How to Configure WinCC with MGate 5105

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Contents

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Moxa is a leading manufacturer of industrial networking, computing, and automation solutions. With over 25 years of industry experience, Moxa has connected more than 30 million devices worldwide and has a distribution and service network that reaches customers in more than 70 countries. Moxa delivers lasting business value by empowering industry with reliable networks and sincere service for automation systems. Information about Moxa's solutions is available at www.moxa.com. You may also contact Moxa by email at info@moxa.com.

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1 Application Description

This application describes how to set up a **WinCC** system to control and monitor **Allen-Bradley PLC** tags which are transmitted from **MGate 5105** in an HVAC application project.

This document includes the following information about WinCC:

- User interface to display and operate the processes on controllable devices.
- Tags to transfer data between devices during installation and operation.

For more information about Allen-Bradley PLC communication using MGate 5105, refer to the documents *Configuring Allen-Brandly ControlLogix PLC with Moxa MGate 5105-MB-EIP* and *How to Configure Pro-face HMI with Allen-Bradley PLC.*

2 System Topology

The following figure shows a system topology where Modbus end devices, **PowerFlex 4M (Converter)** and **IAQPoint2 (Meter)**, are connected to the serial ports on **MGate 5105-MB-EIP** through RS-485-2W wiring. **MGate 5105-MB-EIP** and **PC** (with **RSLogix 5000** and **WinCC** installed) are connected to switch ports on **Allen-Bradley ControlLogix PLC** via Ethernet cables. A **fan** is connected to **PowerFlex 4M** that outputs electric current to power the fan.
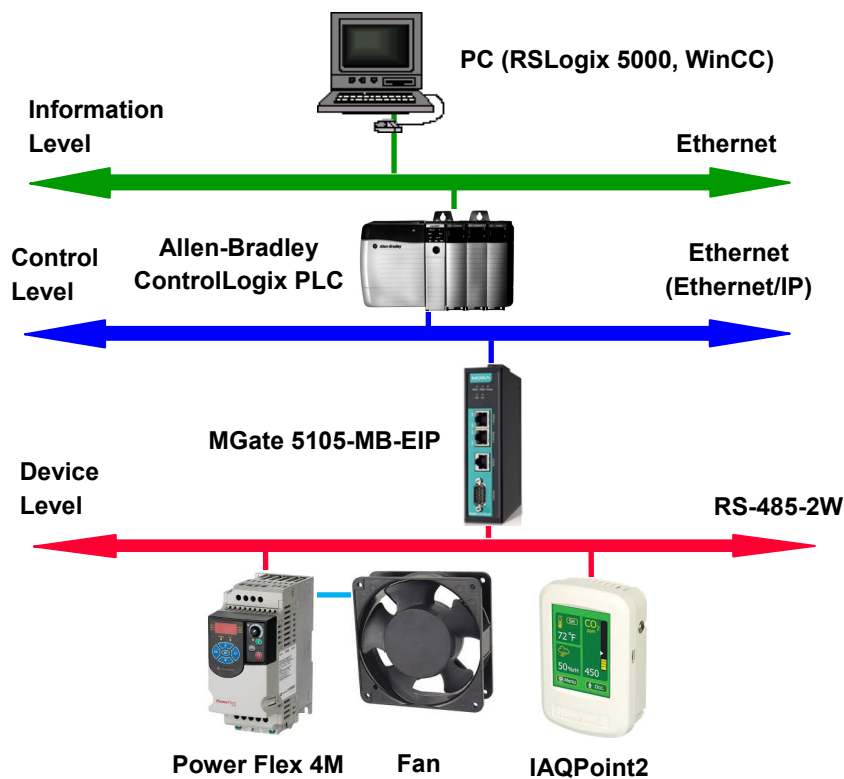
3 Hardware and Software Requirements

- **Allen-Bradley ControlLogix PLC:**
  - **Processor:** 1756 L71 ControlLogix5571
  - **Chassis:** 1756-A7
  - **EIP Module:** 1756-EN2TR
- **PowerFlex 4M:**

  PowerFlex 4M is an adjustable frequency AC drive (converter).
- **IAQPoint2:**

  IAQPoint2 is an indoor air quality monitor. It can detect CO_2, temperature and humidity levels.
- **WinCC**

  A SCADA system developed by Siemens AG.

  Rev.: V7.2.
- **RS Logix 5000:**

  Allen-Bradley ControlLogix PLC Edit Program from Rockwell Automation.

  Rev.: V20

4 About WinCC

WinCC allows you to **visualize the process and configure a graphic user interface**. You can use the user interface to operate and observe the process.

WinCC allows you to:

- **Observe** the process. The process is displayed graphically on a screen. The **display** is updated each time a process status changes.
- **Operate** the process. For example, you can configure a setpoint or open a valve using the user interface.
- **Monitor** the process. An alarm automatically signals in the event of a critical process status. If, for example, a predefined value is exceeded, a message will appear on the screen.

WinCC Components

The major components of WinCC are the **Configuration Software (CS)** and **Runtime Software (RT)**.

The core of the Configuration software is **WinCC Explorer** that displays the entire project structure.

The following table lists the major systems in WinCC.

Process unit	Editor	Function
Graphics System	Graphics Designer	Configuring Screens
Signaling system	Alarm Logging	Configuring messages
Archiving system	Tag Logging	Archiving data
Report system	Report Designer	Create layouts
User Administration	User Administrator	Administering users and user rights
Communication	Tag management	Configure communication

When you execute a project in process mode in **WinCC Runtime**, the project will then be in Runtime. WinCC Runtime allows you to operate and observe the processes.

WinCC Runtime performs the following tasks:

- Read configuration data that has been saved in the CS database.
- Display graphical user interface on the monitor.
- Communicates with the automation systems.
- Archive current Runtime data, such as process values and message events.
- Control processes, for example, through setpoint settings or ON/OFF switch.
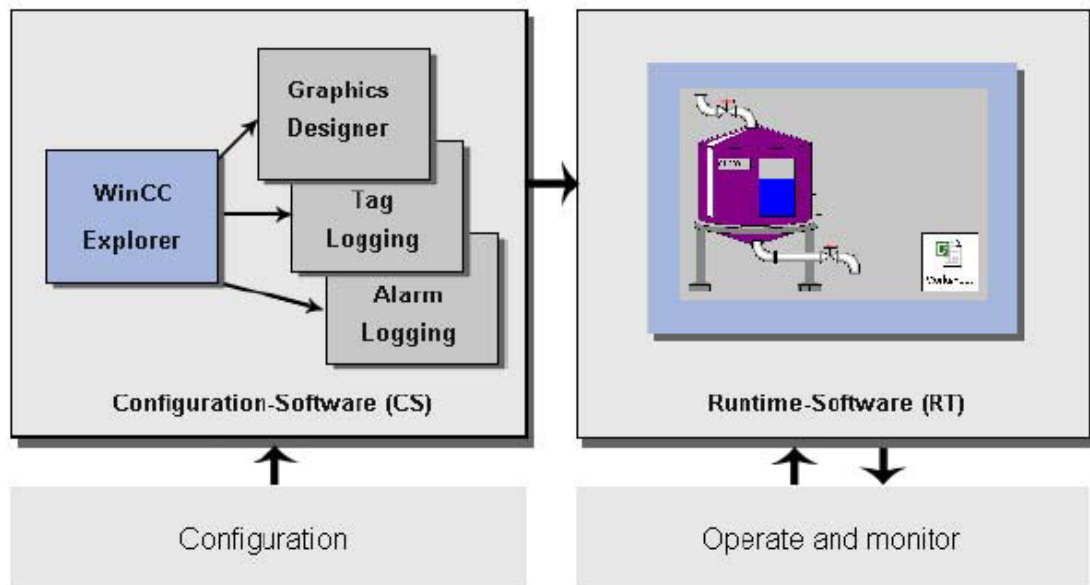

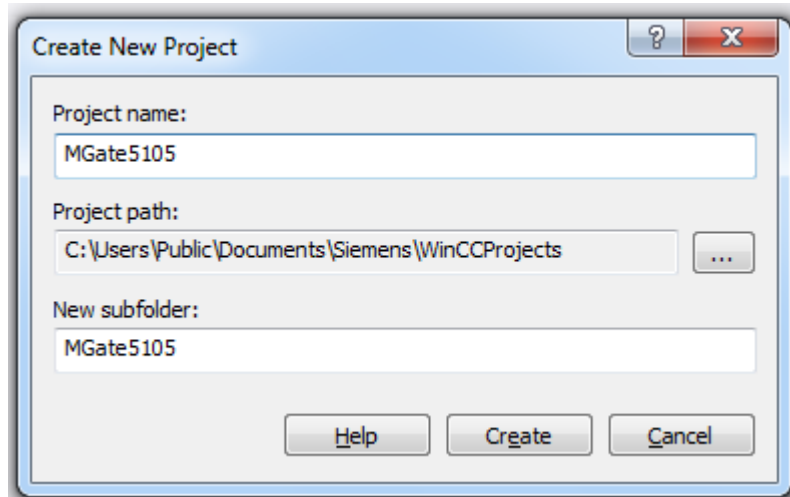## 5 WinCC Configuration

5.1 Creating a Project

1. Start the **WinCC Explorer** Program by clicking **Start → Program → Siemens Automation → SIMATIC → WinCC → WinCC Explorer**.
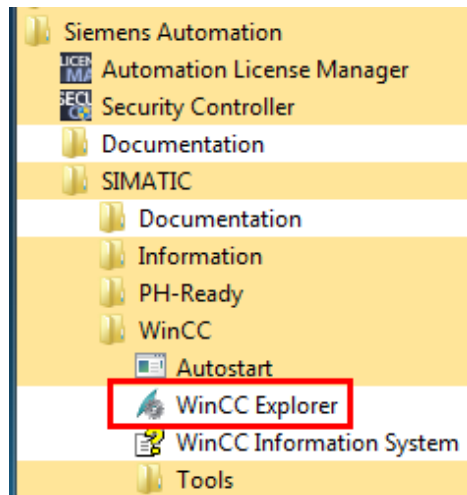
2. In WinCC Explorer, create a new project. Click **File → New** or click the **New** icon.

3. In the WinCC Explorer dialog box, select **Single-user project** and click **OK**.
   A Single-user project runs on only **one computer**. Other computers cannot access this project. The project runs on the computer that serves as the server for data processing and as an operating station.
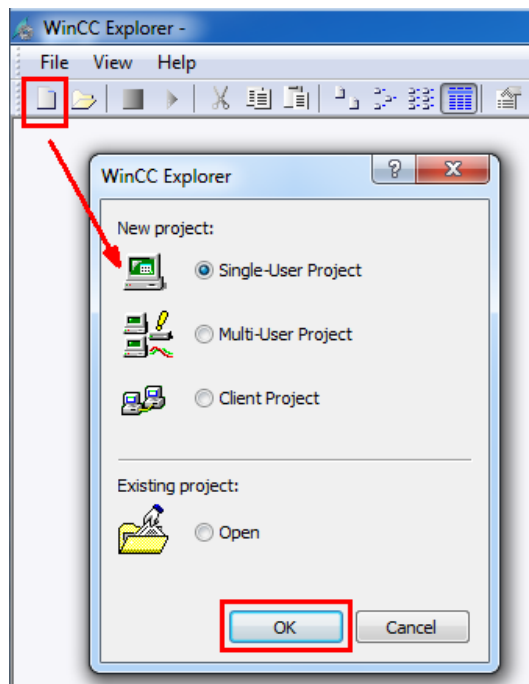
4. In the **Create New Project** dialog box, enter a name in the **Project Name** field and
   click **Create**.

5.2 Configuring Communication Settings

This section contains information on configuring the communication between WinCC and
an automation system.
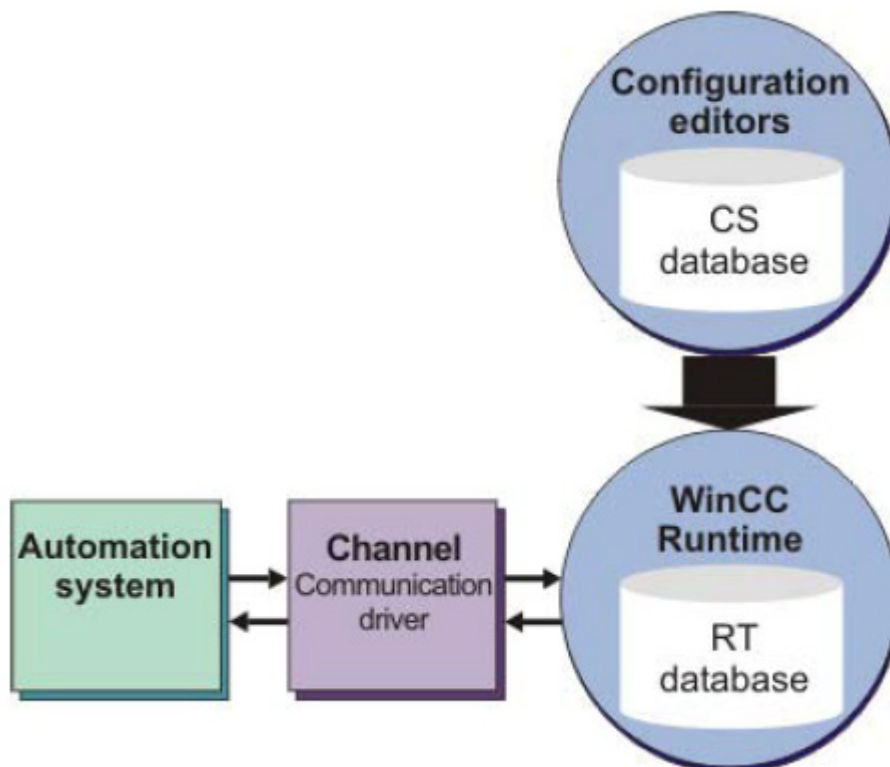
5.2.1 About Communication

Use the **WinCC Configuration Studio** editor to configure communication settings.

The following lists the minimum components required to configure communication settings in the system:

- One **channel** with **channel units**
- One **connection**
- One or more process **tags**

Channels

Channels are specialized **communication drivers**. Channels enable the transmission of process values from the automation system to the process tags. WinCC provides a variety of channels to connect different automation systems.

In WinCC, you can use channels, via which values are transferred to the automation system from WinCC. You can also control processes via these channels.

Channel Units

Channels have different channel units for the different communication networks. A channel unit is used to access a specific type of automation system. A channel unit serves as an interface with exactly one underlying hardware driver and therefore to exactly one communication processor in the computer.

Connections

In channel units, you configure connections to the various automation systems. Each connection describes the interface to a single, defined automation system. The data exchange takes place via the connections in Runtime.
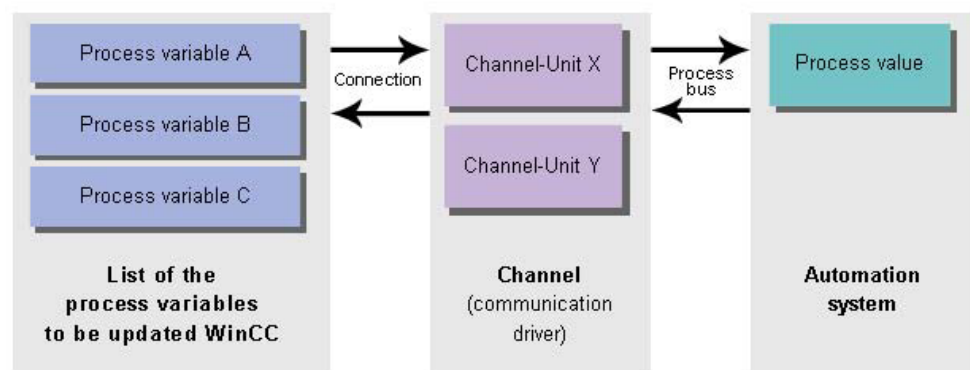
Tags in WinCC

A tag in WinCC represents either a real value or internal value. Internal values are calculated or simulated within WinCC.

Process Tags

External tags serve as connection links for the exchange of data between WinCC and the automation systems. Each external tag in WinCC corresponds to a certain process value in the memory of one of the connected automation systems. **External tags** are therefore referred to as process tags.
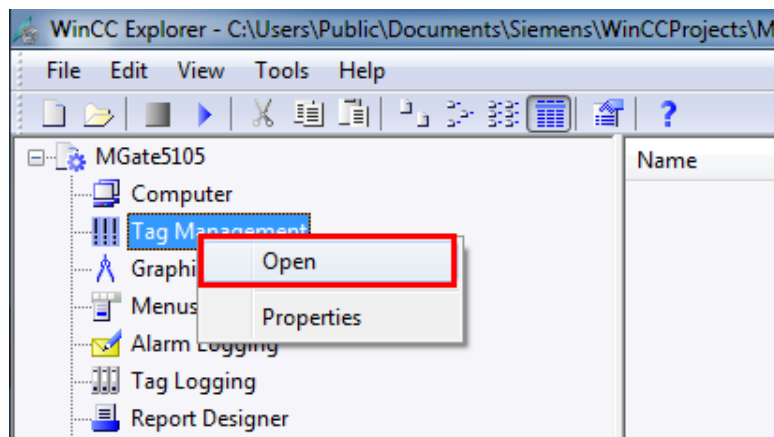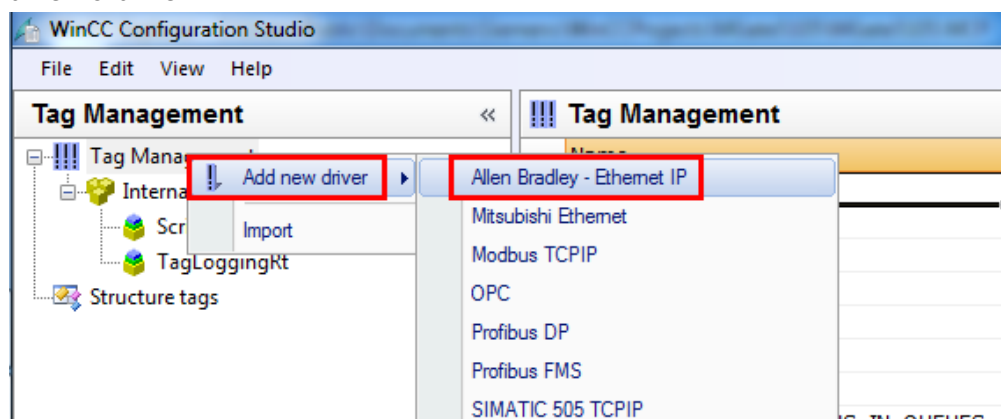
Internal tags

WinCC also contains internal tags. These tags are not linked to a process and only transfer values within WinCC.

5.2.2 Adding a Channel

1. In WinCC Explorer, right-click **Tag Management** and select **Open**. The **WinCC Configuration Studio** screen appears.

2. Click **Tag Management → Add new driver → Allen Bradley – Ethernet IP** to add a new channel.

The WinCC Configuration Studio screen displays the **Allen Bradley – Ethernet IP** channel that you have added. The Allen Bradley – E/IP ControlLogix channel provides several channel units for different communication networks.

Use the **Allen Bradley – E/IP ControlLogix** channel for the application described in the document.
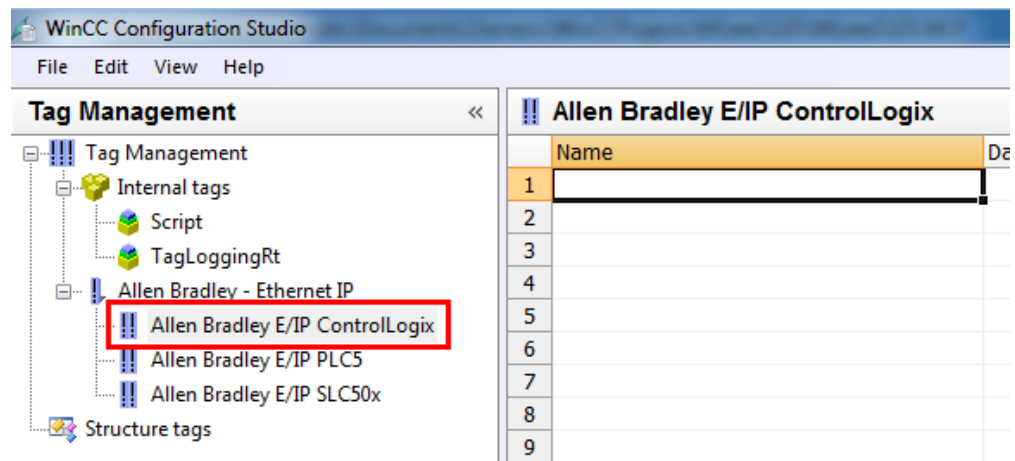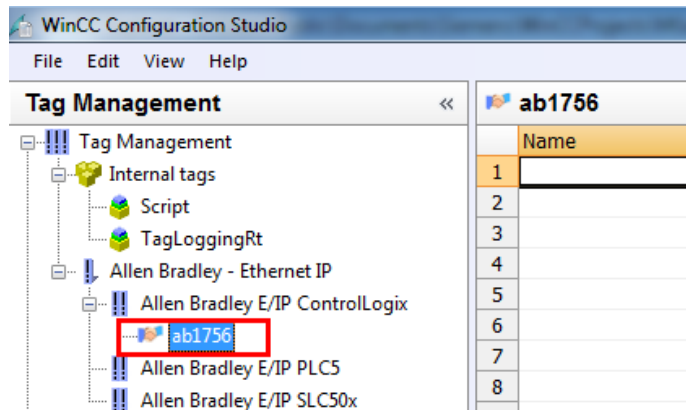

5.2.3 Creating a Connection

1. Right-click **Allen Bradley – E/IP ControlLogix** and select **New Connection** to create a new connection.
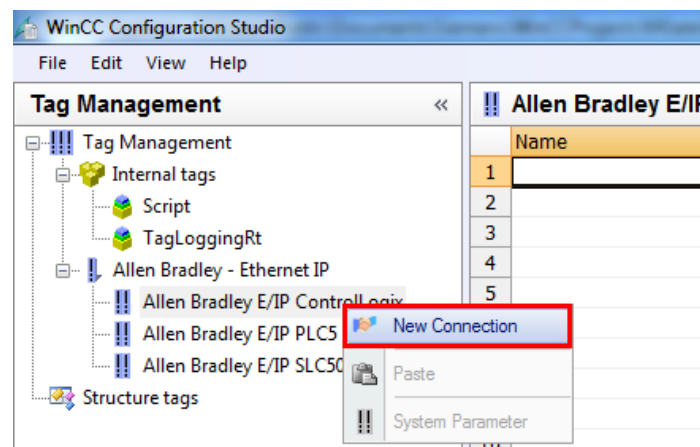
2. Enter "ab1756" as the connection name.

3. Right-click **ab1756** and select **Connection parameter**.

4. In the **IP address** field, enter the IP address of the PLC. In the **Communication path** field, enter "1,0" for the CIP path from the Ethernet module to the controller.
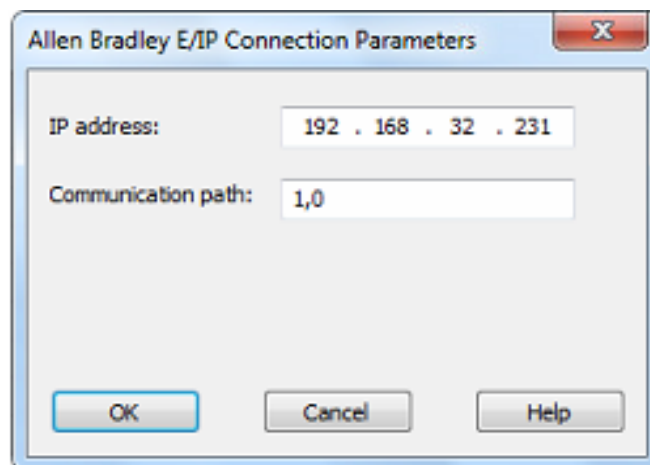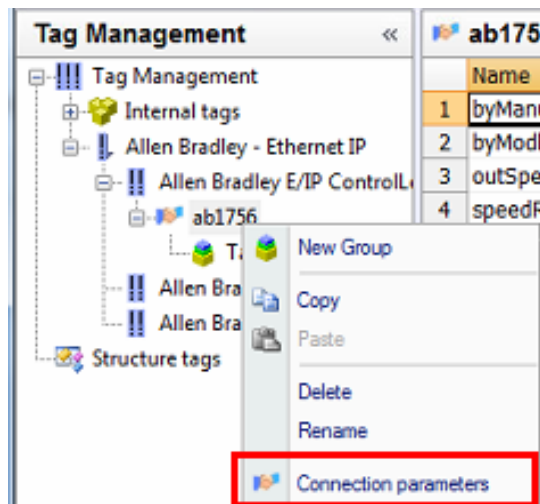
5.2.4 Creating Tags

1. Right-click **ab1756** and select **New Group** to create a new tag group named "NewGroup1".
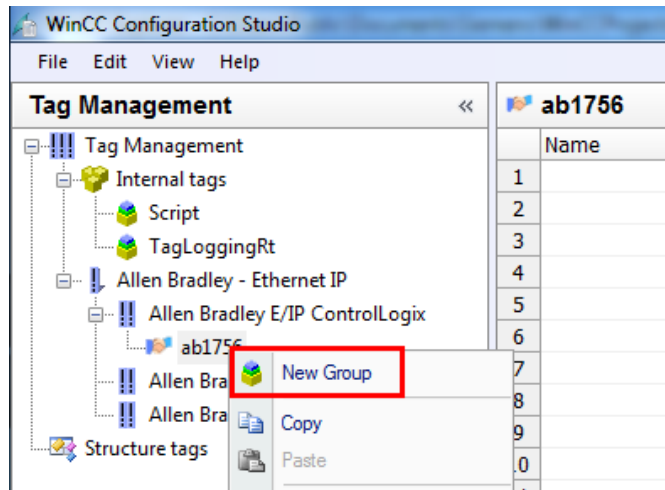
2. For the **NewGroup1** tag group, add the tags as indicated in the following figure.
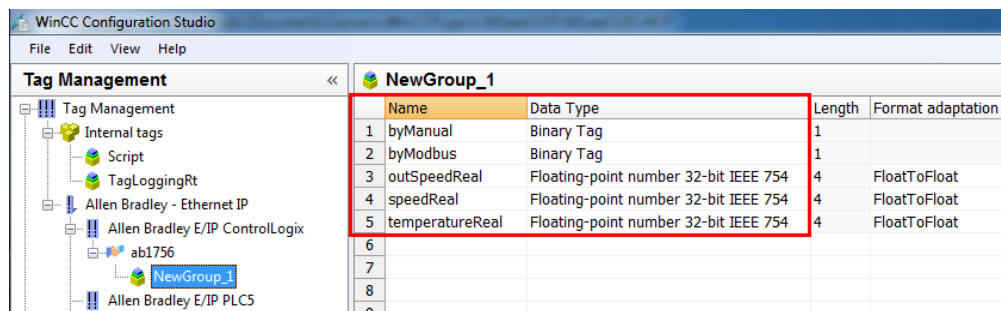
6 Configuring Process Screens

6.1 About Process Screens

The process screens are the main elements of a project. They represent a process and allow you to operate and observe this process.

You can use the **Graphics Designer** editor to configure the process screens. This editor is the configuration component of the graphic system in WinCC.

A process screen consists of the following objects:

- **Statistic objects:** These objects remain unchanged during runtime.
- **Dynamic objects:** These objects will change depending on the individual process values.
- **Controllable objects:** These objects allow you to control the process. For example, you can use the **buttons, sliders,** or **I/O fields** to set process parameters (input/output field).

6.2 About the Graphics System

The Graphics System is part of WinCC. You can use the Graphics System to configure process screens.

The Graphics System performs the following tasks:

- Display static and operator-controllable objects, such as texts, graphics, or buttons.
- Update dynamic objects. For example, modifies the length of a bar graph in relation to a process value.
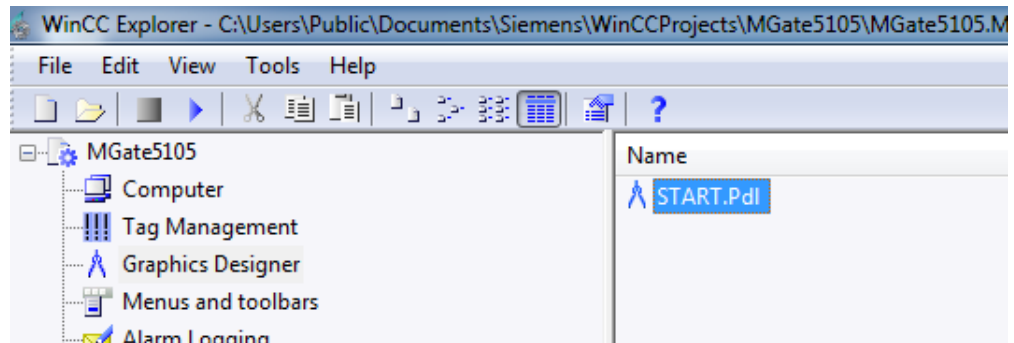- Respond to operator input. For example, the clicking of a button, or the entry of a text in an input field.
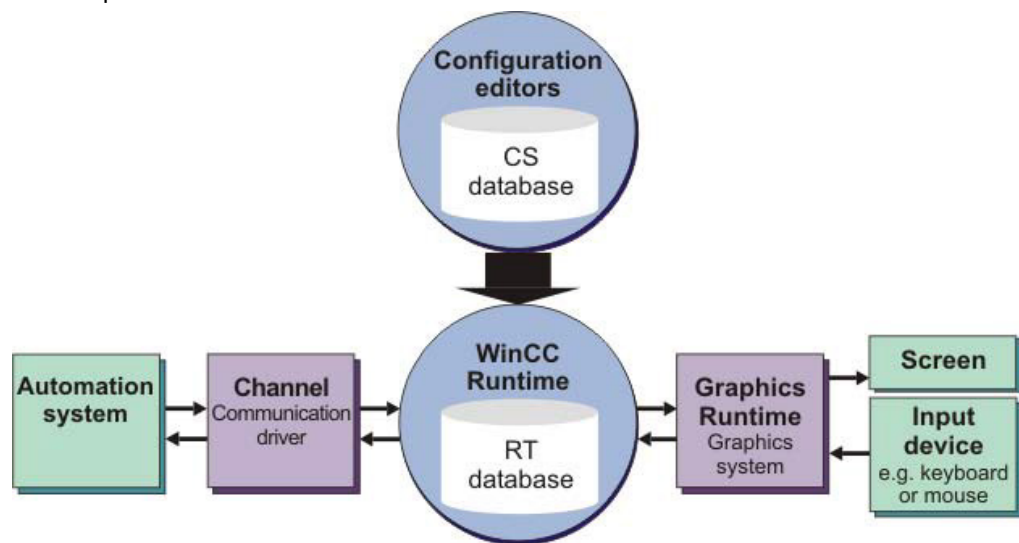
6.3 Creating Process Screens

1. In WinCC Explorer, right-click **Graphics Designer** and select **New picture** to create a new process picture.
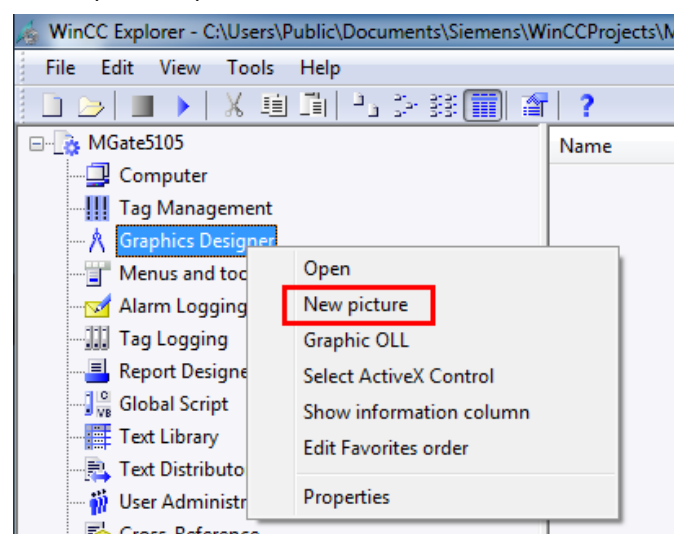
2. Rename the new process picture to "START".

3. Click the **START** process screen to edit.

   The following figure shows the settings after the configuration. Refer to the subsequent sections for information on how to add graphic objects in the work space of a process.
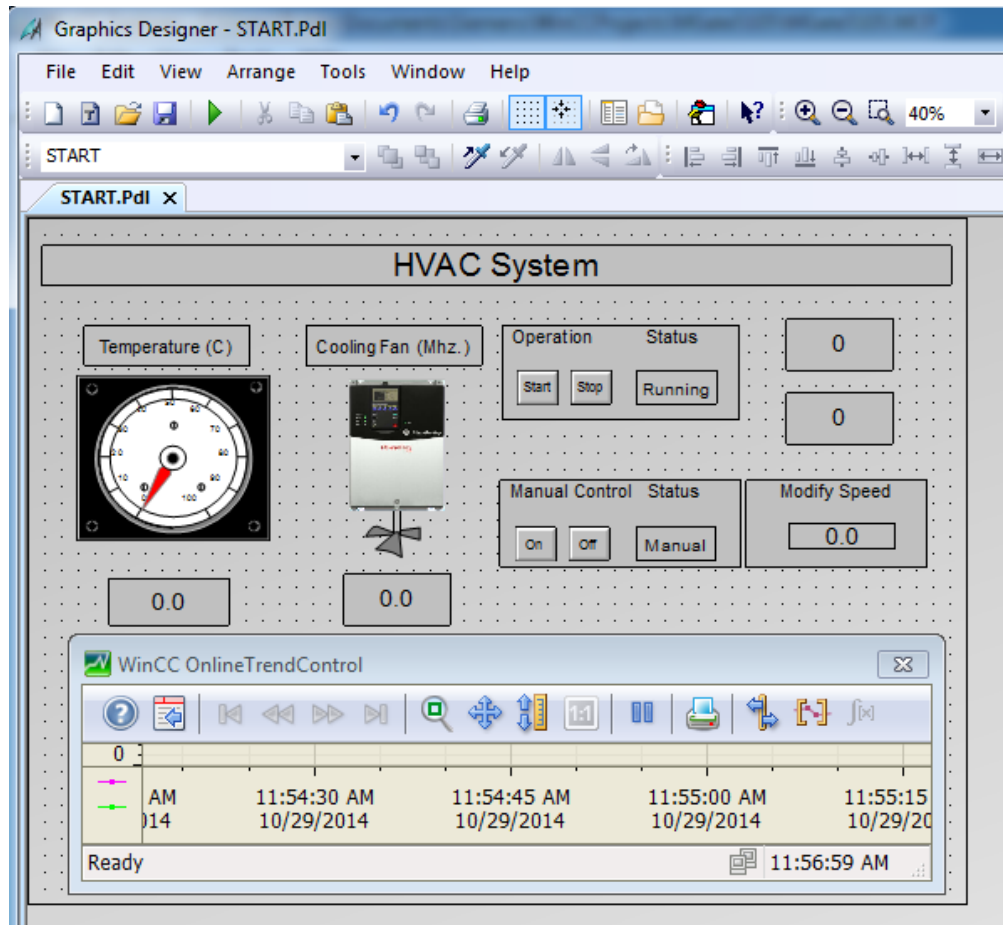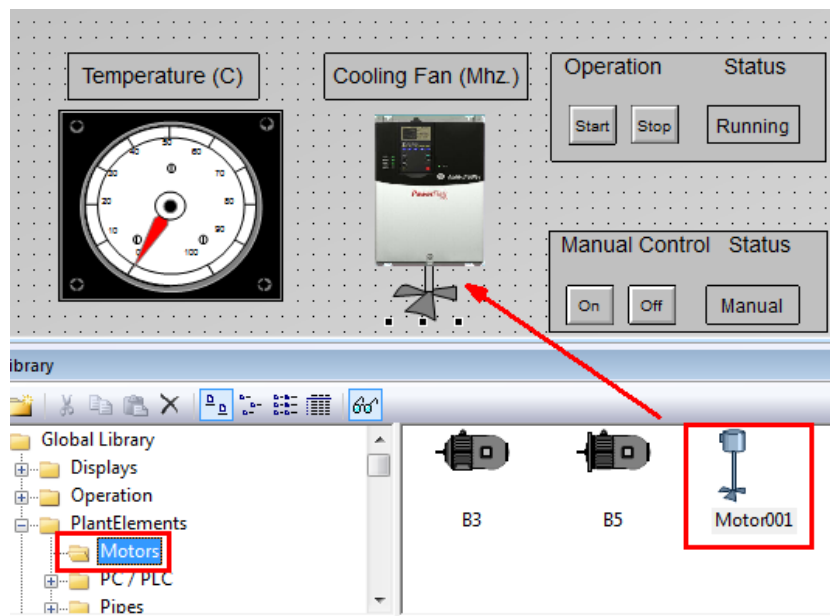
6.3.1 Library Elements

From **Library → Global Library**, you can get the meter and motor graphic objects as shown in the following figures.
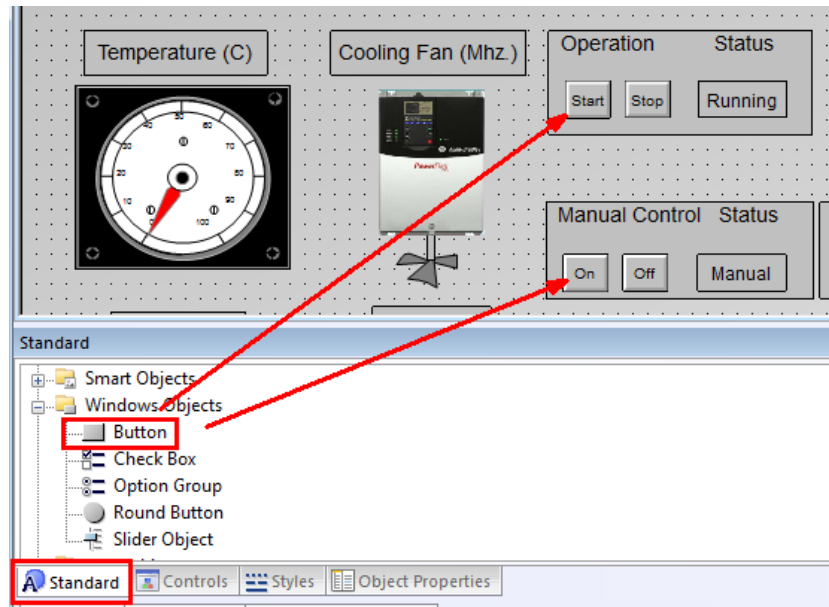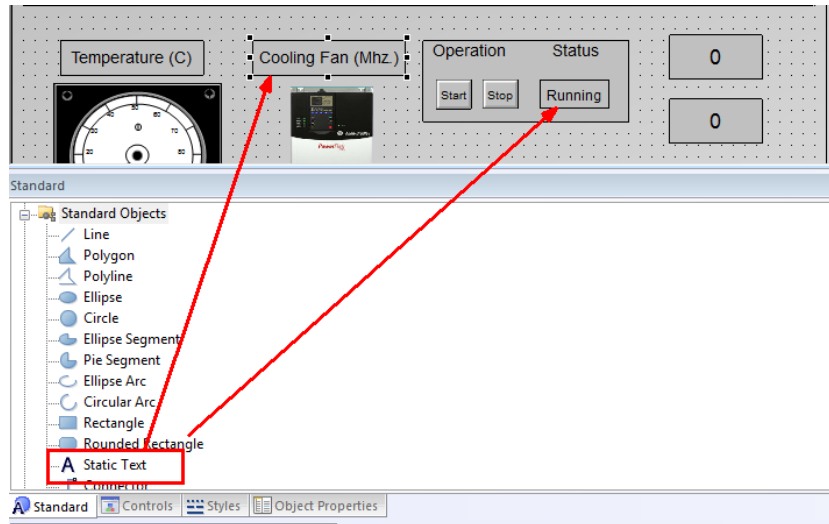
- **Meter**
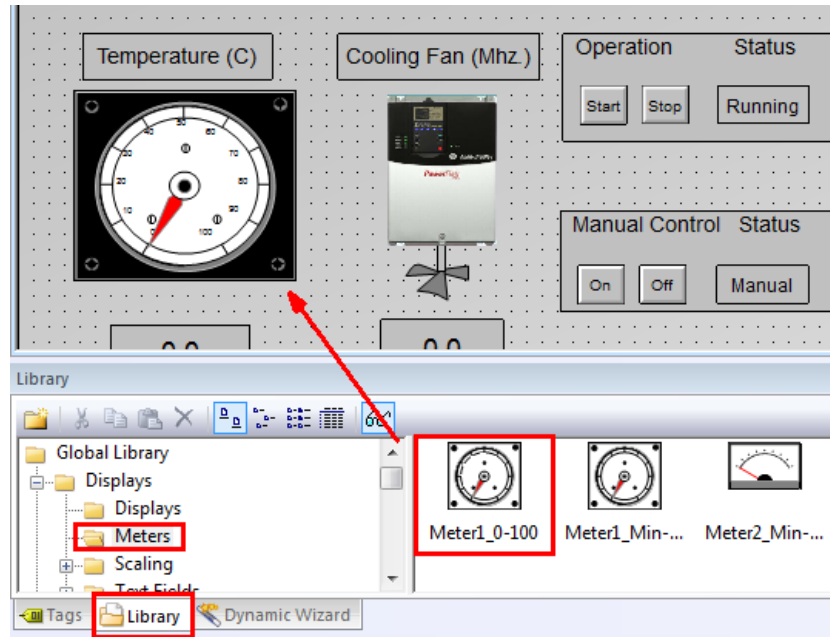
- **Motor**

6.3.2 Standard Objects

In the **Standard** object window, you can get the Button, Static Text, and I/O Fields graphic objects.

- Button (under **Windows Objects**)
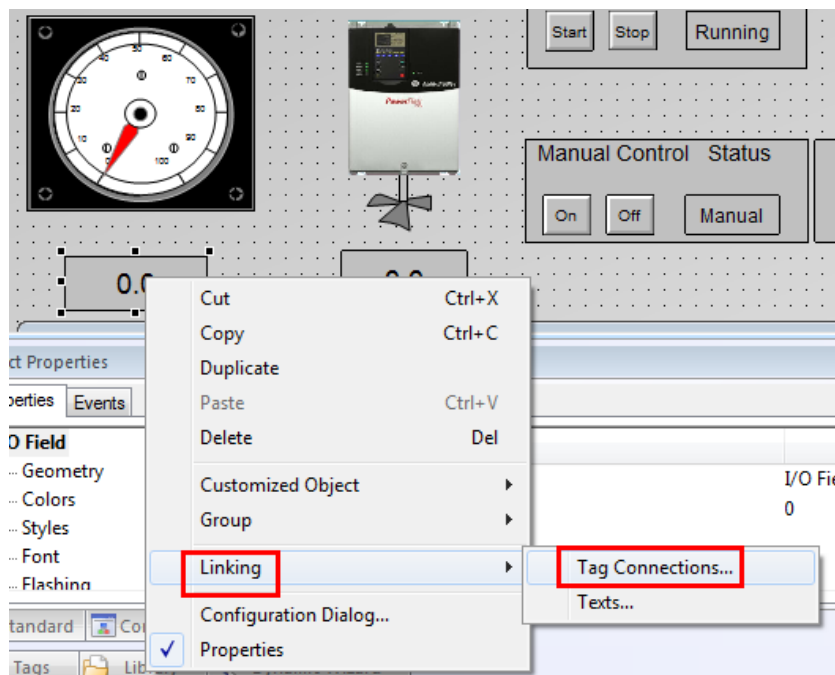

- Static Text (under **Standard Objects**)
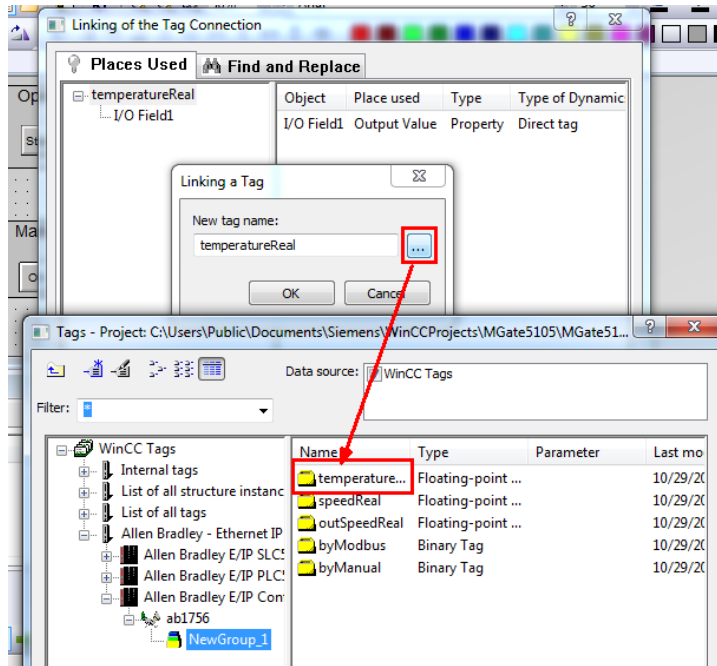
- I/O Field (under **Smart Objects**)
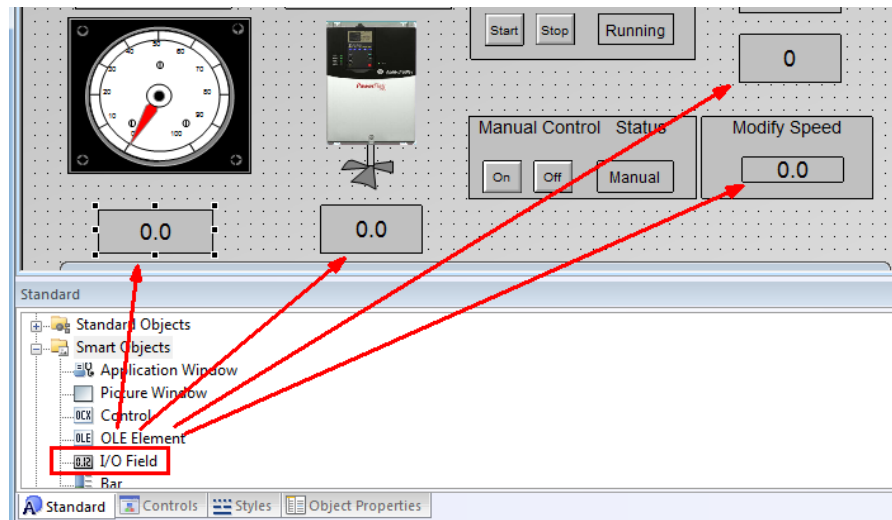
6.4 Adding Links

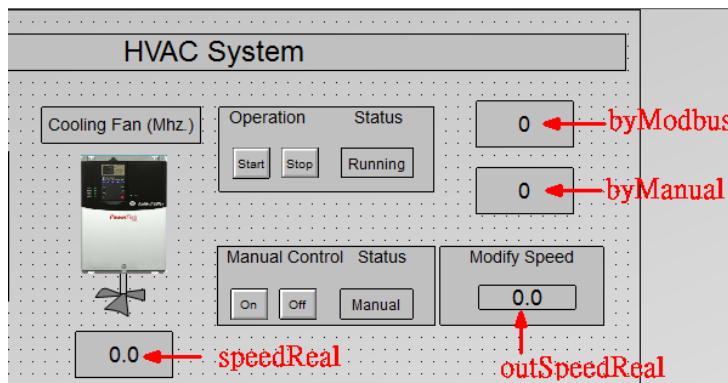1. Right-click the temperature **IO Field** and click **Linking → Tag Connections**.

2. In the **Linking of the Tag Connection** dialog box, click the … icon to select the **temperatureReal** tag.
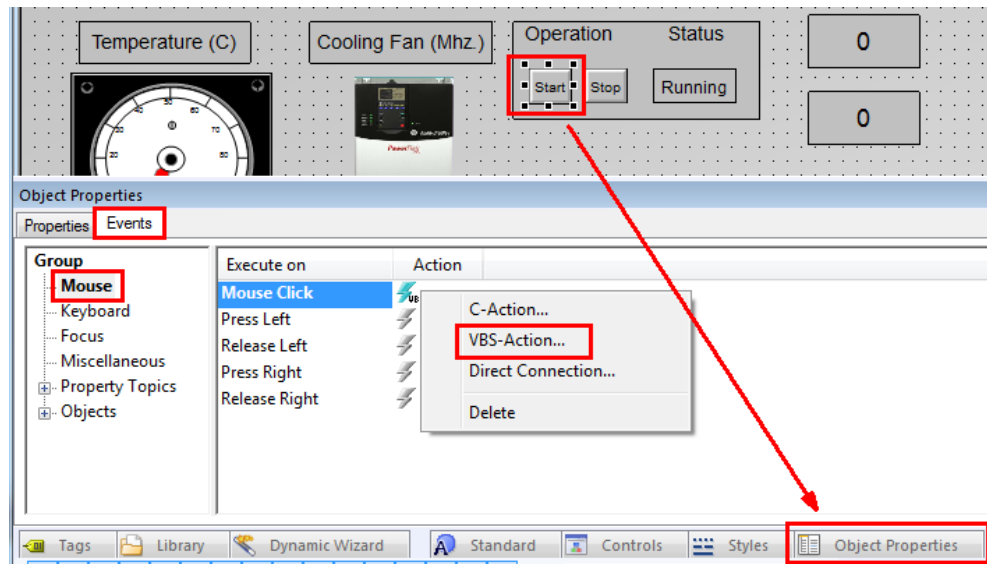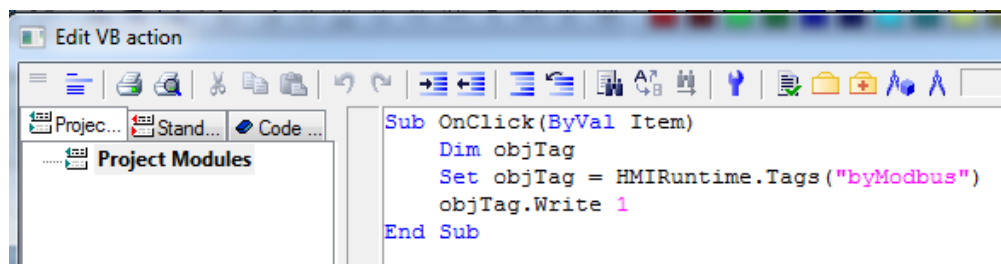

3. Add other links as shown in the following figure.

6.5 Adding Scripts

1. Click **Start** and select **Mouse**.

2. Right-click **Mouse Click** and select **VBS-Action** to add a script for the event.
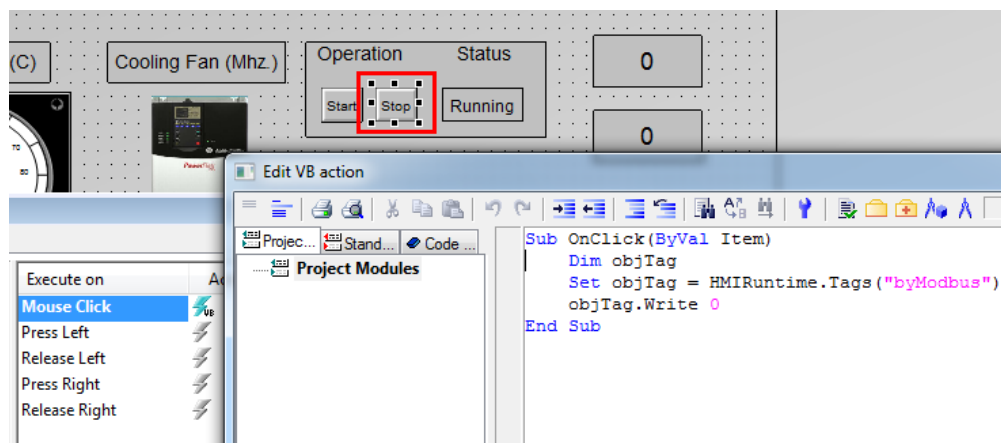

The script program appears as shown in the following figure. The script sets the value of the **byModbus** tag to "1" when the **Start** button is clicked.

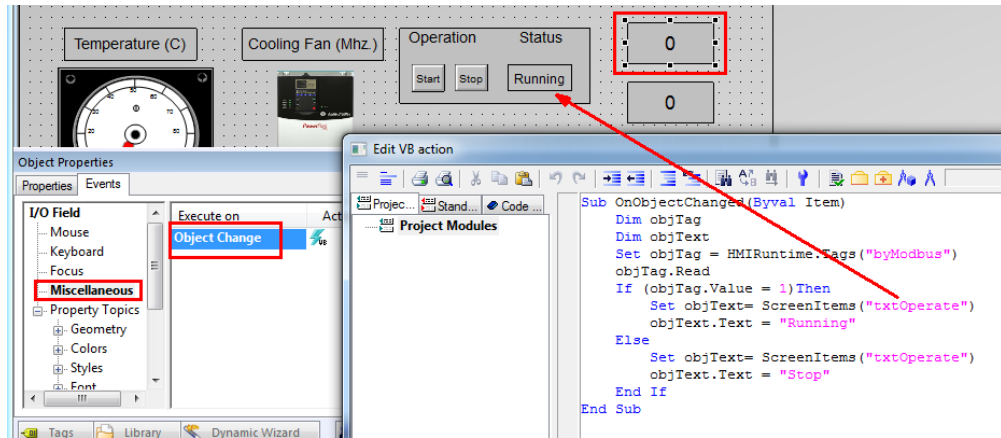The following sections describe the scripts for other events.

Stop Button

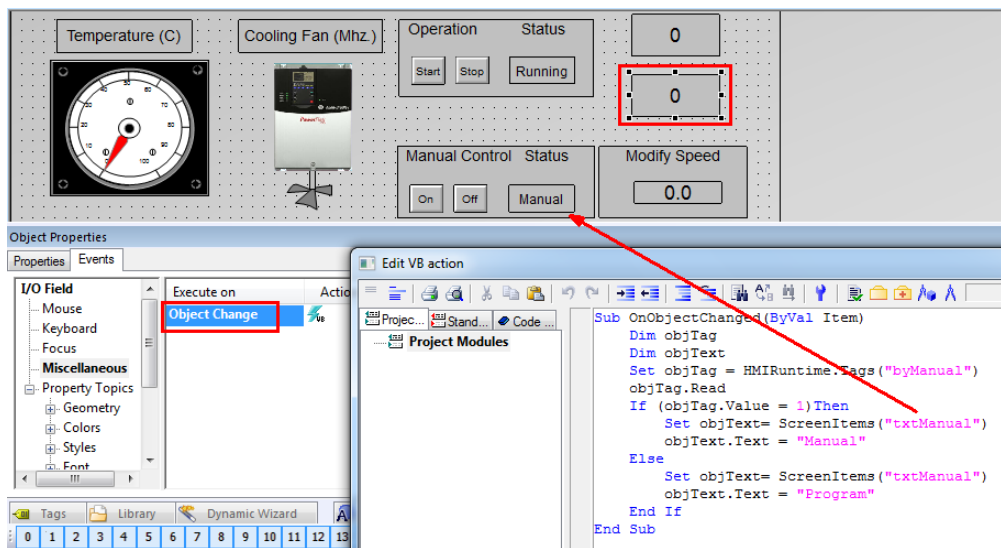The script sets the value of the **byModbus** tag to "0" when the **Stop** button is clicked.

byModbus I/O Field

The script sets the value of the **txtOperate** static text to "Running" or "Stop" based on the value of the byModbus I/O field.
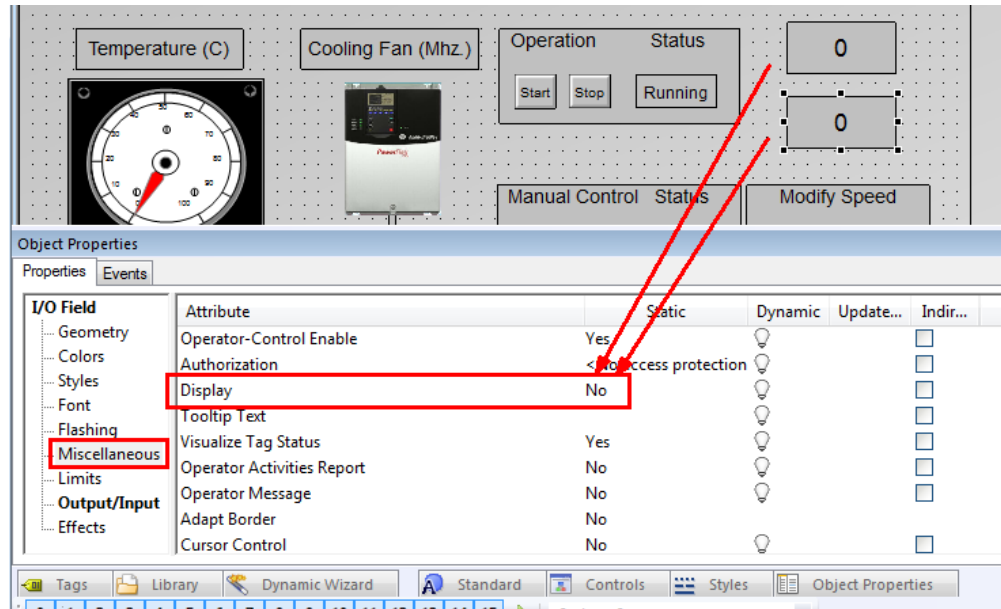

byManual I/O Field

The script sets the value of the **txtManual** static text to "Manual" or "Program" based on the value of the byManual I/O field.
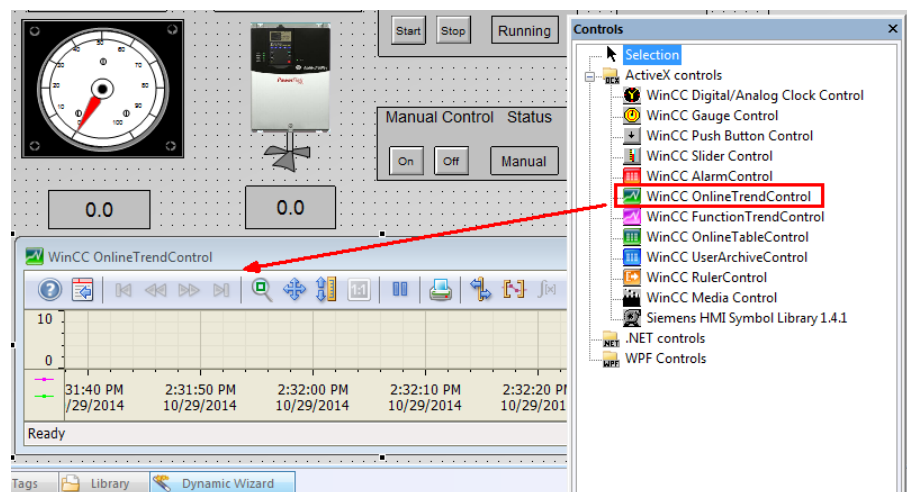
Because the **byModbus** and **byManual** I/O fields are used as script reference, it is not necessary to display them on the screen. Thus, you can set their **Display** property to **No**.
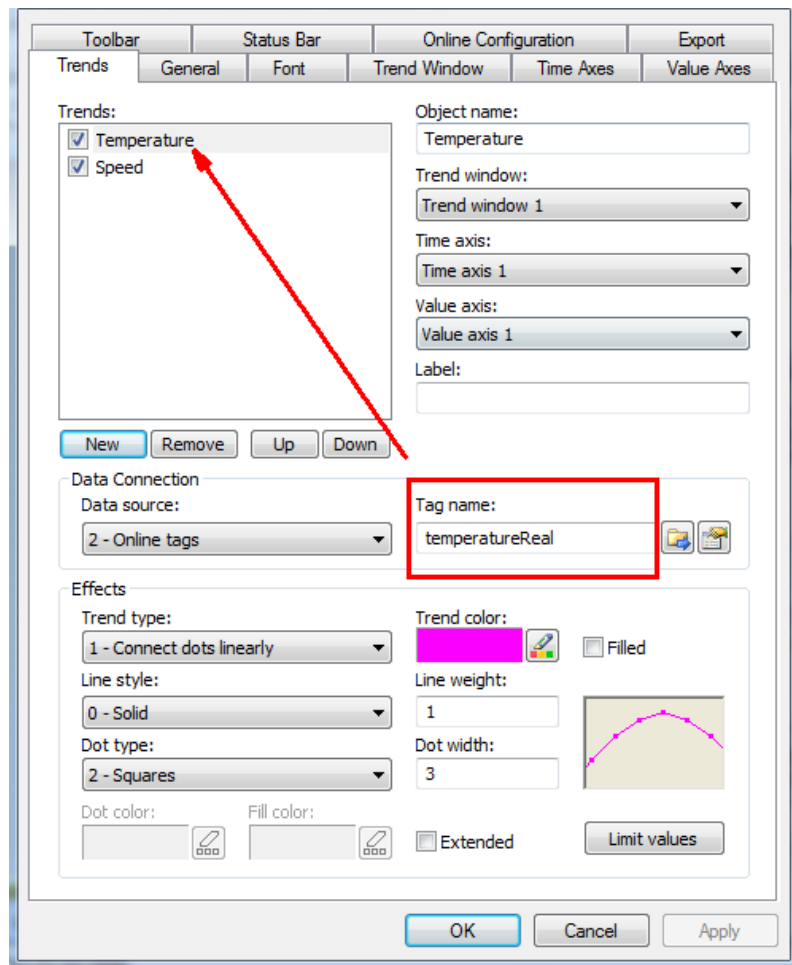

6.6 Adding Trend Curves

1. From the **Controls** window, select and drag the **WinCC OnlineTrendControl** option to the WinCC OnlineTrend Control screen as shown in the following figure.
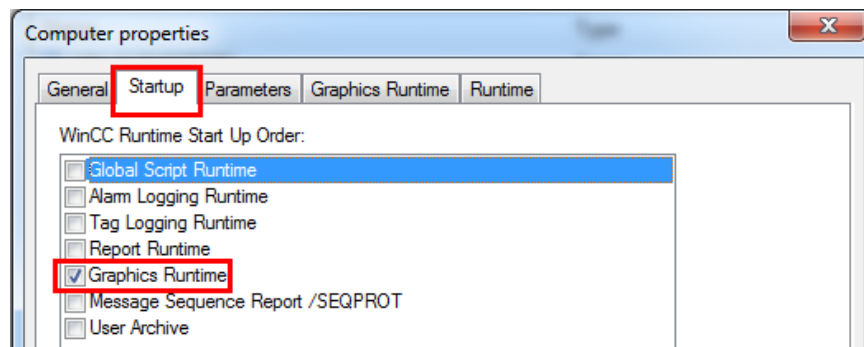
2. Add the **temperatureReal** and **speedReal** trend curve tags.

7 Defining Runtime Properties

1. In WinCC Explorer, open the **Computer Properties** dialog box.
2. Click the **Startup** tab and select the **Graphics Runtime** check box.
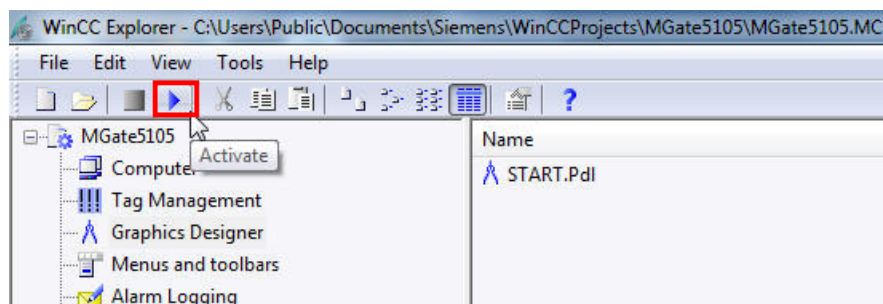
3. Set the START.pdl process picture as the startup screen. Click the **Graphics Runtime** tab and click the … button to select the **START.pdl** process picture in the **Start Picture** field; then, click **OK** to finish.
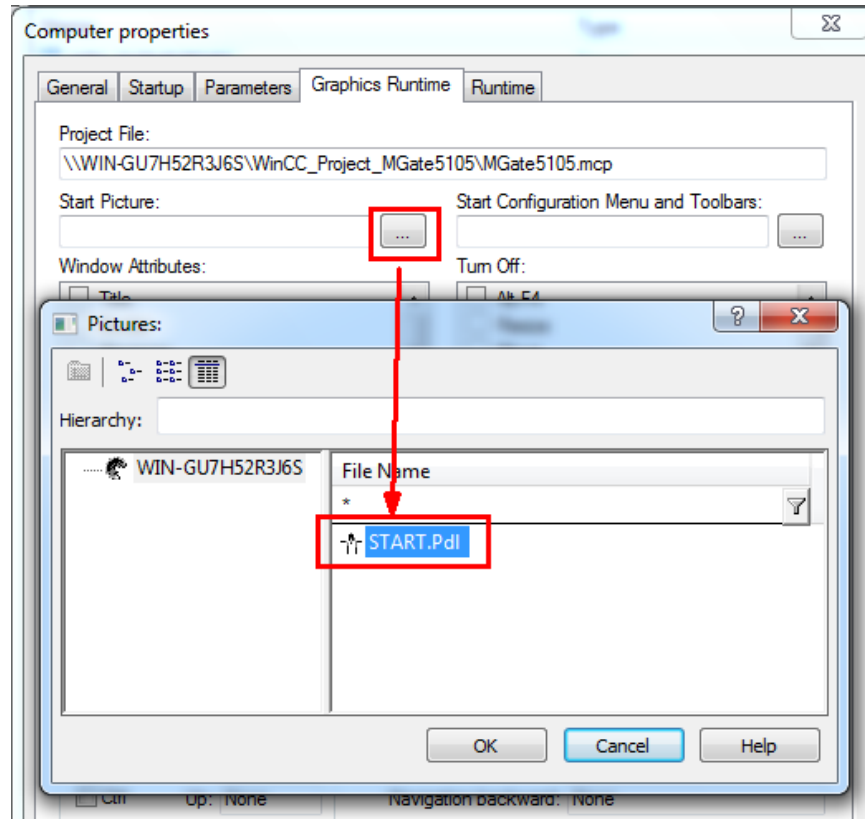
8 Runtime Test

In WinCC Explorer, click the **Activate** button to start **WinCC Runtime**.

The system starts Graphics Runtime and the **START.pdl** process picture is displayed as the startup screen.

WinCC polls the tags of **Allen-Bradley ControlLogix PLC** and displays the updated values on the screen. For example, WinCC displays the current temperature and speed values.

To start or stop the PowerFlex 4M converter, click the **Start** or **Stop** button.

If you use a hairdryer to increase the meter temperature, the converter will increase its output speed. In WinCC, the **Speed/Temperature Trend Chard** area will also show the trend of the temperature and speed change.

If you click the **Manual On** button to enable manual control speed, you can change the **Modify Speed** value.