How to Configure WinCC with MGate MB3000

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1 Application Description

This application describes how to set up a **WinCC** system to control and monitor Modbus end devices whose information is transmitted from **MGate MB3000** in an HVAC application project.
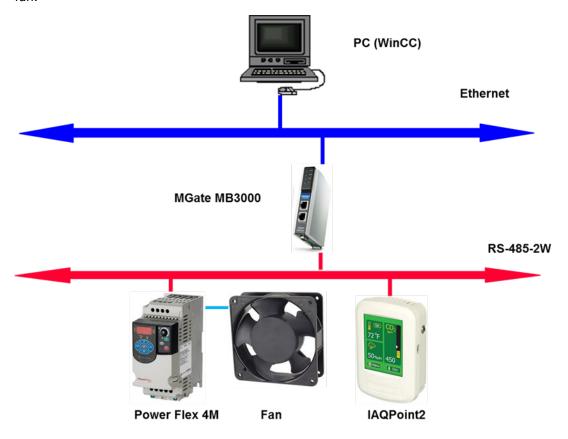
The main topic in this application note will learn about WinCC setting, such as:

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

For more information on Modbus end devices **PowerFlex 4M (Converter)** and **IAQPoint2 (Meter)**, refer to the documents *Configuring Allen-Brandly ControlLogix PLC with Moxa MGate 5105-MB-EIP*.

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 MB3000 through RS-485-2W wiring. **MGate MB3000** and **PC** (with **WinCC** installed) are on the same Ethernet subnet. A **fan** is connected to **PowerFlex 4M** that outputs electric current to power the fan.

3 Hardware and Software Requirements

- **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.

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.
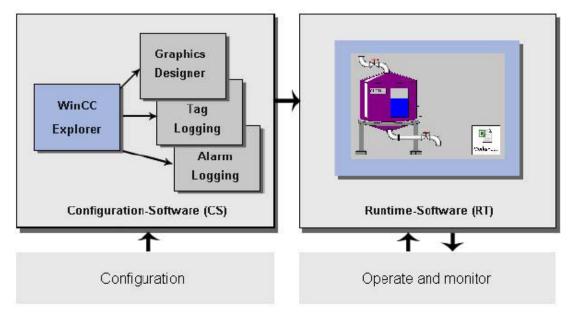
The following table lists the major systems in WinCC.

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.
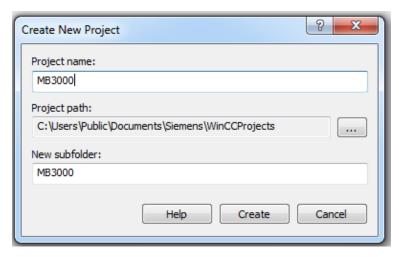

5 WinCC Configuration

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.
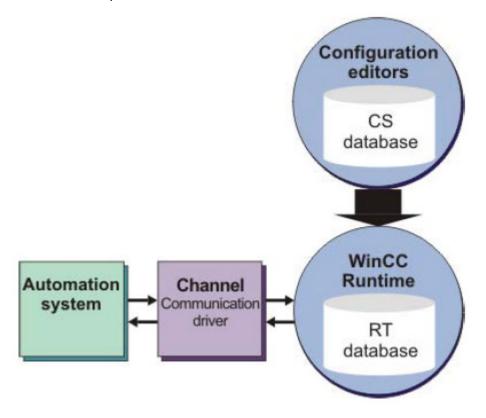

4. In the **Create New Project** dialog box, enter a name in the **Project Name** field and click **Create**.

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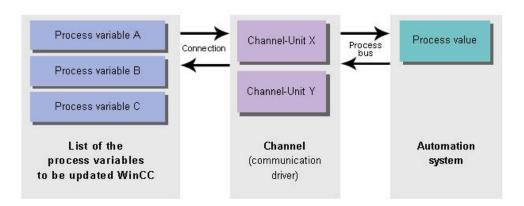
In WinCC, you can use channels, via which values are transferred to the automation system from WinCC. You can also control processes via these channels.

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.
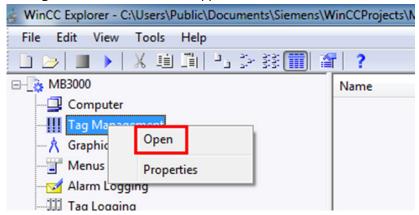
Internal tags

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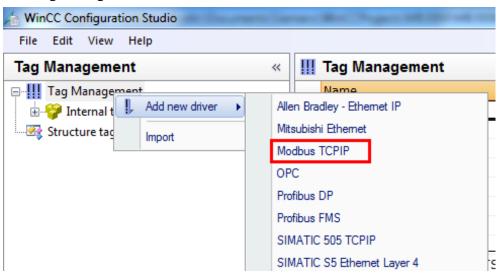
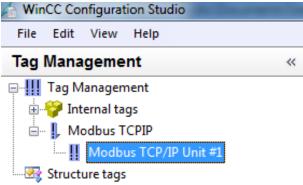### 5.2.2 Adding a Channel

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

2. Click **Tag Management → Add new driver → Modbus TCPIP** to add a new channel.
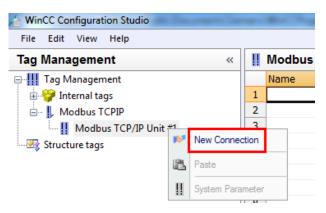

The WinCC Configuration Studio screen displays the **Modbus TCP/IP Unit #1** channel that you have added.
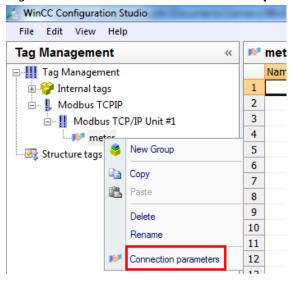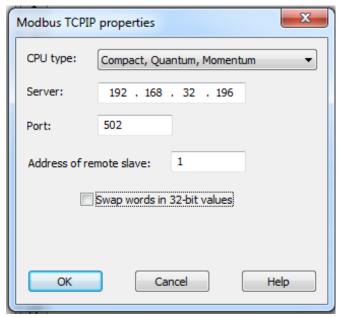
5.2.3 Creating a Connection

1. Right-click **Modbus TCP/IP Unit #1** and select **New Connection** to create a new connection.
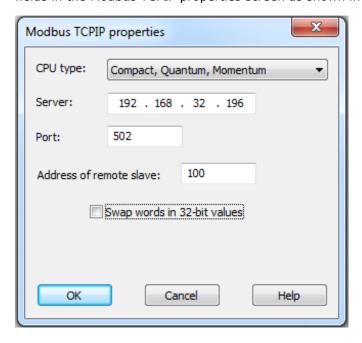

2. Enter "meter" as the connection name.
3. Right-click **meter** and select **Connection parameter**.

4. In the Modbus TCPIP properties screen configure the following fields and click **OK**:
   - **CPU type:** Select **Compact, Quantum, Momentum** from the drop-down list.
   - **Server:** Enter the IP address of MGate MB3000.
   - **Port:** Enter "502".
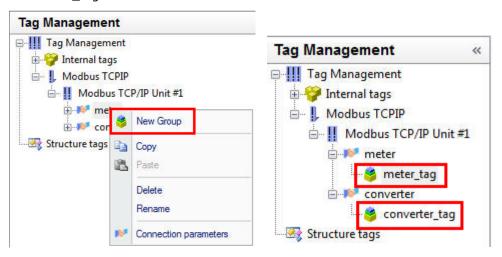   - **Address of remote slave:** Enter "1" as the slave ID for this connection.

5. Repeat steps 1 to 4 to create another connection named "converter" and configure the fields in the Modbus TCPIP properties screen as shown in the following figure.
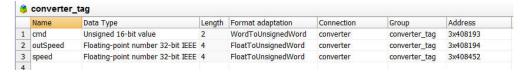
5.2.4 Creating Tags

1. Right-click **meter** and select **New Group** to create a new tag group named "meter_tag".

2. Right-click **converter** and select **New Group** to create a new tag group named "converter_tag".

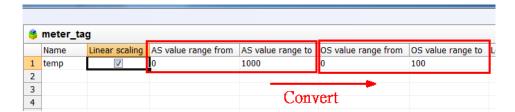3. For the **meter_tag** tag group, add the tag as shown in the following figure.

	Name	Data Type	Length	Format adaptation	Connection	Group	Address
1	temp	Floating-point number 32-bit IEEE	4	FloatToUnsignedWord	meter	meter_tag	3x400103
2							

4. For the **converter_tag** tag group, add the tag as shown in the following figure.

	Name	Data Type	Length	Format adaptation	Connection	Group	Address
1	cmd	Unsigned 16-bit value	2	WordToUnsignedWord	converter	converter_tag	3x408193
2	outSpeed	Floating-point number 32-bit IEEE	4	FloatToUnsignedWord	converter	converter_tag	3x408194
3	speed	Floating-point number 32-bit IEEE	4	FloatToUnsignedWord	converter	converter_tag	3x408452
4							

5.2.5 Scaling Process Tags

With linear scaling, you can map the value range of a process tag to a certain value range of a process tag in WinCC.
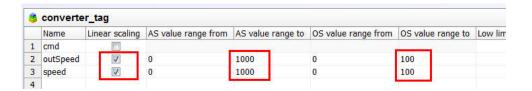
For the **temp** tag, select the check box to activate linear scaling and define the value range for the process tag as shown in the following figure.

	Name	Linear scaling	AS value range from	AS value range to	OS value range from	OS value range to	L
1	temp	☑	0	1000	0	100	
2							
3							
4							

Convert

The value range of the temperature register for **meter** connection is between 0 and 1000. Based on the following formula, the actual temperature is 0 to 100°C:

```
Actual temperature = Value of temperature register / 10
```

For the **converter_tag** group tags, activate linear scaling for the tags as shown 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.
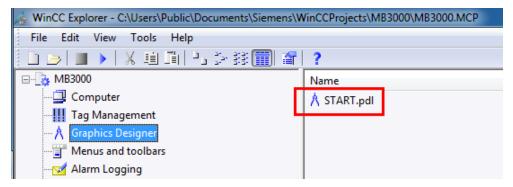
6.3 Creating Process Screens

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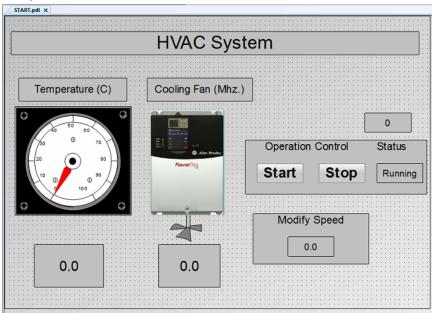

2. Rename the new process picture to "START".
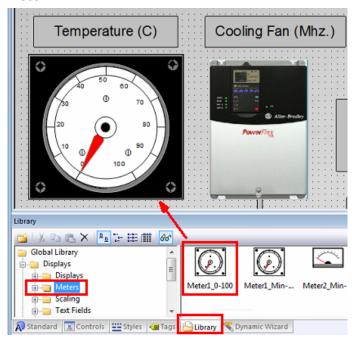
3. Click the **START** process screen to edit.
   The following figure shows the settings after the configuration. Refer to the subsequent sections for information on how to add graphic objects in the work space of a process.
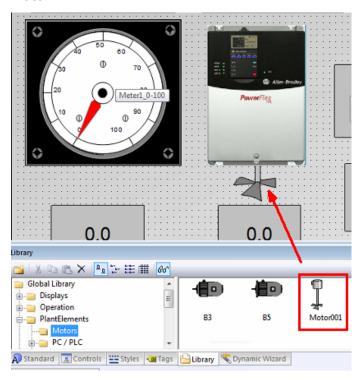

6.3.1 Library Elements

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**)

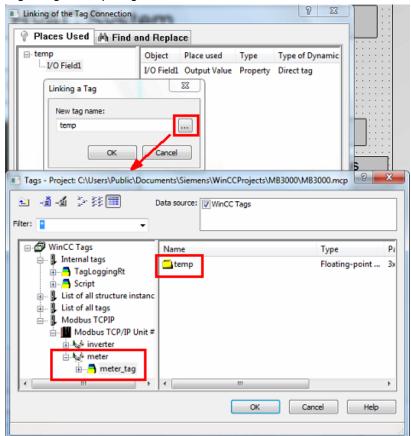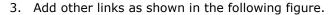

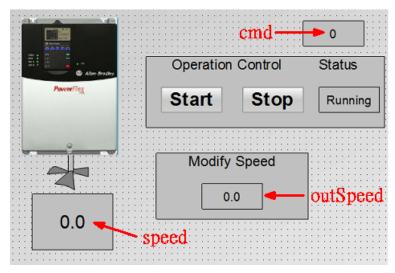- I/O Field (under **Smart Objects**)

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 **temp** tag Assign "temp" tag.
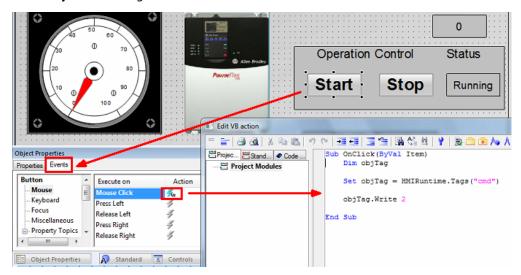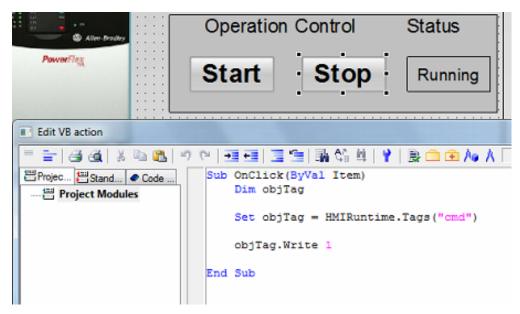
3. Add other links as shown in the following figure.

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.

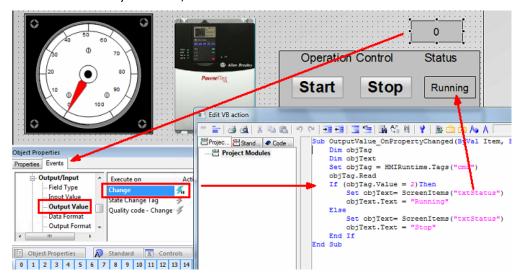3. The following sections describe the scripts for other events.

Stop Button

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

byModbus I/O Field

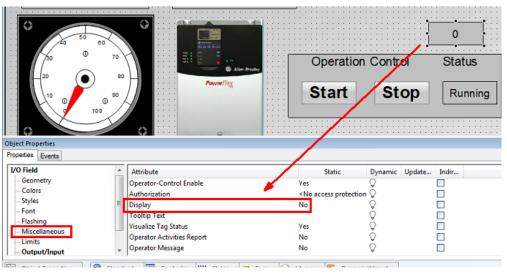The script sets the value of the **txtStatus** static text to "Running" or "Stop" based on the value of the byModbus I/O field.

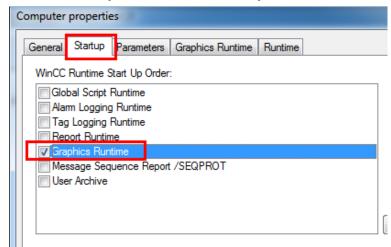Because the **byModbus** I/O fields are used as script reference, it is not necessary to display them on the screen. Thus, you can set their **Display** property to **No**.
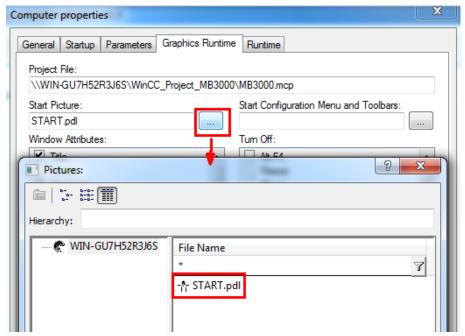

7 Defining Runtime Properties

1. In WinCC Explorer, open the **Computer Properties** dialog box.
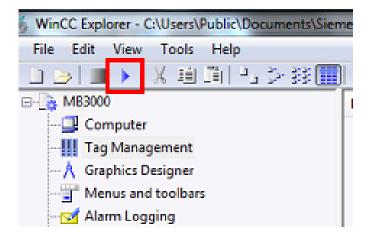2. Click the **Startup** tab and select the **Graphics Runtime** check box.

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 **Modbus TCP** 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.

You also change the value of **Modify Speed** to control the fan speed.