

How to Configure KingSCADA with MGate 5105

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About Moxa

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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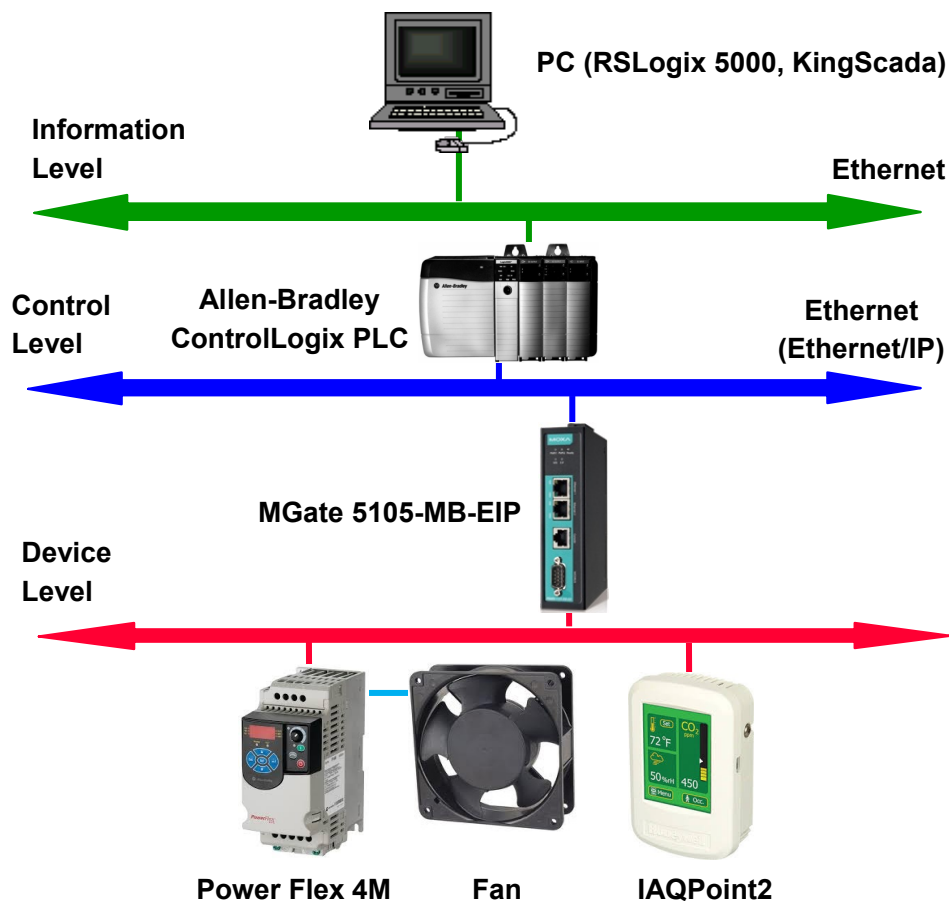
1 Application Description

This application shows how to set up a **KingSCADA** system to control and monitor **Allen-Bradley PLC** tags which are transmitted from **MGate 5105**.

For more information about Allen-Bradley PLC communication with MGate 5105, refer to the documents *Configuring Allen-Bradley 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 the Modbus end devices, **PowerFlex 4M** and **IAQPoint2**, are connected to the serial port on **MGate 5105-MB-EIP** through RS-485-2W wiring. **MGate 5105-MB-EIP** and **PC** (with **RSLogix 5000** and **KingSCADA** installed) are connected to the Ethernet 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 CO2, temperature and humidity levels.

- **KingSCADA:**

A SCADA system released by WellinTech.

Rev.: V3.1.

- **RS Logix 5000:**

Allen-Bradley ControlLogix PLC Edit Program from Rockwell Automation.

- Rev.: V20

- **Operating System Support:**

The RSLogix 5000 V20 software has been tested on the following operating systems:

- a. Microsoft Windows 7 Professional (64-bit) with Service Pack 1
- b. Microsoft Windows 7 Home Premium (64-bit) with Service Pack 1
- c. Microsoft Windows 7 Home Premium (32-bit) with Service Pack 1
- d. Microsoft Windows Vista Business (32-bit) with Service Pack 2
- e. Microsoft Windows XP Professional with Service Pack 3
- f. Microsoft Windows Server 2008 R2 Standard Edition with Service Pack 1
- g. Microsoft Windows Server 2008 Standard Edition with Service Pack 2
- h. Microsoft Windows Server 2003 R2 Standard Edition with Service Pack 2

- **RSLinx:**

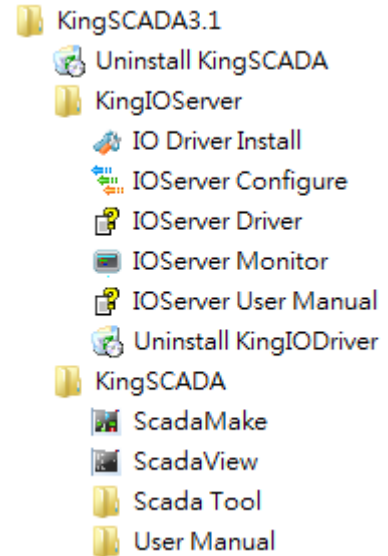
Communication Utility from Rockwell Automation.

Rev.: 2.59

4 About KingSCADA 3.1

KingSCADA 3.1 consists of the following components:

- **KingIOServer:** This component acquires data from I/O devices.
- **KingScada:**
 - **ScadaMake:** This is the development environment.
 - **ScadaView:** This is the runtime application.



The following sections describe these components.

4.1 About KingIO Server

A KingSCADA station communicates with I/O devices through KingIOServer. KingIOServer is used to communicate with the on-site devices and acquire real-time data and control on-site data of the modules.

KingIOServer supports popular PLC, intelligent module, intelligent instrument, transducer, and data acquisition boards, etc.

In addition, KingIOServer can communicate with devices through standard communicate interface to transfer data.

With KingIOServer, site engineers are not required to be familiar with the codes and device communication protocols. Instead, they only need to know how to connect with I/O devices and create tags corresponding with the I/O variables.

4.2 About KingSCADA

You can use KingSCADA is to **create a project** with **data and display**.

The following lists the major steps to create a project:

Step1: Create a new project

Create a new directory to store the documents associated with the project.

Step2: Configure the hardware

Configure the hardware settings of the equipment used in the project.

Step3: Define variables (tags)

Define global variables including memory variables and I/O devices.

Step4: Create graphics:

Draw monitoring pictures according to the project requirements.

Step5: Define animation links

Based on the on-site monitoring requirements, define the animation effects for static pictures to simulate process control objects.

Step6: Write an event script

Create scripts in order to complete the control process.

Step7: Configure of other necessary functions

Configure settings such as networks, recipes, SQL access, and web browsing.

Step8: Operate and debug the project.

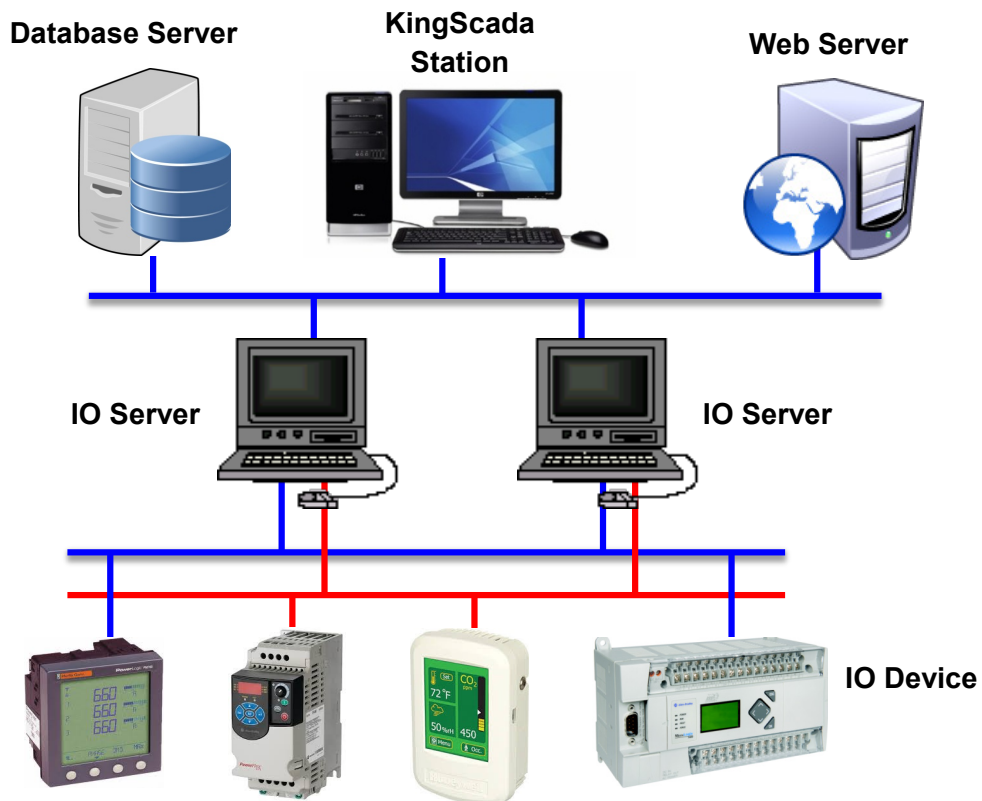
After you complete the procedure as described, you can create a simple project.

Then, you can run **ScadaView** to start run-time operations.

4.3 KingScada System Architecture

In a large system, the KingScada system may deploy some services on multiple servers for load sharing or for security considerations. For example, a run-time project can be executed on KingScada Station for monitoring, on **HMI View** for controlling, and on another **Database Server** for data acquisition and storage. In addition, the web portal can be hosted on another **Web Server** and data can be obtained through several **IO Servers**.

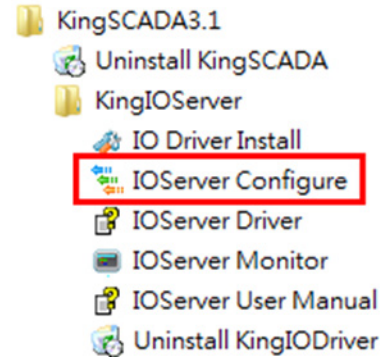
In this document, we show how to create an IO server and Run-Time View on the same PC.



5 KingSCADA Configuration

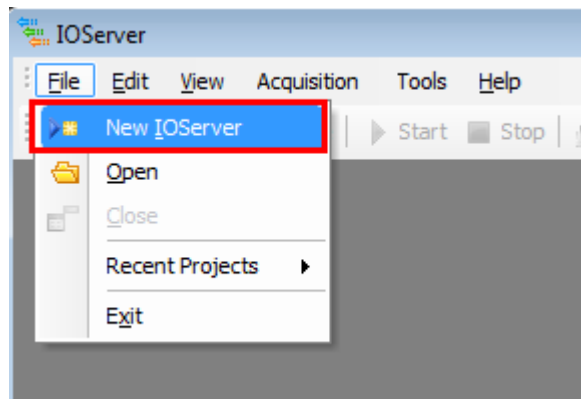
5.1 Creating an IO Server Project

To start the **IOServer Configure** application, click **Start → Program → KingSCADA3.1 → KingIOServer → IO Server Configure** to create an **IO Server** project.

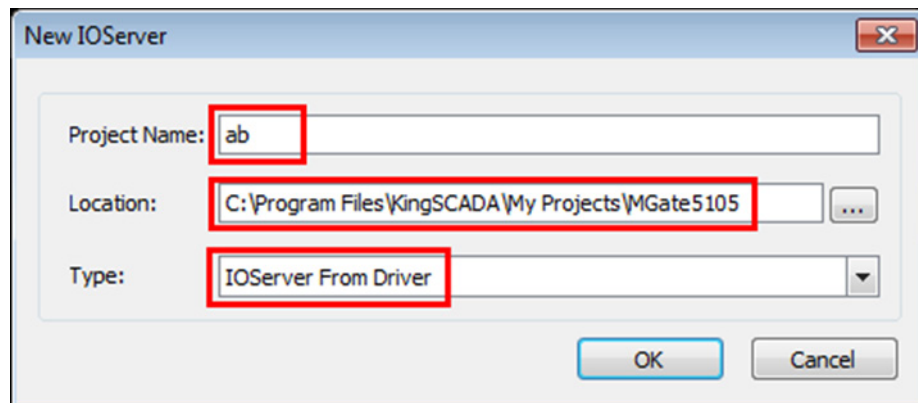


5.1.1 Creating an IO Server

1. In the IOserver screen, click **File → New IOserver** to create a new IO server.

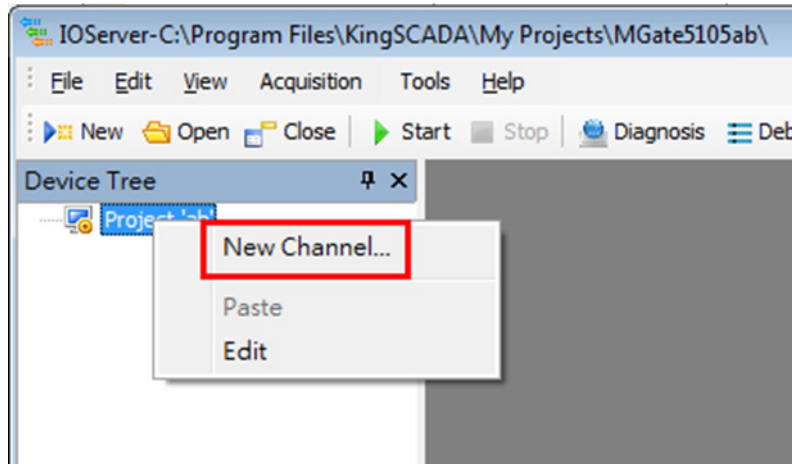


2. In the New IOserver screen, configure the following fields and click **OK**:
 - **Project Name:** Enter a descriptive name.
 - **Location:** Click the ... button to choose a location to store the project.
 - **Type:** Select IOserver From Driver from the drop-down list.

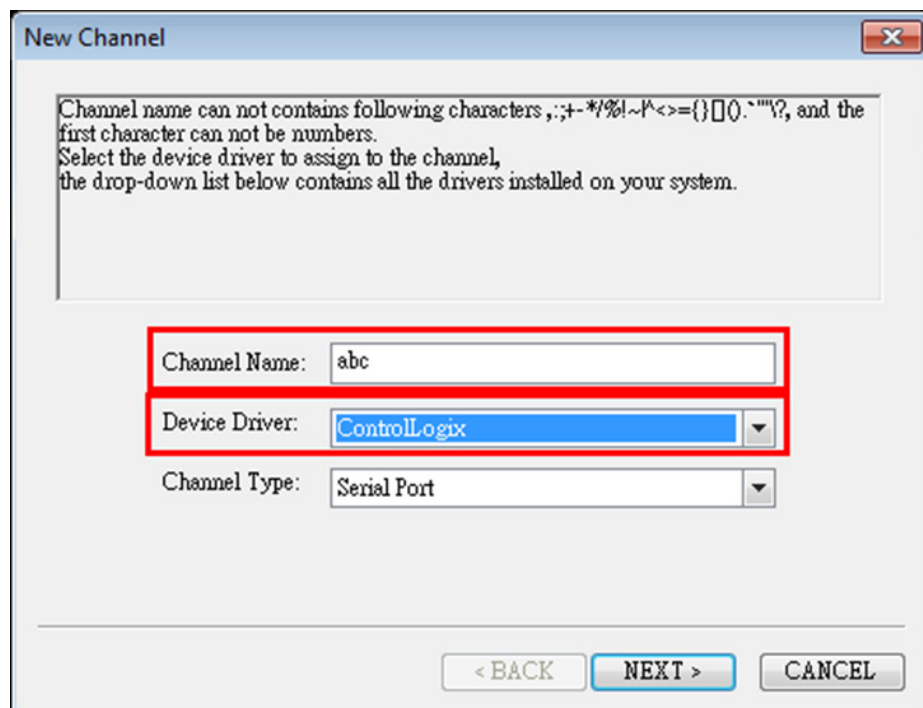


5.1.2 Creating an IO Channel

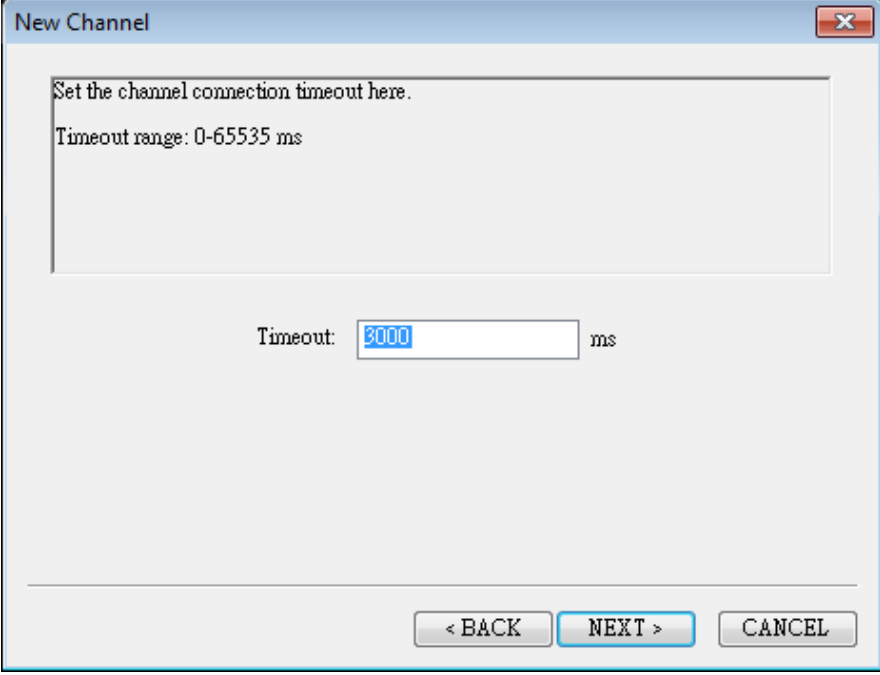
1. Right-click **Device Tree** → **Project-'ab'** and select **New Channel**. A **New Channel** dialog box appears.



2. In the New Channel dialog box, configure the following fields and click **NEXT**.
 - **Channel Name:** Enter a descriptive name.
 - **Device Driver:** Select ControlLogix from the drop-down list.
 - **Channel Type:** Use the default option.

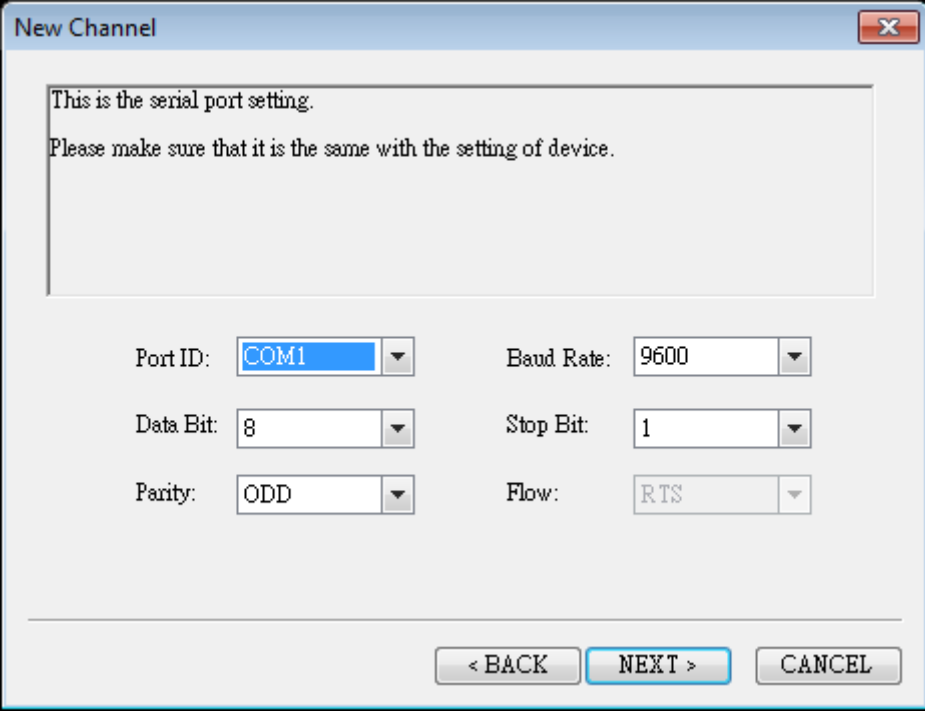


3. Accept the default timeout setting (3000 ms) and click **NEXT**.



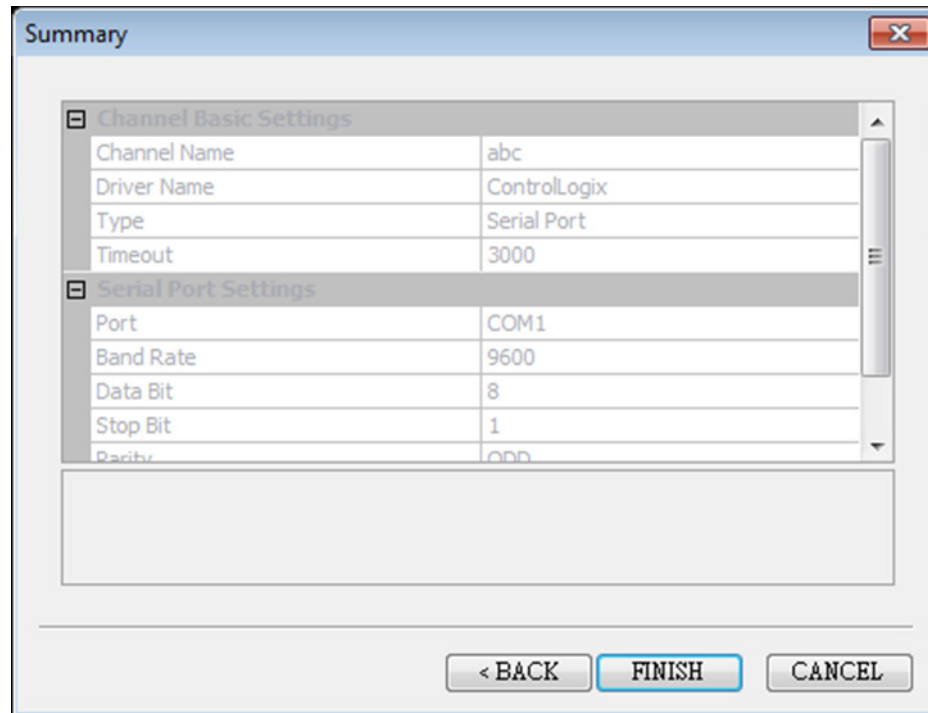
The screenshot shows a dialog box titled "New Channel" with a close button (X) in the top right corner. Inside the dialog, there is a text area containing the instruction "Set the channel connection timeout here." and "Timeout range: 0-65535 ms". Below this, there is a text input field labeled "Timeout:" with the value "3000" entered, followed by "ms". At the bottom of the dialog, there are three buttons: "< BACK", "NEXT >", and "CANCEL".

4. Since this channel is connected through Ethernet, use the default settings for the serial port. Click **NEXT** to continue.



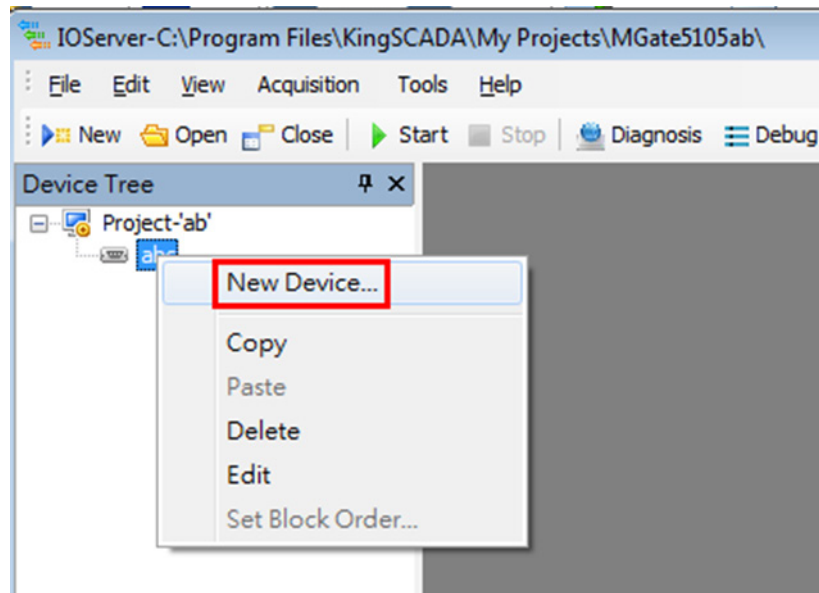
The screenshot shows a dialog box titled "New Channel" with a close button (X) in the top right corner. Inside the dialog, there is a text area containing the instruction "This is the serial port setting." and "Please make sure that it is the same with the setting of device." Below this, there are several settings: "Port ID:" with a dropdown menu showing "COM1", "Baud Rate:" with a dropdown menu showing "9600", "Data Bit:" with a dropdown menu showing "8", "Stop Bit:" with a dropdown menu showing "1", "Parity:" with a dropdown menu showing "ODD", and "Flow:" with a dropdown menu showing "RTS". At the bottom of the dialog, there are three buttons: "< BACK", "NEXT >", and "CANCEL".

5. Click **Finish** to complete the "Allen-Bradley ControlLogix PLC" channel setting.



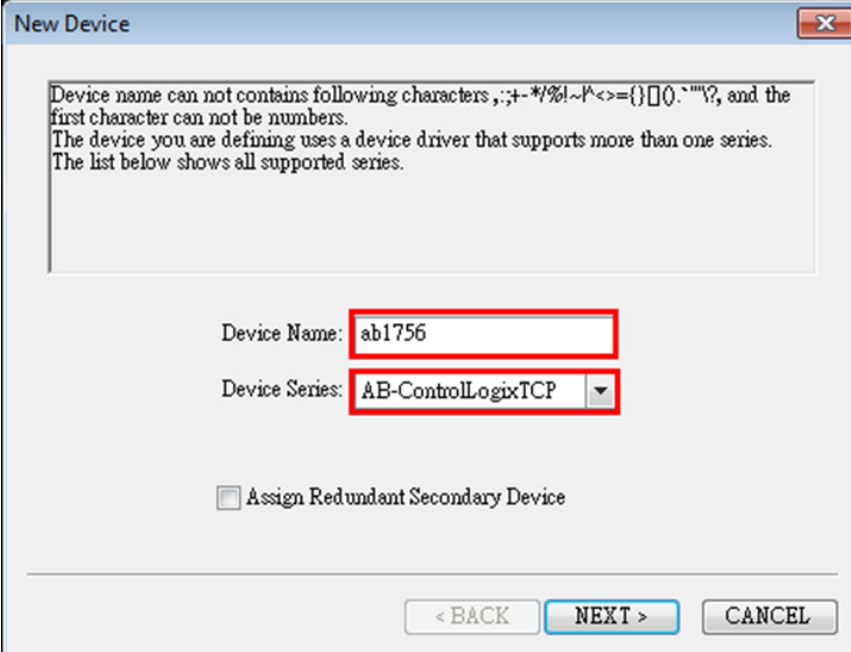
5.1.3 Creating an IO Device

1. Right-click the **abc** channel and select **New Device**.



2. In the **New Device** screen that appears, configure the following fields and click **NEXT**:
 - **Device Name:** Enter a descriptive name.

- **Device Series:** Select **AB-ControlLogixTCP** from the drop-down list.



New Device

Device name can not contains following characters , ; + * % ! ~ ^ < > = () [] \ . ' " ' ? , and the first character can not be numbers.
The device you are defining uses a device driver that supports more than one series.
The list below shows all supported series.

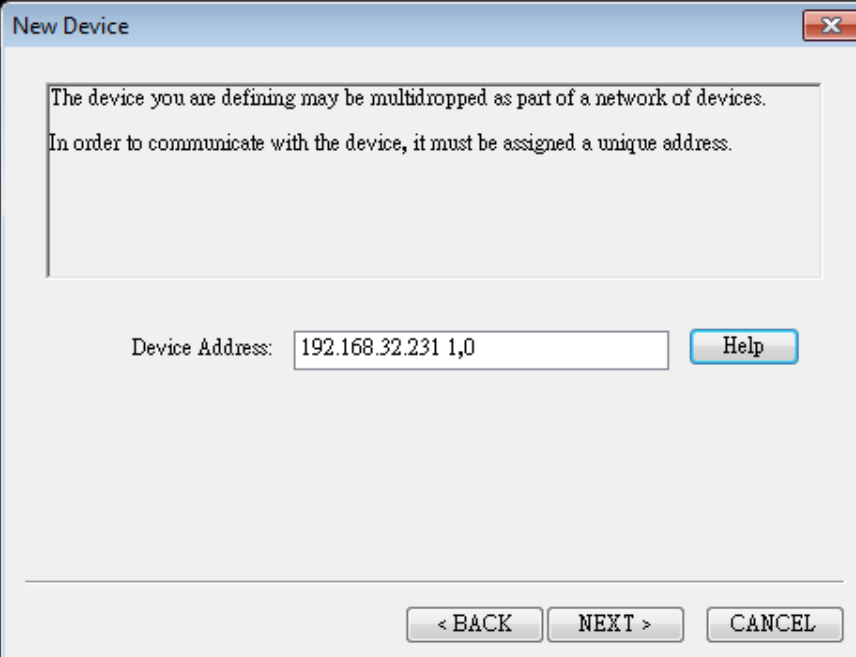
Device Name: ab1756

Device Series: AB-ControlLogixTCP

Assign Redundant Secondary Device

< BACK NEXT > CANCEL

3. In the **Device Address** field, enter the IP address and communication parameter of **Allen-Bradley ControlLogix PLC** in the format [*IP Backplane Slot*]. Then, click **NEXT**.



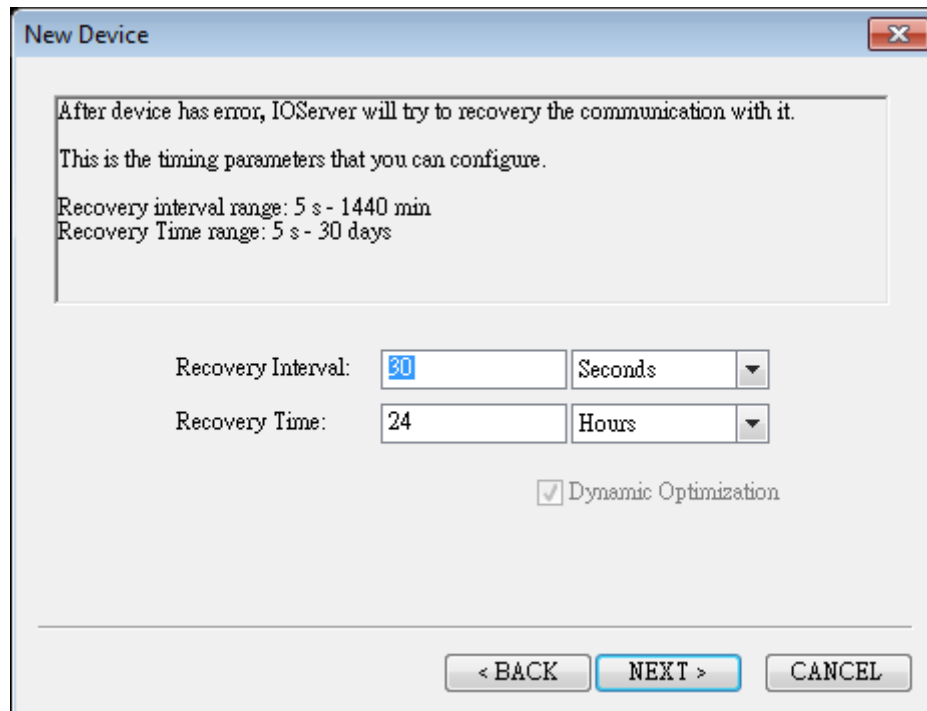
New Device

The device you are defining may be multidropped as part of a network of devices.
In order to communicate with the device, it must be assigned a unique address.

Device Address: 192.168.32.231 1,0 Help

< BACK NEXT > CANCEL

4. Accept the default settings and click **NEXT** to continue.



New Device

After device has error, IOserver will try to recover the communication with it.
This is the timing parameters that you can configure.
Recovery interval range: 5 s - 1440 min
Recovery Time range: 5 s - 30 days

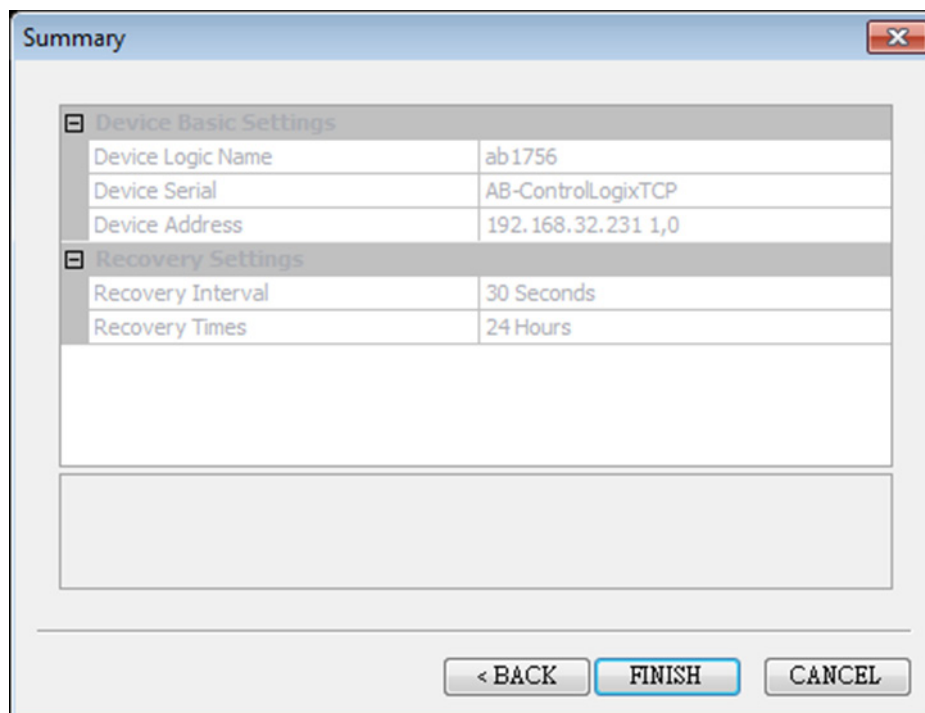
Recovery Interval: Seconds

Recovery Time: Hours

Dynamic Optimization

< BACK NEXT > CANCEL

5. Click **Finish** to complete the device setting.



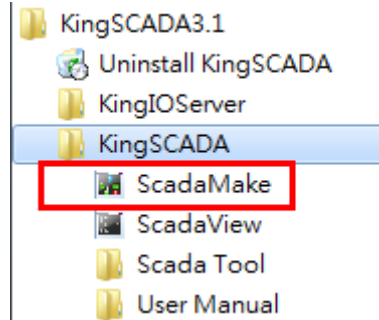
Summary

Device Basic Settings	
Device Logic Name	ab1756
Device Serial	AB-ControllLogixTCP
Device Address	192.168.32.231 1,0
Recovery Settings	
Recovery Interval	30 Seconds
Recovery Times	24 Hours

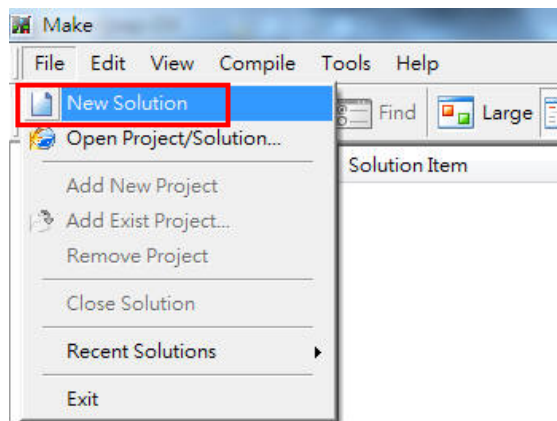
< BACK FINISH CANCEL

5.2 Creating a SCADA Project

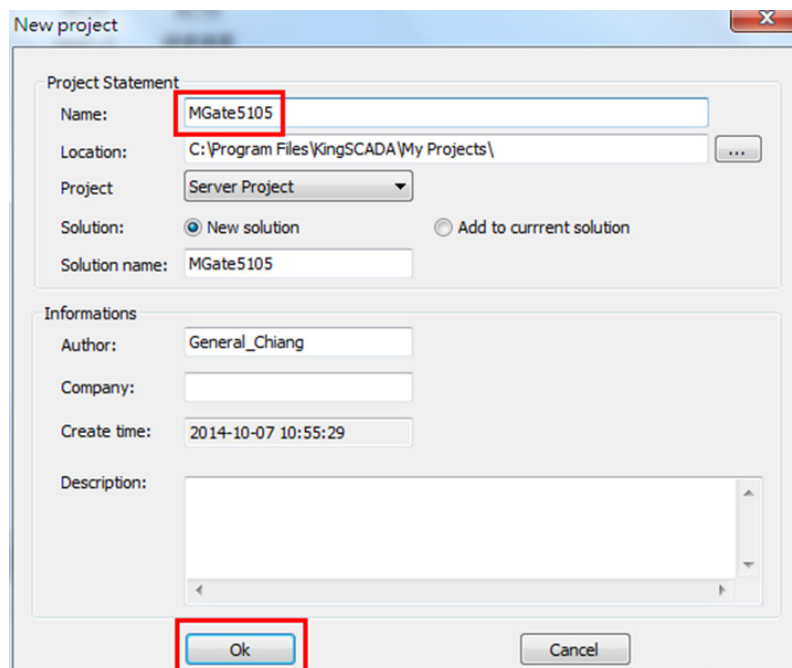
1. To start the **ScadaMake** application, click **Start** → **Program** → **KingSCADA3.1** → **ScadaMake**.



2. Click **File** → **New** Solution to create a new solution.

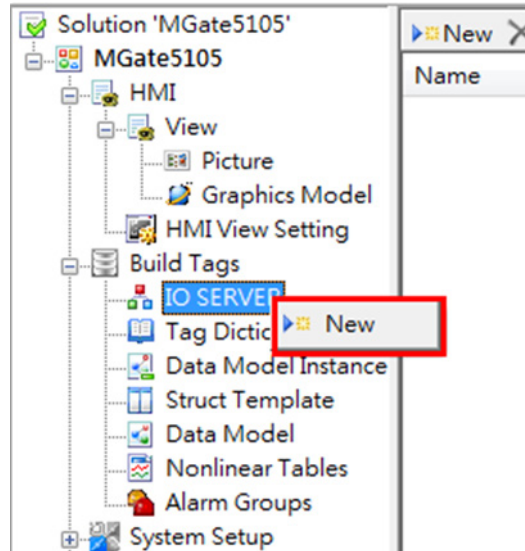


3. Give a project name then click **OK**. System would create a new empty project.

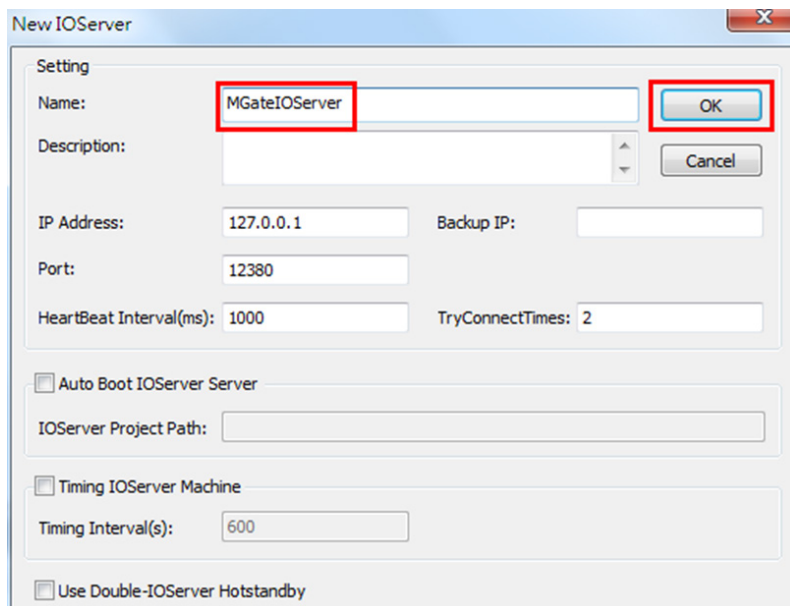


5.3 Building Tags

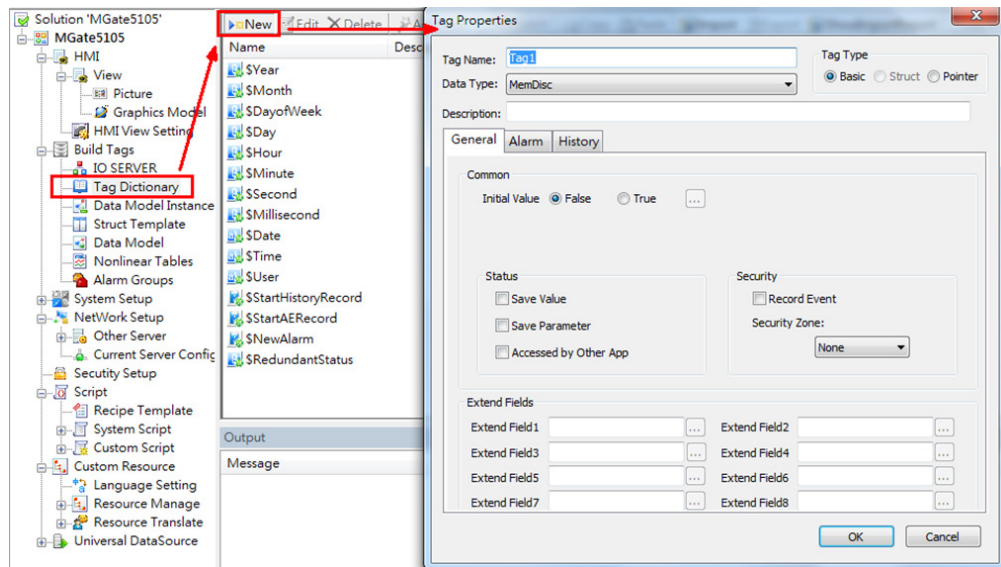
1. Under **Build Tags**, right-click **IO SERVER** and click **New**. The New IOserver screen appears.



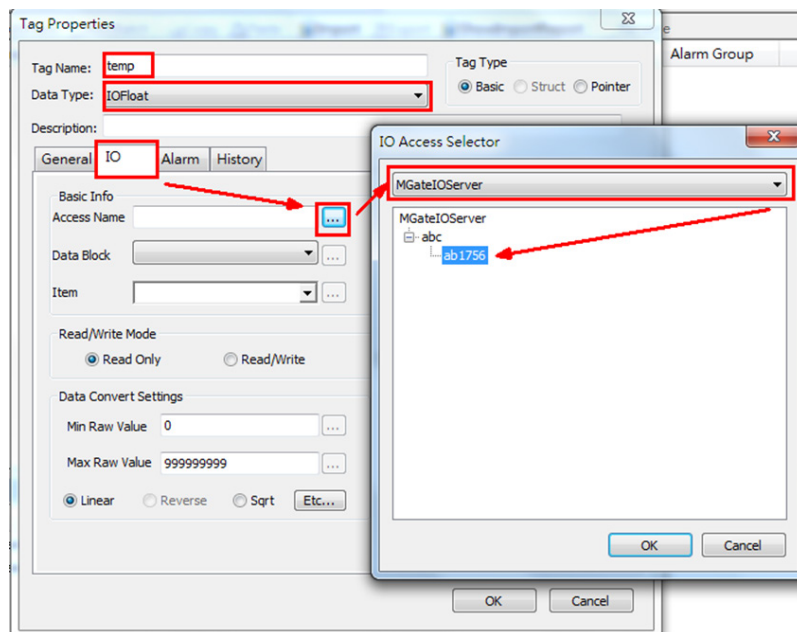
2. In the **New IOserver** screen, enter a server name in the **Name** field and click OK.
Note: Since this IO Server is hosted on the same computer, the IP address is unchanged at 127.0.0.1.



3. Click **Build Tags** → **Tag Dictionary** and click **New**. The Tag Properties screen appears.



4. In the Tag Properties screen, configure the following fields:
 - **Tag Name:** Enter "tempReal".
 - **Data Type:** Select **IOFloat** from the drop-down list.
5. Select the **IO** tab. For **Access Name**, click the ... button to select the **ab1756** IO device (in the IO Access Selector pop-up window, click **MGateIOServer** → **abc** → **ab1756**).



6. In the IO tab, configure the following fields and click **OK** to finish:

- **Data type:** Select **FLOAT** from the drop-down list.
- **Data Block:** Select **None** from the drop-down list.
- **Item:** Select or enter "TAGtemperatureReal". The format is [TAGtagname] as specified in Allen-Bradley ControlLogix PLC.
- **Read/Write Mode:** Select **Read Only**.
- **Data Convert Settings:** Enter "0" in the **Min Raw Value** field and "100" in the **Max Raw Value** field.

Tag Properties

Tag Name: temp

Data Type: IOFloat

Description: Temperature in real format

Tag Type: Basic Struct Pointer

General IO Alarm History

Basic Info

Access Name: MGateIOServer.abc.ab1756

Data type: FLOAT

Data Block: None

Frequency: 1000 ms

Item: TAGtemperatureReal

Read/Write Mode

Read Only Read/Write Write Only

Data Convert Settings

Min Raw Value: 0

Max Raw Value: 100

Linear Reverse Sqrt Etc...

Collect Settings

Enabled

Force Read

Force Write

OK Cancel

7. Repeat steps 1 to 5 to create another tag to read the **speedReal** tag from Allen-Bradley ControlLogix PLC. Configure the tag properties as shown in the following figure.

Tag Properties

Tag Name: speed

Data Type: IOFloat

Description: Speed in real format

Tag Type: Basic Struct Pointer

General IO Alarm History

Basic Info

Access Name: MGateIOServer.abc.ab1756

Data type: FLOAT

Data Block: None

Item: TAGspeedReal

Frequency: 100 ms

Read/Write Mode

Read Only Read/Write Write Only

Data Convert Settings

Min Raw Value: 0

Max Raw Value: 60

Linear Reverse Sqrt Etc...

Collect Settings

Enabled

Force Read

Force Write

OK Cancel

- Repeat steps 1 to 5 to create a **byModbus** tag to read and write the **byModbus** tag from/to Allen-Bradley ControlLogix PLC. Configure the tag properties as shown in the following figure.

Tag Properties

Tag Name: byModbus

Data Type: IODisc

Description: Start fan control by PLC

Tag Type: Basic Struct Pointer

General IO Alarm History

Basic Info

Access Name: MGateIOserver.abc.ab1756

Data type: BIT

Data Block: None

Frequency: 100 ms

Item: TAGbyModbus

Read/Write Mode

Read Only Read/Write Write Only

Data Convert Settings

Min Raw Value: 0

Max Raw Value: 100

None Reverse Sqrt Etc...

Collect Settings

Enabled

Force Read

Force Write

OK Cancel

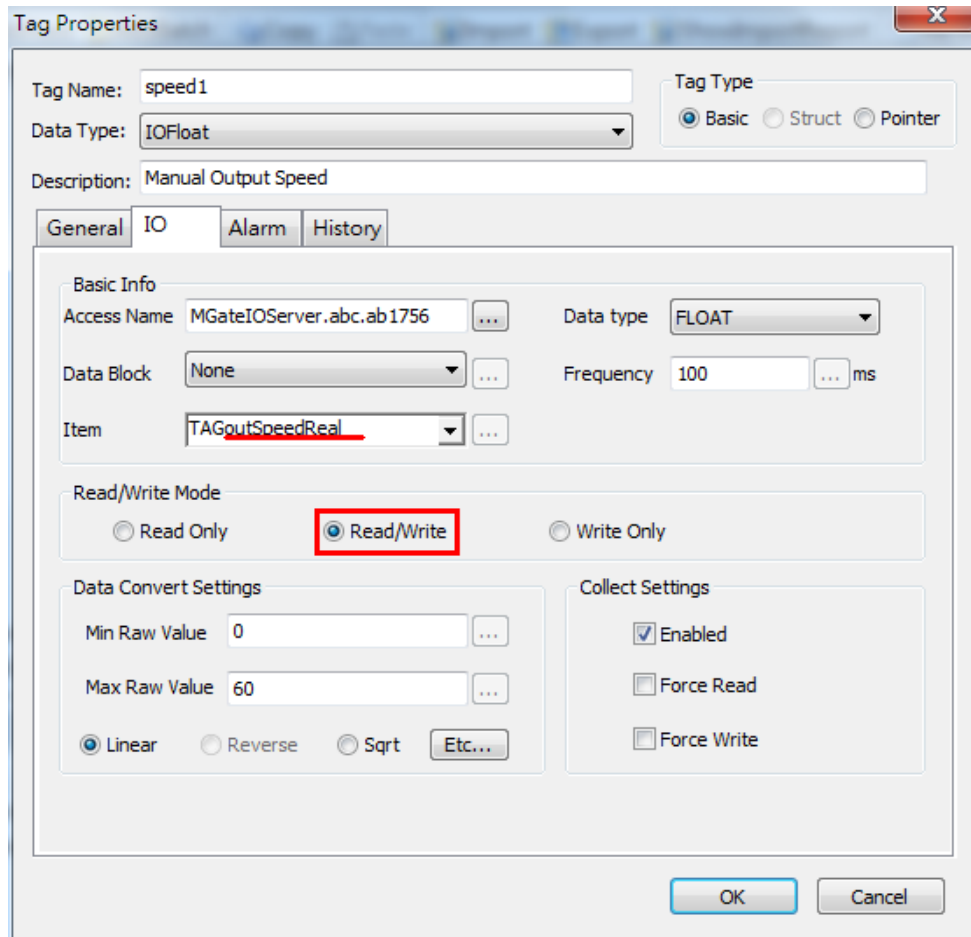
9. Repeat steps 1 to 5 to create a **byManual** tag to read and write the **byManual** tag from/to Allen-Bradley ControlLogix PLC. Configure the tag properties as shown in the following figure.

The screenshot shows the 'Tag Properties' dialog box for a tag named 'byManual'. The 'Data Type' is set to 'IODisc'. The 'Description' is 'Start fan control by PLC'. The 'Tag Type' is 'Basic'. The 'General' tab is selected, showing the following settings:

- Basic Info:**
 - Access Name: MGateIOServer.abc.ab1756
 - Data type: BIT (highlighted with a red box)
 - Data Block: None
 - Frequency: 100 ms
 - Item: TAGbyManual
- Read/Write Mode:**
 - Read Only:
 - Read/Write: (highlighted with a red box)
 - Write Only:
- Data Convert Settings:**
 - Min Raw Value: 0
 - Max Raw Value: 999999999
 - None: (selected)
 - Reverse:
 - Sqrt:
 - Etc...:
- Collect Settings:**
 - Enabled:
 - Force Read:
 - Force Write:

Buttons for 'OK' and 'Cancel' are at the bottom right.

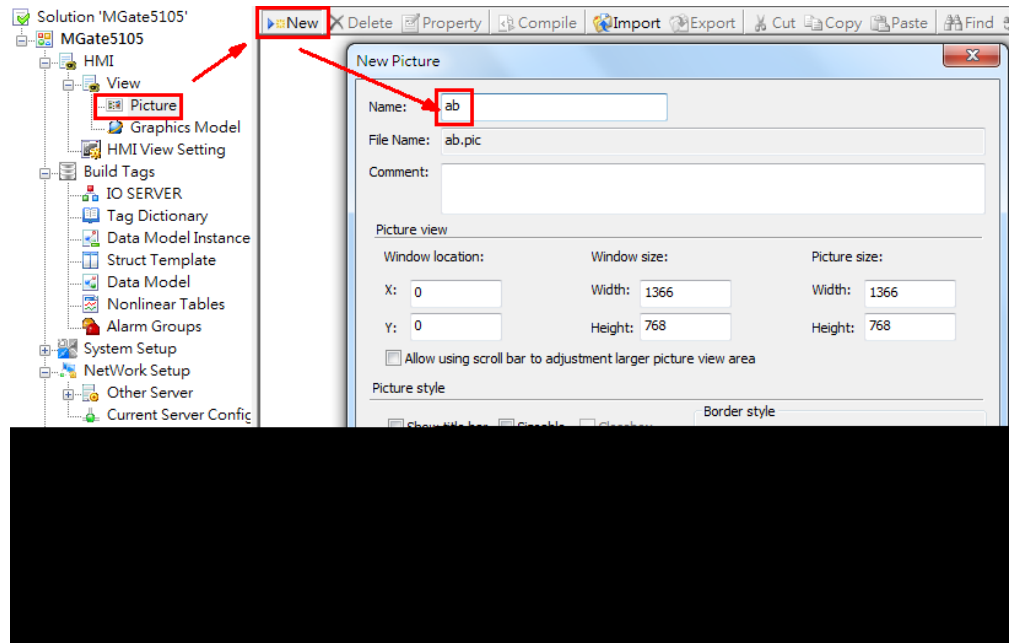
- Repeat steps 1 to 5 to create a **speed1** tag to read and write the **outSpeedReal** tag from/to Allen-Bradley ControlLogix PLC. Configure the tag properties as shown in the following figure.



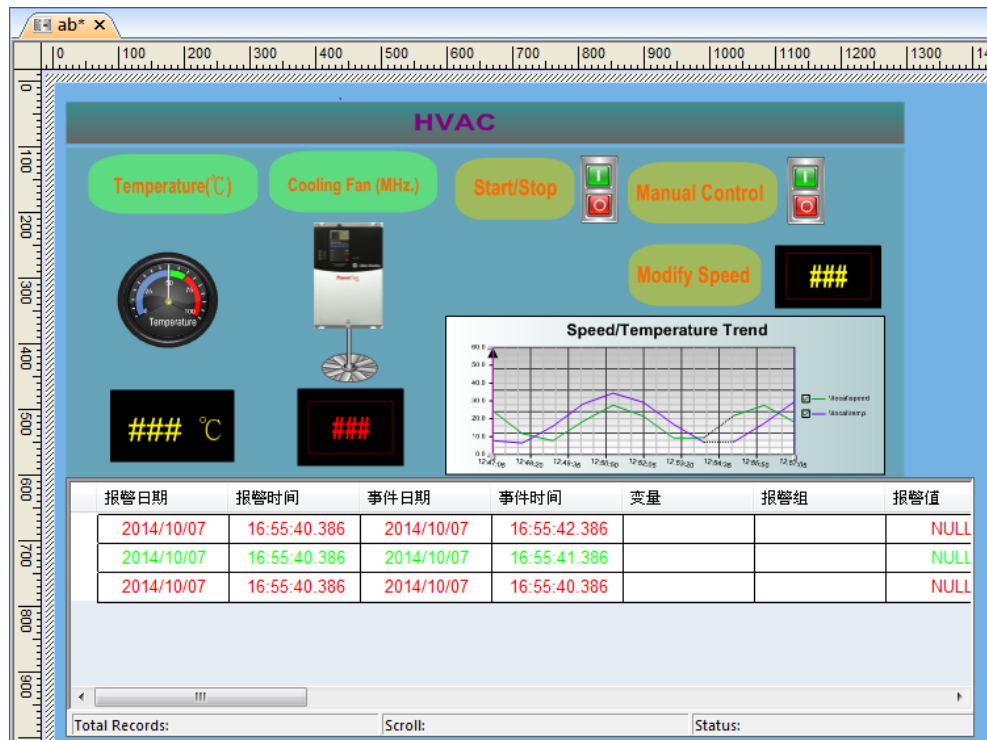
5.4 Creating HMI View

5.4.1 Creating a View Picture

1. Click **HMI → View → Picture** and click **New** to create a view picture.

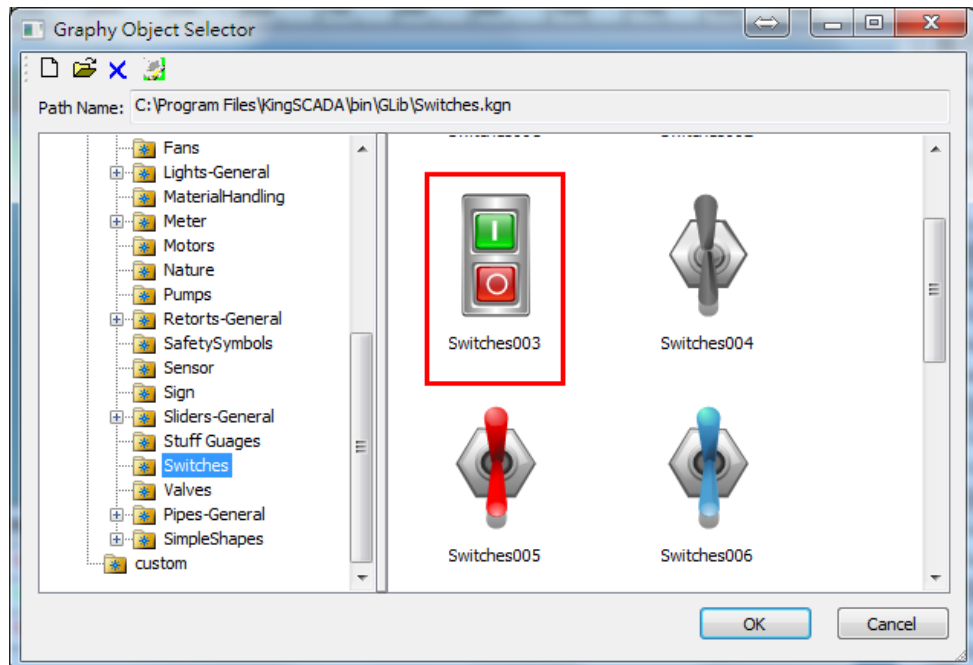


2. After adding object graphics, the following figure shows the complete view picture.

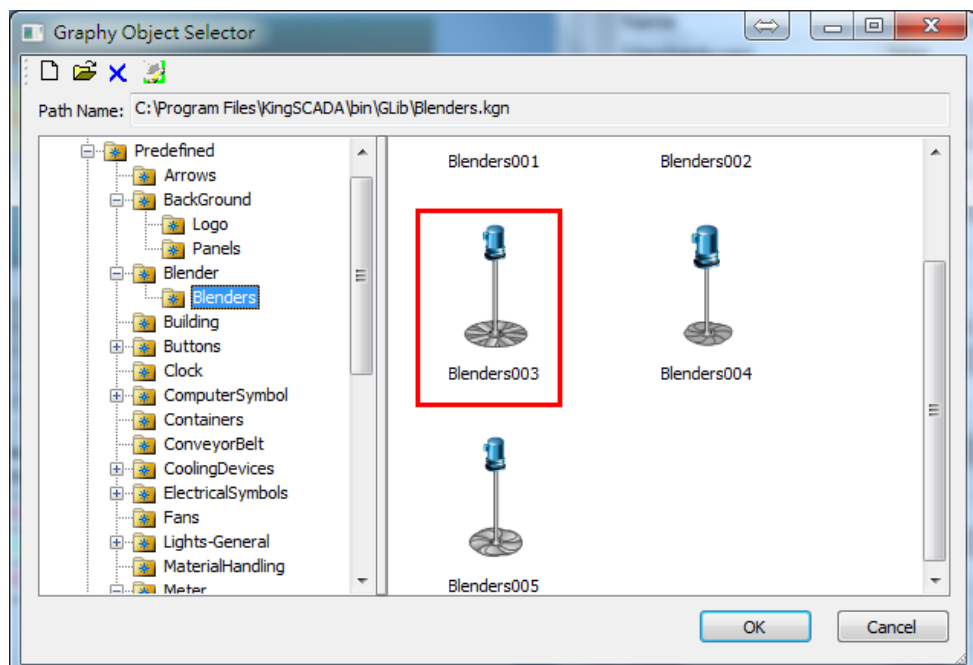


From **File** → **Open** → **Genius**, you can get the Switches, Blenders, and Sign object pictures as shown in the following figures.

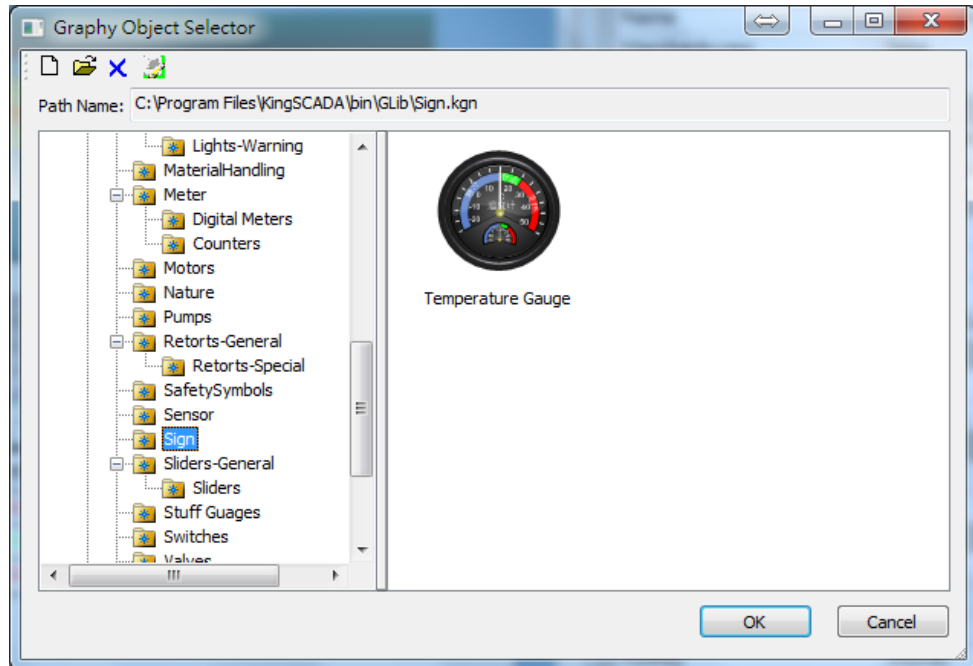
- **Switches**



- **Blenders**



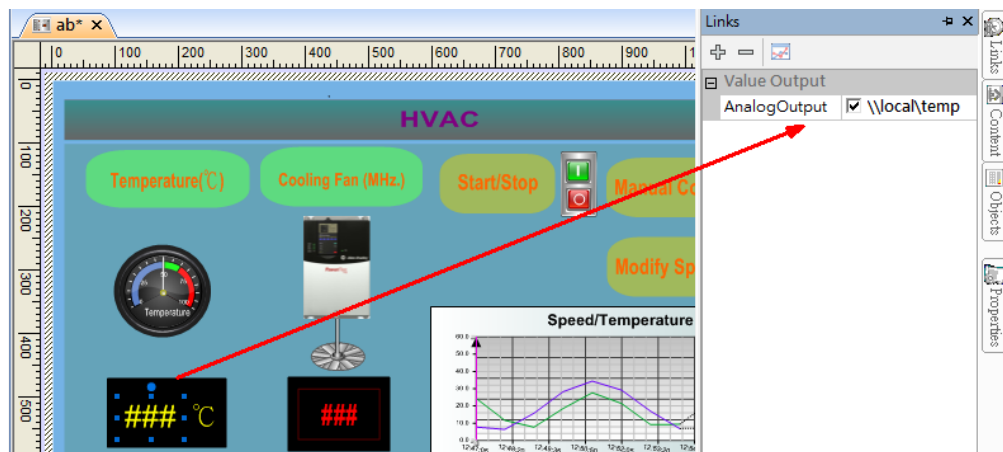
- **Sign**



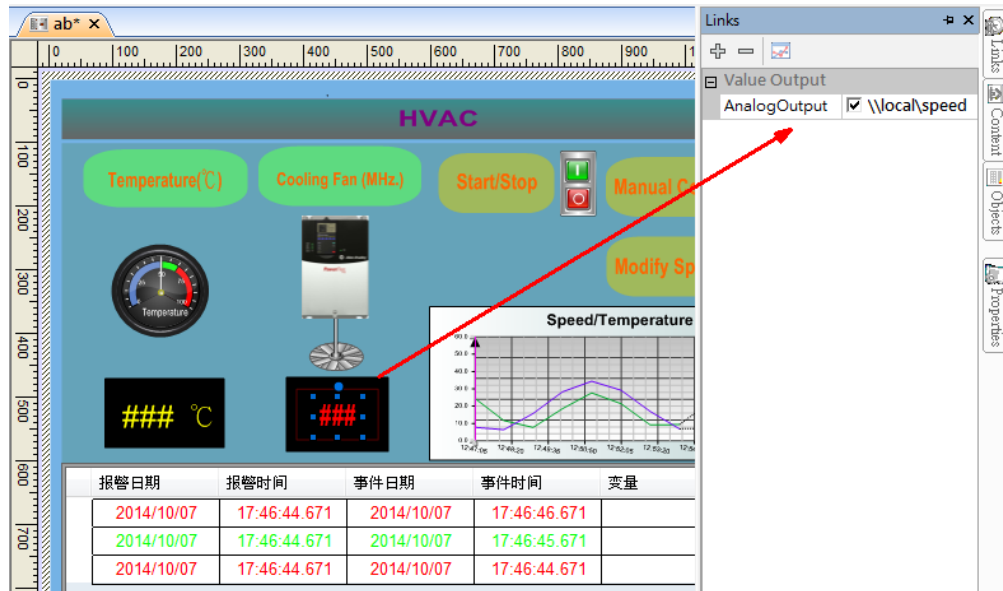
5.4.2 Adding Links

After adding the object pictures, add links to enable the system to dynamically update object graphic animation or input and output element value.

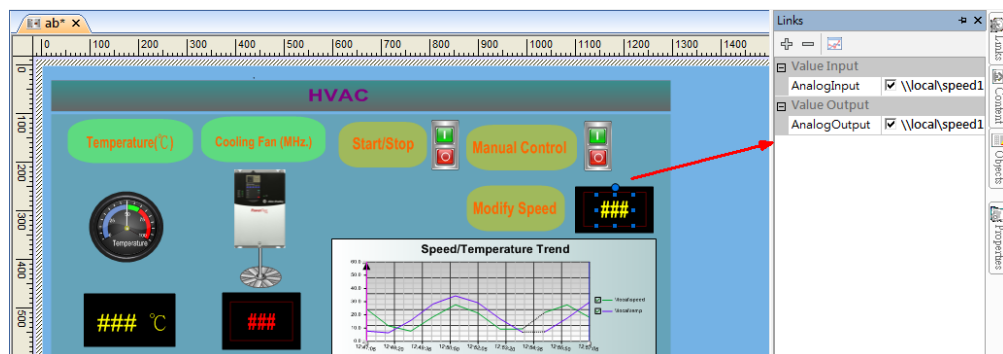
1. Select the **Temperature** input box; then, in the Links window, click the + icon to add the **AnalogOutput** source as the `\\local\temp` tag.



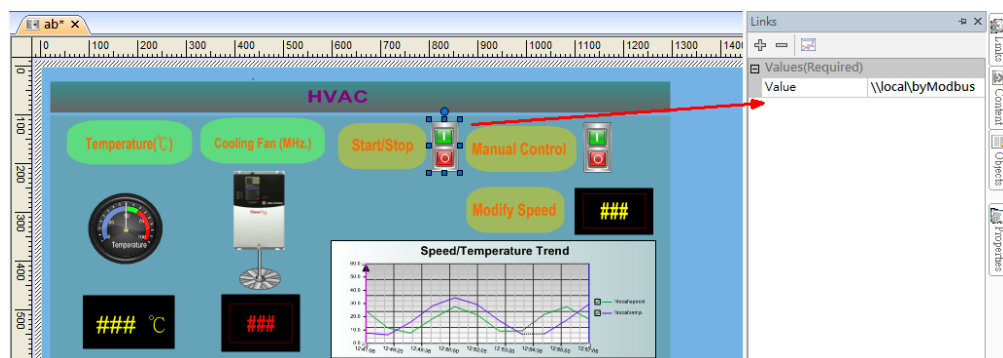
2. Select the **Speed** input box; then, in the Links window, click the + icon to add the **AnalogOutput** source as the `\\local\speed` tag.



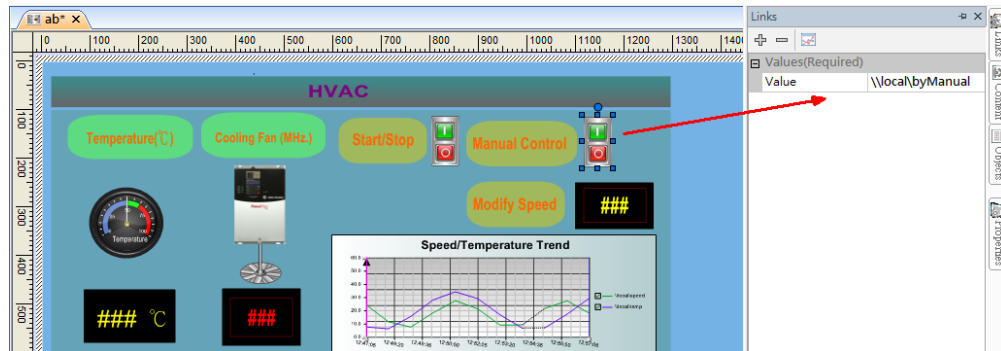
3. Select the **Modify Speed** input box; then, in the Links window, click the + icon to add the **AnalogOutput** source as the `\\local\outSpeed1` tag and the **AnalogInput** source as the `\\local\outSpeed1` tag.



4. Select the **Start/Stop** Switch; then, in the Input window, click the + icon to add the **Value** source as the `\\local\byModbus` tag.

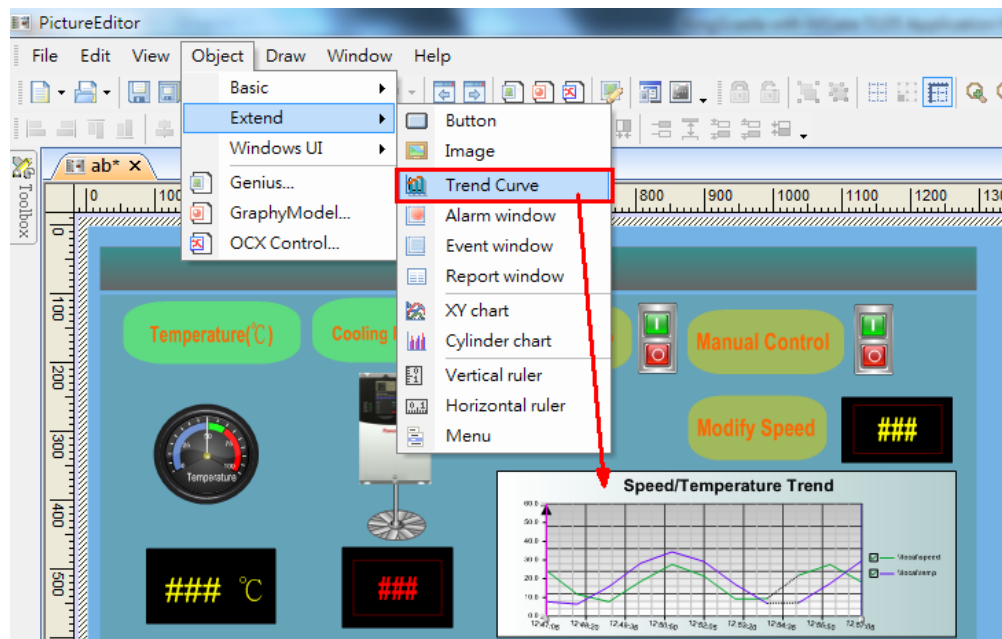


5. Select the **Manual Control** switch; then, in the Input window, click the + icon to add the **Value** source as the `\\local\byManual` tag.

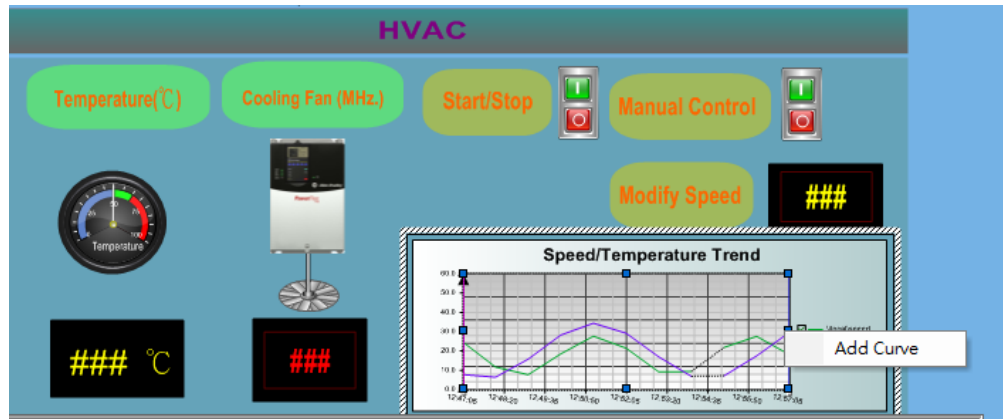


5.4.3 Adding a Trend Curve

1. In the PictureEditor screen, click **Object** → **Extend** → **Trend Curve** to create a trend curve chart.

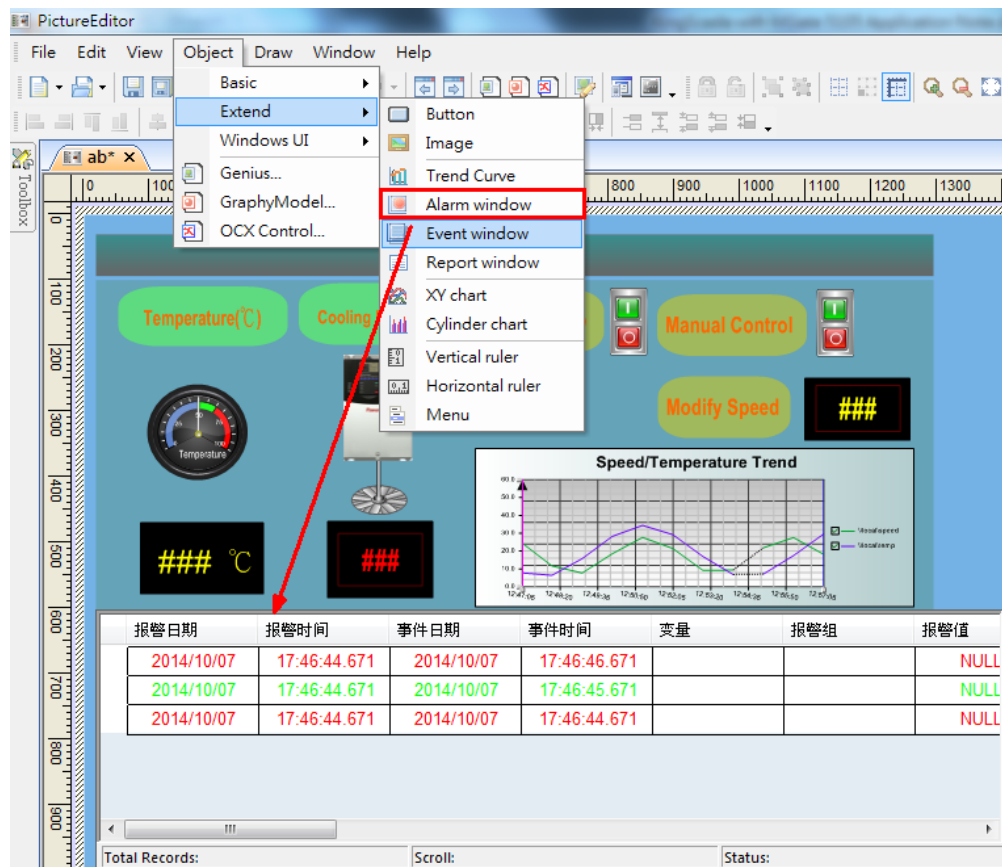


- Right-click on the Chart object and click **Add Curve** to add the **Speed** and **Temperature** curves that are linked to the \\local\speed and \\local\temp tags respectively.



5.4.4 Adding an Alarm Window

- In the PictureEditor screen, click **Object → Extend → Alarm** window to create an alarm window.



- Configure the alarm settings for the **Temp** tag as shown in the following figure.

Tag Properties

Tag Name: temp

Data Type: IOFloat

Description: Temperature in real format

Tag Type: Basic Struct Pointer

General IO Alarm History

Limit Alarm Settings

	Limit Value	Alarm Text	Priority	Alarm Inhibitor
<input type="checkbox"/> LoLo	0	LoLo	1	
<input checked="" type="checkbox"/> Lo	10	Too Cold	1	
<input checked="" type="checkbox"/> Hi	20	Too Hot	1	
<input type="checkbox"/> HiHi	100	HiHi	1	
<input type="checkbox"/> Dead	0			
<input type="checkbox"/> Delay	0	Sec		

ROC Alarm Settings

Roc

Second

20 % Minute Hour

Alarm Text: ROC Priority: 1

Alarm Inhibitor: ?

Delay 0 Sec

Alarm Group: RootNode

Dev Alarm Settings

	Limit Value	Alarm Text	Priority	Alarm Inhibitor
<input type="checkbox"/> Major	80	Major	1	
<input type="checkbox"/> Minor	20	Minor	1	
Target	100			
<input type="checkbox"/> Dead Band	0			
<input type="checkbox"/> Delay	0	Sec		

OK Cancel

- Configure the alarm settings for the **Speed** tag as shown in the following figure.

Tag Properties

Tag Name: speed

Data Type: IOFloat

Description: Speed in real format

Tag Type: Basic Struct Pointer

General IO Alarm History

Limit Alarm Settings

	Limit Value	Alarm Text	Priority	Alarm Inhibitor
<input type="checkbox"/> LoLo	0	LoLo	1	
<input checked="" type="checkbox"/> Lo	10	Speed low	1	
<input checked="" type="checkbox"/> Hi	50	Speed high	1	
<input type="checkbox"/> HiHi	100	HiHi	1	
<input type="checkbox"/> Dead	0			
<input type="checkbox"/> Delay	0	Sec		

ROC Alarm Settings

Roc

Second

20 % Minute Hour

Alarm Text: ROC Priority: 1

Alarm Inhibitor: ?

Delay 0 Sec

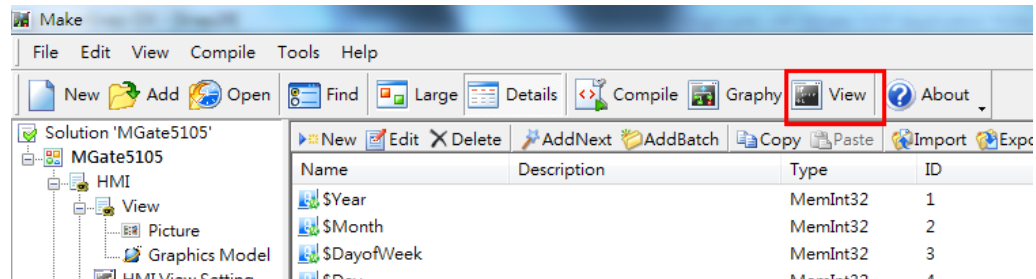
Alarm Group: RootNode

Dev Alarm Settings

	Limit Value	Alarm Text	Priority	Alarm Inhibitor
<input type="checkbox"/> Major	80	Major	1	
<input type="checkbox"/> Minor	20	Minor	1	
Target	100			
<input type="checkbox"/> Dead Band	0			
<input type="checkbox"/> Delay	0	Sec		

OK Cancel

- In the **ScadaMake** program, click **View** to run the SCADA View system. Alternatively, you can execute the **ScadaView** program to run this project.



The screen displays the **HMI View**. SCADA polls the tags of **Allen-Bradley ControlLogix PLC** and updates values on the HMI View (for example, displaying the current temperature and speed values).

You can click the **Start/Stop** switch to start or stop the PowerFlex 4M converter.

If you use a hairdryer to increase the meter temperature, the converter will increase its output speed. The **Speed/Temperature Trend Chart** area will also show the trend of the temperature and speed change. If the temperature or speed value exceeds the alarm threshold, the system logs an event in the **Alarm Window** area.

报警日期	报警时间	事件日期	事件时间	变量	报警组	报警值	限值	报警文本	备注	报警类型	机器名	事件类
2014/09/25	10:22:21.777	2014/09/25	10:23:19.238	speed	RootNode	60.00	50.00	Speed high		HI		AL
2014/09/25	10:22:21.777	2014/09/25	10:22:46.499	temp	RootNode	25.90	25.00	Too Hot		HI		AL
2014/09/25	10:22:21.777	2014/09/25	10:22:21.777	speed	RootNode	60.00	50.00	Speed high		HI		
2014/09/25	10:22:21.777	2014/09/25	10:22:21.777	temp	RootNode	25.90	25.00	Too Hot		HI		

If you click the **Manual Control** switch to enable the manual speed control function, an Input dialog box appears that allows you to specify the speed value in the **Input analog value** field.

