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 <u>www.moxa.com</u>. You may also contact Moxa by email at <u>info@moxa.com</u>.

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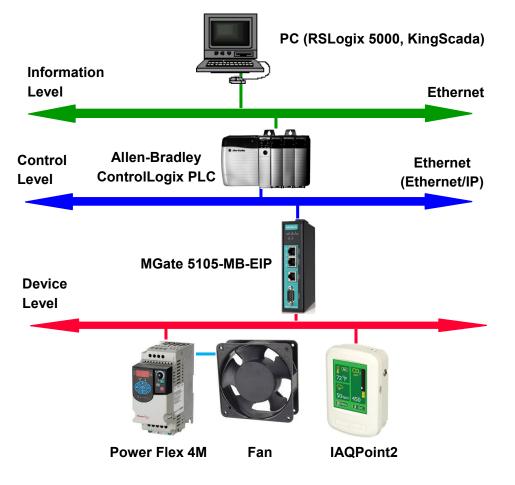
1 Application Description

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-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 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

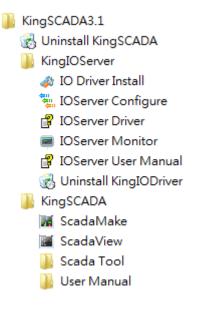
• RSLinx:

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 ystem 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 though several **IO Servers**.

Database Server Station IO Server IO Server IO Device

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

5 KingSCADA Configuration

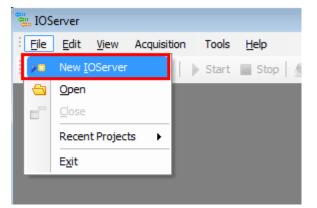
5.1 Creating an IO Server Project

To start the IOServer Configure application, click Start → Program → KingSCADA3.1 → KingIOServer → IOServer 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.

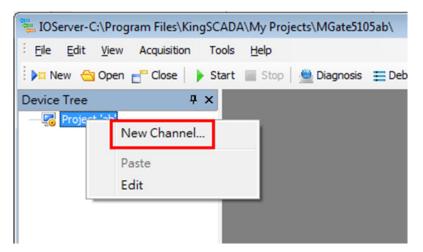


- 2. In the New IOServer screen, configure the following fields and click **OK**:
 - **Project Name:** Enter a descriptive name.
 - Location: Click the ... button to choose a location to store the project.
 - **Type:** Select IOServer From Driver from the drop-down list.

New IOServer	— ×-
Project Name: ab	
Location: C:\Program Files\KingSCADA\My Projects\MGate5105	
Type: IOServer From Driver	•
ОК	Cancel

5.1.2 Creating an IO Channel

 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.

New Chann	nel		×
first char Select the	acter can not be nui e device driver to as	ins following characters ,:;+-*/%!~/^<>={}[[().*'''\?, an nbers. sign to the channel, ntains all the drivers installed on your system.	d the
	Channel Name:	abc	
	Device Driver:	ControlLogix	
	Channel Type:	Serial Port	
-			
		< BACK NEXT > CA	NCEL

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

New Channel	×
Set the channel connection timeout here. Timeout range: 0-65535 ms	_
Timeout: ms	
< BACK NEXT > CANC	EL

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

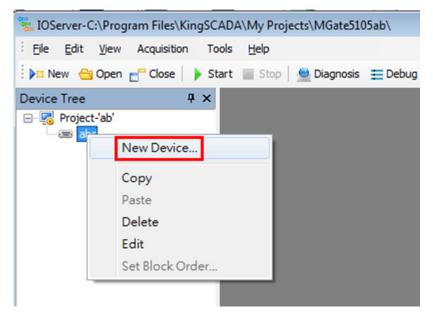
New Channel				—X —
This is the serial po Please make sure th	rt setting. at it is the same with t	he setting of device.		
Port ID: Data Bit: Parity:	COM1 8 ODD	Baud Rate: Stop Bit: Flow:	9600 1 RTS	•
		< BACK	NEXT >	CANCEL

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

Channel Basic Settings Channel Name	abc	
Driver Name	ControlLogix	
Туре	Serial Port	
Timeout	3000	8
Serial Port Settings		
Port	COM1	
Band Rate	9600	
Data Bit	8	
Stop Bit	1	
Darity		

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	x				
Device name can not contains following characters ,:;+-*/%!~/'<>={}[]0.``"'\?, 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					

 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 ne In order to communicate with the device, it must be assigned a un	
Device Address: 192.168.32.231 1,0	Help
< BACK NEX	I > CANCEL

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

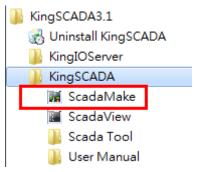
New Device			×			
After device has error, IOServer will try to recovery the communication with it. This is the timing parameters that you can configure. Recovery interval range: 5 s - 1440 min Recovery Time range: 5 s - 30 days						
Recovery Interval:	<u>30</u>	Seconds 💌				
Recovery Time:	24	Hours				
	< BACK	Dynamic Optimization	CANCEL			

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

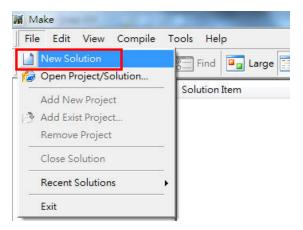
Device Basic Settings			
Device Logic Name	ab 1756		
Device Serial	AB-ControlLogixTCP		
Device Address	192.168.32.231 1,0		
Recovery Settings			
Recovery Interval	30 Seconds		
Recovery Times 24 Hours			

5.2 Creating a SCADA Project

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



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

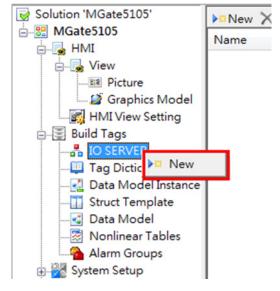


3. Give a project name then click **OK**. System would create a new empty project.

Name:	MGate5105		
Location:	C:\Program Files\KingSCADA	A/My Projects \	
Project	Server Project	•	
Solution:	New solution	Add to currrent solution	
Solution name:	MGate5105		
Informations			
Author:	General_Chiang		
Company:			
Create time:	2014-10-07 10:55:29		
Description:			
			-
	4		P.

5.3 Building Tags

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



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.

New IOServer				×
Setting				
Name:	MGateIOServer			ОК
Description:			* *	Cancel
IP Address:	127.0.0.1	Backup IP:		
Port:	12380			
HeartBeat Interval(ms):	1000	TryConnectTimes:	2	
Auto Boot IOServer Se	erver			
IOServer Project Path:				
Timing IOServer Mach	ine			
Timing Interval(s):	600			
Use Double-IOServer	Hotstandby			

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

Solution 'MGate5105' MGate5105 MGate5105 View View View Graphics Model MIView Setting MIView	SVear SMonth SDayofWeek SDay SHour SSHour SMinute SScond SMillisecond	Desc Tag Name Data Typ Descriptio Genera Com	e: Teg] e: MemDisc n: al Alarm History mon	© True		Tag Type Basic Stri	uct O Pointer
Data Model Nonlinear Tables Nonlinear Tables Alarm Groups System Setup Other Server Current Server Config Secutity Setup Secutity Setup G Script	SDate STime Stude StartHistoryRecord StartAERecord StartAERecord StewAlarm StedundantStatus		itatus Save Value Save Parameter Accessed by Other Ap nd Fields	q	Security		
Recipe Template System Script System Script Source Custom Resource Sustanguage Setting Source Manage Source Translate Sustanguage Source	Output Message	Ext Ext Ext	end Field1 end Field3 end Field5 end Field7	111 111 111 111	Extend Field2 Extend Field4 Extend Field6 Extend Field8	ОК	 Cancel

- 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** \rightarrow **abc** \rightarrow ab1756).

Tag Properties	X	e
Tag Name: temp Data Type: IOFloat	Tag Type	Alarm Group
Description: General IO Alarm History Basic Info Access Name Data Block Item	IO Access Selector MGateIOServer GateIOServer Data dab1756	
Read/Write Mode		
	OK Cancel	Cancel

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 [TAG*tagname*] 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.

ag Name:	temp	Tag Type
ata Type:	IOFloat	Basic Struct Pointer
escription:	Temperature in real format	
General	IO Alarm History	
Basic Ir Access N Data Blo Item	lame MGateIOServer.abc.ab1756	Data type FLOAT Frequency 1000 ms
Read/	/rite Mode	
۲	Read Only © Read/Write	Write Only
Data Contract	onvert Settings	Collect Settings
Data Ci Min Ra	onvert Settings	-
Data Ci Min Ri	aw Value 0 aw Value 100	Collect Settings

 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 Properti	ies	×
Tag Name: Data Type:	speed IOFloat	Tag Type ⓐ Basic ○ Struct ○ Pointer
General	Speed in real format IO Alarm History	
Basic In Access N Data Bloo Item	lame MGateIOServer.abc.ab1756 Data	type FLOAT
۲	Vrite Mode Read Only © Read/Write © Writ	te Only
Min Ra	aw Value 0 Coll Raw Value 60	ect Settings Enabled Force Read
Eine	ear 🔘 Reverse 🔘 Sqrt 🛛 Etc	Force Write
		OK Cancel

8. 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	Tag Type
Description: Start fan control by PLC General IO Alarm History Basic Info Access Name MGateIOServer.abc.ab1756 Data Block None	Data type BIT Frequency 100 ms
Item TAGbyModbus Read/Write Mode Read Only Read/Write	O Write Only
Data Convert Settings Min Raw Value Max Raw Value 100	Collect Settings
None Reverse Sqrt Etc	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.

Tag Properti	ies and the second s	×
Tag Name: Data Type:	byManual IODisc	Tag Type
	[
Description:	Start fan control by PLC	
General	IO Alarm History	
Basic Ir Access N Data Blo Item	Name MGateIOServer.abc.ab1756	Data type BIT Frequency 100 ms
	Vrite Mode Read Only	O Write Only
-Data Co	onvert Settings	Collect Settings
Min Ra	aw Value 0	✓ Enabled
Max R	Raw Value 999999999	Force Read
Nor	ne 🔘 Reverse 🔘 Sqrt 🛛 Etc	Force Write
		OK Cancel

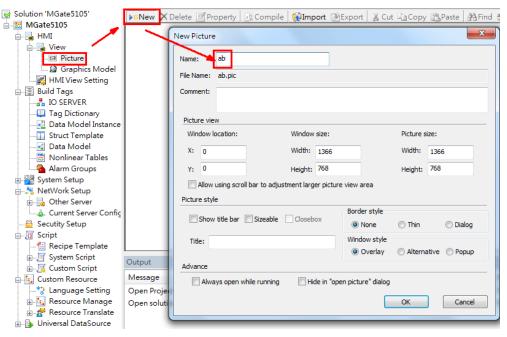
 Repeat steps 1 to 5 to create a **speed1** tag to read and write the **outSpeedReal** tag from/to Allen-Bradley ControlLogix PLC. Configure the tag properties as shown in the following figure.

Tag Properti	es and the second second second second	×
Tag Name:	speed1	Tag Type
Data Type:	IOFloat 🗸	Basic Struct Pointer
Description:	Manual Output Speed	
General	IO Alarm History	
Basic In		
	lame MGateIOServer.abc.ab1756 Data type	e FLOAT 🔻
Data Blo	k None	y 100 ms
Item	TAGoutSpeedReal	
Item		
	/rite Mode	
0	Read Only Read/Write Write O	nly
Data Co	onvert Settings Collect	Settings
Min Ra	aw Value 0	✓ Enabled
Max R	aw Value 60	Force Read
Line	ear 🔿 Reverse 🔿 Sqrt 🛛 Etc	Force Write
		OK Cancel

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.

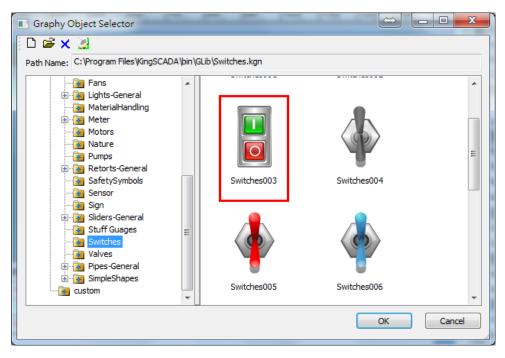


2. After adding object graphics, the following figure shows the complete view picture.

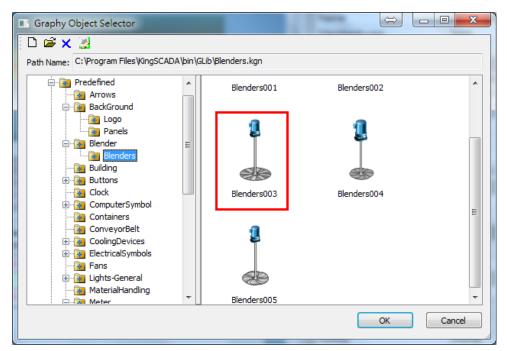


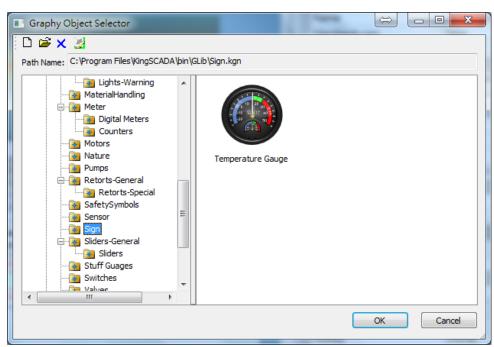
From **File** \rightarrow **Open** \rightarrow **Genius**, you can get the Switches, Blenders, and Sign object pictures as shown in the following figures.

• Switches



Blenders

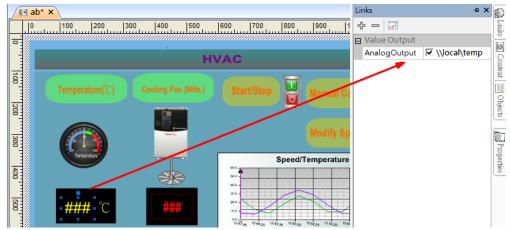




5.4.2 Adding Links

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

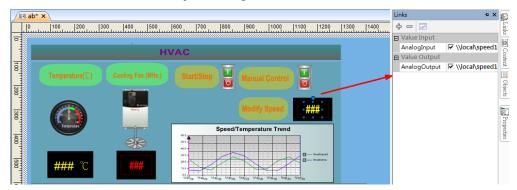
 Select the **Temperature** input box; then, in the Links window, click the + icon to add the **AnalogOutput** source as the **\\local\temp** tag.



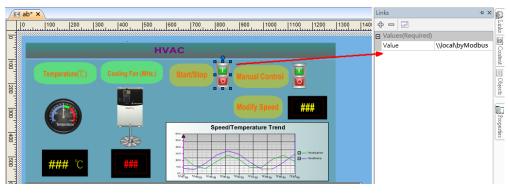
Sign

- Links All ab* X ₽X 0 |100 |200 |300 |400 |500 |600 |700 |800 |900 |1 수 🗆 😾 Links Value Output -Þ AnalogOutput 🔽 \\local\speed **HVAC** Content i i Dijects 📑 20 8 Properties Speed/Temperature 8 50 0.0 8 报警日期 报警时间 事件日期 事件时间 变量 2014/10/07 17:46:44.671 2014/10/07 17:46:46.671 2 2014/10/07 2014/10/07 17:46:45.67 17:46:44.671 2014/10/07 17:46:44.671 2014/10/07
- Select the Speed input box; then, in the Links window, click the + icon to add the AnalogOutput source as the\\local\speed tag.

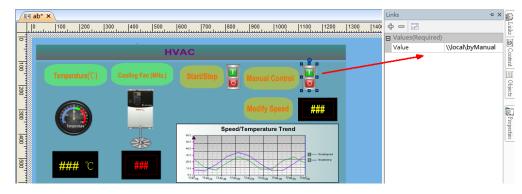
 Select the Modify Speed input box; then, in the Links window, click the + icon to add the AnalogOutput source as the \\local\outSpeed1 tag and the AnalogInput source as the \\local\outSpeed1 tag.



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

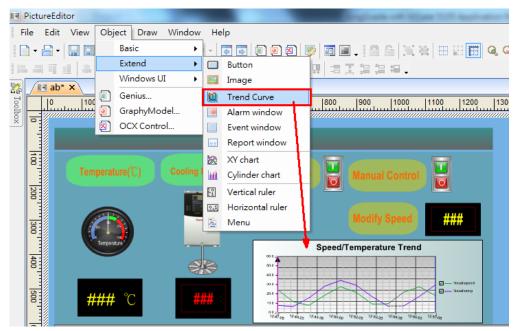


5. Select the **Manual Control** switch; then, in the Input window, click the + icon to add the **Value** source as the **\\local\byManual** tag.

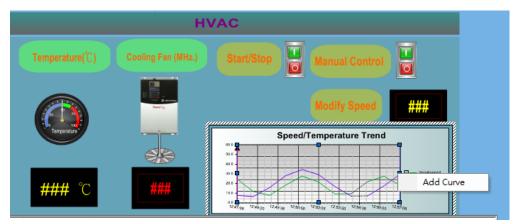


5.4.3 Adding a Trend Curve

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

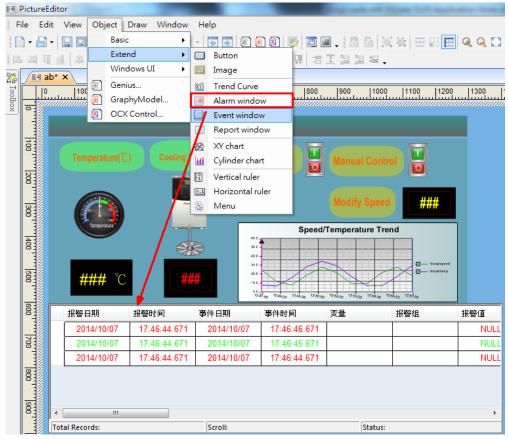


 Right-click on the Chart object and click Add Curve to add the Speed and Temperature curves that are linked to the \\local\speed and \\local\temp tags respectively.



5.4.4 Adding an Alarm Window

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



ag Name: tem	ιp					■ Basic ■ Struct ■ Pointe
ata Type: IOF	loat				•	Basic Struct Pointe
escription: Ter	nperature in	real format				
General IO	Alarr	n History]			
Limit Alarm S	Settings					ROC Alarm Settings
	Limit Value	Alarm Text	Priority	Alarm Inhibitor		
LoLo	0	LoLo	1		?	Roc Second
🔽 Lo	10	Too Cold	1 🚔		?	20 % O Minute
🔽 Hi	20	Too Hot	1 🚔		?	O Hour
🔲 HiHi	100	HiHi	1		?	Alarm Text Priority
🔲 Dead	0	Delay	0	Sec		Alarm Inhibitor
Dev Alarm S						?
	Limit Value	Alarm Text	· · ·	Alarm Inhibitor		
Major	80	Major	1 📩		?	Delay 0 Sec
Minor	20	Minor	1		?	Alarm Group:
Target	100	Dead Ba	nd 0	Delay 0	Sec	RootNode

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

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

Tag Properties		
	eed	Tag Type Basic Struct Pointer
Description: Sp	eed in real format	
General IO	Alarm History	
Limit Alarm CLOLO CLO LO LO LO LO LO LO LO LO LO LO LO LO L	Limit Value Alarm Text Priority Alarm Inhibitor 0 LoLo 1 ?? 10 Speed low 1 ?? 50 Speed high 1 ?? 100 HiHi 1 ?? 0 Delay 0 Sec	Second Z0 % Minute Hour
-Dev Alarm	Settings Limit Value Alarm Text Priority Alarm Inhibitor	
Major	80 Major 1 🔷 ?	Delay 0 Sec
Minor	20 Minor 1 📩 ?	Alarm Group:
Target	100 Dead Band 0 Delay 0 Se	RootNode
		OK Cancel

5.5 Compiling a Project

Click **Compile** to compile project. Make sure that there is no error or warning in the **Output** tab window.

Make Make	AND TAXABLE PROPERTY.	
File Edit View Compile T	ools Help	
New 🤔 Add 🏀 Open	📻 Find 📴 Large 📰 Details 🐼 Compile 🛃 Graphy 📰 View 🥝	About
Solution 'MGate5105' MGate5105 HMI Graphics Model MIView Setting	ab	_I Copy 過 ^p aste │ 船 Fi
Build Tags	Output	
I Tag Dictionary	Message	Position
Tag Dictionary Tag Dict	Begin Compiling DataModel End Compiling DataModel.	MGate5105 MGate5105
Data Model	>>Compile Application Scripts:	Project(MGate5105)
Nonlinear Tables	>>Compile success: void OnApplicationStartUp()	Project(MGate5105).L
Alarm Groups	>>Compile success: void OnApplicationRunning()	Project(MGate5105).L
🗄 🌌 System Setup	>>Compile success: void OnApplicationStop()	Project(MGate5105).L
🚔 🧏 NetWork Setup	>>Compile Alarm Scripts:	Project(MGate5105)
🗈 📴 Other Server	>>Compile success: void OnAlarmEvent_Disc(DiscTag bTag, long filetime, lon	Project(MGate5105).L
Current Server Config	>>Compile success: void OnAlarmEvent_Int(IntTag iTag, long filetime, long ev	Project(MGate5105).L
	>>Compile success: void OnAlarmEvent_Float(FloatTag fTag, long filetime, lo	Project(MGate5105).L
Recipe Template	>>Compile User Login Scripts:	Project(MGate5105)
	>>Compile success: void OnLogOn(string Username)	Project(MGate5105).L
E-Gustom Script	>>Compile success: void OnLogOff)	Project(MGate5105).L
Custom Resource	>>Compile Data Change Scripts:	Project(MGate5105)
⁺ à Language Setting	>>Compile Event Scripts:	Project(MGate5105)
🔬 🔩 Resource Manage	>>Compile Custom Function Scripts	Project(MGate5105)
🗄 😤 Resource Translate	>>Compile Hotkey Scripts:	Project(MGate5105)
🗄 🕒 Universal DataSource	>>Compile Timer Scripts:	Project(MGate5105)
	>>Compile picture - MGate5105.al	Project(MGate5105).F
	==MGate5105.ab - 0 error(s), 0 warning(s)	Project(MGate5105).F
	Output ind Results Error List	

6 Runtime Test

Before you execute **ScadaView**, you must start the IO server first.

1. In the **IOServer Configure** program, click **Start** to start the IO server.

📲 IOServer-C:\Program Files\KingSCA	ADA\My Projects\MGa	te5105ab\					
Eile Edit View Acquisition Tools Help							
🗄 🛌 New 🔄 Open 💼 Close 🕒 Start 🔤 Stop 🔮 Diagnosis 🗮 Debug Message 🛷 DriverSetup 🗃 Monitor 🔯 About IOServ							
Device Tree 🛛 🕂 🗙	🕭 abc.ab1756						
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2. In the **ScadaMake** program, click **View** to run the SCADA View system. Alternatively, you can execute the **ScadaView** program to run this project.

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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 user 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.

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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.

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