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Rev. FEB 27, 2020

# Weintek HMI to BACnet MS/TP Device

**Introduction:** This instruction manual discusses how to communicate with a BACnet MS/TP slave. BACnet is a communication protocol designed for building automation. The BACnet protocol defines the **object types** and the **properties** for each object type. All BACnet objects consists of a number of properties for information exchange. The table below shows you the common BACnet object types. A device that is compatible with BACnet protocol must have only one **instance** of Device object type for its structure. An instance number is the way to identify items within an object type.

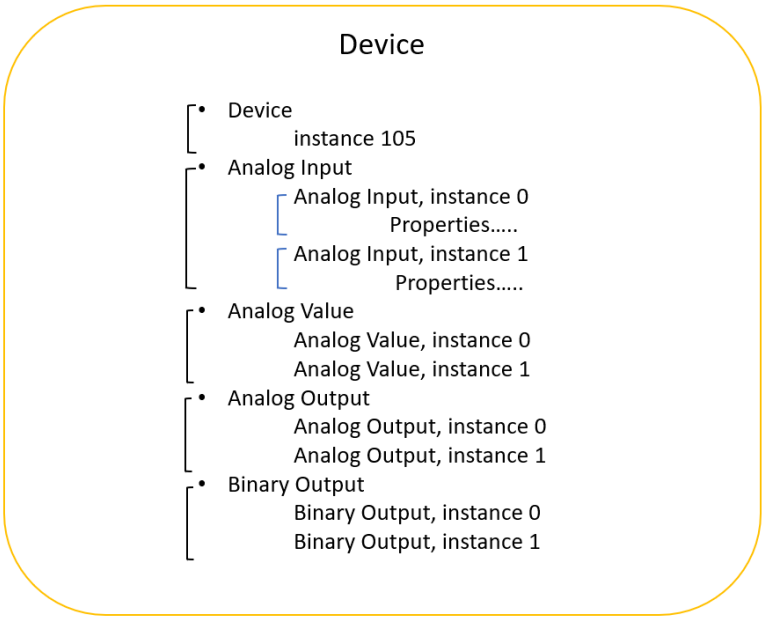
| Object Type | Object Type ID | Example of Use |
|---|---|---|
| Analog Input | 0 | Analog sensor input |
| Analog Output | 1 | Command output |
| Analog Value | 2 | Setpoints or parameters |
| Binary Input | 3 | Digital sensor input |
| Binary Output | 4 | Relay output |
| Binary Value | 5 | Digital logic |
| Device | 8 | Device information, supported object types and services |
| Multi-state Input | 13 | Represents the states of the process, such as OFF, ON, AUTO |
| Multi-state Output | 14 | Represents the desired states of the process |
| Multi-state Value | 19 | Represents multi-state indicators |

There are many properties of the object types that are used to monitor and control a BACnet-compatible device. Some properties apply only to certain object types, but every object type must have at least three properties, including **Object_Identifier**, **Object_Name**, and **Object_Type**. For example, the table below shows you some of the properties within Analog input, instance number 1. A BACnet MS/TP master issues the **Read_Property** service to the BACnet MS/TP slave in order to get temperature data from the **Present_Value** property.

| Properties Name | Properties Value |
|---|---|
| Object_Identifier | Analog input, instance 1 |
| Object_Name | Office temperature |
| Object_Type | Analog input |

| | |
|---|---|
| Present_Value | 72.2 |
| Event_State | normal |
| Units | Degrees Fahrenheit |
| High_Limit | 95.0 |
| Low_Limit | 40.0 |

The object types supported by a BACnet device can be found under the Protocol Object Types Supported property of the **Device** object type or in the user manual of the device.




*BACnet IP Object Modeling*

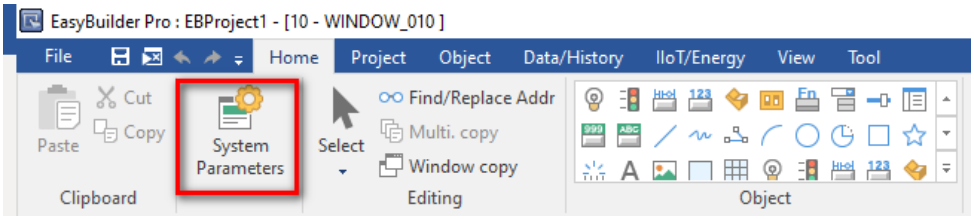
**Equipment & Software:**

1.EasyBuilder Pro v6.03.02.294

2. Weintek HMI cMT3090

3. BACnet MS/TP slave device

**Detail of the HMI Programming:** Open a new project and choose the HMI model cMT3090. To get the HMI talking to the BACnet MS/TP slave, go to the [HOME] tab on the top of the menu and then click on the [System Parameters] button.




Search for **[BACnet/ MSTP]** driver from the list of the device drivers.

I/F: BACnet MS/TP uses RS485 2 wires as its physical layer.

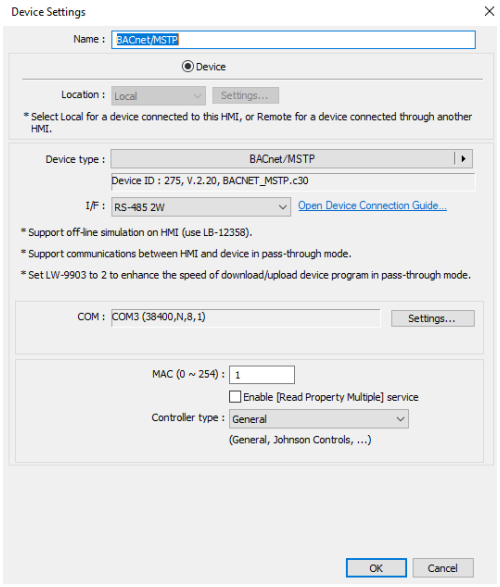
Enable [Read Property Multiple] Service: This option depends on the slave device.

MAC (0 -254): Enter the MAC address of the slave. Each BACnet MS/TP device must have a unique MAC address because a MAC address stands for a node on the BACnet MS/TP network.

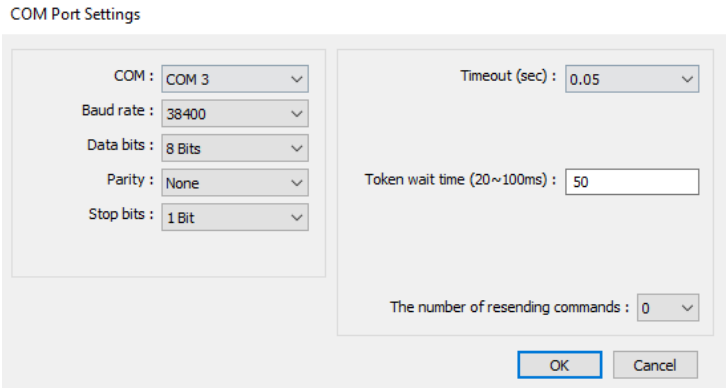
Note: A smaller interval between MAC values will speed up initialization. If the interval is too large, a “device no response” message may be displayed on HMI screen during initialization. Please take this into consideration when setting the MAC addresses on your BACnet MS/TP devices.

Controller type:

- General: select this option for a general BACnet MS/TP slave.
- Johnson Controls: select this option if the device manufacturer is Johnson Controls.




Click on the [Settings…] button to enter the serial settings of the BACnet MS/TP slave device, including Baud rate, Data bits, Stop bits, and Parity. The general baud rates are 19200, 38400, and 76800.



After the above communication settings are finished, you will need to import tags (BACnet object types). Easybuilder Pro supports the following two methods.

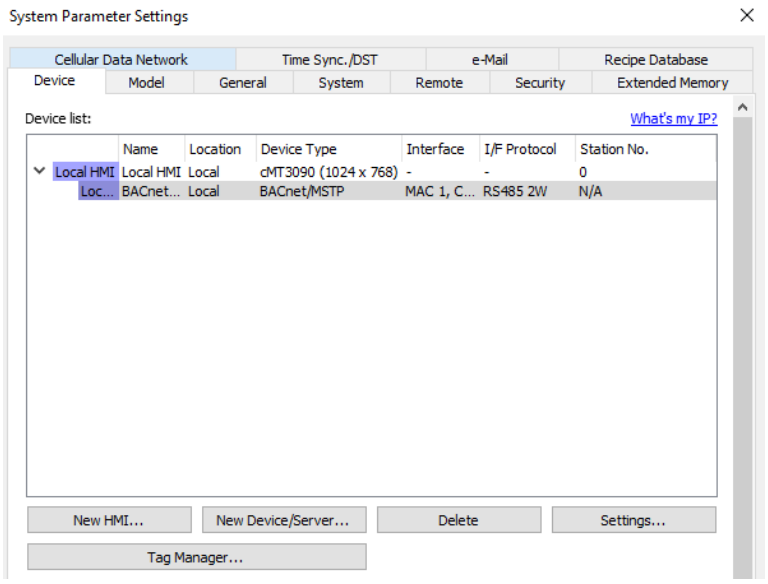
- [Tag Manager…]→[Get Tag Info...]: It reads the tag information from the device directly using an RS232-to-RS485 converter to connect the device to the PC. Only one BACnet MS/TP slave can connect to Easybuider Pro at a time for this procedure.

  Note: Some BACnet MS/TP devices do NOT support the [Who Is] and [Get Tag Info] method. If this is the case, please use the [Import from CSV…] method as the alternative.

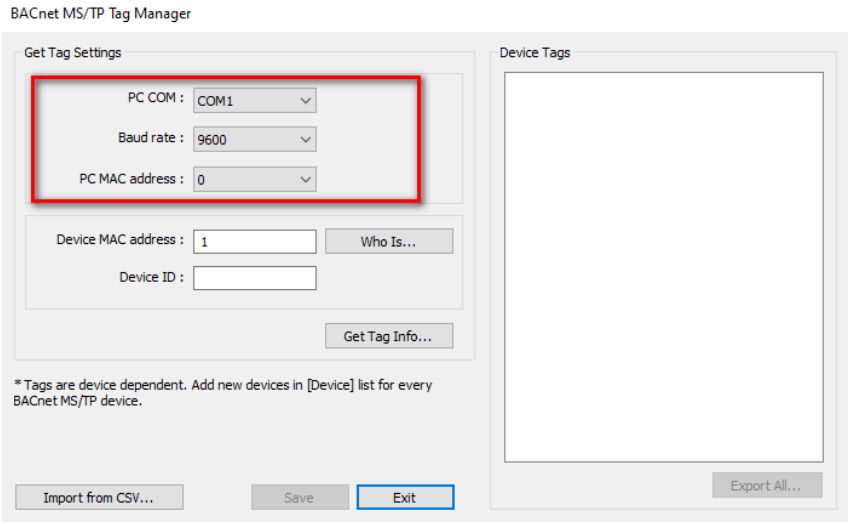
- [Tag Manager…]→[ [Import from CSV…]: Certain BACnet MS/TP masters, such as SCADA, have the capability to export tag information as a CSV or EDE (Engineering Data Exchange) file from a discovered device. These files can be imported into Easybuilder Pro.

## Method 1- Get Tag Info

Click on the [Tag Manager…] button.

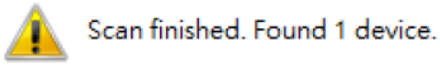


Set the [PC COM] and the [Baud rate] within [Get Tag Settings] to match the serial settings on the PC. Specify a unique MAC address for the PC.

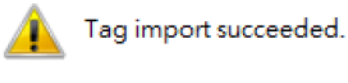



Enter the [MAC address] and [Device ID] or click on the [Who Is…] button to scan for the device. If the device is found, the following message will appear. The MAC address and Device ID will be read by Easybuilder Pro. Click [OK].

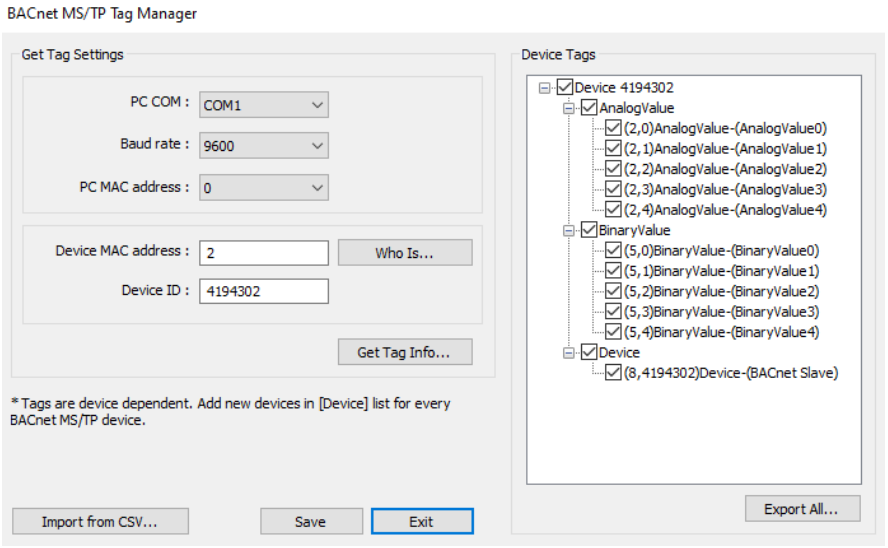
Note: The MAC address and Device ID of some BACnet MS/TP devices can be read by issuing the **Who Is** command only when the device is first powered up. It may be necessary to cycle power on the BACnet MS/TP device to successfully read the MAC address and Device ID.




After setting up the [MAC address] and [Device ID], click the [Get Tag Info…] button to read tag information from the device. If it succeeds, the following message will appear. Click [OK].



The available object types will be listed as below. You can select which object types you need to use in this project or select all of the objects. Click the [Save] button and then the [Exit] button.




You can create a CSV file that contains the object types in the project using the [Export All...] button and import into another project.

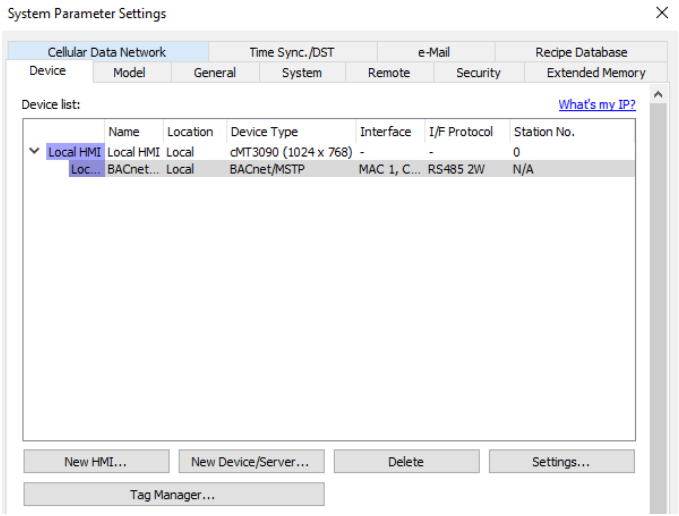
The CSV file can be opened in Excel. The tags starting at line 6 are listed in the following format.

[Device_ID], [Object_Type], [Object_Instance], [Object_Name], [Description]

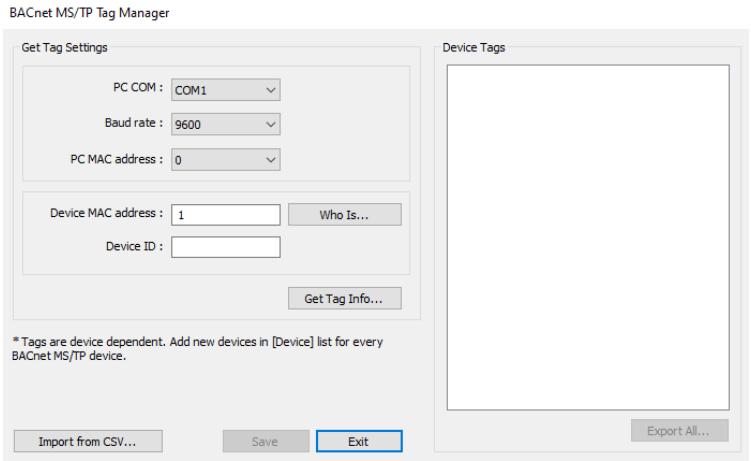
| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | GROUP_ID | GROUP_NAME | | | |
| 2 | 1 | New Group | | | |
| 3 | DEVICE_ID | GROUP_ID | DEVICE_NAME | | |
| 4 | 4194302 | 1 | Device | | |
| 5 | DEVICE_ID | OBJECT_TYPE | INSTANCE | OBJECT_NAME | DESCRI |
| 6 | 4194302 | 2 | 0 | AnalogValue | AnalogValue0 |
| 7 | 4194302 | 2 | 1 | AnalogValue | AnalogValue1 |
| 8 | 4194302 | 2 | 2 | AnalogValue | AnalogValue2 |
| 9 | 4194302 | 2 | 3 | AnalogValue | AnalogValue3 |
| 10 | 4194302 | 2 | 4 | AnalogValue | AnalogValue4 |
| 11 | 4194302 | 5 | 0 | BinaryValue | BinaryValue0 |
| 12 | 4194302 | 5 | 1 | BinaryValue | BinaryValue1 |
| 13 | 4194302 | 5 | 2 | BinaryValue | BinaryValue2 |
| 14 | 4194302 | 5 | 3 | BinaryValue | BinaryValue3 |
| 15 | 4194302 | 5 | 4 | BinaryValue | BinaryValue4 |
| 16 | 4194302 | 8 | 4194302 | Device | BACnet Slave |

Method 2- Import Tags

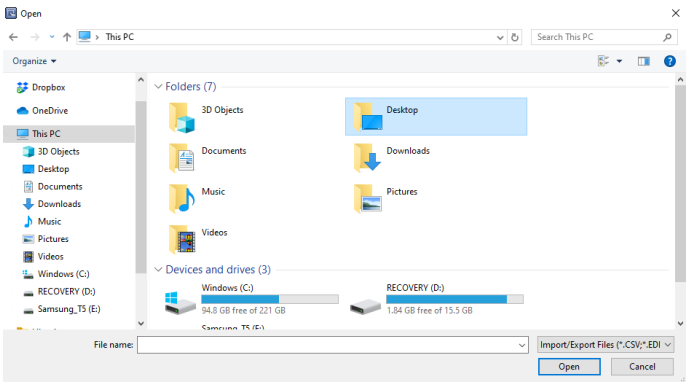
Click on the [Tag Manager…] button.



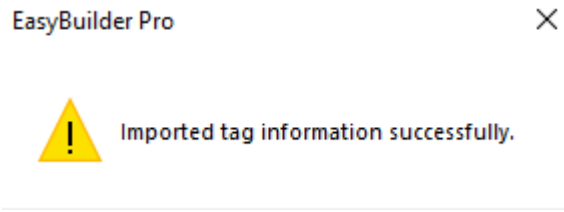

Click on the [Import from CSV...] button.



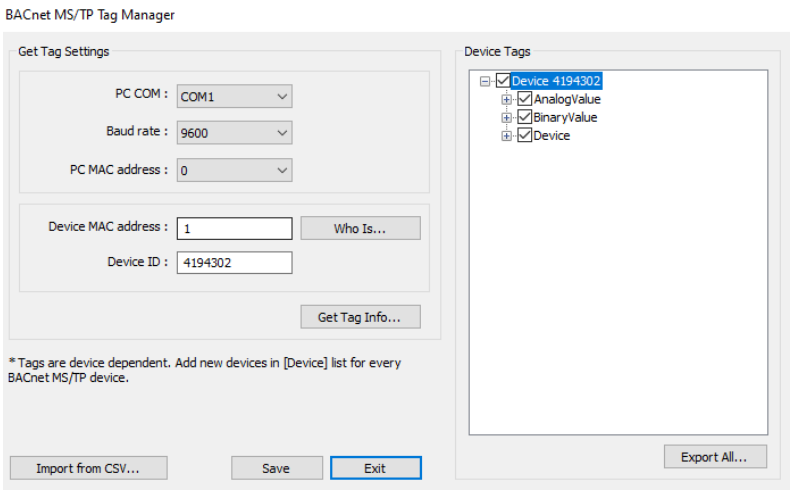
Navigate to your EDE file or the CSV file you exported from EasyBuilder Pro using Method 1.




Once the tags are imported, click the [OK] button on the following dialog.

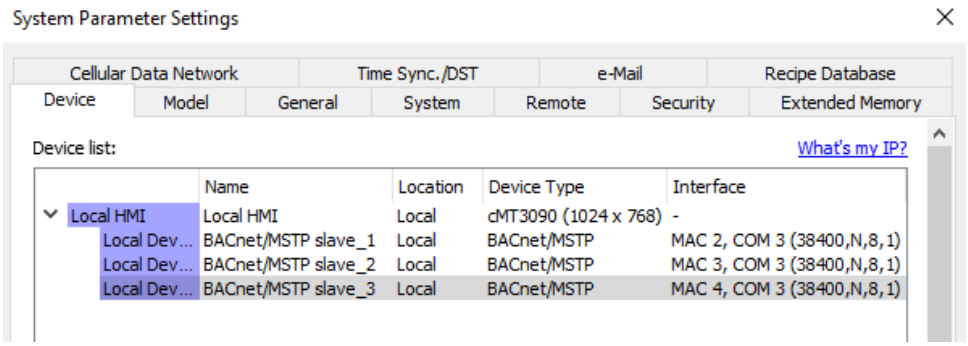



The available object types will be listed as below. You can select which object types you need to use in this project or select all of the objects. Click the [Save] button and then the [Exit] button.



### Connecting to multiple MS/TP devices

To connect to more than one BACnet MS/TP device, configure a **separate** entry in the **Device List** for each device and use either Method 1 or Method 2 to import tags for each device.



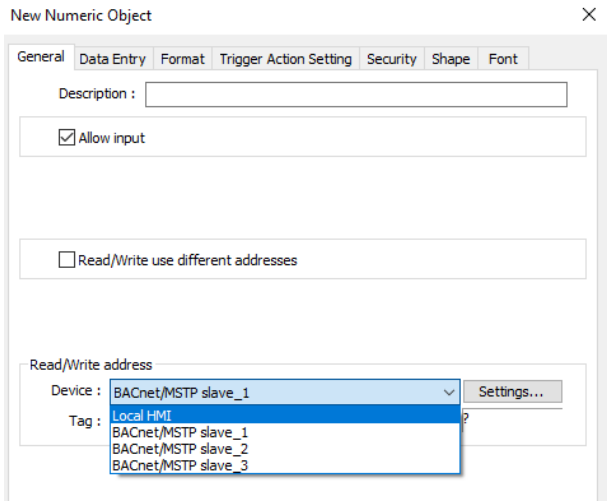

Note:

1. Each device must have a unique **Name** in the **Device List**.

2. Each device must have a unique MAC address in the **Device List**.

3. All of the devices will use the same **COM port** and only one COM port on the HMI can be configured to use the BACnet MS/TP driver. The COM port settings configured for the first BACnet MS/TP device (in this case, it is **BACnet/MSTP slave_1**) will apply to all of the BACnet MS/TP devices.

4. Each slave device will appear as a separate option as shown below when configuring an object on the HMI screen.



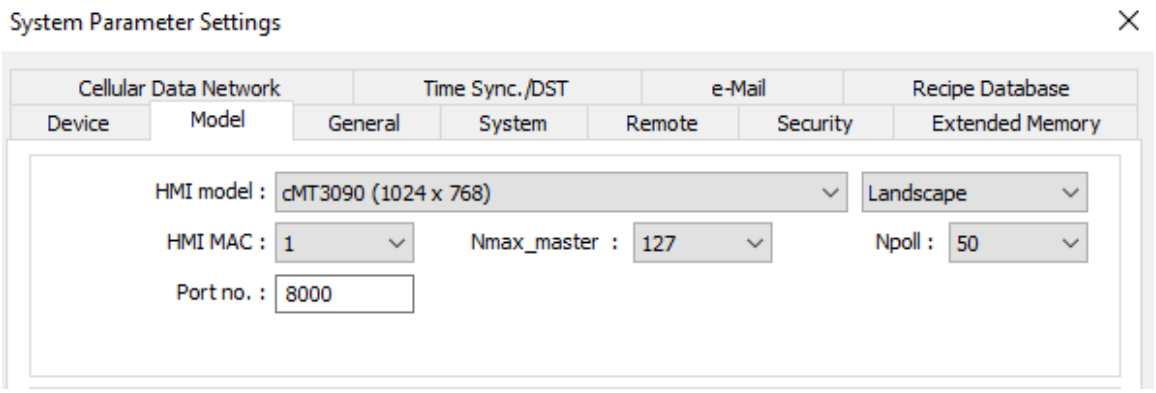
**HMI MAC address**

After configuring the BACnet MS/TP device on the [Device] tab, go to the [Model] tab to set up the **HMI MAC**, **Nmax_master**, and **Npoll**.

**HMI MAC:** Specify the MAC address of the HMI on the BACnet MS/TP network.

**Nmax_master:** The highest allowable MAC for the master node on the BACnet MS/TP network. The **HMI MAC** should be set at or below this number.

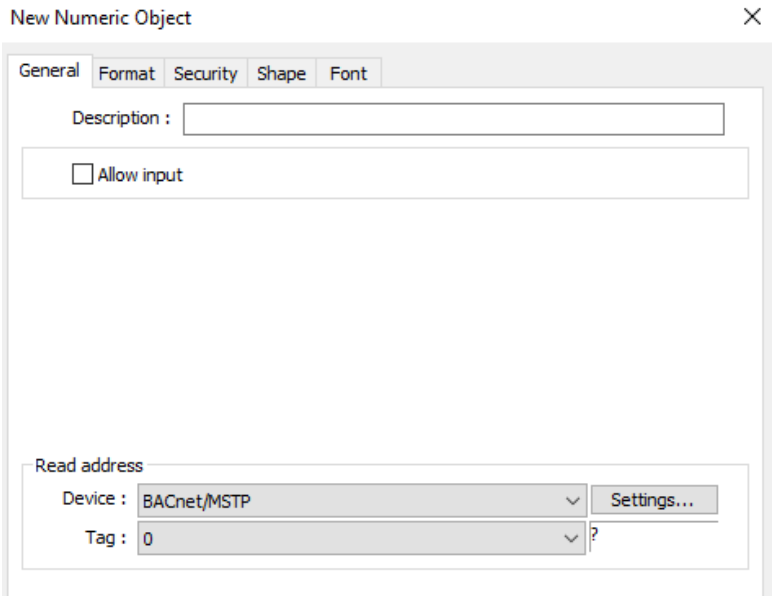
**Npoll:** The number of tokens received before a polling cycle is executed. A smaller value means a higher polling frequency, a larger value means lower polling frequency. By default the **Npoll** value is set to 50.



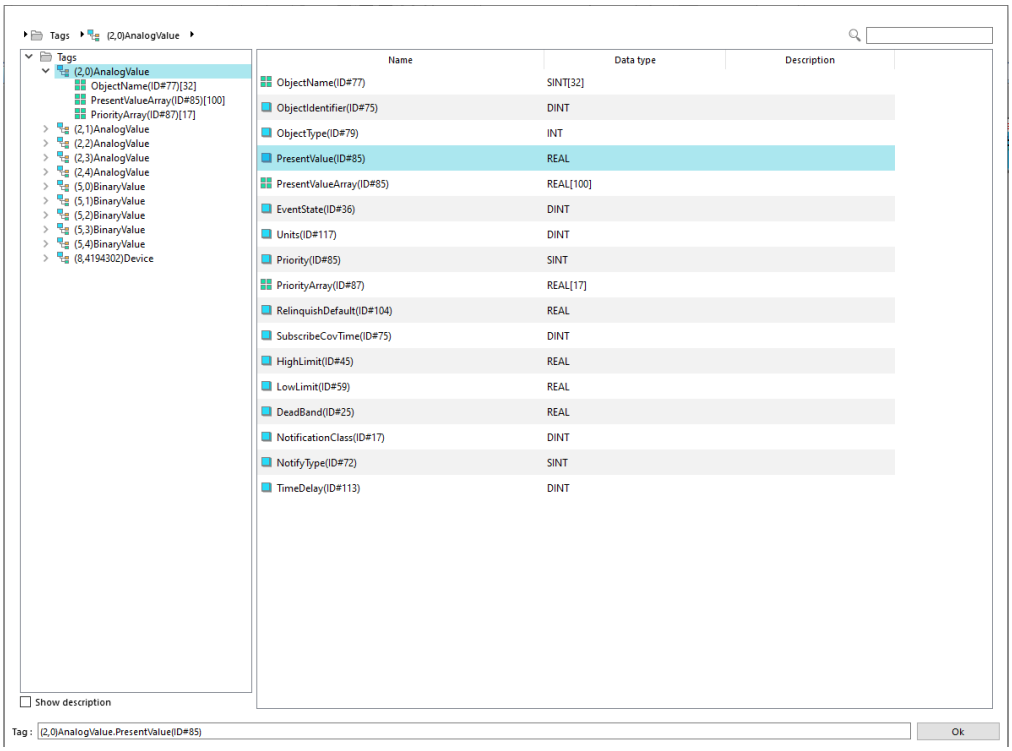
**How to read Present_Value property of Analog Value**

Create a Numeric object and specify the tag by clicking the [Tag] box.

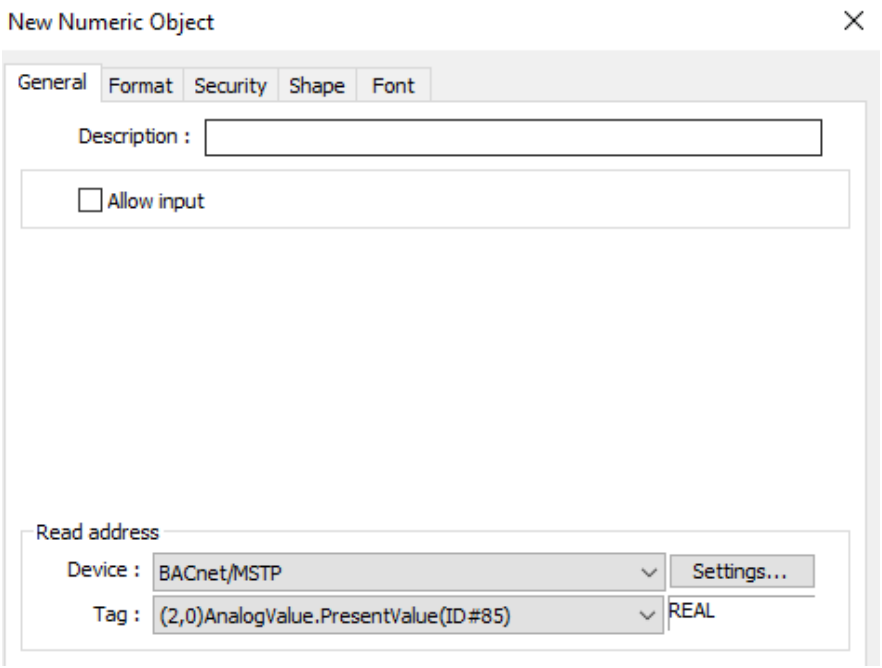
In this case, the Present_Value is read-only data. Unchecking [Allow input] is necessary.



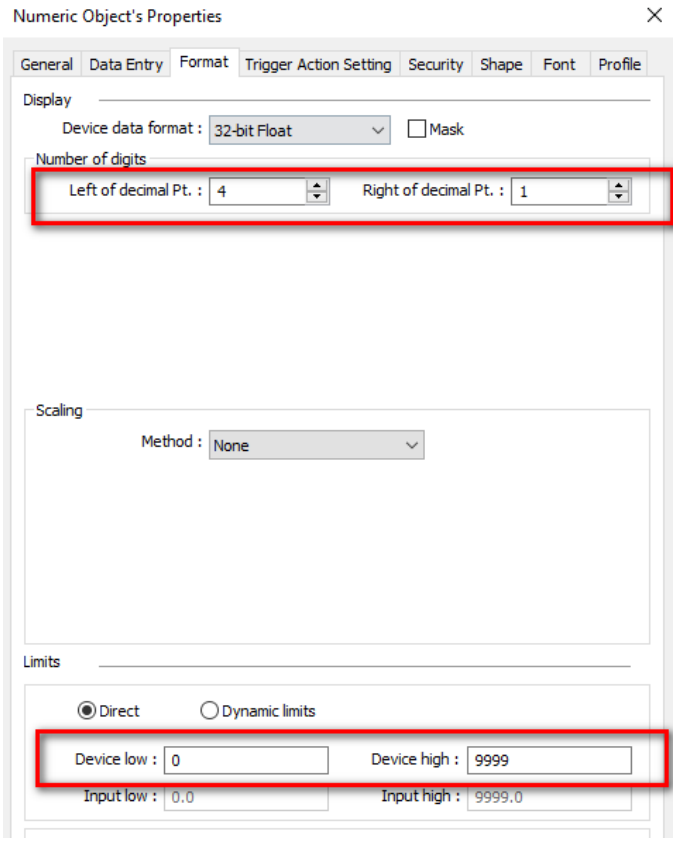

Select the Present_Value under (2,0) Analog Value, which is the instance 0 of Analog Value.




Once the tag is selected, go to the [Format] tab.



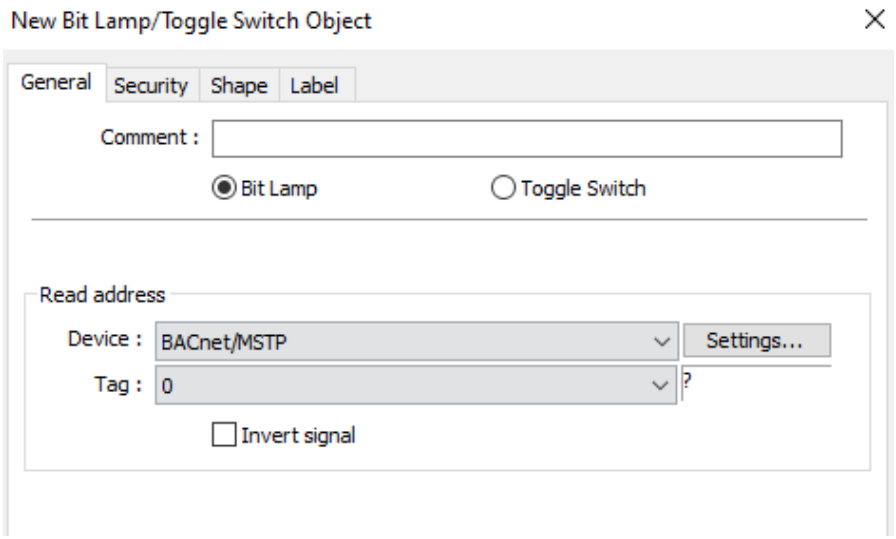
Under the [Format] tab, enter the number of digits used in this tag as well as the device's low limit and high limit. Click the [OK] button to finish setting up this object.



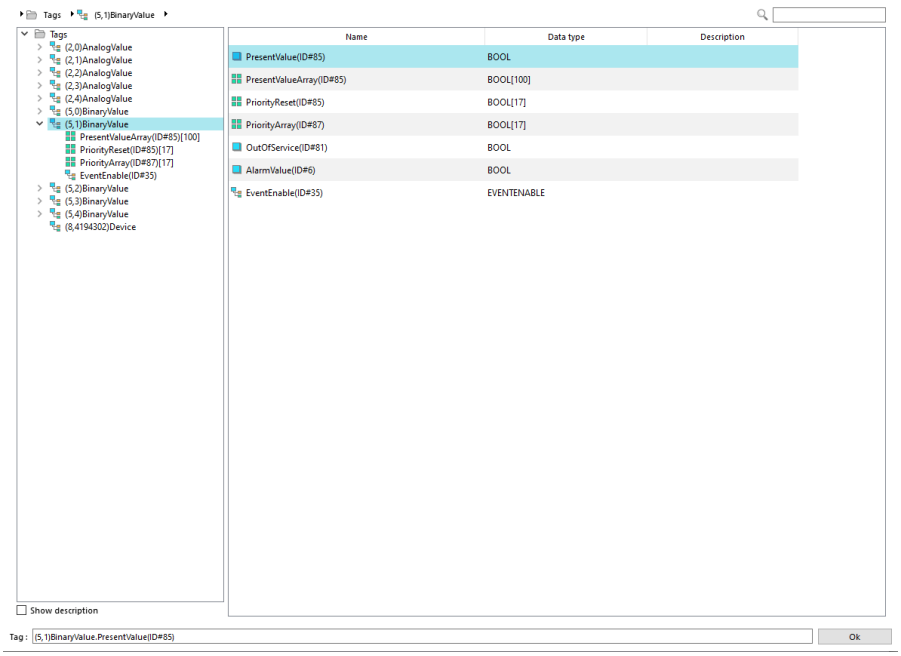

Place the Numeric object onto the editing area.

**How to read/write Present_Value property of Binary Value**

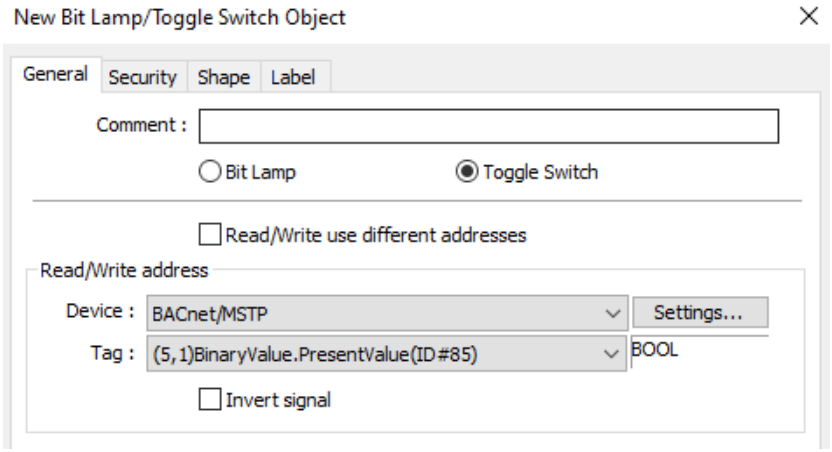
Create a Bit Lamp object and specify the tag by clicking the [Tag] box.



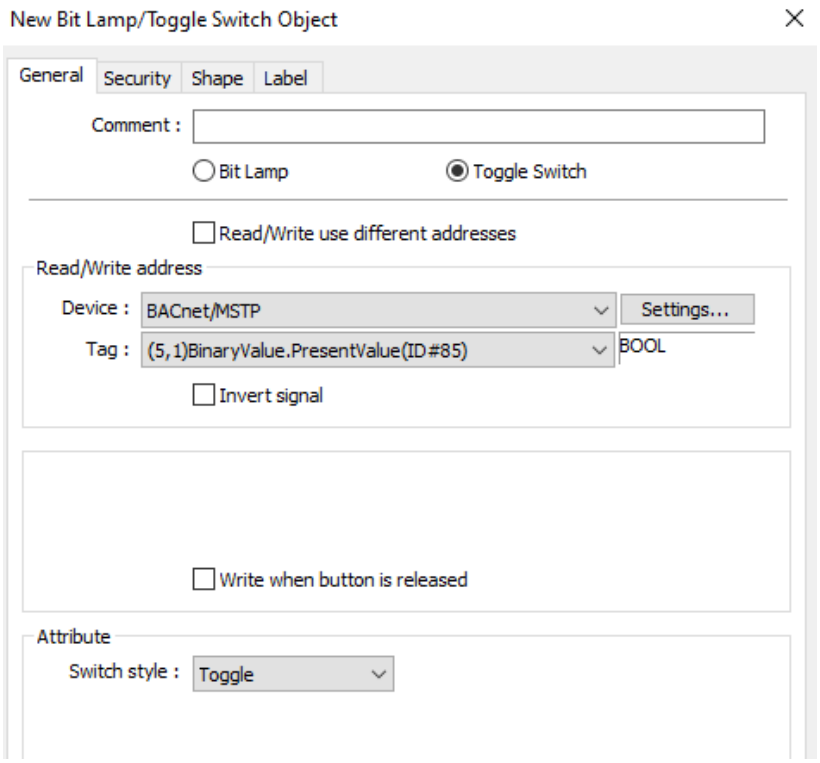

Select the Present_Value under (5,1) Binary Value, which is the instance 1 of Binary Value.



In this case, the tag allows an operator to control the device. Select **Toggle Switch** to enable the control function.




Within the Attribute, select **Toggle**.

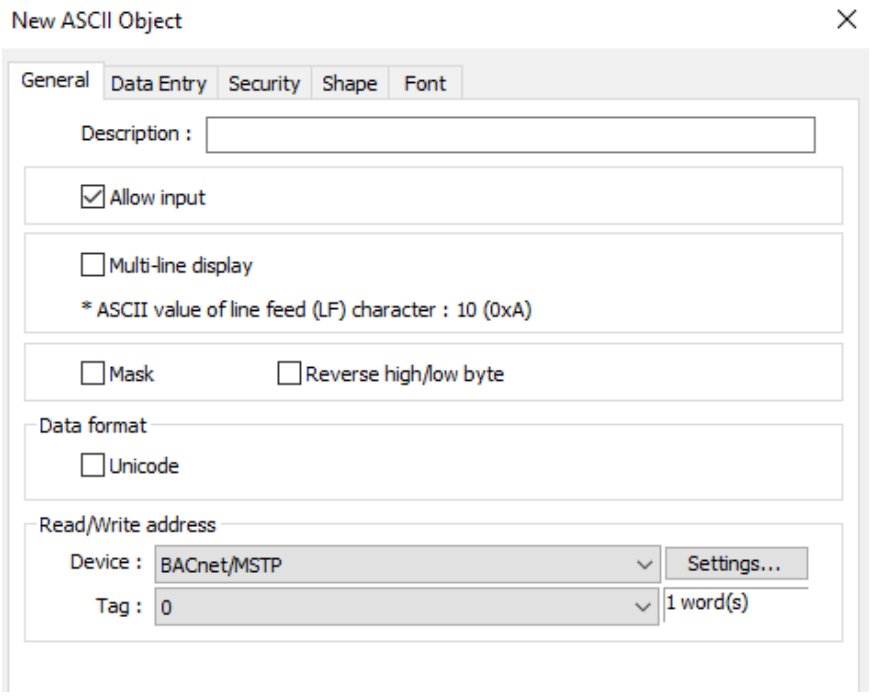


Place the Toggle Switch object onto the editing area.

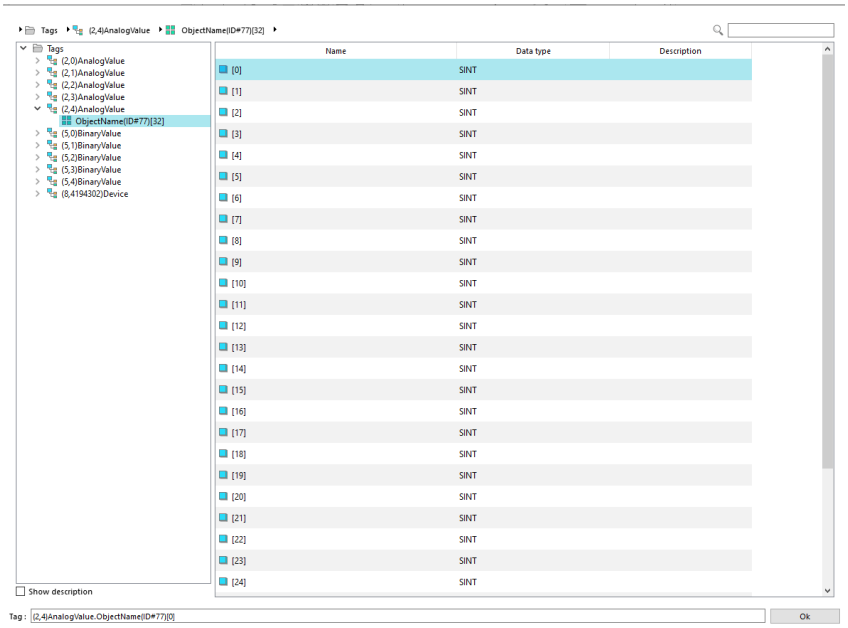

**How to read/write Object_Name property**

Some properties are **CharacterString** data in a BACnet device, such as **Object_Name** and **Object_Description**. Those properties in Easybuilder pro are defined as an array of SINT.

To access those properties, create an ASCII object. Click on the [Tag] box.

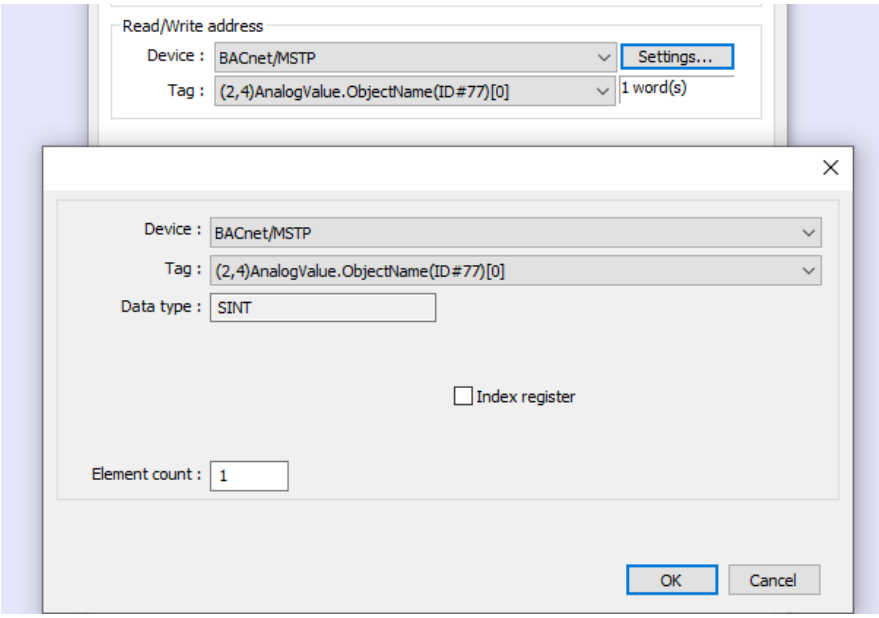


Select the first element of the array under **Object_Name**.

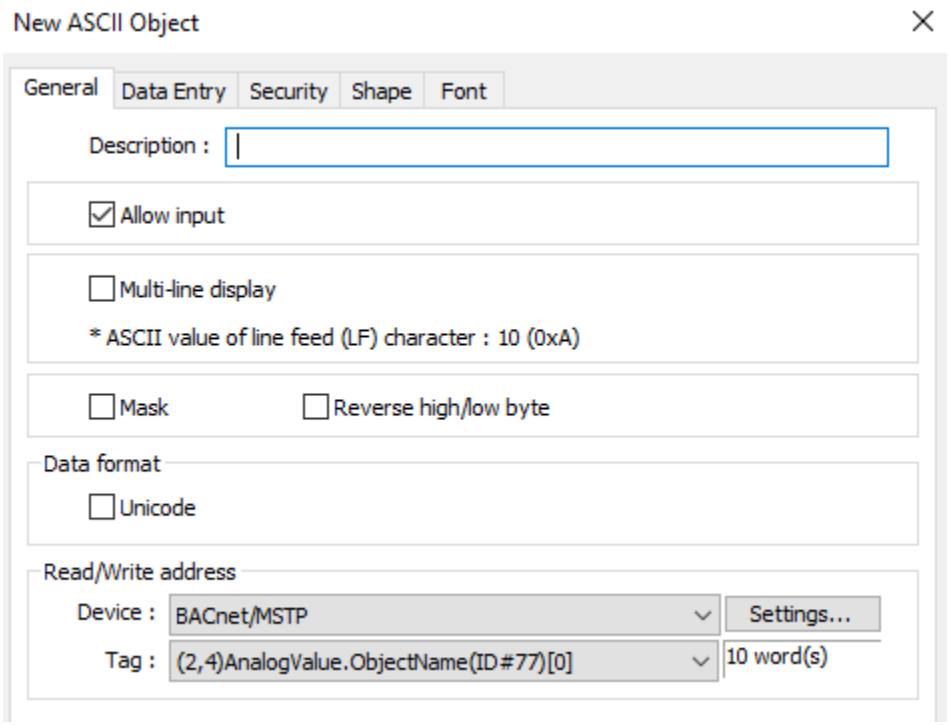



Click the [Settings…] button to enter the number of characters used by this property.

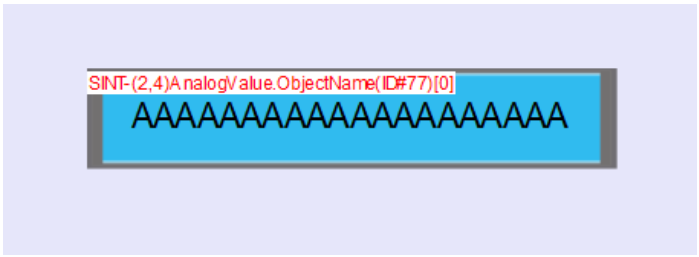
Note: the unit of string data in Easybuilder Pro is **Word**.



In this case, check [Allow input] to allow an operator to change the name of the object type on the HMI screen.




Place the ASCII object onto the editing area.




**Note: The BACnet MS/TP driver does NOT support on-line simulation.**

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Founded in 1996, WEINTEK LABS is a global-leading HMI manufacturer and is dedicated to the development, design, and manufacturing of practical HMI solutions. WEINTEK LAB's mission is to provide quality, customizable HMI-solutions that meet the needs of all industrial automation requirements while maintaining customer satisfaction by providing "on-demand" customer service. WEINTEK LABS brought their innovative technology to the United States in 2016, WEINTEK USA, INC., to provide quality and expedient solutions to the North American industrial market.

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