ANSI/ASHRAE Standard
Building Automation and Control Networks
BACnet MS/TP

Supported version TOP Design Studio V1.4.9.35 or higher

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We want to thank our customers who use the Touch Operation Panel.

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2. External device selection Page 3

Select a TOP model and an external device.

3. TOP communication setting Page 4

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5. Supported addresses Page 12

Refer to this section to check the data addresses which can communicate with an external device.

1. System configuration

The system configuration of TOP and "BACnet MS/TP" is as follows.

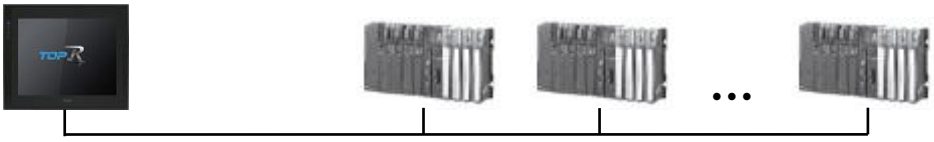
Series	CPU	Link I/F	Communication method	System setting	Cable
BACnet MS/TP Device			RS-232C *Note 1)	3. TOP communication setting	4. Cable table
			RS-422		
			RS-485		

*Note 1) For RS-232C configuration, only 1:1 connection is possible.

■ Connectable configuration

・1:1 connection

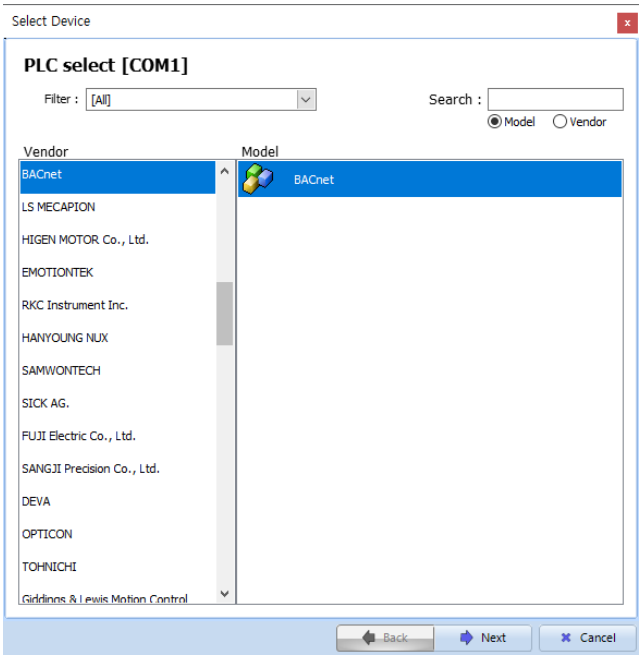
・1:N connection

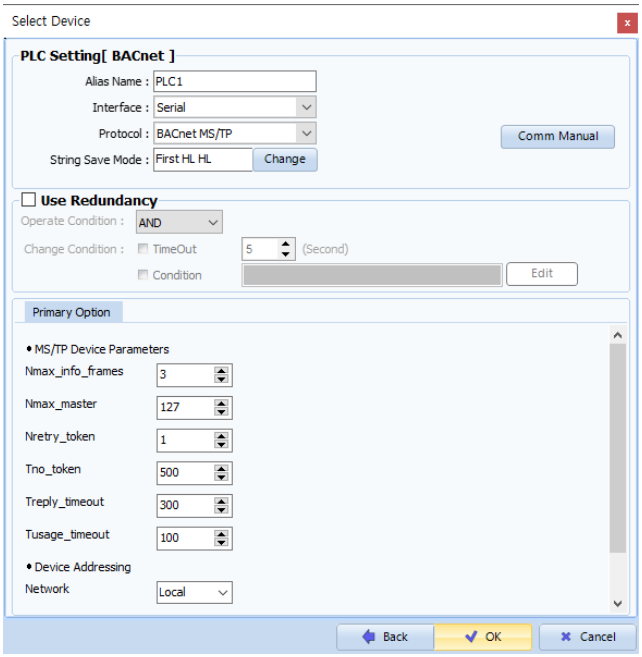


・N : N connection

2. External device selection

■ Select a TOP model and a port, and then select an external device.





Settings		Contents
TOP	Model	Check the display and process of TOP to select the touch model.
External device	Vendor	Select the vendor of the external device to be connected to TOP. Select "BACnet".
	PLC	Select the external device to be connected to the TOP. **Model** / **Interface** / **Protocol** BACnet / Serial / BACnet MS/TP Please check the system configuration in Chapter 1 to see if the external device you want to connect is a model whose system can be configured.

3. TOP communication setting

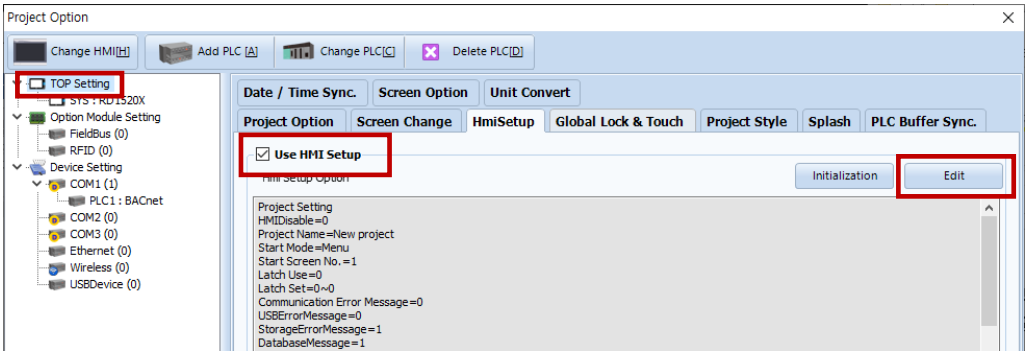
The communication can be set in TOP Design Studio or TOP system menu.

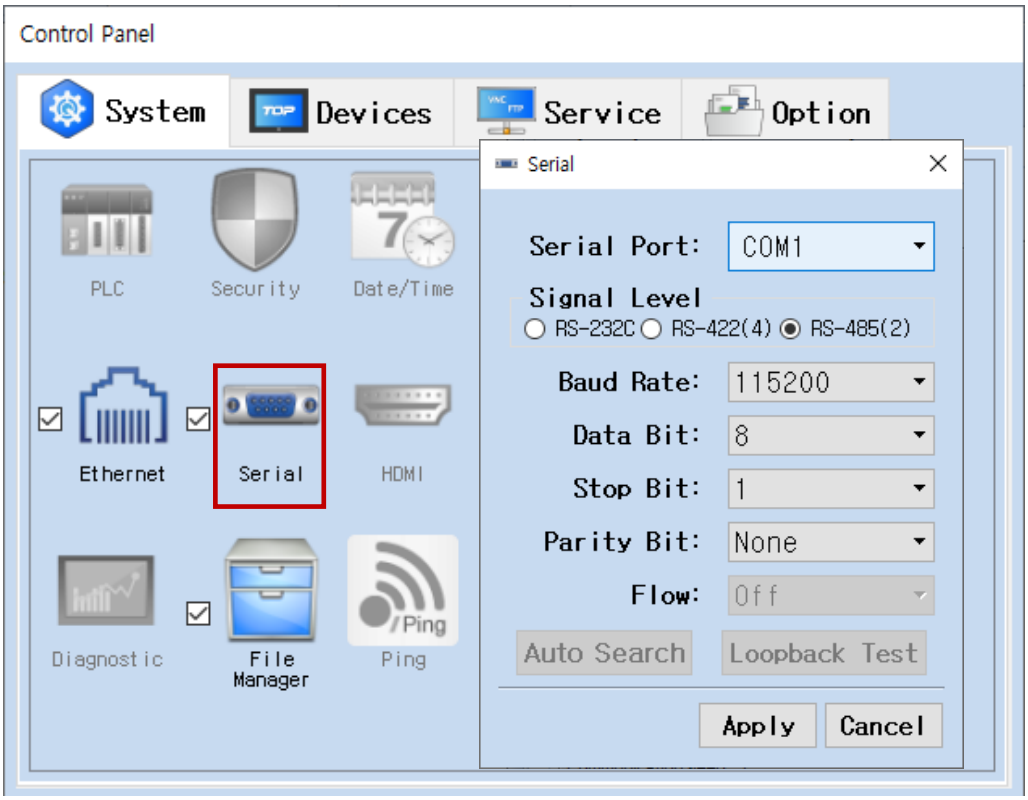
3.1 Communication setting in TOP Design Studio

(1) Communication interface setting

■ [Project] → [Property] → [TOP Setting] → [HMI Setup] → [Use HMI Setup Check] → [Edit] → [Serial]

– Set the TOP communication interface in TOP Design Studio.





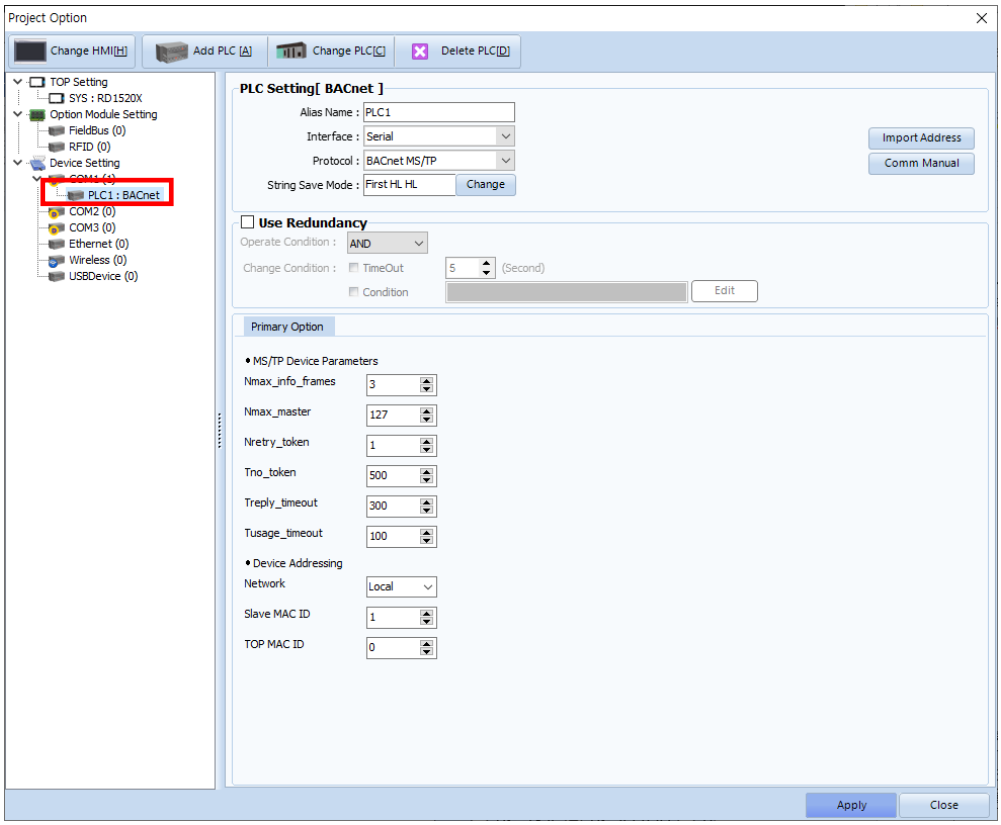
Items	TOP	External device	Remarks
Signal Level	RS-232C RS-422/485	RS-232C RS-422/485	
Baud Rate	115200		
Data Bit	8		
Stop Bit	1		
Parity Bit	None.		

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device. (COM3 supports only RS-485.)
Baud Rate	Select the serial communication speed between the TOP and an external device.
Data Bit	Select the serial communication data bit between the TOP and an external device.
Stop Bit	Select the serial communication stop bit between the TOP and an external device.
Parity Bit	Select the serial communication parity bit check method between the TOP and an external device.

(2) Communication option setting

■ [Project] → [Project properties] → [PLC settings > COM1 > PLC1: BACnet]

– Set the options of the BACnet MS/TP communication driver in TOP Design Studio.



* The above settings are examples recommended by the company.

Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select the communication protocol between the TOP and an external device.	

● **MS/TP Device Parameters**

Items	Settings	Remarks
Nmax_info_frames	Set the number of data communication before TOP delivers the token.	
Nmax_master	Enter the largest master node address.	
Nretry_token	Set the number of token transfer retries.	
Tno_token	Set the time it takes to judge it as token loss.	
Treplry_timeout	Set the amount of time to wait for a response to a data request.	
Tusage_timeout	Set the minimum amount of time when a node must spend a token.	

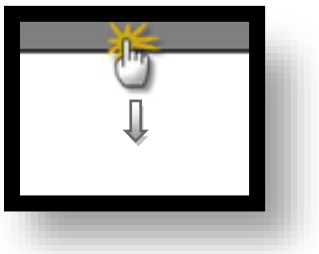
● **Device Addressing**

Items	Settings	Remarks
Network	Select the connection configuration of TOP and the external device.	
■ **When Network is Local**		
Slave MAC ID	Enter the node number of the slave.	
TOP MAC ID	Set the node number of TOP.	
■ **When Network is Remote**		
Router Address	Enter the node number of a router.	
Dst Network Number	Enter the number of the network where the slave is located.	
Slave Address	Enter the address information of the slave.	
TOP MAC ID	Set the node number of TOP.	
Src Network Number	Enter the number of the network where TOP is located.	
TOP Address	Enter the address information of TOP.	

3.2. Communication setting in TOP

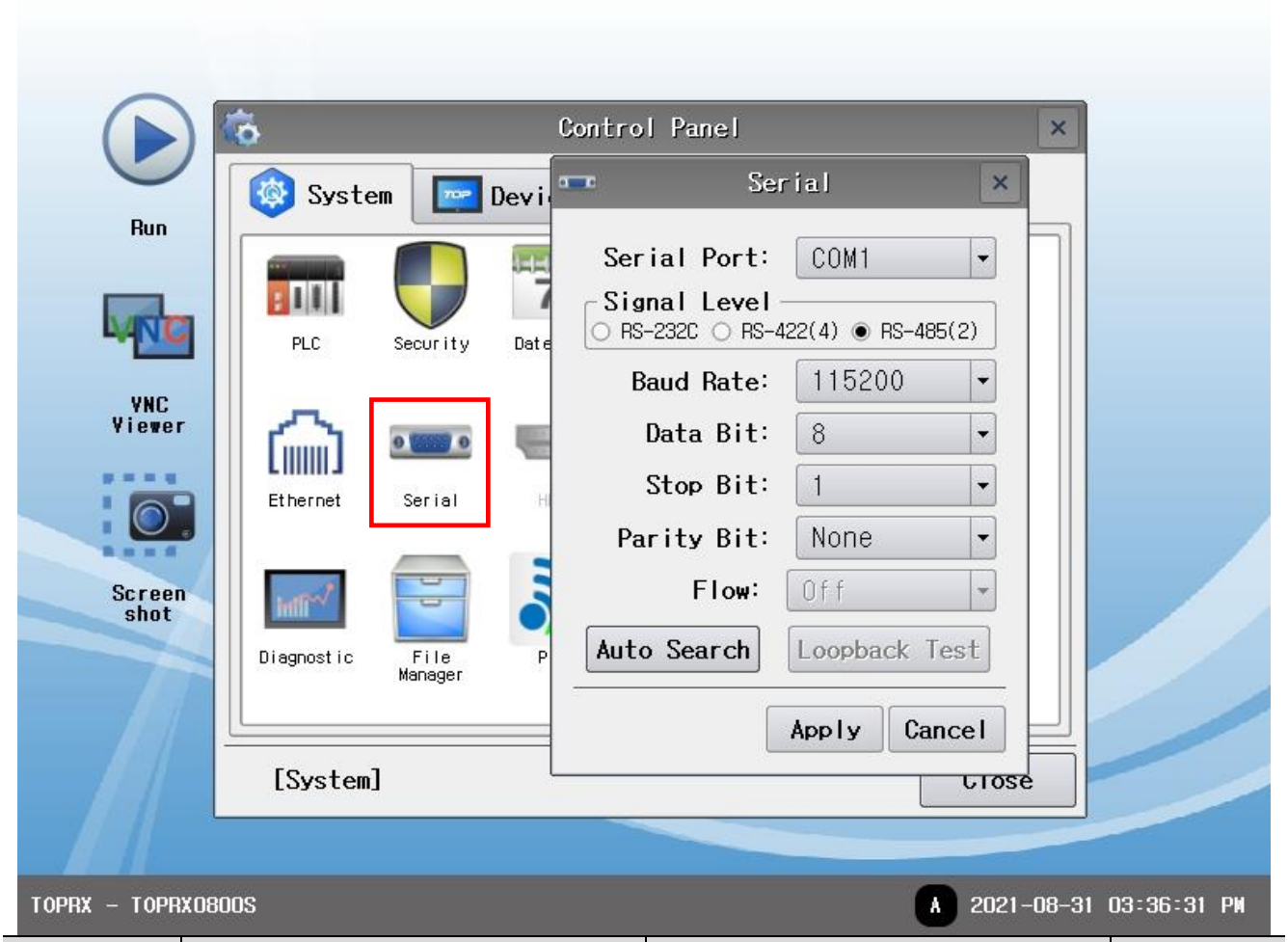
*** This is a setting method when "Use HMI Setup" in the setting items in "3.1 TOP Design Studio" is not checked.**

■ Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.



(1) Communication interface setting

■ [Control Panel] → [Serial]



Items	TOP	External device	Remarks
Signal Level	RS-232C RS-422/485	RS-232C RS-422/485	
Baud Rate	115200		
Data Bit	8		
Stop Bit	1		
Parity Bit	None.		

Items	Description
Signal Level	Select the serial communication method between the TOP and an external device. (COM3 supports only RS-485.)
Baud Rate	Select the serial communication speed between the TOP and an external device.
Data Bit	Select the serial communication data bit between the TOP and an external device.
Stop Bit	Select the serial communication stop bit between the TOP and an external device.
Parity Bit	Select the serial communication parity bit check method between the TOP and an external device.

(2) Communication option setting

■ [Control Panel] → [PLC]

Items	Settings	Remarks
Interface	Select "Serial".	Refer to "2. External device selection".
Protocol	Select the communication protocol between the TOP and an external device.	

● **MS/TP Device Parameters**

Items	Settings	Remarks
Nmax_info_frames	Set the number of data communication before TOP delivers the token.	
Nmax_master	Enter the largest master node address.	
Nretry_token	Set the number of token transfer retries.	
Tno_token	Set the time it takes to judge it as token loss.	
Treplry_timeout	Set the amount of time to wait for a response to a data request.	
Tusage_timeout	Set the minimum amount of time when a node must spend a token.	

● **Device Addressing**

Items	Settings	Remarks
Network	Select the connection configuration of TOP and the external device.	
■ **When Network is Local**		
Slave MAC ID	Enter the node number of the slave.	
TOP MAC ID	Set the node number of TOP.	
■ **When Network is Remote**		
Router Address	Enter the node number of a router.	
Dst Network Number	Enter the number of the network where the slave is located.	
Slave Address	Enter the address information of the slave.	
TOP MAC ID	Set the node number of TOP.	
Src Network Number	Enter the number of the network where TOP is located.	
TOP Address	Enter the address information of TOP.	

3.3 Communication diagnostics

■ Check the interface setting status between the TOP and an external device.

- Touch the top of the TOP screen and drag it down. Touch "EXIT" in the pop-up window to go to the main screen.
- Check that the settings of the connected ports in [Control Panel] → [Serial] are the same as the settings of the external device.

■ Diagnosis of whether the port communication is normal or not

- Touch "Communication diagnostics" in [Control Panel] → [PLC].
- Check whether communication is connected or not.

Communication diagnostics succeeded	**Communication setting normal**
Error message	**Communication setting abnormal** - Check the cable, TOP, and external device settings. (Refer to Communication diagnostics sheet.)

■ Communication diagnostics sheet

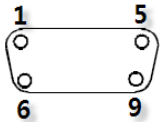
- If there is a problem with the communication connection with an external terminal, please check the settings in the sheet below.

Items	Contents		Check		Remarks
System configuration	How to connect the system		OK	NG	1. System configuration
	Cable		OK	NG	
TOP	Version		OK	NG	2. External device selection 3. Communication setting
	Communication port		OK	NG	
	Communication driver and protocol		OK	NG	
	Other detailed settings		OK	NG	
	Relative prefix	Project setting	OK	NG	
		Communication diagnostics	OK	NG	
	Serial Parameter	Transmission Speed	OK	NG	
		Data Bit	OK	NG	
		Stop Bit	OK	NG	
		Parity Bit	OK	NG	
External device	CPU		OK	NG	
	Communication port		OK	NG	
	Protocol		OK	NG	
	Setup Prefix		OK	NG	
	Other detailed settings		OK	NG	
	Serial Parameter	Transmission Speed	OK	NG	
		Data Bit	OK	NG	
		Stop Bit	OK	NG	
		Parity Bit	OK	NG	
	Check address range		OK	NG	5. Supported addresses (For details, please refer to the PLC vendor's manual.)

4. Cable table

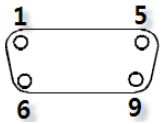
This chapter introduces a cable diagram for normal communication between the TOP and the corresponding device.
(The cable diagrams in this section may differ from the external device vendor's recommendations.)

■ RS-232C (1:1 connection)

COM1 / COM2			Cable connection	BACnet MS/TP Device	
Pin arrangement*Note 1)	Signal name	Pin number		Signal name	
	CD	1			
	RD	2		SD	
	SD	3		RD	
	DTR	4		DTR	
	SG	5		SG	
	DSR	6		DSR	
	RTS	7		RTS	
	CTS	8		CTS	
Based on communication cable connector front, D-SUB 9 Pin male (male, convex)		9			

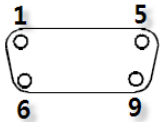
*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-422 (1:1 connection)

COM1 / COM2			Cable connection	BACnet MS/TP Device	
Pin arrangement*Note 1)	Signal name	Pin number		Signal name	
	RDA(+)	1		SDA(+)	
		2		SDB(-)	
		3		RDA(+)	
	RDB(-)	4		RDB(-)	
	SG	5		SG	
	SDA(+)	6			
		7			
		8			
Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	SDB(-)	9			

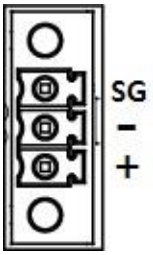
*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ RS-485 (1:1 connection)

COM1 / COM2			Cable connection	BACnet MS/TP Device	
Pin arrangement*Note 1)	Signal name	Pin number		Signal name	
	RDA(+)	1		+	
		2		-	
		3			
	RDB(-)	4			
	SG	5			
	SDA(+)	6			
		7			
		8			
Based on communication cable connector front, D-SUB 9 Pin male (male, convex)	SDB(-)	9			

*Note 1) The pin arrangement is as seen from the connecting side of the cable connection connector.

■ **RS-485** (1:1 connection)

COM3		Cable connection	BACnet MS/TP Device	
Pin arrangement	Signal name		Signal name	
	+		SDA(+)	
	-		SDB(-)	
	SG		RDA(+)	
			RDB(-)	
			SG	

■ **RS-422** (1:N connection)

TOP	Cable connection and signal direction	Device	Cable connection and signal direction	Device
Signal name		Signal name		Signal name
RDA(+)		SDA(+)		SDA(+)
RDB(-)		SDB(-)		SDB(-)
SDA(+)		RDA(+)		RDA(+)
SDB(-)		RDB(-)		RDB(-)
SG		SG		SG

■ **RS-485** (1 : N / N : N connection)

TOP	Cable connection and signal direction	Device	Cable connection and signal direction	Device
Signal name		Signal name		Signal name
RDA(+)		+		+
RDB(-)		-		-
SDA(+)				
SDB(-)				
SG				

5. Supported addresses

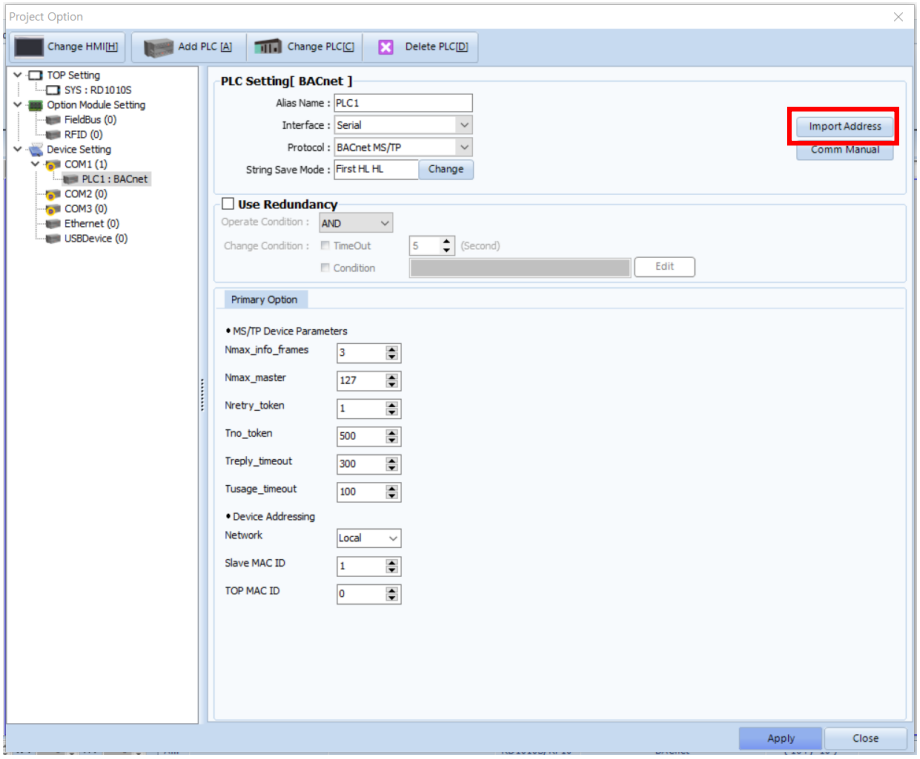
Describes how to register data of BACnet devices in TOP Design Studio.

※ Precautions when registering the address

1. You cannot use " ` " in the name of the address.
2. The description field of the address shows [Object type, Instance number, Property].

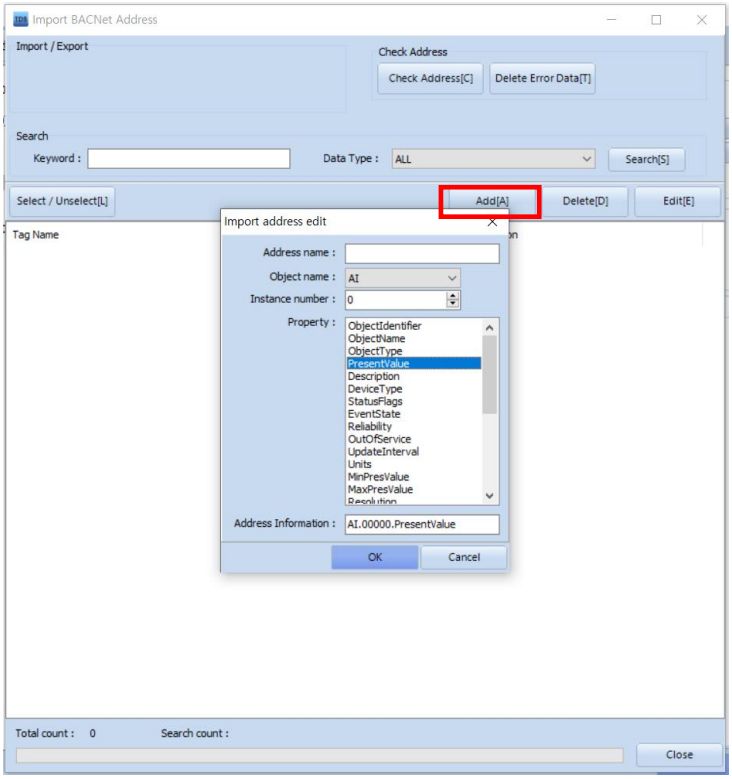
■ How to use Import Address

Step 1. Execute "Import Address" among PLC setting items in TOP Design Studio.



Step 2. After registering the data of the other party's device, start drawing.

(The picture below is an example of registering the current value of the Analog Output object whose instance number is 1 with the name "Sensor_01".)



■Object and property supported in TOP Design Studio

※ Character String data type supports up to 80 characters.
Character String data type supports ANSI X3.4 encoding method.

OBJECT TYPE	PROPERTY	Remarks
Analog Input (AI)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
	DeviceType	
	StatusFlags	
	EventState	
	Reliablity	
	OutOfService	
	UpdateInterval	
	Units	
	MinPresValue	
	MaxPresValue	
	Resolution	
	COVIncrement	
	TimeDelay	
	NotificationClass	
	HighLimit	
	LowLimit	
	Deadband	
	LimitEnable	
	EventEnable	
	AckedTransition	
	NotifyType	
	EventTimeStamps	
	ProfileName	
Analog Output (AO)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
	DeviceType	
	StatusFlags	
	EventState	
	Reliablity	
	OutOfService	
	UpdateInterval	
	Units	
	MinPresValue	
	MaxPresValue	
	Resolution	
	PriorityArray	
	RelinquishDefault	
	COVIncrement	
	TimeDelay	
	NotificationClass	
	HighLimit	
	LowLimit	

OBJECT TYPE	PROPERTY	Remarks
	Deadband	
	LimitEnable	
	EventEnable	
	AckedTransition	
	NotifyType	
	EventTimeStamps	
	ProfileName	
Analog Value (AV)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
	StatusFlags	
	EventState	
	Reliablity	
	OutOfService	
	Units	
	PriorityArray	
	RelinquishDefault	
	COVIncrement	
	TimeDelay	
	NotificationClass	
	HighLimit	
	LowLimit	
	Deadband	
	LimitEnable	
	EventEnable	
	AckedTransition	
	NotifyType	
	EventTimeStamps	
	ProfileName	
Binary Input (BI)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
	DeviceType	
	StatusFlags	
	EventState	
	Reliablity	
	OutOfService	
	Polarity	
	InactiveText	
	ActiveText	
	ChangeOfStateTime	
	ChangeOfStateCount	
	TimeOfStateCountReset	
	ElapsedActiveTime	
	TimeOfActiveTimeReset	
	TimeDelay	
	NotificationClass	
	AlarmValue	
	EventEnable	

OBJECT TYPE	PROPERTY	Remarks
	AckedTransition	
	NotifyType	
	EventTimeStamps	
	ProfileName	
Binary Output (BO)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
	DeviceType	
	StatusFlags	
	EventState	
	Reliablity	
	OutOfService	
	Polarity	
	InactiveText	
	ActiveText	
	ChangeOfStateTime	
	ChangeOfStateCount	
	TimeOfStateCountReset	
	ElapsedActiveTime	
	TimeOfActiveTimeReset	
	MinimumOffTime	
	MinimumOnTime	
	PriorityArray	
	RelinquishDefault	
	TimeDelay	
	NotificationClass	
	FeedbackValue	
	EventEnable	
	AckedTransition	
	NotifyType	
	EventTimeStamps	
	ProfileName	
Binary Value (BV)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
	StatusFlags	
	EventState	
	Reliablity	
	OutOfService	
	InactiveText	
	ActiveText	
	ChangeOfStateTime	
	ChangeOfStateCount	
	TimeOfStateCountReset	
	ElapsedActiveTime	
	TimeOfActiveTimeReset	
	MinimumOffTime	
	MinimumOnTime	
	PriorityArray	

OBJECT TYPE	PROPERTY	Remarks
	RelinquishDefault	
	TimeDelay	
	NotificationClass	
	AlarmValue	
	EventEnable	
	AckedTransition	
	NotifyType	
	EventTimeStamps	
	ProfileName	
Calendar (CD)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	DateList	
Command (CM)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	InProcess	
	AllWritesSuccessful	
Divice (DV)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	SystemStatus	
	VendorName	
	VendorId	
	ModelName	
	FirmwareRevision	
	ApplicationSoftwareVersion	
	ProtocolVersion	
	ProtocolRevision	
	MaxAPDUlengthAccepted	
	SegmentationSupported	
	ApduTimeout	
	NumberOfAPDUretries	
	DataBaseRevision	
	MaxSegmentsAccepted	
	DaylightSavingsStatus	
	ApduSegmentTimeout	
	BackupFailureTimeout	
Event Enrollment (ER)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	Description	
	EventType	
	NotifyType	
	EventParameter	
	ObjectPropertyReference	
	EventState	
	EventEnable	
	AckedTransitions	
	NotificationClass	
	Recipient	

OBJECT TYPE	PROPERTY	Remarks
	ProcessIdentifier	
	Priority	
	IssueConfirmedNotification	
File (FI)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	FileType	
	FileSize	
	Archive	
	ReadOnly	
Group (GR)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	Description	
	ListOfGoupMembers	
Loop (LP)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	Description	
Life Safety Point (LSP)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	TrackingValue	
	EventState	
	Reliability	
	OutOfService	
	Mode	
	Silenced	
Life Safety Zone (LSZ)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	TrackingValue	
	EventState	
	Reliability	
	OutOfService	
	Mode	
	Silenced	
Multi State Input (MI)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	EventState	
	OutOfService	
	Reliability	
	NumberofStates	
	TimeDelay	
	NotifyClass	
	NotifyType	
	ProfileName	

OBJECT TYPE	PROPERTY	Remarks
Multi State Output (MO)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	EventState	
	OutOfService	
	Reliability	
	NumberofStates	
	TimeDelay	
	NotifyClass	
	NotifyType	
	ProfileName	
Multi State Value (MV)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PresentValue	
	EventState	
	OutOfService	
	Reliability	
	NumberofStates	
	TimeDelay	
	NotifyClass	
	NotifyType	
	ProfileName	
Notification Class (NC)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	NotifyClass	
Program (PG)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	Description	
	ProgramState	
	ProgramChange	
	ReasonForHalt	
	DescriptionOfHalt	
	ProgramLocation	
	InstanceOf	
	StatusFlags	
	Reliability	
	OutOfService	
Schedule (SC)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	PriorityForWriting	
Trend Log (TL)	ObjectIdentifier	
	ObjectName	
	ObjectType	
	Enable	
	StopWhenFull	
	BufferSize	
	RecordCount	
	TotalRecordCount	