BACnet Server

EtherNet/IP Adapter

USER MANUAL

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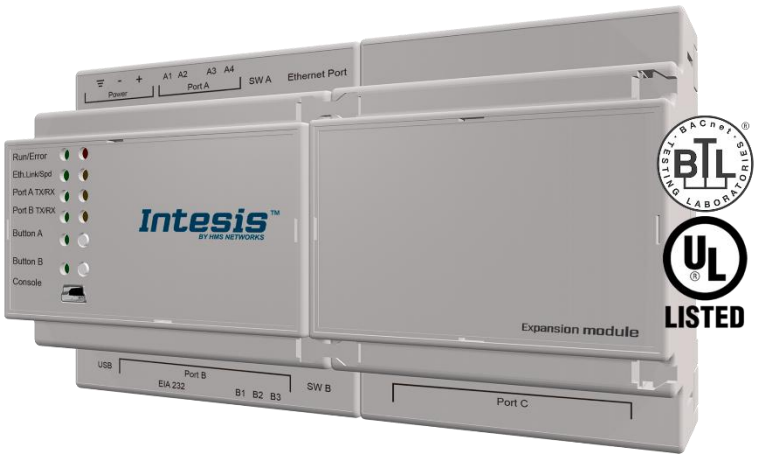

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Gateway to connect BACnet MS/TP or BACnet/IP installations with EtherNet/IP networks.

ORDER CODE
INBACEIP1K20000

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1. Description

1.1 *Introduction*

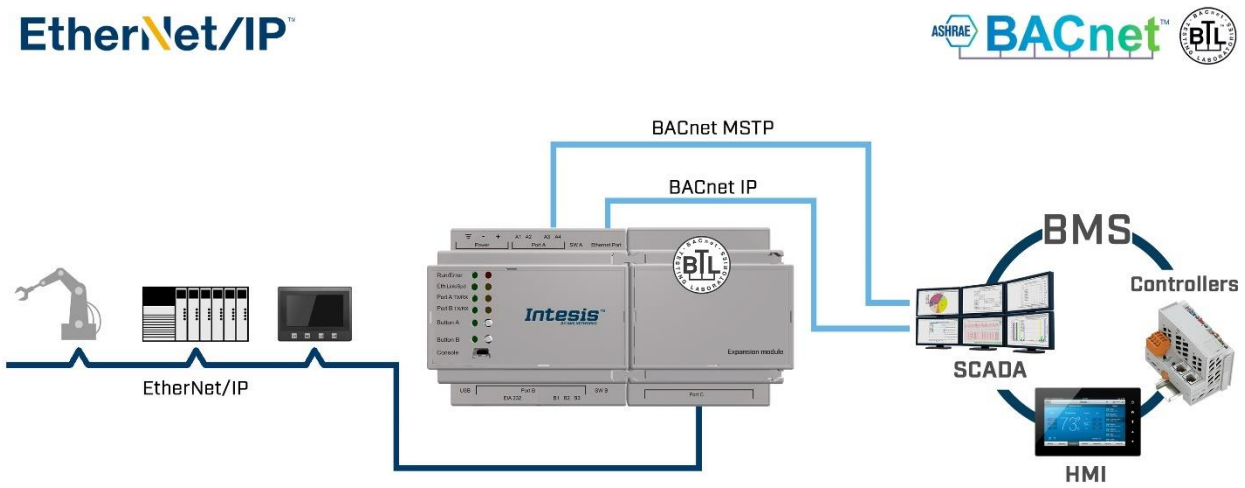
This document describes how to easily connect BACnet MS/TP or BACnet/IP systems with EtherNet/IP networks using the Intesis BACnet Server – EtherNet/IP gateway.

The aim of this integration is to share data between EtherNet/IP Scanner devices and BACnet based control systems or devices, merging both systems into one.

The gateway acts as a BACnet/IP Server or BACnet MS/TP device in its BACnet interface, allowing other BACnet devices to perform subscription (COV) requests and reads/writes to its internal points. From the EtherNet/IP point of view, Intesis gateway acts as an Adaptor device and it can be monitored and controlled by a Scanner device.

Configuration is carried out using the configuration software Intesis™ MAPS.

This document assumes that the user is familiar with BACnet and EtherNet/IP technologies and their technical terms.



Integration scheme to connect BACnet MS/TP or BACnet/IP networks with EtherNet/IP networks.

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1.2 *Functionality*

On the EtherNet/IP side, the gateway acts as an Adaptor device and its interface supports the following CIP connections:

- **Class-1 Connection**. Also called 'Implicit messaging' is a method of communication between EtherNet/IP controllers and devices using Ethernet UDP messages. All data points configured as 'cycle' are exchanged between the controllers and devices at regular time intervals.

When the Scanner device writes an EtherNet/IP register in the gateway, the new value is updated on the BACnet side to be read by BACnet clients using pooling method and, if this BACnet object has active subscriptions the new value will be sent to the subscripted BACnet device(s).

From the BACnet system point of view, after the start up process, the gateway listens to any subscription (COV) request, serves any polling request, or performs any writing request of its internal points received from the BACnet system.

The values received from BACnet are immediately written in the associated register on EtherNet/IP side, available to be read by a Scanner device and/or updated on the next refresh cycle.

1.3 *Gateway's capacity*

Intesis capacity is listed below:

Element	1200 version	Notes
Type of BACnet devices	IP / MS/TP	Communication with BACnet/IP and MS/TP
Number of BACnet Objecs	1200	Maximum number of points that can be defined in the virtual BACnet device inside the gateway
Number of BACnet Subscriptions (COV) requests	2400	Maximum number of BACnet subscriptions (COV) requests accepted by the gateway
EtherNet/IP Max. No. of connections	Class 1: 4 connections (1 as exclusive owner)	Number of simultaneous connections supported on EtherNet/IP interface.
EtherNet/IP Max. I/O Data Size	T → O (Input data): 500 bytes O → T (Output data): 500 bytes	Amount of memory available for mapping on EtherNet/IP network.

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2. Protocol Implementation Conformance Statement

BACnet Protocol Implementation Conformance Statement (PICS)

Date: *2018-05-16*
Vendor Name: *HMS Industrial Networks S.L.U*
Product Name: *INBACEIP---0000*
Product Model Number: *INBACEIP---0000*
Application Software Version: *1.0.0.0*
Firmware Revision: *14.0.1.0*
BACnet Protocol Revision: *14*

Product Description:

BACnet MS/TP & IP Server – EtherNet/IP Gateway

Abstraction of EtherNet/IP data as BACnet Objects.

2.1 *BACnet Standardized Device Profile (Annex L):*

☐ BACnet Operator Workstation (B-OWS)

☐ BACnet Building Controller (B-BC)

☒ BACnet Advanced Application Controller (B-AAC)

☐ BACnet Application Specific Controller (B-ASC)

☐ BACnet Smart Sensor (B-SS)

☐ BACnet Smart Actuator (B-SA)

Additional BACnet Interoperability Building Blocks Supported (Annex K):
Reference of BIBBs List

2.2 *Segmentation Capability:*

Segmented request supported	☐ No	☒ Yes	Window Size *16*
Segmented responses supported	☐ No	☒ Yes	Window Size *16*

2.3 *Data Link Layer Options:*

☒ BACnet IP, (Annex J)
☒ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) ____
☒ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200
☐ MS/TP slave (Clause 9), baud rate(s):
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
☐ Point-To-Point, modem, (Clause 10), baud rate(s):
☐ LonTalk, (Clause 11), medium: _____
☐ Other:

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2.4 *Device Address Binding:*

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes ☒ No

2.5 *Networking Options:*

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☒ BACnet/IP Broadcast Management Device (BBMD)
Does the BBMD support registrations by Foreign Devices? ☒ Yes ☐ No

2.6 *Character Sets Supported*

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☒ ISO 10646 (UTF-8)	☐ IBM™/Microsoft™ DBCS	☐ ISO 8859-1
☐ ISO 10646 (UCS-2)	☐ ISO 10646 (UCS-4)	☐ JIS X 0208

2.7 *Gateway*

If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:

EtherNet/IP communications.

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3. BACnet Interoperability Building Blocks Supported (BIBBs)

3.1 *Data Sharing BIBBs*

BIBB Type		Active	BACnet Service	Initiate	Execute
DS-RP-A	Data Sharing-ReadProperty–A	☐	ReadProperty	☒	☐
DS-RP-B	Data Sharing-ReadProperty–B	☒	ReadProperty	☐	☒
DS-RPM-A	Data Sharing-ReadPropertyMultiple–A	☐	ReadPropertyMultiple	☒	☐
DS-RPM-B	Data Sharing-ReadPropertyMultiple–B	☒	ReadPropertyMultiple	☐	☒
DS-RPC-A	Data Sharing-ReadPropertyConditiona–A	☐	ReadPropertyConditional	☒	☐
DS-RPC-B	Data Sharing-ReadPropertyConditional–B	☐	ReadPropertyConditional	☐	☒
DS-WP-A	Data Sharing-WriteProperty–A	☐	WriteProperty	☒	☐
DS-WP-B	Data Sharing-WriteProperty–B	☒	WriteProperty	☐	☒
DS-WPM-A	Data Sharing-WritePropertyMultiple–A	☐	WritePropertyMultiple	☒	☐
DS-WPM-B	Data Sharing-WritePropertyMultiple–B	☒	WritePropertyMultiple	☐	☒
DS-COV-A	Data Sharing-COV–A	☐	SubscribeCOV	☒	☐
		☐	ConfirmedCOVNotification	☐	☒
		☐	UnconfirmedCOVNotification	☐	☒
DS-COV-B	Data Sharing-COV–B	☒	SubscribeCOV	☐	☒
		☒	ConfirmedCOVNotification	☒	☐
		☒	UnconfirmedCOVNotification	☒	☐
DS-COVP-A	Data Sharing-COVP–A	☐	SubscribeCOVProperty	☒	☐
		☐	ConfirmedCOVNotification	☐	☒
		☐	UnconfirmedCOVNotification	☐	☒
DS-COVP-B	Data Sharing-COVP–B	☐	SubscribeCOVProperty	☐	☒
		☐	ConfirmedCOVNotification	☒	☐
		☐	UnconfirmedCOVNotification	☒	☐
DS-COVU-A	Data Sharing-COV-Unsubscribed–A	☐	UnconfirmedCOVNotification	☐	☒
DS-COVU-B	Data Sharing-COV- Unsubscribed -B	☐	UnconfirmedCOVNotification	☒	☐

3.2 *Alarm and Event Management BIBBs*

BIBB Type		Active	BACnet Service	Initiate	Execute
AE-N-A	Alarm and Event-Notification–A	☐	ConfirmedEventNotification	☐	☒
		☐	UnconfirmedEventNotification	☐	☒
AE-N-I-B	Alarm and Event-Notification Internal–B	☒	ConfirmedEventNotification	☒	☐
		☒	UnconfirmedEventNotification	☒	☐
AE-N-E-B	Alarm and Event-Notification External–B	☐	ConfirmedEventNotification	☒	☐
		☐	UnconfirmedEventNotification	☒	☐
AE-ACK-A	Alarm and Event-ACK–A	☐	AcknowledgeAlarm	☒	☐
AE-ACK-B	Alarm and Event-ACK–B	☒	AcknowledgeAlarm	☐	☒
AE-ASUM-A	Alarm and Event-Alarm Summary–A	☐	GetAlarmSummary	☒	☐
AE-ASUM-B	Alarm and Event-Alarm Summary–B	☒	GetAlarmSummary	☐	☒
AE-ESUM-A	Alarm and Event-Enrollment Summary-A	☐	GetEnrollmentSummary	☒	☐
AE-ESUM-B	Alarm and Event-Enrollment Summary-B	☐	GetEnrollmentSummary	☐	☒
AE-INFO-A	Alarm and Event-Information–A	☐	GetEventInformation	☒	☐
AE-INFO-B	Alarm and Event-Information–B	☒	GetEventInformation	☐	☒
AE-LS-A	Alarm and Event-LifeSafety–A	☐	LifeSafetyOperation	☒	☐
AE-LS-B	Alarm and Event-LifeSafety–B	☐	LifeSafetyOperation	☐	☒

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3.3 *Scheduling BIBBs*

BIBB Type		Active	BACnet Service	Initiate	Execute
SCHED-A	Scheduling–A *(must support DS-RP-A and DS-WP-A)*	☐			
SCHED-I-B	Scheduling-Internal–B *(shall support DS-RP-B and DS-WP-B)* *(shall also support ether DM-TS-B or DS-UTC-B)*	☒			
SCHED-E-B	Scheduling-External–B *(shall support SCHED-I-B and DS-WP-A)*	☐			

3.4 *Trending BIBBs*

BIBB Type		Active	BACnet Service	Initiate	Execute
T-VMT-A	Trending - Viewing and Modifying Trends–A	☐	ReadRange	☒	☐
T-VMT-I-B	Trending - Viewing and Modifying Trends Inernal–B	☒	ReadRange	☐	☒
T-VMT-E-B	Trending - Viewing and Modifying Trends External–B	☐	ReadRange	☐	☒
T-ATR-A	Trending - Automated Trend Retrieval–A	☐	ConfirmedEventNotification	☐	☒
		☐	ReadRange	☒	☐
T-ATR-B	Trending - Automated Trend Retrieval–B	☒	ConfirmedEventNotification	☒	☐
		☒	ReadRange	☐	☒

3.5 *Network Management BIBBs*

BIBB Type		Active	BACnet Service	Initiate	Execute
NM-CE-A	Network Management - Connection Establishment–A	☐	Establish-Connection-To-Network	☒	☐
		☐	Disconnect-Connection-To-Network	☒	☐
NM-CE-B	Network Management - Connection Establishment– B	☐	Establish-Connection-To-Network	☐	☒
		☐	Disconnect-Connection-To-Network	☐	☒
NM-RC-A	Network Management - Router Configuration–A	☐	Who-Is-Router-To-Network	☒	☐
		☐	I-Am-Router-To-Network	☐	☒
		☐	I-Could-Be-Router-To-Network	☐	☒
		☐	Initialize-Routing-Table	☒	☐
		☐	Initialize-Routing-Table-Ack	☐	☒
NM-RC-B	Network Management - Router Configuration–B	☐	Who-Is-Router-To-Network	☒	☒
		☐	I-Am-Router-To-Network	☒	☒
		☐	Initialize-Routing-Table	☐	☒
		☐	Initialize-Routing-Table-Ack	☒	☐

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3.6 *Device Management BIBBs*

BIBB Type		Active	BACnet Service	Initiate	Execute
DM-DDB-A	Device Management - Dynamic Device Binding–A	☒	Who-Is	☒	☐
		☒	I-Am	☐	☒
DM-DDB-B	Device Management - Dynamic Device Binding–B	☒	Who-Is	☐	☒
		☒	I-Am	☒	☐
DM-DOB-A	Device Management - Dynamic Object Binding–A	☐	Who-Has	☒	☐
		☐	I-Have	☐	☒
DM-DOB-B	Device Management - Dynamic Object Binding–B	☒	Who-Has	☐	☒
		☒	I-Have	☒	☐
DM-DCC-A	Device Management - DeviceCommunicationControl–A	☐	DeviceCommunicationControl	☒	☐
DM-DCC-B	Device Management - DeviceCommunicationControl–B	☒	DeviceCommunicationControl	☐	☒
DM-PT-A	Device Management - PrivateTransfer–A	☐	ConfirmedPrivateTransfer	☒	☐
		☐	UnconfirmedPrivateTransfer	☒	☐
DM-PT-B	Device Management - PrivateTransfer–B	☐	ConfirmedPrivateTransfer	☐	☒
		☐	UnconfirmedPrivateTransfer	☐	☒
DM-TM-A	Device Management - Text Message–A	☐	ConfirmedTextMessage	☒	☐
		☐	UnconfirmedTextMessage	☒	☐
DM-TM-B	Device Management - Text Message–B	☐	ConfirmedTextMessage	☐	☒
		☐	UnconfirmedTextMessage	☐	☒
DM-TS-A	Device Management - TimeSynchronization–A	☐	TimeSynchronization	☒	☐
DM-TS-B	Device Management - TimeSynchronization–B	☒	TimeSynchronization	☐	☒
DM-UTC-A	Device Management - UTCTimeSynchronization–A	☐	UTCTimeSynchronization	☒	☐
DM-UTC-B	Device Management - UTCTimeSynchronization–B	☐	UTCTimeSynchronization	☐	☒
DM-RD-A	Device Management - ReinitializeDevice–A	☐	ReinitializeDevice	☒	☐
DM-RD-B	Device Management - ReinitializeDevice–B	☒	ReinitializeDevice	☐	☒
DM-BR-A	Device Management - Backup and Restore–A	☐	AtomicReadFile	☒	☐
		☐	AtomicWriteFile	☒	☐
		☐	CreateObject	☒	☐
		☐	ReinitializeDevice	☒	☐
DM-BR-B	Device Management - Backup and Restore–B	☐	AtomicReadFile	☐	☒
		☐	AtomicWriteFile	☐	☒
		☐	ReinitializeDevice	☐	☒
DM-R-A	Device Management - Restart–A	☐	UnconfimedCOVNotification	☐	☒
DM-R-B	Device Management - Restart–B	☐	UnconfimedCOVNotification	☒	☐
DM-LM-A	Device Management - List Manipulation–A	☐	AddListElement	☒	☐
		☐	RemoveListElement	☒	☐
DM-LM-B	Device Management - List Manipulation–B	☐	AddListElement	☐	☒
		☐	RemoveListElement	☐	☒
DM-OCD-A	Device Management - Object Creation and Deletion–A	☐	CreateObject	☒	☐
		☐	DeleteObject	☒	☐
DM-OCD-B	Device Management - Object Creation and Deletion–B	☐	CreateObject	☐	☒
		☐	DeleteObject	☐	☒
DM-VT-A	Device Management - Virtual Terminal–A	☐	VT-Open	☒	☐
		☐	VT-Close	☒	☒
		☐	VT-Data	☒	☒
DM-VT-B	Device Management - Virtual Terminal–B	☐	VT-Open	☐	☒
		☐	VT-Close	☒	☒
		☐	VT-Data	☒	☒

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4. Service Types

Service type	Service name	Supported	Remarks
Alarm and Event Services	AcknowledgeAlarm	☒	
	ConfirmedCOVNotification	☐	
	ConfirmedEventNotification	☐	
	GetAlarmSummary	☒	
	GetEnrollmentSummary	☐	
	SubscribeCOV	☒	
File Access Services	AtomicReadFile	☐	
	AtomicWriteFile	☐	
Object Access Services	AddListElement	☐	
	RemoveListElement	☐	
	CreateObject	☐	
	DeleteObject	☐	
	ReadProperty	☒	
	ReadPropertyConditional	☐	
	ReadPropertyMultiple	☒	
	ReadRange	☒	
	WriteProperty	☒	
	WritePropertyMultiple	☒	
Remote Device Management Services	DeviceComminicationControl	☒	
	ConfirmedPrivateTransfer	☐	
	ConfirmedTextMessage	☐	
	ReinitializeDevice	☒	
Virtual Terminal Services	VtOpen	☐	
	VtClose	☐	
	VtData	☐	
Security Services	Authenticate	☐	
	RequestKey	☐	
Unconfirmed Services	I-Am	☒	
	I-Have	☐	
	UnconfirmedCOVNotification	☐	
	UnconfirmedEventNotification	☐	
	UnconfirmedPrivateTransfer	☐	
	UnconfirmedTextMessage	☐	
	TimeSynchronization	☒	
	UtcTimeSynchronization	☐	
	Who-Has	☒	
	Who-Is	☒	
	LifeSafetyOperation	☐	
	SubscribeCOVProperty	☐	
	GetEventInformation	☒	

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5. Objects

5.1 *Supported Object Types*

The objects supported are shown in the table below.

Object Type	ID	Supported	Management Point
Analog-Input	0	☒	
Analog-Output	1	☒	
Analog-Value	2	☒	
Averaging	18	☐	
Binary-Input	3	☒	
Binary-Output	4	☒	
Binary-Value	5	☒	
Calendar	6	☒	
Command	7	☐	
Device	8	☒	
Event-Enrollment	9	☐	
File	10	☐	
Group	11	☐	
Life-Safety-Point	21	☐	
Life-Safety-Zone	22	☐	
Loop	12	☐	
Multistate-Input	13	☒	
Multistate-Output	14	☒	
Multistate-Value	19	☒	
Notification-Class	15	☒	
Program	16	☐	
Schedule	17	☒	
Trend-Log	20	☒	
Trend-Log-Multiple	27	☒	

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5.2 *Objects and properties*

5.2.1 INBACEIP---0000 (Device Object Type)

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Device, 246000)	R	R
Object_Name	CharacterString	"INBACEIP---0000"	R	R
Object_Type	BACnetObjectType	DEVICE (8) (Device Object Type)	R	R
System_Status	BACnetDeviceStatus	OPERATIONAL (0)	R	R
Vendor_Name	CharacterString	"HMS Industrial Networks S.L.U"	R	R
Vendor_Identifier	Unsigned16	246	R	R
Model_Name	CharacterString	"INBACEIP---0000 "	R	R
Firmware_Revision	CharacterString	"1.0.0.0"	R	R
Application_Software_ Version	CharacterString	"1.0.0.0"	R	R
Location	CharacterString	""	O	-
Protocol_Version	Unsigned	1	R	R
Protocol_Revision	Unsigned	14	R	R
Protocol_Services_ Supported	BACnetServiceSupported	Refer to section 4 [Service Types]	R	R
Protocol_Object_Types_ Supported	BACnetObjectTypes Supported	Refer to section 4 [Object Types]	R	R
Object_List	BACnetArray[N] of BACnetObjectIdentifier	BACnetARRAY[N]	R	R
Structured_Object_List	BACnetArray[N] of BACnetObjectIdentifier	-	O	-
Max_APDU_Length_ Accepted	Unsigned	480 when MS/TP / 1476 when BACnet/IP	R	R
Segmentation_Supported	BACnetSegmentation	SEGMENTED-BOTH (0)	R	R
Max_Segments_accepted	Unsigned	16	O	R
VT_Classes_Supported	List of BACnetVTClass	-	O	-
Active_VT_Sessions	List of BACnetVTSession	-	O	-
Local_Date	Date	Current date	O	R
Local_Time	Time	Current time	O	R
UTC_Offset	INTEGER	-	O	-
Daylight_Savings_Status	BOOLEAN	-	O	-
APDU_Segment_Timeout	Unsigned	3000	R	R
APDU_Timeout	Unsigned	3000	R	R
Number_of_APDU_ Retries	Unsigned	3	R	R
List_Of_Session_Keys	List of BACnetSessionKey	-	O	-
Time_Synchronization_ Recipients	List of BACnetRecipient	-	O	-

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Max_Master * **	Unsigned	127	R	W
Max_Info_Frames *	Unsigned	1	O	R
Device_Address_Binding	List of BACnetAddressBinding	NULL (empty)	R	R
Database_Revision	Unsigned	0	R	R
Configuration_Files	BACnetArray[N] of BACnetObjectIdentifier	-	O	-
Last_Restore_Time	BACnetTimeStamp	-	O	-
Backup_Failure_Timeout	Unsigned16	-	O	-
Active_COV_ Subscriptions	List of BACnetCOVSubscription	List of BACnetCOVSubscription	O	R
Slave_Proxy_Enable	BACnetArray[N] of BOOLEAN	-	O	-
Manual_Slave_Address_ Binding	List of BACnetAddressBinding	-	O	-
Auto_Slave_Discovery	BACnetArray[N] of BOOLEAN	-	O	-
Slave_Address_Binding	BACnetAddressBinding	-	O	-
Last_Restart_Reason	BACnetRestartReason	-	O	-
Time_Of_Device_Restart	BACnetTimeStamp	-	O	-
Restart_Notification_ Recipients	List of BACnetRecipient	-	O	-
UTC_Time_ Synchronization_ Recipients	List of BACnetRecipient	-	O	-
Time_Synchronization_ Interval	Unsigned	-	O	-
Align_Intervals	BOOLEAN	-	O	-
Interval_Offset	Unsigned	-	O	-
Profile_Name	CharacterString	-	O	-

* Only available when MS/TP is used

** Configurable through the configuration tool.

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5.2.2 Analog Input Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value	REAL	x	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	*Configurable through BACnet and Config Tool*	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
High_Limit	REAL	-	O	R*
Low_Limit	REAL	-	O	R*
Deadband	REAL	-	O	R*
Limit_Enable	BACnetLimitEnable	-	O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

* Only available when specific object has a Notification Class configured

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5.2.3 Analog Output Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Output, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	ANALOG_OUTPUT (1)	R	R
Present_Value	REAL	x	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	*Configurable through BACnet and Config Tool*	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	Unsigned	*Configurable through BACnet and Config Tool*	W	W
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
High_Limit	REAL	-	O	R*
Low_Limit	REAL	-	O	R*
Deadband	REAL	-	O	R*
Limit_Enable	BACnetLimitEnable	-	O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.4 Analog Value Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Value, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	ANALOG_VALUE (2)	R	R
Present_Value	REAL	x	R	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	*Configurable through BACnet and Config Tool*	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
High_Limit	REAL	-	O	R*
Low_Limit	REAL	-	O	R*
Deadband	REAL	-	O	R*
Limit_Enable	BACnetLimitEnable	-	O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.5 Binary Input Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Input, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	BINARY_INPUT (3)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString	*Configurable through BACnet and Config Tool*	O	R
Active_Text	CharacterString	*Configurable through BACnet and Config Tool*	O	R
Change_Of_State_Time	BACnetDatetime	-	O	R
Change_Of_State_Count	Unsigned	-	O	R
Time_Of_State_Count_Reset	BACnetDatetime	-	O	R
Elapsed_Active_Time	Unsigned	-	O	R
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	R
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
Alarm_Value	BACnetBinaryPV	-	O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.6 Binary Output Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Output, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	BINARY_OUTPUT (4)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString	*Configurable through BACnet and Config Tool*	O	R
Active_Text	CharacterString	*Configurable through BACnet and Config Tool*	O	R
Change_Of_State_Time	BACnetDatetime	-	O	R
Change_Of_State_Count	Unsigned	-	O	R
Time_Of_State_Count_Reset	BACnetDatetime	-	O	R
Elapsed_Active_Time	Unsigned	-	O	R
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	R
Minimum_Off_Time	Unsigned32	-	O	-
Minimum_On_Time	Unsigned32	-	O	-
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	BACnetBinaryPV	INACTIVE (0)	W	W
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
Feedback_Value	BACnetBinaryPV	-	O	W
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.7 Binary Value Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Value, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	BINARY_VALUE (5)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	W	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Inactive_Text	CharacterString	*Configurable through BACnet and Config Tool*	O	R
Active_Text	CharacterString	*Configurable through BACnet and Config Tool*	O	R
Change_Of_State_Time	BACnetDatetime	-	O	R
Change_Of_State_Count	Unsigned	-	O	R
Time_Of_State_Count_Reset	BACnetDatetime	-	O	R
Elapsed_Active_Time	Unsigned	-	O	R
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	R
Minimum_Off_Time	Unsigned32	-	O	-
Minimum_On_Time	Unsigned32	-	O	-
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
Alarm_Value	BACnetBinaryPV	-	O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.8 Multistate Input Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT (13)	R	R
Present_Value	Unsigned	x	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	*Configurable through BACnet and Config Tool*	R	R
State_Text	BACnetArray[N] of CharacterString	-	O	R
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
Alarm_Values	List of Unsigned	-	O	R*
Fault_Values	List of Unsigned	-	O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.9 Multistate Output Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	MULTISTATE_OUTPUT (14)	R	R
Present_Value	Unsigned	x	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	*Configurable through BACnet and Config Tool*	R	R
State_Text	BACnetArray[N] of CharacterString		O	R
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	Unsigned	1	W	W
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
Feedback_Value	Unsigned	-	O	W
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.10 Multistate Value Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 0)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	MULTISTATE_VALUE (19)	R	R
Present_Value	Unsigned	x	W	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	*Configurable through BACnet and Config Tool*	R	R
State_Text	BACnetArray[N] of CharacterString		O	R
Time_Delay	Unsigned	-	O	R*
Notification_Class	Unsigned	-	O	R*
Alarm_Values	Unsigned	-	O	R*
Fault_Values	Unsigned		O	R*
Event_Enable	BACnetEventTransitionBits	-	O	R*
Acked_Transitions	BACnetEventTransitionBits	-	O	R*
Notify_Type	BACnetNotifyType	-	O	R*
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	R*
Profile_Name	CharacterString	-	O	-

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5.2.11 Calendar Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Calendar, 6)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	CALENDAR (6)	R	R
Description	CharacterString	-	O	-
Present_Value	BOOLEAN	-	R	R
Date_List	BACnetLIST of BACnetCalendarEntry	-	R	W
Profile_Name	BACnetARRAY[N] of BACnetPropertyIdentifier	-	O	-

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5.2.12 Schedule Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Schedule, 17)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	SCHEDULE (17)	R	R
Present_Value	Any	-	R	R
Description	CharacterString	-	O	-
Effective_Period	BACnetDateRange	-	R	W
Weekly_Schedule	BACnetARRAY[7] of BACnetDailySchedule	-	R	W
Exception_Schedule	BACnetARRAY[N] of BACnetSpecialEvent	-	R	W
Schedule_Default	Any	-	R	W
List_Of_Object_Property_References	BACnetLIST of BACnetDeviceObjectPropertyReference	-	R	R
Priority_For_Writing	Unsigned(1..16)	-	R	W
Status_Flags	BACnetStatusFlags	-	R	R
Reliability	BACnetReliability	-	R	R
Out_Of_Service	BOOLEAN	-	R	R
Event_Detection_Enable	BOOLEAN	-	O	-
Notification_Class	Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Event_State	BACnetEventState	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetARRAY[3] of BACnetTimeStamp	-	O	-
Event_Message_Texts	BACnetARRAY[3] of CharacterString	-	O	-
Event_Message_Texts_Config	BACnetARRAY[3] of CharacterString	-	O	-
Reliability_Evaluation_Inhibit	BOOLEAN	-	O	-
Profile_Name	CharacterString	-	O	-

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5.2.13 Notification Class Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Notification_Class, 15)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	NOTIFICATION_CLASS (15)	R	R
Description	CharacterString	-	O	-
Notification_Class	Unsigned	-	R	R
Priority	BACnetARRAY[3] of Unsigned	-	R	R
Ack_Required	BACnetEventTransitionBits	-	R	R
Recipient_List	BACnetLIST of BACnetDestination	-	R	R
Profile_Name	CharacterString	-	O	-

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5.2.14 Trend Log Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Trend_Log, 20)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	TREND_LOG (20)	R	R
Description	CharacterString	-	O	-
Enable	BOOLEAN		R	W
Start_Time	BACnetDateTime		O	W
Stop_Time	BACnetDateTime		O	W
Log_DeviceObjectProperty	BACnetDeviceObject PropertyReference		O	-
Log_Interval	Unsigned		O	-
COV_Resubscription_Interval	Unsigned		O	-
Client_COV_Increment	BACnetClientCOV		O	-
Stop_When_Full	BOOLEAN		R	R
Buffer_Size	Unsigned		R	R
Log_Buffer	List of BACnetLogRecord		R	R
Record_Count	Unsigned		R	W
Total_Record_Count	Unsigned		R	R
Notification_Threshold	Unsigned		O	R*
Records_Since_Notification	Unsigned		O	R*
Last_Notify_Record	Unsigned		O	R*
Event_State	BACnetEventState		R	R
Notification_Class	Unsigned		O	R*
Event_Enable	BACnetEventTransitionBits		O	R*
Acked_Transitions	BACnetEventTransitionBits		O	R*
Notify_Type	BACnetNotifyType		O	R*
Event_Time_Stamps	BACnetARRAY[3] of BACnetTimeStamp		O	R*
EventMessageTexts	BACnetARRAY[3] of CharacterString		O	R*
Profile_Name	CharacterString		O	-
Logging_Type	BACnetLoggingType		R	R
Status_Flags	BACnetStatusFlags		R	R

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5.2.15 Trend Log Multiple Object Type

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Trend_Log_Multiple, 27)	R	R
Object_Name	CharacterString	*Configurable through BACnet and Config Tool*	R	R
Object_Type	BACnetObjectType	TREND_LOG_MULTIPLE (27)	R	R
Description	CharacterString	-	O	-
Enable	BOOLEAN		R	W
Start_Time	BACnetDateTime		O	W
Stop_Time	BACnetDateTime		O	W
Log_DeviceObjectProperty	BACnetARRAY[10] of BACnetDeviceObject PropertyReference		O	R
Log_Interval	Unsigned		O	-
COV_Resubscription_Interval	Unsigned		O	-
Client_COV_Increment	BACnetClientCOV		O	-
Stop_When_Full	BOOLEAN		R	R
Buffer_Size	Unsigned		R	R
Log_Buffer	List of BACnetLogRecord		R	R
Record_Count	Unsigned		R	W
Total_Record_Count	Unsigned		R	R
Notification_Threshold	Unsigned		O	R*
Records_Since_Notification	Unsigned		O	R*
Last_Notify_Record	Unsigned		O	R*
Event_State	BACnetEventState		R	R
Notification_Class	Unsigned		O	R*
Event_Enable	BACnetEventTransitionBits		O	R*
Acked_Transitions	BACnetEventTransitionBits		O	R*
Notify_Type	BACnetNotifyType		O	R*
Event_Time_Stamps	BACnetARRAY[3] of BACnetTimeStamp		O	R*
EventMessageTexts	BACnetARRAY[3] of CharacterString		O	R*
Profile_Name	CharacterString		O	-
Logging_Type	BACnetLoggingType		R	R
Status_Flags	BACnetStatusFlags		R	R

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6. EtherNet/IP Module

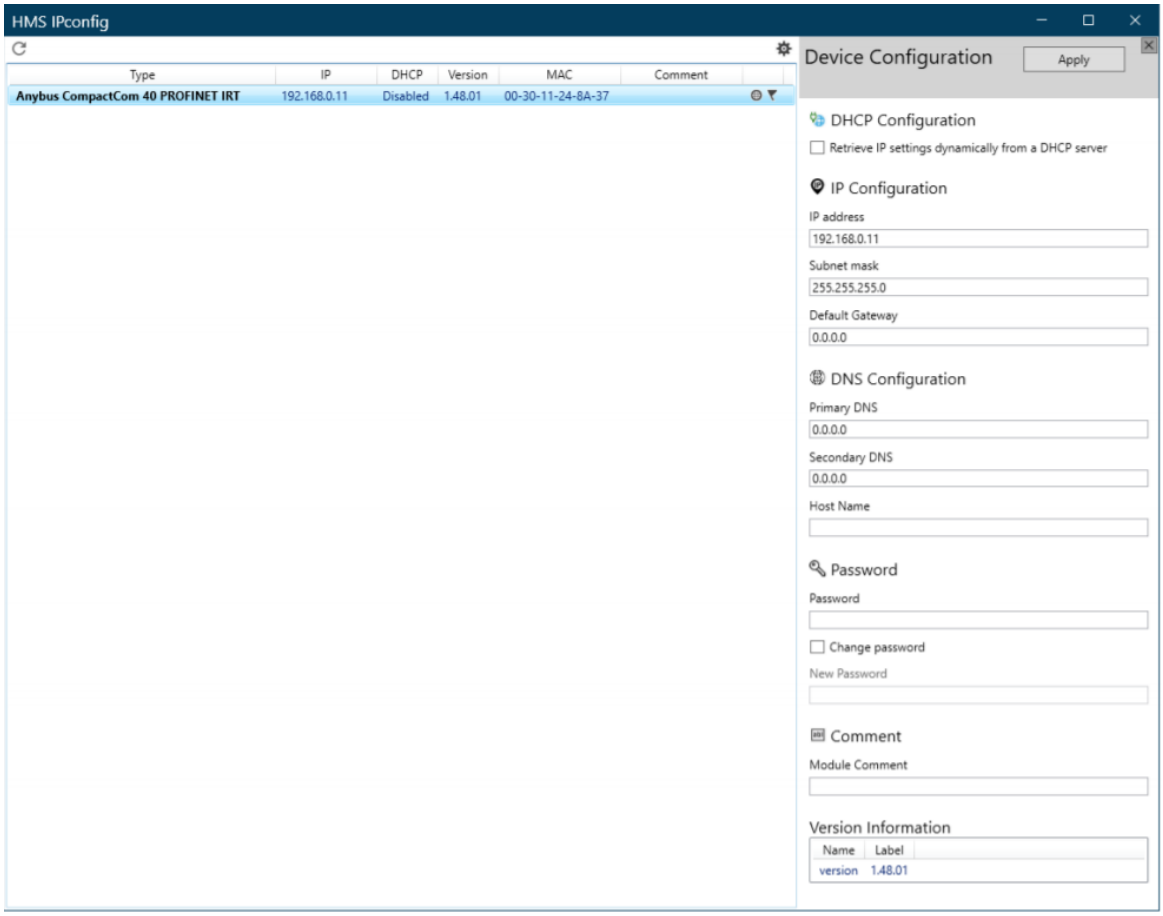
6.1 *Network configuration*

Intesis gateway supports the Secure HICP protocol used by the IPConfig tool for changing settings like IP address, Subnet mask, and enable/disable DHCP. By default, it is disabled but it can be enabled from Intesis MAPS tool.

When the application is started, the network is automatically scanned for Intesis BACnet-EtherNet/IP modules. The network can be rescanned at any time by cliking **Scan**.

To change the network settings of a BACnet-EtherNet/IP module, double-click on the corresponding entry in the list. A window will appear, containing the settings of the module.

Validate the new settings by cliking **Set** or click **Cancel** to cancel all changes. Optionally, the configuration can be protected from unauthorized acces by a password.



6.2 *FTP Server*

The built-in FTP-server is used to do firmware upgrades using HMS Firmware Manager tool. By default, it is disabled but it can be enabled from Intesis MAPS tool.

By default, the following port numbers are used for FTP communication:

- TCP, port 20 (FTP data port)
- TCP, port 21 (FTP command port)

The FTP server supports up to two concurrent clients.

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6.3 *Web Server*

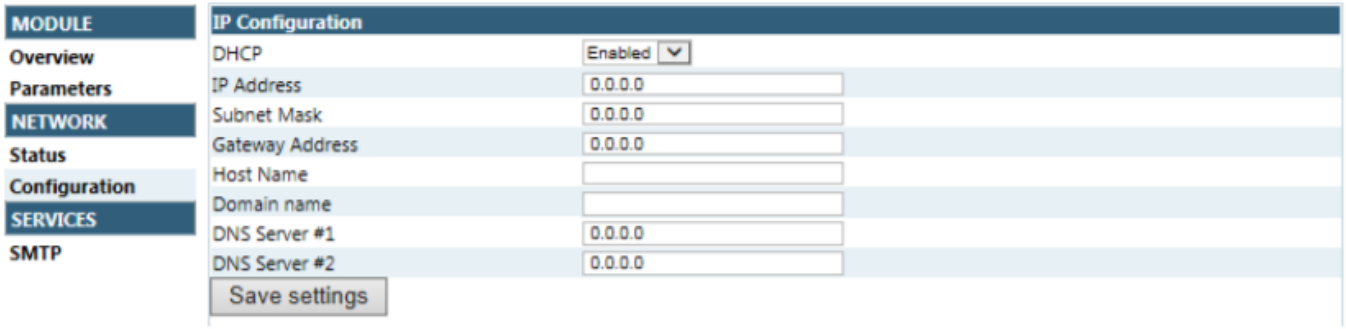
The built-in web server provides a flexible environment for end-user interaction and configuration purposes. By default, it is disabled, but it can be enabled from Intesis MAPS tool.

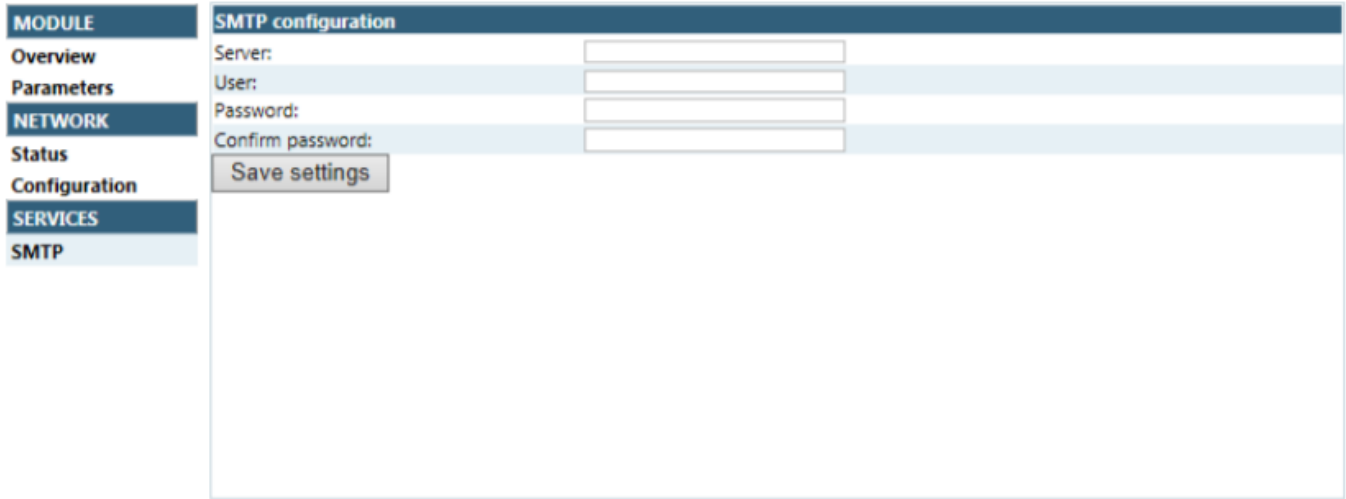
The web server supports up to 20 concurrent connections and communicates through port 80.

The default web pages provide access to:

- Network configuration parameters
- Network status information
- Access to the host application ADIs

The network configuration page provides interfaces for changing TCP/IP and SMTP settings of the EtherNet/IP interface.





The module needs a reset for the changes to take effect.

Available IP Configuration Settings

Name	Description
DHCP	Checkbox for enabling or disabling DHCP Default value: disabled
IP address	The TCP/IP settings of the module Default values: 0.0.0.0Value ranges: 0.0.0.0 - 255.255.255.255
Subnet mask	
Gateway address	
Host name	IP address or name Max 64 characters
Domain name	IP address or name Max 48 characters

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Available SMTP Settings

Name	Description
Server	IP address or name Max 64 characters
User	Max 64 characters
Password	Max 64 characters

The Ethernet statistics page contains the following information:

Current IP Configuration	Description
DHCP:	-
Host Name:	-
IP Address:	-
Subnet Mask:	-
Gateway Address:	-
DNS Server #1:	-
DNS Server #2:	-
Domain Name:	-

Current Ethernet Configuration		Description
MAC Address:		-
Port 1	Speed:	The current link speed.
	Duplex:	The current duplex configuration.
Port 2	Speed:	The current link speed.
	Duplex:	The current duplex configuration.

Interface Counters	Description
In Octets:	Received bytes.
In Ucast Packets:	Received unicast packets.
In NUcast packets:	Received non-unicast packets (broadcast and multicast).
In Discards:	Received packets discarded due to no available memory buffers.
In Errors:	Received packets discarded due to reception error.
In Unknown Protos:	Received packets with unsupported protocol type.
Out Octets:	Sent bytes.
Out Ucast packets:	Sent unicast packets.
Out NUcast packets:	Sent non-unicast packets (broadcast and multicast).
Out Discards:	Outgoing packets discarded due to no available memory buffers.
Out Errors:	Transmission errors.

Media Counters	Description
Alignment Errors	Frames received that are not an integral number of octets in length.
FCS Errors	Frames received that do not pass the FCS check.
Single Collisions	Successfully transmitted frames which experienced only one collision
Multiple Collisions	Successfully transmitted frames that experienced more than one collision.
SQE Test Errors	Number of times SQE test error messages are generated.
Deferred Transmissions	Frames for which first transmission attempt is delayed because the medium is busy.
Late Collisions	Number of times a collision is detected later than 512 bit-times into the transmission of a packet.
Excessive Collisions	Frames for which a transmission fails due to excessive collisions.
MAC Receive Errors	Frames for which reception of an interface fails due to an internal MAC sublayer receive error
MAC Transmit Errors	Frames for which transmission fails due to an internal MAC sublayer receive error.
Carrier Sense Errors	Times that the carrier sense condition was lost or never asserted when attempted to transmit a frame.
Frame Size Too Long	Frames received that exceed the maximum permitted frame size.
Frame Size Too Short	Frames received that are shorter than lowest permitted frame size.

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6.4 *CIP Object Implementation*

The following CIP-Objects are implemented in this product:

Mandatory Objects

- Identify Object, Class 01h
- Message Router, Class 02h
- Assembly Object, Class 04h
- Connection Manager Object, Class 05h
- Port Object, Class F4h
- TCP/IP Interface Object, Class F5h
- Ethernet Link Object, Class F6h

Vendor Specific Objects

- DLR Object, Class 47h
- Quality of Service Object, Class 48h

6.4.1 Identify Object, Class 01h

The Identity Object provides identification and general information about the device. The first and only instance identifies the whole device. It is used for electronic keying and by applications wishing to determine what devices are on the network.

Supported Services

- Get Attribute All
- Get Attribute Single
- Reset

Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Revision 1

Instance Attributes

#	Access	Name	Type	Value	Description
1	Get	Vendor ID	UINT	Default: 005Ah	HMS Industrial Networks AB
2	Get	Device Type	UINT	Default: 000Ch	Communication Adapter
3	Get	Product Code	UINT	Default: 005Bh	
4	Get	Revision	Struct of:		-
			USINT		Major fieldbus version
			USINT		Minor fieldbus version
5	Get	Status	WORD	-	Device status, see table below
6	Get	Serial Number	UDINT	(unique serial number)	Serial number of the interface
7	Get	Product Name	SHORT_STRING	IBOX-BAC-EIP	Name of product

Status AttributeExtended Device Status

Bit(s)	Name	Description
0	Module Owned	-
1	(reserved)	-
2	Configured	-
3	(reserved)	-
4 - 7	Extended Device Status	(See table on the right)
8	Minor recoverable fault	-

Value	Meaning
0000b	Unknown
0010b	Faulted I/O Connection
0011b	No I/O connection established
0100b	Non volatile configuration bad
0110b	Connection in Run mode
0111b	Connection in Idle mode

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9	Minor recoverable fault	-
10	Major recoverable fault	-
11	Major unrecoverable fault	-
12 - 15	(reserved)	-

Reset Service

The identify object provides a reset service. There are two different types of reset requests:

Reset Type	Action
Power Cycling Reset (Type 0)	This will cause the interface to emulate a power cycling reset.
Out of box reset (Type 1)	This will cause the interface to delete its configuration and reset.

6.4.2 Message Router, Class 02h

The Message Router Object provides a messaging connection point through which a client may address a service to any object class or instance residing in the physical device.

There are no class or instance attributes and no services supported.

6.4.3 Assembly Object, Class 04h

The Assembly object uses static assemblies and holds the Process Data sent/received by the host application. It allows data to and from each object to be sent or received over a single connection. The default assembly instance IDs used are in the vendor specific range.

It is possible for the application to create and support up to six consuming and six producing instances if the Assembly Mapping Object is implemented.

The terms “input” and “output” are defined from the network’s point of view. An input will produce data on the network and an output will consume data from the network

Supported Services

- Get Attribute Single
- Set Attribute Single

Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0002h	Revision 2
2	Get	Max Instance	UINT	0096h	The highest instance no.

Instance Attributes, Instance 64h

#	Access	Name	Type	Value	Description
3	Get	Input Buffer	Array of BYTE	-	Mapped to Input Buffer
4	Get	Size	UINT	-	Number of bytes in attribute 3

Instance Attributes, Instance 96h

#	Access	Name	Type	Value	Description
3	Set	Output Buffer	Array of BYTE	-	Mapped to Output Buffer
4	Get	Size	UINT	-	Number of bytes in attribute 3

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6.4.4 Connection Manager Object, Class 05h

This object is used for connection and connectionless communications, including establishing connections across multiple subnets.

Supported Services

- Get Attribute All
- Get Attribute Single
- Set Attribute Single
- Large_Forward_Open
- Forward_Open
- Forward_Close
- Unconnected Send (When unconnected routing is enabled)

Instance Attributes

#	Access	Name	Type	Value	Description
1	Set	Open Requests	UINT	-	Number of Forward Open service requests received.
2	Set	Open Format Rejects	UINT	-	Number of Forward Open service requests which were rejected due to bad format.
3	Set	Open Resource Rejects	UINT	-	Number of Forward Open service requests which were rejected due to lack of resources.
4	Set	Open Other Rejects	UINT	-	Number of Forward Open service requests which were rejected for reasons other than bad format or lack of resources.
5	Set	Close Requests	UINT	-	Number of Forward Close service requests received.
6	Set	Close Format Rejects	UINT	-	Number of Forward Close service requests which were rejected due to bad format.
7	Set	Close Other Rejects	UINT	-	Number of Forward Close service requests which were rejected for reasons other than bad format.
8	Set	Connection Timeouts	UINT	-	Total number of connection timeouts that have occurred in connections controlled by this Connection Manager.

6.4.5 Port Object, Class F4h

The Port Object describes the CIP ports present on the device. Each routable CIP port is described in a separate instance. Non-routable ports may be described. Devices with a single CIP port are not required to support this object.

Supported Services

- Get Attribute All
- Get Attribute Single

Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0002h	Object revision
2	Get	Max Instance	UINT	-	Max. Instance number
3	Get	Number of Instances	UINT	-	Number of ports currently created.
8	Get	Entry Port	UINT	-	Returns the instance of the Port Object that describes the port through which this request entered the device.
9	Get	Port Instance Info	Array	-	Array of structures containing instance attributes 1 and 2 from each instance. The array is indexed by instance number, up to the

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					maximum number of instances. The value at index 1 (offset 0) and any non-instantiated instances will be zero.
			Struct of: UINT(Type) UINT(Number)	-	Enumerates the type of port (see instance attribute #1) CIP port number associated with this port (see instance attribute #2)

Instance Attributes

#	Access	Name	Type	Value	Description
1	Get	Port Type	UINT	0h	0h by Default, 4h if the application registers a port
2	Get	Port Number	UINT	2h	-
3	Get	Link Object	Struct of: UINT Padded EPATH	 2h 20 F5 24 01h	-
4	Get	Port Name	SHORT_STRING	"EtherNet/IP"	-
5	Get	Port Type Name	SHORT_STRING		-
6	Get	Port Description	SHORT_STRING		-
7	Get	Node Address	SHORT_STRING		-
10	Get	Port Routing Capabilities	SHORT_STRING	1h	Routing of incoming Unconnected Messaging supported

6.4.6 TCP/IP Interface Object, Class F5h

This object provides the mechanism to configure the TCP/IP network interface of the module. It groups the TCP/IP-related settings in one instance for each TCP/IP capable communications interface.

Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0004h	Object revision
2	Get	Max Instance	UINT	1	Max. Instance number
3	Get	Number of Instances	UINT	1	Number of TCP/IP Interface objects currently created.
6	Get	Maximum ID Number Class Attributes	UINT	7	The attribute number of the last implemented class attribute
7	Get	Maximum ID Number Instance Attributes	UINT	13	The attribute number of the last implemented instance attribute

6.4.7 Ethernet Link Object, Class F6h

This object maintains link specific counters and status information for an IEEE 802.3 communications interface. Exactly one instance for each communications interface on the module is supported. Instances for internally accessible interfaces can also be supported.

Supported Services

- Get Attribute All
- Get Attribute Single
- Set Attribute Single
- Get and Clear

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Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0004h	Object revision
2	Get	Max Instance	UINT	1 or 3	Max. Instance number
3	Get	Number of Instances	UINT	1 or 3	Number of Ethernet Link objects currently created.
6	Get	Maximum ID Number Class Attributes	UINT	7	The attribute number of the last implemented class attribute
7	Get	Maximum ID Number Instance Attributes	UINT	11	The attribute number of the last implemented instance attribute

6.4.8 DLR Object, Class 47h

The Device Level Ring (DLR) Object provides the status information interface for the DLR protocol. This protocol enables the use of an Ethernet ring topology, and the DLR Object provides the CIP application-level interface to the protocol.

Supported Services

- Get Attributes All
- Get Attribute Single

Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0003h	Object revision

Instance Attributes

#	Access	Name	Type	Value	Description
1	Get	Network Topology	USINT	-	Bit 0: Linear Bit 1: Ring
2	Get	Network status	USINT	-	Bit 0: Normal Bit 1: Ring Fault Bit 2: Unexpected Loop Detected Bit 3: Partial Network Fault Bit 4: Rapid Fault/Restore Cycle
10	Get	Active Supervisor Address	Struct of: UDINT Array of 6 USINTs	-	This attribute holds the IP address (IPv4) and/or the Ethernet Mac address of the active ring supervisor.
12	Get	Capability Flags	DWORD	82h	Beacon-based ring node, Flush_Table frame capable

6.4.9 QoS Object, Class 48h

Quality of Service (QoS) is a general term that is applied to mechanisms used to treat traffic streams with different relative priorities or other delivery characteristics. Standard QoS mechanisms include IEEE 802.1D/Q (Ethernet frame priority) and Differentiated Services (DiffServ) in the TCP/IP protocol suite. The QoS Object provides a means to configure certain QoS related behaviours in EtherNet/IP devices. The object is required for devices that support sending EtherNet/IP messages with nonzero DiffServ code points (DSCP) or sending EtherNet/IP messages in 802.1Q tagged frames.

Supported Services

- Get Attribute Single
- Set Attribute Single

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Class Attributes

#	Access	Name	Type	Value	Description
1	Get	Revision	UINT	0001h	Object revision

Instance Attributes

#	Access	Name	Type	Value	Description
1	Set	802.1Q Tag Enable	USINT	0	Enables or disables sending 802.1Q frames. (0 – Disabled/1 – Enabled)
2	Set	DSCP PTP Event	USINT	59	DSCP value for PTP (IEEE 1588) event messages.
3	Set	DSCP PTP General	USINT	47	DSCP value for PTP (IEEE 1588) general messages.
4	Set	DSCP Urgent	USINT	55	CIP transport class 1 messages with priority Urgent
5	Set	DSCP Scheduled	USINT	47	CIP transport class 1 messages with priority Scheduled
6	Set	DSCP High	USINT	43	CIP transport class 1 messages with priority High
7	Set	DSCP Low	USINT	31	CIP transport class 1 messages with priority Low

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6.5 *Device Level Ring (DLR)*

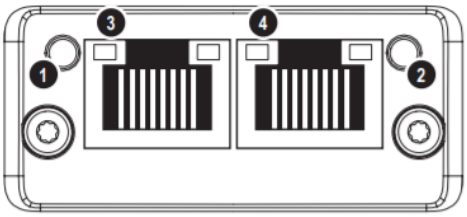
Device Level Ring (DLR) enables the use of ring topologies on EtherNet/IP networks and has built-in mechanisms for media redundancy, network fault detection, and network fault resolution. It is a token-based ring protocol with a master-slave hierarchy.

All the nodes in the EtherNet/IP network part of the ring are connected using ring topology (that is, the last node is connected directly to the first node). If, at any point, the connection between two nodes would break, the data will flow the other way instead, guaranteeing that data can be sent to/from the Scanner to the Adaptor(s).

On a network consisting entirely of DLR devices, there are two types of devices: ring supervisors and ring nodes. **There must be one active ring supervisor on the network**, though it is considered best practice to have at least one backup ring supervisor as well.

A straightforward way to think of the ring supervisor is that it serves as the traffic cop of the network. It sends out special-purpose frames to determine the status of the network and sends out additional frames to reconfigure the network in the event of a device failure or break in physical media.

6.6 *LED Indicators*



Network Status LED (LED1)

LED state	Description
Off	No power or no IP address
Green	Online, one or more connections established (CIP class 1)
Green, flashing	Online, no connections established
Red	Duplicate IP address, FATAL error
Red, flashing	One or more connections timed out (CIP class 1)

Module Status LED (LED2)

LED state	Description
Off	No power
Green	Controlled by a Scanner in Run state and, if CIP Sync is enabled, time is synchronized to a Grandmaster clock
Green, flashing	Not configured, Scanner in idle state, or, if CIP Sync is enabled, time is synchronized Grandmaster clock
Red	Major fault (EXCEPTION-state, FATAL error etc.)
Red, flashing	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters

LINK/Activity LEDs (LED3/4)

LED state	Description
Off	No link, no activity
Green	Link (100 Mbit/s) established
Green, flickering	Activity (100 Mbit/s)
Yellow	Link (10 Mbit/s) established
Yellow, flickering	Activity (10 Mbit/s)

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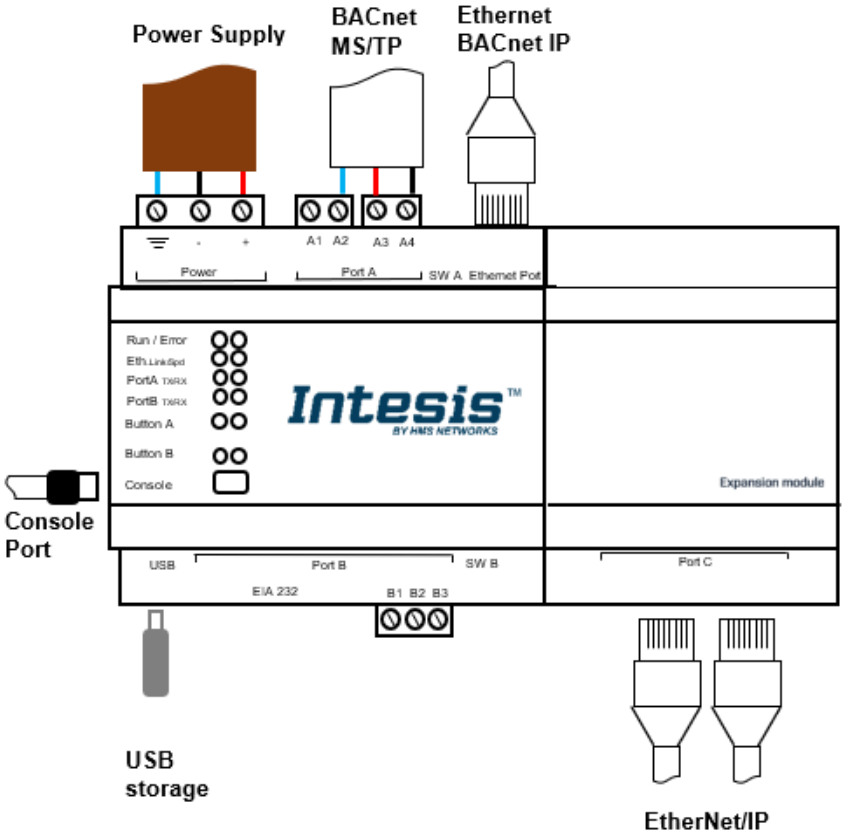
7. Connections

Find below information regarding the Intesis connections available.



Power Supply
Must use NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Respect polarity applied of terminals (+) and (-). Be sure the voltage applied is within the range admitted (check section 10). The power supply can be connected to earth but only through the negative terminal, never through the positive terminal.

Ethernet / BACnet/IP (UDP) / Modbus TCP / Console (UDP & TCP)
Connect the cable coming from the IP network to the connector ETH of the gateway. Use an Ethernet CAT5 cable. If communicating through the LAN of the building, contact the network administrator and make sure traffic on the port used is allowed through all the LAN path (check the gateway user manual for more information). With factory settings, after powering up the gateway, DHCP will be enabled for 30 seconds. After that time, if no IP is provided by a DHCP server, the default IP 192.168.100.246 will be set.

PortA / BACnet MS/TP
Connect the EIA485 bus to connectors A3 (A-), A4 (B+) and A1 or A2 (SNGD) of gateway's PortA. Respect the polarity. Remember the characteristics of the standard EIA485 bus: maximum distance of 1200 meters, maximum 32 devices connected to the bus, and in each end of the bus it must be a termination resistor of 120 Ω. The gateway has an internal bus biasing circuit that incorporates the termination resistor. If you install the gateway in one of the ends of the bus, then do not install an additional termination resistor in that end.

PortB
Reserved for future use.

EtherNet/IP
Connect the cables coming from the IP network to the EtherNet/IP connectors.

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Console Port

Connect a mini-type B USB cable from your computer to the gateway to allow communication between the Configuration Software and the gateway. Remember that Ethernet connection is also allowed. Check the user manual for more information.

USB

Connect a USB storage device (not a HDD) if required. Check the user manual for more information.

Ensure proper space for all connectors when mounted (see section 11).

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7.1 *Powering the device*

A power supply working with any of the voltage range allowed is needed (check section 10). Once connected the RUN led (Figure above) will turn on.

WARNING! To avoid earth loops that can damage the gateway and/or any other equipment connected to it, we strongly recommend:

- The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth**.

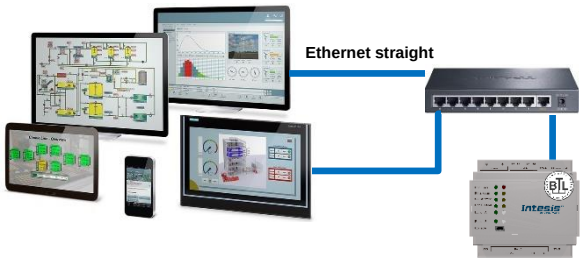
7.2 *Connection to BACnet*

7.2.1 BACnet/IP

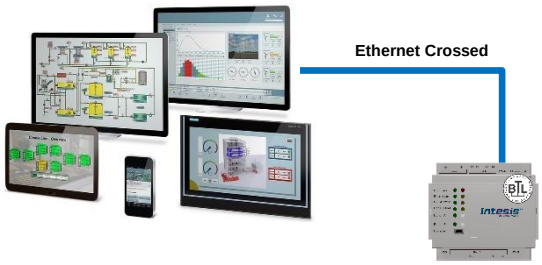
Connect the communication cable coming from the network hub or switch to the ETH port (Figure above) of Intesis. The cable to be used shall be a straight Ethernet UTP/FTP CAT5 cable.

In case there is no response from the BACnet devices to the frames sent by Intesis, check that they are operative and reachable from the network connection used by Intesis. Check the Intesis Ethernet interface sending *Pings* to its IP address using a PC connected to the same Ethernet network.

Check as well with the network admin that there are no limitations regarding UDP communication or ports blocked.



BACnet/IP connection using switch/hub and straight cable



BACnet/IP connection without switch/hub and crossed cable

7.2.2 BACnet MS/TP

Connect the EIA485 bus to connectors A4 (B+), A3 (A-) and A2 (SNGD) of gateway's PortA. Respect the polarity.

Remember the characteristics of the standard EIA485 bus: maximum distance of 1200 meters, maximum 32 devices connected to the bus, and in each end of the bus it must be a termination resistor of 120 Ω. The gateway has an internal bus biasing circuit that incorporates the termination resistor. If you install the gateway in one of the ends of the bus, then do not install an additional termination resistor in that end.

SW1:
- ***ON:*** *120 Ω termination active*
- ***OFF:*** *120 Ω termination inactive*

SW2-3:
- ***ON:*** *Polarization active*
- ***OFF:*** *Polarization inactive*

If the gateway is installed in one bus end, make sure that termination is active.

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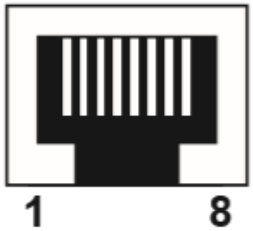
7.3 *Connection to EtherNet/IP*

Connect the communication cables coming from previous and next device in the EtherNet/IP network, using a line or ring topology. When ring topology is used, a device must take over the function of the ring supervisor. See section 6.4 CIP Object Implementation for more details. If only one Ethernet connection is needed (e.g., last device in a line topology), either Port 1 or Port 2 can be used.

The cable to be used shall be a straight Ethernet UTP/FTP CAT5 cable.

EtherNet/IP interface contains a dual port Ethernet switch, they both operate at 10/100Mbit, full or half duplex.

Pin no.	Description
4, 5, 7, 8	Connected to chassis ground over serial RC circuit.
6	RD-
3	RD+
2	TD-
1	TD+
Housing	Cable Shield



7.4 *Connection to the configuration tool*

This action allows the user to have access to configuration and monitoring of the device (more information can be found in the configuration tool User Manual). Two methods to connect to the PC can be used:

- **Ethernet:** Using the Ethernet port of Intesis.
- **USB:** Using the console port of Intesis, connect a USB cable from the console port to the PC.

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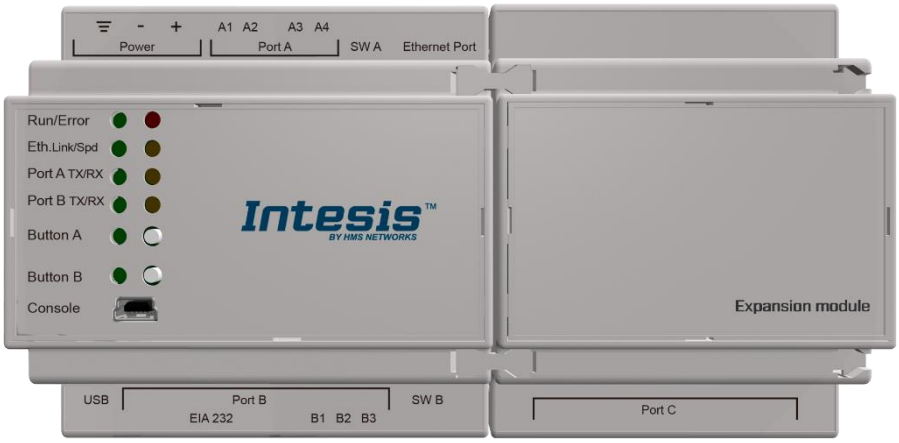
8. Status LEDs and push buttons



LED	Colour	Indication
Run	Off	No power
	Green	Device powered and working.
Error	Off	No error
	Red	Error
Port A (Tx/Rx) – BACnet	Off	There is no activity on this port.
	Tx - Blinking green	Every data packet sent to the network it blinks
	Rx – Blinking yellow	Every data packet received from a slave device it blinks
Port B (Tx/Rx) – Expansion Module communication	Off	There is no activity on this port.
	Tx - Blinking green	Every data packet sent to Expansion module it blinks.
	Rx – Blinking yellow	Every data packet received from Expansion module it blinks.
Button A – BACnet	Off / Red	On when link is detected: - BACnet/IP: ethernet is up & running, the IBOX got an IP - BACnet MS/TP: token passing is detected
Button B – Expansion Module communication	Off / Red	It indicates the state of the Anybus CompactCom internal FSM: - Steady: PROCESS_ACTIVE - Blinking: WAIT_PROCESS - Off: Other states

Push button	Functionality
Button A – BACnet	Sends to Broadcast I-Am message
Button B – Expansion Module communication	It doesn't have any functionality. It can be configured from Intesis MAPS software

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9. Setup process and troubleshooting

9.1 *Pre-requisites*

It is necessary to have a BACnet/IP client or MS/TP device operative and well connected to the corresponding BACnet port of Intesis and an EtherNet/IP Scanner connected to their corresponding ports as well.

Connectors, connection cables, PC to use the configuration tool and other auxiliary material, if needed, are not supplied by HMS Industrial Networks S.L.U for this standard integration.

Items supplied by HMS Networks for this integration are:

- Intesis gateway.
- Link to download the configuration tool.
- USB Console cable to communicate with gateway.
- Product documentation.

9.2 *Intesis MAPS. Configuration & monitoring tool for Intesis BACnet series*

9.2.1 Introduction

Intesis MAPS is a Windows® compatible software developed specifically to monitor and configure Intesis BACnet series.

The installation procedure and main functions are explained in the *Intesis MAPS User Manual*. This document can be downloaded from the link indicated in the installation sheet supplied with the Intesis device or in the product website at www.intesis.com.

In this section, only the specific case of EtherNet/IP and BACnet systems will be covered.

Please check the Intesis MAPS user manual for specific information about the different parameters and how to configure them.

9.2.2 Connection

To configure the Intesis connection parameters press on the ***Connection*** button in the *menu bar*.

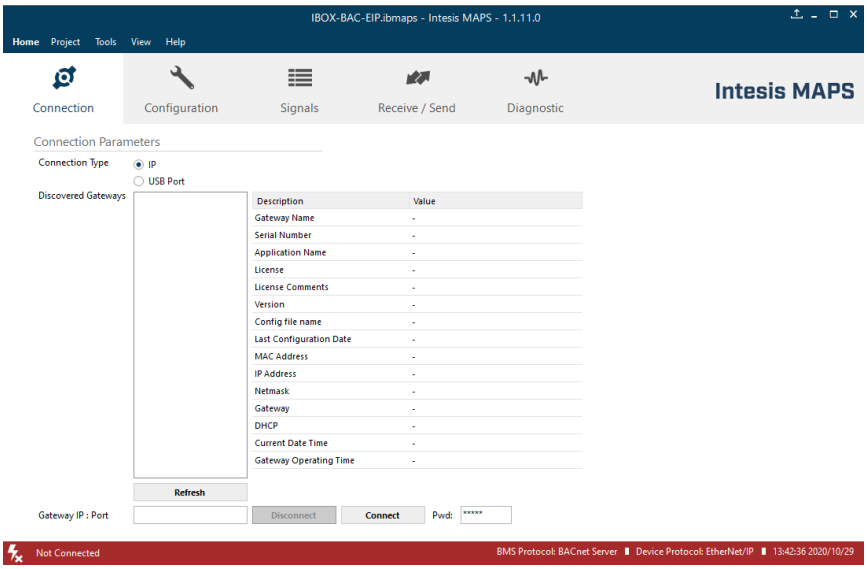

Figure 9.1 MAPS connection

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9.2.3 Configuration tab

Select the ***Configuration*** tab to configure the connection parameters. Three subsets of information are shown in this window: General (Gateway general parameters), BACnet Server (BACnet interface configuration) and EtherNet/IP (interface parameters).

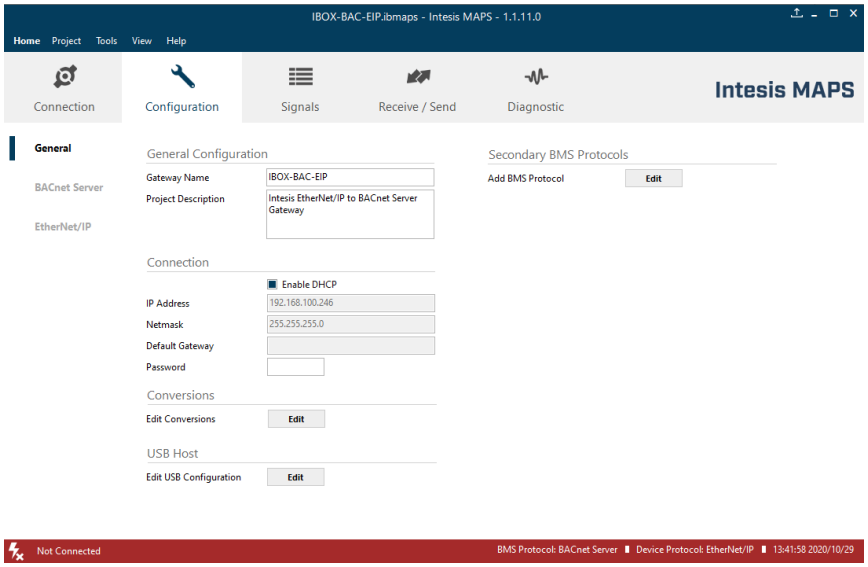

Figure 9.2 Intesis MAPS configuration tab

9.2.4 Signals

All available objects, Object Instances, its corresponding EtherNet/IP data and other main parameters are listed in the **Signals** tab. More information on each parameter and how to configure it can be found in the Intesis MAPS user manual.

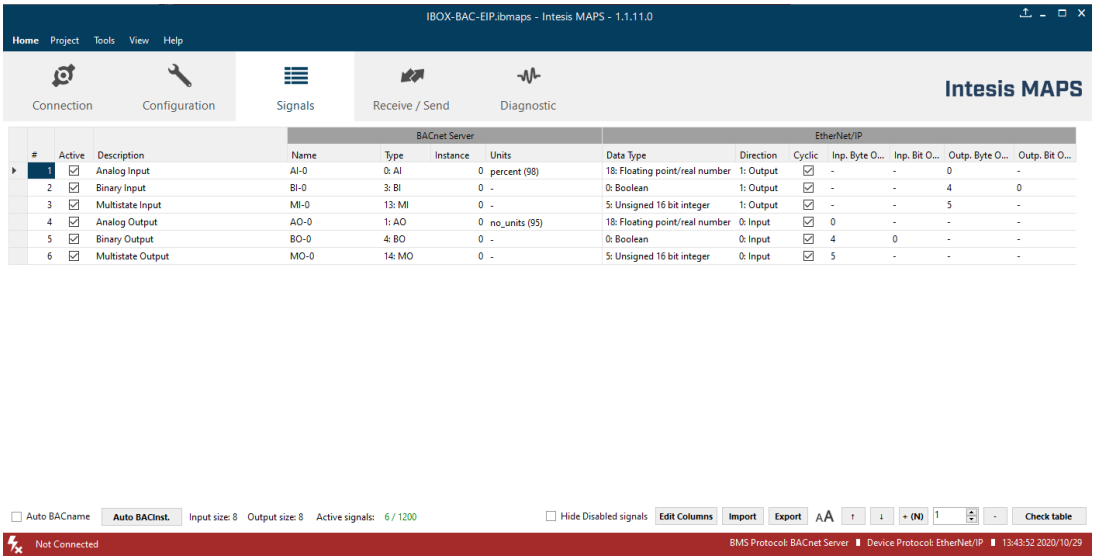

Figure 9.3 Intesis MAPS Signals tab

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9.2.5 Sending the configuration to Intesis

Once the configuration is finished, follow these steps:

1.- Click on ***Save*** button to save the project to the project folder on your hard disk (more information in Intesis MAPS User Manual).

2.- You will be prompted to generate the configuration file to be sent to the gateway.

a.- If ***Yes*** is selected, the file containing the configuration for the gateway will be generated and saved also into the project folder.

b.- If ***NO*** is selected, remember that the binary file with the project needs to be generated before the Intesis starts to work as expected.

3.- Press the ***Send File*** button to send the binary file to the Intesis device. The process of file transmission can be monitored in the Intesis Communication Console window. Intesis will reboot automatically once the new configuration is loaded.

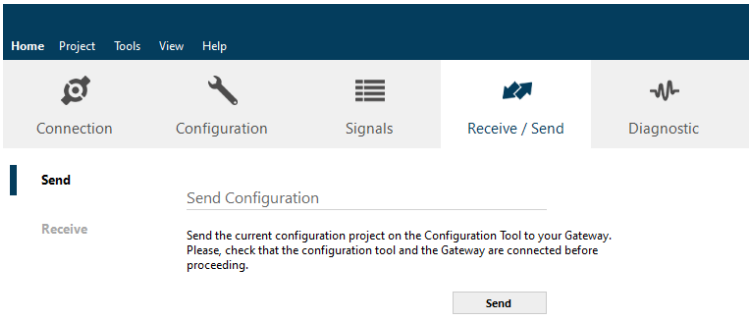

Figure 9.4 Intesis MAPS Receive/Send tab

Remember to send the configuration file to the Intesis using button Send File after any configuration change.

9.2.6 Diagnostic

To help integrators in the commissioning tasks and troubleshooting, the Configuration Tool offers some specific tools and viewers.

To start using the diagnostic tools, a connection with the Gateway is required.

The **Diagnostic** section is composed by two main parts: Tools and Viewers.

- **Tools**
  Use the tools section to check the current hardware status of the box, log communications into compressed files to be sent to the support, change the Diagnostic panels' view, or send commands to the gateway.

- **Viewers**
  To check the current status, viewers for the Internal and External protocols are available. A generic Console viewer for general information about communications and the gateway status is also available. Finally, there is also a Signals Viewer to simulate the BMS behavior or to check the current values in the system.

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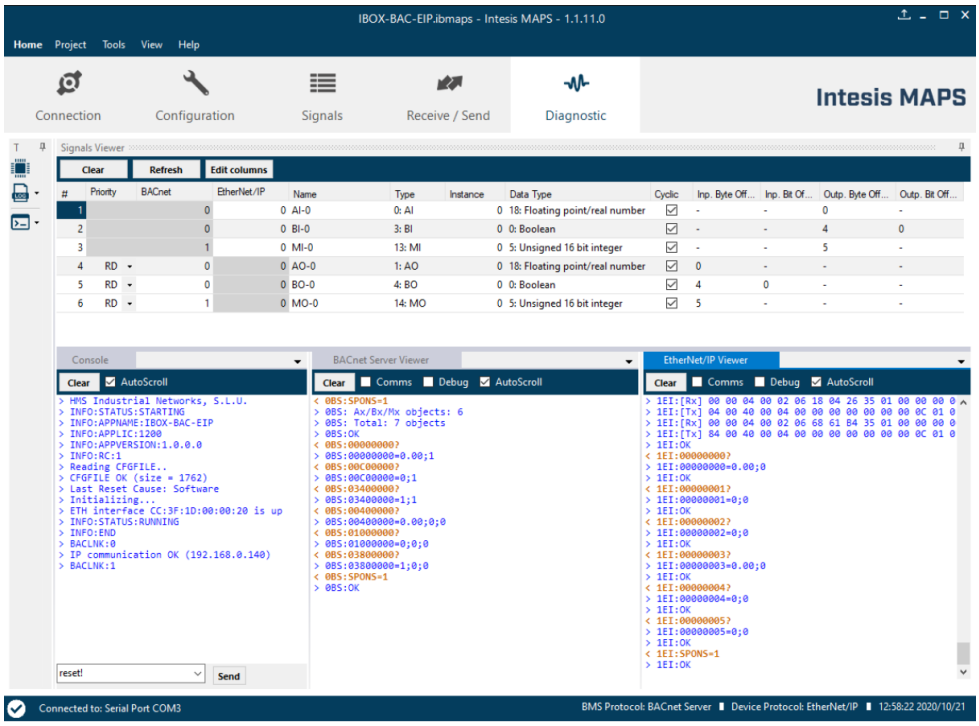

Figure 9.5 Diagnostic

More information about the Diagnostic section can be found in the Configuration Tool manual.

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9.3 *Setup procedure*

1. Install Intesis MAPS on your laptop. Use the setup program supplied for this and follow the instructions given by the Installation wizard.

2. Install the Intesis gateway in the desired installation site. Installation can be on DIN rail or on a stable non-vibrating surface (DIN rail mounted inside a metallic industrial cabinet connected to ground is recommended).

3. If using BACnet/IP, connect the communication cable coming from the BACnet/IP network to the port marked as Ethernet on Intesis (More details in section 6.4).

   If using BACnet MS/TP, connect the communication cables coming from the BACnet MS/TP network to the port marked as Port A on Intesis (More details in section 6.4).

4. Connect the communication cable coming from EtherNet/IP network to the port marked as Port C of Intesis (More details in section 6.4).

5. Power up Intesis. The supply voltage can be 9 to 30 Vdc. Take care of the polarity of the supply voltage applied.

   WARNING! To avoid earth loops that can damage Intesis and/or any other equipment connected to it, we strongly recommend:

   - The use of DC power supplies, floating or with the negative terminal connected to earth. **Never use a DC power supply with the positive terminal connected to earth**.

6. If you want to connect using IP, connect the Ethernet cable from the laptop PC to the port marked as Ethernet of Intesis (More details in section 6.4).

   If you want to connect using USB, connect the USB cable from the laptop PC to the port marked as Console of Intesis (More details in section 6.4).

7. Open Intesis MAPS, create a new project selecting a template of the one named **INBACEIP---0000**.

8. Modify the configuration as desired, save it and download the configuration file to Intesis as explained in the Intesis MAPS user manual. Remember to activate HICP to configure network settings of the EtherNet/IP interface.

9. Connect the Ethernet cable from the laptop PC to the EtherNet/IP network and open HMS IPConfig tool, then modify settings as desired and validate new configuration by clicking **Set**.

10. Visit the Diagnostic section, on Intesis MAPS, and check that there is communication activity, some TX frames, and some other RX frames. This means that the communication with the BACnet master device and EtherNet/IP Scanner is OK. In case there is no communication activity between Intesis and the BACnet and/or EtherNet/IP devices, check that those are operative: check all communication parameters and connection of all devices.

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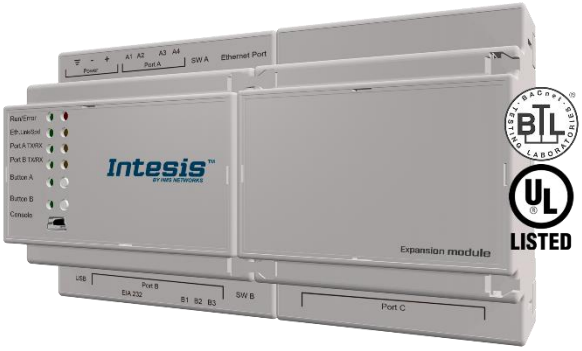
10. Electrical & Mechanical Features



Housing	Plastic, type ABS (UL 94 V-0) Net dimensions (HxWxD): 90x160x58 mm Recommended space for installation (HxWxD): 130x160x100 mm Color: Light Grey. RAL 7035
Mounting	DIN rail EN60715 TH35
Terminal Wiring (for power supply and low-voltage signals)	Per terminal: solid wires or stranded wires (twisted or with ferrule) One core: 0.2 mm^2… 2.5 mm^2 Two cores: 0.2 mm^2… 1.5 mm^2 Three cores: Not permitted
Power	1 x Plug-in screw terminal block (3 poles) Positive, Negative, Earth 24VDC±10% Max: 580 mA
Ethernet	1 x Ethernet 10/100 Mbps RJ45 2 x Ethernet LED: port link and activity
Port A	1 x Serial EIA485 (Plug-in screw terminal block 2 poles) A, B 1 x Plug-in screw terminal block green (2 poles) SGND (Reference ground or shield) 1500 VDC isolation from other ports
Switch A (SWA)	1 x DIP-Switch for PORT A configuration: Position 1: **ON:** 120 Ω termination active **Off:** 120 Ω termination inactive Position 2-3: **ON:** Polarization active **Off:** Polarization inactive
PORT B	1 x EIA232 (SUB-D9 male connector) Reserved for future use 1 x EIA485 port (Plug-in screw terminal block 3 poles) Reserved for future use
Switch B (SWB)	1 x DIP-Switch for serial EIA485 configuration: Reserved for future use
PORT C	2 x Ethernet 10/100 Mbps RJ45 4 x Ethernet LED: 2 x port link and 2 x activity

Battery	Size: Coin 20 mm x 3.2 mm Capacity: 3 V / 225 mAh Type: Manganese Dioxide Lithium
Console Port	Mini Type-B USB 2.0 compliant 1500 VDC isolation
USB port	Type-A USB 2.0 compliant Only for USB flash storage device (USB pen drive) Power consumption limited to 150 mA (HDD connection not allowed)
Push Button	Button A: Check section 8 Button B: Check section 8
Operation Temperature	0°C to +60°C
Operational Humidity	5 to 95%, no condensation
Protection	IP20 (IEC60529)
LED Indicators	8 x On board LED indicators 1 x Error LED 1 x Power LED 2 x Port A TX/RX 2 x Port B TX/RX 1 x Button A indicator 1 x Button B indicator

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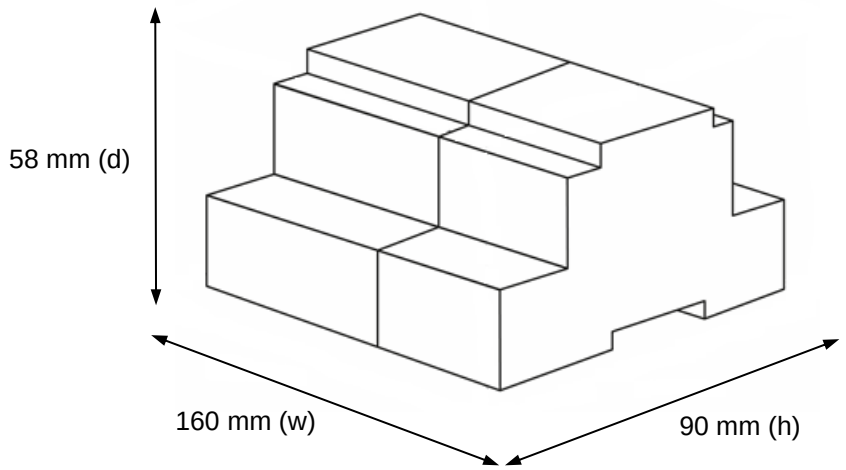
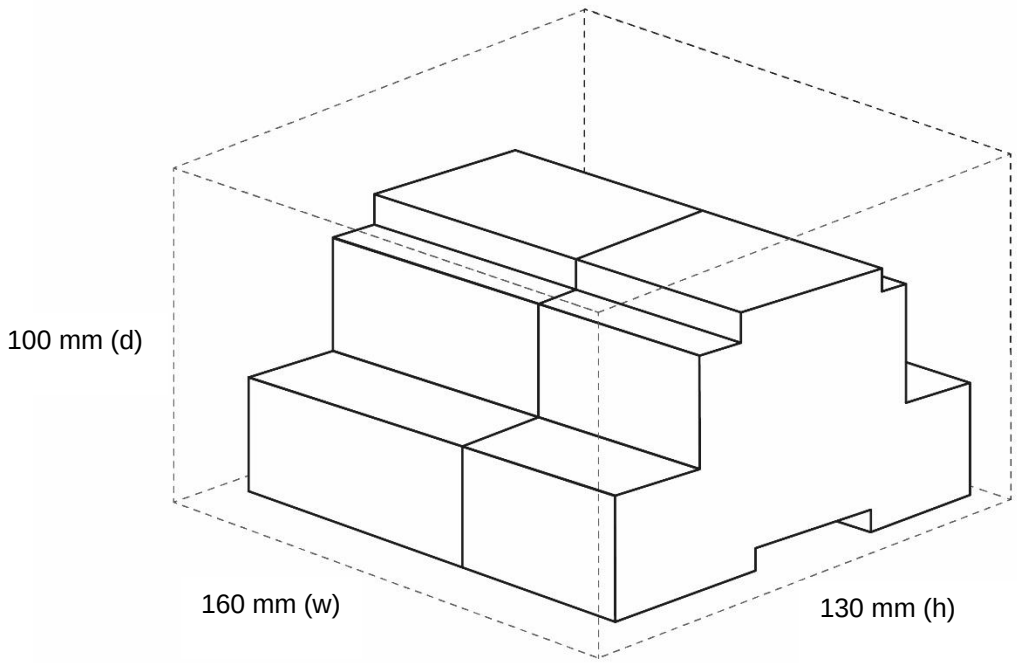
11. Dimensions



Recommended available space for its installation into a cabinet (wall or DIN rail mounting), with space enough for external connections:



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