BACnet Server

PROFINET IO Device

USER MANUAL

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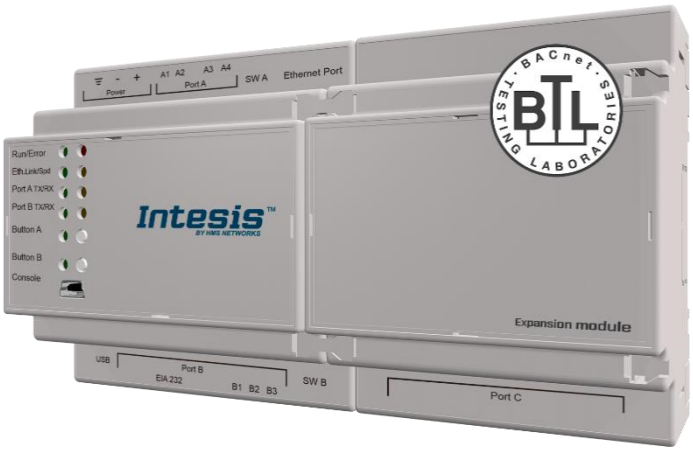

14 rue Edouard Petit
42000 St-Etienne

Tel : +33 477 92 03 56
Email : contact@rg2i.com

www.rg2i.com

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

ORDER CODE
INBACPRT1K20000

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INDEX

1. Description 6
1.1 Introduction 6
1.2 Functionality 7
1.3 Gateway's capacity 7
2. Protocol Implementation Conformance Statement 8
2.1 BACnet Standardized Device Profile (Annex L): 8
2.2 Segmentation Capability: 8
2.3 Data Link Layer Options: 8
2.4 Device Address Binding: 9
2.5 Networking Options: 9
2.6 Character Sets Supported 9
2.7 Gateway 9
3. BACnet Interoperability Building Blocks Supported (BIBBs) 10
3.1 Data Sharing BIBBs 10
3.2 Alarm and Event Management BIBBs 10
3.3 Scheduling BIBBs 11
3.4 Trending BIBBs 11
3.5 Network Management BIBBs 11
3.6 Device Management BIBBs 12
4. Service Types 13
5. Objects 14
5.1 Supported Object Types 14
5.2 Objects and properties 15
5.2.1 INBACPRT---0000 (Device Object Type) 15
5.2.2 Analog Input Object Type 17
5.2.3 Analog Output Object Type 18
5.2.4 Analog Value Object Type 19
5.2.5 Binary Input Object Type 20
5.2.6 Binary Output Object Type 21
5.2.7 Binary Value Object Type 22
5.2.8 Multistate Input Object Type 23
5.2.9 Multistate Output Object Type 24
5.2.10 Multistate Value Object Type 25
5.2.11 Calendar Object Type 26
5.2.12 Schedule Object Type 27
5.2.13 Notification Class Object Type 28
5.2.14 Trend Log Object Type 29
5.2.15 Trend Log Multiple Object Type 30
6. PROFINET Module 31
6.1 Secure HICP 31
6.2 FTP Server 31
6.3 Web Server 32
6.4 Media Redundancy Protocol (MRP) 34
6.5 LED Indicators 34
7. Connections 35
7.1 Powering the device 37
7.2 Connection to BACnet 37
7.2.1 BACnet/IP 37
7.2.2 BACnet MS/TP 37
7.3 Connection to PROFINET 38
7.4 Connection to the configuration tool 38
8. Status LEDs and push buttons 39
9. Setup process and troubleshooting 40
9.1 Pre-requisites 40
9.2 Intesis MAPS. Configuration & monitoring tool for Intesis BACnet series 40
9.2.1 Introduction 40
9.2.2 Connection 40
9.2.3 Configuration tab 41
9.2.4 Signals 41

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9.2.5 Sending the configuration to Intesis 42
9.2.6 Diagnostic 42
9.3 Setup procedure 44
10. Electrical & Mechanical Features 45
11. Dimensions 46

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1. Description

1.1 *Introduction*

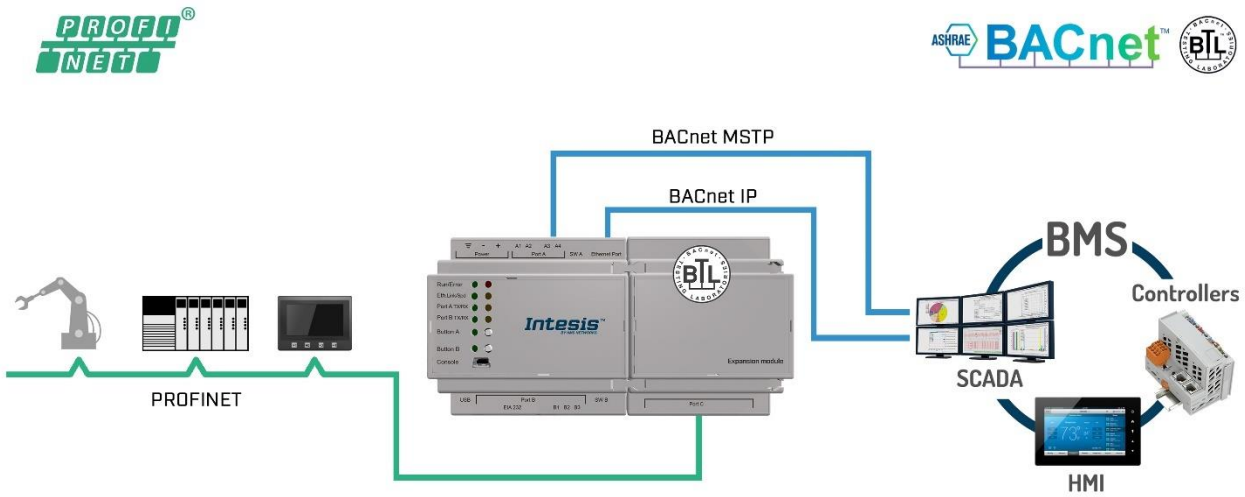
This document describes how to easily connect BACnet MS/TP or BACnet/IP systems with PROFINET networks using the Intesis BACnet Server – PROFINET gateway.

The aim of this integration is to share data between PROFINET IO Controllers 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 PROFINET point of view, Intesis gateway acts as an IO Device and it can be monitored and controlled by an IO Controller.

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

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



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

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1.2 *Functionality*

On the PROFINET side, the gateway acts as a PROFINET IO-Device, so after the start up process, the gateway presents its points as PROFINET IO data to exchange them cyclically or using acyclic Read/Write requests, according to their configuration.

- **Acyclic communication** (Unscheduled, on demand communications). Data exchanged using this method is called 'PROFINET Record Data' and is exchanged using acyclic Record Data Read/Write requests.

- **Cyclic communication** (Scheduled, repetitive communications). Data exchanged using this method is called 'PROFINET IO Data'. Gateway will send periodically all points configured as 'cycle'.

When an IO-Controller writes a PROFINET 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 PROFINET side available to be read by an IO-Controller 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
Communication Chanels supported	RT (Real-Time), IRT (Isochronous Real-Time)	Types of PROFINET communication channels suported
Memory available in PROFINET	Cyclic: 500 bytes as Input; 500 bytes as Output Acyclic: Up to 4800 bytes	Amount of memory available for mapping on PROFINET (as cyclic and acyclic).

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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: *INBACPRT---0000*
Product Model Number: *INBACPRT---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 – PROFINET Gateway

Abstraction of PROFINET 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:

PROFINET 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 INBACPRT---0000 (Device Object Type)

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Device, 246000)	R	R
Object_Name	CharacterString	"INBACPRT---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	"INBACPRT---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 MSTP / 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. PROFINET Module

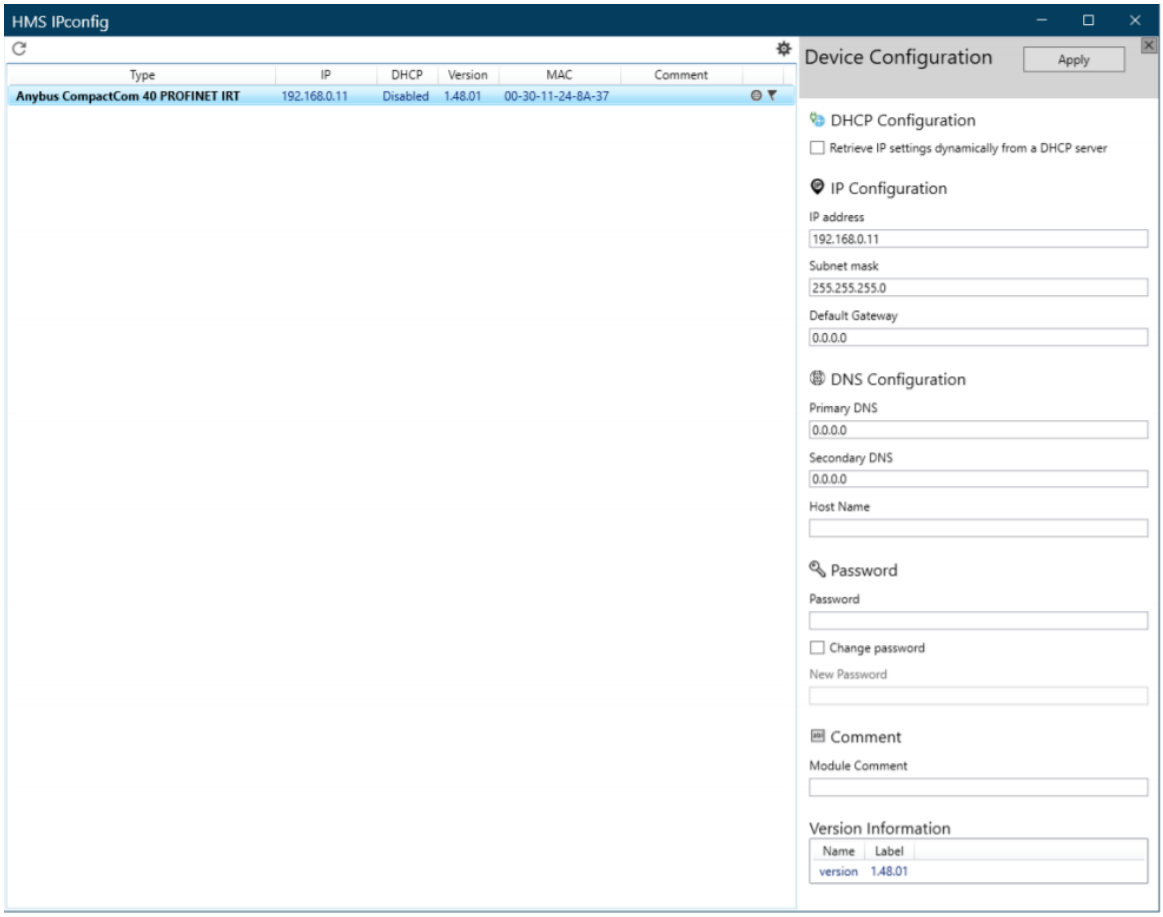
6.1 *Secure HICP*

Intesis gateway supports the Secure HICP protocol used by the IPConfig tool for changing settings like IP address, Subnet mask, and enable/disable DHCP. This configuration interface can be used if configuration via the PROFINET configuration tool (via PROFINET DCP) is not possible or desired. 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-PROFINET modules. The network can be rescanned at any time by cliking **Scan**.

To change the network settings of a BACnet-PROFINET 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*

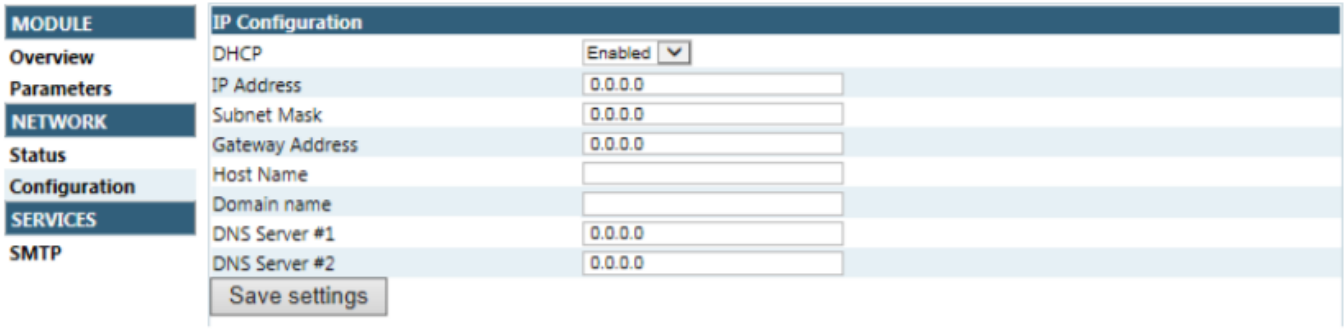
The built-in web server provides a flexible environment for end-user interaction and configuration purposes. By default, it is disabled, but it can be enabled from Intesis MAPS tool.

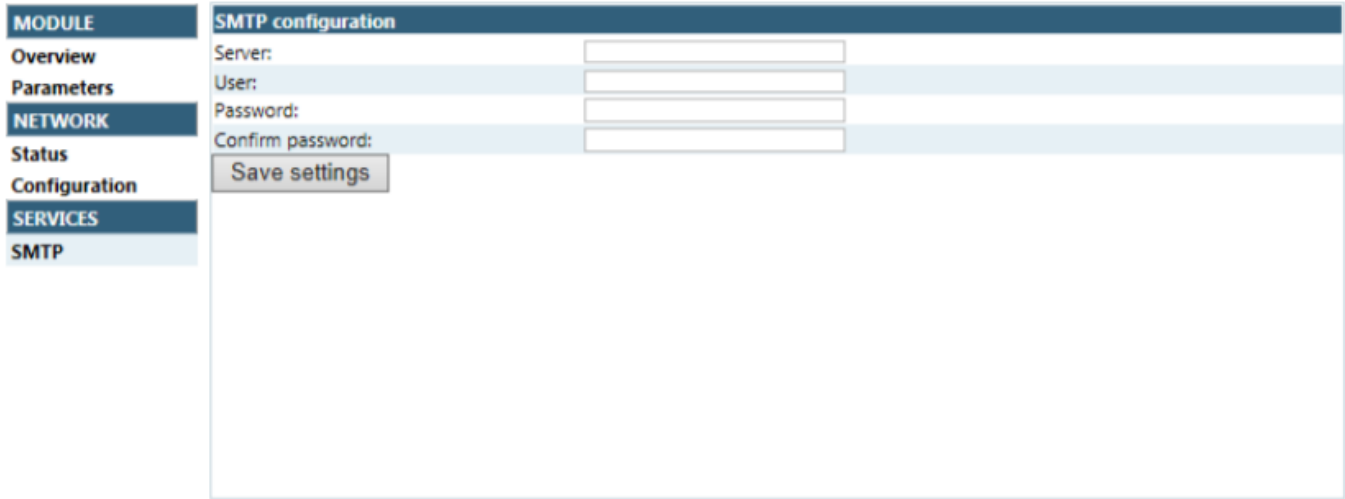
The web server supports up to 20 concurrent connections and communicates through port 80.

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 PROFINET 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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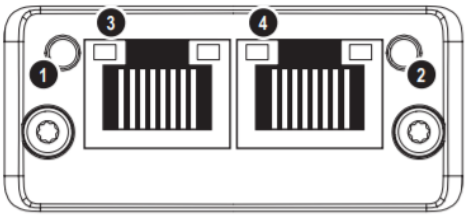
6.4 *Media Redundancy Protocol (MRP)*

Media Redundancy Protocol (MRP) is a PROFINET specific ring protocol ensuring redundancy in the network, which can significantly decrease network downtime. It is a token-based ring protocol with a master-slave hierarchy.

All the nodes in the PROFINET 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 IO Controller to the IO Device(s). The self-healing time is approximately 200 ms.

The Media Redundancy Master (MRM) is responsible for checking the functional capability of the ring network, by sending out cyclic tokens. The Media Redundancy Clients (MRC) basically work as switches that pass on the tokens. **The Intesis gateway supports acting as a Media Redundancy Client (MRC)**. It also supports propagating link change to the Media Redundancy Master.

6.5 *LED Indicators*



Network Status LED (LED1)

LED state	Status	Comments
Off	Offline	No connection with IO controller
Green	Online (RUN)	Connection with IO controller established, IO controller in Run state
Green, 1 flash	Online (STOP)	Connection with IO controller established, IO controller in Stop state or IO data bad.
Green, blinking (1Hz)	Blink (DCP_Identify)	Used by engineering tools to identify the node on the network.
Red	Fatal event	Major internal error (this indication is combined with a red module status LED)
Red, 1 flash	Station name error	Station name not set
Red, 2 flashes	IP address error	IP address not set
Red, 3 flashes	Configuration error	Expected identification differs from Real identification.

Module Status LED (LED2)

LED state	Status	Comments
Off	Not Initialized	PROFINET interface not initialized.
Green	Normal Operation	PROFINET interface initialized.
Red	Exception error	Module in state Exception
	Fatal event	Major internal error (this indication is combined with a red module status LED)
Alternating Red/Green	Firmware Update	Do NOT power off the module. Turning the module off during this phase could cause permanent damage.

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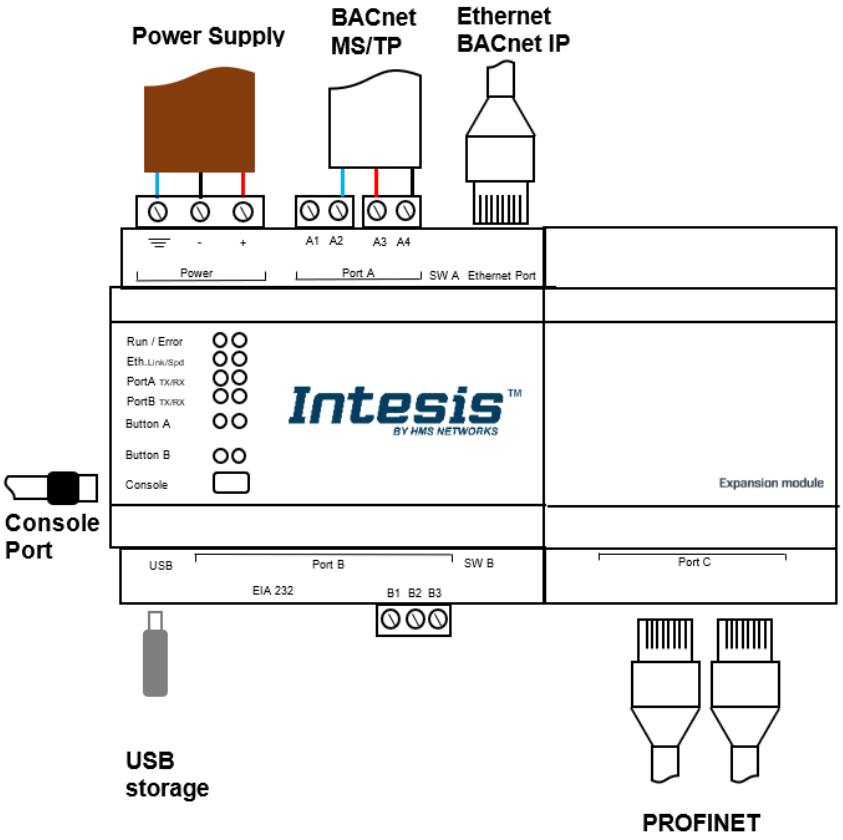
7. Connections

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.

PROFINET
Connect the cables coming from the IP network to the PROFINET 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 an 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**.

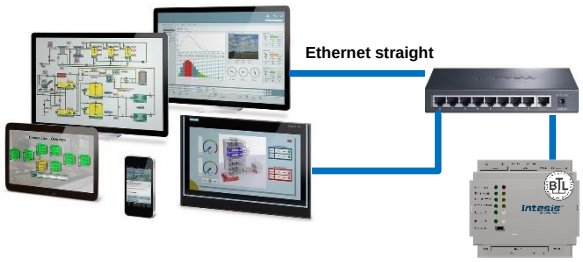
7.2 *Connection to BACnet*

7.2.1 BACnet/IP

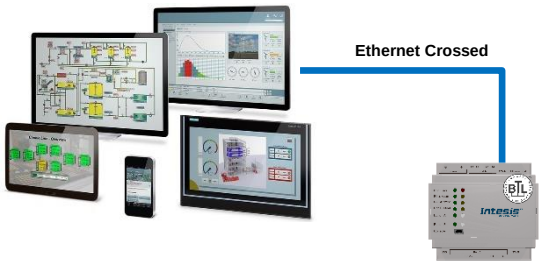
Connect the communication cable coming from the network hub or switch to the ETH port (Figure above) of Intesis. The cable to be used shall be a straight Ethernet UTP/FTP CAT5 cable.

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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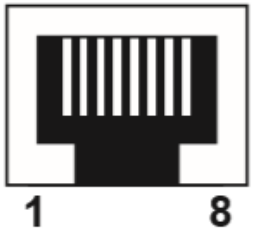
7.3 *Connection to PROFINET*

Connect the communication cables coming from previous and next device in the PROFINET network, using a line or ring topology. When ring topology is used, a device must take over the function of the ring manager (MRM). See section 6.4 Media Redundancy Protocol (MRP) 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.

PROFINET interface contains a dual port Ethernet switch, they both operate at 100Mbit, full duplex, as required by PROFINET.

Pin no.	Description
1, 2, 4, 5	Connected to chassis ground over serial RC circuit.
3	RD-
6	RD+
7	TD-
8	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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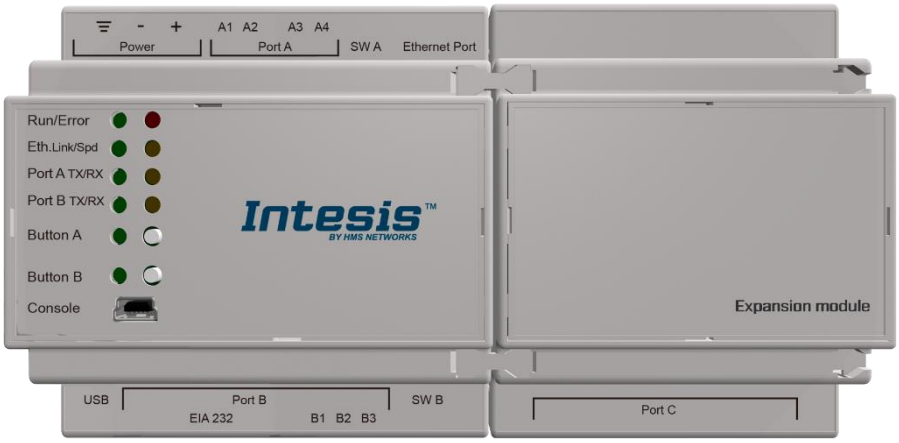
8. Status LEDs and push buttons



LED	Color	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 an 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: - BACnetIP: ethernet is up & running, the IBOX got an IP - BACnetMSTP: 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 a PROFINET IO Controller 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 Networks 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 PROFINET 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*.

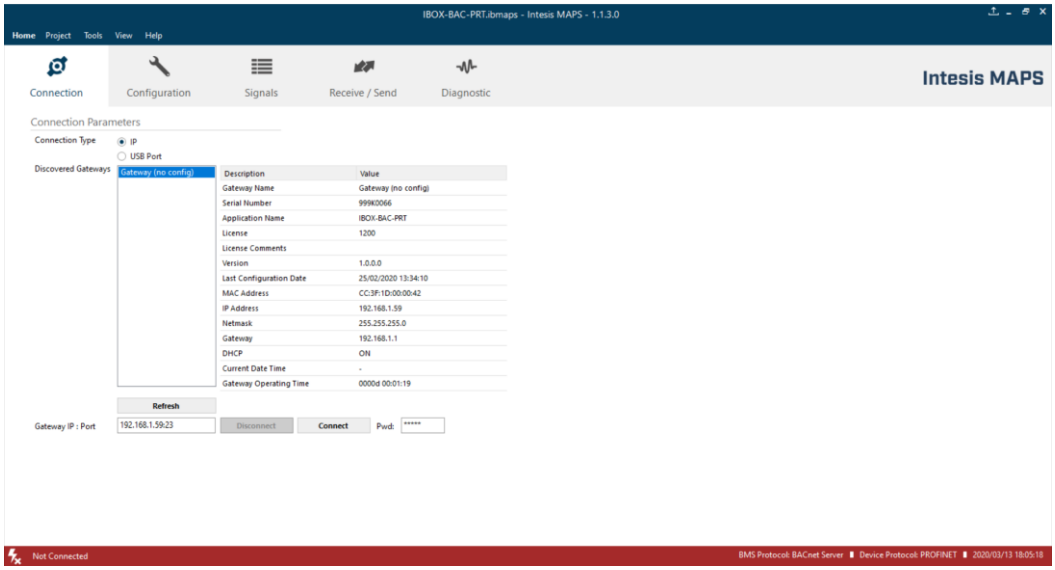

Figure 9.1 MAPS connection

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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 PROFINET (interface parameters).

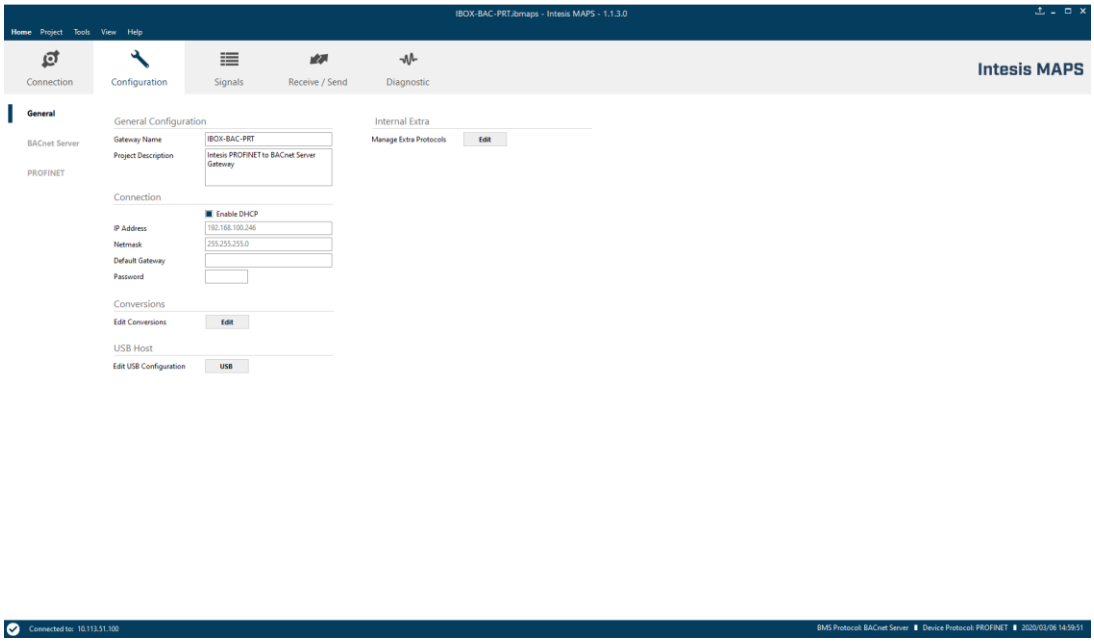

Figure 9.2 Intesis MAPS configuration tab

9.2.4 Signals

All available objects, Object Instances, its corresponding PROFINET data and other main parmaters 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.

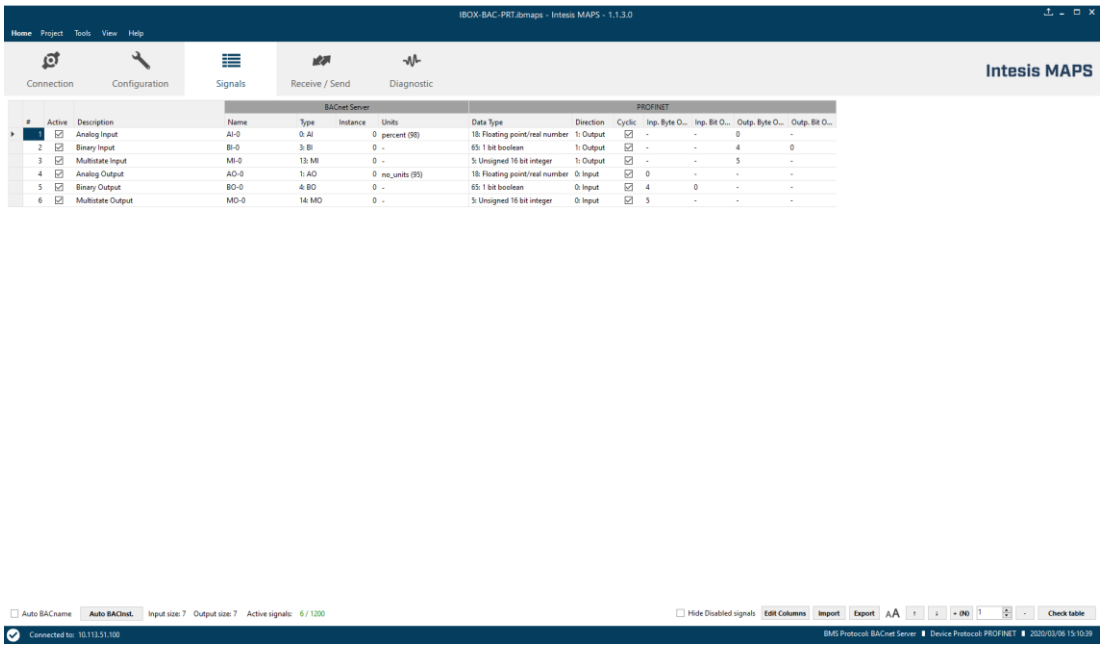

Figure 9.3 Intesis MAPS Signals tab

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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.

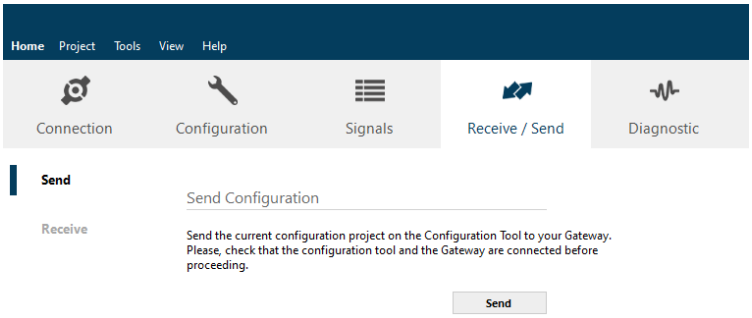

Figure 9.4 Intesis MAPS Receive/Send tab

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

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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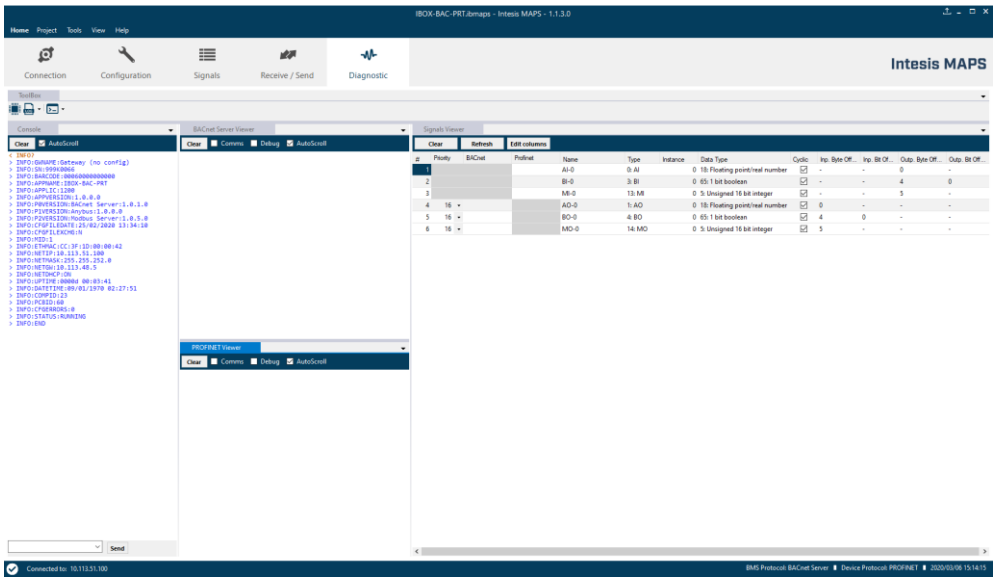

Figure 9.5 Diagnostic

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 PROFINET 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 and create a new project selecting a template of the one named **INBACPRT---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 PROFINET interface.

9. Connect the Ethernet cable from the laptop PC to the PROFINET network and open HMS IPConfig tool, then modify the settings as desired and validate the 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 PROFINET IO Controller is OK. In case there is no communication activity between Intesis and the BACnet and/or PROFINET devices, check that those are operative: check all communication parameters and connection of all devices.

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10. Electrical & Mechanical Features

Enclosure	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 mm²… 2.5 mm² Two cores: 0.2 mm²… 1.5 mm² Three cores: Not permitted
Power	1 x Plug-in screw terminal block (3 poles) Positive, Negative, Earth 24 VDC±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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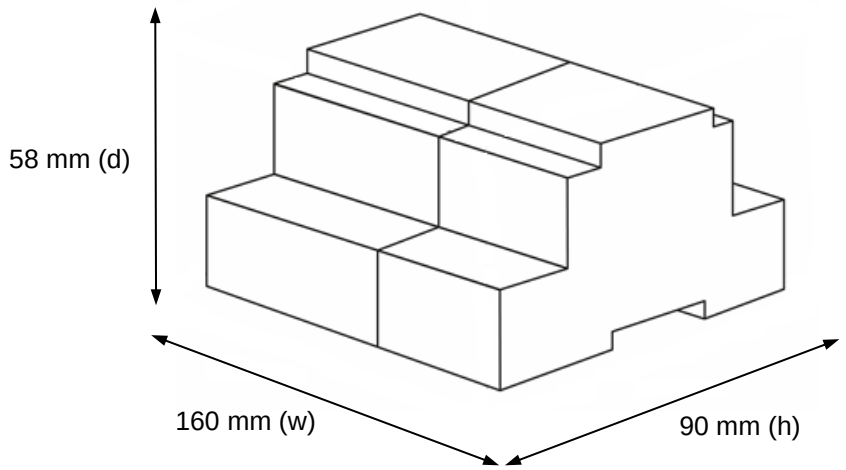
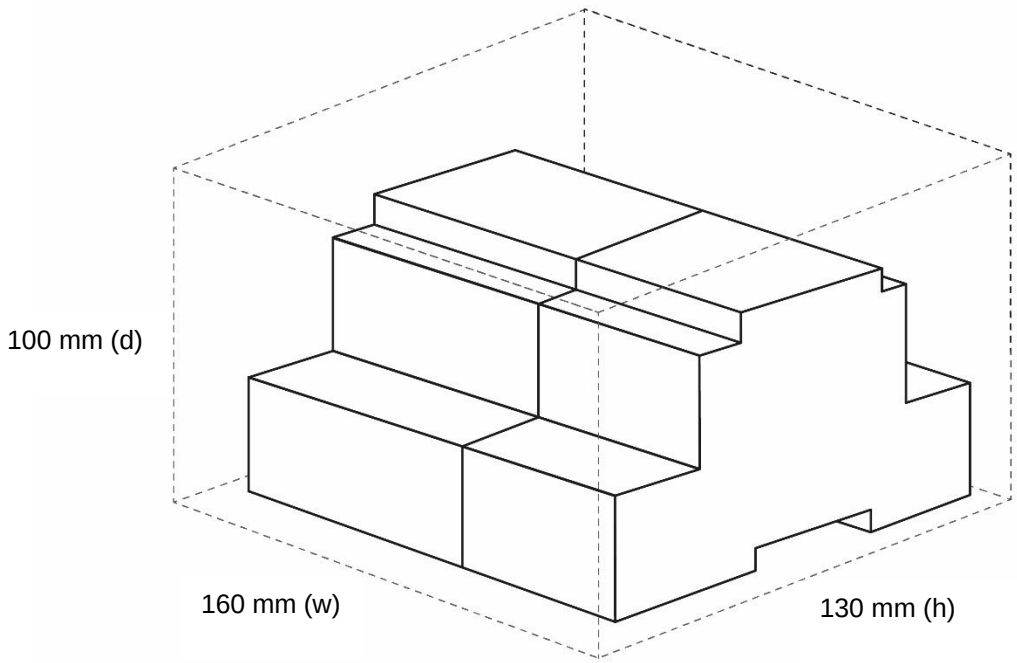
11. Dimensions



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



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