

SIEMENS

BACnet Driver for PXC Modular and PXC-36

Technical Manual

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Table of Contents

Chapter 1 – Product Description	7
Introduction	7
Field Panel Related Documents	7
Supported Hardware	7
Virtual ALN Communications (Firmware 2.x)	8
BACnet ALN Communications (Firmware 3.x)	8
System Architecture	8
Revision Information	11
Compatibility	11
BACnet Driver with BACnet Field Panel Web Server Licenses	12
BACnet Driver Unique Characteristics	12
Sequence of Operations	12
Point Update Control on BACnet ALNs	12
Device Failure	12
Read Property versus Read Property Multiple	13
Poll Sequence	13
BACnet Driver Mode	14
Addressing Devices in BACnet MS/TP Mode	14
Addressing Devices in BACnet/IP Mode	14
Dynamic Offset	15
Panel Updates to Set Initial Values	17
What Not to Do	17
What to Do	17
Alarming	18
Point Mapping	19
Application Numbers	19
Application 4098: Device Communication Status	20
Application 4099: Diagnostic and Control Points	21
PrintF Cntrl (Point 15)	31
Diag Control (Point 20)	32
RPM ER CLASS (Point 88)	34
RPM ER REASN (Point 89)	34
Chapter 2 – Startup and Commissioning with an Insight Workstation	40
Prerequisites	40
Starting up the Driver	40
Loading an Integration Driver into a PXC Series	41
Loading an ISB File	42
Loading the Driver License	43
Setting the FLN Communication Speed	43

Verifying the Setup Information	43
Establishing Communications with the BACnet Devices	44
Adding Devices (BACnet only)	44
Adding Applications	45
Method 1 – Using the Buffalo Grove TEC Applications Feature	45
Method 2 – Using the HMI Port and the Insight Workstation	45
Method 3 – Using the HMI Port and Commissioning Tool	46
Method 4 – Learning Custom Applications Using System Profile	46
Adding the Required Points and Devices	46
Making the Driver Ready	47
Checking Communications	48
Adding Remaining Devices	48
Commissioning the System	48
Chapter 3 – Building the Point Database	50
Overview	50
Understanding BACnet Protocol	51
BACnet Object Properties	51
Command Priority	52
Out-of-Service	53
Driver Revisions BNP2.2, BNB2.2, and Later	53
Driver Revisions BNC, BND, and BNE	54
Driver Revisions BNAX.x and Earlier than BNP2.2	54
Creating Custom Applications	55
Before You Begin	55
BACnet Additional Data Fields	55
Interpreting Vendor Data	55
Creating the Custom Application File	59
BACnet Driver Application Template	59
Defining Application Numbers	60
Guidelines for Defining Points	60
Point Data	61
Chapter 4 – License Manager	62
Why Do I Need a License?	62
What License Choices Do I Have?	62
What if I Don't Have a License?	62
What is a Demo License?	62
Creating a Demo License	62
Appendix A – Importing Applications Using the Buffalo Grove TEC Applications Drive and Commissioning Tool	65
Importing Standard Integrated Systems Applications	65
Importing Custom Applications	66
Appendix B – Adding Applications Using the HMI Port and the Insight Workstation ...	68
Uploading Applications to the Insight Workstation	68

Appendix C – Adding Applications Using the HMI Port and Commissioning Tool.....	70
Uploading Applications to Commissioning Tool	70
Learning Applications in Commissioning Tool	71
Appendix D – Learning Applications Using System Profile	72
Uploading Applications to the Insight Workstation	72
Appendix E – Custom HMI Prompts for Integration Drivers.....	73
Introduction.....	73
Integration Driver Status Display (HMI: System ⇒ Integration ⇒ Log)	73
Integration Driver Diagnostic Counter Display (HMI: System ⇒ Integration ⇒ Counters).....	75
Integration Driver Database Dump (HMI: System ⇒ Integration ⇒ dBdump).....	77
Integration Driver Datascope Control (HMI: System ⇒ Integration ⇒ Datascope)	81
Integration Driver Configuration	83
Appendix F – Startup and Commissioning with a Desigo CC Management Station....	84
Prerequisites.....	84
Starting up the Driver.....	84
Loading an Integration Driver into a PXC Series	85
Loading an ISB File	86
Loading the Driver License	87
Setting the FLN Communication Speed.....	87
Verifying the Setup Information	87
Establishing Communications with the BACnet Devices	88
Adding Devices	88
Adding Applications.....	89
Method 1 – Using the Buffalo Grove TEC Applications Feature	89
Method 2 – Using the HMI Port and Commissioning Tool.....	89
Adding the Required Points and Devices	90
Making the Driver Ready.....	90
Checking Communications	91
Adding Remaining Devices	91
Commissioning the System.....	92
Migrating the Driver Database to the Desigo CC System	92

Chapter 1 – Product Description

Chapter 1 describes the features and functions of the BACnet Driver.

Introduction

The BACnet Driver enables the APOGEE Automation System to communicate with BACnet devices. The integrated system consists of the BACnet system plus the APOGEE Automation System, linked by the BACnet Driver.

The BACnet Driver is released on the PXC Modular and PXC-36. Throughout the rest of this document, *PXC series* is used to refer to both models. *PXC Modular* or *PXC-36* is used when a specific model is being discussed.

The BACnet Driver operates in two modes: BACnet MS/TP mode or BACnet/IP mode. Both modes are exclusive and cannot be used together at the same time.

- When using a P2 ALN, the BACnet Driver firmware is based on Firmware Revision 2.x and the driver uses the proprietary APOGEE Ethernet/IP or RS-485 protocol to communicate with the APOGEE Automation System.
- When using a BACnet ALN, the BACnet Driver firmware is based on Firmware Revision 3.x and the driver uses BACnet/IP or BACnet MS/TP to communicate with the APOGEE Automation System.

The System Architecture [→ 8] section shows a diagram of a typical BACnet and APOGEE Automation System configuration.

Field Panel Related Documents

This document describes the functionality and use of the BACnet Driver. For hardware-specific information, see the following documents:

For PXC Modular Series

- *PXC Modular Series Installation Instructions* (553-638)
- *PXC Modular Start-up Procedures* (145-729 (BACnet), 145-728 (Ethernet), or 145-718 (RS-485))
- *PXC Modular Series with BACnet II ALN Start-up Procedures* (145-728)
- *PXC Modular Technical Reference Manual* (145-046)

For PXC Compact 36

- *PXC Compact 36 Installation Instructions* (553-504)
- *PXC Compact Series Start-up Procedures* (145-157)
- *PXC Compact Series Technical Reference Manual* (145-172)

Supported Hardware

- Any PXC Modular can be converted to a BACnet Driver.
- Any PXC Compact 36 can be converted to a BACnet Driver.

Virtual ALN Communications (Firmware 2.x)

**NOTE:**

Do not use an Integration Driver as a Virtual AEM or for a dial-up modem for a remote ALN because the field panel with the Virtual AEM should contain the most current firmware revision.

BACnet ALN Communications (Firmware 3.x)

The BACnet Driver on a PXC Series with BACnet ALN enables the APOGEE Automation System to use a field panel that conforms to the ANSI/ASHRAE Standard 135-2004 BACnet standard. Since BACnet is a standard protocol used by many vendors, its application is frequent, yet tricky due to the many different ways for vendors to implement BACnet. It is important to understand the different APOGEE solutions for BACnet and when to apply each solution.

For more information about BACnet communications, see the *BACnet Application Guide* (125-1984) on the Partner site.

**NOTE:**

To connect a BACnet MS/TP network to an Insight workstation or Desigo CC management station, a standard field panel with Firmware Revision 3.1 or later can be used as a router.

Integration Drivers should **not** be used as BACnet MS/TP to BACnet IP routers, even though this option can be enabled through the HMI, Insight or Desigo CC software, or Commissioning Tool (CT).

Do not create manual unbundled points and device points for the same point address because the manual unbundled point will not update the Out Of Service status correctly.

System Architecture

The BACnet Driver operates in two modes: BACnet MS/TP mode or BACnet/IP mode. Both modes are exclusive and cannot be used together at the same time.

BACnet MS/TP Mode

In BACnet MS/TP mode, the driver provides communication between BACnet MS/TP Devices and the APOGEE Automation System through a TCP/IP ALN. The following features are supported:

- One physical connection to FLN 1 only.
- Up to 255 BACnet MS/TP devices, of which up to 126 can be masters.
- TX-I/O Modules.
- Maximum of 8,000 APOGEE points per driver.

The actual number of BACnet MS/TP devices that the driver can support is dependent on the devices themselves, the number of points per device, and their electrical constraints.

The following diagram shows a typical configuration for using the BACnet Driver in MS/TP Mode with Firmware 2.x.

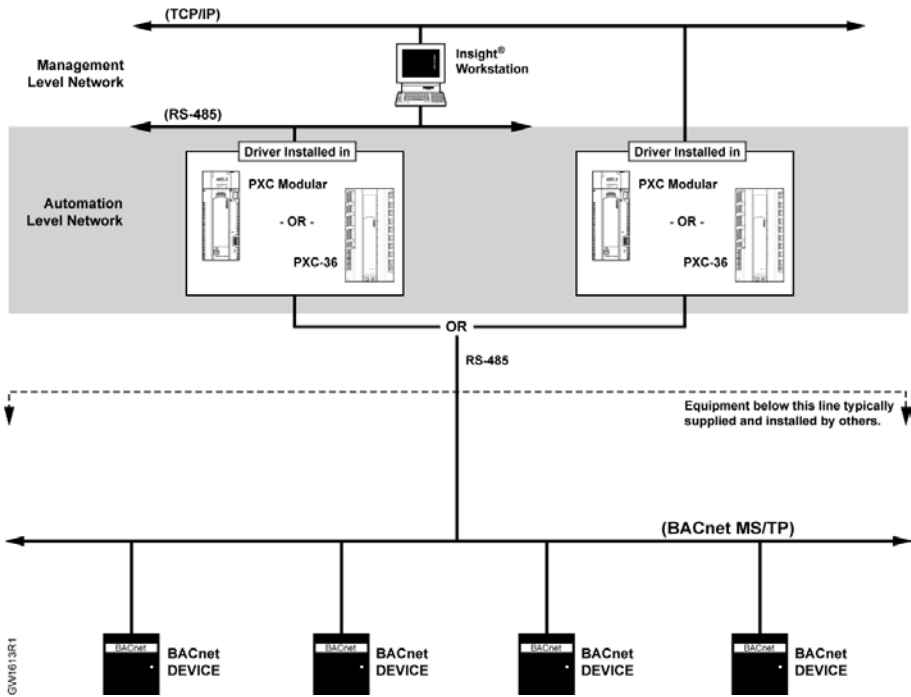


Figure 1: Typical BACnet Driver in MS/TP Mode and APOGEE Automation System Configuration (Firmware Revision 2.x).

The following diagram shows a typical configuration for using the BACnet Driver in MS/TP Mode with Firmware 3.x.

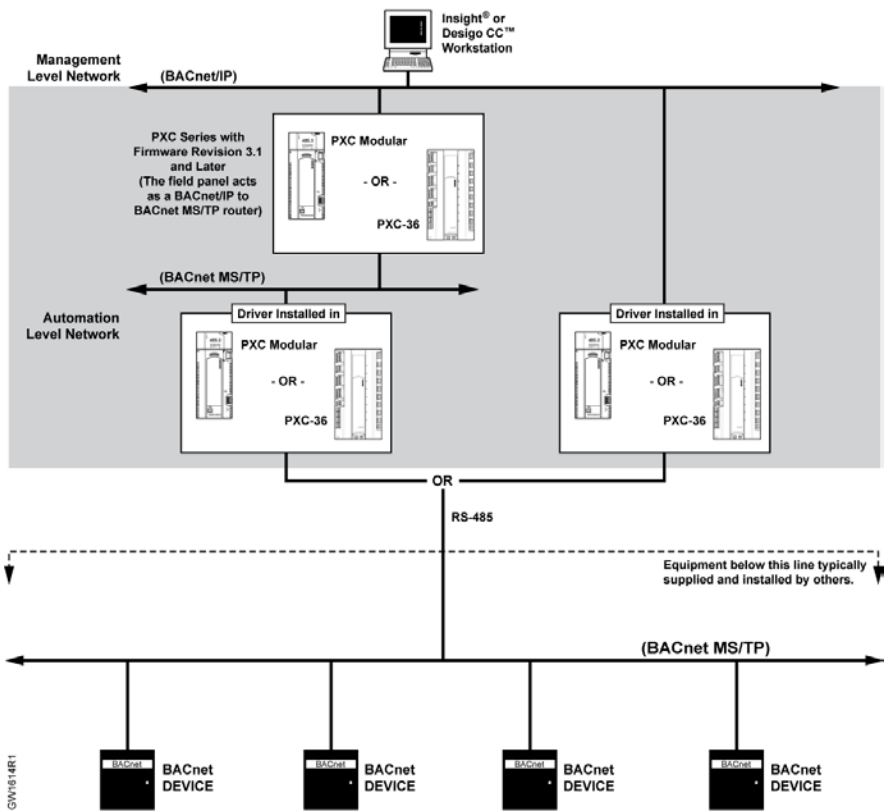


Figure 2: Typical BACnet Driver System Configuration with BACnet MS/TP Devices (Firmware Revision 3.x).

BACnet/IP Mode

In BACnet/IP mode, the driver communicates with other BACnet/IP devices through the Ethernet port using FLN 6 as a virtual FLN. The following features are supported:

- Up to 255 BACnet/IP devices.
- TX-I/O Modules.
- Maximum of 8,000 APOGEE points per driver.

The actual number of BACnet/IP devices that the driver can support is dependent on the devices themselves, the number of points per device, and their electrical constraints.

The following diagram shows a typical configuration for using the BACnet Driver in IP Mode with Firmware 2.x. The driver provides communication between BACnet/IP Devices and the APOGEE Automation System through a TCP/IP ALN. It communicates to the BACnet/IP devices by using the BACnet/IP protocol by sharing the same Ethernet connection used for the TCP/IP ALN.

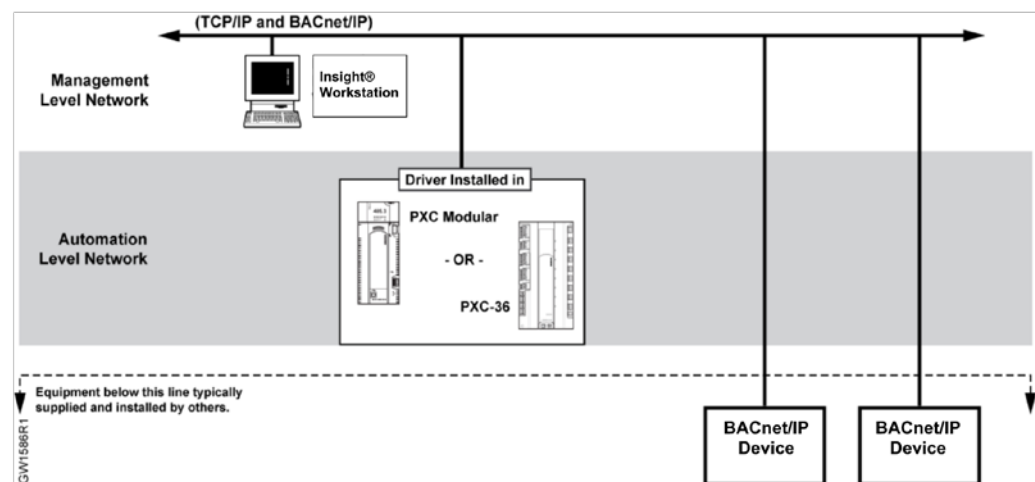


Figure 3: Typical BACnet Driver in BACnet/IP Mode with BACnet/IP Devices (Firmware Revision 2.x).

The following diagram shows a typical configuration for using the BACnet Driver in IP Mode with Firmware 3.x. The driver provides communication between BACnet/IP Devices and the APOGEE Automation System through a BACnet ALN. It communicates to the BACnet/IP devices using the BACnet/IP protocol by sharing the same Ethernet connection used for the BACnet/IP ALN.

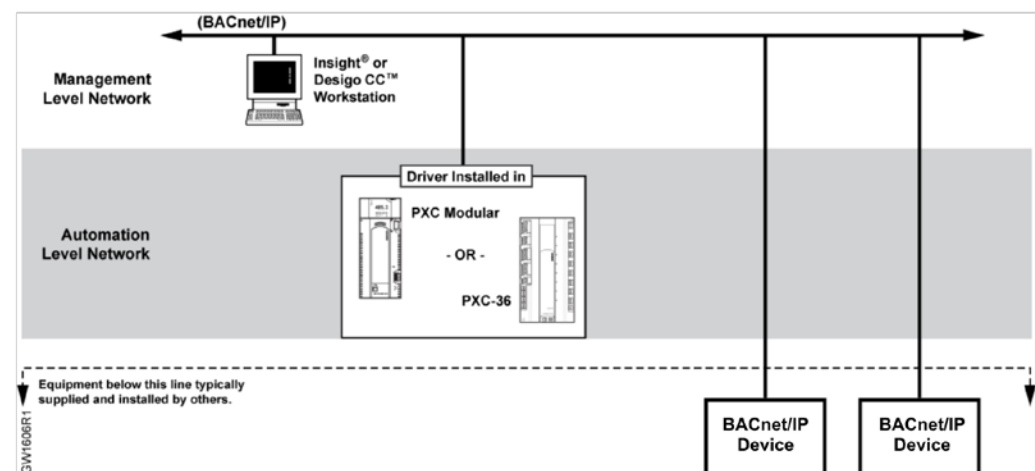


Figure 4: Typical BACnet Driver in BACnet/IP Mode with BACnet/IP Devices (Firmware Revision 3.x).



Revision Information

NOTE:

For the PXC Series field panel, the BACnet Driver firmware must be flashed into memory before it can be used. A permanent driver license must also be purchased and generated through License Manager and loaded into the PXC Series. Once a field panel with standard firmware is upgraded to an Integration Driver, standard firmware cannot be reloaded into that field panel.

The BACnet Driver can be identified by its revstring:

Table 1:

Driver Revision String Table.	
Driver ALN Type	Driver Revision
PXC Series, BACnet/IP ALN with BACnet BACnet Field Panel Web Server (FPWeb)	BNE
PXC Series, BACnet/IP ALN	BND
PXC Series, P2 Ethernet or RS-485 ALN	BNC

For detailed driver revision information, see the *Release/Upgrade Notes* (126-983).

Compatibility

The following table outlines which hardware or software is compatible with each firmware revision.

Table 2:

Hardware and Software Supported by the BACnet Driver.							
	Firmware Revision						
	3.5.1 and later	3.5*) and later	3.4 and later	3.2 and later	3.0 and later	2.8.5 and later	2.8.2 and earlier
PXC Modular	✓	✓	✓	✓	✓	✓	✓
PXC-36	✓	✓	✓	✓		✓	
Desigo® CC™, minimum revision	V3.0	V2.1	V2.1	V1.0	V1.0	V2.1	V2.1
BACnet Field Panel Web Server, minimum revision	1.4	1.4	1.4				
PXM10T Controller-mounted Operator Display module	✓	✓	✓				
Commissioning Tool and Datamate Advanced, minimum revision	3.16	3.15SP2	3.14	3.11	3.9.1	3.16	3.9.1
Insight software, minimum revision	3.15SP2	3.15SP2	3.14	3.11	3.9.1	3.14	3.9.1
Other APOGEE Field Panels	✓	✓	✓	✓	✓	✓	✓

- *)
- Auto-export of Trend Data, is not recommended on job sites using a workstation.
 - Backups of 3.5 field panels do not include the FTP configuration for a Trend. This means restored panels must be manually reconfigured for this feature.
 - Desigo CC can be used to backup field panels using this feature, but if you're not using Desigo CC, then field panels using the Trend FTP feature must be backed up to flash to ensure the settings are not lost after a restart.

BACnet Driver with BACnet Field Panel Web Server Licenses

The BACnet Driver can be loaded onto the same controller as the BACnet Field Panel Web Server (FPWeb) Host license (LSM-FPWEBPLHST) or Service license (LSM-FPWEBPL).

BACnet Driver Unique Characteristics

The BACnet Driver has the following unique characteristics:

- Cannot communicate with APOGEE Automation System FLN devices (for example, Terminal Equipment Controllers).
- Connects to the BACnet MS/TP system using FLN 1 only.
- Connects to the BACnet IP system using the Ethernet port. Points are mapped using FLN 6.
- The BACnet Driver operates in two modes: BACnet MS/TP mode or BACnet/IP mode. Both modes are exclusive and cannot be used together at the same time.

To size the database for the driver and to calculate the APOGEE Automation System database requirements, see the BACnet *Driver Product Update* (127-0157).

Sequence of Operations

A point database, physically located within and managed by each driver, contains information about all the points it monitors. Likewise, the BACnet system contains its own database tables of point information, representing the states of devices it is programmed to monitor and/or control. A driver database must always mirror the contents of its respective BACnet database. The two databases must be synchronized using communication between the driver and the BACnet system.

Should communications between the driver and the BACnet devices fail, the driver reports the loss of communications to the APOGEE Automation System. Upon restoration of communications, the driver will re-synchronize the database.

When a driver recovers from a coldstart, the driver assumes that all points are Normal and the point values are set to a value of zero. Then the driver polls the network for devices. If a device does not respond, the driver determines if the device subpoints should be failed based on the setting of PTFAILMODE (Diagnostic Point 4). For more information on the device subpoint status, see the *Device Failure* section.

Point Update Control on BACnet ALNs

The BACnet Driver controls how LAO and LDO points of third-party devices are updated in a BACnet field panel. When the driver receives point values from the BACnet devices, the points' present value is updated and assigned to the priority array. For detailed information, see the PNTUPDATECTL (Point 601) section.

Device Failure

When the driver loses communication with a device (except during a system synchronization), the Application Device Status is Failed and a *Device Failure* message displays. In addition, the driver determines if the device subpoints should be failed based on PTFAILMODE (Diagnostic Point 4).

- If PTFAILMODE is OFF, no device subpoints will fail, other than the ones that have previously failed.
- If PTFAILMODE is ON, all subpoints will fail.





When the driver re-establishes communication with a device, the Application Device Status is Normal and a `Device Return from Failure` message displays. All subpoints that receive a valid response from the device will display as Normal.

Read Property versus Read Property Multiple

For devices with low resources that do not support Read Property Multiple or are limited by how many objects a Read Property call can support, the BACnet Driver configures the type of polling as follows:

- Diagnostic Point 51 sets the poll type for the whole driver. A value of 0 disables Read Property Multiple and Read Property is used instead. A value between 1 and 12 defines how many objects with Read Property Multiple are polled. The default is 4.

	 CAUTION
	<p>The information in the point descriptor will be lost if you do any of the following:</p> <ul style="list-style-type: none">• Change the device descriptor.• Delete and re-add a device.• Edit the descriptor of the TEC that represents the third-party device. <p>⇒ Verify the proper descriptor settings after any modification to the device. Otherwise, you may have communication problems.</p>

- To set the poll type for an individual device, the descriptor field of the device's application point (Point 2) can be used. A numeric value in the descriptor field between 0 and 12 has the same functionality as Diagnostic Point 51, but only at the device level rather than for all the devices defined on the driver.
 - A value of 0 disables Read Property Multiple and Read Property is used instead.
 - A value between 1 and 12 defines how many objects with Read Property Multiple are polled. If the address point descriptor field is empty, or it contains a numeric value outside the range of 0 to 12, then the value of Diagnostic Point 51 is used.

Poll Sequence

The BACnet Driver uses a unique poll sequence to ensure that **in use** points are updated with a higher priority. *In use* points are points that are used on graphics, or in PPCL, Scheduler or Trend. The following poll sequence is used by default:

- The driver continuously polls and updates all points according to the list of configured BACnet devices.
- The driver also polls for all **in use** points in other devices.

This poll sequence can be disabled by setting SUBPT POLLING to 1. When SUBPT POLLING is set to 1, only **in use** points are polled.

BACnet Driver Mode



NOTE:

With older ISB files, Application 4099 Point 99 may be displayed as GWPRINTF CTL, which controls print diagnostic messages. However, when used in a driver on Baseline 120 or later (Firmware 2.x) and Baseline 220 or later (Firmware 3.x), Point 99 will select the driver operation mode, regardless of the point name displayed.

The BACnet Driver can operate in one of two modes.

- In BACnet MS/TP mode, the driver communicates with a BACnet MS/TP network through FLN 1.
- In BACnet/IP mode, the driver communicates with a BACnet/IP network through the Ethernet port using FLN 6 for mapping of the devices and points.

To switch between the modes, use Diagnostic Point 99.

- In the default state (Diagnostic Point value = 0), the BACnet Driver operates in MS/TP mode.
- When the value of Diagnostic Point 99 is set to 1, the BACnet Driver operates in BACnet/IP mode.

Addressing Devices in BACnet MS/TP Mode

In MS/TP mode, the BACnet Driver addresses devices by MAC address only. The device instance ID is not used. When a device is created in APOGEE, the drop number is initially used as the MAC address. If needed, the value of the address point can be set to a different number by setting the initial value.

- Addresses 1 through 126 are for MS/TP Master or Slave devices.
- Addresses above 126 are for Slave devices exclusively.

The actual number of BACnet MS/TP devices that the driver can support is dependent on the devices themselves, the number of points per device, and their electrical constraints.

Addressing Devices in BACnet/IP Mode



CAUTION

The information in the point descriptor will be lost if you do any of the following:

- Change the device descriptor.
- Delete and re-add a device.
- Edit the descriptor of the TEC that represents the third-party device.

⇒ Verify the proper descriptor settings after any modification to the device. Otherwise, you may have communication problems.

In BACnet/IP mode, the BACnet Driver can use two methods to address devices:

- By providing the device instance ID as the initial value of the address point, the driver will issue a “Who Is?” to find the network address information for the selected device and initiate communication. The Insight software cannot set the initial value above 65,535 at this time. If you encounter an instance ID above 65,535, you must manually unbundle the address point and set the initial value in the manually unbundled point.
- By providing the device’s IP address in the descriptor of the address point in the format **xxx.xxx.xxx.xxx**, the driver will direct-address the device without using a “Who Is?”. The value of the address point is then disregarded.

The actual number of BACnet/IP devices that the driver can support is dependent on the devices themselves, the number of points per device, and their electrical constraints.

Dynamic Offset

Dynamic offsets allow you to use the variable Object IDs within an application to access BACnet devices through a gateway device. With a dynamic offset, you can use the same application for the same device multiple times, if the objects are listed in sequence in the gateway object list.

Usually, the Object ID of a BACnet Object in the application file is fixed and can only be changed by modifying the application. A dynamic offset enables you to shift the Object ID of a block of BACnet Objects. A dummy point without PSD data is inserted in front of the BACnet Object block to be shifted. Later, the initial value of this dummy point can be set to a value which will shift all Object IDs following the dummy point by that value. If needed, additional dummy points further down the point list in the application allow you to set a new value, which then will be used, instead. This allows for different offsets inside the application file.

Example

For example, you have three devices using a proprietary protocol connected through a BACnet/IP gateway. Each device has four Binary Output Objects (BO0 through BO11 in the gateway) and three Analog Value Objects (AV0 through AV8 in the gateway).

Table 3: Example: Object Types

Object Type	Description
BO0	Device 1 Digital 1
BO1	Device 1 Digital 2
BO2	Device 1 Digital 3
BO3	Device 1 Digital 4
BO4	Device 2 Digital 1
BO5	Device 2 Digital 2
BO6	Device 2 Digital 3
BO7	Device 2 Digital 4
BO8	Device 3 Digital 1
BO9	Device 3 Digital 2
BO10	Device 3 Digital 3
BO11	Device 3 Digital 4

Object Type	Description
AV0	Device 1 Analog 1
AV1	Device 1 Analog 2
AV2	Device 1 Analog 3
AV3	Device 2 Analog 1
AV4	Device 2 Analog 2
AV5	Device 2 Analog 3
AV6	Device 3 Analog 1
AV7	Device 3 Analog 2
AV8	Device 3 Analog 3

To integrate these three devices, you would create one application with four BO objects and three AV objects. A dummy point would be added in front of the four BO objects (Dummy1). A second dummy point would be added in front of the group of AV objects (Dummy2). The application would then have the following points:

Table 4: Example: Devices Integrated for Dynamic Offset.

Point Number	Type	Name
1	LAO	Address
2	LAO	Application
3	LAO	Dummy1
4	LDO	BO0
5	LDO	BO1
6	LAO	BO2
7	LAO	BO3
8	LAO	Dummy2
9	LAO	AV0
10	LAO	AV1
11	LAO	AV2

For the first device, you would leave the dummy points at a value of **0** and the objects **BO0** through **BO3** and **AV0** through **AV2** would be accessed. For the second device, you would set the initial value of Dummy1 to **4** and of Dummy2 to **3**. This would then shift the BOs to read **BO4** through **BO7** and the AVs to read **AV3** through **AV5**. For the third device, you would set Dummy1 to **8** and Dummy2 to **6**. This would then shift the BOs to read **BO8** through **BO11** and the AVs to read **AV6** through **AV8**.

This can be expanded to any number of objects and object types as needed.

Panel Updates to Set Initial Values

What Not to Do

Do not use the **Panel_update** command through the HMI or select **Update** in the Application Initial Values dialog box from the Insight or Designo CC software or Commissioning Tool (CT). This will cause all output (LAO and LDO) points to update their present value as an initial value. See the following figures for examples.

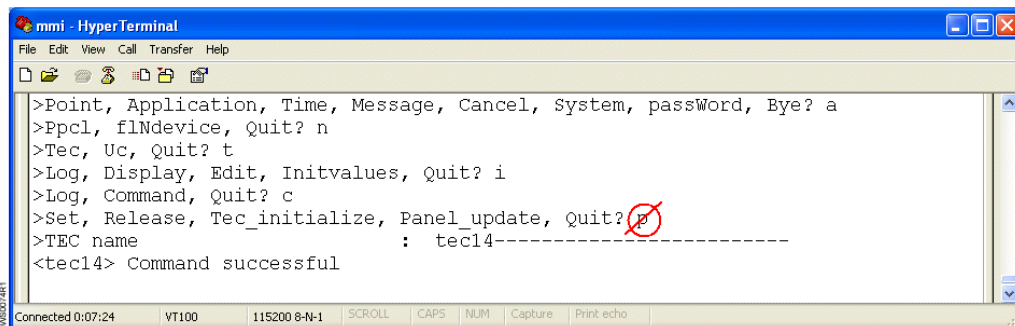


Figure 5: Do Not Use the Panel_update Command through the HMI.

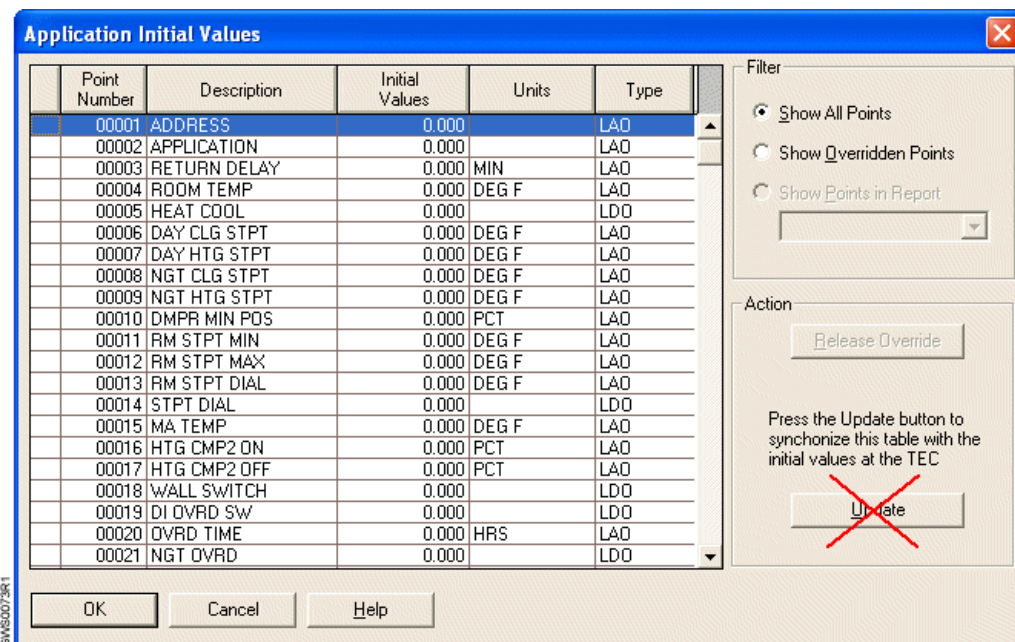


Figure 6: Do Not Select Update in the Application Initial Values Dialog Box.

What to Do

To establish an initial value for a point, either use the **Set** command in the HMI or select **Initial Values** from the TEC Definition dialog box from the Insight or Designo CC software. See the following figures for clarification.

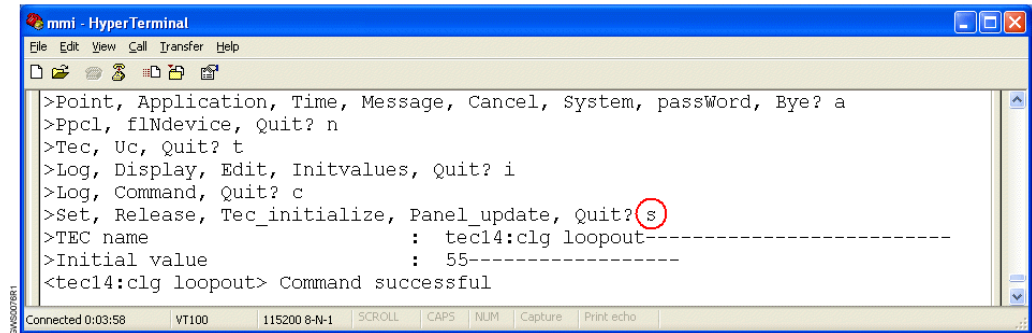


Figure 7: Setting Initial Values through the HMI.

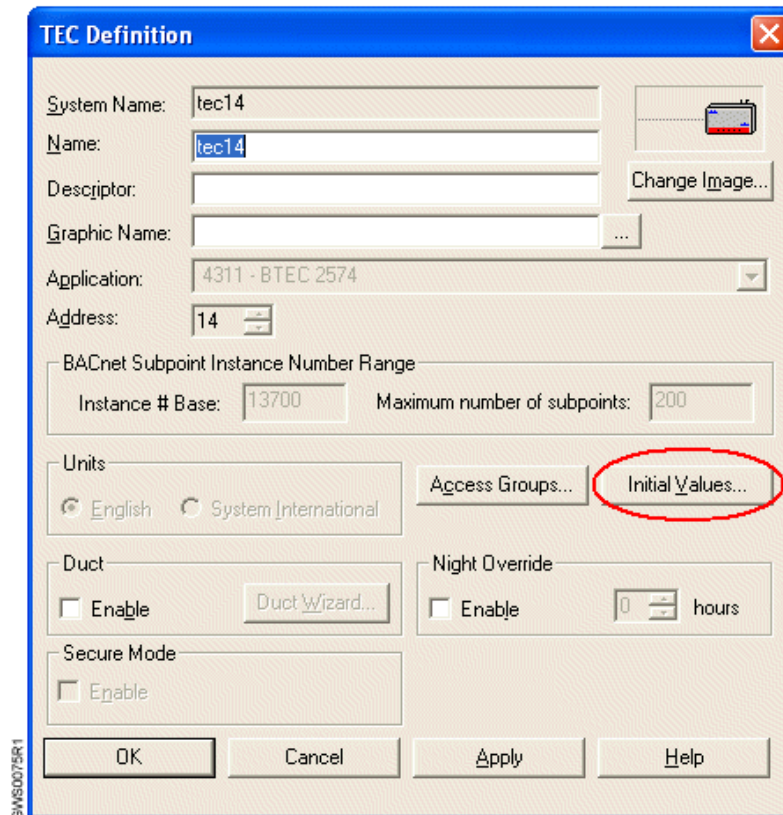


Figure 8: Setting Initial Values through the Workstation Software.

Alarming

The BACnet Driver supports standard alarming, where the alarm condition is activated when the value of the point exceeds a single threshold value.



Advanced alarm features are supported as follows:

- When using P2 firmware (Firmware Revision 2.x), the BACnet Driver supports Enhanced Alarming, which allows you to assign different alarm severity levels and associated colors on the alarm screen and graphics. For more information, see the *Using Enhanced Alarming* section of the *APOGEE P2 ALN Field Panel User's Manual* (125-3019).
- When using BACnet firmware (Firmware Revision 3.x), the BACnet Driver supports BACnet Intrinsic Alarming, which sets different alarm levels based on conditions that you specify. For more information, see the *Using Intrinsic Alarming* section of the *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

Point Mapping

The driver uses applications to map the BACnet points. This section contains features and point maps, complete with slopes and intercepts, for all BACnet system supported by the driver.

Each FLN Application occupies one drop on an FLN in the driver’s address space. There is no requirement that the drop address be related to the BACnet device address; however, for ease of maintenance, you may want to relate the two.

	⚠ CAUTION
	<p>Incorrect point commanding and operation can damage the devices that are controlled by this driver.</p> <p>Points that can be commanded for specific devices must not be set to values other than those recommended by the vendor.</p>
	⚠ CAUTION
	<p>There can be more than one source of control for points in the BACnet system. Use caution when commanding points that are being commanded by other BACnet devices.</p> <p>Also, be sure that the real-time clocks for the BACnet network and the APOGEE Automation System network are synchronized.</p>

Application Numbers

The points for the driver are grouped into different point maps, called *applications*. Points are grouped together based on their use.

BACnet Driver Application Numbers.	
Application Number	Description
4098	Device Communication Status
4099	Diagnostic and Control Points

Application 4098: Device Communication Status

This application details the communication status of all devices. Point 1 describes the communication status for the device defined on Drop 1; Point 2 describes the communication status for the device defined on Drop 2, and so on.



NOTE:

Device Communication Status points can be defined as a TEC with Application Number 4098 on FLN 2, Drop 0. All auto-unbundling and reporting capabilities will apply.

The following table defines the Communications Failure status of each BACnet device.

Table 5:

Communication Failure Status Point Map.						
Point	Type	Subpoint Name	Description	Range/Units ^{a) b) c)}	Slp ^{c)}	Int ^{c)}
1	LDI	COMMSTAT 01	Communication Failure Status of Device 01.	Normal/Fail	–	–
2	LDI	COMMSTAT 02	Communication Failure Status of Device 02.	Normal/Fail	–	–
3	LDI	COMMSTAT 03	Communication Failure Status of Device 03.	Normal/Fail	–	–
4	LDI	COMMSTAT 04	Communication Failure Status of Device 04.	Normal/Fail	–	–
5	LDI	COMMSTAT 05	Communication Failure Status of Device 05.	Normal/Fail	–	–
...
253	LDI	COMMSTAT 253	Communication Failure Status of Device 253.	Normal/Fail	–	–
254	LDI	COMMSTAT 254	Communication Failure Status of Device 254.	Normal/Fail	–	–

a) Values noted for LDIs and LDOs are in the following format: OFF text/ON text.

b) This column indicates the value/range or engineering units or both if known.

c) Default values are shown in **bold** text.

Application 4099: Diagnostic and Control Points



CAUTION

Changing any of these diagnostic points can adversely affect your control and communication. It is not recommended to change these points except by the direction of Technical Support.

For troubleshooting in the field, diagnostic and control points are available on FLN 253, Drop 31. During startup and subsequent operation, these points can be used to determine whether the driver is operational and, if not, the source of the problem. All drivers contain diagnostic Points 0 through 49. Points 50 and above are unique to the BACnet Driver.

Diagnostic Point 35

Diagnostic Point 35 is now DISCMDFAILPT (Disable Commanding of Failed Points Diagnostic Point).

- This point has a default value of FALSE (0), which permits failed APOGEE Automation System points to be commanded.
- Commanding this point to TRUE (1) disables the commanding of failed points in the APOGEE Automation System point database.

This point was added to Firmware Revision 2.5.2 and later to prevent failed APOGEE points from being commanded.

Diagnostic Point 99

Diagnostic Point 99 is now OPMODE, which controls if the driver works in BACnet MS/TP mode or BACnet/IP mode. Older versions of this driver (BNP and BNB) are using Diagnostic Point 99 for GWPRINTF CTL, which controls print diagnostic messages (now Diagnostic Point 15).

- This point has a default value of **FALSE** (0), which selects BACnet MS/TP mode.
- Commanding this point to **TRUE** (1) switches to BACnet/IP mode.

After changing the OPMODE value, you must coldstart the driver to ensure that the TEC is properly initialized.



NOTICE

If you experience intermittent point failures and want to increase the tolerance to these failures, try the following settings:

- Verify that 3SCANFAIL (253.31.67) is set to **ON**.
- Increase PP MESSG WAIT (253.31.56) from **4** up to **16**, in increments of **2**.
- Increase MAX RETRIES (253.31.13) from **3** up to **12**, in increments of **2**.



NOTICE

To further reduce the possibility of communication issues for some BACnet MS/TP devices, it might be necessary to tune the driver Reply Timeout Value:

- Adjust REPLY TIMEOUT (253.31.54) in increments of ~4 until point failures stop.

To see the immediate result of each adjustment, run Datascope in parallel as the adjustments are made. Use Printf values **2** and **4** so that point values or read errors are visible.



NOTE:

With older ISB files, Application 4099 Point 99 may be displayed as GWPRINTF CTL, which controls print diagnostic messages. However, when used in a driver on Baseline 120 or later (Firmware 2.x) and Baseline 220 or later (Firmware 3.x), Point 99 will select the driver operation mode, regardless of the point name displayed.

The following table defines the use of the standard diagnostic and control points. These points may be accessed by entering individual points at the addresses in this table, or as sub-points of Application 4099, on FLN 253, Drop 31.

Table 6:

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units ^{a) b) c)}	Slp	Int
1	LDI	READY	Ready Indicates that the driver's database is synchronized with the BACnet system's database. NOTE: It is recommended that PPCL be written so that lines which rely on values received from the BACnet system do not execute unless the Ready point is ON.	Off = Not Synchronized On = Synchronized	–	–
2	LDI	COMM FAIL	Communications Failure Indicates the status of communications between the driver and the BACnet system.	Off = Normal Communications On = Failed Communications	–	–
3	LDO	FAIL ON CMFL	Fail Points on Comm Failure When COMM FAIL (Point 2) turns on, the driver will either mark all associated points as failed or keep them in the normal status.	Off = Keep All Associated Points Normal On = Fail All Associated Points	–	–
4	LDO	PTFAILMODE	Subpoint Failure Mode. Indicates that device subpoints will fail if device communication is lost.	Off = Subpoints will not fail On = Subpoints will fail	–	–
5	LAO	TIMEOUT	Time Out Number of times that the driver retries a communications message before considering the device as failed. The driver then turns on COMM FAIL (Point 2).	Default = 3	1.0	0

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units a) b) c)	Slp	Int
6	LAO	RESPONSE INT	Response Interval Length of time that the driver waits for a response from the BACnet system before the driver retries the same message.	Ticks (1/100th of a second) Default = 62 For example, a value of 50 would cause the driver to wait for one half second before timing out.	1.0	0
7	LAO	POLL SUPPRESS	Poll Suppression Suppression of polling for the specified amount of time.	Minutes (Do not use)	0	1.0
8	LAO	POLL DELAY	Poll Delay Minimum time between the receipt of a message from the BACnet system and the next message sent from the driver.	Ticks (1/100th of a second) Default = 3.	1.0	0
9	LAO	POLL FREQ	Poll Frequency Minimum time between the start of the last message sent to the BACnet system and the start of the next message sent from the driver.	Ticks (1/100th of a second) Default = 3	1.0	0
10	LAO	ADDRESS	Diagnostic Drop Address Address of the diagnostic application.	Value is set internally. Field configuration is not required.	1.0	0
11	LAO	APPLICATION	Diagnostic Application Number Number assigned to the diagnostic application.	Value is set internally. Field configuration is not required.	1.0	0
12	LAI	LICENSE	License Feature Point displays the currently active license.	-1 = no license 0 = full license	1.0	0
13	LAO	MAX RETRIES	Maximum Retry Maximum number of retries before a communication failure is created.	Default = 3	1.0	0
14	LAO	START DELAY	Initial Count Initial Count of Poll Timer upon warmstart. Provides a means of synchronizing multiple drivers so that they do not poll simultaneously. An initial value is set at warmstart to be used in conjunction with POLL FREQ (Point 9).	1st Driver = 0 2nd Driver = (POLL FREQ/# of drivers) 3rd Driver = 2 × (POLL FREQ/# of drivers) 4th Driver = 3 × (POLL FREQ/# of drivers)	1.0	0
15	LAO	PRINTF CNTRL	Print_F Diagnostic Filter	See the PRINTF CONTROL (Point 15) [→ 31] section. Default = 12	1.0	0
16	LDO	EVENTS	Event Enable/disable recording of event diagnostics.	Off = Disable On = Enable	–	–

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units a) b) c)	Slp	Int
17	LAI	CMDS PENDING	Command Pending Number of commands currently waiting to be sent to the BACnet system.	Number of commands	1.0	0
18	LAI	CMD Q MAX	Command Highest Waiting Highest number of commands that are waiting to be sent to the BACnet system at any one time.	Number of commands	1.0	0
19	LAO	DATA CONTROL	Communication Parameters. The network communications parity setting. Do not change this for BACnet MS/TP.	DPS D = Number of data bits (For example 7 or 8) P= Parity 0 = No Parity 1 = Odd Parity 2 = Even Parity S = Number of Stop Bits (For example, 1 or 2)	1.0	0
20	LAO	DIAG CONTROL	Diagnostic Control	For more information, see the DIAG CONTROL (Point 20) [→ 32] section. Default = 0	1.0	0
21	LAI	RESPONSES	ResponseCounter. Total number of responses from the BACnet system.	–	1.0	0
22	LAI	GOOD PACKETS	Good PacketCounter. Total number of good message packets sent to the BACnet system.	–	1.0	0
23	LAI	NAK CNT	Negative Acknowledge Total number of negative responses from the BACnet system.	–	1.0	0
24	LAI	BAD SEQ CNT	Bad Sequence Counter Total number of times that the communications between the driver and the BACnet system were out of order.	–	1.0	0
25	LAI	UNKNOWN PKTS	Unknown Packet Counter Total number of times the driver has received a message from the BACnet system that was not recognized.	–	1.0	0
26	LAI	PARITY ERRS	Bad Parity Counter Total number of times the driver indicated a parity error on the network.	–	1.0	0

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units a) b) c)	Slp	Int
27	LAI	BAD PACKETS	Bad Packet Counter Total number of bad packets received from the BACnet system.	–	1.0	0
28	LAI	NO RESPONSES	No Response Counter Total number of times the BACnet system did not respond to the driver.	–	1.0	0
29	LAI	TRANSMISSIONS	Transmissions Counter Total number of transmissions from the driver to the BACnet system.	–	1.0	0
30	LAI	BAD TX CNT	Bad Transmissions Counter Total number of times an error occurred in sending a message to the BACnet system.	–	1.0	0
31	LAI	OVRRUN CNT	Overflow Counter Total number of times the driver indicated an overrun.	–	1.0	0
32	LAI	FRAMING ERRS	Framing Error Counter Total number of times the driver indicated a framing error.	–	1.0	0
33	LAI	HW ERRS	Hardware Error Counter Total number of times the driver indicated a hardware error.	–	1.0	0
34	LAI	BREAK RCVD	Break Received Counter Total number of times a break was received.	–	1.0	0
35	LDO	DISCMDFAILPT	Disable Commanding of Failed Points This point permits failed APOGEE Automation System points to be commanded.	Off = Permit Commanding of Failed Points On = Disable Commanding of Failed Points	–	–
36	LAI	DYNADD	Dynamic Msgs Added Counter. The total number of dynamic alarm messages added successfully.	–	1.0	0
37	LAI	DYNBAD	Dynamic Msg Failure. The total number of dynamic alarms failed because no buffer was available.	–	1.0	0
38	LAI	STLOUT	Dynamic Msg Outstanding. The total number of times the dynamic alarm message was stolen from the outstanding list.	–	1.0	0
39	LAI	STLACT	Dynamic Msg Active. The total number of times the dynamic alarm message was stolen from the active list.	–	1.0	0

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units a) b) c)	Slp	Int
40	LAO	DAMLEN	Dynamic Msg Buffer Length. The buffer length to allocate for dynamic alarm messages (must include trailing 0).	–	1.0	0
41	LAO	DAMMAX	Dynamic Msg Buffers Allocated. Maximum number of dynamic alarm message buffers to allocate.	–	1.0	0
42	LAO	DAMRAM	Dynamic Msg RAM Pct Allocated. Maximum percent of available RAM in the driver to allocate for dynamic alarm message.	For example, a value of 80 => can use up to 80% available RAM.	1.0	0
43	LDO	DAMCAR	Check Dynamic Msg Integrity. Enable/disable integrity check of dynamic alarm queues after every access.	Disable/Enable	–	–
44	LDO	DAMSTR	Coldstart if Bad Dyn Message. Enable/disable coldstart if dynamic alarm queues' integrity is found to be violated.	Disable/Enable	–	–
45	LAI	NUMOUT	Num Dynamic Msgs Waiting. Number of outstanding (to-be-delivered) dynamic alarm messages.	–	1.0	0
46	LAI	NUMACT	Num Dynamic Msgs Active. Number of active dynamic alarm messages.	–	1.0	0
47	LAI	NUMFRE	Num Dynamic Msg Buffers Free. Number of unused dynamic alarm message buffers.	–	1.0	0
48	–	RESERVED	–	–	–	–
49	LAI	APPERR	Application Error Total number of times that the driver received a message other than those recorded in GOOD PACKETS (Point 22), NAK CNT (Point 23), BAD SEQ CNT (Point 24), UNKNOWN PKTS (Point 25), or BADPK (Point 27).	–	1.0	0
50	LAO	MAC ADDRESS	BACnet Driver MAC Address.	–	1.0	0
51	LAO	PTS PER READ	Points per Read Property Multiple.	0 = "Read Property" polling 1–12 = "Read Property Multiple" polling Default = 4 For more information, see the Read Property versus Read Property Multiple [→ 13] section.	1.0	0

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units a) b) c)	Slp	Int
52	LAO	MX INFO FRAM	N Max Info Frames.	Default = 1	1.0	0
53	LAO	MX MSTR ADDR	N Max Master.	Default = 127	1.0	0
54	LAO	REPLY TIMOUT	T Reply Timeout.	Default = 20	1.0	0
55	LAO	USAGE TIMOUT	T Usage Timeout.	Default = 20	1.0	0
56	LAO	PP MESG WAIT	Messages to Ignore Before Failing Points. Number of postponed reply message to ignore before failing point.	1–16 Default = 4	1.0	0
57	LAO	RCV BFR CLOS	Receive Buffer Closure.	Default = 1	1.0	0
58	LAO	NORESP RETRY	Number of Nonresponses to Retry before Failing Polled Points.	Default = 3	1.0	0
59	LAO	INITVAL CMND	Initial Value Commanding.	0 = Do not send initial values on download (default) 1 = Send initial values on download	1.0	0
60	LAO	SUBPT POLLNG	Subpoint Polling Method.	0 = Poll all subpoints all the time (default) 1 = Poll only points in use	1.0	0
61	LAO	SMOK CMD PRI	Smoke Command Priority. See the Command Priority [→ 52] section for details.	1–16 Default = 2	1.0	0
62	LAO	EMER CMD PRI	Emergency Command Priority. See the Command Priority [→ 52] section for details.	1–16 Default = 5	1.0	0
63	LAO	OPER CMD PRI	Operator Command Priority. See the Command Priority [→ 52] section for details.	1–16 Default = 8	1.0	0
64	LAO	PDL CMD PRI	PDL Command Priority. See the Command Priority [→ 52] section for details.	1–16 Default = 10	1.0	0
65	LAO	NONE CMD PRI	None Command Priority. See the Command Priority [→ 52] section for details.	1–16 Default = 16	1.0	0
67	LDO	3SCANFAIL	Fail Point After 3 Scans. Fail polled point(s) only after three failed scans.	OFF/ON Default = ON	–	–
68	LAO	TECBV12MODE	TEC Version BV12 Mode. Used for relinquishing TEC subpoints.	0 = BV12 or later and third-party devices (default) 1 = BV11 and earlier	1.0	0

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units ^{a) b) c)}	Slp	Int
69	LAO	FAST SLV POL	Poll Slave Devices without Poll For Master.	0 = Disabled (default) 1 = Enabled	1.0	0
70	LAI	UNSUP FRAMES	Unsupported Frame Count.	–	1.0	0
71	LAI	UNS DATA TYP	Unsupported Data Type Count.	–	1.0	0
72	LAI	BD DATA CKSM	Bad Data Checksum Count.	–	1.0	0
73	LAI	BAD PDU TYPE	Bad PDU Type Count.	–	1.0	0
74	LAI	BD INVOKE ID	Bad Invoke ID Count.	–	1.0	0
75	LAI	MISMATCH PDU	Mismatch PDU Count.	–	1.0	0
76	LAI	ERROR PDU	Error PDU Count.	–	1.0	0
77	LAI	ABORT PDU	Abort PDU Count.	–	1.0	0
78	LAI	REJECT PDU	Reject PDU Count.	–	1.0	0
79	LAI	BAD PDU	Bad PDU Count.	–	1.0	0
80	LAI	UNSUPP REQST	Unsupported Request Count.	–	1.0	0
86	LAI	RPM ER DROP	Last R-P-M Error: Drop.	–	1.0	0
87	LAI	RPM ER POINT	Last R-P-M Error: Point.	–	1.0	0
88	LAI	RPM ER CLASS	Last R-P-M Error: Error Class.	For more information, see the Table RPM ER CLASS (Point 88) [→ 34].	1.0	0
89	LAI	RPM ER REASN	Last R-P-M Error: Error Reason.	For more information, see the Table RPM ER REASN (Point 89) [→ 34].	1.0	0
90	LAI	LS SCAN TIME	Last Scan Time.	sec	1.0	0
91	LAI	LSCAN FL PTS	Failed Points Last Scan.	–	1.0	0
95	LAI	BNP COMMSTAT	Driver Communication Status.	–	1.0	0
99	LAO	OPMODE	Driver Operation Mode	0 = BACnet MS/TP 1 = BACnet/IP	1.0	0
100	LAO	ROP ADDRESS	ROP Address.	–	1.0	0
101	LAO	WOP ADDRESS	WOP Address.	–	1.0	0
102	LAO	RELINQ ADDR	Relinquish Address.	–	1.0	0
103	LAO	ROP OBJ TYPE	ROP Object Type.	–	1.0	0
104	LAO	ROP INSTANCE	ROP Instance.	–	1.0	0
105	LAO	ROP PROPERTY	ROP Property.	–	1.0	0

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units a) b) c)	Slp	Int
106	LAO	RW VALUE	RW Value.	–	1.0	0
107	LAO	W CMD PRIOR	W Command Priority.	–	1.0	0
108	LAO	SND TEST REQ	Send Test Request.	–	1.0	0
109	LDO	REINITIALIZE	Reinitialize.	NO/YES	1.0	0
110	LDO	MONITOR MODE	Monitor Only -No Polling.	OFF/ON	–	–
111	LDO	RESET MASTER	Reset Master Node State to INITIALIZE.	NO/YES	–	–
112	LAO	UNFAIL POINT	Unfail a Device Point.	–	1.0	0
113	LAO	DISP APP PTS	Display Application Subpoint Info.	–	1.0	0
114	LAO	SOURCE P	Selects the source port for BACnet/IP communication.	47808-47813 BNC default = 47808 BND default = 47809 BNE default = 47809	1.0	0
115	LAO	TARGET P	Selects the target port for BACnet/IP Communication.	47808-47813 Default = 47808	1.0	0
501 d)	LAO	SEL FLN	Selects the FLN port for a database dump. 0 = OFF 1 to 252 = select FLN 65535 = all FLNs	0 to 252, 65535	1.0	0
502 d)	LAO	SEL DROP	Selects the drop for a database dump. 0 to 255 = select drop 65535 = all drops	0 to 255, 65535	1.0	0
503 d)	LAO	SEL POINT	Selects the point for a database dump. 0 to 32767 = select points 65535 = all points	0 to 32767, 65535	1.0	0
520 d)	LDO	SEL CHARED	Select Characterized Bit. Enable display of points with the Characterized Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to a value of 114.	OFF/ON	–	–
521 d)	LDO	SEL COV	Select COV Bit. Enable display of points with the COV Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
522 d)	LDO	SEL FAILED	Select Lost Communication Bit. Enable display of points with the Communication Lost Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–

APOGEE Diagnostic and Control Points, FLN 253 Drop 31, Application: 4099.						
Point	Type	Subpoint Name	Description	Range/Units ^{a) b) c)}	Slp	Int
523 ^{d)}	LDO	SEL COM COV	Select Communication COV Bit. Enable display of points with the Communication COV Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
524 ^{d)}	LDO	SEL DALM COV	Select Dynamic Alarming COV Bit. Enable display of points with the Dynamic Message COV Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
525 ^{d)}	LDO	SEL ALARM	Select Alarm Acknowledge COV Bit. Enable display of points with the Alarm Acknowledge COV Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
526 ^{d)}	LDO	SEL CMDED	Select Commanded Bit. Enable display of points with the Commanded Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
527 ^{d)}	LDO	SEL LOGGED	Select Logged Bit. Enable display of points with the Logged Bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
528 ^{d)}	LDO	SEL IN USE	Select “In Use” Bit. Enable display of points with the “In Use” bit set for a database dump when DIAG CONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
529 ^{d)}	LDO	SEL OOS	Select “Out of Service” Bit Enable display of points with the “Out-of-Service” bit set for a database dump when DIAGCONTROL (Point 20) is commanded to 114.	OFF/ON	–	–
601	LAO	PNTUPDATECTL	Point Update Control. Controls how commandable points are updated in a BACnet field panel. Not used for BNP versions.	0-18 Default = 17 For more information, see the PNTUPDATECTL (Point 601) section.	1.0	0

a) Values noted for LDIs and LDOs are in the following format: OFF text/ON text.

b) This column indicates the value/range or engineering units or both if known.

c) Default values are shown in **bold** text.

d) This point is used with Firmware Revision 2.8.5 but not with Firmware Revision 3.5.1.

PrintF Cntrl (Point 15)

The following table shows the supported values for PRINTF CONTROL (Point 15). Command the point to the value shown to perform the diagnostic function listed. The default is 12.


NOTE:

DIAG CONTROL (Point 20) must be commanded to **31** for PrintF messages to display.

Table 7:

Point Diagnostic (Point 15) Codes.			
Point Value	Action	Enable to Display	Description of Displayed Values
0	Disable All	—	—
1	Enable All	—	—
2	Enable	Polling	Device Number, Point Number, and APOGEE address
3	Disable	—	—
4	Enable	Polling Response	Polled points and value updates
5	Disable	—	—
6	Enable	Commanding	Commanded points and commanded values
7	Disable	—	—
8	Enable	Item Queue	Item queue events
9	Disable	—	—
10	Enable	ISB Info	Point-specific data fields
11	Disable	—	—
12	Enable	Critical Errors	Errors specified per each driver
13	Disable	—	—
14	Enable	Non-critical Errors	Errors specified per each driver
15	Disable	—	—
16	Enable	Operation Flow Parameters	State Machine, Timers, Flags, and so on.
17	Disable	—	—
18	Enable	Ethernet Info	IP address, Port number, and so on.
19	Disable	—	—
20	Enable	P1 Messages	—
21	Disable	—	—

Point Diagnostic (Point 15) Codes.			
Point Value	Action	Enable to Display	Description of Displayed Values
50	Enable	State Machine Entry Parameters	–
51	Disable	State Machine Entry Parameters	–
54	Enable	Add/Delete TEC Points	–
55	Disable	Add/Delete TEC Points	–
56	Enable	Scan Time; Failed Points/Scan	–
57	Disable	Scan Time; Failed Points/Scan	–

Diag Control (Point 20)

DIAG CONTROL (Point 20) offers a way of monitoring the communications between the driver and the BACnet system.

This point controls the operation of the diagnostic functions available in the driver. The functions are grouped by type, and each type of diagnostic can be activated or deactivated, independent of the other types. The functions are activated or deactivated by commanding this point to the appropriate value(s).

Once the driver has been made ready, commanding DIAG CONTROL to any value will display a list of the available values and their function on the defined debug output port (see values 41 through 44). This list displays many options, most of which are intended to assist Technical Support in troubleshooting communications problems. The values which may prove useful in field troubleshooting are shown in the following table.

Unlike other LAO points, DIAG CONTROL appears to take on multiple values at the same time, even though only the last value is displayed in a Point Log. For example, a port must be selected for diagnostic messages by commanding the point to a value of **41** or **42**. Subsequently, commanding the point to a value of **2** resets and then enables the diagnostic counters. Commanding it again to a value of **31** turns on the diagnostic messages. Commanding the point again, this time to a value of **0**, turns off the counters, but leaves the diagnostic messages running.

- See PRINTF CNTRL (Point 15) [→ 31] for information on selecting the type of diagnostic messages.
- A quick way to turn off all diagnostic messages (including any requested by Technical Support) is to command DIAG CONTROL to a value of **40**.

The following table shows the function of DIAG CONTROL (Point 20). Command the point to the value shown to perform the diagnostic function listed.

Table 8:

Diagnostic Control (Point 20) Values.	
Value	Function
0	Disable Diagnostic Points 21 through 35. (default)
1	Enable diagnostic counts.
2	Reset and enable diagnostic counts.
10	Disable datascope to output port.
11	Enable raw datascope output.
12	Enable hex datascope output. (Use this value to perform a datascope capture of the BACnet system.)
13	Enable ASCII datascope output.
20	Disable events to datascope.
21	Enable events to datascope.
22	Disable Slave API Event display.
23	Enable Slave API Event display.
24	Disable Local DB Event display.
25	Enable Local DB Event display.
30	Disable display of formatted data output.
31	Enable display of formatted data output.
40	Disable output port.
41	Output port is MMI (AUX) port.
42	Output port is MMI/MODEM port.
43	Output port is Telnet Port 23 (Ethernet ALN).
44	Output port is Telnet Port 50 (Ethernet ALN).
53	List applications loaded from .ISB file.
114	Dump Local Point Database.
1001 ^a	Only display FLN 1 packets from Local Point Database.
1255	Display all FLN packets from Local Point Database.

^a The value can be set to 1FFF where FFF = the FLN packets to be displayed (for example, FLN 1 = 1001, FLN 253 = 1253, and so on.).

RPM ER CLASS (Point 88)

Use the following table to interpret the BACNet Error Class codes (Point 88).

Table 9:

BACnet Error Class (Point 88) Codes.	
Value	Description
0	Device
1	Object
2	Property
3	Resources
4	Security
5	Services
6	Virtual Terminal

RPM ER REASN (Point 89)

Use the following table to interpret the BACNet Error Reason codes (Point 89).

Table 10:

BACnet Error Reason (Point 89) Codes.	
Value	Description
0	Other
1	Authentication Failed
2	Configuration In Progress
3	Device Busy
4	Dynamic Creation Not Supported
5	File Access Denied
6	Incompatible Security Levels
7	Inconsistent Parameters
8	Inconsistent Selection Criterion
9	Invalid Data Type
10	Invalid File Access Method
11	Invalid File Start Position
12	Invalid Operator Name
13	Invalid Parameter Data Type
14	Invalid Time Stamp
15	Key Generation Error
16	Missing Required Parameter
17	No Objects Of Specified Type

BACnet Error Reason (Point 89) Codes.	
Value	Description
18	No Space For Object
19	No Space To Add List Element
20	No Space To Write Property
21	No Virtual Terminal Sessions Available
22	Property Is Not A List
23	Object Deletion Not Permitted
24	Object Identifier Already Exists
25	Operational Problem
26	Password Failure
27	Read Access Denied
28	Security Not Supported
29	Service Request Denied
30	Time Out
31	Unknown Object
32	Unknown Property
33	(Unused)
34	Unknown Virtual Terminal Class
35	Unknown Virtual Terminal Session
36	Unsupported Object Type
37	Value Out Of Range
38	Virtual Terminal Session Already Closed
39	Virtual Terminal Session Termination Failure
40	Write Access Denied
41	Character Set Not Supported
255	Invalid Object Type

PNTUPDATECTL (Point 601)



NOTE:

Point 601 is used only in Firmware Revision 3.0 and later.

BACnet Point Update Control (Point 601) controls how output points of third-party devices are updated in a BACnet field panel.

When the BACnet Driver is on BACnet/IP ALN, Diagnostic Point 601 must be set to a value from **0** to **17** (the driver default is 17). This point controls how the update of commandable (LAO or LDO) points is to be handled.

- If PNTUPDATECTL is set to a value of **0**, the present value of the point will be updated, but the value will not be assigned to a command priority. Therefore, no value from the third-party system will ever be updated if a value exists in the priority array for the point. This is how the standard firmware functions.
- If PNTUPDATECTL is set to a value of **1** through **16**, the present value of the point will be updated and assigned to the priority array at a command priority equal to the value set by PNTUPDATECTL.
- If PNTUPDATECTL is set to a value of **17** (default), the present value of the point will be updated and assigned to the priority array at the highest active command priority.

Pre-built PTEC and BTEC BACnet MS/TP Applications

BACnet MS/TP Integration Driver: PTEC and BTEC Applications are Available on Standard Apps Drive.

Integration applications for most of the BTECs and 66xx and 67xx series PTECs have been pre-built in Home Office. These applications can be imported in an ISB file and loaded in the BACnet integration driver to communicate with PTECs and BTECs. The PTEC applications are available in the following location on the Standard Apps drive:

X:\APOGEE_Products_FW_SW\Integrated_Solutions\BACnet\Siemens_Building_Technologies_TEC_BACnet_MSTP_Solution\PTEC_66xx

The BTEC applications are available in the following location on the Standard Apps drive:

X:\APOGEE_Products_FW_SW\Integrated_Solutions\BACnet\Siemens_Building_Technologies_TEC_BACnet_MSTP_Solution\BTEC

The table below is the cross reference between the pre-built PTEC applications and their corresponding integration application numbers.

Table 11: Available PTEC Applications and Cross Reference to Integration Application Numbers.

PTEC Application	Equivalent Integration Application
6600	4165
6601	4166
6602	4167
6603	4168
6604	4169
6605	4172
6606	4173
6607	4174
6611	4184
6620	4081
6621	4082

PTEC Application	Equivalent Integration Application
6622	4083
6623	4084
6624	4085
6625	4086
6626	4087
6627	4089
6640	4042
6641	4043
6642	4176
6643	4177
6644	4178
6645	4179
6646	4180
6647	4181
6648	4182
6650	4044
6651	4045
6652	4046
6653	4047
6654	4048
6657	4009
6658	4097
6660	4193
6662	4194
6663	4195
6665	4187
6666	4188
6667	4189
6668	4190
6669	4191
6673	4005
6674	4006
6675	4070
6676	4071
6677	4072
6678	4073
6679	4074
6680	4197
6681	4198
6682	4199
6687 (slave)	4164
6688 (slave)	4088
6689 (slave)	4049
6690 (slave)	4004

PTEC Application	Equivalent Integration Application
6691 (slave)	4175
6692 (slave)	4096
6693 (slave)	4186
6694 (slave)	4192
6695 (slave)	4069
6696 (slave)	4007
6697 (slave)	4183
6698 (slave)	4196
6699 (slave)	4008
6720	4257
6721	4259
6722	4253
6723	4261
6724	4255
6726	4258
6727	4260
6728	4254
6729	4262
6730	4256
6731	4263
6740	4270
6741	4271
6742	4272
6763	4251
6700 (slave)	4269
6765 (slave)	4250
6797 (slave)	4252

Table 12: Available BTEC Applications and Cross Reference to Integration Application Numbers.

BTEC Application	Equivalent Integration Application
2510	4340
2511	4341
2512	4342
2513	4343
2514	4344
2515	4345
2516	4346
2517	4347
2540	4349
2541	4350
2550	4351
2551	4352
2552	4353
2553	4354
2554	4355
2573	4357
2574	4358
2587 (slave)	4348
2590 (slave)	4359
2591 (slave)	4327

Chapter 2 – Startup and Commissioning with an Insight Workstation

Chapter 2 describes the process for starting up the BACnet Driver on a network with an Insight workstation.

To start-up the BACnet Driver on a network with a Desigo CC management station, see Appendix F – Startup and Commissioning with a Desigo CC Management Station [→ 84].

Prerequisites



NOTE:

You should have a working knowledge of the APOGEE Automation System and have completed the Integration training course.

Complete all the items in the following checklist before proceeding.

- You are familiar with the point mapping and application concepts of the BACnet Driver as described in Chapter 1 – Product Description [→ 7] in this manual.
- You are familiar with the BACnet system and the specific device to be integrated.
- You have installed the PXC Series, as specified in the *PXC Modular Series Installation Instructions* (553-638) or the *PXC Compact 36 Installation Instructions* (553-504).
- If using an .ISB file, you have created or obtained the .ISB file using the Application Builder tool.
- You have obtained the .EBN and .ENU files from the StdApps drive.
- You have obtained a Permanent driver license or plan to use a Demo license. (See the Loading the Driver License [→ 43] section.)
- You have confirmed that the BACnet representative has performed the checkout on its system, and all of the devices are communicating with BACnet devices.

Starting up the Driver



NOTE:

See Appendix E – Custom HMI Prompts for Integration Drivers [→ 73].

Before you Begin

Perform the general startup tasks as described in the appropriate *Start-up Procedures*:

- *PXC Modular Series with BACnet ALN* (145-729)
- *PXC Modular Series with Ethernet ALN* (145-728)
- *PXC Modular Series with RS-485 ALN* (145-718)
- *PXC Compact Series* (145-157)

Loading an Integration Driver into a PXC Series


NOTE:

For full functionality, the driver license must be uploaded (see Chapter 4 – License Manager [→ 62]).


CAUTION

This procedure cannot be reversed. Once a field panel with standard firmware is upgraded to an Integration Driver, standard firmware cannot be reloaded into that field panel.


NOTE:

To perform this procedure, you must use the appropriate revision of Commissioning Tool (CT) :

- For PXC Modular, use CT Revision 3.9.1 or later.
- For PXC-36, CT Revision 3.11 or later.

Earlier revisions do not work.


NOTE:

The same firmware files can be used for PXC Modular and PXC-36 field panels.

1. Go to the Standard Apps drive or the Partner Extranet Web site for Independent Field Offices and obtain the driver files (.EBN and .ENU) to be flashed.
 - ⇒ The firmware files for the BACnet Driver on RS-485 P2 or Ethernet ALN are located in the following folder on the StdApps drive:
X:\APOGEE_Products_FW_SW\Integrated_Solutions\BACnet_BACnet_Driver_Firmware_2.X\PXC
 - ⇒ The firmware files for the BACnet Driver on BACnet ALN are located in the following folder on the StdApps drive:
X:\APOGEE_Products_FW_SW\Integrated_Solutions\BACnet_BACnet_Driver_Firmware_3.X\PXC
2. Do the following to configure the HMI port baud rate to 115200 bps:
 - a. From the HMI main menu, type the following letters in sequence:
S, H, F, C, F (System, Hardware, Fieldpanels, Config, Fln)
 - b. Press **1** for FLN 1 and press **ENTER**.
 - c. Type **115200** and press **ENTER**.
3. Open Firmware Loading Tool (FLT) Revision 3.9.1 or later and connect to the PXC Series HMI port.
4. Click the **Settings** tab in FLT and configure the download and communication baud rate to **115200**.
5. Click the **Firmware** tab.

6. Click **Identify** to display the currently-loaded field panel firmware revision in the Controller section.
7. Click **Browse** and locate the driver files (.EBN and .ENU) obtained in Step 1.
8. Click **Load**.
 - ⇒ The BACnet Driver firmware is loaded into flash memory. This is an automatic load and does not require any firmware upgrade credits. Depending what firmware or driver was loaded before, several messages display to indicate what processing step is taking place.
9. When the firmware load is complete, click the **Integrated Systems** tab.
10. Click **Identify** and confirm that the BACnet Driver name and its revision are displayed in the Controller section.

Loading an ISB File



NOTE:

ISB files are only required for application-based drivers.



NOTE:

The .ISB file must be compatible with the revision listed in the Revision field. Specifically, BNCx.x driver revisions are compatible with BNCx.x ISBs, the BNDx.x driver revisions are compatible with BNDx.x ISBs, and the BNEx.x driver revisions are compatible with BNEx.x ISBs.

An Integrated System Binary (.ISB) file must be loaded into the driver after flashing the firmware.

- ▷ Using the Application Builder tool, create an ISB file by importing standard application files or custom application files into the appropriate ISB template.
 - Save the ISB file.
 - ▷ Keep the ISB file with your job records as it will be needed for future Firmware upgrades or job modifications.
1. In **Firmware Loading Tool (FLT)**, click the **Integrated Systems** tab.
 2. Click **Browse** and locate the .ISB file to be flashed.
 3. Click **Load**.
 - ⇒ The application file is loaded into Flash memory. This is an automatic load. Several messages display to indicate what step is taking place. Wait for the `Database Load Complete` message to display.
 4. Click **OK** to accept the database load.
 - ⇒ The PXC Series is now ready to operate as a BACnet Driver.

Loading the Driver License

**NOTE:**

You must verify that the proper license is installed. Without a valid license installed, you cannot see point updates from the BACnet system at the APOGEE Automation System database. However, the driver can be started up, and communication can be verified without a valid license installed.

1. Obtain the license for the BACnet Driver (P/N LSM-INT-BMSTP).
2. Using License Manager, load the BACnet Driver Permanent License into the PXC Series field panel.

See Chapter 4 - License Manager [→ 62] in this manual for more information about licenses.

See the *APOGEE License Manager Start-up Procedures* (145-600) for information on the process of requesting licenses, installing features, loading licenses, and verifying operation of the licensed features.

Setting the FLN Communication Speed

This procedure configures the field panel FLN 1 port.

1. From the HMI main menu, type the following letters in sequence:
S, H, F, C, F (System, Hardware, Fieldpanels, Config, Fln)
2. Press **1** for FLN 1 and press **ENTER**.
3. Type in the baud rate that matches the communication speed of the BACnet network and press **ENTER**.

Verifying the Setup Information

**NOTE:**

When verifying the setup information, if the battery status displays LOW BATTERY/DEAD, either the tab was not removed, or the battery has discharged and must be replaced.

1. From the HMI main menu, type the following letters in sequence:
S, H, F, D (System, Hardware, Fieldpanels, Display)
2. At the **Here, Printer** prompt, do one of the following:
 - To view the report on the screen, type **H** or press **ENTER**.
 - To send the report to the ALN report printer, type **P**.
3. At the **Field Panel** prompt, type the field panel number and press **ENTER**.
⇒ The system displays or prints the Field Panel Configuration report.
4. Type **#** (SHIFT+3) to return to the HMI main menu.

Establishing Communications with the BACnet Devices

Adding Devices (BACnet only)

Through Insight Software or Commissioning Tool (CT)

Along with the other required fields in the **TEC Definition** dialog box, type a value in the **Max Number of Subpoints** field that is large enough to allow for all the subpoints in the application.

- To determine the correct value, find the highest subpoint number in the application and round up to the next 100.
- If the value is too small, the TEC Application Status will be failed.

Figure 9: Adding Devices—TEC Definition Dialog Box.

Through the HMI

Leave the **Instance Number Block Start** field blank. The driver will automatically assign the correct instance block size.

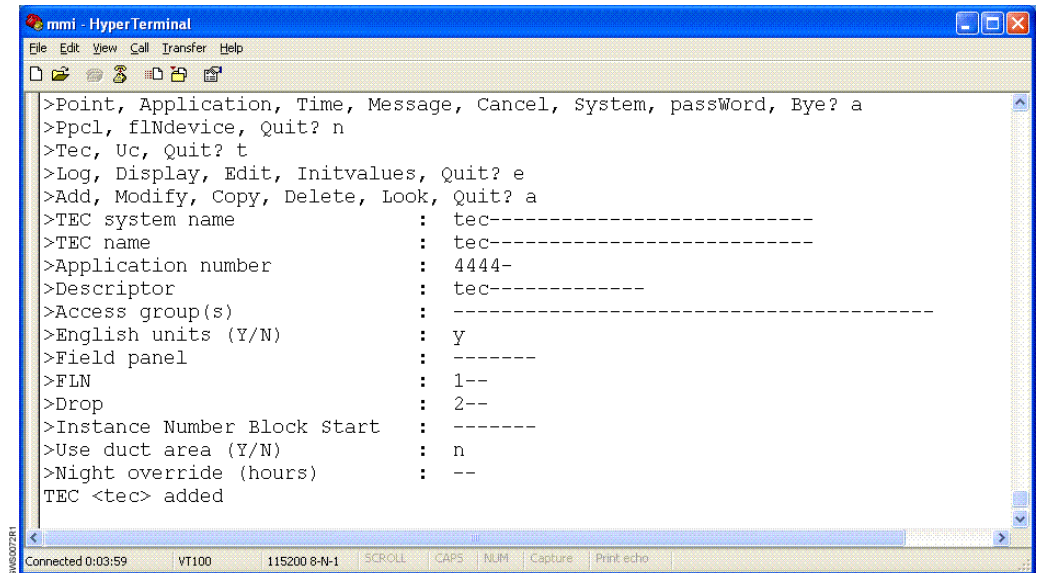


Figure 10: Adding Devices through the HMI.

Adding Applications

To add applications for the BACnet devices and the Siemens Industry BACnet TEC, use one of the following methods. The methods are listed in order of preference, with the preferred method listed first; however, you can use any of the available methods. The method you choose may depend on the tools you have available.



NOTE:

At this time, it is recommended that you DO NOT enter duplicate copies of the applications for the additional devices. After an application type is defined, it is available in System Profile.

Method 1 – Using the Buffalo Grove TEC Applications Feature

Import standard or custom applications into Commissioning Tool (CT) using the Buffalo Grove TEC Applications feature. Then use those applications to add devices. See Appendix A – Importing Applications Using the Buffalo Grove TEC Applications Drive and Commissioning Tool [→ 65] for the steps.

Method 2 – Using the HMI Port and the Insight Workstation

Add devices using the HMI port, and then upload the field panel database to the Insight workstation. The Insight workstation will then learn the applications. See Appendix B – Adding Applications Using the HMI Port and the Insight Workstation [→ 68] for the steps.

Method 3 – Using the HMI Port and Commissioning Tool

Add devices using the HMI port, and then upload the field panel database to Commissioning Tool (CT). CT will then learn the applications. See Appendix C – Adding Applications Using the HMI Port and Commissioning Tool [→ 70] for the steps.

Method 4 – Learning Custom Applications Using System Profile

Add devices using System Profile at the Insight workstation. The Insight workstation will then learn the applications. See Appendix D – Learning Applications Using System Profile [→ 72] for the steps.

Adding the Required Points and Devices



NOTE:

The field panel must be made ready for communications to occur.



NOTE:

If adding required points online at the HMI port while the Insight or Desigo CC software is not online, the BACnet Driver must be manually made ready. For more information, see the Making the Driver Ready [→ 47] section.

If downloading from the Insight workstation or Desigo CC management station or Commissioning Tool (CT), this occurs automatically.

It is recommended to start up the driver with a minimum database (required points only) to establish communications. This will assist in pinpointing the source of start-up problems. Once communication has been established, the remainder of the database can be added.

Table 13:

Rev. No.	Required Points and Devices	
All	To see the TX and RX LEDs flashing	Per driver, add: <ul style="list-style-type: none">• One TEC per BACnet Driver device.• Additional points as described in the vendor-specific application notes.

Making the Driver Ready



CAUTION

Using the Makeready command when the field panel is connected to the Insight workstation or Desigo CC management station may cause database downloads to fail.

Use the Makeready command only if the field panel is stand-alone (not connected to a mass storage device, such as an Insight workstation or Desigo CC management station).

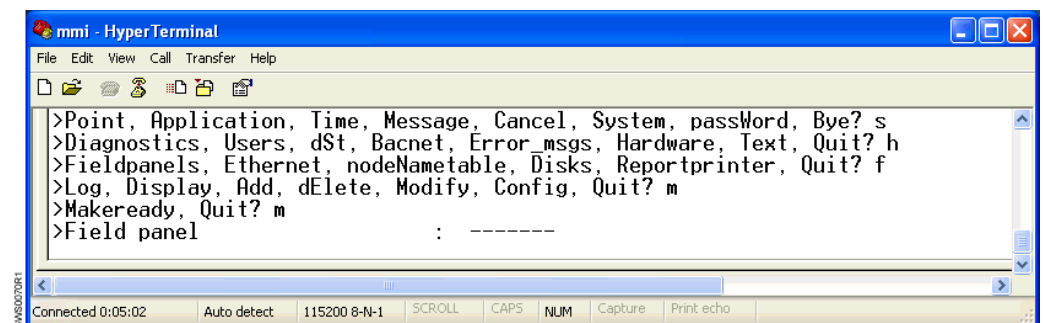
1. To make the driver ready, type the following sequence at the HMI:
S, H, F, M, M (System, Hardware, Fieldpanels, Modify, Makeready)
2. Enter the field panel number and press **ENTER**.

Example with Firmware Revision 2.x

```
>Point, Application, Time, Message, Cancel, System, passWord, Bye? S
>Diagnostics, Users, dAtes, deStinations, Error_msgs, Hardware, Text, Quit? h
>Fieldpanels, Ethernet, nodeNameetable, Disks, Licensemanager, Vaem, Quit? f
>Log, Display, Add, dElete, Modify, Config, Ostracize, Quit? m
>Makeready, Offline, oNline, normTimeout, eXtendtimeout, Quit? m
>Field panel : 10-
Command successful

>Makeready, Offline, oNline, normTimeout, eXtendtimeout, Quit? -
```

Example with Firmware Revision 3.x



Checking Communications



NOTE:

The TX and RX do not flash in BACnet/IP mode because ALN communication over the Ethernet is interlaced with BACnet traffic. Therefore, no clear indication is given to verify BACnet traffic.

1. Verify that the RUN LED on the front of the PXC Series is on solid (steadily lit). If not, the PXC Series is malfunctioning.
2. If an Expansion Module is being used, verify the following:
 - The TX and RX LEDs on the Expansion Module flash while the PXC Series transmits data.
 - The RX LED on the Expansion Module flashes while the PXC Series receives data from the BACnet system. This sequence repeats in quick succession.
3. Verify that communications have been established by displaying a Point Log and verifying that points contain the expected values.

Displaying a Point Log

To display a Point Log, complete the following steps in terminal mode:

HMI	P, L (Point, Log)
-----	-------------------

Prompt/Field	Option/Entry	Description
Point name	Press ENTER	All points
	Type that point name.	A particular point
	Type that point name, including wildcard characters.	A range of points
	Type ? , and then type a number from the list.	A point using a query

The field panel displays a Point Log report.

Adding Remaining Devices

1. Once communications have been verified, add the remainder of the devices from System Profile by dragging and choosing the correct application number from the list in the **Add TEC** dialog box.
2. Auto-unbundle any additional points required for these devices.

Commissioning the System

Consult as needed with the BACnet representative and the building engineer to make sure that the driver is providing accurate information and is performing the intended functions. In particular, verify that:

- The driver database is loaded.
- All lines of PPCL execute as intended.
- All LAO and LDO points commanded at the driver are confirmed at the BACnet system.

- Values read by the driver for LAI and LDI point COVs at the BACnet system are confirmed at the driver.
- Alarmable points correctly transmit alarm information.
- Any other functions that the driver is to perform are carried out as intended.

If any of the tests do not check out, see the *Knowlix Troubleshooting Tool*. For more information, contact Technical Support.

Chapter 3 – Building the Point Database

Chapter 3 describes the process for building the point database.

Overview

The BACnet Driver maps its points in a similar method to a TEC, using applications and allowing auto-unbundling. The driver provides application support through Integrated Systems Binary (ISB) files. An ISB file is a collection of application files. It can be created by Home Office or by Field personnel using the Application Builder tool. The completed ISB files must be flashed into the driver.

For information about:

- Using standard applications, see the vendor-specific application notes.
- Creating custom applications, see the Creating Custom Applications [→ 55] section.
- Creating an ISB file, see the online help for the Application Builder tool.

FLN Connection in BACnet MS/TP Mode

The BACnet Driver in BACnet MS/TP mode allows a physical connection to FLN 1 only. It uses FLN 1, Drops 0 through 254 to map its data for devices connected to FLN 1. The data is mapped in the following manner:

- Add the device as you would a normal TEC. Add the device to FLN 1 and to the drop equal to the device address.
- For mapping devices to drops other than the one equaling the device address, unbundle the Address point (Point 1) and Application point (Point 2) for the device on the desired drop.

Once the devices are added, either use auto-unbundling or manually unbundle needed points.

FLN Connection in BACnet/IP Mode

The BACnet Driver in BACnet/IP Mode connects to the BACnet IP system using the Ethernet port. Points are mapped using FLN 6.



NOTE:

For Firmware Revision 3.x, do not auto-unbundle and manually unbundle the same device application point.

Understanding BACnet Protocol

The BACnet Driver maps BACnet objects into APOGEE points. Each device, or unique list of objects, is defined by an application. Many applications have already been defined. However, if a device has not been previously defined, or the list of objects for that device is different, contact the Integrated Systems department for assistance.

BACnet points are known as *objects*. Each object is made up of many attributes known as *properties*. To map the BACnet objects into APOGEE points, specific properties must be identified: Object Name, Object Type, Object Instance, Object Property, and Command Priority.

BACnet Object Properties

Object Name

The Object Name is the name given to the object and is similar to a point name.

Object Type Enumeration

The Object Type Enumeration is the number given to the object type. The driver supports both standard and nonstandard object types. The object type is similar to the APOGEE point type. Nonstandard objects are defined by the vendor, but in a similar manner to standard objects.

Table 14:

Standard BACnet Objects		
Object Type	Enumeration	APOGEE Point Type
Analog Input (AI)	0	LAI
Analog Output (AO)	1	LAO
Analog Value (AV)	2	LAI or LAO
Binary Input (BI)	3	LDI
Binary Output (BO)	4	LDO
Binary Value (BV)	5	LDI or LDO
Multistate Input (MSI)	13	LAI
Multistate Output (MSO)	14	LAO
Multistate Value (MSV)	19	LAI or LAO

Object Instance

The Object Instance is the number assigned to the object which makes it unique from all other objects of that type.

Object Property

The Object Property is the number which further defines one of the many characteristics of the object. Properties which are of importance to the driver are: Present Value, Out-of-Service, Reliability Status Flags, and Command Priority.

Only one property is requested for every entry in the application file. In most cases, this would be the Present Value. If an indication of the object status is needed, define a second point that points to the same object, but use **111** for the Object Property.

Table 15:

Object Property Name.		
Property Name	Enumeration	Description
Present Value	85	Defines the present value of the object.
Out-of-Service	81	Set by the vendor device if the present value property is invalid. If this property is set to TRUE, the present value property may be written to. The APOGEE Automation System can also force this property to TRUE and override the present value.
Reliability	103	Provides the reliability of an object as an enumerated value (NO_FAULT_DETECTED, CONFIGURATION_ERROR, COMMUNICATION_FAILURE, UNRELIABLE_OTHER)
Status Flags	111	Provides the status of an object as an enumerated value (IN_ALARM, FAULT, OVERRIDDEN, OUT_OF_SERVICE)
Command Priority	N/A	Defines the priority level at which the present value output is to be set. See the following paragraph for more details.

The idea behind command priority is that all commands for an object are issued to a 16-level array for that object. The commanded values are put into the array based upon the priority level. The commanded value with the highest priority (lowest number) will be executed. Upon completion of the control action driving that object, the command is to be “relinquished,” meaning the commanded value is removed from the array. Then the commanded value with the next highest priority will be executed. If more than one commanded value is entered in the array with the same priority level, the commands are executed in a First In First Out (FIFO) manner. It is the duty of the facility’s site manager to assign priority levels to vendors based upon the applications and sequence of operations which are to be performed.

Command Priority

When commands are issued for BACnet objects, a present value and command priority are associated. The command priority has 16 possible priority levels, 1 is the highest and 16 is the lowest.

The BACnet Driver manages BACnet command priorities differently depending on its firmware version.

Firmware Revision 2.x

With Firmware Revision 2.x, the BACnet Driver maps BACnet object command priorities to APOGEE point priorities (SMOKE, EMER, OPER, PDL, NONE). Using Diagnostic Points 61 through 65 (FLN 3, Drop 31), you can set the BACnet command priority value (1 through 16) that is assigned to each APOGEE point priority. Any time a point is commanded at a specific point priority, the present value is sent to the priority array of the associated object with the BACnet command priority level set by the diagnostic point for that given point priority.

Table 16:

Default Values for Command Priorities.			
Diagnostic Point	Name	Description	Default Value
61	SMOK CMD PRI	Command Priority at SMOKE	2
62	EMER CMD PRI	Command Priority at EMER	5
63	OPER CMD PRI	Command Priority at OPER	8
64	PDL CMD PRI	Command Priority at PDL	10
65	NONE CMD PRI	Command Priority at NONE	16

A command is “relinquished” from the object priority array when any of the following occurs:

- A RELEASE is performed for the APOGEE point. This should be done any time the application (program) no longer requires the use of the point.
- Another command is issued at a different command priority.

Firmware Revision 3.x

With Firmware Revision 3.x, the BACnet Driver issues all commands to devices at the same priority, which is selected through Diagnostic Point 63, **OPER CMD PRI** (3.31.63). Therefore, the command priority (BN01 through BN16) assigned to the point command at the field panel is not translated to the BACnet MS/TP device. The default value for OPER CMD PRI is 8.

A command is “relinquished” from the object priority array when any of the following occurs:

- A RELEASE is performed for the APOGEE point. This should be done any time the application (program) no longer requires the use of the point.
- The value of OPER CMD PRI (Diagnostic Point 63) is changed and another command is sent.

Out-of-Service

The Out-of-Service property in BACnet provides the capability of setting an input object (such as Room Temperature) to a specific value if the input fails or is no longer reliable. The BACnet Driver manages Out-of-Service differently depending on its firmware revision.

Driver Revisions BNP2.2, BNB2.2, and Later

- For LAI and LDI points, the BACnet Driver is aligned with standard BACnet Out-of-Service functionality.
- For LAO and LDO points, the driver does not support Out-of-Service functionality.

For more information on Out-of-Service functionality, see the *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

Driver Revisions BNC, BND, and BNE

For points, the BACnet Driver is aligned with standard BACnet Out-of-Service functionality.

For more information on Out-of-Service functionality, see the *APOGEE BACnet ALN Field Panel User's Manual* (125-3020).

Driver Revisions BNAX.x and Earlier than BNP2.2

While the BACnet TECs fully support Out-of-Service functionality, the APOGEE Automation System has an issue with commanding input points. Therefore, the BACnet Driver maps all TEC input points as outputs.

Furthermore, the APOGEE Automation System does not have an available point attribute that can be used to support BACnet Out-of-Service functionality. Thus, two points are required per object.

Table 17:

Out-of-Service (BNAX.x and Earlier than BNP2.2).			
BACnet Property	Point Type	Requirements	Example
Present Value	LAO	<ul style="list-style-type: none"> Uses typical naming conventions. Point number is less than 100. 	Point Number: 04 Point Type: LAO Point Name: ROOM TEMP
Out-of-Service	LDO	<ul style="list-style-type: none"> Point name is similar to Present Value point name, but prefixed with an "OOS." Point number is incremented by 100 from the Present Value point number. 	Point Number: 104 Point Type: LDO Point Name: OOS ROOMTEMP

The Out-of-Service point must be first set to **YES** before the Present Value point can be set. When the Out-of-Service functionality is no longer needed, set the Out-of-Service point to **NO**, and the Present Value point will monitor the Present Value object for COVs.

Because the Present Value and Out-of-Service points are outputs (LAO and LDO), they must follow the command priority rules. After using the Out-of-Service feature, do one of the following for each point in order to "clear out" the command from the BACnet priority array:

- At the Insight workstation, use Commander to set only the point priority of the point (no value) to NONE.
- At HMI, set the point priority to NONE (Point / Operation / Priority / None).
- At CIS, release the override from the point.



NOTE:

If none of the above operations releases the point priority from OPER, the value was set with a command priority higher than 8 (1 through 7) by a third party. Contact the site manager for resolution.

Creating Custom Applications

Overall, implementing a custom application is a three-step process:

1. Create the application file using the BACnet application template.
 - ⇒ The template comes with Commissioning Tool (CT) Revision 3.11 and later, and is stored in the **Comm Tool** folder (CommTool\Isbs\BNx).
2. Add/import the application to an ISB using the Application Builder tool.
3. Flash the ISB file into the driver.

Before You Begin



NOTE:

To learn about the Application Builder tool, refer to the *Application Builder User's Guide* (140-0574) available on the CPS Website.

To create custom application files for the BACnet Driver, you should have knowledge in the following areas:

- Integration Driver applications and Integrated Systems Binary (ISB) files
- Application Builder tool
- BACnet Driver functionality

BACnet Additional Data Fields

While there are standard data fields used in every application, BACnet Driver applications use additional data fields. These data fields contain BACnet object information and are as follows:

- ObjectType
- Object Instance
- Object Property

For more information on these additional data fields, see Understanding BACnet Protocol [→ 51].

Interpreting Vendor Data

Before you can create a custom application file, BACnet object assignment information for the device must be obtained from the vendor. While there is no general standard for this information exchange, vendor object data is generally provided in a table format. The following Figure shows an example of BACnet object data as provided by the vendor. Each data row (such as the one circled) represents a BACnet object.

Network Control Property (Keypad attributes available as BACnet Standard Objects for network control of the unit)	Page	Read Or Read/Write	Object Type	Instance	Enumerations	Description
ANALOG INPUTS						
Space Temp Input		R/W	AI	1	Deg F	Temperature of the Space ** Writing a valid value to this will override the local sensor**
Outdoor Air Temp Input		R/W	AI	2	Deg F	Outdoor Air Temperature ** Writing a valid value to this will override the local sensor**
Discharge Air Temp Output		R	AI	6	Deg F	Discharge Air Temperature
Effective Setpoint Output		R	AI	7	Deg F	This will display either the Heating or Cooling setpoint depending on the unit status.
ANALOG VALUES						
Occupied Cooling	55	R/W	AV	1	Deg F	Occupied Cooling Setpoint
Unoccupied Cool	55	R/W	AV	3	Deg F	Unoccupied Cooling Setpoint
Occupied Heat	55	R/W	AV	4	Deg F	Occupied Heat Setpoint
Unoccupied Heat	55	R/W	AV	6	Deg F	Unoccupied Heat Setpoint
BINARY INPUTS						
Filter Alarm		R	BI	4	OFF / ON	Filter Alarm
General Alarm		R	BI	5	OFF / ON	General Alarm
BINARY VALUES						
Economizer Enable Input		R/W	BV	6	Disable / Enable	Enables or Disables the economizer operation

Figure 11: Vendor Point Data Example.

When interpreting vendor data, BACnet objects must be mapped to application points. Each BACnet object will have at least one point defined in the application. Some objects have two properties used by the BACnet Driver, in which case a separate point is defined for each in the application.

The following are typical steps used to extract and map vendor object data to a custom application.

1. Determine the type and instance for each object in the vendor data.

Network Control Property (Keypad attributes available as BACnet Standard Objects for network control of the unit)	Page	Read Or Read/Write	Object Type	Instance	Enumerations	Description
ANALOG INPUTS						
Space Temp Input		R/W	AI	1	Deg F	Temperature of the Space ** Writing a valid value to this will override the local sensor**
Outdoor Air Temp Input		R/W	AI	2	Deg F	Outdoor Air Temperature ** Writing a valid value to this will override the local sensor**
Discharge Air Temp Output		R	AI	6	Deg F	Discharge Air Temperature
Effective Setpoint Output		R	AI	7	Deg F	This will display either the Heating or Cooling setpoint depending on the unit status.
ANALOG VALUES						
Occupied Cooling	55	R/W	AV	1	Deg F	Occupied Cooling Setpoint
Unoccupied Cool	55	R/W	AV	3	Deg F	Unoccupied Cooling Setpoint
Occupied Heat	55	R/W	AV	4	Deg F	Occupied Heat Setpoint
Unoccupied Heat	55	R/W	AV	6	Deg F	Unoccupied Heat Setpoint
BINARY INPUTS						
Filter Alarm		R	BI	4	OFF / ON	Filter Alarm
General Alarm		R	BI	5	OFF / ON	General Alarm
BINARY VALUES						
Economizer Enable Input		R/W	BV	6	Disable / Enable	Enables or Disables the economizer operation

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⇒ In the example above, the object is a “BI” type (circled) with an instance of 4 (circled). To be defined in the application, the object type must be entered using an enumeration value. The Table Object Type Enumerations [→ 51] provides a listing of enumeration values by object type. For our example, the object type is 3 (enumeration for a “BI” object type) and the object instance is 4.



NOTE:

The BACnet Driver supports both standard and non-standard object types. The Table Object Type Enumerations [→ 51] provides standard enumeration values for standard BACnet object types. For non-standard object types, you must obtain enumeration values from the vendor.

2. Determine the properties for each object in the vendor data.

- ⇒ While there are many properties for an object, there are only two used by the BACnet Driver:
- PresentValue
 - Out-of-Service

While the Present Value property is always defined as a point in the application, the Out-of-Service property is defined as a point only when you choose to include it. The following table shows points to be defined for the object in the application based on using the Out-of-Service property.



NOTE:

For the BNDx.x version driver, the Out-of-Service property is automatically managed by the driver for LAI and LDI points. Therefore, Out-of-Service points are not required. Only the points associated with present values and LAO and LDO points need to be defined in the application.

Table 18:

Use Out-of-Service Points Property?	Object Property Points		
	Property Name	Point Type	Property Value (Enumeration)
No	Present Value	LAI or LDI	85
Yes	Present Value	LAO or LDO	85
	Out-of-Service	LDO	81

Using the Out-of-Service property allows you to write a value to a point that is typically considered an input. For example, assume you have two identical rooftop units (RTU1 and RTU2) using the same application, in the same vicinity, each with an outside air (OA) temperature sensor. In the following example, the object for the OA sensor is circled.

Network Control Property (Keypad attributes available as BACnet Standard Objects for network control of the unit)						
	Page	Read Or Read/Write	Object Type	Instance	Enumerations	Description
ANALOG INPUTS						
Space Temp Input		R/W	AI	1	Deg F	Temperature of the Space ** Writing a valid value to this will override the local sensor**
Outdoor Air Temp Input		R/W	AI	2	Deg F	Outdoor Air Temperature ** Writing a valid value to this will override the local sensor**
Discharge Air Temp Output		R	AI	6	Deg F	Discharge Air Temperature
Effective Setpoint Output		R	AI	7	Deg F	This will display either the Heating or Cooling setpoint depending on the unit status.
ANALOG VALUES						
Occupied Cooling	55	R/W	AV	1	Deg F	Occupied Cooling Setpoint
Unoccupied Cool	55	R/W	AV	3	Deg F	Unoccupied Cooling Setpoint
Occupied Heat	55	R/W	AV	4	Deg F	Occupied Heat Setpoint
Unoccupied Heat	55	R/W	AV	6	Deg F	Unoccupied Heat Setpoint
BINARY INPUTS						
Filter Alarm		R	BI	4	OFF / ON	Filter Alarm
General Alarm		R	BI	5	OFF / ON	General Alarm
BINARY VALUES						
Economizer Enable Input		R/W	BV	6	Disable / Enable	Enables or Disables the economizer operation

Figure 12: Interpreting Vendor Data.

In this example, you choose to use the Out-of-Service property. Thus, two points are defined for both RTU1 and RTU2 (as shown in the Table *Object Property Points*). Now,

assume that the RTU2 OA sensor is faulty and not in operation. To keep RTU2 operating, you can do the following using both points of the object:

1. Set the Out-of-Service point for RTU2 to **ON**.
2. Using PPCL, set the Outdoor Air Temp Present Value point for RTU2 equal to the value of the Outdoor Air Temp Present Value point for RTU1.
⇒ This keeps RTU2 in operation until its OA sensor is replaced.
3. Once the sensor is replaced, you can do the following to restore normal operation:
 - Set the Out-of-Service point for RTU2 to **OFF**.
 - Disable the PPCL that linked the Outdoor Air Temp Present Value points in RTU2 and RTU1.
⇒ This restores RTU2 to normal operation using its OA sensor.

The following Figure shows how the extracted data from Steps 1 and 2 are mapped to an application.

Point #	Pt Type	Name	Description	US-UM	US-Slope OFF Test	US-Intercept ON Test	SI-UM	SI-Slope OFF Test	SI-Intercept ON Test	Object	Instance	Property
1	LAO	ADDRESS	Device Address		1	0		1	0			
2	LAO	APPLICATION	Device Application		1	0		1	0			
3	LAO	ZAT	Space Temperature	DEGF	1	0		1	0			
4	LDO	ZAT OOS	Space Temperature Out Of Service Flag		NO	YES				0	1	85
5	LAO	OAT	Outdoor Air Temperature	DEGF	1	0				0	2	85
6	LDO	OAT OOS	Outdoor Air Temperature Out of Service Flag		NO	YES				0	2	81
7	LAO	DAT	Discharge Air Temperature	DEGF	1	0				0	6	85
8	LDO	DAT OOS	Discharge Air Temperature Out of Service Flag		NO	YES				0	6	81
9	LAI	EFF SP	Effective Setpoint	DEGF	1	0				0	7	85
10	LAO	OCC CLG SP	Occupied Cooling Setpoint	DEGF	1	0				2	1	85
11	LAO	UNOC CLG SP	Unoccupied Cool Setpoint	DEGF	1	0				2	3	85
12	LAO	OCC HTG SP	Occupied Heat Setpoint	DEGF	1	0				2	4	85
13	LAO	UNOC HTG SP	Unoccupied Heat Setpoint	DEGF	1	0				2	6	85
14	LDI	FILTER ALM	Filter Alarm		CLEAN	DIRTY				5	7	85
15	LDI	GENERAL ALM	General Alarm		NORMAL	ALARM				5	9	85
16	LDO	ECON ENABLE	Economizer Enable		DISABL	ENABLE				5	8	85
17	LDO	COMP ENABLE	Compressor Enable		DISABL	ENABLE				5	7	85
18	LAO	OCC OVRD	Occupancy Override Input		1	0				14	1	85
19	LAO	APPL MODE	Application Mode		1	0				14	2	85
20	LAI	FAN SPEED	Fan Speed Output		1	0				13	1	85
21	LAI	HTG CLG MODE	Heat/Cool Mode		1	0				13	2	85

Figure 13: BACnet Application Example.

Creating the Custom Application File

Upon exporting group data for the devices, a custom application file can be created.

BACnet Driver Application Template

While there are several methods for creating custom application files, a template is available that simplifies the process. The BACnet Application Template is a Microsoft Excel file used specifically for creating or modifying BACnet application files.

- The template file (**BACnet CSV Template.xls**) is provided with the Application Builder tool (Commissioning Tool (CT) Revision 3.9.1 and later) and installed on your computer at **CommTool\lsbs\BNC or BND or BNE**.
- If you have an older revision of Commissioning Tool (CT), download the Application Builder patch from the Field Support patches page on iKnow.

The template provides the proper structure for creating BACnet application files as well as basic error checking on field content.

1. Manually enter the application point data based on the device information obtained from the vendor.
2. Save the application file in CSV format.
3. Import the CSV to an ISB file using the Application Builder tool.

The following Figure shows an example of the template populated with a BACnet application.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	#	Pt Type	Name	Description	US-UM	US-Slope OFF Tst	US-Intercept ON Test	SI-UM	SI-Slope OFF Tst	SI-Intercept ON Test	Object	Instance	Property	
1														
2	1	LAD	ADDRESS	Device Address		1	0		1	0				
3	2	LAD	APPLICATION	Device Application		1	0		1	0				
4	3	LAD	ZAT	Space Temperature	DEG F	1	0		1	0		0	1	85
5	4	LDO	ZAT OOS	Space Temperature Out Of Service Flag		NO	YES					0	1	81
6	5	LAD	OAT	Outdoor Air Temperature	DEG F	1	0					0	2	85
7	6	LDO	OAT OOS	Outdoor Air Temperature Out of Service Flag		NO	YES					0	2	81
8	7	LAD	DAT	Discharge Air Temperature	DEG F	1	0					0	6	85
9	8	LDO	DAT OOS	Discharge Air Temperature Out of Service Flag		NO	YES					0	6	81
10	9	LAI	EFF SP	Effective Setpoint	DEG F	1	0					0	7	85
11	10	LAD	OCC CLG SP	Occupied Cooling Setpoint	DEG F	1	0					2	1	85
12	11	LAD	UNOC CLG SP	Unoccupied Cool Setpoint	DEG F	1	0					2	3	85
13	12	LAD	OCC HTG SP	Occupied Heat Setpoint	DEG F	1	0					2	4	85
14	13	LAD	UNOC HTG SP	Unoccupied Heat Setpoint	DEG F	1	0					2	6	85
15	14	LAI	FILTER ALM	Filter Alarm		CLEAN	DIRTY					3	4	85
16	15	LDI	GENERAL ALM	General Alarm		NORMAL	ALARM					3	5	85
17	16	LDO	ECON ENABLE	Economizer Enable		DISABL	ENABLE					5	6	85
18	17	LDO	COMP ENABLE	Compressor Enable		DISABL	ENABLE					5	7	85
19	18	LAD	OCC OVRD	Occupancy Override Input		1	0					14	1	85
20	19	LAD	APPL MODE	Application Mode		1	0					14	2	85
21	20	LAI	FAN SPEED	Fan Speed Output		1	0					13	1	85
22	21	LAI	HTG CLG MODE	Heat/Cool Mode		1	0					13	2	85
23														
24														
25														
26														
27														
28														
29														
30														
31														
32														
33														
34														
35														
36														
37														
38														
39														
40														

Figure 14: BACnet Driver Application Template.

Defining Application Numbers

When creating a custom application file, you must assign an application number within the range of 11,600 through 11,999. This number range is reserved for field custom applications only.

Guidelines for Defining Points

Use the following guidelines for defining points in a BACnet application.

- The first two points in a BACnet application are reserved and should never be changed.
- The range of point numbers is 3 to 32767, with 32767 being the maximum point number. However, no more than 1,000 points should be defined in an application.
- Points can be sequenced in any order.
- Gaps between point numbers are allowed. However, the driver will look for all points in between each sequence, which takes more time.
- Duplicate point numbers or names are not allowed.

Point Data

This section outlines the point data guidelines for BACnet applications.



NOTE:

Points without specified values for the additional BACnet data fields should not be auto-unbundled at the Insight workstation unless the point's relinquish default is set to match its initial value (the intended offset). This ensures that the point's initial value is not overwritten after a driver coldstart during point recharacterization.

- Three additional data fields are provided for BACnet applications. Each of the following fields must be defined for each physical point of the end device:
 - PSD 1 = Object Type Enumeration (See the Table *Standard BACnet Objects*.)
 - PSD 2 = Instance
 - PSD 3 = Property (either present value (85) or out-of-service (81))

Table 19:

Standard BACnet Objects		
Object Type	Enumeration	APOGEE Point Type
Analog Input (AI)	0	LAI
Analog Output (AO)	1	LAO
Analog Value (AV)	2	LAI or LAO
Binary Input (BI)	3	LDI
Binary Output (BO)	4	LDO
Binary Value (BV)	5	LDI or LDO
Multistate Input (MSI)	13	LAI
Multistate Output (MSO)	14	LAO
Multistate Value (MSV)	19	LAI or LAO

- A point with no entry in the additional BACnet data fields is not polled, but its value is added to the instance number for all following points until the end of the application file or until another point without PSD data is encountered. Then this point's value will be used as an offset for any additional points. This feature allows the same application file to be reused if multiple third-party devices are represented through a gateway.
- Point data fields not exclusive to BACnet applications should be defined using the same guidelines as all other applications.

Chapter 4 – License Manager

Chapter 4 answers some frequently asked questions about License Manager and provides instructions for Creating a Demo License [→ 62].

Why Do I Need a License?

Generating a valid license via License Manager allows you to flash standard firmware into an integration driver using the Firmware Loading Tool (FLT). For more information about License Manager, see the *License Manager Start-up Procedures* (145-600).

What License Choices Do I Have?

BACnet Driver (LSM-INT-BMSTP).

What if I Don't Have a License?

An integration driver needs a valid license to enable the updating of data point values. Without a valid license installed, you will be unable to see point updates from the third-party device at the APOGEE Automation System database. However, the driver can be started up, and communication can be verified without a valid license installed.

What is a Demo License?

A demo license enables all features of a controller. In the case of an integration driver, it will enable the full functionality of an integration driver.

A demo license cannot be obtained from License Manager. It must be created manually in a simple text editing tool like Notepad. If you use any other program, make sure that you save the file without formatting. The file is only needed if you want to load the license through Commissioning Tool (CT) or Insight or Desigo CC software. You can also manually enter the license string through the HMI.

A demo license is good for five (5) days. At midnight after the fifth day, the controller will remove the license and automatically coldstart. You can load the same demo license again to get another five days of run time.

Creating a Demo License

1. Open Notepad and enter the following text:
 - **FEATURE SERVICEDEMO siemenssbt 1.0 temporary uncounted 0 **
HOSTID=ID_STRING=ANY
2. Save the file with the extension **.LIC**.
3. Import the file into the License Manager window in Commissioning Tool (CT) or Insight or Desigo CC software.

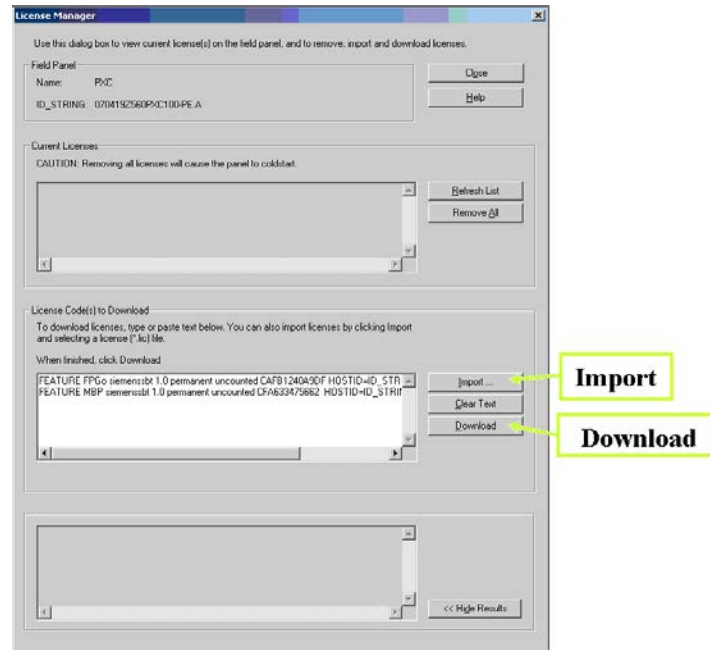


Figure 15: Importing the License using Commissioning Tool or Insight Software.



NOTE:

The field panel controller will coldstart after the license is accepted.

The license can also be entered by hand. The field in the License Manager window allows entering of text. Use the same text as shown above (including the “\”).

The license can also be entered through the HMI, but the input buffer is limited to 50 characters per line. Because a license has far more than 50 characters, the license must be split into multiple lines.

The following example shows the same demo license as entered by hand through the HMI:

```
>Log, Display, Add, dElete, Removall, Quit? a
>License : FEATURE SERVICEDEMO siemenssb 1.0 \-----
>License : temporary uncounted 0 HOSTID=ID_STRING=ANY\-----
>License : -----
License 1 accepted
Licenses received 1, Licenses accepted 1, Licenses rejected 0
>Log, Display, Add, dElete, Removall, Quit? -
```



NOTE:

Licenses must be typed exactly as displayed. If a mistake is made, your license is rejected.

- Make sure to type all spaces as they occur.
- Extend the entry to several lines to fit the entire license.
- Do not enter more than 50 characters per line.

**NOTE:**

If the field panel controller was made ready before entering the license, the controller will coldstart after the license is accepted. Otherwise, the controller will coldstart when it is made ready.

**NOTE:**

Changing the system date to a date more than five (5) days away from the install date will immediately erase the demo license and coldstart the field panel controller.

When a demo license is loaded and accepted by the controller, the word *temporary* is replaced by the last day the license is valid.

```
>Time, Message, Cancel, Hello? h
>Enter user initials      : high
>Enter user password     : ???------

>Point, Application, Time, Message, Cancel, System, passWord, Bye? -
01:41:22 05/15/2008 THU Logged on successfully Field panel <PXM71>
User: <high> <High default user account>

>Point, Application, Time, Message, Cancel, System, passWord, Bye? s
>Diagnostics, Users, dAtes, deStinations, Error msgs, Hardware, Text, Quit? h
>Fieldpanels, Ethernet, nodeNametable, Disks, Licensemanager, Vaem, Quit? l
>Log, Display, Add, dElete, Removall, Quit? l
>Here, Printer           : H
>Field panel name        : -----
FEATURE SERVICEDEMO siemensbt 1.0 20-MAY-2008 uncounted 0
HOSTID=ID_STRING=ANY

>Log, Display, Add, dElete, Removall, Quit? -
```

Figure 16: Expiration Date for a Demo License.

Appendix A – Importing Applications Using the Buffalo Grove TEC Applications Drive and Commissioning Tool

The Buffalo Grove TEC Applications feature in Commissioning Tool (CT) allows you to import the Integrated Systems applications from the Home Office TECAPPS Drive, as well as custom applications, by using the browse feature.

Requirements for performing the steps in Appendix A

- Access to the corporate network if importing from the Home Office TECAPPS Drive (or any other network drive).
- The latest revision of CT.

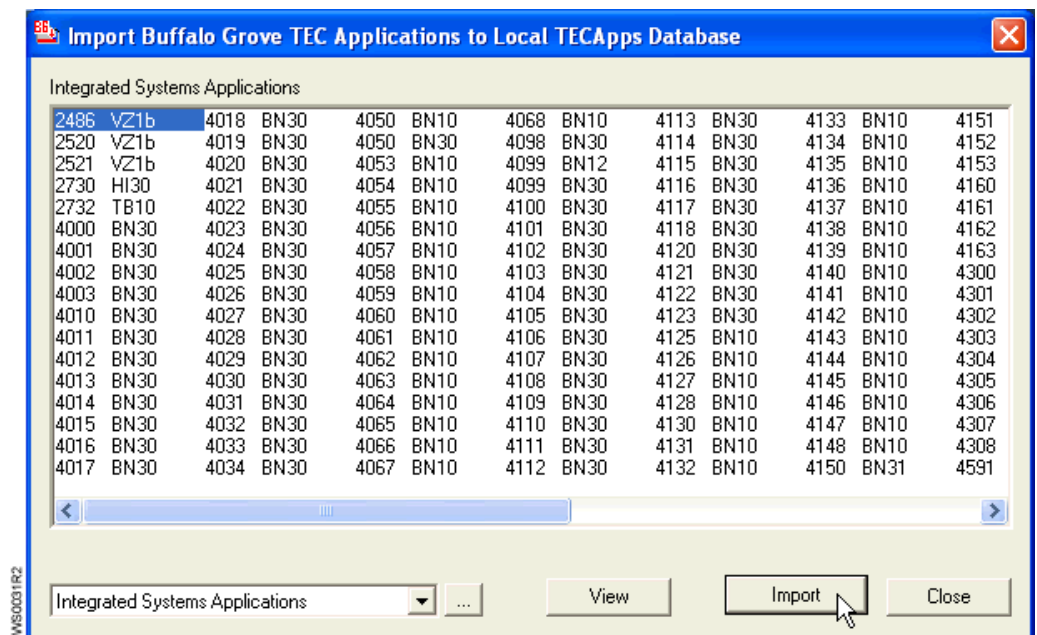
Importing Standard Integrated Systems Applications

1. Click **Start**, and then click **Programs, Commissioning Tool, Buffalo Grove TEC Applications**.
 - ⇒ The **Import Buffalo Grove TEC Applications to Local TECApps Database** dialog box displays.
2. From the drop-down menu, select **Integrated System Applications**.
 - ⇒ The **Integrated Systems Applications** list displays.



NOTE:

Use the button to the right of the drop-down menu to browse through the network drives.



3. Select the application(s) and then click **Import**.


4. In Commissioning Tool (CT), open System Profile and click **Tools, Auto Unbundling**.
 5. In the **Auto Unbundling** dialog box, click **Import Applications**, select the desired application(s), and click **OK**.
 6. If the **TEC Application Overwrite** dialog box displays, click **Yes** to accept and overwrite the files.
- ⇒ The application is now available to be selected for devices.

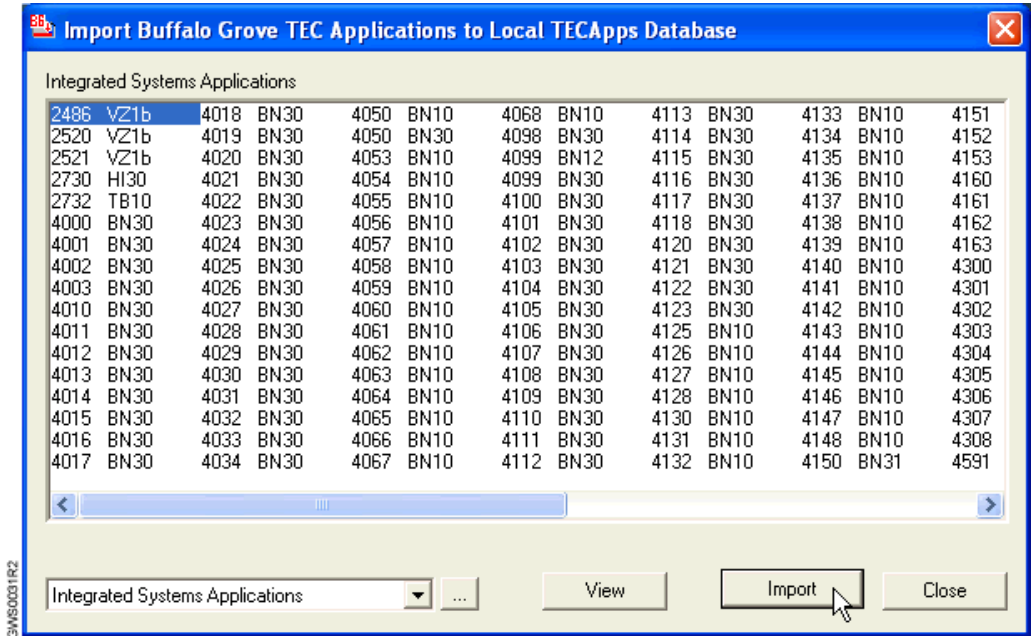
Importing Custom Applications

Exporting the Application File to Your Local Hard Drive

1. In the Application Builder tool, open the ISB file that contains the desired integration application.
2. Highlight the desired application in the left window pane.
3. From the **Data** menu, click **Export As**, and then select **TXT (*.txt)**.
4. Browse to any folder on your local hard drive and click **Save**.
5. Close the Application Builder tool.

Importing the Application File

1. Click **Start, Programs, Commissioning Tool**, and then click **Buffalo Grove TEC Applications**.
 - ⇒ The **Import Buffalo Grove TEC Applications to Local TECApps Database** dialog box displays.
2. Click the browse button  next to the drop-down list and browse to the folder where the **.txt** file was saved in Step 4 of the exporting procedure.
3. Select the folder, and then click **OK**.
4. Highlight the application and click **Import**.



5. Close the **Import Buffalo Grove TEC Applications to Local TECApps Database** dialog box.
 6. Open your job in Commissioning Tool.
 7. Open System Profile.
 8. From the **Tools** menu, click **Auto Unbundling**.
 9. Click the **Import Application** button.
 10. Highlight the application that was imported in Step 9 and click **Add**.
- ⇒ The application is now available to be selected for devices.

Appendix B – Adding Applications Using the HMI Port and the Insight Workstation


Requirement for performing the steps in Appendix B


- Insight software Revision 3.7 or later.

When defining the System Profile at the job site or without access to the corporate network, use the HMI port and the Insight workstation to add the applications. Uploading to the Insight workstation requires fewer steps than uploading to Commissioning Tool (CT) because the Insight workstation automatically “learns” the application when it is uploaded.

The first time you attempt to assign an application for the driver using the Insight workstation, the application numbers used by the driver will most likely NOT appear in the list of TEC applications. The following steps describe how to import the application into the Insight workstation.

Uploading Applications to the Insight Workstation



 **CAUTION**

Attempts to add the applications using the Insight workstation via any method other than what is described in the following steps is likely to cause unexpected results.



NOTE:
If the needed application numbers already appear in the Insight workstation’s list of TEC applications, you do not need to do the following procedure. The Insight workstation has already imported these applications.



NOTE:
If any applications for the driver are displayed on System Profile as Application 65535 or as Application 5000, you must delete these TECs from the Insight workstation. Then, coldstart the driver before proceeding.

1. Connect a terminal (or computer running FLT, HyperTerminal, etc.) to the HMI or HMI/MODEM port on the driver hardware. Adjust the communication speed, etc. as needed to establish communications.
2. For each different application number used to monitor or control BACnet devices, add Points 1 and 2 for one FLN drop.
3. From the HMI main menu, add any TEC with a unique application number.



NOTE:
The application number must match the initial value entered for Point 2 in Step 2.

4. Open System Profile.



NOTE:

It is not necessary to add the TECs.

5. From the Insight workstation, perform a Full Backup for the driver. When the upload is complete, refresh System Profile.
- ⇒ All applications that you defined through the HMI should now display correctly in System Profile.

Appendix C – Adding Applications Using the HMI Port and Commissioning Tool

Requirements for performing the steps in Appendix C

- Access to the corporate network if importing from the Home Office TECAPPS Drive (or any other network drive).
- The latest version of Commissioning Tool (CT).

When defining the system profile at the job site or without access to the corporate network, use the HMI port and Commissioning Tool (CT) to define your applications.

The first time you attempt to assign an application for the driver using Commissioning Tool (CT), the application numbers used by the driver will most likely NOT appear in the list of TEC applications. The following steps describe how to import the application into Commissioning Tool (CT).

Uploading Applications to Commissioning Tool



CAUTION

Attempts to add the applications using Commissioning Tool (CT) via any method other than what is described in the following steps is likely to cause unexpected results.



NOTE:

If the needed application numbers are already in the Commissioning Tool (CT) list of TEC applications, you do not need to perform the following procedure. Commissioning Tool (CT) has already imported these applications.



NOTE:

If any applications for the driver are displayed on the Commissioning Tool (CT) System Profile as Application 65535 or as Application 5000, you must delete these TECs from Commissioning Tool (CT). Then coldstart the driver before proceeding.

1. Connect a terminal (or computer running FLT, HyperTerminal, and so on.) to the HMI port on the driver hardware.
⇒ Adjust the communication speed, etc. as needed to establish communications.
2. For each unique application number used to monitor or control BACnet devices, add Points 1 and 2 for one FLN drop.
3. Do the following to add any TEC with a unique application number:
 - From the HMI main menu, type **A, N, T, E, A** (Application, flNdevice, Tec, Edit, Add)
 - When prompted, enter the TEC System Name and the TEC Name.
 - When prompted, enter the application number.



NOTE:

The application number must match the initial value entered for Point 2 in Step 2.

4. Open System Profile from Commissioning Tool (CT) and perform a Full Backup for the driver.
5. When the upload is complete, refresh System Profile.
 - ⇒ All applications defined through the HMI should now display correctly in System Profile.



NOTE:

It is not necessary to add the TECs.

Learning Applications in Commissioning Tool



NOTE:

This procedure does not work for diagnostic applications. These can be imported from the Buffalo Grove TEC Applications feature in Commissioning Tool (CT).



NOTE:

This procedure works with custom (five-digit) applications, but subpoints above 99 will not be discovered.



NOTE:

The TEC added in System Profile must have the same name and address as defined in the driver.

1. Select a TEC in the right area of the HMI Database Transfer screen.
2. From the **File** menu, click **Learn TEC**.
 - ⇒ The application is uploaded into the CommTool ATOM database. Wait for the upload to complete.
3. In System Profile, select **Auto-unbundling, Import Application**.
4. Repeat Steps 1 through 3 for each TEC with a different application number.

Appendix D – Learning Applications Using System Profile

Requirement for performing the steps in Appendix D

- Insight software Revision 3.7 or later.

Uploading Applications to the Insight Workstation

1. Ensure that the Insight workstation or Desigo CC management station is configured and communicating with the driver.
2. Open System Profile.
3. Add the TEC to the desired FLN.
 - ⇒ The **TEC Definition** dialog box opens.
4. Fill in the appropriate information.
 - In the **Application** field, highlight any default information and enter the desired application number.
5. Click **OK**.
 - ⇒ The Insight workstation or Desigo CC management station automatically learns the application from the driver's ISB file and downloads the new TEC to the driver.
6. Repeat Steps 1 through 5 for all unique applications.

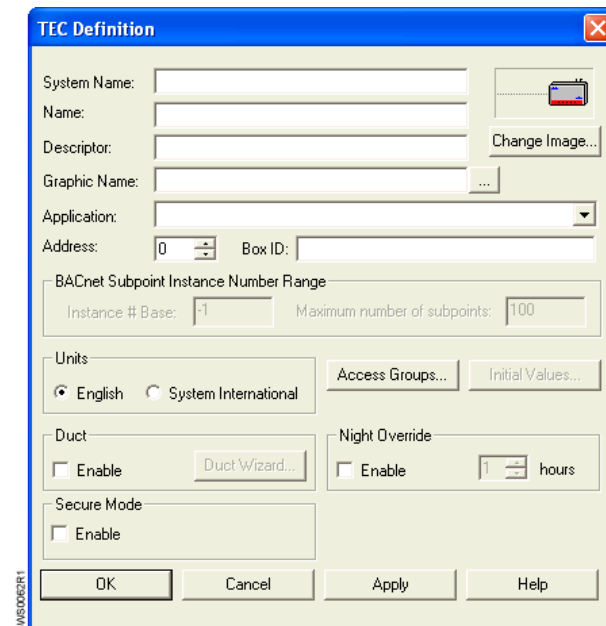


Figure 17: TEC Definition Dialog Box.

Appendix E – Custom HMI Prompts for Integration Drivers

Introduction

Integration-specific HMI prompts are available for the BACnet Driver. These HMI prompts are only available if an Integration driver is loaded. Integration HMI prompts are selected in the same way as standard prompts—the capitalized letters in the prompt string are used to make a selection.

- ➔ To access the Integration HMI prompts, go to the HMI Main Menu and enter **S, I** (System, Integration).

The Integration HMI menu contains the following options:

Table 20:

Integration Menu Item	Description
Log	Displays current status of the integration driver
Counters	Displays diagnostic counter values
dBdump	Allows you to probe the local driver database
Datascope	Controls the driver datascope feature
Settings	Allows the configuration of driver parameters
Quit	Returns you to the previous menu

```
09:05:49 10/10/2008 FRI Logged on successfully Field panel <8071>
User: >Point, Application, Time, Message, Cancel, System, passWord, Bye? s
>Diagnostics, Integration, Users, dSt, Bacnet, Error_msgs, Hardware, Text,
Quit? I
>Log, Counters, dBdump, Datascope, Settings, Quit? -
```

Integration Driver Status Display (HMI: System ⇒ Integration ⇒ Log)

This menu selection gives a quick overview of the driver status and what applications are available. The output is in the form of a report that provides the following information:

- Current status of the READY and the COMMFAIL diagnostic points.
- Whether an active license is installed and what feature level is recognized (LICENSE FEATURE).
- The diagnostic drop address and the default diagnostic application number. These items are for user information and are hard-coded in the driver firmware.
- A list of available applications and the point count of each application.

```
>Log, Counters, dBdump, Datascope, Settings, Quit? 1
10/10/2008 FRI INTEGRATION LOG REPORT 09:07
```

```
Node name : PXC71
Site name : LONLAB
BLN name : BACBLN
Field panel address : 8071
Firmware revision : TME1163 PXME MBD0.1 200 V3.1 BACnet 4.3g
Firmware link time : Oct 09 2008 15:41:16
DIAGNOSTIC DESCRIPTION VALUE
READY : 1
COMM FAIL : 0
LICENSE FEATURE : 0
DIAGNOSTIC ADDRESS : 253.31
APPLICATION NAME      APPLICATION NUMBER      NUMBER OF APPLICATION POINTS
```

MB DIAG	4500	120
MB GE9070 TEST	11900	237
SEA PM9500	4542	73
SEA PM9200	4543	82
DATA AIRE DAP II	4593	103
MB MASTER TEST	11111	587
MB PERF TEST	11112	120
MB SLAVE TEST	11600	285
MB250 TEST	11909	225

```
End of report
>Log, Counters, dBdump, Datascope, Settings, Quit? -
```

Reference:

REV → Revision String from driver code

BUILD → Driver Build Date from driver code

READY → DIAG 01

COMMFAIL → DIAG 02

LICENSE FEATURE → DIAG 12

DIAG ADDRESS → Diagnostic address from driver code

DIAG APPLICATION → Diagnostic application number from driver code

Application List → from loaded ISB

Integration Driver Diagnostic Counter Display (HMI: System ⇒ Integration ⇒ Counters)

This menu option displays a list of available diagnostic counters and their current values. The output format is a report.

```
>Log, Counters, dBdump, Datascope, Settings, Quit? c  
>Display, Enable, dIsable, Reset, Quit? d  
10/10/2008 FRI INTEGRATION DIAGNOSTIC COUNTER REPORT 09:08
```

```
Node name : PXC71  
Field panel address : 8071  
DIAGNOSTIC DESCRIPTION VALUE  
CMDS PENDING          0  
CMD Q MAX             2  
RESPONSES             27898  
GOOD PACKETS          27898  
NAK CNT               0  
BAD SEQ CNT           0  
UNKNOWN PACKETS       0  
PARITY ERRS           0  
BAD PACKETS           0  
NO RESPONSES          0  
TRANSMISSIONS         27899  
BAD TX CNT            0  
OVERRUN CNT           0  
FRAMING ERRS          0  
HW ERRS               0  
BREAK RCVD            0  
DYN ADDITION          0  
DYN BAD               0  
STL OUT               0  
STL ACT               0  
DYN WAITING           0  
DYN ACTIVE            0  
DYN FREE              0  
APPERR                0  
End of report  
>Display, Enable, dIsable, Reset, Quit? -
```

Reference

COUNTERS ENABLED/DISABLED → Status information from driver code

CMDS PENDING → DIAG 17

CMD Q MAX → DIAG 18

RESPONSES → DIAG 21

GOOD PACKETS → DIAG 22

NAK CNT → DIAG 23

BAD SEQ CNT → DIAG 24

UNKNOWN PKTS → DIAG 25

PARITY ERRS → DIAG 26

BAD PACKETS → DIAG 27

NO RESPONSES → DIAG 28

TRANSMISSIONS → DIAG 29

BAD TX CNT → DIAG 30

OVERRUN CNT → DIAG 31

FRAMING ERRS → DIAG 32

HW ERRS → DIAG 33

BREAK RCVD → DIAG 34

DYN ADDITION → DIAG 36

DYN BAD → DIAG 37

STL OUT → DIAG 38

STL ACT → DIAG 39

DYN WAITING → DIAG 45

DYN ACTIVE → DIAG 46

DYN FREE → DIAG 47

APPERR → DIAG 49

ENABLE COUNTERS → same as DIAG 20 commanded to **1**

DISABLE COUNTERS → same as DIAG 20 commanded to **0**

RESET COUNTERS → same as DIAG 20 commanded to **2**

Integration Driver Database Dump (HMI: System ⇒ Integration ⇒ dBdump)

>Log, Counters, dBdump, Datascope, Settings, Quit? b

>Configure, Stop, Quit?

This menu option features a submenu which allows control of the database dump with two selection options. The first option is to configure any applicable filters, and the second option runs the local database dump.

Reference

- An input is required for **FLN**, **Drop**, and **Point**.
 - If you specify **FLN**, **Drop**, and **Point** without using the wildcard (*), the rest of the option will not display.
 - If the **FLN**, **Drop**, and **Point** values are **0**, then nothing displays.
- If you press **ENTER** or enter an invalid value, the prompt redisplay.
- The rest of the options will be set to the driver default values and can be selected by pressing **ENTER**. Any selections should be retained as if the appropriate diagnostic point is commanded.

After the necessary options are selected, the database dump can be started using the Run menu option.

The following tables outline the options that must be set when **Configure** is selected from the dBdump HMI menu.

Table 21:

dBdump Prompts with Point Number Specified.		
HMI Prompt	Option/Entry	Description
Port	41 through 44	Directs the datascope output to the selected port. Same as commanding DIAG 20 to: 41 (HMI), 42 (USB), or 43 or 44 (Telnet).
FLN	0 to 253	Write DIAG 501 selects FLN
Drop	0 to 254	Write DIAG 502 selects device
Point	0 to 32767	Write DIAG 503 selects Point

```
>Configure, Stop, Quit? c
> Port (41-44)           : 43
> FLN (0-253)           : 1-
> Drop (0-254)          : 1-
> Point (0-32767)       : 1--
Point record for fln 1 drop 1 (dev 1) pnt 1 at 0xbc0919
.chared      TRUE
.data_COV    FALSE
.com_lost    FALSE
.com_COV     FALSE
.dynmsg_COV  FALSE
.alarm_ack_COV FALSE
.commanded   FALSE
.logged      FALSE
.inuse       FALSE
.out-of-service FALSE
.controlStatus Undefined
.priority    None
.value       1.000000
.spare       0
point_type PAO
-- Local database dump complete. --
>Configure, Stop, Quit? -
```

Table 22:

dBdump Prompts with Wildcard Entered for Point Number.		
HMI Prompt	Option/Entry	Description
Port	41 through 44	Directs the datascope output to the selected port. Same as commanding DIAG 20 to: 41 (HMI), 42 (USB), or 43 or 44 (Telnet).
FLN	0 to 253	Write DIAG 501 selects FLN
Drop	0 to 254	Write DIAG 502 selects device
Point	*	Write DIAG 503 selects Point
Chared	Y, N	Write DIAG 520 selects points with characterized flag set
COV	Y, N	Write DIAG 521 selects points with COV flag set
Failed	Y, N	Write DIAG 522 selects points with failed flag set
Cmd COV	Y, N	Write DIAG 523 selects points with communication COV flag set
Dyn Alm COV	Y, N	Write DIAG 524 selects points with the dynamic alarm COV flag set
Alarm Ack	Y, N	Write DIAG 525 selects points with the alarm acknowledged flag set

dBdump Prompts with Wildcard Entered for Point Number.		
HMI Prompt	Option/Entry	Description
Commanded	Y, N	Write DIAG 526 select points with the commanded flag set
Logged	Y, N	Write DIAG 527 selects points with the logged flag set
InUse	Y, N	Write DIAG 528 selects points with the in use flag set
Out Of Service	Y, N	Write DIAG 529 selects points with the Out-of-Service flag set

```

>Configure, Stop, Quit? c
> Port (41-44) : 43
> FLN (0-253) : 1-
> Drop (0-254) : 1-
> Point (0-32767) : *--
> Chared (Y/N) : y
> COV(Y/N) : N
> Failed (Y/N) : N
> Cmd COV (Y/N) : N
> Dyn Alm COV (Y/N) : N
> Alarm Ack (Y/N) : N
> Commanded (Y/N) : N
> Logged (Y/N) : N
> InUse (Y/N) : N
> Out Of Service (Y/N) : N
>Configure, Stop, Quit? -
ADDRESS TYPE CHARDDACOV FAILD
STCOVDYCOVALACKCOMMDLOGGDINUSEOOSRVSPAREVALUE
00100100001PAO Y N N N N N N N N N 0 1.00
00100100002PAI Y N N N N N N N N N 0 11111.00
00100100003PDI Y N N N N N N N N N 0 0.00
00100100004PAO Y N N N N N N N N N 0 0.00
00100100005PAO Y N N N N N N N N N 0 0.00
00100100006PAO Y N N N N N N N N N 0 0.00
00100100007PAO Y N N N N N N N N N 0 0.00
00100100008PAO Y N N N N N N N N N 0 0.00s
>Configure, Stop, Quit? -

```


Integration Driver Datascope Control (HMI: System ⇒ Integration ⇒ Datascope)

```
>Log, Counters, dBdump, Datascope, Settings, Quit? d  
>Configure, Stop, Quit? C
```

The datascope is a very powerful feature which allows you to display the inner workings of an Integration Driver. The datascope can still be controlled in the conventional way through DIAG Point 20. By making the diagnostic control available through HMI, it becomes more transparent to the user.

The datascope control includes a submenu with options to configure, run, and stop the datascope. If the output is directed to the currently used HMI port, it might be difficult to maneuver back to the submenu to reach the **Stop** function.

Reference

- The **Stop** function stops the datascope.
- At the start of a datascope capture, the date and time, driver revision string, HMI port the datascope is running, Print_f selection details, Events (Y/N), and data type are displayed.
- If a datascope is started without any configuration option, it will always default to the current active HMI port, hex display, and no Print_f. The selected options will be retained as if DIAG Point 20 were commanded.
- Pressing the **\$** key stops the datascope from anywhere in the menu tree.
- When the datascope stops, it has the same effect as if you commanded DIAG Point 20 to **10**, **20**, and **30** in succession.

The following table outlines the options that need to be set when **Configure** is selected from the **Datascope** HMI menu.

Table 23:

HMI Prompt	Option/Entry	Description
Port	41 through 44	Directs the datascope output to the selected port. Same as commanding DIAG 20 to: 41 (HMI), 42 (USB), or 43 or 44 (Telnet).
Timer	0 to 9999 minutes	The amount of time (in minutes) the datascope should run. 0 (default) = unlimited
Mode	R (Raw) H (Hex) A (ASCII)	The type of decoding to use. Same as commanding DIAG 20 to: 11 (raw), 12 (Hex) or 13 (ASCII). Raw = no decoding
PrintF	Y N	Selects the display of debug information. Same as commanding DIAG 20 to 31 .
Detail	0 to 255	Selects the debug feature. Same as commanding DIAG 15.
Events	Y N	Turns the events display on (Y) or off (N). Selects display of internal driver events. Same as commanding DIAG 20 to 21 .

```
>Log, Counters, dBdump, Datascope, Settings, Quit? d
>Configure, Stop, Quit? c
> Port (41-44) : 43
> Timer (0-9999 minutes) : 0-
> Mode (Raw,Hex,Ascii) : H
> PrintF(Y/N) : N
> Detail (0-255) : 12-
> Events (Y/N) : N
Start of Datascope
Time is 9:23:31'128 on 10/10/2008
23:31'128: FLN 1:      Sent packet :[01][03][00][00][00][0A][C5][CD]
23:31'133: FLN 1:      Received
packet :[01][03][14][00][05][7F][80][00][00][00][00][00][00][00][0
0][00][00][00][00][00][00][00][00][27][8F]
23:31'176: FLN 1:      Sent packet :[01][03][00][5A][00][0A][E5][DE]
```

Integration Driver Configuration

This menu option allows you to permanently change the driver configuration parameters. Changed values are stored in EEPROM and are loaded during start-up as default values of the equivalent diagnostic point.

- The configuration points are displayed one after another showing the current stored value.
- Entering an asterisk (*) for an individual option changes the value to the driver factory default value.
- If you enter an invalid value, the prompt redisplay with the previous value.
- The prompt **Save, Cancel, Reset, Quit?** allows you to **Save** the changes, **Cancel** to start again, or **Reset** all values to the driver factory default value. (Bold characters indicate the HMI entry.)
- At the prompt **Are you sure? (Y/N)**, entering **Y** confirms the Save or Reset function. Entering **N** restarts the configuration sequence.

```
> Log, Counters, dB dump, Datascope, Settings, Other, Quit? S
>FAIL ON CMFL (Y/N) N
>PTFAILMODE (Y/N) N
>TIMEOUT (MIN) 0
>RESPONSE INT (TICKS) 16
>POLL SUPRESS (MIN) 0
>POLL DELAY (TICKS) 32
>POLL FREQ (TICKS) 32
>MAX RETRIES 3
>START DELAY (CYCLS) 0
>DATA CONTROL (B P S) 801
>DISCMDFAILPT (Y/N) N
>DYN MSG LEN (CHRS) 0
>DYN MAX BUFR (CHRS) 0
>DYN MSG RAM (BYTE) 0
>DYN MSG CHK (Y/N) N
>DYN MSG STRT (Y/N) N
>PNTUPDATECTL (1-18) 16
>Save, Cancel, Reset, Quit? S
>Are you sure (Y/N) ? N
```

Appendix F – Startup and Commissioning with a Desigo CC Management Station

Appendix F describes the process for starting up the BACnet Driver on a network with a Desigo CC management station.

Prerequisites



NOTE:

You should have a working knowledge of the APOGEE and Desigo CC Automation Systems and have completed the Integration training course.



NOTE:

To migrate the BACnet Driver database to the Desigo CC system by using auto discovery, any compatible revision of Commissioning Tool (CT) may be used to start-up and commission the driver.

If you prefer to use the APOGEE Export tool (SiB-X) to migrate the database, you must use Commissioning Tool 3.12 or later.

Complete all the items in the following checklist before proceeding.

- You are familiar with the point mapping and application concepts of the BACnet Driver as described in Chapter 1 – Product Description [→ 7] in this manual.
- You are familiar with the auto discovery procedure as described in the *Desigo™ CC APOGEE BACnet Systems Integration Guide* (A6V10376174)
- You are familiar with the BACnet system and the specific device to be integrated.
- You have all wiring and installation complete, as specified in the BACnet *Driver for PXC Modular and PXC-36 Installation Instructions* (565-711).
- If using an .ISB file, you have created or obtained the .ISB file using the Application Builder tool.
- You have obtained the .EBN and .ENU files from the StdApps drive.
- You have obtained a Permanent driver license or plan to use a Demo license. (See the Loading the Driver License [→ 43] section.)
- You have confirmed that the BACnet representative has performed the checkout on its system, and all of the devices are communicating with the BACnet devices.

See also

- 📄 Loading the Driver License [→ 43]
- 📄 Chapter 1 – Product Description [→ 7]

Starting up the Driver



NOTE:

See Appendix E – Custom HMI Prompts for Integration Drivers [→ 73].

Before you Begin

Perform the general startup tasks as described in the appropriate *Start-up Procedures*:

- *PXC Modular Series with BACnet ALN* (145-729)
- *PXC Compact Series* (145-157)

Loading an Integration Driver into a PXC Series



NOTE:

For full functionality, the driver license must be uploaded (see Chapter 4 – License Manager [→ 62]).



CAUTION

This procedure cannot be reversed. Once a field panel with standard firmware is upgraded to an Integration Driver, standard firmware cannot be reloaded into that field panel.



NOTE:

To perform this procedure, you must use the appropriate revision of Commissioning Tool (CT) :

- For PXC Modular, use CT Revision 3.9.1 or later.
- For PXC-36, CT Revision 3.11 or later.

Earlier revisions do not work.



NOTE:

The same firmware files can be used for PXC Modular and PXC-36 field panels.

1. Go to the Standard Apps drive or the Partner Extranet Web site for Independent Field Offices and obtain the driver files (.EBN and .ENU) to be flashed.
 - ⇒ The firmware files for the BACnet Driver on RS-485 P2 or Ethernet ALN are located in the following folder on the StdApps drive:
X:\APOGEE_Products_FW_SW\Integrated_Solutions\BACnet_BACnet_Driver_Firmware_2.X\PXC
 - ⇒ The firmware files for the BACnet Driver on BACnet ALN are located in the following folder on the StdApps drive:
X:\APOGEE_Products_FW_SW\Integrated_Solutions\BACnet_BACnet_Driver_Firmware_3.X\PXC

2. Do the following to configure the HMI port baud rate to 115200 bps:
 - a. From the HMI main menu, type the following letters in sequence:
S, H, F, C, F (System, Hardware, Fieldpanels, Config, Fln)
 - b. Press **1** for FLN 1 and press **ENTER**.
 - c. Type **115200** and press **ENTER**.
3. Open Firmware Loading Tool (FLT) Revision 3.9.1 or later and connect to the PXC Series HMI port.
4. Click the **Settings** tab in FLT and configure the download and communication baud rate to **115200**.
5. Click the **Firmware** tab.
6. Click **Identify** to display the currently-loaded field panel firmware revision in the Controller section.
7. Click **Browse** and locate the driver files (.EBN and .ENU) obtained in Step 1.
8. Click **Load**.
 - ⇒ The BACnet Driver firmware is loaded into flash memory. This is an automatic load and does not require any firmware upgrade credits. Depending what firmware or driver was loaded before, several messages display to indicate what processing step is taking place.
9. When the firmware load is complete, click the **Integrated Systems** tab.
10. Click **Identify** and confirm that the BACnet Driver name and its revision are displayed in the Controller section.

Loading an ISB File



NOTE:

ISB files are only required for application-based drivers.



NOTE:

The .ISB file must be compatible with the revision listed in the Revision field. Specifically, BNCx.x driver revisions are compatible with BNCx.x ISBs, the BNDx.x driver revisions are compatible with BNDx.x ISBs, and the BNEx.x driver revisions are compatible with BNEx.x ISBs.

An Integrated System Binary (.ISB) file must be loaded into the driver after flashing the firmware.

- ▷ Using the Application Builder tool, create an ISB file by importing standard application files or custom application files into the appropriate ISB template.
 - Save the ISB file.
 - ▷ Keep the ISB file with your job records as it will be needed for future Firmware upgrades or job modifications.
1. In **Firmware Loading Tool (FLT)**, click the **Integrated Systems** tab.
 2. Click **Browse** and locate the .ISB file to be flashed.

3. Click **Load**.

⇒ The application file is loaded into Flash memory. This is an automatic load. Several messages display to indicate what step is taking place. Wait for the Database Load Complete message to display.

4. Click **OK** to accept the database load.

⇒ The PXC Series is now ready to operate as a BACnet Driver.

Loading the Driver License



NOTE:

You must verify that the proper license is installed. Without a valid license installed, you will be unable to see point updates from the BACnet system at the Desigo CC Automation System database. However, the driver can be started up, and communication can be verified without a valid license installed.

1. Obtain the license for the BACnet Driver (P/N LSM-INT-BMSTP).
 2. Using License Manager, load the BACnet Driver Permanent License into the PXC Series field panel.
- ⇒ See Chapter 4 - License Manager [→ 62] in this manual for more information about licenses.

See the *APOGEE License Manager Start-up Procedures* (145-600) for information on the process of requesting licenses, installing features, loading licenses, and verifying operation of the licensed features.

Setting the FLN Communication Speed

This procedure configures the field panel FLN 1 port.

1. From the HMI main menu, type the following letters in sequence:
S, H, F, C, F (System, Hardware, Fieldpanels, Config, Fln)
2. Press **1** for FLN 1 and press **ENTER**.
3. Type in the baud rate that matches the communication speed of the BACnet network and press **ENTER**.

Verifying the Setup Information



NOTE:

When verifying the setup information, if the battery status displays LOW BATTERY/DEAD, either the tab was not removed, or the battery has discharged and must be replaced.

1. From the HMI main menu, type the following letters in sequence:
S, H, F, D (System, Hardware, Fieldpanels, Display)
2. At the **Here, Printer** prompt, do one of the following:
 - To view the report on the screen, type **H** or press **ENTER**.

- To send the report to the ALN report printer, type **P**.
- 3. At the **Field Panel** prompt, type the field panel number and press **ENTER**.
 - ⇒ The system displays or prints the Field Panel Configuration report.
- 4. Type **#** (SHIFT+3) to return to the HMI main menu.

Establishing Communications with the BACnet Devices

Adding Devices

Through Commissioning Tool (CT)

Along with the other required fields in the **TEC Definition** dialog box, type a value in the **Max Number of Subpoints** field that is large enough to allow for all the subpoints in the application.

- To determine the correct value, find the highest subpoint number in the application and round up to the next 100.
- If the value is too small, the TEC Application Status will be failed.

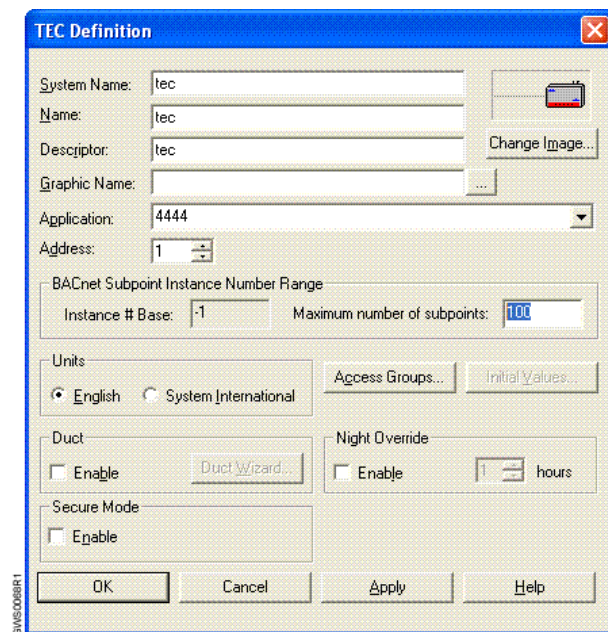


Figure 18: Adding Devices—TEC Definition Dialog Box.

Through the HMI

Leave the **Instance Number Block Start** field blank. The driver will automatically assign the correct instance block size.

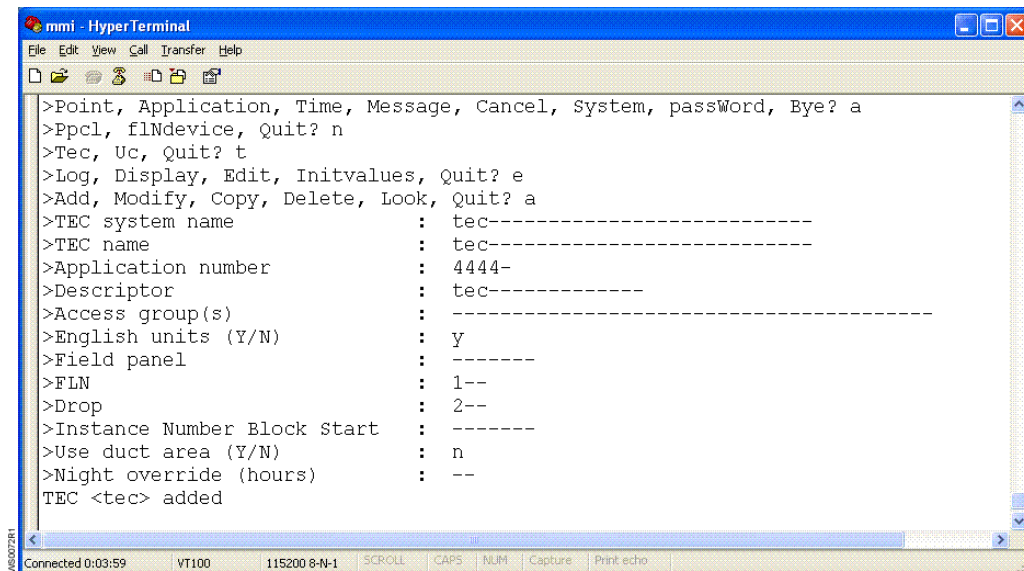


Figure 19: Adding Devices through the HMI.

Adding Applications

To add applications for the BACnet devices and the Siemens Industry BACnet TEC, use one of the following methods. The methods are listed in order of preference, with the preferred method listed first; however, you can use any of the available methods. The method you choose may depend on the tools you have available.



NOTE:

At this time, it is recommended that you DO NOT enter duplicate copies of the applications for the additional devices. After an application type is defined, it is available in System Profile.

Method 1 – Using the Buffalo Grove TEC Applications Feature

Import standard or custom applications into Commissioning Tool (CT) using the Buffalo Grove TEC Applications feature. Then use those applications to add devices. See Appendix A – Importing Applications Using the Buffalo Grove TEC Applications Drive and Commissioning Tool [→ 65] for the steps.

Method 2 – Using the HMI Port and Commissioning Tool

Add devices using the HMI port, and then upload the field panel database to Commissioning Tool (CT). CT will then learn the applications. See Appendix C – Adding Applications Using the HMI Port and Commissioning Tool [→ 70] for the steps.

Adding the Required Points and Devices



NOTE:

The field panel must be made ready for communications to occur.



NOTE:

If adding required points online at the HMI port, the BACnet Driver must be manually made ready. For more information, see the Making the Driver Ready [→ 90] section. If downloading from Commissioning Tool (CT), this occurs automatically.

It is recommended to start up the driver with a minimum database (required points only) to establish communications. This will assist in pinpointing the source of start-up problems. Once communication has been established, the remainder of the database can be added.

Table 24:

Rev. No.	Required Points and Devices	
All	To see the TX and RX LEDs flashing	Per driver, add: <ul style="list-style-type: none"> One TEC per BACnet Driver device. Additional points as described in the vendor-specific application notes.

Making the Driver Ready

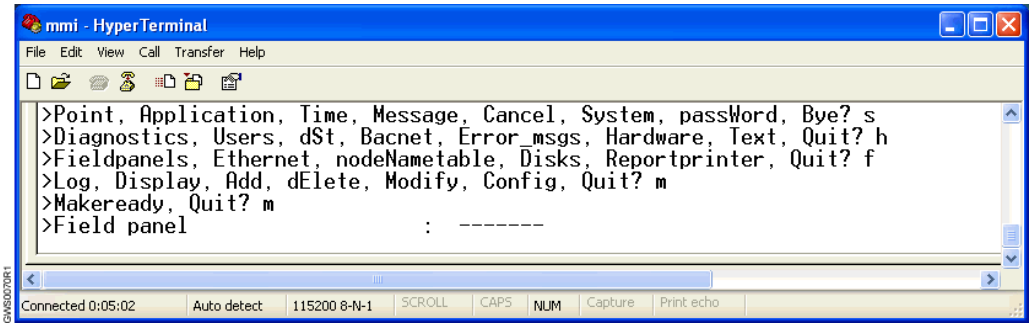


CAUTION

Using the Makeready command when the field panel is connected to the Desigo CC management station may cause firmware downloads to fail.
Use the Makeready command only if the field panel is stand-alone (not connected to a mass storage device, such as a Desigo CC management station).

1. To make the driver ready, type the following sequence at the HMI:
S, H, F, M, M (System, Hardware, Fieldpanels, Modify, Makeready)
2. Enter the field panel number and press **ENTER**.

Example with Firmware Revision 3.x



Checking Communications

1. Verify that the RUN LED on the front of the PXC Series is on solid (steadily lit). If not, the PXC Series is malfunctioning.
2. If an Expansion Module is being used, verify the following:
 - The TX and RX LEDs on the Expansion Module flash while the PXC Series transmits data.
 - The RX LED on the Expansion Module flashes while the PXC Series receives data from the BACnet system. This sequence repeats in quick succession.
3. Verify that communications have been established by displaying a Point Log and verifying that points contain the expected values.

Displaying a Point Log

To display a Point Log, complete the following steps in terminal mode:

HMI	P, L (Point, Log)	
-----	-------------------	--

Prompt/Field	Option/Entry	Description
Point name	Press ENTER	All points
	Type that point name.	A particular point
	Type that point name, including wildcard characters.	A range of points
	Type ?, and then type a number from the list.	A point using a query

The field panel displays a Point Log report.

Adding Remaining Devices

1. Once communications have been verified, add the remainder of the devices from System Profile by dragging and choosing the correct application number from the list in the **Add TEC** dialog box.
2. Auto-unbundle any additional points required for these devices.

Commissioning the System

Consult as needed with the BACnet representative and the building engineer to make sure that the driver is providing accurate information and is performing the intended functions. In particular, verify that:

- The driver database is loaded.
- All lines of PPCL execute as intended.
- All LAO and LDO points commanded at the driver are confirmed at the BACnet system.
- Values read by the driver for LAI and LDI point COVs at the BACnet system are confirmed at the driver.
- Alarmable points correctly transmit alarm information.
- Any other functions that the driver is to perform are carried out as intended.

If any of the tests do not check out, see the *Knowlix Troubleshooting Tool*. For more information, contact Technical Support.

Migrating the Driver Database to the Desigo CC System



NOTE:

The driver database must be commissioned with Commissioning Tool in either Online or Offline Mode. Currently, Desigo CC cannot be used to create the driver database.

This procedure migrates the BACnet Driver database to the Desigo CC system by using auto discovery. If you prefer to use SiB-X to migrate the database, follow the instructions in the *Desigo™ CC APOGEE BACnet Systems Integration Guide* (A6V10376174).

1. From the Desigo CC management station, launch the BACnet Object Browser from Windows. Select **Start > All Programs > Desigo CC > Tools > BACnet Browser**.
2. Once the BACnet Object Browser opens, verify that the BACnet Driver is present in the System Tree.
3. In System Manager, select **BACnet Network** and then the **Operation** tab. Verify that the field panel is online and communicating on the BACnet network. For more information, see the following Figure.
4. Set your network filters using the information in the *BACnet Network* section of the *Field Networks* chapter in the *Desigo™ CC Engineering Manual* (A6V10376170).
5. Save the network filter settings.
 - ⇒ The Desigo CC management station imports the BACnet Driver database, and the driver hardware and related BACnet objects become accessible in System Browser.
6. In the Operation section of the System Browser, verify the BACnet Driver status is displayed as follows:
 - The Online operation is Connected.
 - The System Status operation is Operational.For more information, see the following Figure.

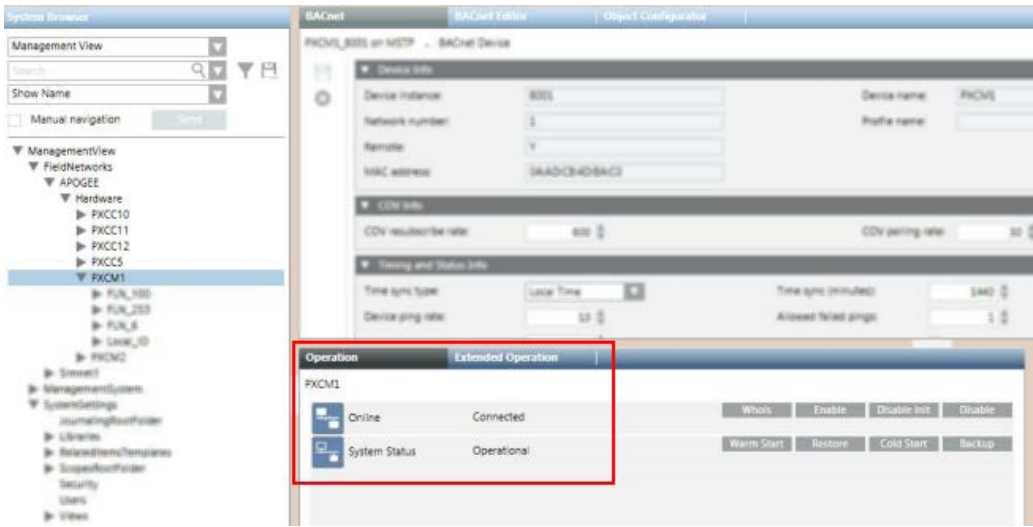


Figure 20: Verifying the Driver Operation.

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