

## PolyGard® Communication Module BacNET-05 for DGC-05 System

### DESCRIPTION

This Module is used to transport values from Gas measuring systems or gas Sensors to BMS or PLC systems, which are able to be connected via Ethernet to a BACnet/IP-network.

### APPLICATION

The BC-05 Communication Module is used in the DGC-05 system as Interface module. One BC Module is obligatory per system.

The connection to each local DGC System must be within specified limits.

If all electrical wires for bus and power are connected correctly, communication from DGC to BacNET Side will start working.

There is no additional work to do, because the BacNET Host automatically detect the connected parts, such as sensors and relay modules with digital and analogue outputs do.

These modules have been developed per ANSI /ASRAE Norm 135-2001\_BACNET-A- Data Communication protocol for Building Automation and Control Networks.

The used data link layer is the same as specified in Annex J- named BacNet /IP.

#### On BacNet side user has to do:

- use correct static IP address on IP Side or use DHCP
- use Correct BacNET ID Number
- take the EPICS (Electronic Protocol Implementation Conformance Statement) from this module to implement it on BMS side



## TECHNICAL DATA

### Electrical

Power supply	24 VDC (16 VDC to 30 VDC)
Power consumption	0,7 W, 50 mA
Fieldbus current	Max. 1,0 A
Over-voltage protection	Max. 35 V
Reverse polarity protection	Max. 30 V

### DGC5 side

Signal repeater bi-directional	Max. 900 m /2700 ft. segment length
--------------------------------	-------------------------------------

### BacNet side

Ethernet requirements	Max. 100 m /300 ft. per segment length
-----------------------	--

### Environmental conditions

Humidity	15 – 95 % RH non condensing
Working temperature	-10 °C to + 70 °C (14 °F to 158 °F)
Storage temperature	0 °C to + 50 °C (32 °F to 122 °F)

### Physical

Enclosure	Plastic housing ABS
Colour	RAL 7035
Protection class	IP 40
Weight	0,1 kg (0.2 lbs.)
Installation	Top hat rail installation
Connection	Spring type: 0,5, to 1,5 mm <sup>2</sup> (AWG 22 to 16)
Dimensions (W x H x D)	36 x 86 x 56 mm (1.4 x 3.4 x 2.2 in.)

### Physical (housing incl. power supply unit / field installation)

Enclosure	
Colour	Plastic housing ABS
Protection class	RAL 7035
Weight	IP 55
Installation	1,5 kg (3.2 lbs.)
Dimensions (W x H x D)	Wall / ceiling installation
<b>Power supply unit for field installation</b>	200 x 250 x 100 mm (7.9 x 9.8 x 3.9 in.)
Power supply	110/230 VAC 50/60Hz
Secondary	24 VDC, 4,5 A max., overload and short-circuit proof

### Guidelines

EMC Directives 89/336/EEC;  
Low voltage directive 73/23/EEC

### Warranty

1 year on material

## ORDERING INFORMATION

### DGC-Bac-x5-000

Bac-05 Connector Module

XX-BAC-XX-XXXX.X

#### Options

BXXX.X Housing  
BPS1.5 Housing incl. 24 VAC to DC 1.5 A  
Power supply

#### Software Versions

C5-BAC-B1 DGC max 98 Bus Sensors  
C5-BAC-B2 DGC max 48 Bus + 48 analogue Sensors  
C2-BAC-B MGC max 98 analogue Sensors  
T5-BAC-B1 without Controller max. 98 Bus Sensors  
T5-BAC-B2 without Controller max. 48 Bus + 48  
analogue Sensors

**Example:** Module for field installation to a DGC5 Controller with only 98 Bus Sensors

**Order number:** C5-BAC-B1-00-XXXX.X

## WIRING CONNECTION

If all electrical wires for bus and power are connected correctly, communication from DGC to BacNET Side will start working. There is no additional work to do, because the BacNET Host automatically find the connected parts, such as sensors and relay modules with digital and analogue outputs.

The modules have been developed as per ANSI /ASRAE Norm 135-2001\_BACNET-A- Data Communication protocol for Building Automation and Control Networks.

The used data link layer is the same as specified in Annex J- named BacNET /IP.

## TYPE DESCRIPTION

### Available Properties

Property	Value	Is Writable
Object_Identifier	configured at install-time (unique internetwork-wide)	-
Object_Name	configured at install-time (unique internetwork-wide)	-
Location	configured at install-time (optional)	-
Description	configured at install-time (optional)	-
Vendor_Name	download	-
Vendor_Identifier	download	-
Model_Name	download	-
Firmware_Revision	download	-
Application_Software_Version	download	-
Object_Type	DEVICE	-
System_Status	OPERATIONAL	-
APDU_Timeout	3 sec (download?)	-
Number_Of_APDU_Retries	3 (download?)	-
Protocol_Version	1	-
Protocol_Revision	1	-
Protocol_Services_Supported	{ READ-PROPERTY, WRITE-PROPERTY, WHO-IS, I-AM }	-
Protocol_Object_Types_Supported	{ DEVICE, AI, AO, AV, BI, BO, BV, MSI, MSO, MSV }	-
Object_List	based on downloaded configuration	-
Max_APDU_Length_Accepted	1024	-
Segmentation_Supported	FALSE	-
Device_Address_Binding	empty	-
Database_Revision	download	-

### Not Available Properties

The following optional properties are not present: Max\_Segments\_Accepted, VT\_Classes\_Supported, Active\_VT\_Sessions, Local\_Time, Local\_Date, UTC\_Offset, Daylight\_Savings\_Status, APDU\_Segment\_Timeout, List\_Of\_Session\_Keys, Time\_Synchronization\_Recipients, Max\_Master, Max\_Info\_Frames, Configuration\_Files, Last\_Restore\_Time, Backup\_Failure\_Timeout, Active\_COV\_Subscriptions, Slave\_Proxy\_Enable, Manual\_Slave\_Address\_Binding, Auto\_Slave\_Discovery, Slave\_Address\_Binding, Profile\_Name.

### Static Properties

The Parameters were downloaded by DGC5-Bacnet-Interface-Manufacturer

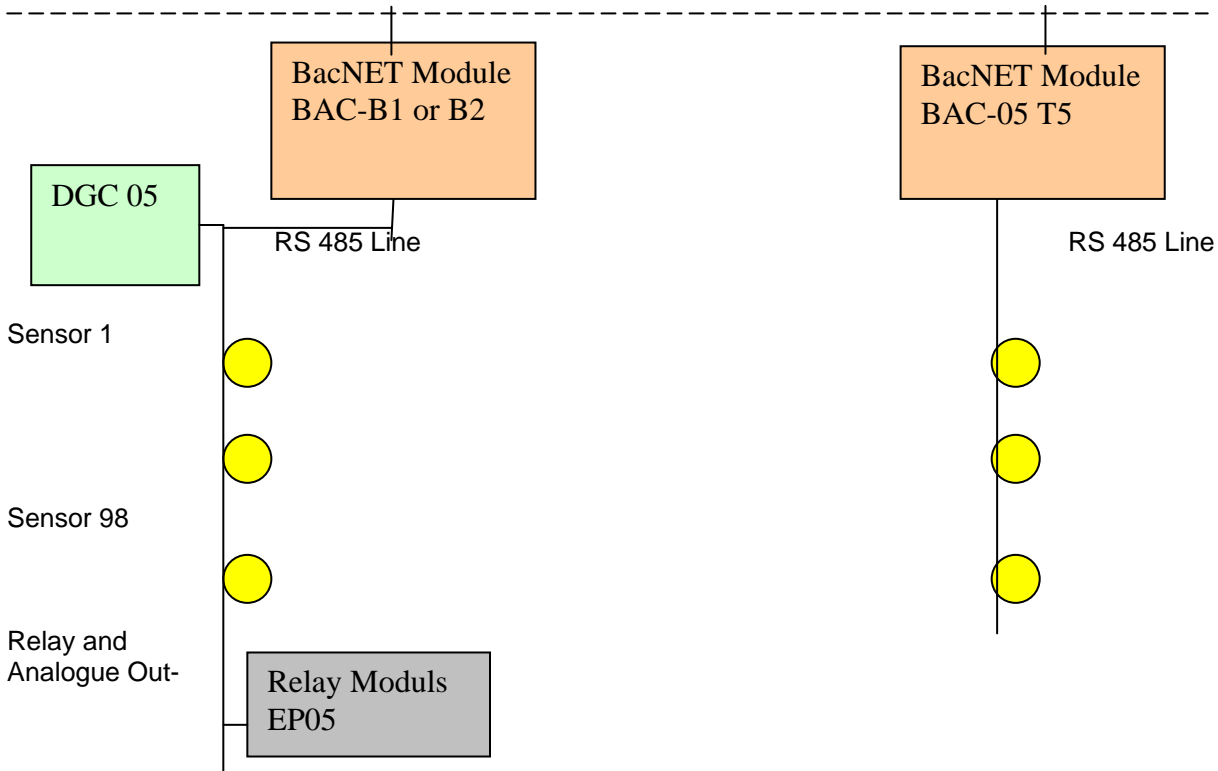
Device	
Property	Value
Vendor Name	MSR-Electronic
Vendor ID	60368
Model Name	DT5-Bacnet
Firmware Revision	Bac1-1
Application Software Version	1-001
Database Revision	1

## DEVELOPMENT

Each DGC unit is connected to the sensors and output module via its own bus system. At this local bus structure the converter to Bacnet picks all Information from the system.

Each gas-Controller DGC is connected to its bus sensors and output Modules over separate bus-system (RS485 bases with power supply within the same cable). At this point, Bacnet-station will also be connected to this LAN (Local Area Network), to get all information about the connected DGC stations.

TCP/IP Line to BMS with Protocoll BacNET - ISO 16484-5



## SOFTWARE INTERFACE DESCRIPTION

### Bacnet Profile

**DGC05-Bacnet-Interface** supports functions that fit the BACnet profile called an "Application Specific Controller" (B-ASC).

### Bacnet Services

**DGC05-Bacnet-Interface** supports the following BACnet protocol services:

1. **Who-Is (Execute)** Upon receipt of a Who-Is request, EasyBAC initiates an I-Am request, as appropriate, using Device object's properties values for service request parameters.
2. **I-Am (Initiate)** **DGC05-Bacnet-Interface** initiates I-Am requests filled with Device object's properties values in the following situations:
  - at start-up
  - upon receipt of a Who-Is request

**ReadProperty (Execute)** all properties present in the Object Database are readable. Upon receipt of a Read Property request, **DGC05-Bacnet-Interface** performs request validation and sends back an acknowledgement, as defined by the BACnet standard. In case of a success.

**DGC05-Bacnet-Interface** sends back to the BACnet network positive acknowledgement (ReadProperty-ACK) containing current value of the requested property from the BACnet Object Database. In case of a failure, **DGC05-Bacnet-Interface** sends negative acknowledgement (BACnet-Error) with appropriate BACnet error class and error code.

Current value of a property in the Database may originate from:

- DGC05-Bacnet-side
- DGC05-Controller
- Another BACnet device (set by means of a WriteProperty BACnet service request)

**WriteProperty (Execute)** Most of the properties in the BACnet Object Database are not writeable and cannot be changed by means of a WriteProperty service request. See Object Types Supported for complete list of writeable properties in each supported object type.

Upon receipt of a valid WriteProperty request, **DGC05-Bacnet-Interface** writes to the Virtual Object Database specified value of the specified property of the specified object and sends back to the BACnet network positive acknowledgement, as defined by the BACnet standard. In case of a failure

**DGC05-Bacnet-Interface** sends negative acknowledgement.

If the property being written is Present value or Relinquish default, and the object in question is not out of service (see Handling out Of Service Property), new property value is sent to the **DGC05-Controller**. FB: Output Property serial message is sent a synchronously and may be sent to the microprocessor either after or before BACnet acknowledgement is actually sent over the BACnet network.

**DGC05-Bacnet-Interface** WriteProperty handler performs basic request validity checks, such as existence of the object specified, existence and write ability of the property specified. Standard-mandated BACnet logic is also implemented: see handling Command Priorities and Out\_Of\_Service handling.

However, application-level checks, such as checking Present\_Value against device-specific bounds, are not performed.

## BACnet BIBBs supported

The BACnet standard defines a concept called **BIBBs** (BacNET Interoperability Building Blocks). A BIBB is a simple definition of a specific set of BacNET features that must be implemented by a device to support that BIBB.

The **DGC05-Bacnet-Interface** is capable of performing the functionality of the following BIBBs:

- **DS-RP-B** that means **DS** (data sharing), **RP** (read property), **B** (Server device)
- **DS-WP-B** that means **DS** (data sharing), **WP** (write property), **B** (Server device)
- **DM-DDB-B** that means **DM** (device management), **DDB** (Dynamic Device Binding), **B** (Server device)  
The "DDB" description means that this device can find another device on the network.

This set of BIBBs matches the **BACnet B-ASC profile** (without support for Who-Has/I-Have and DCC - Device Communications Control)

## Reliability property handling

**DGC05-Bacnet-Interface** checks all possible **DGC05 –Bus-Nodes** for his correct functionality. If a **Sensor- or Relay Module is not available, damaged or not activated**: Input property with property ID set to Reliability **DGC05-Bacnet-Interface** automatically updates FAULT flag in the Status Flags property in the BACnet Object Database: sets it if new Reliability value is not equal to NO\_FAULT\_DETECTED, and clears it otherwise.

## Object Types supported

The Version B1.2 will support this objects:

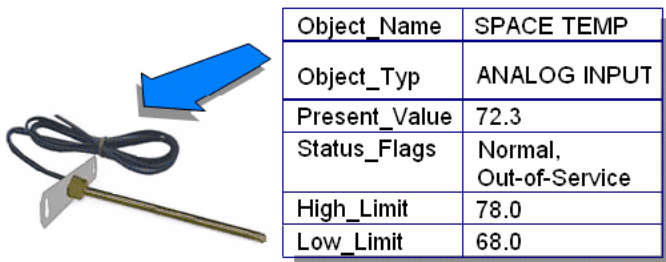
- Device Object
- Analogue Input 1 to 98 - reflecting actual CO Gas Sensor Value –Adr.1 to 98
- Analogue Value 1 to 12 - reflecting actual Min/Max/Av Signal of the Controller
- Binary Input 1 to 30 - reflecting actual Relay Status Signal of the Controller

The Version B2.2 will support this objects:

- Device Object
- Analogue input 1, 3, 5..95 - reflecting act. **internal** CO Gas Sensor Value Bus-Adr1 to 48
- Analogue input 2, 4, 6..96 - reflecting act. **external** CO Gas Sensor Value Bus-Adr1 to 48
- Analogue Value 1 to 12 - reflecting actual Min/Max/Av Signal of the Controller
- Binary Input 1 to 30 - reflecting actual Relay Status Signal of the Controller

Every object has a set of "Properties". These describe the parameters within an object and their current status. Here is an example of the properties of a temperature sensor:

Every product that communicates over BACnet must have a "Device Object" which includes identification information and a summary of the capabilities that are available to other devices on the network.



Object_Name	SPACE TEMP
Object_Typ	ANALOG INPUT
Present_Value	72.3
Status_Flags	Normal, Out-of-Service
High_Limit	78.0
Low_Limit	68.0

The Object\_Identifier property must be unique across the entire BACnet network connection.

## Device Object

Device Object reflects Information about Manufacturer and Version.

## Available Properties

Property	Value	Is Writable
Object_Identifier	configured at install-time (unique internetwork-wide)	-
Object_Name	configured at install-time (unique internetwork-wide)	-
Location	configured at install-time (optional)	-
Description	configured at install-time (optional)	-
Vendor_Name	download	-
Vendor_Identifier	download	-
Model_Name	download	-
Firmware_Revision	download	-
Application_Software_Version	download	-
Object_Type	DEVICE	-
System_Status	OPERATIONAL	-
APDU_Timeout	3 sec (download?)	-
Number_Of_APDU_Retries	3 (download?)	-
Protocol_Version	1	-
Protocol_Revision	1	-
Protocol_Services_Supported	{ READ-PROPERTY, WRITE-PROPERTY, WHO-IS, I-AM }	-
Protocol_Object_Types_Supported	{ DEVICE, AI, AO, AV, BI, BO, BV, MSI, MSO, MSV }	-
Object_List	based on downloaded configuration	-
Max_APDU_Length_Accepted	1024	-
Segmentation_Supported	FALSE	-
Device_Address_Binding	empty	-
Database_Revision	download	-

## Not Available Properties

The following optional properties are not present: Max\_Segments\_Accepted, VT\_Classes\_Supported, Active\_VT\_Sessions, Local\_Time, Local\_Date, UTC\_Offset, Daylight\_Savings\_Status, APDU\_Segment\_Timeout, List\_Of\_Session\_Keys, Time\_Synchronization\_Recipients, Max\_Master, Max\_Info\_Frames, Configuration\_Files, Last\_Restore\_Time, Backup\_Failure\_Timeout, Active\_COV\_Subscriptions, Slave\_Proxy\_Enable, Manual\_Slave\_Address\_Binding, Auto\_Slave\_Discovery, Slave\_Address\_Binding, Profile\_Name.

## Static Properties

These Parameters are downloaded by DGC5-Bacnet-Interface-Manufacturer

Device	
Property	Value
Vendor Name	MSR-Electronic
Vendor ID	60368
Model Name	DT5-Bacnet
Firmware Revision	Bac1-1
Application Software Version	1-001
Database Revision	1

## Dynamic Properties

### Analogue Input Object 1 to 98

#### Available Properties:

Property	Value	Is Writable
Object_Identifier	download (unique device-wide)	-
Object_Name	download (unique device-wide)	-
Units	download	-
Description	download	-
Device_Type	download	-
Min_Pres_Value	download	-
Max_Pres_Value	download	-
Resolution	download	-
Object_Type	ANALOG-INPUT	-
Present_Value	variable (initial value is 0.0)	-
Status_Flags	{ 0, 0, 0, 0 }	-
Event_State	NORMAL	-
Out_Of_Service	FALSE	Yes
Reliability	No_Fault_Detected	-

## Not Available Properties:

The following optional properties are not present: Update\_Interval, COV\_Increment, Time\_Delay, Notification\_Class, High\_Limit, Low\_Limit, Deadband, Limit\_Enable, Event\_Enable, Acked\_Transitions, Notify\_Type, Event\_Time\_Stamps, Profile\_Name.

## Static Properties:

These Parameters are downloaded by DGC5-Bacnet-Interface-Manufacturer

Property Name	Property Value
description	Carbon Monoxide Sensor
device-type	DT05-v2
event-state	normal (0)
max-pres-value	250
min-pres-value	0
object-identifier	(analog-input.3)
object-name	Gas Concentration
object-type	analog-input (0)
out-of-service	F
present-value	128.825
reliability	no-fault-detected (0)
resolution	0.1
status-flags	(F,F,F,F) ()
units	parts-per-million (96)

## Dynamic Properties:

This Analogue Input Object reflects the Current Value Information from Digital Bus Gas Sensors 1 to 98 in the Field.

During Normal Operation Properties

- **Present value** and
- **Status Flags**

updated by DT05 Controller.

present-value	128.825
reliability	no-fault-detected (0)
resolution	0.1
status-flags	(F,F,F,F) ()

## Analogue Value Object 1 to 12

### Available Properties

Property	Value	Is Writable
Object_Identifier	download (unique device-wide)	-
Object_Name	download (unique device-wide)	-
Units	download	-
Relinquish_Default 1)	download	Yes
Description	download	-
Object_Type	ANALOG-VALUE	-
Present_Value	variable	Optionally2)
Priority_Array 1)	variable (initial value is all NULLs)	-
Status_Flags	{ 0, 0, 0, 0 }	-
Event_State	NORMAL	-
Out_Of_Service	FALSE	Yes
Reliability	No_Fault_Detected	-

## Not Available Properties

The following optional properties are not present: COV\_Increment, Time\_Delay, Notification\_Class, High\_Limit, Low\_Limit, Deadband, Limit\_Enable, Event\_Enable, Acked\_Transitions, Notify\_Type, Event\_Time\_Stamps, Profile\_Name.

## Static Properties:

Property Name	Property Value
description	CO Gas Concentration per Zone
event-state	normal (0)
object-identifier	{analog-value,1}
object-name	DT05 Analog -MIN/MAX/AV
object-type	analog-value (2)
units	parts-per-million (96)

## Dynamic Properties:

This Analogue Value object reflects the actual value Information from Relay- and analogue Out Module 1 to 6 in the Field or in the Controller.

Each Module 1 to 2 analogue- Outputs with 4-20mA signal.

So a maximum Number of 12 signals are available.

Per Software Select in the DGC5 Controller-menu Each analogue- Output can be the Signal of Minimum-Value or Maximum-Value or Average-Value of a individual set of sensor signals- also selectable per software.

During Normal operation Properties

- **Present value** and
- **Status flags**

are updated by DT05 Controller.

out-of-service	F
present-value	126.2
reliability	no-fault-detected (0)
status-flags	{F,F,F,F} (0)

## Binary Input Object 1 to 30

### Available Properties

Property	Value	Is Writable
Object_Identifier	download (unique device-wide)	-
Object_Name	download (unique device-wide)	-
Polarity	download	-
Description	download	-
Device_Type	download	-
Inactive_Text	download	-
Active_Text	download	-
Object_Type	BINARY-INPUT	-
Present_Value	variable (initial value is INACTIVE)	-
Status_Flags	{ 0, 0, 0, 0 }	-
Event_State	NORMAL	-
Out_Of_Service	FALSE	Yes
Reliability	No_Fault_Detected	-

## Not Available Properties

The following optional properties are not present: Change Of State Time, Change of State Count, Time Of State Count Reset, Elapsed Active Time, Time of Active Time Reset, Time Delay, Notification Class, Alarm Value, Event Enable, Acked Transitions, Notify Type, Event Time Stamps, Profile Name.

## Static Properties

Binary Input, 1 (Read-only)	
Property	Value
Instance Number	1
Object Name	Relais 1
Polarity	NORMAL
Description	OUTPUT STAGE
Device Type	DT05-v2
Inactive Text	RELAIS 1 OFF
Active Text	RELAIS 1 ON

## Dynamic Properties

This Binary Input object reflects the Relay Status Information from Relay- and analogue Out Module 1 to 6 in the Field or in the Controller.

Each Module 1 to 5 Relay- Outputs.

So a maximum Number of 30 Relay Information bits are available as Input on the BacNet side.

Per Software Select in the DGC5 Controller-Menu each Relay is software addressable from each sensor-alarm output.

During Normal operation Properties

- **Present Value** and
- **Status Flags**

present-value	active (1)
reliability	no-fault-detected (0)
status-flags	(F,F,F,F) (0)

are updated by DT05 Controller.

## Integration - what's to do from the users side

The following screens are available at all times but the **DGC05-Bacnet-Interface** is not a completely "stand-alone" product until the Virtual Objects file has been downloaded by DT05-Manufacturer according to the version of DGC05 Controller.

**IMPORTANT: This is what an end-user (or installation) person does.**

3.1 Installing TCP/IP Network Node into End-User-Network.

Connect your computer DIRECTLY (over Switch or HUB) to the **DGC05-Bacnet-Interface** TCP/IP Connector in Top of the Interface Module - with no other network devices attached (an isolated network). Either set your computers network connections to Automatic IP Address (**DHCP**), or set your computers IP address to 192.168.88.90 (subnet mask of 255.255.255.0)

Restart the EasyBAC interface (or module) by cycling the power off and then on again.

Open a browser window and insert the correct url: <http://192.168.1.123/admin>

- other TCP/IP Adresses are noted as stricker onto the modul

The default user name / password "**admin**" and "**admin**" (without the quotes).

BACnet Device																
Home	<p><b>BACnet/IP Settings</b></p> <p>This page allows you to view current BACnet/IP settings, to change them or to restore them to factory defaults.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Parameter</th> <th style="width: 30%;">Value</th> <th style="width: 45%;">Description</th> </tr> </thead> <tbody> <tr> <td>IP</td> <td><input type="text" value="192.168.xx.xx"/></td> <td>IP address of the BACnet device.</td> </tr> <tr> <td>Network Mask</td> <td><input type="text" value="255.255.255.0"/></td> <td>IP subnet mask.</td> </tr> <tr> <td>Default Gateway</td> <td><input type="text" value="192.168.xx.xx"/></td> <td>IP address of the default gateway.</td> </tr> <tr> <td>UDP Port</td> <td><input type="text" value="47808"/></td> <td>BACnet/IP UDP port number.</td> </tr> </tbody> </table> <p style="text-align: center;"> <input type="button" value="Save"/> <input type="button" value="Reset"/> <input type="button" value="Defaults"/> </p>	Parameter	Value	Description	IP	<input type="text" value="192.168.xx.xx"/>	IP address of the BACnet device.	Network Mask	<input type="text" value="255.255.255.0"/>	IP subnet mask.	Default Gateway	<input type="text" value="192.168.xx.xx"/>	IP address of the default gateway.	UDP Port	<input type="text" value="47808"/>	BACnet/IP UDP port number.
Parameter	Value	Description														
IP	<input type="text" value="192.168.xx.xx"/>	IP address of the BACnet device.														
Network Mask	<input type="text" value="255.255.255.0"/>	IP subnet mask.														
Default Gateway	<input type="text" value="192.168.xx.xx"/>	IP address of the default gateway.														
UDP Port	<input type="text" value="47808"/>	BACnet/IP UDP port number.														
BACnet/IP Settings																
BACnet Device Settings																
Restore Defaults																
Change Password																
Activate Configuration																

Now Change IP address to your address, it should be in your network.  
 Now Change Default Gateway to your address, it should be in your network.

**IMPORTANT: Make sure that you remember any changes made here.**

You can now reconfigure these settings according to your network requirements. Make sure that you press SAVE on every screen where you make changes. The BACnet Device Settings screen looks like this:

BACnet Device																
Home	<p><b>BACnet Device Settings</b></p> <p>This page allows you to view current BACnet Device settings, to change them or to restore them to factory defaults.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Parameter</th> <th style="width: 30%;">Value</th> <th style="width: 45%;">Description</th> </tr> </thead> <tbody> <tr> <td>Device ID:</td> <td><input type="text" value="1"/></td> <td>BACnet Device Instance Number.</td> </tr> <tr> <td>Object Name:</td> <td><input type="text"/></td> <td>Value of the Device's Object_Name property.</td> </tr> <tr> <td>Description:</td> <td><input type="text"/></td> <td>Value of the Device's Device_Description property.</td> </tr> <tr> <td>Location:</td> <td><input type="text"/></td> <td>Value of the Device's Device_Location property.</td> </tr> </tbody> </table> <p style="text-align: center;"> <input type="button" value="Save"/> <input type="button" value="Reset"/> <input type="button" value="Defaults"/> </p>	Parameter	Value	Description	Device ID:	<input type="text" value="1"/>	BACnet Device Instance Number.	Object Name:	<input type="text"/>	Value of the Device's Object_Name property.	Description:	<input type="text"/>	Value of the Device's Device_Description property.	Location:	<input type="text"/>	Value of the Device's Device_Location property.
Parameter	Value	Description														
Device ID:	<input type="text" value="1"/>	BACnet Device Instance Number.														
Object Name:	<input type="text"/>	Value of the Device's Object_Name property.														
Description:	<input type="text"/>	Value of the Device's Device_Description property.														
Location:	<input type="text"/>	Value of the Device's Device_Location property.														
BACnet/IP Settings																
BACnet Device Settings																
Restore Defaults																
Change Password																
Activate Configuration																

**NOTE:** The **Device ID** must be unique on the entire BACnet internetwork.

If you will use more than one DT5- BACnet -Interfaces- you must use a unique Number on each Node.

The Restore Defaults and Change Password screens are very simplistic. When you select Activate

Configuration, it will ask you if you want to SAVE your settings. This will then store your new settings and re-boot automatically.

## General Information

### 4.1 Links to BACnet Resources

Here is where you can purchase a copy of the BACnet standard:

[ASHRAE BACnet Standard 135-2004](#) - or the crazy long URL is this:

<http://resourcecenter.ashrae.org/store/ashrae/newstore.cgi?itemid=22170&view=item&page=1&loginid=5193944&priority=cat311egory&words=135-2004&method=and&>

This is available in as a hard-copy , CD-ROM, or download.

[BACnet.org](#) - The official ASHRAE BACnet web site.

[BACnet International](#) - A group of manufacturers who promote the use of BACnet.

[BACnet Testing Lab](#) - The organization that tests BACnet devices for conformance to the standard...

[BACnet - European Interest Group](#) - The European group which promotes the use of BACnet and holds regular training conferences in Europe.

[BACnet FAQ](#) - A good frequently asked questions page on the [www.bacnet.org](http://www.bacnet.org) web site.

### Available additional Automation Tools for BACnet Side

- BACnet OPC Server - Control BACnet devices with any OPC workstation.
- BACnet Explorer - Auto discovery of devices and status on existing BACnet networks.
- BACtiveX - ActiveX software for writing custom BACnet control programs.
- BACstac series - BACnet Windows and embedded protocol stacks for manufacturers.
- BAS-o-matic - A powerful protocol analyzer for **building automation** protocols.
- Indy/A - A powerful protocol analyzer for **industrial automation** protocols.