SIEMENS

GAMMA instabus

Technical Product Information

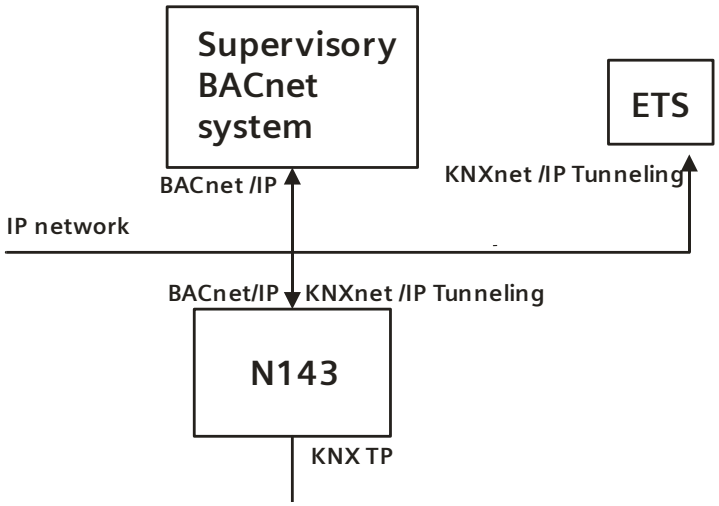
June 2022

IP Gateway KNX/BACnet N143	**5WG1143-1AB01**

Product and Application Description

The device serves as an interface between KNX and BACnet. The parameterized KNX communication objects are translated as BACnet objects and can thus communicate into the BACnet world.
BACnet clients can either log in via a so-called COV subscription and are automatically informed about KNX events, or they use the Read Property service to query the status of the objects as required.

Example of operation



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A6V10466141 RS-AC

Update
http://www.siemens.com/gamma-td

IP Gateway KNX/BACnet N143	**5WG1143-1AB01**

The device provides up to 250 communication objects. Via these objects KNX functions (group addresses) are transposed to BACnet objects.

The communication objects can be configured optionally as:

Length	Type	Datapoint type	Description / Unit
1 bit		1.*	Binary (on/off, true/false, 1/0, ...)
1 Byte	unsigned	5.001	Percentage (0...100 %)
		5.010	Counter pulses
		5.004	Percentage (0...255 %)
		17.001	Scene number
		18.001	Scene control
	signed	6.010	Counter pulses
		6.001	Percentage (-128...127 %)
2 Byte	unsigned	7.001	Pulses
		7.013	Brightness lux
	signed	8.001	Pulses difference
	Float	9.*	Float value
		9.001	Temperature °C
		9.001	Temperature °F (KNX value in °C)
		9.006	Pressure hPa (KNX value in Pa)
		9.006	Pressure Pa
		9.024	Power kW
		9.022	Power density W/m²
		9.005	Speed m/s
		9.005	Speed km/h (KNX value in m/s)
		9.004	Brightness lux
		9.007	Humidity %
		9.010	Time s
		9.021	Current A (KNX value in mA)
		9.021	Current mA
		9.020	Voltage V (KNX value in mV)
		9.020	Voltage mV
		9.008	Parts/million ppm
		9.009	Flow rate m³/h
		9.027	Temperature °F
4 Byte	Unsigned	12.001	Counter pulses
	Signed value	13.001	Counter pulses
		13.010	Active energy Wh
		13.013	Active energy kWh
		13.002	Flow rate m³/h
	Float	14.*	Float value
		14.068	Temperature °C

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IP Gateway KNX/BACnet N143	**5WG1143-1AB01**

Length	Type	Datapoint type	Description / Unit
		14.068	Temperature °F (KNX value in °C)
		14.058	Pressure hPa (KNX value in Pa)
		14.058	Pressure Pa
		14.056	Power W
		14.056	Power kW (KNX value in W)
		14.031	Energy J
		14.031	Energy kWh (KNX value in J)
		14.033	Frequency Hz
		14.010	Area m²

The device is configured entirely with ETS.

The configuration of the KNX communication objects automatically generates the corresponding BACnet objects. The following BACnet objects are being used:

- Binary Input
- Binary Output
- Binary Value
- Analog Input
- Analog Output
- Analog Value

No special knowledge about BACnet is required for the commissioning.

The KNX objects configured with ETS are automatically "translated" by the device into BACnet objects according to the following process:

The BACnet object instance number is identical to the object number of the ETS. Objects with a 1 bit datapoint type are translated into "binary" objects. All others become "analog" objects. The parameter "Object Mode" (INPUT, OUTPUT, VALUE) completes the transformation to a BACnet object.

On BACnet the device appears as an Application Specific Controller (B-ASC) with up to 250 BACnet objects. BACnet clients may set up to 455 BACnet change-of-value (COV) subscriptions for these 250 BACnet objects.
A common memory space is available for the administration of the COV subscriptions and priority arrays. This resource optimization is because subscriptions are required for objects which send from KNX to BACnet whilst priority arrays are for objects sending from BACnet to KNX.

The maximum number of possible subscriptions is 455 if no priority arrays are used.
As each priority array has a size of 64 Byte (16 priority levels of 4 Byte each), the number of possible subscriptions decreases accordingly. The maximum possible number of subscriptions is displayed on the device website once the configuration is complete.

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When a subscription is registered the BACnet object sends its current value, if a value is available for this object. The validity of a value can be verified via the status property (Failure flag). Initially, the status failure flag for the object type Binary Input, Binary Value, Analog Input and Analog Value is set to TRUE. Once a value is transmitted from the KNX bus or from BACnet (for Binary Value or Analog Value) this status flag is set to FALSE.
When using a Priority Array with all Priority Array positions released then the last received KNX value is sent as "relinquish default", if the value is valid.

All Analog and Binary BACnet objects supported by the device support the writeable Out-Of-Service property. When this property is set to TRUE, the communication of the respective object with KNX is inhibited. Values of Input objects can then be changed from the BACnet side, which otherwise would not be possible. Value changes of objects with set Out-Of-Service property are also indicated via the object status flag Overridden. The Out-Of-Service flag handling is especially important for finding errors in complex systems.

When the description of an object is requested from the BACnet side (ReadProperty "Description"), the description text is automatically generated and assembled from the object name, BACnet identifier and KNX group address data separated by a colon (":").

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Integrated Webserver
The device is equipped with a web server presenting the configuration and current values in an overview page. This presentation is helpful for testing purposes and for documentation of the interface between KNX and BACnet.

Note

The web server is disabled in the ETS parameters for security reasons. To use it, it must first be activated by a corresponding ETS parameter under "Options".

The web page contains a header section showing general device specific information:

- Device name
- Device description
- Installation location
- BACnet instance number of the device
- Firmware version
- Physical KNX address
- IP address
- Netmask
- Gateway address
- MAC address
- Number of configured objects
- Maximum number of possible COV subscriptions
- Current number of COV subscriptions
- Number of binary input objects
- Number of binary output objects
- Number of binary value objects
- Number of analog input objects
- Number of analog output objects
- Number of analog value objects
- Device status
- Revision number
- Priority: This displays the priority array, which is used to transmit events from KNX to BACnet

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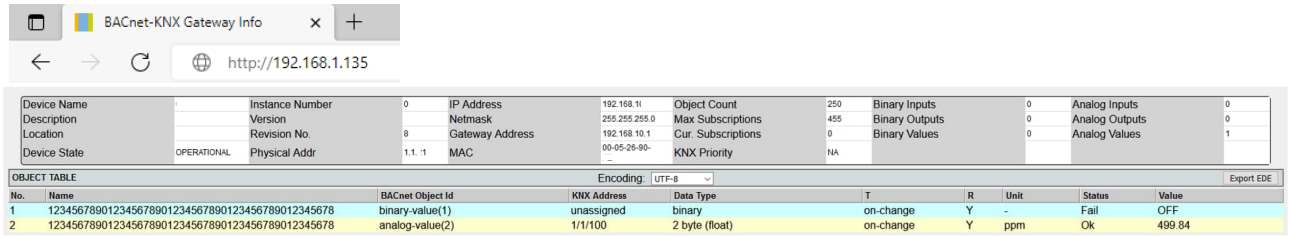

Beneath the header is a table listing all configured objects. The table is divided into the following columns:

- Object number
- Object name
- BACnet object ID
- KNX group address
- Datapoint type
- Transmission mode
- Reading during initialisation
- Unit
- Object value

Object values are not dynamically up-dated on the website. To up-date the objects, please re-load the website.

The revision number increases on every download on ETS.

An EDE (Engineering Data Exchange) list can be exported as csv file format via the button „Export EDE“ on the right side of the web page.

Note

In general, the webpage is coded for the UTF-8 character set. A selection field on the web page allows switching between UTF-8 and ISO 8859-1 encoding.
When ETS is used for configuration then texts (including special characters) are coded dependent on the settings in ETS. The encoding is set in ETS for the project under General - Codepage. The UTF-8 character set should be selected. Texts to be communicated via BACnet are transmitted as entered in ETS.

Integrated KNXnet/IP interface
The device also has a KNXnet/IP interface to enable a connection to the ETS for remote parameterization. This interface can be deactivated via an ETS parameter.
Hint
The KNXnet/IP interface is deactivated in the ETS parameters for security reasons. To use it, it must first be activated by a corresponding ETS parameter under "Options".

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Behavior at bus voltage failure / recovery
Failure of the auxiliary power (DC 24 V) results in a functional failure of the device.
A bus voltage failure results in a functional failure of the device.
On bus voltage recovery the configured actions are executed and, if applicable, new status values are reported.
The device sends "I am" onto BACnet.

Factory default state
In the factory default state, the device has no gateway function.
IP Address: 192.168.1.135
Physical address: 15.15.255
Physical address IP interface 15.15.255

Ports used:

Service	Port	Conditions
FTP/Firmware updates	TCP 20 / TCP 21	Activate possibility of firmware updates = yes
BACnet	UDP 47808	Set via parameter "BACnet Communication Port"
HTTP / Webserver	TCP 80	Activate webserver = yes
DHCP	UDP 68	IP address assignment = DHCP Server
KNXnet/IP	UDP 3671	KNXnet/IP Interface active = yes

Behavior on unloading the application program
When the application program is unloaded with ETS the device does not function.
All BACnet objects are still visible but are set to "out of service".
The property "revision number" in the BACnet Device is incremented by one.
The web server stays in operation.

Resetting the device to factory default settings
To bring the ETS configuration data into the delivery state, a master reset can be performed. To do this, the following steps are necessary:
- Supply the device with 24 V voltage.
- Disconnect the KNX bus from the device.
- Press and hold the programming button for 5 seconds until the Error LED starts flashing.
- If the programming button is still pressed (Error LED flashes), connect the bus to the device.
- Release the programming button.

The device is restarted without ETS data and with the physical address 15.15.255.
Note: The IP address is reset to 192.168.1.135.

Possible further security measures are
- Operate the device only in a secure network environment.
- Set up a separate IP network with its own hardware for BACnet communication.

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- Restrict access to the (BACnet) IP network to an authorized group of people through user IDs and strong passwords.
- Additionally secure remote access to the device via a VPN connection.
- A virtual private network (VPN) establishes an encrypted and authorized connection (VPN tunnel) from a remote location to a network over the Internet. This VPN connection allows for a secure
- and overheard-protected communication between a remote device and the KNX installation.
- If Wi-Fi is used, change the default SSID from the wireless access point. Encrypt the Wi-Fi with a secure procedure (currently e.B. WPA2) and a strong password.
- Document network settings and hand them over to the building owner/operator or the LAN administrator.
- Manage access rights to this BACnet device on an IP network with the appropriate IP network administrator.
- Since the DCC (DeviceCommunicationControl) password is stored in the device, the ETS BCU password must be set to protect this password.
- For security reasons, the FTP port may only be opened for a firmware download and must be closed again after the update.
- For security reasons, the HTTP port may only be opened during troubleshooting and commissioning and must then be closed again.
- The configuration of the device must be backed up. To do this, an ETS BCU password must be set and KNXnet/IP must be deactivated.

Actions after replacing a device on the network

If a BACNET gateway is stolen from a network or replaced due to a defect, the BACnet DCC (DeviceCommunicationControl) password must be changed and a different BAU password must be assigned to the new BACnet gateway.
This is necessary because it cannot be ruled out that the passwords that are in a protected area of the device can be read.

Installation notes

The device may be used for permanent interior installations in dry locations within distribution boards or small casings with DIN rail EN 60715-TH35.

WARNING

- The device must be mounted and commissioned by an authorized electrician.
- The prevailing safety rules must be heeded.
- The device must not be opened.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.

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Technical Data

Network communication
- Ethernet:
  100BaseT (100 Mbit/s)
- Supported Internet Protocols:
  ARP, ICMP, IGMP, UDP/IP, DHCP
- KNXnet/IP according to KNX System Specification:
  Core, Device Management, Tunneling

Rated voltage
- Bus: DC 24 V (DC 21...30V)
- Auxiliary power supply:
  AC 12-24V, DC 12-30V
- Current demand: 40 mA

Power Supply
- Bus voltage: via the bus line
- Operating voltage:
  from external SELV power supply
  AC 24 V / DC 24 V nominal,
  permissible input voltage range:
  AC 12-24 V, DC 12-30 V
- Recommended power supplies:
  - separate safety extra low voltage power supply
  - unchoked power from KNX power supplies N125/x2

Control elements
- 1 learning button:
  for switching between normal operating mode and addressing mode

Display elements
- 1 YELLOW LED: Ethernet Link Signal available (LK)
- 1 RED LED: Status / Error display
- 1 RED LED: for monitoring bus voltage and for displaying normal mode (LED=Off) / programming mode (LED=On)

Connections
- bus line: bus connection block (red-black), screwless 0.6...0.8mm Ø single core
- Ethernet / IP network: RJ45 socket
- auxiliary power: extra low voltage terminal (yellow-white), screwless
  0.6...0.8mm Ø single core

Physical specifications
- housing: plastic
- dimensions: DIN-rail mounted device,
  width: 4 SUs (1 SU = 18 mm), height: 55 mm
- weight: approx. 120 g
- fire load: approx. 3245 kJ
- installation: rapid mounting on EN 60715-TH35 rail

Electrical safety
- degree of pollution (according to IEC 60664-1): 2
- type of protection (according to EN 60529): IP 20
- overvoltage class (according to EN 60664-1): III
- bus: safety extra low voltage SELV DC 24 V
- the device complies with EN 50428

Electromagnetic compatibility
- complies with EN 50428

Environmental specifications
- climatic conditions: EN 50090-2-2
- ambient temperature operating: 0...+ 45 °C
- storage temperature: - 25...+ 70 °C
- relative humidity (not condensing): 5 to 93 %

Reliability
- Failure rate: 476 fit at 40°C

Markings
- KNX, CE, BTL

CE mark
- complies with the EMC regulations (residential and functional buildings), low voltage regulations

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Location / Function of the Display and Operating Elements

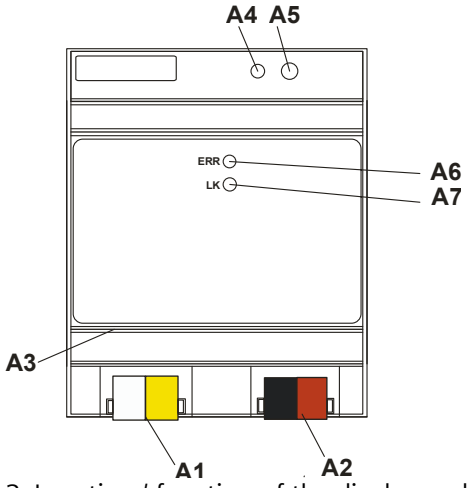

figure 2: Location / function of the display and operating elements

A1 AC/DC 24 V bus connector terminal (yellow / white)
A2 KNX bus connector terminal (black / red)
A3 Ethernet RJ45 socket
A4 KNX programming LED
A5 KNX programming button
A6 Status / failure LED
A7 Ethernet Link LED

Mounting and Wiring

General description
The N-system DIN-rail device can be installed in distribution boards, surface or flush mounted, or on any DIN rail complying with EN 60715-TH35.
The connection to the bus line is established via a bus connector terminal (red/black).
The RJ45 socket on the device front side provides the connection to the Ethernet-IP data network.

Mounting DIN-rail devices (Figure 3)
- Slide the device (figure 3, B1) onto the DIN-rail (figure 3, B2) and
- swivel back the device (figure 3, B1) until the slide clicks into place audibly.
- Connect the auxiliary power AC/DC 24V with the yellow-white bus connector terminal (figure 2, A1).
- Connect the bus line with the black-red bus connector terminal (figure 2, A2).
- Plug an Ethernet patch cable with an RJ45 plug into the RJ45 socket (figure 2, A3) to connect the device with the LAN / Intranet.
  A connection is established to the network when the yellow LED marked ERR (figure 2, A6) is continuously lit. When the LED LK (figure 2, A7) flashes data is sent to or from the device.

Dismounting DIN-rail devices
- Unplug the Ethernet patch cable from the RJ45 socket (figure 2, A3).
- Remove the yellow-white bus connector terminal (figure 2, A1) from its socket.
- Remove the black-red bus connector terminal (figure 2, A2) from its socket.
- press down the slide (figure 3, C3) with a screwdriver and
- swivel the device (figure 3, C1) from the DIN-rail (figure 3, C2).

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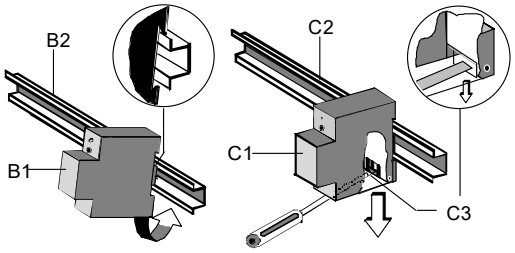

figure 3: *Mounting and unmounting a DIN rail mounted device*

Slipping off bus connection blocks (Figure 4)
- The bus connection block (D2) consists of two components (D2.1 and D2.2) with four terminal contacts each. Take care not to damage the two test sockets (D2.3) by accidentally connecting them to the bus cable or with the screw-driver (e.g. when attempting to unplug the bus connection block).
- Carefully put the screw-driver to the wire-inserting slit of the bus connection block's grey component and pull the bus connection block (D2) from the device (D1).

Slipping on bus connection blocks (Figure 4)
- Slip the bus connection block onto the guide slot and
- press the bus connection block (D2) down to the stop.

Connecting bus cables (Figure 4)
- The bus connection block (D2) can be used with single core conductors Ø 0.6 ... 0.8 mm.
- Remove approx. 5 mm of insulation from the conductor (D2.4) and plug it into the bus connection block (D2) (red = +, black = -).

Disconnecting bus cables (Figure 4)
- Unplug the bus connection block (D1) and remove the bus cable conductor (D2.4) while simultaneously wiggling it.

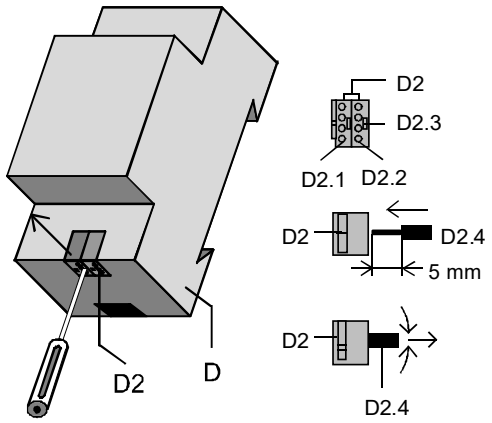

figure 4: Connecting and disconnecting bus wires

Slipping off / on auxiliary power connection block
- Follow the instructions for the bus connection block when slipping off/on the auxiliary power connection block.

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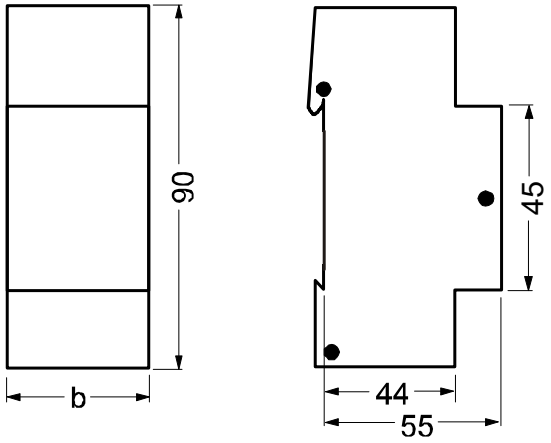
Dimension Drawing

Dimensions in mm



b = 4 SU

1 Standard unit (SU) = 18 mm

General Notes

- The operating instructions must be handed over to the client.
- Any faulty device is to be sent together with a return delivery note of the local Siemens office.
- For any technical questions, please consult:

☏ +49 89 9221 8000
www.siemens.de/automation/support-request

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