STC-BACnet IP V4

EnOcean to BACnet IP Gateway/transceiver

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to alteration
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»APPLICATION

Bidirectional gateway for EnOcean-based sensors and actuators as well as controllers and control systems with BACnet IP interface inclusive external receiving antenna (2,5 m), prepared for mounting on DIN rail TS35 (35x7,5 mm) according to EN 60715. To be configured via EasySens airConfig software tool. Details of the communication protocol are available in the software documentation.

»SECURITY ADVICE – CAUTION

The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Please comply with

- Local laws, health & safety regulations, technical standards and regulations
- Condition of the device at the time of installation, to ensure safe installation
- This data sheet and installation manual

»PRODUCT TESTING AND CERTIFICATION

Declaration of conformity
The declaration of conformity of the products are available on our website
https://www.thermokon.de/direct/en-gb/categories/stc-bacnet-ip

»NOTES ON DISPOSAL

The crossed-out wheelie bin symbol indicates that the product or removable batteries must not be disposed of with household or commercial waste. Within the EU, you are legally obliged to dispose of the product separately and appropriately in accordance with the national laws of your country. Alternatively, please contact your supplier or Thermokon Sensortechnik GmbH. Further information can be found at: www.thermokon.com

»INFORMATION ABOUT EASYSENS® (RADIO) / AIRCONFIG GENERAL USAGE

EasySens® - airConfig
Grundlegende Informationen zu EasySens® Funk sowie zur Bedienung der Software airConfig finden Sie zum Download auf unserer Webseite. https://www.thermokon.de/direct/files/airconfig-software-manual-en.pdf

»OVERVIEW OF THE RADIO TELEGRAMS

EEP
The structure of the data contained in the telegram can be found in the EEP (EnOcean equipment profile) list provided by the EnOcean Alliance. http://tools.enocean-alliance.org/EEPViewer/

»INFORMATION ABOUT SMART ACKNOWLEDGE (SMARTACK)

This bi-directional communication mechanism also allows the building system to send back data to a sensor, i.e. to overwrite SR06LCD´s set point. Smart Acknowledge requires that both communication devices do support the Smart Acknowledge mechanism. Repeaters are not supported, they delay in the telegram transmission. Sensor and gateway must communicate directly with each other.
Additional Information of the used EEP´s with Smart ACK can be found using the following link:
https://www.thermokon.de/direct/files/smartack-info-en.pdf

»TECHNICAL DATA

Network technology	BACnet IP
Radio technology	EnOcean (IEC 14543-3-10), transmission power <10 mW
Frequency	868 MHz, optional: 902 MHz
Antenna	external transmitting/receiving antenna with magnetic holding
Data transmission	bidirectional, airConfig ready
Receive channels	no limit
Transmit channels	128 (Tx)
Power supply	24 V = (±10%) or 24 V ~ (±10%)
Power consumption	typ. 3 W (24 V =) | 5 VA (24 V ~)
Enclosure	ABS, light grey
Protection	IP20 according to EN 60529
Connection electrical	terminal block, max. 1,5 mm²
Ambient condition	0..+50 °C, max. 85% rH non-condensing
Weight	approx. 300 g, (without antenna)
Mounting	prepared for mounting on DIN rail TS35 (35x7,5 mm) according to EN 60715
Delivery content	incl. external transmitting/receiving antenna 2,5 m with magnetic holding, software for configuration (freeware via download)
Notes	For network connection use a shielded standard Ethernet cable with shielded RJ45 connectors to use the free software airConfig (download) an usb stick, which is able to send and receive EnOcean telegrams, is necessary. We offer such a stick with the package airScan (item No. 566704 for 868 MHz), magnetic antenna plate recommended to improve radio coverage

»MOUNTING

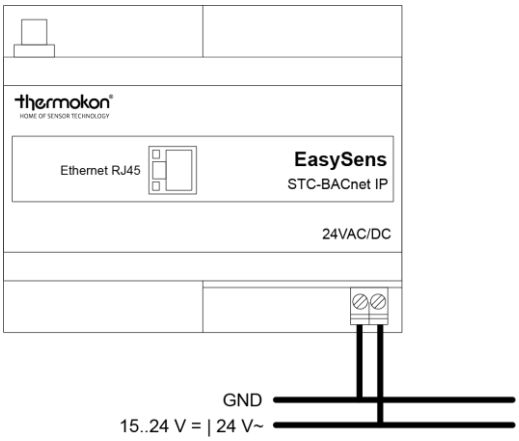
Use standard mounting rails according to DIN EN 60715. The use of the external antenna supplied with the product is necessary for proper operation.

The antenna shall be mounted in the centre of a metal plate (i.e. galvanized sheet metal) exceeding 180mm x 180mm using the advantage of its magnetic base. Best position for the antenna is keeping a distance of >10 cm from ceiling and walls. The distance to other powerful transmitters (e.g. LTE/ GSM / DECT / wireless LAN / EnOcean senders) should be minimum 0,5 m.

The antenna extension should only be used if it is not possible to position the gateway in the respective radio range. Its use additionally attenuates the radio signal and reduces the possible radio range between the participants.

The antenna will be best when mounted vertically, pointing up or downwards. The antenna cable shall be wired in an electric conduit. Pulling with force and bending sharply may cause damages to the sheathing of the antenna cable respectively to the connectors. Minimal radius of the antenna cable is 50 mm.

»CONNECTION PLAN



- Install the IoT Gateway on the DIN rail according to the mounting advices and connect the power supply and ethernet cable.
- Pay attention to the correct polarity of the 24V power supply to the IoT Gateway!
- Connect the STC-IoT to your local network (router).

»BEHAVIOUR OF THE LEDS



Label	Colour	Luminous behaviour	Description
POWER	green	Permanent glow	Operating voltage connected
RADIO	orange	Permanent glow	Proper operation (radio module)
STATE	orange	Permanent glow	Connection sucessfull established.
STATE	orange	Flashing	(after 20-30 sec.) connection failed, IP 192.168.100.100 is set

CONFIGURATION SOFTWARE

The Thermokon configuration software airConfig can be downloaded on the Thermokon website (www.thermokon.de) for free. Computer with Windows or MAC operating system are supported.

Connection to STC-BACnet IP Gateway

For configuration with airConfig, either an EnOcean capable USB transceiver (for airConfig/airScan) or an RJ45 connection via TCP/IP can be used.

a) **Pre-configuration via radio (EnOcean USB transceiver required)**
To define an IP address for the gateway (no configuration of the input and output data points possible)

b) **Configuration via TCP/IP**
For configuration of input and output data points.
- via DHCP-capable router (automatic search) with RJ45 cable
- Connection via IP address (manual entry)

1. **Connecting the USB transceiver to the computer**
Connect the USB transceiver to the USB port of your computer. The driver will be installed automatically.

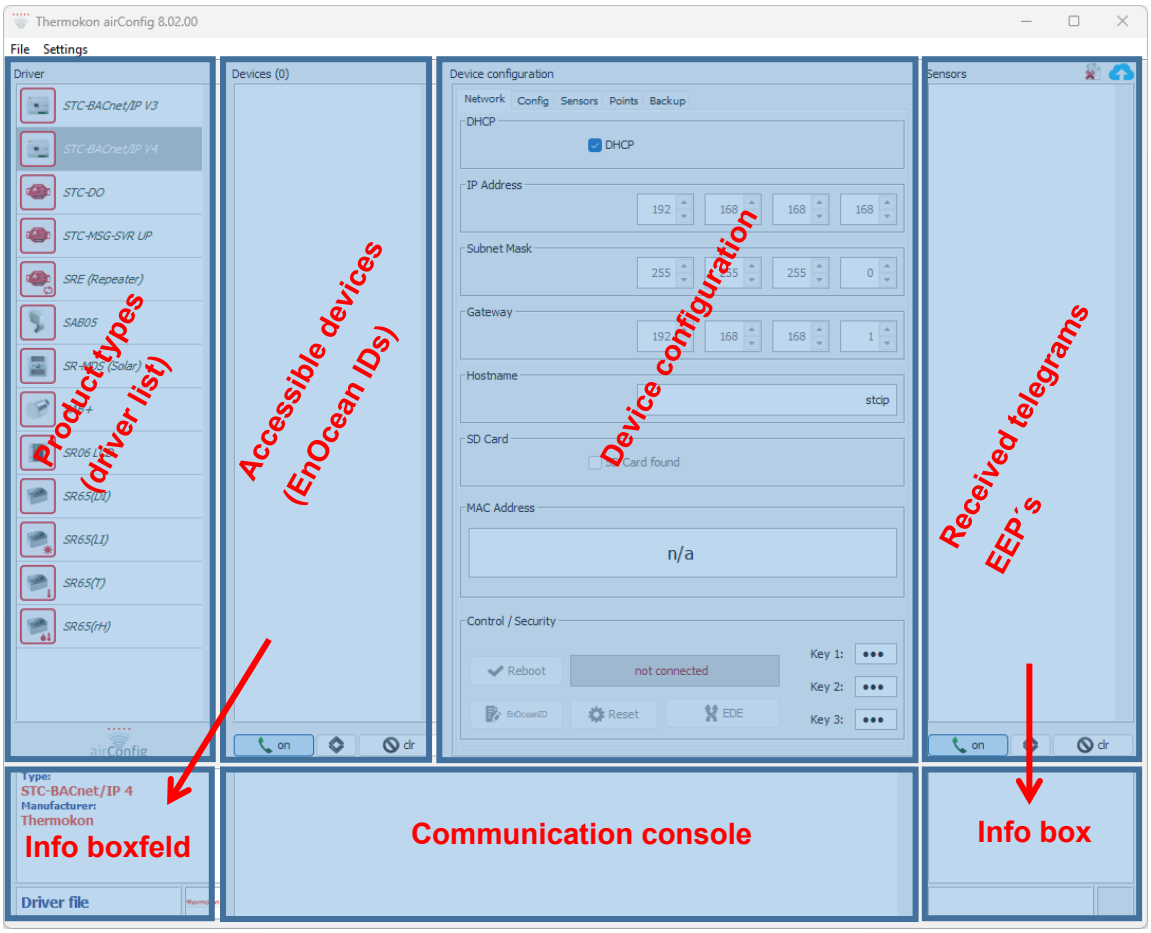
2. **Start airConfig**
Once the driver has been successfully installed, airConfig can be started.

3. **Selecting the connection**
Open the selection menu and select the connection. **Update list if required*

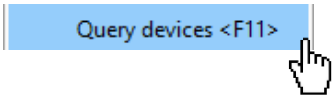


4. **Select Start**

» AIRCONFIG HOME SCREEN



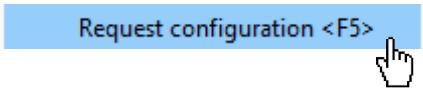
» QUERY DEVICES



Right-click on the device icon in the driver list (left column 1) and select **<Query devices>**, alternatively you can also use the **<F11> key**. airConfig will send a request to the network to request the IDs of all devices of the selected type in the reception area or in the network.

Each device is displayed with its own EnOcean ID in the “Devices” list. If the IP address is known (static default IP address, without DHCP 192.168.100.100), the device can also be addressed by entering the IP manually **<Manual IP query>**.

» REQUEST CONFIGURATION (ONLY VIA IP)



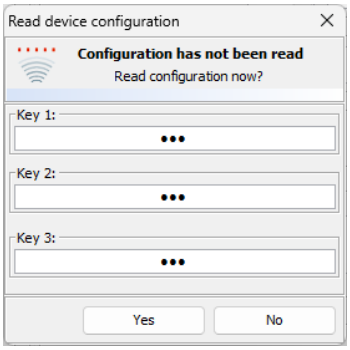
To configure a specific device, right-click on the device icon and select **<Request configuration>** or press the **<F5> key**.

airConfig will request the PIN that protects the configuration of the device.

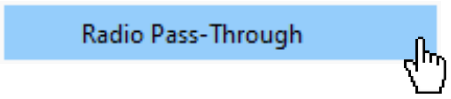
The device can only be configured if the BACnet IP V4 is available in the same IP network and the network settings are configured correctly.

The default setting is 000-000-000

Enter the PIN number (000..255) and select “Yes” to read out the configuration of the device. To work with the default settings, click on “No”. The PIN number can be changed in EEP Virtuoso mode.

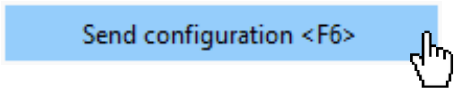


» RADIO PASS-THROUGH



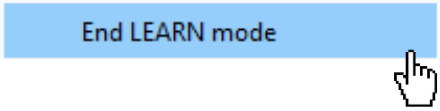
As an alternative to the USB transceiver, the gateway's radio receiver can also be used to configure airConfig-compatible EasySens sensors. In this case, airConfig displays all received telegrams and RSSI values of the sensors within range of the gateway.

» SEND CONFIGURATION



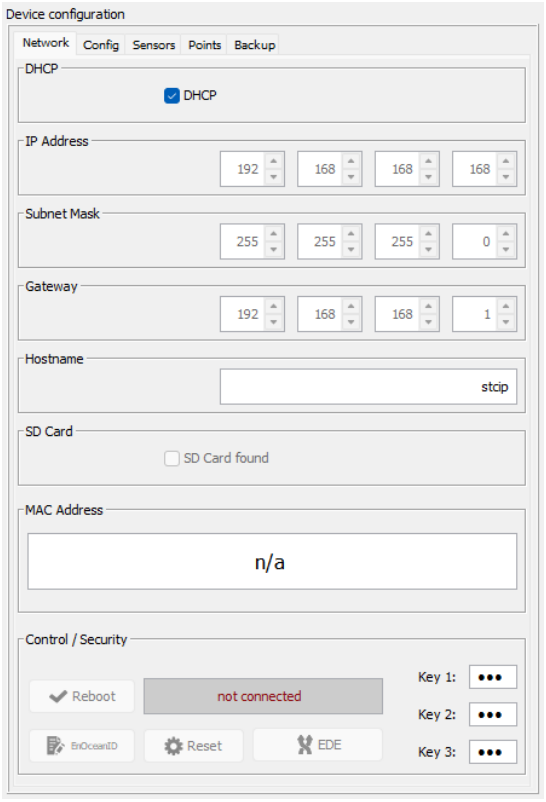
To finalize the configuration in the context window **<Send configuration>, select <F6>**. For sensors, the learn button must be pressed to accept the new configuration data. A restart is only necessary if the network settings have been changed.

» EXIT LEARN MODE



Exit LEARN mode after completing the configuration. AirConfig establishes a session ID-protected connection to the gateway and prevents another device from accessing the configuration for the duration of the connection. If the learning mode is not properly terminated, this connection remains in place until it is automatically terminated after 30 minutes. During this time, the device cannot be accessed - even from the same computer. The icon of the affected gateway is marked with a padlock.

» NETWORK



With DHCP, the connection-seeking gateway requests the IP address configuration from a DHCP server.

IP adress • subnet mask • gateway • hostname
If a DHCP server is not available or does not exist in the network, TCP/IP addressing must be carried out manually. If you configure the TCP/IP protocol, an IP address, the subnet mask and usually also a standard gateway are required.

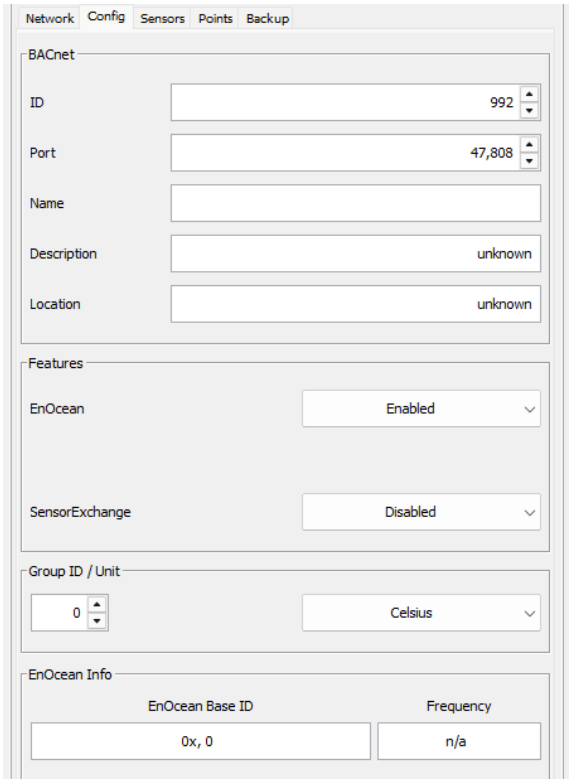
SD carte (optional available)
Thermokon SD card for temporary storage of the received data points.

Without an SD card, the data points are initialized with the respective lower limit of the measuring range. e.g. for temperature sensor 0-40°C = basic value 0 °C This can lead to the unintentional start of heating / lighting or similar. With an SD card, the STC-BACnet IPV4 starts with the last values received.

MAC Address
The Media Access Control address (**MAC address**) is a unique hardware address for each network adapter, making each device uniquely identifiable.

Control / Security
Changes to the network settings require the gateway to be restarted for them to take effect. As the gateway can only obtain an IP address at startup, it delays its startup by approx. 90 seconds to ensure that even slow DHCP servers are available. If both orange LEDs (Radio and State) are permanently lit, the gateway is ready for operation.

» CONFIGURATION



BACnet
BACnet Settings of the BACnet IP for identification and communication with the device via a BACnet network. The displayed values are visible via the BACnet network and can be configured.

BACnet ID
A BACnet device is addressed by the “instance number”, which is also referred to as the “device instance”. **The “device instance” should be unique within the BACnet network and an integer number in the range 0 to 4,194,302.**

Features
To activate / deactivate the Enocean and the SensorExchange function.

Sensor Exchange (unidirectional)
Received EnOcean telegrams are communicated via IP to other BACnet IP gateways with activated SensorExchange function in the same BACnet network. Only the respective BACnet IP gateway in which EnOcean IDs have been learned processes the EnOcean telegrams into BACnet data points. By using several gateways, an increased radio coverage can be realized.

Group ID (bidirectional sensor exchange)
The group ID function sends EnOcean telegrams via all BACnet IP V4 gateways with an identical group ID.
(only addressed telegrams).

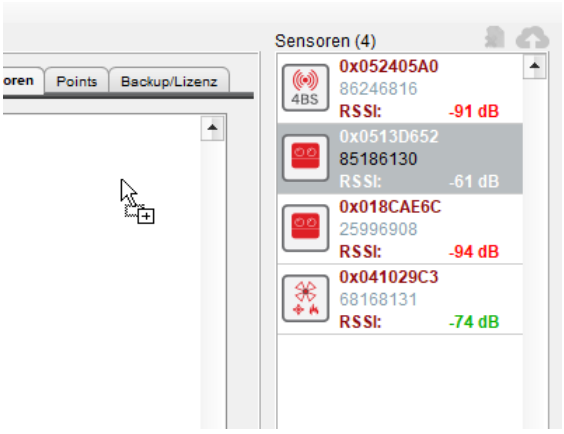
Unit
Definition of the temperature unit (Celsius / Fahrenheit)

EnOcean Info

The data displayed here is device-specific and may be required for support requests. EnOcean base ID / frequency

» SENSORS

For teach-in, received telegrams from the sensors are dragged and dropped into the sensor device configuration area.



The “Sensors” area shows the EnOcean telegrams that can be converted into BACnet data points. In order to generate data points, the gateway must know the ID and the EEP of the sensor, as this defines how which data point is generated. Therefore, only EnOcean sensors whose EEP has been recognized by the learning telegram or to which an EPP has been manually assigned can be assigned.

Telegrams from sensors to which airConfig cannot assign an EPP due to a lack of identification are marked with a telegram type symbol (e.g. 4BS, VLD, MSC) and highlighted in red. These sensors can only be taught in after manual assignment (right mouse button -> Change type).

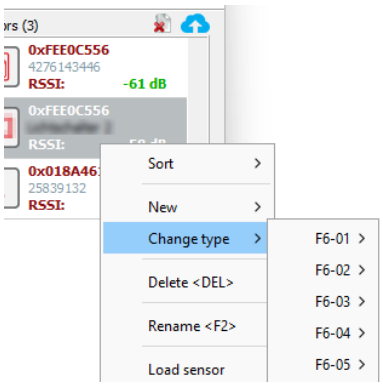
The BACnet IP V4 always creates the corresponding BACnet input / output points (if available) automatically.

Example: Thermokon SR06 LCD teach-in procedure

Depending on the EnOcean device, further steps may be necessary for a teach-in procedure (e.g. pressing the learn button).

The sensor designations are taken from the received telegrams.

If known, an EEP can also be set manually for a sensor by right-clicking on the sensor icon and selecting the ID from the <Change type> dialog.

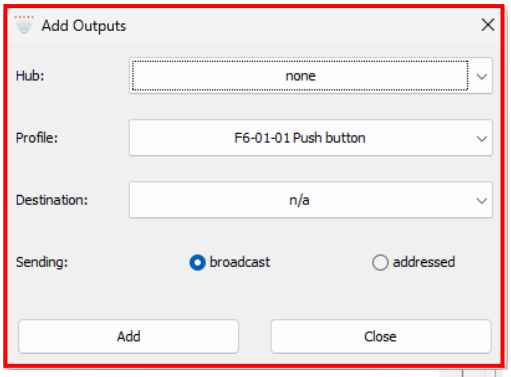


Teached-in sensors can be replaced with identical devices with an identical EEP. (right-click -> replace).
This is intended for exchanging / replacing devices without adapting BACnet programming.

»ADD OUTPUT / ADD SENSORS (BACNET → ENOCEAN)

The STC-BACnet IP V4 can generate EnOcean telegrams from BACnet data points. To do this, the EEPs to be simulated are added to the sensor list. The corresponding BACnet data points are created automatically.

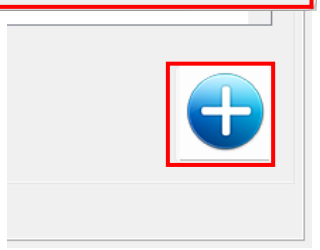
Select the desired EEP from the Profile list, specify the target device (Destination), configure the transmission type (broadcast / addressed) and add the EEP (Add). Once all the required EEPs have been added, close the window with “Close”.



Send learning telegrams
Right-click on a specific sensor icon to open the context menu and select **<Send LRN>** to send a learning telegram to the assigned device.

<Send LRN (3x)> transmits the learning telegram 3 times with random pauses in between. The **<Send LRN (3x)>** should not be used for devices that undo the learning on the 2nd receipt of an LRN telegram.

For devices that support the universal learning message (UTE), use **<Send LRN (UTE)>**.



» POINTS

The BACnet data points are automatically created in the BACnet IP V4 gateway as soon as an EnOcean device has been taught in.

BACnet data points display the last value transmitted to the gateway before teaching.

BACnet data points can be renamed if required. (Right mouse button on selected data points -> Rename)

After the desired renaming, transfer the data by clicking on “Send” and close the window by clicking on “Close”. There is no confirmation of the renaming, the new name is displayed directly in the BACnet data point list.

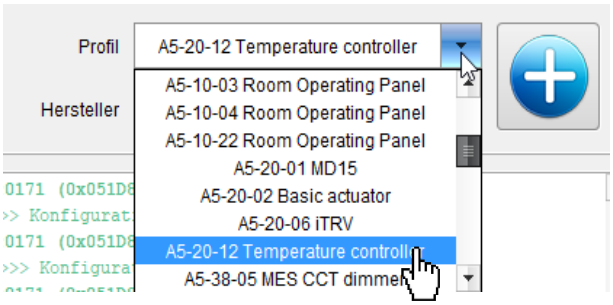
» HIGHER-LEVEL TEMPERATURE CONTROL - BIDIRECTIONAL TEACH-IN (EXAMPLE ‘JOY SR’)

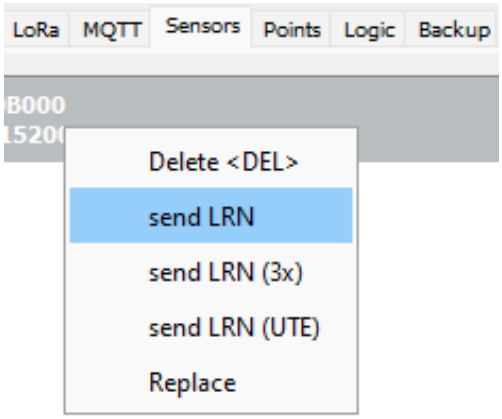
General information
The JOY room thermostat must be taught-in bidirectionally in order to receive data on the status of the room thermostat and to be able to overwrite the device with the higher-level controller via the gateway.

To do this, the status telegram of the JOY is taught in as a BACnet input and a BACnet output defined as a “higher-level controller” is taught into the JOY SR by the STC-BACnet.

Teach-in process - inputs
Select the last menu item Actuator teach-in - OUT A5-11-02 in the EnOcean configuration menu of the JOY SR and confirm the selection with the Enter button. The LRN telegram is sent and appears in the sensor list (right) of airConfig. From there, you can drag and drop it into the inputs.

Send the configuration (without restarting) and request the configuration again directly. The instance number for the BACnet objects is displayed in brackets.





Teach-in procedure - Outputs
From the “Outputs” tab, select the telegram

(A5-20-12, Temperature controller) from the list and add it to the output list using the blue PLUS symbol.

Send the configuration (without restarting) and request the configuration again directly. The instance number for the BACnet objects is shown in brackets.

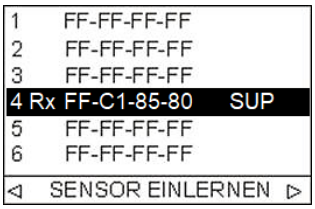
The numbers shown in brackets after the symbols indicate the start value of the data points. Outputs can be found in steps of 1000 from 1,000 to 128,000. Inputs can also be found in steps of 1000 from 129,000.

Finally, the “Superior Temperature Controller” profile must be taught into the JOY.

To do this, select a free sensor location in the EnOcean configuration menu of the JOY SR under Teach-in sensor and make it ready to learn.

In the Outputs tab of the airConfig software, right-click on the “Temperature controller” profile icon and select **<Send LRN>**

To check, the EnOcean ID of the telegram followed by the identifier “SUP” for Superior Temperature Controller must now appear in the JOY SR display.



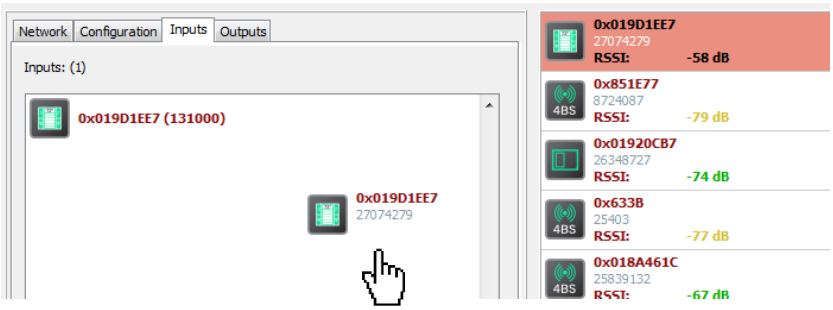
» SMARTACK – BIDIRECTIONAL TEACH IN SR06LCD

The learn-in process is carried out in both directions.

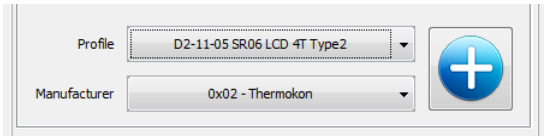
Activate SmartACK of the SR06 LCD via airConfig:



or with the configuration software.

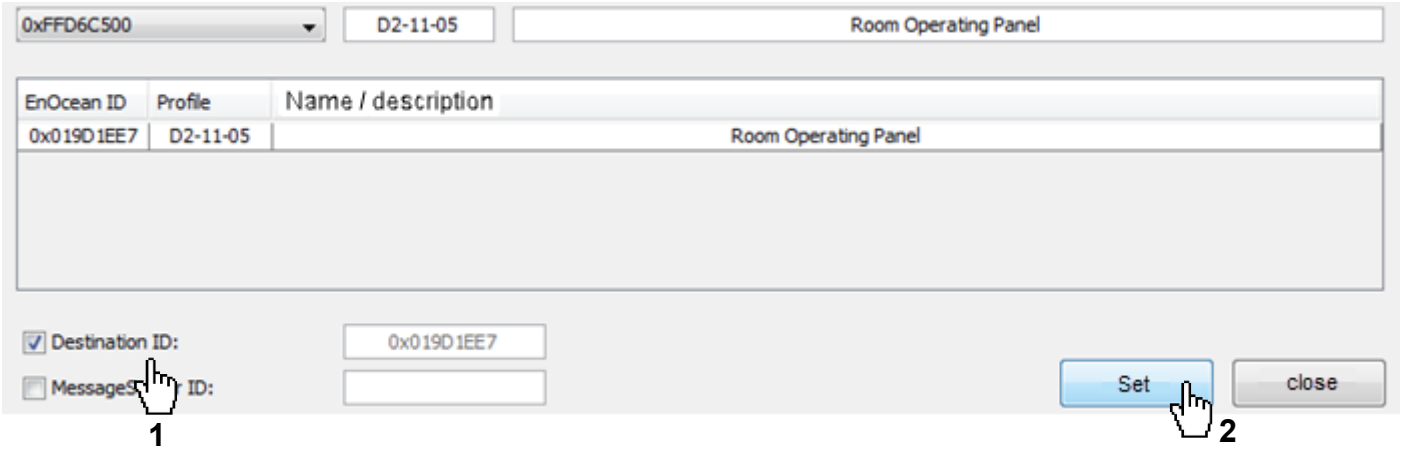


For the learn-in process press shortly the LRN-button. The EasySens room operating panel will be displayed in the sensorlist. Drag this symbol in the inputs.



Select the appropriate profile on the „Outputs“ tab. Add the profile to the “outputs” using the blue plus symbol.

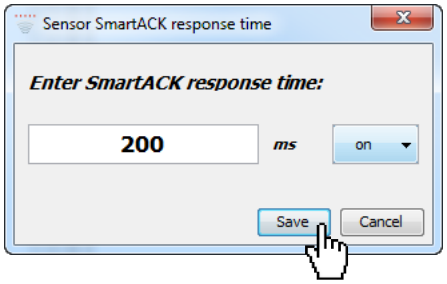
The output channel only sends data to specific participants, using addressed telegramms. A click with the right mouse button on the output datapoint opens the context menu. Select the **<Destination / MsgServer>** entry from the menu and activate the desired destination address. This should be the same address, which has been drawn in the input channel.



Send the new configuration to the BACnet IP Gateway. A click with the right mouse button on the device symbol opens the context menu. Select the **<Send configuration>** entry. A restart of the device is not required. When the configuration process is completed, the configuration session has to be closed with the **<End LEARN mode>** entry.

A click with the right mouse button on the output datapoint opens the context menu. Select the **<SmartACK Response Time>** entry from the menu and activate the desired destination address.

The waiting period between data and reclaim telegram is defined with the response time. SR06 LCD has a fixed response time of 200 ms.

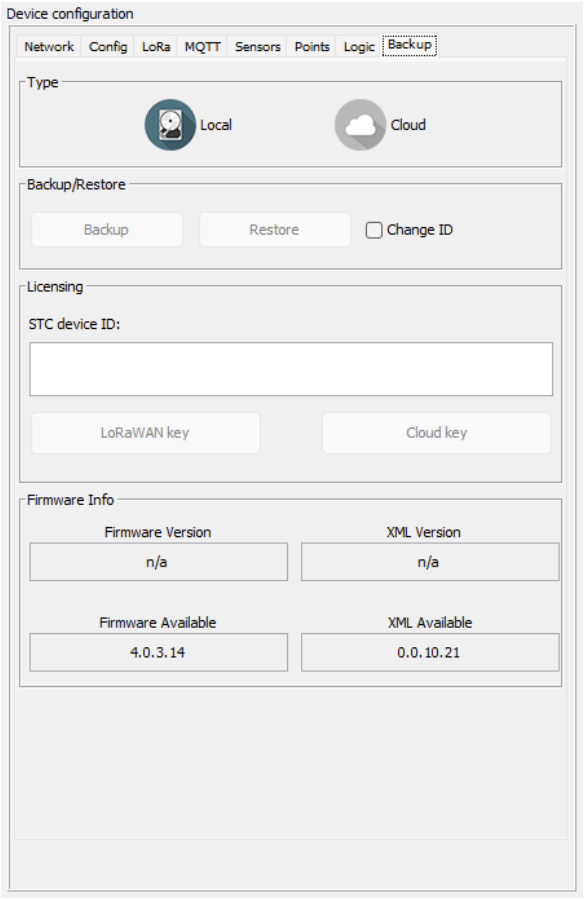


SmartACK

For more information about the function, please download from the document from our website.

www.thermokon.de

» BACKUP/RESTORE



Airconfig can save the configuration of the STC-BACnet IP V4 with a cloud function if required. A subsequent ID change is only possible with a local backup.

Type
Choose the type of Backup, On a local save.

Backup
Backups can be made locally on the computer in a desired folder using the Backup button.

Restore
The Restore button is used to restore previously created backups. An ID change is possible during the restore.

An ID change enables the complete replacement of an STC-BACnet IP V4 Gateway configuration with a previously created backup. **ATTENTION: Only V4 backups can be imported to V4 devices!**

The ID change can be carried out a maximum of 10 times per device.

Licensing
License keys can be purchased to extend the functions. The STC device ID is required to create the device-specific keys.

Firmware Update
If firmware updates are available, the buttons (Update...) can be activated.

» EXEMPLARY OVERVIEW OF THE BACNET DATA POINTS

Any Bacnet Explorer allows access to the created objects and their properties.
Thermokon offers a free version of BACeye (V1) for Thermokon units in the download area. Third-party devices cannot be accessed in this version.

Obj. Type	Inst.-No.	Object Name	Description
AI	1	CPU load	With this object you can display the current curve of the processor load. This provides a simple overview of the performance.
AI	2	EnOcean error count	Network and communication error EnOcean.
AI	3	BACnet error count	Network and communication error BACnet.
BO	4	Purge MessageServer	Purge MessageServer deletes telegrams for actuators stored in the MessageServer that have not yet been sent.
DEV	123	STC-BACnet/IP 3.0	The device object provides all basic properties and information and contains, among other things, the time of the last start, which can be used, for example, to detect the restart after a power failure.

Example: Data points created from EEP A5-08-01
0x123456789 = Example EnOcean ID

Obj. Type	Inst.-No.	Object Name	Description
AI	129000	0x123456789 [0] (5) Supply voltage (linear)	The data points of the sensors and actuators are named according to the EEP definition of the EnOcean Alliance. Each sensor generates several data points according to the EEP as well as the gateway-specific standard data points: Heartbeat, Signal, Manufacturer and RSSI.
AI	129001	0x123456789 [0] (4) Illumination (linear)	
AI	129002	0x123456789 [0] (3) Temperature (linear)	
BI	129003	0x123456789 [0] (2) PIR Status	
BI	129004	0x123456789 [0] (1) Occupancy button	
AO	129995	{HeartBeat}	Using the {HeartBeat} object, the gateway can signal to each sensor data point block that a data point represents an "old" value. The PresentValue of each data point always contains the last valid value received, regardless of when it was received. In order to signal to the application programme that the value is not up-to-date, a period of time in seconds can be defined in the PresentValue, after the expiry of which the gateway first declares all associated data points as "unreliable" and, in the absence of a telegram for even longer, as faulty ("no sensor"). EnOcean sensors send a heatbeat signal every 1000s (±30%) in the default setting, a value of approx. 2400s has proven itself.
BI	129997	{Signal}	The PresentValue of the data point Signal shows whether a telegram of this sensor has been received since the gateway start. Directly after the start of the gateway, this value is "Invalid". After the first received valid telegram, the PresentValue changes to "valid".
MI	129998	{Manufacturer}	contains manufaturer ID.
AI	129999	{RSSI}	RSSI shows the field strength of the last telegram received. The value range is from approx. -50 to typ. -93 dBm, whereby larger numerical values indicate a lower reception level. If both the original telegram of a sensor and the repetition by a repeater reach the gateway, the RSSI value of the first received (= sensor telegram) is displayed, even if the level of the repeater signal was received much stronger.

BACnet Interoperability Building Blocks Supported (BIBBs)

Data Sharing BIBBs

BIBB Type	BACnet Service
DS-RP-B	ReadProperty
DS-RPM-B	ReadPropertyMultiple
DS-RPC-B	ReadPropertyConditional
DS-WP-B	WriteProperty
DS-WPM-B	WritePropertyMultiple
DS-COV-B	SubscribeCOV ConfirmedCOVNotification UnconfirmedCOVNotification
DS-COVP-B	SubscribeCOV
DS-COVU-A	UnconfirmedCOVNotification
DS-COVU-B	UnconfirmedCOVNotification

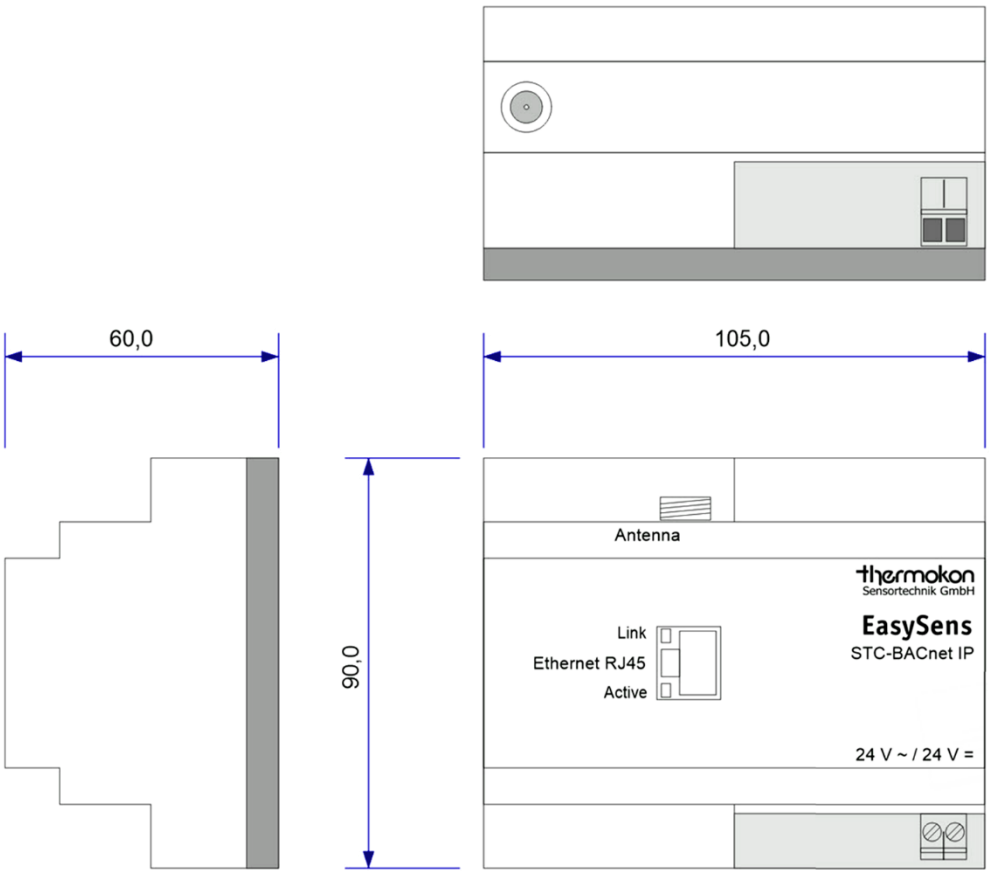
Network Management BIBBs

BIBB Type	BACnet Service
NM-CE-B	Establish-Connection-To-Network Disconnect-Connection-To-Network

Device Management BIBBs

BIBB Type	BACnet Service
DM-DDB-B	Who-Is I-Am
DM-DOB-B	Who-Has I-Have
DM-TS-A	TimeSynchronization
DM-UTC-B	UTCTimeSynchronization
DM-RD-B	ReinitializeDevice

» DIMENSIONS (MM)



» ACCESSORIES (OPTIONAL)

Antenna extension 10 m	Item No. 257206
Antenna extension 20 m	Item No. 257213
Magnetic antenna holder form L, 180x180 mm	Item No. 255097
EnOcean USB transceiver 868 MHz for airConfig/airScan (incl. license)	Item No. 566704