ProtoNode FPC-N40 (RD-BACnet/KNX) For Interfacing Airflow Commercial MVHR units To Building Automation Systems: BACnet/IP, KNX

Part number: 90000554

APPLICABILITY & EFFECTIVITY

Explains ProtoNode FPC-N40 hardware and how to install it.

The document release: 10st March 2023

Technical Support:

Thank you for purchasing the ProtoNode (RD-BACnet/KNX; Part number: 90000554).

Please call Airflow for Technical support of the RD-BACnet/KNX product.

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Certifications

- **BTL MARK – BACNET TESTING LABORATORY**

The BTL Mark on ProtoNode RER is a symbol that indicates that a product has passed a series of rigorous tests conducted by an independent laboratory which verifies that the product correctly implements the BACnet features claimed in the listing. The mark is a symbol of a high-quality BACnet product.
Go to http://www.BACnetInternational.net/btl/ for more information about the BACnet Testing Laboratory. Click here for BACnet PIC Statement.

TABLE OF CONTENTS

1 INTRODUCTION

1.1 RD-BACnet/KNX Gateway

RD-BACnet/KNX is an external, high performance **Building Automation multi-protocol gateway.**
The delivery of the Airflow company contains the ProtoNode gateway equipped with the preloaded software image supporting Airflow HVAC unit DUPLEX with the RD4, RD5 or aMotion (RD6) control system. The RD-BACnet/KNX gateway with this software is provided as the **RD-BACnet/KNX** module.
The **RD-BACnet/KNX** is preconfigured to automatically communicate between Airflow products connected to the **RD-BACnet/KNX** and automatically configures them for BACnet/IP or KNX.

The **RD-BACnet/KNX** is pre-loaded with tested Profiles/Configurations for the supported devices. Regarding the further progress or HVAC devices development, the RD-BACnet/KNX range of support can be enlarged to new HVAC device type by the configuration files download – 3.3.9 and 3.3.10

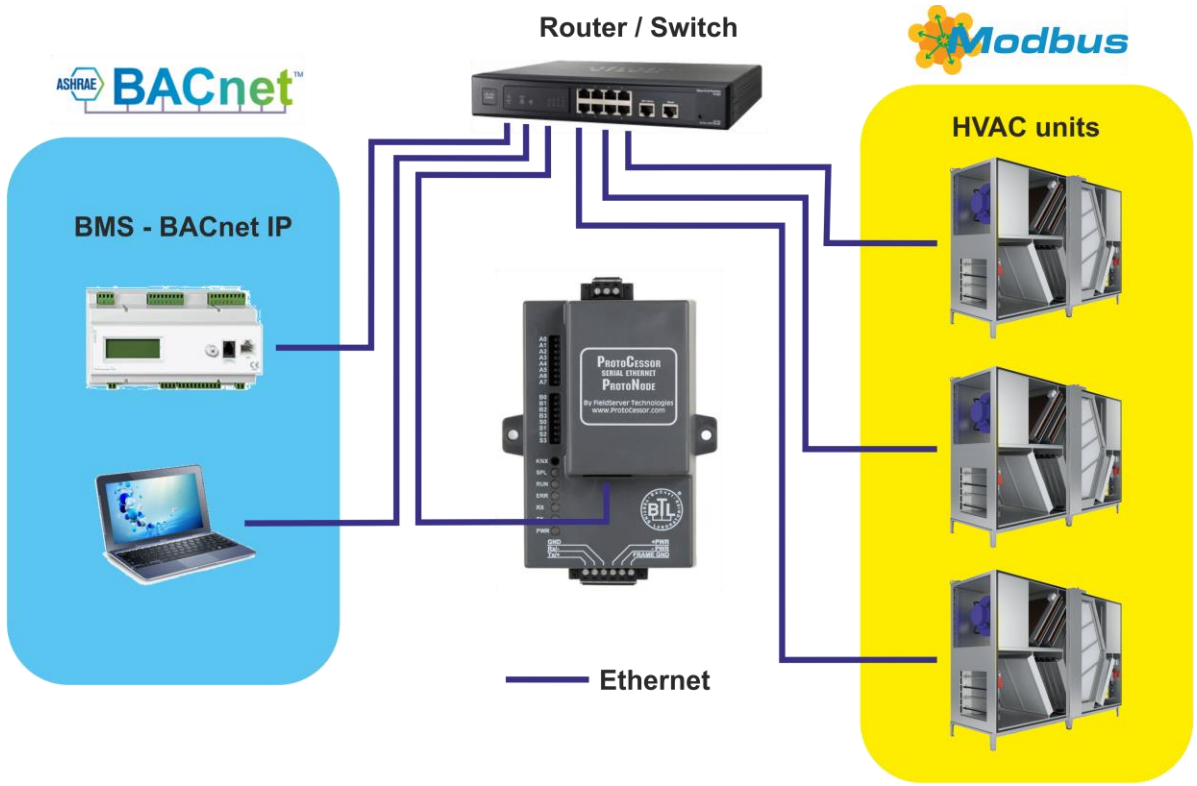


Fig 1: The BACnet IP topology

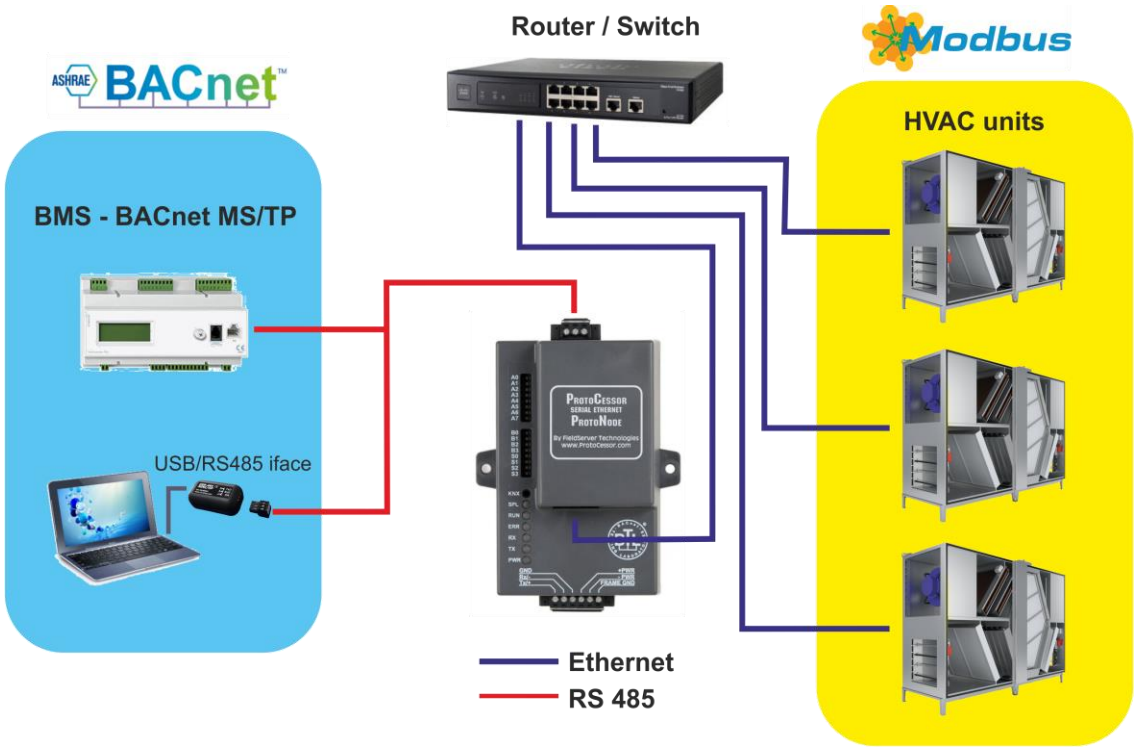


Fig 2: The BACnet MS/TP topology

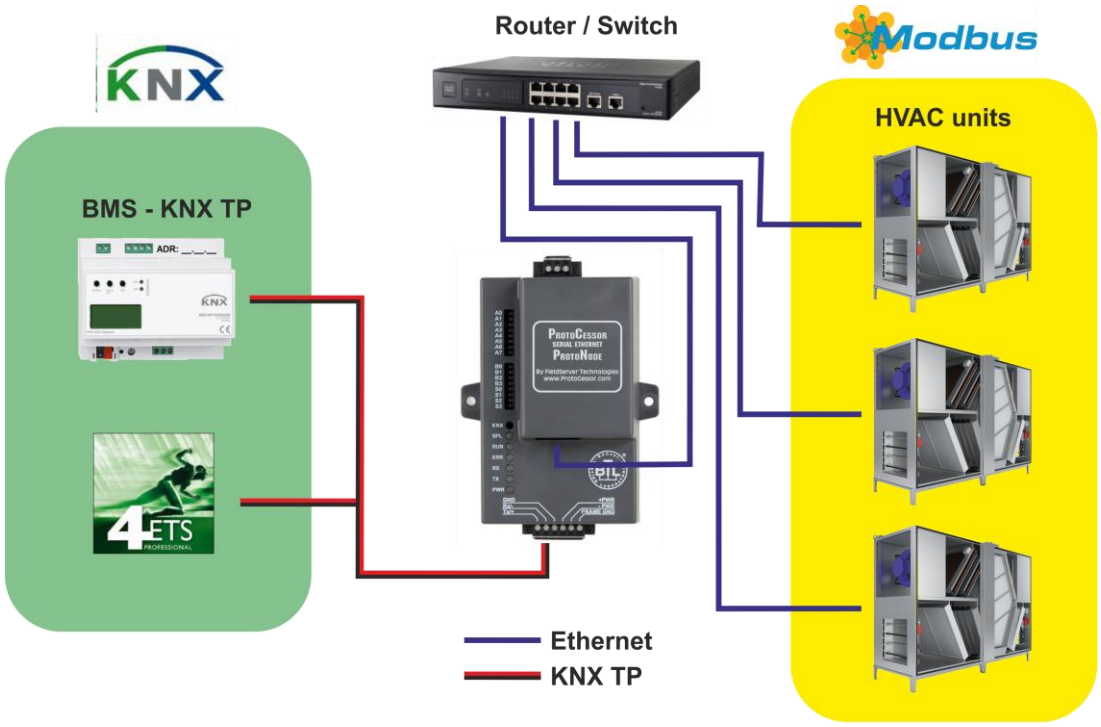


Fig 3: The KNX TP topology

1.2 Airflow Devices and Point Count Available

- **The total number of devices attached to RD-BACnet/KNX cannot exceed 1500 Modbus registers for BACnet or KNX in total number**
- Regarding the total number of the operated Modbus registers, the maximum number of connected devices accords to the table:

Control system / ProtoNode image	Point Count	Max.number of devices to 1 RD-BACnet/KNX
HVAC RD4 /CN1007	78	18
HVAC RD5 / CN1007	79	18
HVAC RD5 / CN2077	90	16
SMARTbox VAV / CN2077	51	29
RD6 / CN2180	122	12

- The table reflects the situation, when all the connected devices are of the same type. In case of device type combination (eg. HVAC RD5 units and SMART boxes) the total sum of data points must be lower than 1500, as mentioned above.

Where to find the code of the "ProtoNode image"?

- Open the website of the RD-BACnet/KNX gateway – see the chapter 4.
- Open the "Diagnostics & Debugging"

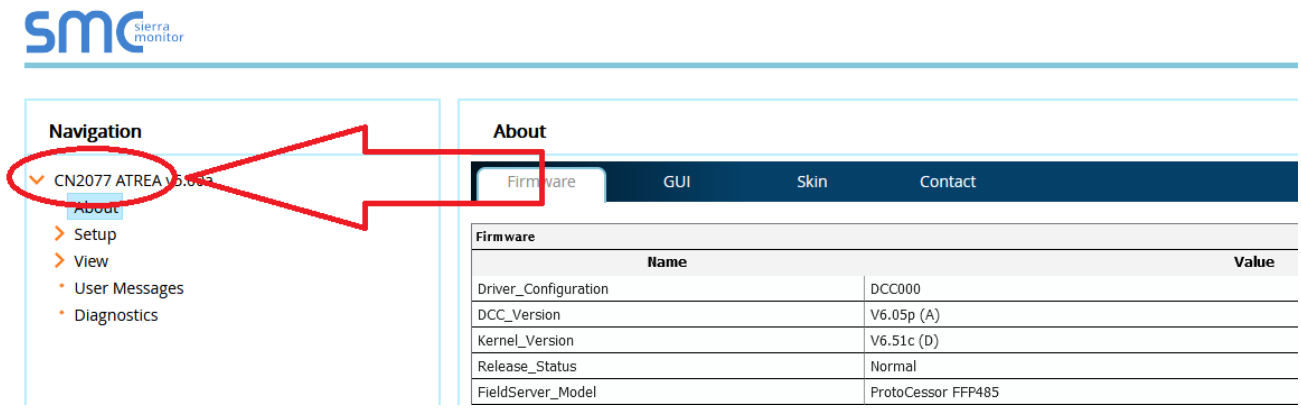


Fig 4: Reading of the sw image number

1.3 Relevant fw version

All the functionalities described in this document are supported by the fw version:

- DCC Version: V6.05p(A)
- Kernel Version: V6.51c (D)

For the version of the RD-BACnet/KNX, see the web page of the module – Diagnostics & Debugging – About...

2 INTERFACING RD-BACNET/KNX TO DEVICES

2.1 RD-BACnet/KNX

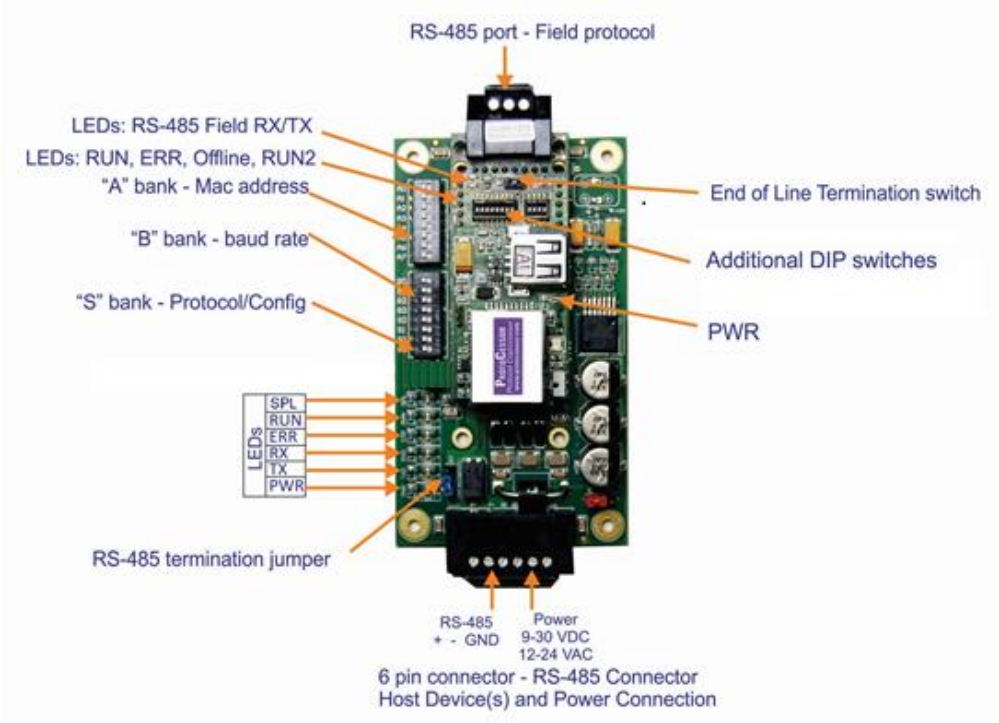


Fig 5: Port topology

2.2 Device Connections to RD-BACnet/KNX

RD-BACnet/KNX 6 Pin Phoenix connector for KNX Devices

- The 6 pin Phoenix connector is the same for RD-BACnet/KNX Pins 1 and 2 are for KNX.
- Pins 4 through 6 are for power. **Do not connect power** (wait until **Section 2.3**).

Device Pins	RD-BACnet/KNX Pin #	Pin assignment
Tx/+	Pin 1	KNX +
Rx/ -	Pin 2	KNX -
Pin GND	Pin 3	GND
Power In (+)	Pin 4	+PWR
Power In (-)	Pin 5	-PWR
Frame Ground	Pin 6	FRAME GND

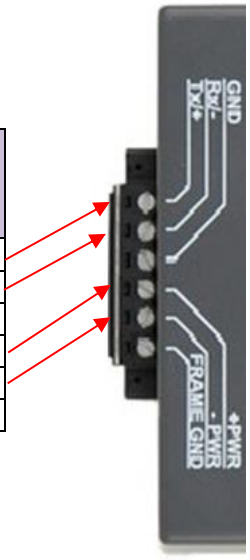


Fig 6: Power supply connector

2.3 Connecting Power to ProtoNode.

Apply power to RD-BACnet/KNX as show below in Chyba! Nenalezen zdroj odkazů**.** Ensure that the p ower supply used complies with the specifications provided in **Appendix C.1**.

- RD-BACnet/KNX accepts either 9-30VDC or 12-24 VAC on pins 4 and 5.

Power Requirement for RD-BACnet/KNX at 9V through 30 VDC or 12-24 VAC			
	Current Draw Type		
RD-BACnet/KNX	12VDC/VAC	24VDC/VAC	30VDC
FPC – N40 (Typical)	170mA	100mA	80mA
FPC – N40 (Maximum)	240mA	140mA	100mA
Note: These values are 'nominal' and a safety margin should be added to the power supply of the host system. A safety margin of 25% is recommended.			

3 COMMUNICATION SETUP FOR RD-BACNET/KNX

3.1 Record Identification Data

Each RD-BACnet/KNX has a unique part number located on the underside of the unit. This number should be recorded, as it may be required for technical support. The numbers are as follows:

Model	Part Number
ProtoNode FPC N40	FPC-N40-1007
	FPC-N40-2077
	FPC-N40-2180

Figure 1: ProtoCessor Part Numbers

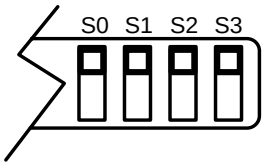
- FPC-N40 units have the following 3 ports: 2 x RS-485 and Ethernet

3.2 Setting the Field Protocol

3.2.1 Selection of the Protocol

- RD-BACnet/KNX units use the “S” bank of DIP switches (S0 – S3) to select the Field Protocol.
  - See the table in fig. 3 for the switch settings to select BACnet IP, BACnet MS/TP or KNX.
  - The OFF position is when the DIP switches are set closest to the outside of the box.

Note: Switch off the power supply of the RD-BACnet/KNX before any change of DIP switch position!



S0 – S3 DIP Switches

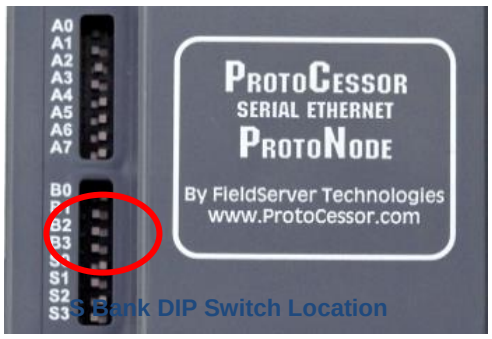


Fig 7: S DIP switches

RD-BACnet/KNX FPC-N40	S Bank DIP Switches			
Profile	S0	S1	S2	S3
BACnet IP	Off	Off	Off	Off
BACnet MS/TP	**On**	Off	Off	Off
KNX	Off	Off	**On**	Off

Note: The communication via the BACnet MS/TP protocol is not supported in the default range of profiles. The presetting profile for the BACnet MS/TP must be downloaded to the particular RD-BACnet/KNX module.
The download process is described in the chap.3.3.9 and 3.3.10

3.2.2 Setting the Node/ID Device Instance (DIP Switch A0 – A7)

- The A Bank DIP switches on the ProtoNode allow users to set the Node-ID/Device Instance on the Field RS-485.
- DIP switches A0 – A7 can also be used to set the MAC Address for BACnet MS/TP and BACnet/IP.

Fig 8: A DIP switches

The setting of the DIP switches accords to the binary coding, i.e. the Off position ~ 0 and the On position ~ 1, the LSB is A0 DIP.
Example:

- A0=On and A1=On, the decadic address=3
- A2=On, A3=On and A5=On, the decadic address=44

3.2.3 Setting the Serial Baud Rate (DIP Switch B0 – B3)

- DIP Switches B0 – B3 can be used to set the serial baud rate to match the baud rate provided by the interfaced systems.
- The default setting for the BACnet MS/TP is 38400 baud

Fig 9: B DIP switches

Baud rate	B0	B1	B2	B3
9600	On	On	On	Off
19200	Off	Off	Off	On
38400	On	On	Off	On
57600	Off	Off	On	On
76800	On	Off	On	On

3.3 Configuring Device Communications

It is recommended to use the “Field server ToolBox” application for configuration.

It is possible to download the from:

https://us.msasafety.com/downloads#smc

When “Field server ToolBox” application is installed, continue with following procedure:

3.3.1 IP address setting

1. Connect the the power supply (chapter 2.3)
2. Connect a standard Cat 5 Ethernet cable (Straight through or Cross-Over) to the RD-BACnet/MNX module . The Ethernet cable should be connected to the existing Network.
3. Start the Fieldserver Toolbox (the PC where you run the “Toolbox” must be in the same network as the RD_BACnet/KNX module)
4. When connection of the RD-BACnet/KNX module to the network is in good order the module will be visible in the Toolbox window:

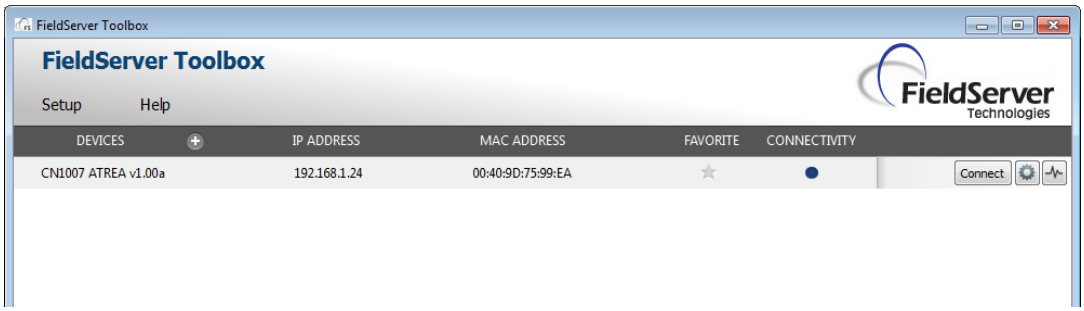


Fig 10: Toolbox list

5. The “CN1007 Airflow v1.00a” is the code of the RD-BACnet/KNX module.
6. Adjust the IP address according to the network where the module is connected in – press the button for setting:

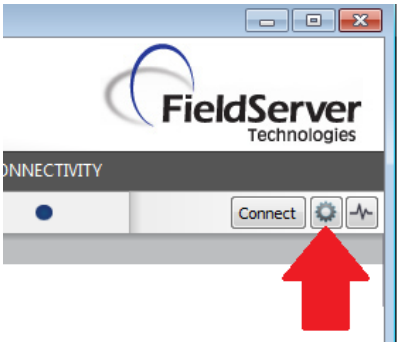


Fig 11: Toolbox setting

7. Choose the “Network setting”, so the window with the network parameters will be displayed, then sat the required values.

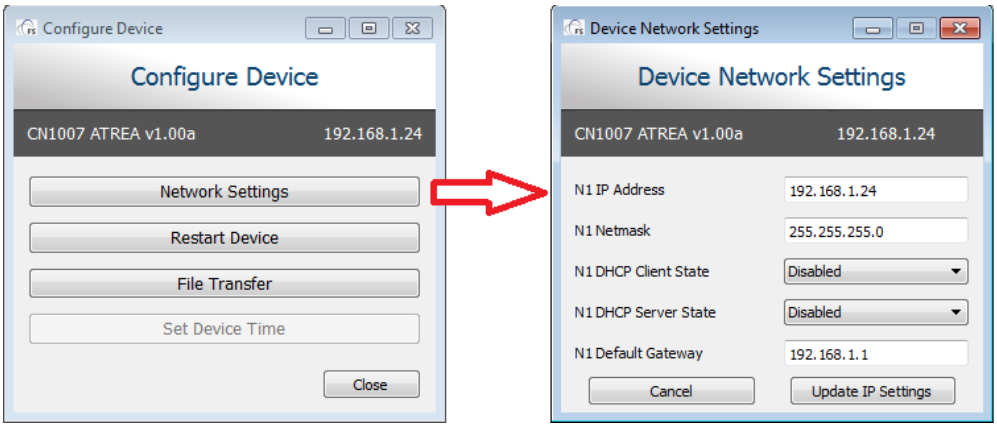


Fig 12: Toolbox IP address setting

8. If the IP address configuration is required, DHCP adjust the “N1 DHCP Client” to the “Enabled”

Fig 13: Toolbox IP DHCP

9. When IP setting is established, continue by inserting the IP address of the module to a internet browser or by clicking the “Connect” button (it opens default internet browser and redirects to module’s IP address)

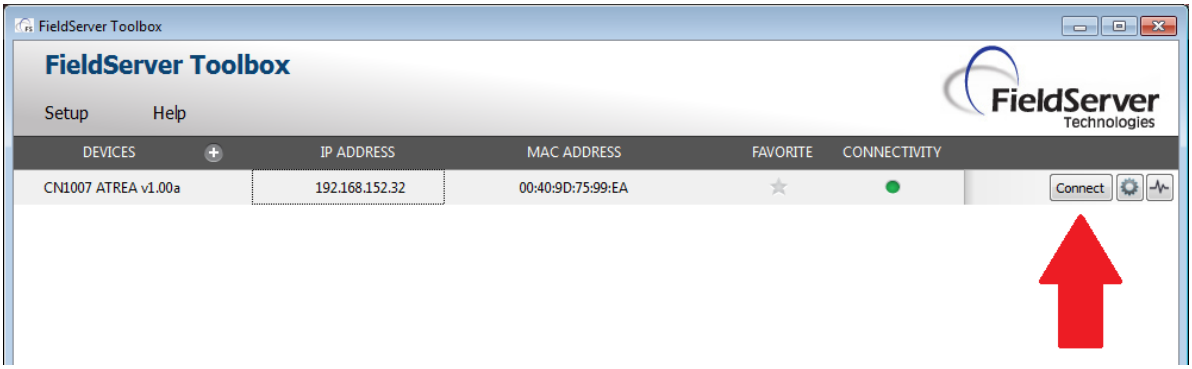


Fig 14: Toolbox connect the device

3.3.2 IP address RESET

If the RD-BACnet/KNX is not accessible on the local network or during direct Ethernet connection, the probable cause might be unknown IP address. The IP address of the module can be rest into the default setting.

Note: The IP reset is available for the BIOS version 4.1.2 or higher!

Procedure:

1. Switch the power off,
2. Remove the plastic cover of the module and connect the jumper according to the picture (from the DIP switches view, connect the left jumper):

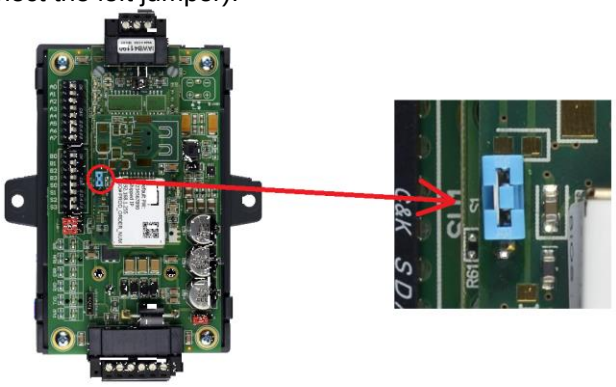


Fig 15: Reset to default

3. Switch the power on,
4. Wait up to 2 minutes – the green RUN LED should start flashing regularly.
5. Remove the jumper.

After the procedure, the IP address is: **192.168.1.24.**

3.3.3 Web server security

The web server of the RD-BACnet/KNX gateway provides several levels of secure access – available with the image CN2077 or later. To find the image version, see the chapter 1.2
The details are contained in the separate document "**ENOTE-Secure_FieldServer.pdf**".
The secure access to the web browser requires to login as approved user. The user management is also described in the mentioned doc.

For the first access to the web server of the RD-BACnet/KNX gateway, use following login data:

- User: **admin**
- Password:
  - **admin** – when the image **CN2077** was downloaded into the gateway with the origin CN1007 image.
  - Use the **default password**, which is placed on the label:

,which is placed on the side of the ProtoNode:

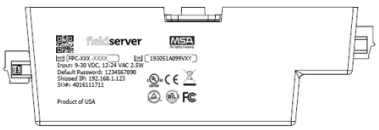


Fig 16: Default password

3.3.4 Create KNX profile

When the RD-BACnet/KNX is switched to KNX protocol (S2 DIP=ON), the web site shows following options:

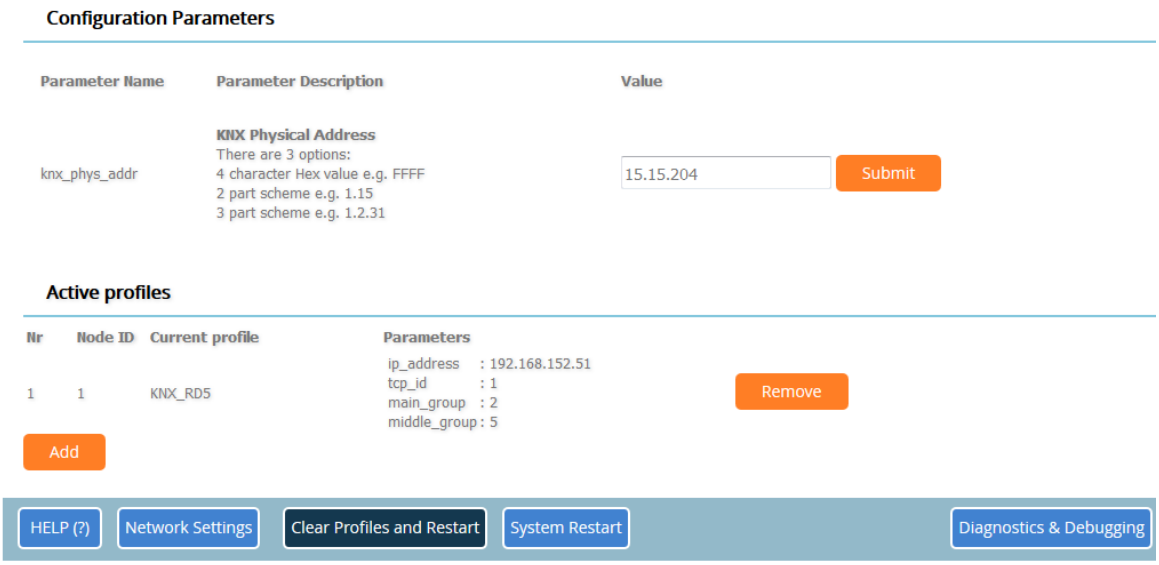


Fig 17: KNX profile setting

KNX Physical Address.... the group address of the RD-BACnet/KNX gateway. The device of the gateway type doesn't expect to be asked on this physical address.

Active profiles....shows created profiles, each profile is used for one ventilation unit communication

Adding of a new profile:

1. Press the "Add" button
2. Fill all the offered text boxes with relevant values:

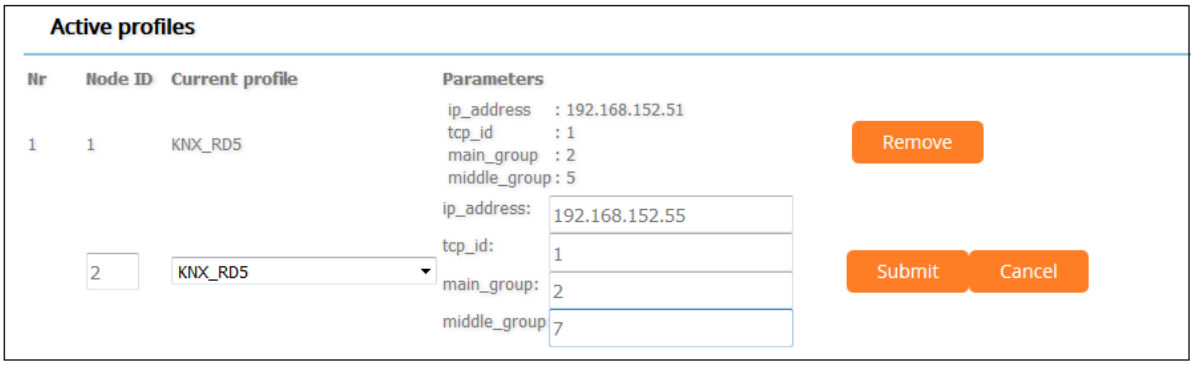


Fig 18: KNX profile setting

- **Node_ID**...identification of the profile i the RD-BACnet/KNX module. The number must be different from already existing profile Node_ID
- **Current profile (listbox)**...chose the apropriate type of the control system, which is installed in the connected ventilation unit (RD4, RD5 or aM)
- **ip_address**...the IP address of the connected ventilation unit
- **tcp_id**...identification id for the Modbus TCP protocol – whatever number in the range 1..255
- **main_group**...the part of the KNX address (**X** . Y . Z) – the part "X" (value 0..31)
- **middle_group**...the part of the KNX address (X . **Y** . Z) – the part "**Y**" (value 0..7)

3. Press the "Submit" button to save the new profile.

3.3.5 Create BACnet IP profile

When the RD-BACnet/KNX is switched to BACnet IP protocol (all the S DIPs are OFF), the web site shows following options:

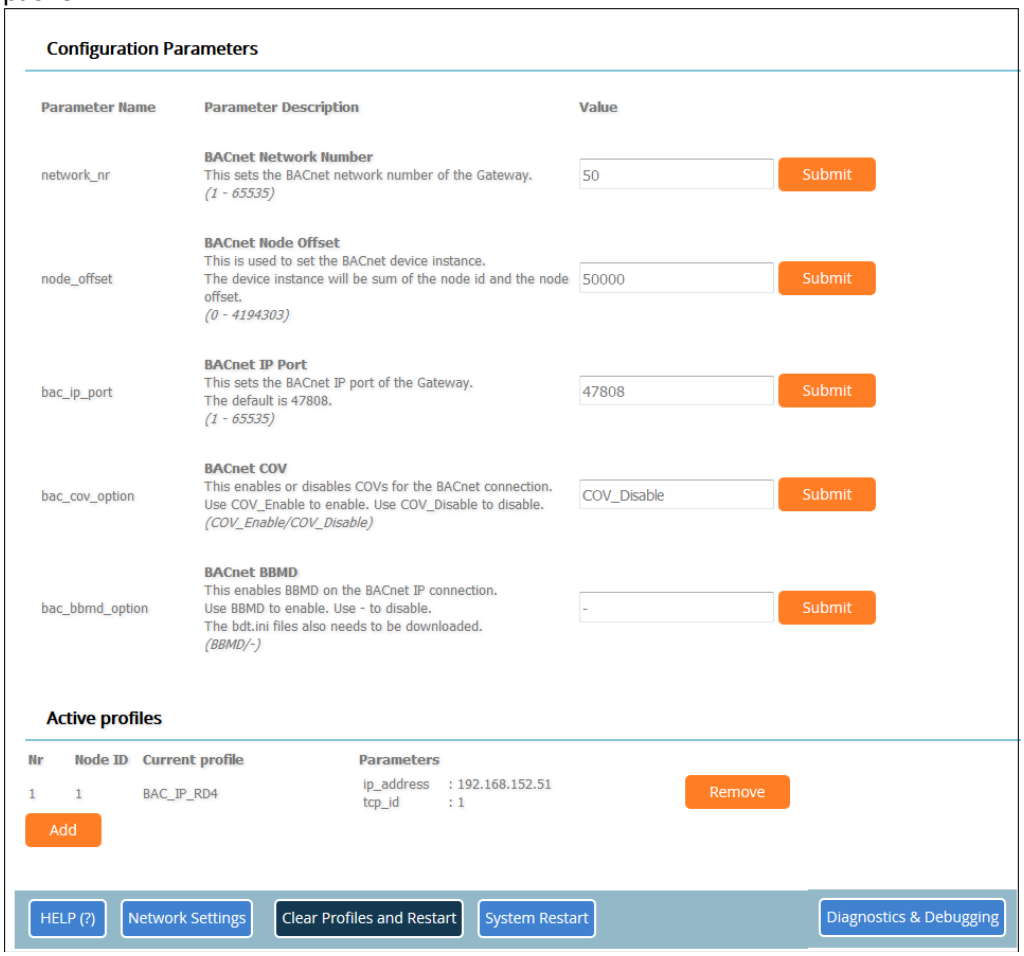


Fig 19: BACnet IP profile setting

The upper part of the window provides BACnet parameters for the Device instance setting:

- The BACnet Device Instances will be calculated by adding the Node_Offset (default value is 50,000) to the device's Modbus Node ID
- The BACnet Device Instance can range from 1 to 4,194,303.
- To assign specific Device Instance values, change the Node_Offset value.

  For example:
  - Node_Offset value (default) = 50,000
  - Device 1 has a Modbus Node-ID of 1
  - Device 2 has a Modbus Node-ID of 22
  - Device 3 has a Modbus Node-ID of 33
  - **Given that: Device Instance = Node_Offset + Modbus Node_ID**
  - Device Instance, Device 1 = 50,000 + 1 = 50,001
  - Device Instance, Device 2 = 50,000 + 22 = 50,022
  - Device Instance, Device 3 = 50,000 + 33 = 50,033

Active profiles....shows created profiles, each profile is used for one ventilation unit communication

Adding of a new profile:

1. Press the "Add" button
2. Fill all the offered text boxes with relevant values:

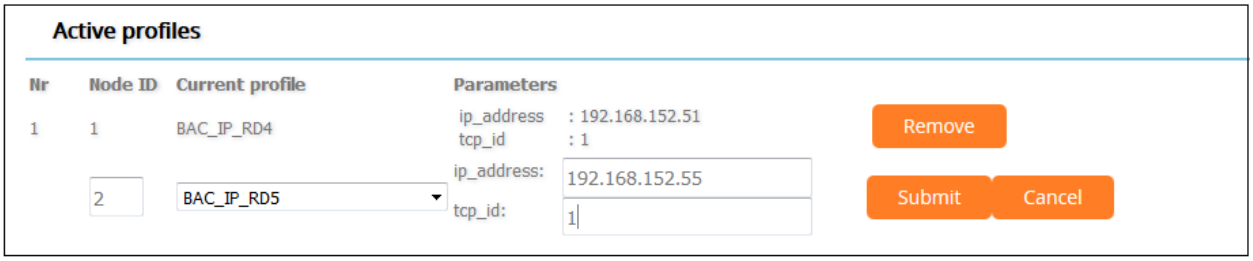


Fig 20: BACnet IP profile setting

- **Node_ID**...identification of the profile i the RD-BACnet/KNX module. The number must be different from already existing profile Node_ID
- **Current profile (listbox)**...chose the apropriate type of the control system, which is installed in the connected ventilation unit (RD4, RD5, SB or aM)
- **ip_address**...the IP address of the connected ventilation unit
- **tcp_id**...identification id for the Modbus TCP protocol – whatever number in the range 1..255

3. Press the "Submit" button to save the new profile

3.3.6 Create BACnet MS/TP profile

When the RD-BACnet/KNX is switched to BACnet MS/TP protocol (S0 DIP is ON), the web site shows following options:

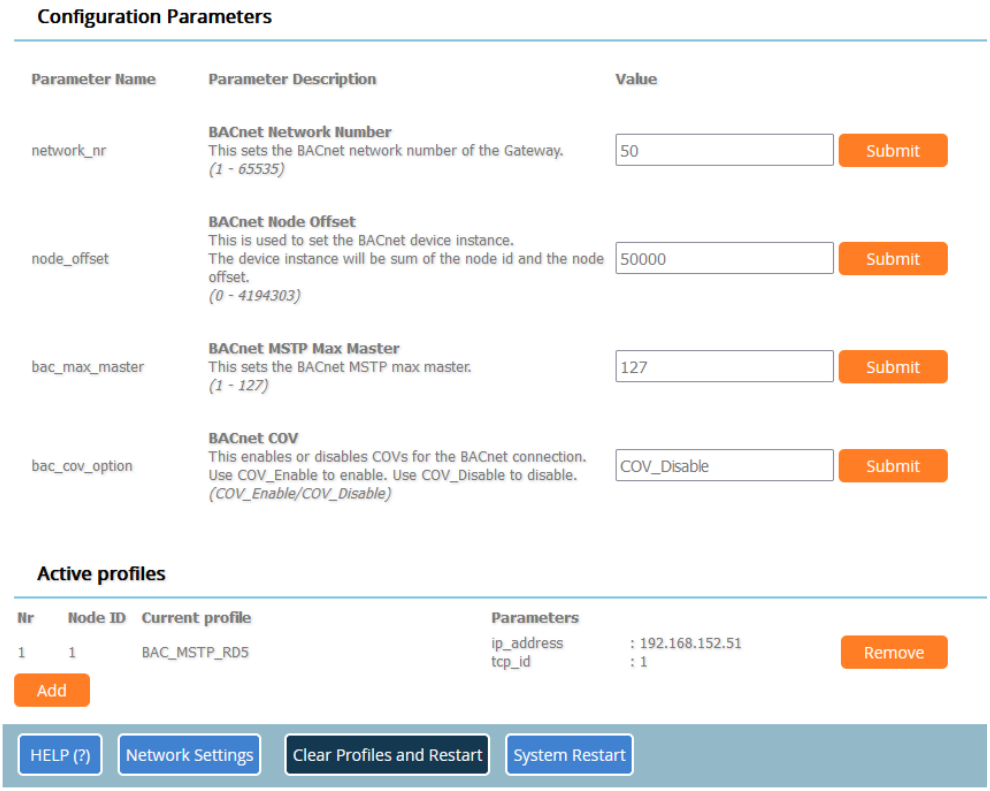


Fig 21: BACnet MS/TP profile setting

The upper part of the window provides BACnet parameters for the Device instance setting.
The setting parameters are similar to the setting for the BACnet IP protocol except the parameter:

"BACnet MSTP MAX Master" – the expected range of master addresses communicating on the BACnet bus.

Active profiles: the same setting as for the BACnet IP during adding the new profile.

3.3.7 How to Start the Installation Over: Clearing Profiles

- After setting your PC to be on the same subnet as the RD-BACnet/KNX (chap. 3.3), open a web browser on your PC and enter the IP address of the ProtoNode;
- If the IP address of the RD-BACnet/KNX has been changed by previous configuration, you will need to get the assigned IP address from the network administrator.
- The Web Configurator will be displayed as your landing page.
- **At the bottom-left of the page, click the "Clear Profiles and Restart" button.**
- Once restart is complete, all the past profiles that were discovered and or added via the Web configurator will be delete. The unit is now ready to be reinstalled.

3.3.8 Profile type

The RD-BACnet/KNX gateway provides following profile types:

Profile type	Description	Gatewy image
BAC_IP_RD4 or KNX_RD4	Use this profile for the communication with the HVAC unit, which are equipped with the **RD4** control system - HVAC unit from 2011 to 2017	CN1007, CN2077
BAC_IP_RD5 or KNX_RD5	Use this profile for the communication with the HVAC unit, which are equipped with the **RD5** control system - HVAC unit from 2016 to now (2023)	CN1007, CN2077
BAC_IP_SB or KNX_SB	Use this profile for the communication with the **SMARTbox**, which are equipped with the **RD5Lbb** control system - **SB** from 2016 to now (2023)	CN2077
BAC_IP_aM or KNX_aM	Use this profile for the communication with the HVAC unit, which are equipped with the **aMotion (RD6)** control system - HVAC unit from 2022 to now (2023)	CN2180 or group of csv for CN2180

3.3.9 A new profile download

The ProtoNode gateway is multipurpose device without strict content of supported function.
The RD-BACnet/KNX is the ProtoNode module, which contains specific mapping profiles for the HVAC unit DUPLEX with the specific type of inbuilt control system.

When a RD-BACnet/KNX is already delivered and the range of profiles should be extended to new profile, it is possible to use downloading appropriate image file or downloading the group of mapping csv files.

Example:
New image file CN2180 provides the set of profiles for the aMotion (RD6) control system in connected HVAC DUPLEX units.

Complete Image download:

- Advantages:
  - All the profiles are ready to use with „oneshot" downloading the CN2180 image

- Disadvantages:
  - the image can be used only for the Protonode with the BIOS 4.1.2 or higher (deliver after 2019)
  - if the image CN2180 is download to incompatible BIOS, the **Protonode stops to run at all**!

Mapping csv files download:

- Advantages:
  - the usage of the CSV tables doesn't affect the function of the OS Protonode and its system
  - the csv download is applicable for whatever BIOS i the Protonode

- Disadvantages:
  - the download process must be repeated for every csv file, so the profiles improvement takes a bit longer time in comparison with the image application.

To apply the sent csv files:

1. Click on the Diagnostics & Debugging button.
2. In the Navigation Tree on the left hand side, go to : SETUP - FILE TRANSFER - **GENERAL tab**.
3. In the GENERAL tab, click on Browse and select the .CSV file.
4. Click on submit.
5. Repeat steps 3 and 4 until all .CSV files from the package "CN2180_profiles.zip".
6. When the final download is complete, click on the SYSTEM RESTART button.

3.3.10 Profile List

Following table contains the information about the profiles released in the year 2023.

Package name	Content	Description	Released
CN2180_profiles.zip	config.csv, prof1b.csv, prof1k.csv, prof2b.csv, prof2k.csv, prof3b.csv, prof3k.csv, prof4b.csv, prof4k.csv, protocol1.csv, protocol5.csv, web_config.csv	All the profiles content for the CN2180 v 6.0 image. **Supported control systems:** - RD4, RD5, aMotion (RD6) and Smartbox. **Supported protocols:** - BACnet IP, KNX TP	26.1.2023
CN2180_Bacnet_smtp.zip	config.csv, prof2m.csv, prof4m.csv, protocol2.csv, web_config.csv	Additional support for the BACnet MS/TP **Supported control systems:** - RD5, aMotion (RD6). **Supported protocols:** - BACnet MS/TP	28.2.2023

Download the packages:

Please contact Airflow, see contact details on page 2.

4 COMMUNICATION OVERVIEW

When IP address and at least one profile is adjusted, the inbuilt web server provides overview of communication with the connected ventilation units.

To access the overview, click on the "Diagnostics & Debugging" button in the bottom right side of the page.

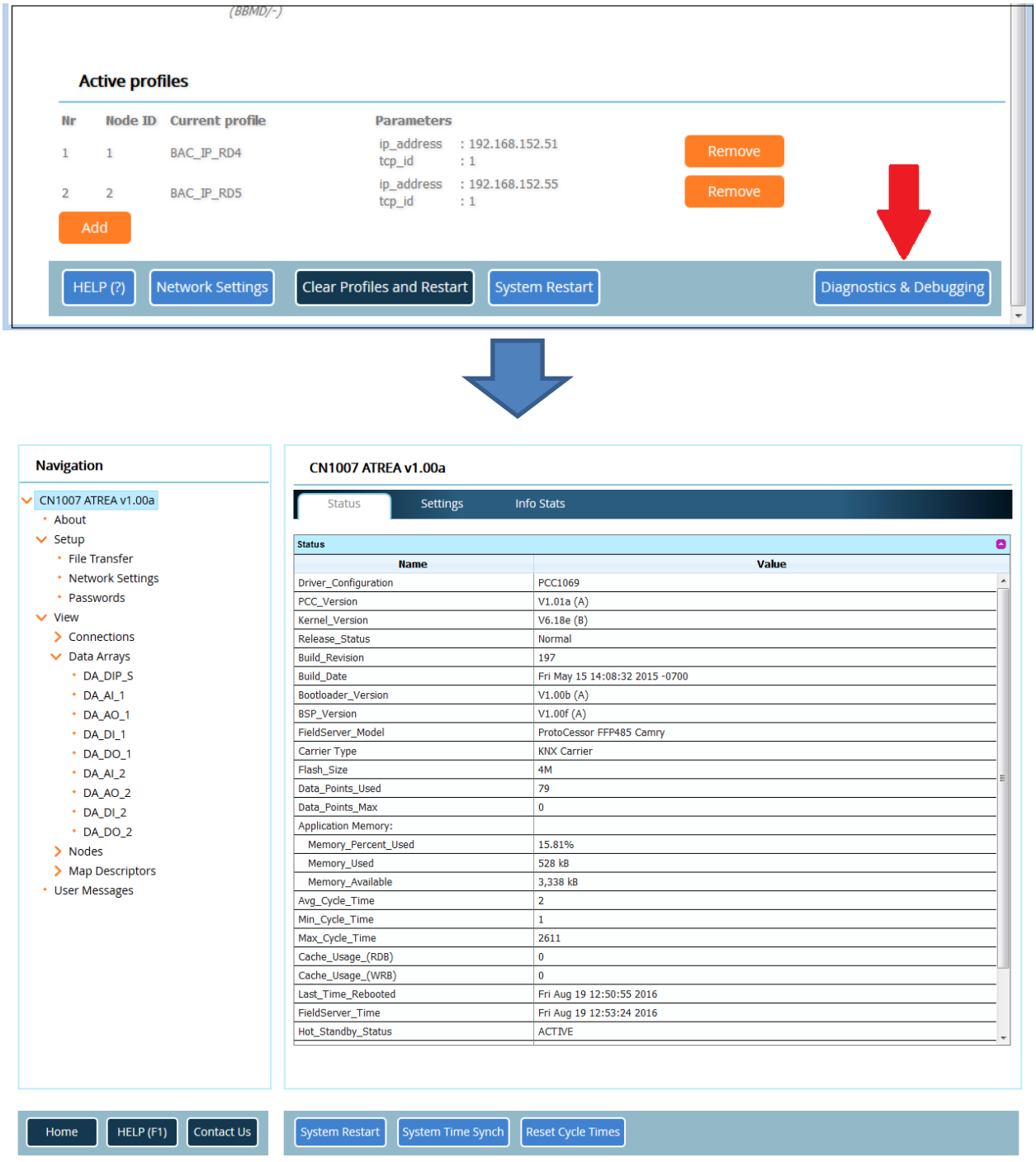


Fig 22: Diagnostics & Debugging

Setup

- File Transfer – used for update (or change) of the RD-BACnet/KNX module.
    - If the update is necessary, go to the section General
    - Click the “Browse” button to search appropriate *.img file with the required sw version
    - Press the “Submit“ button to confirm the image file download
    - When the download is complete, click on the system restart button

      Note: Do not use the file transfer if you are not absolutely sure about the image file function! If wrong image file is downloaded, it might destroy the RD-BACnet/KNX module function.
- Network setting – provides the network parameter of the RD-BACnet/KNX module.
- Passwords – the web site password setting.

View

- Connection – provides status info about the protocol communication
- Data Arrays – shows the datapoint content. The values accords to Modbus TCP communication with particular ventilation units.
    - DA_AI_n – analog inputs for the device profile NODE_ID=n
    - DA_AO_n – analog outputs for the device profile NODE_ID=n
    - DA_DI_n – digital inputs for the device profile NODE_ID=n
    - DA_DO_n – digital outputs for the device profile NODE_ID=n
- Nodes, Map Description – communication details of the data point mapped to particular communication profiles

Example of Data array:

Data Array

Offset	0	1	2	3	4	5	6	7	8	9
0	233	235	235	234	1260	1389	3761	239	1030	708
10	550	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0

Displayed example is table DA_AI_1 (analog inputs of the profile NODE_ID=1). According to the table

Appendix B. RD5 Modbus TCP/IP Mappings:

Line 0, column 0 ~ Temperature TU1

Line 0, column 1 ~ Temperature TU2

See the chapter: 5 Assiging the real data.

5 ASSIGING THE REAL DATA

In order to read the real value of parameters on a connected ventilation unit, it is necessary to translate Modbus TCP representation according to tables in the Appendix B and C.

Procedure:

1. Check the type of the control system of the connected ventilation unit (RD4, RD5,SB or aMotion (RD6)). The profile type should be chosen in the same way.
2. According to the control system, choose the table of addresses for BACnet/KNX protocol – chapter 6, according to the chosen profile (RD4, RD5, SB or aM)
3. Find the Modbus index of the chosen data in the Appendix A – the list of modbus documents to require.
4. Check the Column "Value representation" for the chosen line with relevant Modbus index

Example:

Task: Control of the **Demanded temperature** via the **KNX** protocol on the ventilation unit with the **RD5** control system.

Assumption: The relevant profile is set to group address e.g. 2/5/n...where n is the address according to the table in the chap. 7.

1. Find the line with Demanded temperature – the line has the last part of KNX group address 0:XXX:024. I.e. the complete group address for the demanded temperature is 2/5/24
2. See the Appendix C.2 to find the value representation – searched index is H10706 (H = holding register). The result is

- *H10706 Required temper. R 100-400 10-40°C*

- It means that minimal value is 100 ~ 10°C, maximal value 400 ~ 40°C. Demanded temperature 23,5°C is represented by the value=235.

Checking the value of the „Demanded temperature" parameter:

- Search the Data Array Offset:
  - Go to "Navigation – View – Map Descriptors – find the "Demanded temperature"
  - Find the values of the parameters **Data_Array Name** and **Data Array offset**

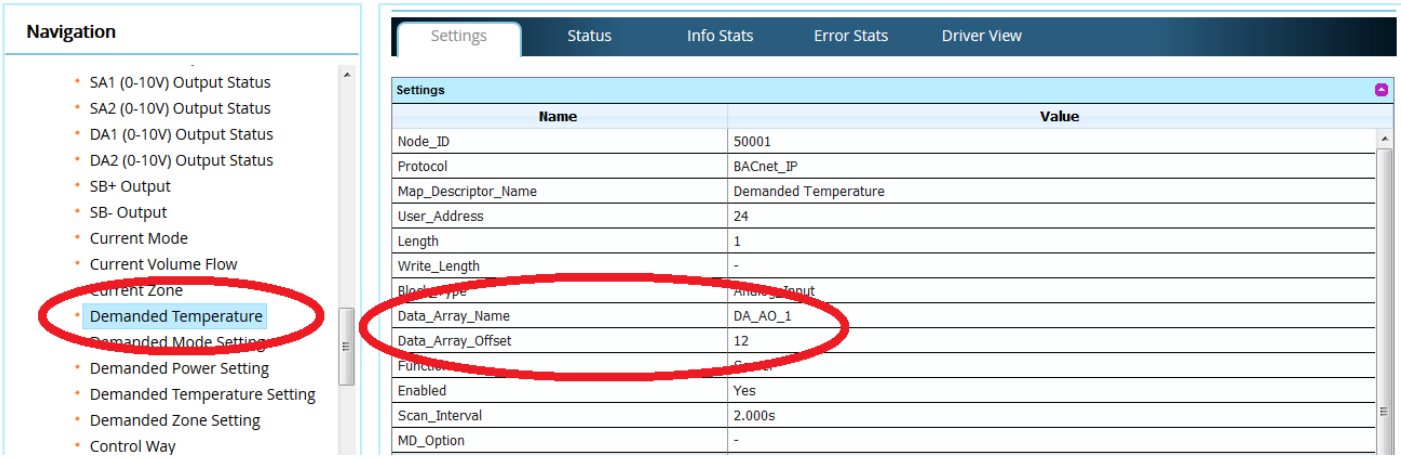


Fig 23: Data reading from map list

- Then go to the “Navigation – View – Data Arrays - DA_AO_1 menu to see the data table
- Search the field according to the found Data_Array_Offset value (line 10 +column 2 = offset 12)

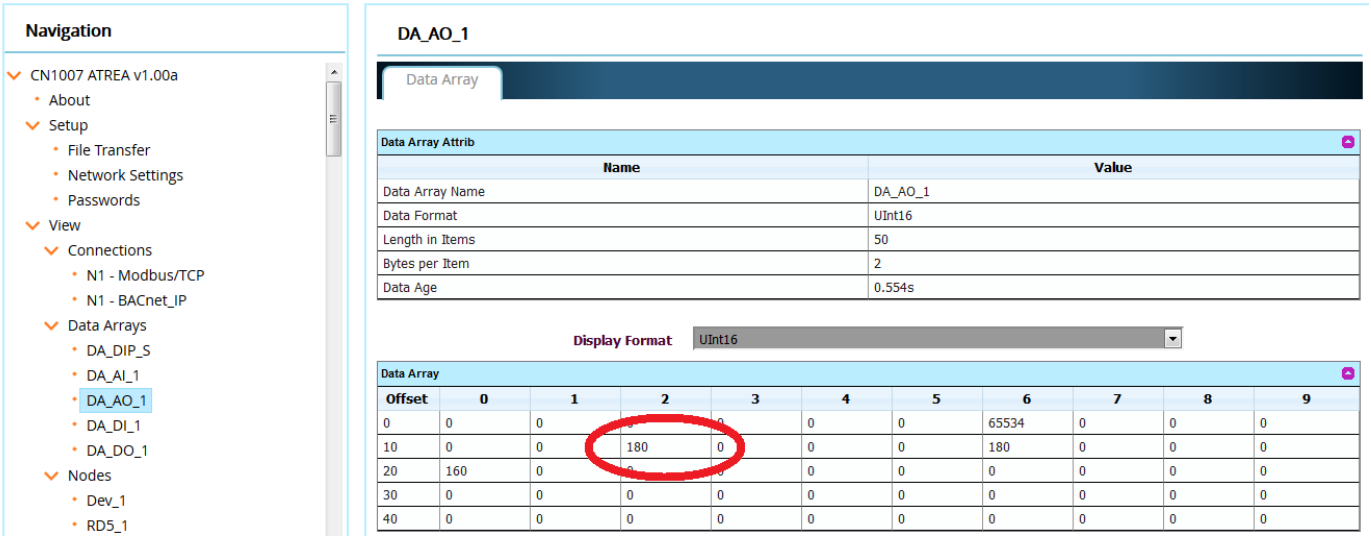


Fig 24: Data reading from array table

The value of the demanded temperature is 18°C.

6 DATA POINT CONTENT

Following tables contains all the data point for provided profiles and protocols. It is possible to use relevant file export to download the data points according to the following key:

Protocol	Profile	image	File name
BACnet	BAC_IP_RD4	CN1007	-
	BAC_IP_RD5	CN1007	EDE_BAC_RD5_CN1007.csv
	BAC_IP_RD5	CN2077	EDE_BAC_RD5_CN2077.csv
	BAC_IP_SB	CN2077	EDE_BAC_SB_CN2077.csv
	BAC_IP_aM	CN2180	EDE_BAC_aM_CN2180.csv
KNX	KNX_RD4	CN1007	-
	KNX_RD5	CN1007	ETS_config_RD5_CN1007.xml
	KNX_RD5	CN2077	ETS_config_RD_CN2077.xml
	KNX_SB	CN2077	ETS_config_SB_CN2077.xml
	KNX_ aM	CN2180	ETS_config_aM_CN2180.xml

The mentioned files can be provided on require.

6.1 **RD4** Modbus TCP/IP Mappings BACnet/IP and KNX, img CN1007 and CN2077

Point Name	BACnet Object Type	BACnet Object ID	Modbus Data Type	Modbus Register	KNX Address –READ (Main/Middle/?)	KNX Address – WRITE (Main/Middle/?)	KNX Data type
TU1 Temperature	AI	1	Input_Reg.	00200	Ma/Mi:001	-	9.001 Temperature
TU2 Temperature	AI	2	Input_Reg.	00201	Ma/Mi/002	-	9.001 Temperature
TA2 Temperature	AI	3	Input_Reg.	00202	Ma/Mi/003	-	9.001 Temperature
TEa Temperature	AI	4	Input_Reg.	00203	Ma/Mi/004	-	9.001 Temperature
TEb Temperature	AI	5	Input_Reg.	00204	Ma/Mi/005	-	9.001 Temperature
IN1 (0-10V) Input Status	AI	6	Input_Reg.	00205	Ma/Mi/006	-	9.020 Voltage
IN2 (0-10V) Input Status	AI	7	Input_Reg.	00206	Ma/Mi/007	-	9.020 Voltage
DP1 (0-10V) Input Status	AI	8	Input_Reg.	00207	Ma/Mi/008	-	9.020 Voltage
DP2 (0-10V) Input Status	AI	9	Input_Reg.	00208	Ma/Mi/009	-	9.020 Voltage
DP3 (0-10V) Input Status	AI	10	Input_Reg.	00209	Ma/Mi/010	-	9.020 Voltage
Room Temperature 1	AI	11	Input_Reg.	00210	Ma/Mi/011	-	9.001 Temperature
Room Temperature 2	AI	12	Input_Reg.	00211	Ma/Mi/012	-	9.001 Temperature
Room Temperature 3	AI	13	Input_Reg.	00212	Ma/Mi/013	-	9.001 Temperature
Room Temperature 4	AI	14	Input_Reg.	00213	Ma/Mi/014	-	9.001 Temperature
M1 (0-10V) Output Status	AI	15	Holding_Reg.	00200	Ma/Mi/015	-	9.020 Voltage
M2 (0-10V) Output Status	AI	16	Holding_Reg.	00201	Ma/Mi/016	-	9.020 Voltage
SC (0-10V) Output Status	AI	17	Holding_Reg.	00202	Ma/Mi/017	-	9.020 Voltage
SA1 (0-10V) Output Status	AI	18	Holding_Reg.	00203	Ma/Mi/018	-	9.020 Voltage
SA2 (0-10V) Output Status	AI	19	Holding_Reg.	00204	Ma/Mi/019	-	9.020 Voltage
DA1 (0-10V) Output Status	AI	20	Holding_Reg.	00205	Ma/Mi/020	-	9.020 Voltage
DA2 (0-10V) Output Status	AI	21	Holding_Reg.	00206	Ma/Mi/021	-	9.020 Voltage
Current Mode	AI	22	Holding_Reg.	01000	Ma/Mi/022	-	2 Byte
Current Volume Flow	AI	23	Holding_Reg.	01001	Ma/Mi/023	-	9.007 Percentage
Current Zone	AI	24	Holding_Reg.	01002	Ma/Mi/024	-	2 Byte
Demanded Temperature	AI	25	Holding_Reg.	01006	Ma/Mi/025	-	9.001 Temperature
Demanded Mode Setting	AV	26	Holding_Reg.	01008	Ma/Mi/026	Ma/Mi+1/026	2 Byte
Demanded Power Setting	AV	27	Holding_Reg.	01009	Ma/Mi/027	Ma/Mi+1/027	9.007 Percentage

Demanded Temperature Setting	AV	28	Holding_Reg.	01010	Ma/Mi/028	Ma/Mi+1/028	9.001 Temperature
Demanded Zone Setting	AV	29	Holding_Reg.	01011	Ma/Mi/029	Ma/Mi+1/029	2 Byte
Demanded Mode Setting	AV	30	Holding_Reg.	01012	Ma/Mi/030	Ma/Mi+1/030	2 Byte
Demanded Power Setting	AV	31	Holding_Reg.	01013	Ma/Mi/031	Ma/Mi+1/031	9.007 Percentage
Demanded Temperature Setting	AV	32	Holding_Reg.	01014	Ma/Mi/032	Ma/Mi+1/032	9.001 Temperature
Mode Control Way	AV	33	Holding_Reg.	01015	Ma/Mi/033	Ma/Mi+1/033	2 Byte
Volume Flow Control Way	AV	34	Holding_Reg.	01016	Ma/Mi/034	Ma/Mi+1/034	2 Byte
Temporary Control Way	AV	35	Holding_Reg.	01017	Ma/Mi/035	Ma/Mi+1/035	2 Byte
Language Setting	AV	36	Holding_Reg.	01200	Ma/Mi/036	Ma/Mi+1/036	2 Byte
AHU Unit Ready	BI	37	Discrete_In.	00001	Ma/Mi/037	-	1 bit
D1 Input Status	BI	38	Discrete_In.	00200	Ma/Mi/038	-	1 bit
D2 Input Status	BI	39	Discrete_In.	00201	Ma/Mi/039	-	1 bit
D3 Input Status	BI	40	Discrete_In.	00202	Ma/Mi/040	-	1 bit
D4 Input Status	BI	41	Discrete_In.	00203	Ma/Mi/041	-	1 bit
STP Input Status	BI	42	Discrete_In.	00204	Ma/Mi/042	-	1 bit
TR Input Status	BI	43	Discrete_In.	00205	Ma/Mi/043	-	1 bit
DF Input Status	BI	44	Discrete_In.	02007	Ma/Mi/044	-	1 bit
TR Input Status - Filter Manostats	BI	45	Discrete_In.	01400	Ma/Mi/045	-	1 bit
TEa Temperature Sensor Failure	BI	46	Discrete_In.	01401	Ma/Mi/046	-	1 bit
TEb Temperature Sensor Failure	BI	47	Discrete_In.	01402	Ma/Mi/047	-	1 bit
Heat Recovery Frost Protection	BI	48	Discrete_In.	01403	Ma/Mi/048	-	1 bit
Poor Heat Pump Operation	BI	49	Discrete_In.	01404	Ma/Mi/049	-	1 bit
TA2 Temperature Sensor Failure	BI	50	Discrete_In.	01405	Ma/Mi/050	-	1 bit
1st Frost Protect. - Water Heater	BI	51	Discrete_In.	01406	Ma/Mi/051	-	1 bit
2nd Frost Protect. - Water Heater	BI	52	Discrete_In.	01407	Ma/Mi/052	-	1 bit
STP Input Activated	BI	53	Discrete_In.	01408	Ma/Mi/053	-	1 bit
TU1 Temperature Sensor Failure	BI	54	Discrete_In.	01409	Ma/Mi/054	-	1 bit
TU2 Temperature Sensor Failure	BI	55	Discrete_In.	01410	Ma/Mi/055	-	1 bit
Unit Orientation Is Not Set	BI	56	Discrete_In.	01411	Ma/Mi/056	-	1 bit
Heater Type Is Not Set	BI	57	Discrete_In.	01412	Ma/Mi/057	-	1 bit
Pressure Gauge Failure	BI	58	Discrete_In.	01413	Ma/Mi/058	-	1 bit
Communication Failure	BI	59	Discrete_In.	01414	Ma/Mi/059	-	1 bit
Unit Overheating	BI	60	Discrete_In.	01415	Ma/Mi/060	-	1 bit
Higher Tariff	BI	61	Discrete_In.	01416	Ma/Mi/061	-	1 bit
Room Temperature Sensor Error	BI	62	Discrete_In.	01417	Ma/Mi/062	-	1 bit
Unit Is Not Commissioned	BI	63	Discrete_In.	01418	Ma/Mi/063	-	1 bit
Disbalanced Volume Flow Sup/Eta	BI	64	Discrete_In.	01419	Ma/Mi/064	-	1 bit
KK Output Status	BI	65	Coil	00202	Ma/Mi/065	-	1 bit
YV2 Output Status	BI	66	Coil	00203	Ma/Mi/066	-	1 bit
YV1 Output Status	BI	67	Coil	00204	Ma/Mi/067	-	1 bit
SZ1 Output Status	BI	68	Coil	00205	Ma/Mi/068	-	1 bit
SZ2 Output Status	BI	69	Coil	00206	Ma/Mi/069	-	1 bit
SV Output Status	BI	70	Coil	00207	Ma/Mi/070	-	1 bit
EXT Output Status	BI	71	Coil	00208	Ma/Mi/071	-	1 bit
SDB Output Status	BI	72	Coil	00209	Ma/Mi/072	-	1 bit

SB- Output Status	BI	73	Coil	00210	Ma/Mi/073	-	1 bit
SB+ Output Status	BI	74	Coil	00211	Ma/Mi/074	-	1 bit
SE Output Status	BI	75	Coil	00215	Ma/Mi/075	-	1 bit
SC Output Status	BI	76	Coil	00216	Ma/Mi/076	-	1 bit
OC1 Output Status	BI	77	Coil	00217	Ma/Mi/077	-	1 bit
Heating/Nonheating Season	BV	78	Coil	01200	Ma/Mi/078	Ma/Mi+1/078	1 bit

6.2 RD5 Modbus TCP/IP Mappings to BACnet/IP and KNX, img CN1007

Point Name	BACnet Object Type	BACnet Object ID	Modbus Data Type	Modbus Register	KNX Address –READ (Main/Middle/?)	KNX Address – WRITE (Main/Middle/?)	KNX Data type
TU1 Temperature	AI	1	Input_Reg.	10200	Ma/Mi/001	-	9.001 Temperature
TU2 Temperature	AI	2	Input_Reg.	10201	Ma/Mi/002	-	9.001 Temperature
TA2 Temperature	AI	3	Input_Reg.	10204	Ma/Mi/003	-	9.001 Temperature
TEa Temperature	AI	4	Input_Reg.	10202	Ma/Mi/004	-	9.001 Temperature
TEb Temperature	AI	5	Input_Reg.	10203	Ma/Mi/005	-	9.001 Temperature
IN1 (0-10V) Input Status	AI	6	Input_Reg.	10205	Ma/Mi/006	-	9.020 Voltage
IN2 (0-10V) Input Status	AI	7	Input_Reg.	10206	Ma/Mi/007	-	9.020 Voltage
DP1 (0-10V) Input Status	AI	8	Input_Reg.	10208	Ma/Mi/008	-	9.020 Voltage
DP2 (0-10V) Input Status	AI	9	Input_Reg.	10209	Ma/Mi/009	-	9.020 Voltage
DP3 (0-10V) Input Status	AI	10	Input_Reg.	10210	Ma/Mi/010	-	9.020 Voltage
Room Temperature	AI	11	Input_Reg.	10207	Ma/Mi/011	-	9.001 Temperature
M1 (0-10V) Output Status	AI	12	Holding_Reg.	10200	Ma/Mi/012	-	9.020 Voltage
M2 (0-10V) Output Status	AI	13	Holding_Reg.	10201	Ma/Mi/013	-	9.020 Voltage
SC (0-10V) Output Status	AI	14	Holding_Reg.	10204	Ma/Mi/014	-	9.020 Voltage
SA1 (0-10V) Output Status	AI	15	Holding_Reg.	10202	Ma/Mi/015	-	9.020 Voltage
SA2 (0-10V) Output Status	AI	16	Holding_Reg.	10203	Ma/Mi/016	-	9.020 Voltage
DA1 (0-10V) Output Status	AI	17	Holding_Reg.	10207	Ma/Mi/017	-	9.020 Voltage
DA2 (0-10V) Output Status	AI	18	Holding_Reg.	10208	Ma/Mi/018	-	9.020 Voltage
SB+ Output	AI	19	Holding_Reg.	10205	Ma/Mi/019	-	9.011 Time
SB- Output	AI	20	Holding_Reg.	10206	Ma/Mi/020	-	9.011 Time
Current Mode	AI	21	Holding_Reg.	10705	Ma/Mi/021	-	2 Byte
Current Volume Flow	AI	22	Holding_Reg.	10704	Ma/Mi/022	-	9.007 Percentage
Current Zone	AI	23	Holding_Reg.	10707	Ma/Mi/023	-	2 Byte
Demanded Temperature	AI	24	Holding_Reg.	10706	Ma/Mi/024	-	9.001 Temperature
Demanded Mode Setting	AV	25	Holding_Reg.	10709	Ma/Mi/025	Ma/Mi+1/025	2 Byte
Demanded Power Setting	AV	26	Holding_Reg.	10708	Ma/Mi/026	Ma/Mi+1/026	9.007 Percentage
Demanded Temperature Setting	AV	27	Holding_Reg.	10710	Ma/Mi/027	Ma/Mi+1/027	9.001 Temperature
Demanded Zone Setting	AV	28	Holding_Reg.	10711	Ma/Mi/028	Ma/Mi+1/028	2 Byte
Control Way	AV	29	Holding_Reg.	10700	Ma/Mi/029	Ma/Mi+1/029	2 Byte
Language Setting	AV	30	Holding_Reg.	10900	Ma/Mi/030	Ma/Mi+1/030	2 Byte
Heating/Nonheating Season Setting	AV	31	Holding_Reg.	11401	Ma/Mi/031	Ma/Mi+1/031	2 Byte
HS/NHS Switching Temperature	AV	32	Holding_Reg.	11402	Ma/Mi/032	Ma/Mi+1/032	9.001 Temperature
D1 Input Status	BI	33	Discrete_In.	10200	Ma/Mi/033	-	1 bit
D2 Input Status	BI	34	Discrete_In.	10201	Ma/Mi/034	-	1 bit
D3 Input Status	BI	35	Discrete_In.	10202	Ma/Mi/035	-	1 bit
D4 Input Status	BI	36	Discrete_In.	10203	Ma/Mi/036	-	1 bit
STP Input Status	BI	37	Discrete_In.	10204	Ma/Mi/037	-	1 bit

TR Input Status	BI	38	Discrete_In.	10205	Ma/Mi/038	-	1 bit
DF Input Status	BI	39	Discrete_In.	10207	Ma/Mi/039	-	1 bit
TR Input Status - Filter Manostats	BI	40	Discrete_In.	11122	Ma/Mi/040	-	1 bit
TEa Temperature Sensor Failure	BI	41	Discrete_In.	11109	Ma/Mi/041	-	1 bit
TEb Temperature Sensor Failure	BI	42	Discrete_In.	11110	Ma/Mi/042	-	1 bit
TU1 Temperature Sensor Failure	BI	43	Discrete_In.	11107	Ma/Mi/043	-	1 bit
TU2 Temperature Sensor Failure	BI	44	Discrete_In.	11108	Ma/Mi/044	-	1 bit
Heat Exchanger frost	BI	45	Discrete_In.	11117	Ma/Mi/045	-	1 bit
Insufficient power of the prim. Heater	BI	46	Discrete_In.	11121	Ma/Mi/046	-	1 bit
TA2 Temperature Sensor Failure	BI	47	Discrete_In.	11111	Ma/Mi/047	-	1 bit
1st Frost Protect.-Water Heater	BI	48	Discrete_In.	11115	Ma/Mi/048	-	1 bit
2nd Frost Protect.-Water Heater	BI	49	Discrete_In.	11103	Ma/Mi/049	-	1 bit
STP Input Activated	BI	50	Discrete_In.	11104	Ma/Mi/050	-	1 bit
RD-IO communication failure	BI	51	Discrete_In.	11112	Ma/Mi/051	-	1 bit
Orientation is not set	BI	52	Discrete_In.	11101	Ma/Mi/052	-	1 bit
No heater is set	BI	53	Discrete_In.	11102	Ma/Mi/053	-	1 bit
Unit Overheating	BI	54	Discrete_In.	11100	Ma/Mi/054	-	1 bit
Higher Tariff	BI	55	Discrete_In.	11119	Ma/Mi/055	-	1 bit
Room Temeprature Sensor Error	BI	56	Discrete_In.	11116	Ma/Mi/056	-	1 bit
Unit Is Not Commissioned	BI	57	Discrete_In.	11140	Ma/Mi/057	-	1 bit
Disbalanced Volume Flow	BI	58	Discrete_In.	11114	Ma/Mi/058	-	1 bit
IN2 Input Failuer	BI	59	Discrete_In.	11124	Ma/Mi/059	-	1 bit
INk11 Input Failuer	BI	60	Discrete_In.	11125	Ma/Mi/060	-	1 bit
INk21 Input Failuer	BI	61	Discrete_In.	11126	Ma/Mi/061	-	1 bit
INk31 Input Failuer	BI	62	Discrete_In.	11127	Ma/Mi/062	-	1 bit
INk41 Input Failuer	BI	63	Discrete_In.	11128	Ma/Mi/063	-	1 bit
INk12Input Failuer	BI	64	Discrete_In.	11129	Ma/Mi/064	-	1 bit
INk22 Input Failuer	BI	65	Discrete_In.	11130	Ma/Mi/065	-	1 bit
INk32 Input Failuer	BI	66	Discrete_In.	11131	Ma/Mi/066	-	1 bit
INk42 Input Failuer	BI	67	Discrete_In.	11132	Ma/Mi/067	-	1 bit
---no use---	BI	68	Discrete_In.	11133	Ma/Mi/068	-	1 bit
KK Output Status	BI	69	Coil	10200	Ma/Mi/069	-	1 bit
YV2 Output Status	BI	70	Coil	10202	Ma/Mi/070	-	1 bit
YV1 Output Status	BI	71	Coil	10201	Ma/Mi/071	-	1 bit
SZ1 Output Status	BI	72	Coil	10203	Ma/Mi/072	-	1 bit
SZ2 Output Status	BI	73	Coil	10204	Ma/Mi/073	-	1 bit
SV Output Status	BI	74	Coil	10205	Ma/Mi/074	-	1 bit
EXT Output Status	BI	75	Coil	10206	Ma/Mi/075	-	1 bit
SDB Output Status	BI	76	Coil	10207	Ma/Mi/076	-	1 bit
SE Output Status	BI	77	Coil	10215	Ma/Mi/077	-	1 bit
SC Output Status	BI	78	Coil	10216	Ma/Mi/078	-	1 bit
OC1 Output Status	BI	79	Coil	10217	Ma/Mi/079	-	1 bit

6.3 RD5 Modbus TCP/IP Mappings to BACnet/IP and KNX, img CN2077

Point Name	BACnet Object Type	BACnet Object ID	Modbus Data Type	Modbus Register	KNX Address –READ (Main/Middle/?)	KNX Address – WRITE (Main/Middle/?)	KNX Data type
T-ODA Temperature	AI	1	Input_Reg.	10211	Ma/Mi/001	-	9.001 Temperature
T-SUP Temperature	AI	2	Input_Reg.	10212	Ma/Mi/002	-	9.001 Temperature
T-ETA Temperature	AI	3	Input_Reg.	10213	Ma/Mi/003	-	9.001 Temperature
T-EHA Temperature	AI	4	Input_Reg.	10214	Ma/Mi/004	-	9.001 Temperature
T-IDA Temperature	AI	5	Input_Reg.	10215	Ma/Mi/005	-	9.001 Temperature
IN1 (0-10V) Input Status	AI	6	Input_Reg.	10205	Ma/Mi/006	-	9.020 Voltage
IN2 (0-10V) Input Status	AI	7	Input_Reg.	10206	Ma/Mi/007	-	9.020 Voltage
DP1 (0-10V) Input Status	AI	8	Input_Reg.	10208	Ma/Mi/008	-	9.020 Voltage
DP2 (0-10V) Input Status	AI	9	Input_Reg.	10209	Ma/Mi/009	-	9.020 Voltage
DP3 (0-10V) Input Status	AI	10	Input_Reg.	10210	Ma/Mi/010	-	9.020 Voltage
M1 (0-10V) Output Status	AI	11	Holding_Reg.	10200	Ma/Mi/011	-	9.020 Voltage
M2 (0-10V) Output Status	AI	12	Holding_Reg.	10201	Ma/Mi/012	-	9.020 Voltage
SA1 (0-10V) Output Status	AI	13	Holding_Reg.	10202	Ma/Mi/013	-	9.020 Voltage
SA2 (0-10V) Output Status	AI	14	Holding_Reg.	10203	Ma/Mi/014	-	9.020 Voltage
SC (0-10V) Output Status	AI	15	Holding_Reg.	10204	Ma/Mi/015	-	9.020 Voltage
SB+ Output	AI	16	Holding_Reg.	10205	Ma/Mi/016	-	9.011 Time
SB- Output	AI	17	Holding_Reg.	10206	Ma/Mi/017	-	9.011 Time
DA1 (0-10V) Output Status	AI	18	Holding_Reg.	10207	Ma/Mi/018	-	9.020 Voltage
DA2 (0-10V) Output Status	AI	19	Holding_Reg.	10208	Ma/Mi/019	-	9.020 Voltage
KK Output Status	BI	20	Coil	10200	Ma/Mi/020	-	1 bit
YV1 Output Status	BI	21	Coil	10201	Ma/Mi/021	-	1 bit
YV2 Output Status	BI	22	Coil	10202	Ma/Mi/022	-	1 bit
SZ1 Output Status	BI	23	Coil	10203	Ma/Mi/023	-	1 bit
SZ2 Output Status	BI	24	Coil	10204	Ma/Mi/024	-	1 bit
SV Output Status	BI	25	Coil	10205	Ma/Mi/025	-	1 bit
EXT Output Status	BI	26	Coil	10206	Ma/Mi/026	-	1 bit
SDB Output Status	BI	27	Coil	10207	Ma/Mi/027	-	1 bit
SE Output Status	BI	28	Coil	10216	Ma/Mi/028	-	1 bit
SC Output Status	BI	29	Coil	10217	Ma/Mi/029	-	1 bit
D1 Input Status	BI	30	Discrete_In.	10200	Ma/Mi/030	-	1 bit
D2 Input Status	BI	31	Discrete_In.	10201	Ma/Mi/031	-	1 bit
D3 Input Status	BI	32	Discrete_In.	10202	Ma/Mi/032	-	1 bit
D4 Input Status	BI	33	Discrete_In.	10203	Ma/Mi/033	-	1 bit
STP Input Status	BI	34	Discrete_In.	10204	Ma/Mi/034	-	1 bit
TR Input Status	BI	35	Discrete_In.	10205	Ma/Mi/035	-	1 bit
DF Input Status	BI	36	Discrete_In.	10200	Ma/Mi/036	-	1 bit
Power - control mode	AV	37	Holding_Reg.	10700	Ma/Mi/037	Ma/Mi+1/037	2 Byte
Running mode - control mode	AV	38	Holding_Reg.	10701	Ma/Mi/038	Ma/Mi+1/038	2 Byte
Temperature - control mode	AV	39	Holding_Reg.	10702	Ma/Mi/039	Ma/Mi+1/039	2 Byte

Zone - control mode	AV	40	Holding_Reg.	10703	Ma/Mi/040	Ma/Mi+1/040	2 Byte
Current Rq.Power	AV	41	Holding_Reg.	10704	Ma/Mi/041	-	9.007 Percentage
Current Rq.Mode	AV	42	Holding_Reg.	10705	Ma/Mi/042	-	2 Byte
Current Rq.Temperature	AV	43	Holding_Reg.	10706	Ma/Mi/043	-	9.001 Temperature
Current Rq.Zone	AV	44	Holding_Reg.	10707	Ma/Mi/044	-	2 Byte
Power - Manual set	AV	45	Holding_Reg.	10708	Ma/Mi/045	Ma/Mi+1/045	9.007 Percentage
Mode - Manual set	AV	46	Holding_Reg.	10709	Ma/Mi/046	Ma/Mi+1/046	2 Byte
Temperature - Manual set	AV	47	Holding_Reg.	10710	Ma/Mi/047	Ma/Mi+1/047	9.001 Temperature
Zone - Manual set	AV	48	Holding_Reg.	10711	Ma/Mi/048	Ma/Mi+1/048	2 Byte
Forced mode	AI	49	Holding_Reg.	10712	Ma/Mi/049	-	2 Byte
Heating/Nonheat.Season Set	AV	50	Holding_Reg.	11401	Ma/Mi/050	Ma/Mi+1/050	2 Byte
HS/NHS Switching Temper.	AV	51	Holding_Reg.	11402	Ma/Mi/051	Ma/Mi+1/051	9.001 Temperature
Averaging int.HS/NHS switch	AI	52	Holding_Reg.	11431	Ma/Mi/052	Ma/Mi+1/052	2 Byte
Current HS/NHS	AI	53	Input_Reg.	11400	Ma/Mi/053	-	2 Byte
T-ODA calculated average	AI	54	Input_Reg.	11420	Ma/Mi/054	-	9.001 Temperature
Alarm Reset	BV	55	Coil	10005	Ma/Mi/055	Ma/Mi+1/055	1 bit
Filter Reset	BV	56	Coil	10006	Ma/Mi/056	Ma/Mi+1/056	1 bit
Alarms and notifications							
Unit Overheating	BI	57	Discrete_In.	11100	Ma/Mi/057	-	1.005 Alarm
Orientation is Not Set	BI	58	Discrete_In.	11101	Ma/Mi/058	-	1.005 Alarm
No Heater is set	BI	59	Discrete_In.	11102	Ma/Mi/059	-	1.005 Alarm
2nd Frost Protection	BI	60	Discrete_In.	11103	Ma/Mi/060	-	1.005 Alarm
STP Input Activated	BI	61	Discrete_In.	11104	Ma/Mi/061	-	1.005 Alarm
DP1 Pressure Gauge Failure	BI	62	Discrete_In.	11105	Ma/Mi/062	-	1.005 Alarm
DP2 Pressure Gauge Failure	BI	63	Discrete_In.	11106	Ma/Mi/063	-	1.005 Alarm
TU1 Temp. Sensor Failure	BI	64	Discrete_In.	11107	Ma/Mi/064	-	1.005 Alarm
TU2 Temp. Sensor Failure	BI	65	Discrete_In.	11108	Ma/Mi/065	-	1.005 Alarm
TEa Temp. Sensor Failure	BI	66	Discrete_In.	11109	Ma/Mi/066	-	1.005 Alarm
TEb Temp. Sensor Failure	BI	67	Discrete_In.	11110	Ma/Mi/067	-	1.005 Alarm
TA2 Temp. Sensor Failure	BI	68	Discrete_In.	11111	Ma/Mi/068	-	1.005 Alarm
RD IO Communication Failure	BI	69	Discrete_In.	11112	Ma/Mi/069	-	1.005 Alarm
Disbalanced Volume Flow	BI	70	Discrete_In.	11114	Ma/Mi/070	-	1.005 Alarm
1st Frost Protection	BI	71	Discrete_In.	11115	Ma/Mi/071	-	1.005 Alarm
Room Temp. Sensor Failure	BI	72	Discrete_In.	11116	Ma/Mi/072	-	1.005 Alarm
Heat Exchanger Frost	BI	73	Discrete_In.	11117	Ma/Mi/073	-	1.011 State
Heat Recov.Frost Protection	BI	74	Discrete_In.	11118	Ma/Mi/074	-	1.011 State
Higher Tariff	BI	75	Discrete_In.	11119	Ma/Mi/075	-	1.011 State
Insufficient volume flow	BI	76	Discrete_In.	11120	Ma/Mi/076	-	1.011 State
Insufficient Power-1st Heater	BI	77	Discrete_In.	11121	Ma/Mi/077	-	1.011 State
Air Filter Is Choked	BI	78	Discrete_In.	11122	Ma/Mi/078	-	1.011 State
Configuration file is missing	BI	79	Discrete_In.	11141	Ma/Mi/079	-	1.005 Alarm

Insufficient Prewarming	BI	80	Discrete_In.	11143	Ma/Mi/080	-	1.005 Alarm
Disallowed heaters combin.	BI	81	Discrete_In.	11144	Ma/Mi/081	-	1.005 Alarm
DP3 Pressure Gauge Failure	BI	82	Discrete_In.	11145	Ma/Mi/082	-	1.005 Alarm
External Press.Gauge Failure	BI	83	Discrete_In.	11146	Ma/Mi/083	-	1.005 Alarm
Heat Pump Defrosting Status	BI	84	Discrete_In.	11149	Ma/Mi/084	-	1.005 Alarm
Emergency status	BI	85	Discrete_In.	11165	Ma/Mi/085	-	1.011 State
Frost protection-capillary	BI	86	Discrete_In.	11166	Ma/Mi/086	-	1.005 Alarm
Cooling is not available	BI	87	Discrete_In.	11171	Ma/Mi/087	-	1.011 State
Heating is not available	BI	88	Discrete_In.	11172	Ma/Mi/088	-	1.005 Alarm
Perform boost during heating	BI	89	Discrete_In.	11174	Ma/Mi/089	-	1.011 State
Filter replace interval	BI	90	Discrete_In.	11183	Ma/Mi/090	-	1.011 State

6.4 SMART box Modbus TCP/IP Mappings to BACnet/IP and KNX, img CN2077

Point Name	BACnet Object Type	BACnet Object ID	Modbus Data Type	Modbus Register	KNX Address –READ (Main/Middle/?)	KNX Address – WRITE (Main/Middle/?)	KNX Data type
MP1 Connection	BI	1	Input_Reg.	12400	Ma/Mi/001	-	1.011 State
MP1 Flow requirement	AI	2	Input_Reg.	12401	Ma/Mi/002	-	9.007 Percentage
MP1 Position	AI	3	Input_Reg.	12402	Ma/Mi/003	-	9.007 Percentage
MP1 Volume Flow	AI	4	Input_Reg.	12450	Ma/Mi/004	-	9.007 Percentage
MP2 Connection	BI	5	Input_Reg.	12451	Ma/Mi/005	-	1.011 State
MP2 Flow requirement	AI	6	Input_Reg.	12452	Ma/Mi/006	-	9.007 Percentage
MP2 Position	AI	7	Input_Reg.	12500	Ma/Mi/007	-	9.007 Percentage
MP2 Volume Flow	AI	8	Input_Reg.	12501	Ma/Mi/008	-	9.007 Percentage
MP3 Connection	BI	9	Input_Reg.	12550	Ma/Mi/009	-	1.011 State
MP3 Position	AI	10	Input_Reg.	12551	Ma/Mi/010	-	9.007 Percentage
MP4 Connection	BI	11	Input_Reg.	12600	Ma/Mi/011	-	1.011 State
MP4 Position	AI	12	Input_Reg.	12601	Ma/Mi/012	-	9.007 Percentage
MP5 Connection	BI	13	Input_Reg.	12400	Ma/Mi/013	-	1.011 State
MP5 Position	AI	14	Input_Reg.	12401	Ma/Mi/014	-	9.007 Percentage
Power - control mode	AV	15	Holding_Reg.	10700	Ma/Mi/015	Ma/Mi+1/015	2 Byte
Running mode-control mode	AV	16	Holding_Reg.	10701	Ma/Mi/016	Ma/Mi+1/016	2 Byte
Temperature - control mode	AV	17	Holding_Reg.	10702	Ma/Mi/017	Ma/Mi+1/017	2 Byte
Zone - control mode	AV	18	Holding_Reg.	10703	Ma/Mi/018	Ma/Mi+1/018	2 Byte
Current Rq.Power	AI	19	Holding_Reg.	10704	Ma/Mi/019	-	9.007 Percentage
Current Rq.Mode	AI	20	Holding_Reg.	10705	Ma/Mi/020	-	2 Byte
Current Rq.Temperature	AI	21	Holding_Reg.	10706	Ma/Mi/021	-	9.001 Temperature
Current Rq.Zone	AV	22	Holding_Reg.	10707	Ma/Mi/022	-	2 Byte
Power - Manual set	AV	23	Holding_Reg.	10708	Ma/Mi/023	Ma/Mi+1/023	9.007 Percentage
Mode - Manual set	AV	24	Holding_Reg.	10709	Ma/Mi/024	Ma/Mi+1/024	2 Byte
Temperature - Manual set	AV	25	Holding_Reg.	10710	Ma/Mi/025	Ma/Mi+1/025	9.001 Temperature
Zone - Manual set	AV	26	Holding_Reg.	10711	Ma/Mi/026	Ma/Mi+1/026	2 Byte
Forced mode	AI	27	Holding_Reg.	10712	Ma/Mi/027	-	2 Byte
Heat/nonheating season	AV	28	Holding_Reg.	11401	Ma/Mi/028	Ma/Mi+1/028	2 Byte
Season switch temperature	AV	29	Holding_Reg.	11402	Ma/Mi/029	Ma/Mi+1/029	9.001 Temperature
TU1 Temperature sensor	AI	30	Input_Reg.	10200	Ma/Mi/030	-	9.001 Temperature
TU2 Temperature sensor	AI	31	Input_Reg.	10201	Ma/Mi/031	-	9.001 Temperature

CP-Touch temp.sensor	AI	32	Input_Reg.	10206	Ma/Mi/032	-	9.001 Temperature
IN1 Input Status	AI	33	Input_Reg.	10203	Ma/Mi/033	-	9.020 Voltage
IN2 Input Status	AI	34	Input_Reg.	10204	Ma/Mi/034	-	9.020 Voltage
CI Input Status	AI	35	Input_Reg.	10205	Ma/Mi/035	-	9.020 Voltage
D1 Input Status	BI	36	iscrete_In.	10200	Ma/Mi/036	-	1 bit
D2 Input Status	BI	37	iscrete_In.	10201	Ma/Mi/037	-	1 bit
D4 Input Status	BI	38	iscrete_In.	10203	Ma/Mi/038	-	1 bit
STP Input Status	BI	39	iscrete_In.	10204	Ma/Mi/039	-	1 bit
KK Output Status	BI	40	Coil	10200	Ma/Mi/040	-	1 bit
SA1 Output Status	AI	41	Holding Reg.	10202	Ma/Mi/041	-	9.020 Voltage
Unit Overheating-alarm	BI	42	Discrete_In.	11100	Ma/Mi/042	-	1.005 Alarm
Orientation Is Not Set-alarm	BI	43	Discrete_In.	11101	Ma/Mi/043	-	1.005 Alarm
No Heater Is Set-alarm	BI	44	Discrete_In.	11102	Ma/Mi/044	-	1.005 Alarm
STOP Input Activate-alarm	BI	45	Discrete_In.	11104	Ma/Mi/045	-	1.005 Alarm
TU1 Temp. Sensor Failure	BI	46	Discrete_In.	11107	Ma/Mi/046	-	1.005 Alarm
TU2 Temp. Sensor Failure	BI	47	Discrete_In.	11108	Ma/Mi/047	-	1.005 Alarm
Flow disbalance-alarm	BI	48	Discrete_In.	11114	Ma/Mi/048	-	1.005 Alarm
Indoor temp.sensor failure	BI	49	Discrete_In.	11116	Ma/Mi/049	-	1.005 Alarm
Configuration file missing	BI	50	Discrete_In.	11141	Ma/Mi/050	-	1.005 Alarm
AHU unit is not available	BI	51	Discrete_In.	11171	Ma/Mi/051	-	1.005 Alarm

6.5 aMotion (RD6) Modbus TCP/IP mappings to BACnet IP, SMTP and KNX, img CN2180

Point Name	BACnet Object Type	BACnet Object ID	Modbus Data Type	Modbus Register	KNX Addr. – read (Main/Middle/?)	KNX addr. – write (Main/Middle/?)	KNX Data type
Fan status - SUP or ETA	DI	1	Discrete_In.	D 2301	Ma/Mi/001	-	1 bit
In/Out damper status	DI	2	Discrete_In.	D 2302	Ma/Mi/002	-	1 bit
Preheater status	DI	3	Discrete_In.	D 2303	Ma/Mi/003	-	1 bit
Any heater activity	DI	4	Discrete_In.	D 2310	Ma/Mi/004	-	1 bit
Primary heater status	DI	5	Discrete_In.	D 2311	Ma/Mi/005	-	1 bit
Secondary heater status	DI	6	Discrete_In.	D 2312	Ma/Mi/006	-	1 bit
Primary heater pump-status	DI	7	Discrete_In.	D 2321	Ma/Mi/007	-	1 bit
Secondary heater pump-status	DI	8	Discrete_In.	D 2322	Ma/Mi/008	-	1 bit
Cooler status	DI	9	Discrete_In.	D 2330	Ma/Mi/009	-	1 bit
Cooler pump - status	DI	10	Discrete_In.	D 2341	Ma/Mi/010	-	1 bit
1st frost protection	DI	11	Discrete_In.	D 6003	Ma/Mi/011	-	1 bit
2nd frost protection	DI	12	Discrete_In.	D 6004	Ma/Mi/012	-	1 bit
Stop signal active	DI	13	Discrete_In.	D 6005	Ma/Mi/013	-	1 bit
HRC defrosting	DI	14	Discrete_In.	D 6006	Ma/Mi/014	-	1 bit
Unit is overheated	DI	15	Discrete_In.	D 6012	Ma/Mi/015	-	1 bit
Load management - high tariff	DI	16	Discrete_In.	D 6013	Ma/Mi/016	-	1 bit
Unbalanced flow	DI	17	Discrete_In.	D 6014	Ma/Mi/017	-	1 bit
Insufficient flow	DI	18	Discrete_In.	D 6015	Ma/Mi/018	-	1 bit
Insufficient preheating	DI	19	Discrete_In.	D 6017	Ma/Mi/019	-	1 bit

Heat pump defrost	DI	20	Discrete_In.	D 6018	Ma/Mi/020	-	1 bit
Learning process	DI	21	Discrete_In.	D 6021	Ma/Mi/021	-	1 bit
PF1 filter choked	DI	23	Discrete_In.	D 6044	Ma/Mi/023	-	1 bit
PF2 filter choked	DI	24	Discrete_In.	D 6045	Ma/Mi/024	-	1 bit
PF3 filter choked	DI	25	Discrete_In.	D 6046	Ma/Mi/025	-	1 bit
Heater A overload	DI	26	Discrete_In.	D 6051	Ma/Mi/026	-	1 bit
Heater B overload	DI	27	Discrete_In.	D 6052	Ma/Mi/027	-	1 bit
SUP duct pressure sensor failure	DI	28	Discrete_In.	D 6055	Ma/Mi/028	-	1 bit
ETA duct pressure sensor failure	DI	29	Discrete_In.	D 6056	Ma/Mi/029	-	1 bit
Analog output IN1 activation	DI	30	Discrete_In.	D 6058	Ma/Mi/030	-	1 bit
Analog output IN2 activation	DI	31	Discrete_In.	D 6059	Ma/Mi/031	-	1 bit
Analog output IN3 activation	DI	32	Discrete_In.	D 6060	Ma/Mi/032	-	1 bit
Frost protection from the DI1	DI	33	Discrete_In.	D 6062	Ma/Mi/033	-	1 bit
Frost protection from the DI2	DI	34	Discrete_In.	D 6063	Ma/Mi/034	-	1 bit
Frost protection from the DI3	DI	35	Discrete_In.	D 6064	Ma/Mi/035	-	1 bit
Frost protection from the DI4	DI	36	Discrete_In.	D 6065	Ma/Mi/036	-	1 bit
Primary heater failure	DI	37	Discrete_In.	D 6066	Ma/Mi/037	-	1 bit
Secondary heater failure	DI	38	Discrete_In.	D 6067	Ma/Mi/038	-	1 bit
Cooler failure	DI	39	Discrete_In.	D 6070	Ma/Mi/039	-	1 bit
Internal bus failure	DI	40	Discrete_In.	D 6071	Ma/Mi/040	-	1 bit
External bus failure	DI	41	Discrete_In.	D 6072	Ma/Mi/041	-	1 bit
Ethernet failure	DI	42	Discrete_In.	D 6073	Ma/Mi/042	-	1 bit
T-EHA sensor failure	DI	43	Discrete_In.	D 6074	Ma/Mi/043	-	1 bit
T-ETA sensor failure	DI	44	Discrete_In.	D 6075	Ma/Mi/044	-	1 bit
T-ODA sensor failure	DI	45	Discrete_In.	D 6076	Ma/Mi/045	-	1 bit
T-IDA sensor failure	DI	46	Discrete_In.	D 6077	Ma/Mi/046	-	1 bit
T-SUP sensor failure	DI	47	Discrete_In.	D 6078	Ma/Mi/047	-	1 bit
Stop signal - resetable	DI	48	Discrete_In.	D 6081	Ma/Mi/048	-	1 bit
Frost protection capilary	DI	49	Discrete_In.	D 6082	Ma/Mi/049	-	1 bit
Frost status of HRC	DI	50	Discrete_In.	D 6084	Ma/Mi/050	-	1 bit
Device is not ready	DI	51	Discrete_In.	D 6085	Ma/Mi/051	-	1 bit
Heaters overload status	DI	52	Discrete_In.	D 6086	Ma/Mi/052	-	1 bit
Flow learning process	DI	53	Discrete_In.	D 6087	Ma/Mi/053	-	1 bit
Ventilation boost for heating	DI	54	Discrete_In.	D 6088	Ma/Mi/054	-	1 bit
UVC lamps change interval	DI	55	Discrete_In.	D 6089	Ma/Mi/055	-	1 bit
Inspection interval	DI	56	Discrete_In.	D 6090	Ma/Mi/056	-	1 bit
Trial period expiration	DI	57	Discrete_In.	D 6091	Ma/Mi/057	-	1 bit
Cooler overload status	DI	58	Discrete_In.	D 6099	Ma/Mi/058	-	1 bit
Filters choked status	DI	59	Discrete_In.	D 6104	Ma/Mi/059	-	1 bit
Filter replacement interval	DI	60	Discrete_In.	D 6105	Ma/Mi/060	-	1 bit
Overheating input active	DI	61	Discrete_In.	D 6106	Ma/Mi/061	-	1 bit

Cooler is blocked	DI	62	Discrete_In.	D 6107	Ma/Mi/062	-	1 bit
Vent.boost after HRC defrost	DI	63	Discrete_In.	D 6108	Ma/Mi/063	-	1 bit
Flow Sensor supply failure	DI	64	Discrete_In.	D 6109	Ma/Mi/064	-	1 bit
Flow Sensor extract failure	DI	65	Discrete_In.	D 6110	Ma/Mi/065	-	1 bit
Flow Sensor fresh air failure	DI	66	Discrete_In.	D 6111	Ma/Mi/066	-	1 bit
Alarm Reset	DO	67	Coil	C 8001	Ma/Mi/067	Ma/Mi+1/067	1 bit
Filter change interval reset	DO	68	Coil	C 8002	Ma/Mi/068	Ma/Mi+1/068	1 bit
Current Work Regime	AI	70	Input_Reg.	I 1001	Ma/Mi/070	-	2 byte
Current Requested Temperature	AI	71	Input_Reg.	I 1002	Ma/Mi/071	-	9.001 temperature
Current Requested Zone	AI	72	Input_Reg.	I 1003	Ma/Mi/072	-	2 byte
Current Requested fan power	AI	73	Input_Reg.	I 1004	Ma/Mi/073	-	9.007 percentage
Curr. flow ventilation request	AI	74	Input_Reg.	I 1005	Ma/Mi/074	-	9.009 air flow
Current flow circulation request	AI	75	Input_Reg.	I 1006	Ma/Mi/075	-	9.009 air flow
Current Pressure Level request	AI	76	Input_Reg.	I 1007	Ma/Mi/076	-	2 byte
Circulation rate request	AI	77	Input_Reg.	I 1008	Ma/Mi/077	-	9.007 percentage
Bypass position request	AI	78	Input_Reg.	I 1009	Ma/Mi/078	-	2 byte
Outdoor air temperature (T-ODA)	AI	79	Input_Reg.	I 1101	Ma/Mi/079	-	9.001 temperature
Supply air temperature (T-SUP)	AI	80	Input_Reg.	I 1102	Ma/Mi/080	-	9.001 temperature
Extract air temperature (T-ETA)	AI	81	Input_Reg.	I 1103	Ma/Mi/081	-	9.001 temperature
Indoor air temperature (T-IDA)	AI	82	Input_Reg.	I 1104	Ma/Mi/082	-	9.001 temperature
Exhaust air temperature (T-EHA)	AI	83	Input_Reg.	I 1105	Ma/Mi/083	-	9.001 temperature
Outdoor air average temperature	AI	84	Input_Reg.	I 1106	Ma/Mi/084	-	9.001 temperature
Supply fan control factor	AI	85	Input_Reg.	I 1107	Ma/Mi/085	-	9.007 percentage
Extract fan control factor	AI	86	Input_Reg.	I 1108	Ma/Mi/086	-	9.007 percentage
Current supply fan flow	AI	87	Input_Reg.	I 1109	Ma/Mi/087	-	9.009 air flow
Current extract fan flow	AI	88	Input_Reg.	I 1110	Ma/Mi/088	-	9.009 air flow
Current outdoor air flow	AI	89	Input_Reg.	I 1111	Ma/Mi/089	-	9.009 air flow
Time transition BPS damper	AI	90	Input_Reg.	I 1112	Ma/Mi/090	-	9.011 time (ms)
Circulation control factor	AI	91	Input_Reg.	I 1113	Ma/Mi/091	-	9.007 percentage
Preheater control factor	AI	92	Input_Reg.	I 1114	Ma/Mi/092	-	9.007 percentage
Heater A control factor	AI	93	Input_Reg.	I 1115	Ma/Mi/093	-	9.007 percentage
Heater B control factor	AI	94	Input_Reg.	I 1116	Ma/Mi/094	-	9.007 percentage
Cooler control factor	AI	95	Input_Reg.	I 1117	Ma/Mi/095	-	9.007 percentage
Current operation mode	AI	96	Input_Reg.	I 1119	Ma/Mi/096	-	2 byte
Fan control type	AI	97	Input_Reg.	I 1201	Ma/Mi/097	-	2 byte
Maximal adjustable volume flow	AI	98	Input_Reg.	I 1202	Ma/Mi/098	-	9.009 air flow
Minimal adjustable volume flow	AI	99	Input_Reg.	I 1203	Ma/Mi/099	-	9.009 air flow

Volume flow measurement source	AI	100	Input_Reg.	I 1204	Ma/Mi/100	-	2 byte
Circulation damper control way	AI	101	Input_Reg.	I 1205	Ma/Mi/101	-	2 byte
Bypass damper control way	AI	102	Input_Reg.	I 1206	Ma/Mi/102	-	2 byte
Work Regime	AO	110	Holding_Reg.	H 1001	Ma/Mi/110	Ma/Mi+1/110	2 byte
Requested Temperature	AO	111	Holding_Reg.	H 1002	Ma/Mi/111	Ma/Mi+1/111	9.001 temperature
Requested Zone	AO	112	Holding_Reg.	H 1003	Ma/Mi/112	Ma/Mi+1/112	2 byte
Requested fan power	AO	113	Holding_Reg.	H 1004	Ma/Mi/113	Ma/Mi+1/113	9.007 percentage
Volume flow ventilation request	AO	114	Holding_Reg.	H 1005	Ma/Mi/114	Ma/Mi+1/114	9.009 air flow
Volume flow circulation request	AO	115	Holding_Reg.	H 1006	Ma/Mi/115	Ma/Mi+1/115	9.009 air flow
Pressure Level control request	AO	116	Holding_Reg.	H 1007	Ma/Mi/116	Ma/Mi+1/116	2 byte
Circulation rate req.	AO	117	Holding_Reg.	H 1008	Ma/Mi/117	Ma/Mi+1/117	9.007 percentage
Bypass position req.	AO	118	Holding_Reg.	H 1009	Ma/Mi/118	Ma/Mi+1/118	2 byte
T-IDA from external measure	AO	119	Holding_Reg.	H 1500	Ma/Mi/119	Ma/Mi+1/119	9.001 temperature
T-ODA from external measure	AO	120	Holding_Reg.	H 1501	Ma/Mi/120	Ma/Mi+1/120	9.001 temperature
Current season	AI	121	Input_Reg.	I 1010	Ma/Mi/121	-	2 byte
Season setting	AO	122	Holding_Reg.	H 1010	Ma/Mi/122	Ma/Mi+1/122	2 byte

Appendix A. Modbus index table

The Modbus indexes table for the following control systems can be provided on require – use the contact from the header of the document and ask the document according to the control system type

Control system type	Modbus table doc
RD4 – HVAC unit	**RD4_parameters_140815.pdf**
RD5 – HVAC unit	**RD5_parameters_EN.pdf**
SB - SMARTbox	**RD5_SB_parameters_EN.pdf**
aMotion (RD6)	**aM_parameters_en.pdf.pdf**

Appendix B. Troubleshooting

Appendix B.1. Viewing Diagnostic information

- Type the IP address of the RD-BACnet/KNX into your web browser or use the FieldServer Toolbox to connect to the ProtoNode.
- Click on **Diagnostics and Debugging** Button, then click on **View**, and then on **Connections**.
- If there are any errors showing on the Connection page, please refer to Appendix B.2 for the relevant wiring and settings.

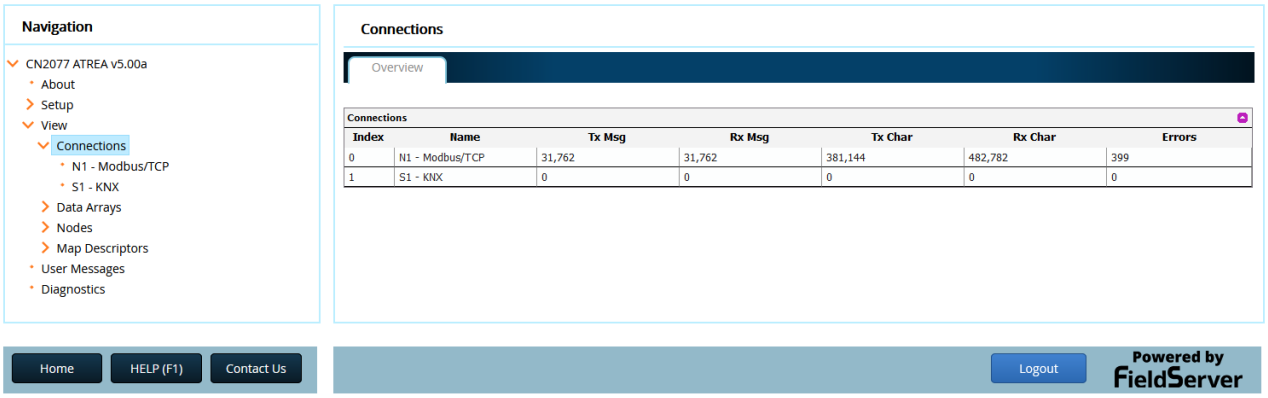


Fig 25: Error messages screen

Appendix B.2. Check Wiring and Settings

- Modbus TCP communication:
    - Visual observations of LEDs on ProtoNode. (Appendix B.4)
    - Verify IP address setting
    - Verify wiring

If the problem still exists, a Diagnostic Capture needs to be taken and sent to FieldServer. (Appendix B.3)

Appendix B.3. Take Diagnostic Capture With the FieldServer Utilities

- **Once the Diagnostic Capture is complete, email it to support@sierramonitor.com. The Diagnostic Capture will allow us to rapidly diagnose the problem.**
- Ensure that FieldServer Toolbox is Loaded on the PC that is currently being used, or download FieldServer-Toolbox.zip on the Sierra Monitor webpage, under Customer Care: Resource Center, Software Downloads:
  http://www.sierramonitor.com/customer-care/resource-center?filters=software-downloads
- Extract the executable file and complete the installation.
- Disable any wireless Ethernet adapters on the PC/Laptop.
- Disable firewall and virus protection software if possible.
- Connect a standard Cat 5 Ethernet cable between the PC and ProtoNode.
- Double click on the FS Toolbox Utility.
- **Step 1:** Take a Log
    - Click on the diagnose icon  of the desired device.

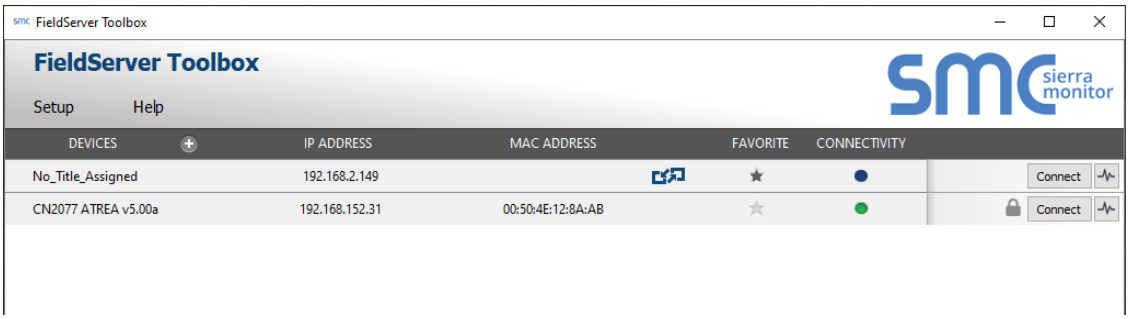


Fig 26: Toolbox – device list

- Select full Diagnostic

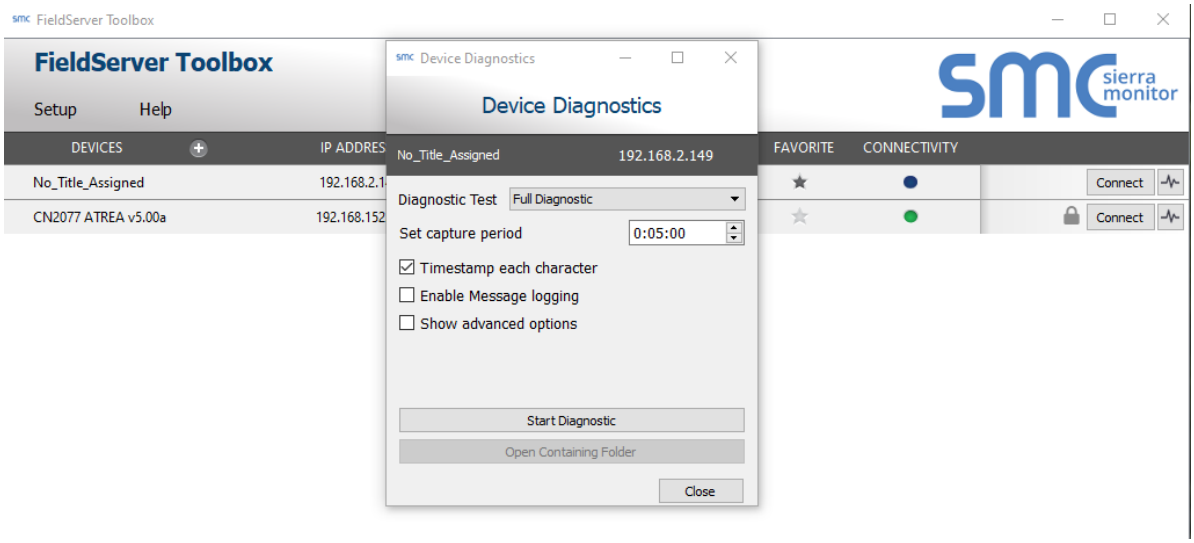


Fig 27: Toolbox – diagnostics tool

- If desired, the default capture period can be changed.
- Click on Start Diagnostic.

- Wait for Capture period to finish. Diagnostic Test Complete window will appear.

- **Step 2**: Send Log
  - Once the Diagnostic test is complete, a .zip file will be saved on the PC.

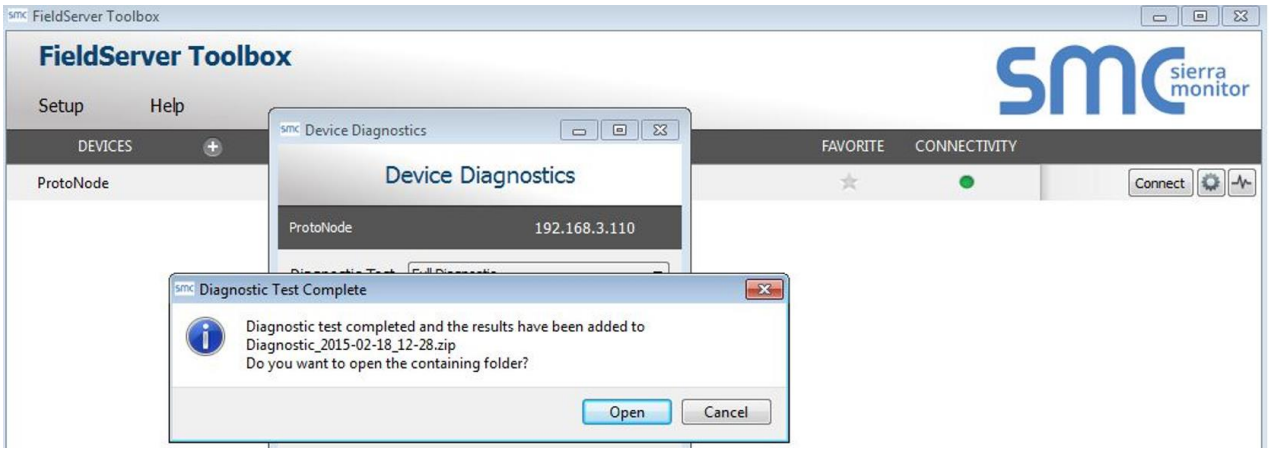


Fig 28: Toolbox – diagnostics tool

- Choose open to launch explorer and have it point directly at the correct folder. Send the Diagnostic zip file to **support@sierramonitor.com**

Appendix B.4. LED Diagnostics RD-BACnet/KNX and Devices

Please see the diagram below for RD-BACnet/KNXLED Locations.

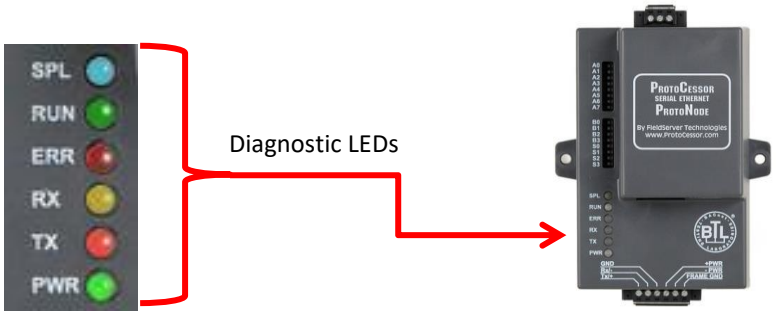


Fig 29: LED position

Tag	Description
SPL	The SPL LED lights blue, when the RD-BACnet/KNX has no Modbus connection with one (or more) adjusted profiles.
RUN	The RUN LED will start flashing when the module is ready for standard operation – typically in 60s after power supply is on.
ERR	The SYS ERR LED will go on solid 15 seconds after power up. It will turn off after 5 seconds. A steady red light will indicate there is a system error on ProtoNode. One of the reason of the red LED could be conflict of adjusted profiles – erase all the profiles and build them again. If it doesn't help, report the related "system error" shown in the error screen of the GUI interface to FieldServer Technologies for evaluation.
RX	The RX LED flashes when a message is received on the host port – the flash may last short interval, typically several ms.
TX	The TX LED flashes when a message is sent on the host port -– the flash may last short interval, typically several ms.
PWR	This is the power light and should show steady green at all times when RD-BACnet/KNX is powered.

Appendix B.5. Image versions coping

There are more sw images in the RD-BACnet/KNX module during the history its distribution.

Image	Possible fault	Solution
CN1007	KNX communication doesn't work at all	Download the "prof2b_RD5till21_CN1007_fix.csv" mapping file to the ProtoNode
	When writing data through KNX, the affected unit is always the 1st. it is not possible to write date to the 2nd or further unit	Download the "prof2b_RD5till21_CN1007_fix.csv" mapping file to the ProtoNode
	The KNX communication doesn't work with GIRA home server	Download the image "CN1007-Profile_Loader-B0005-2.3.8-armv7.img" to the ProtoNode. **Attention! Apply to the ProtoNode, which is equipped with ARM7 proc only!**
CN2077	*Till current manual revision, no fault in this image is known*	
CN2180	*Till current manual revision, no fault in this image is known*	Download the image "CN2180-Profile_Loader-B0024-1.0.1-beta-armv7.simg" to the ProtoNode. **Attention! Apply to the ProtoNode, which is equipped BIOS 4.1.2 or higher!**

Appendix C. Reference

Appendix C.1. Specifications

	ProtoNode	
Electrical Connections	One 6-pin Phoenix connector, one RS-485 +/- ground port, power +/- frame ground port One 3-pin RS-485 Phoenix connector, one RS-485 +/- ground port One Ethernet-10/100 Ethernet port	
Approvals:	CE Certified; TUV approved to UL 916, EN 60950-1, EN 50491-3 and CSA C22-2 standards; FCC Class A Part 15; DNP3 Conformance Tested; OPC Self-tested for Compliance; RoHS Compliant; CSA 205 Approved	
	BTL Marked	LonMark Certified
Power Requirements	Multi-mode power adapter: 9-30VDC or 12 - 24VAC	
Physical Dimensions	11.5 cm L x 8.3 cm W x 4.1 cm H (4.5 x 3.2 x 1.6 in.)	
Weight:	0.2 kg (0.4 lbs)	
Operating Temperature:	-40°C to 75°C (-40°F to167°F)	
Surge Suppression	EN61000-4-2 ESD EN61000-4-3 EMC EN61000-4-4 EFT	
Humidity:	5 - 90% RH (non-condensing)	

Appendix C.1.1. Compliance with UL Regulations

For UL compliance, the following instructions must be met when operating ProtoNode.

- The units shall be powered by listed LPS or Class 2 power supply suited to the expected operating temperature range.
- The interconnecting power connector and power cable shall:
  - Comply with local electrical code.
  - Be suited to the expected operating temperature range.
  - Meet the current and voltage rating for ProtoNode/Net
- Furthermore, the interconnecting power cable shall:
  - Be of length not exceeding 3.05m (118.3")
  - Be constructed of materials rated VW-1 or FT-1 or better
- If the unit is to be installed in an operating environment with a temperature above 65 °C, it should be installed in a Restricted Access Area requiring a key or a special tool to gain access
- This device must not be connected to a LAN segment with outdoor wiring.Limited 2 Year Warranty

Sierra Monitor Corporation warrants its products to be free from defects in workmanship or material under normal use and service for two years after date of shipment. Sierra Monitor Corporation will repair or replace any equipment found to be defective during the warranty period. Final determination of the nature and responsibility for defective or damaged equipment will be made by Sierra Monitor Corporation personnel.

All warranties hereunder are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without Sierra Monitor Corporation's approval or which have been subjected to accident, improper maintenance, installation or application, or on which original identification marks have been removed or altered. This Limited Warranty also will not apply to interconnecting cables or wires, consumables or to any damage resulting from battery leakage.

In all cases Sierra Monitor Corporation's responsibility and liability under this warranty shall be limited to the cost of the equipment. The purchaser must obtain shipping instructions for the prepaid return of any item under this warranty provision and compliance with such instruction shall be a condition of this warranty.

Except for the express warranty stated above, Sierra Monitor Corporation disclaims all warranties with regard to the products sold hereunder including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Sierra Monitor Corporation for damages including, but not limited to, consequential damages arising out of/or in connection with the use or performance of the product.

Appendix D. SW version

SW version of the RD-BACnet/KNX customized image can be read in the “Diagnostic & Debugging“ site.

Fig 30: Web – Diagnostics & debugging

Then open the „About“ item, and see the „DCC_Version“

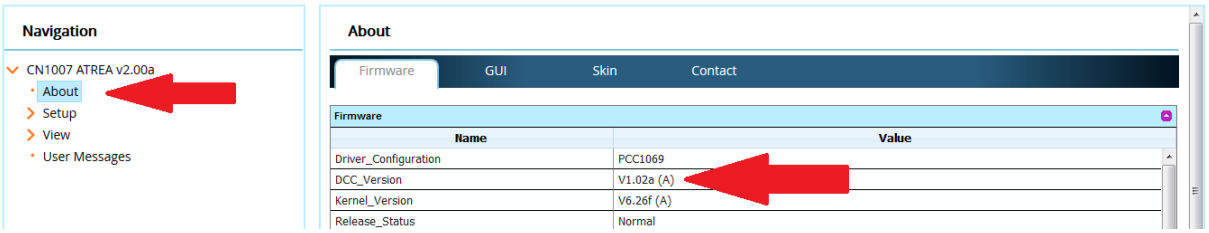


Fig 31: Web – read the DCC version

SW	Changes, new functions	failure correction	release date
CN1006	• 1st version supporting KNX and BACnet – Airflow data table included		25.5.2015
CN1007		• Restoration of the BACnet profiles (nl9210_4.bin,web.img)	24.4.2016
CN1007 Kernel v.: 6.32 Build rev.: 3.14.0		• KNX 3 level addressing was fixed (2 versions for DIGI and current hw) – web.img	19.12.2016
CN1007 Kernel v.: 6.32 Build rev.: 3.14.0		• Correction of multiple profile communication (KNX protocol only) – more than 1 profile didi not work. (web.img)	18.4.2017
CN1007 Kernel v.: 6.37d Build rev.: 4.8.14-11	• Correction of KNX protocol proces for GIRA Home Server		10.10.2017
CN1007 Kernel v.: 6.37d Build rev.: 4.8.14-11 Image: 17.4.2018		• RD5 data fixing – no transfer of the status of the SE, SC and CO1 outputs	17.4.2018
CN1007 Kernel v.: 6.37d Build rev.: 4.8.14-11 Img: 2018-07-05		• Fixing of the data transfer: Alarms 48 and 58 (1.st Frost protection and Flow disbalance) (for RD5)	5.7.2018

CN1007 BIOS 4.0.2 or higher Img: 2019-04-02	• Support of the Gira HS with the FPC-N40 hw with arm 7		19.4.2019
CN1007 BIOS 4.0.2 or higher Img: 2019-04-02 **prof2k.csv**		KNX: • Fixing of the communication with more then 1 HVAC unit	6.1.2021
CN2077 BIOS 4.0.2 or higher Img: 2021-03-04	**Can be used only with ARM7 platform** • Correction of the data points content (RD5 for KNX and BACnet) • Profile for the SMARTboxes		4.3.2021
CN2180 v 6.00a BIOS 4.1.2 or higher Img: 2023-01-26	HVAC unit with the **aMotion (RD6)** control system is supported (BACnet and KNX) **Note:** When necessary to apply to ProtoNode with BIOS lower than 4.1.2, the group of csv files can be used.		26.1.2023
CN2180 v6.02a	Only group of csv profile files. Support for the BACnet MS/TP. See the chap. 3.3.9 and 3.3.10		28.2.2023

CAUTION!

Do not use image, which is generated for **ARM 7** to download into different platform (**ARM5** or **DIGI)** ! It may cause fatal error of the module, which cannot be repaired!

The BIOS version refers about the hw of the module:

- ARM 7 ~ BIOS 4.0.2 or higher
- ARM 5 ~ BIOS 2.5.2

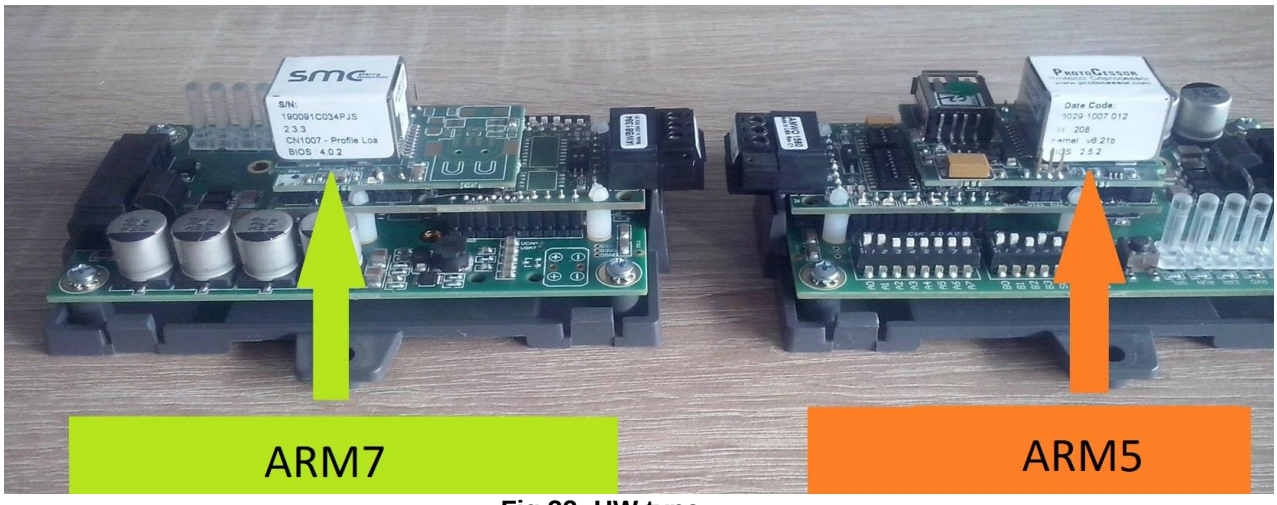


Fig 32: HW type