Helvar

436 Gateway

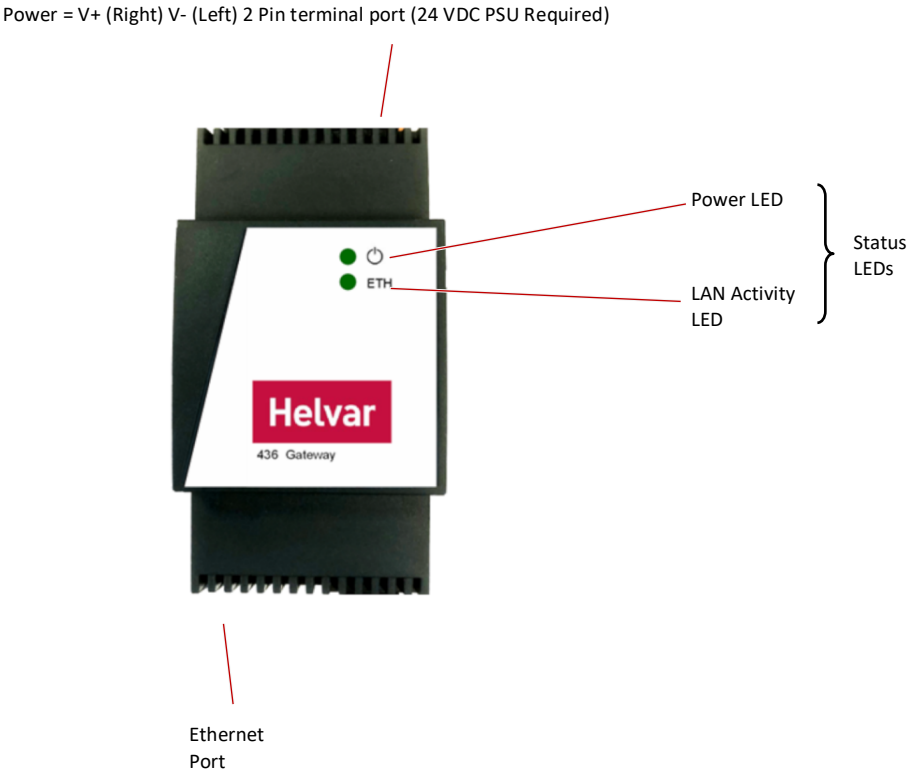
User Guide

Doc. No. D009284 issue 2

2024-12-12

1.0 Introduction

The 436 Gateway provides a simple interface to a Helvar Imagine system and allows lighting system data to appear in a Building energy Management System (BeMS).



Note: Typically, individual systems (energy control, lighting, boiler and air-conditioning systems, etc.) are measured separately for CO_2 accountability. Therefore, installing the Gateway and combining the various systems can help an effective BeMS be more energy efficient and comply with national building regulations.

The 436 allows a Building Management System BMS or BeMS to control and monitor the lighting system as well as obtain device status and group power consumption information. BACnet/IP clients can easily connect with the gateway via a TCP/IP network.

The 436 Gateway has been specifically designed to expose the 'Router', 'group' and 'device' parameters from Helvar Routers in a designated workgroup through the TCP/IP network. The BMS can use this information to control and monitor the lighting, energy and environmental conditions.

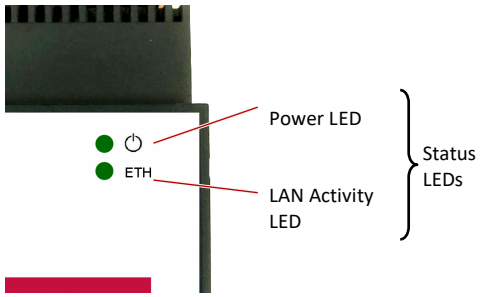
1.1 Device limits and compatibility

The 436 Gateway has the following limitations and compatibility requirements:

- Limits:
  - Single workgroup
  - Max. 20 Routers
  - Max. 300 Groups
  - Max. 2000 Data points

Note: Certain project installations may require reduced limits if higher data frequency is required. See section 6.0 sub note *2

Note: For Modbus, the max group number is limited to 1500 due to Modbus related limitations.



- Compatibility:
  - Router (Router) firmware version 5.2 or above. Some features require higher versions, see section 6.0
  - Router IP addresses need to have the same first and second octets, i.e. '10.254.x.x'.
  - Web browsers: Chrome and Firefox.

1.2 Description of the unit

The 436 Gateway includes internal HTML configuration pages designed to simplify the engineering and setting of the interface. These pages make it easier to configure the communication requirements.

From the configuration pages users can do the following:

- Identify:
  - Each Helvar Router in a defined workgroup.
  - The required Helvar Router and DALI device parameters.
  - Which IP BMS type is assigned to each parameter.
- Simplify the configuration of the IP BMS communication requirements and allow for connected Routers and devices to appear on the IP BMS Network

1.3 Front panel LEDs

The LEDs on the unit indicate the general status of the Gateway, including power, ready and LAN communication activity.

- Power LED

  This LED indicates the current status of the power applied to the unit.

  When continuously illuminated the 24VDC power is supplied. If the LED is off, the power is not supplied or has failed.

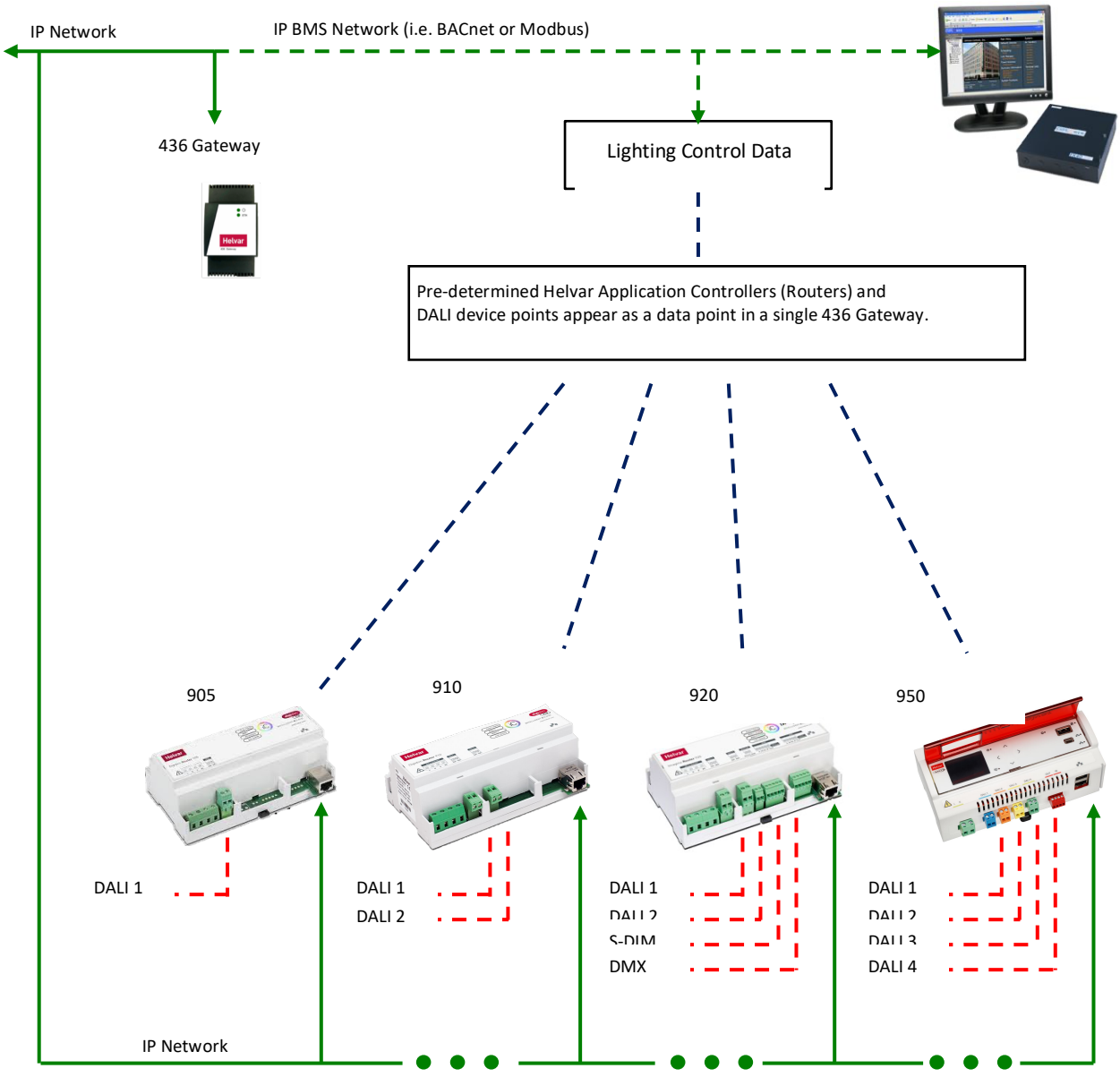
- Ethernet (Activity) LED

  This **Eth** LED indicates the communication between this unit and the supervisory computer or controller connected via the Ethernet.

  When incoming communications traffic is detected, the LED will illuminate, but will extinguish if outgoing communications traffic is detected.

2.0 System overview

The 436 Gateway provides direct interface between Helvar Routers, including the devices connected to them (such LED drivers and sensors), and an IP BMS. Thus, the IP BMS can access the values recorded in the Helvar Routers and in the DALI devices.



2.1 Helvar devices and DALI networks

The Helvar Routers use the Ethernet connection as a network backbone to combine DALI, SDIM and DMX networks. The DALI and SDIM networks appear as Helvar Router subnets in the 436 web browser interface.

DALI (Digital Addressable Lighting Interface) is a standardised (IEC 62386) protocol that, among other things, provides individual addressing and monitoring of lighting devices. It allows users to connect of DALI devices on a single and simple two-wire network and communicate with them individually, collectively or in groups. Users can thus instruct DALI loads to turn on and off and to dim up and down. Additional operational status information is available from each of them, confirming its ability to operate effectively or to confirm a fault condition.

	DALI 1	DALI 2	DALI 3	DALI 4	SDIM	DMX (NOT EXPOSED)
905	64 Devices	N/A	N/A	N/A	N/A	N/A
910	64 Devices	64 Devices	N/A	N/A	N/A	N/A
920	64 Devices	64 Devices	N/A	N/A	252 addresses	512 in/out addresses
950	64+64 Devices	64+64 Devices	64+64 Devices	64+64 Devices	N/A	N/A

Tip: For DALI, SDIM and DMX network installation, refer to the Helvar Routers documentation. See also the Designer 5 Recommended Best Practices document for networking and system guidelines.

Note: The 920 Router DMX subnet is not displayed as no export information is supported for DMX devices.

3.0 Connect to the 436 Gateway

After the 436 Gateway has been correctly installed (see the *Installation Leaflet* supplied with each unit), users need to configure the communication protocols and the required parameters.

Each unit is supplied with a default IP address that identifies the unit on the IP network. Users must replace this IP address with a unique IP address as required by the applicable local network policy.

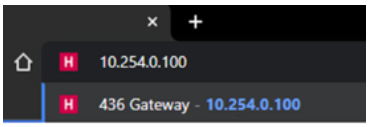
Before configuring the unit, make sure that the connected computer has a compatible IP address, i.e. an IP address in the same IP range as the 436 Gateway. Otherwise, change the computer's IP address.

To connect to the 436 Gateway:

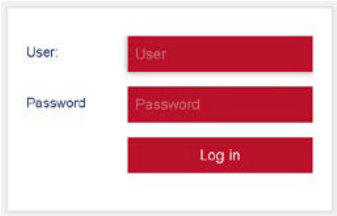
1. Connect a PC or Mac to the same IP network as the 436 (see the *Installation Guide*), open a browser application (Chrome or Firefox recommended).
2. In the browser address bar, type the required IP address using the standard 32-bit dotted-decimal notation.

   Default IP address: 10.254.0.100 (255.0.0.0)

   The **Login** page will appear.



3. Type the **User name** and **Password** (both are case sensitive), and then press **Log in**.
   - **Default User name**: Admin
   - **Default Password**: password



Tip: If the 'Login' page fails to appear, use the ping test to confirm that the expected IP address is used.

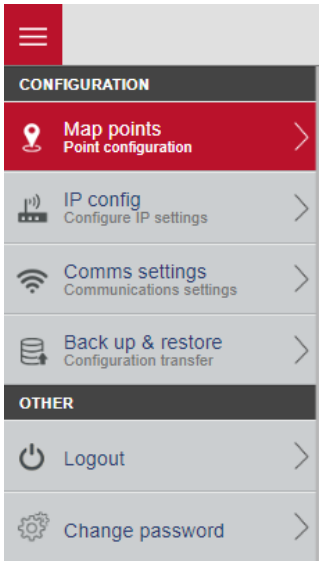
If the valid 'User name' and 'Password' fails to launch the configuration page, clear the browser cache, and then contact technical support for instructions.

4. Press Helvar (top right) to display the **Home** page. This provides access to the configuration pages.

Tip: Zoom out to display more information.

3.1 Configuration pages

Users can configure the 436 Gateway via the configuration pages in the web browser interface. The settings in these pages define the operation of the unit.



The internal configuration pages include the following:

- **Map points**: To link and assign the required Helvar Router points to a predetermined data type point for the selected BMS protocol
- **IP config**: To configure the unique identity of the 436 Gateway on the IP network.
- **Comms settings**: Select BMS protocol and configure the communications network parameters that correspond to the communications with the Helvar Routers and BMS network.
- **Back up and restore**: To save the current configuration and apply an existing backup file or firmware update file.
- **Logout**: Logs user out of 436 Gateway web browser page
- **Change Password**: To configure the login security (password) of the unit, the firmware version and the documentation.

Remember: To apply the changes, press **Save** or the corresponding **Save** button. Users may need to wait until the unit reboots and **Refresh** the browser.

3.2 IP config settings

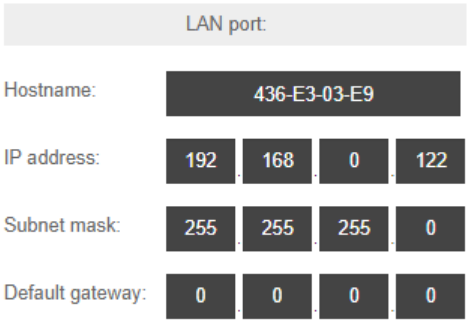
The parameters on the IP config page are used to configure the unique identity of the 436 Gateway on the IP (Internet Protocol) network.

Caution: The unit must use an IP address compatible with both Helvar Routers and the BMS client; for example, 10.254.1.x (255.0.0.0).

1. Press , and then select **IP config** to display the TCP/IP parameters that identify the 436 Gateway on the LAN. Users can use a specific range of configured IP addresses to group units in networks or subnets.

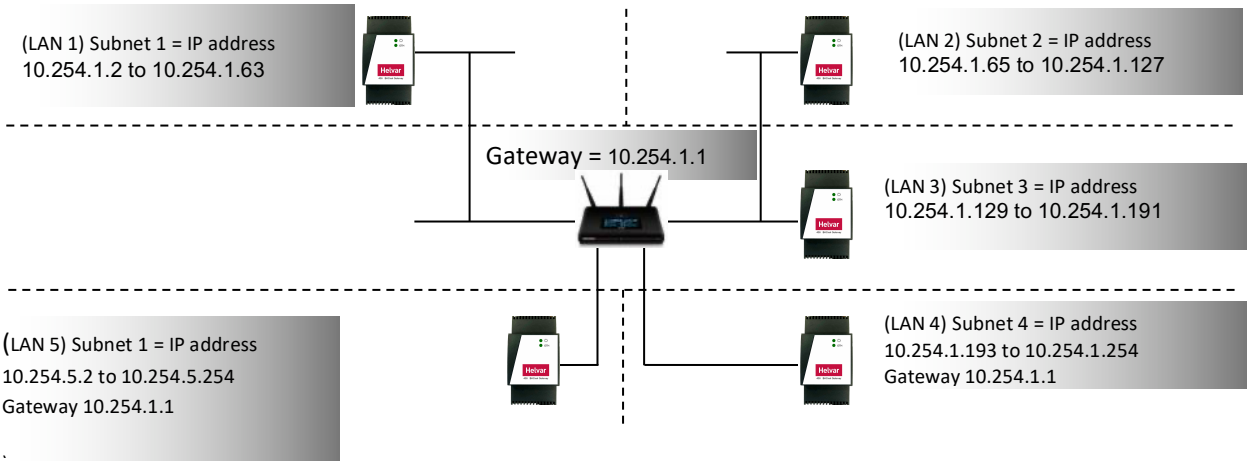
- If necessary, edit the **Hostname**. This is a 15 character label (letters, numbers, '-' and '_') assigned to this unit and linked to the IP address.

  Default: Helvar-<last 3 pairs of hardware MAC address>.



2. Change the IP address, subnet mask, and default gateway according to the applicable local network policy. The IP address provides a unique identification of the 436 Gateway in the defined subnet mask on the IP network. The subnet mask is a configurable range of accessible IP addresses. The default gateway is used to direct communications to IP addresses that are not in the defined subnet mask.

Note: Use the Helvar search tool provided (available from the 436 browser homepage > **Support** page) to detect the 436 Gateway(s) on the IP network.



3. Press **Save**, and then reboot the 436 Gateway.

   The unit restarts (as confirmed by a beep) and loads the **Login** page.

Caution: Assign a different IP address to each gateway before networking them.

Remember: When the 436 is rebooting, the connection to it stops. To ensure that the browser shows the latest data, clear the browser cache (Ctrl+Shift+Del and the top four options enabled as a minimum) before login.

4.0 Comms Settings

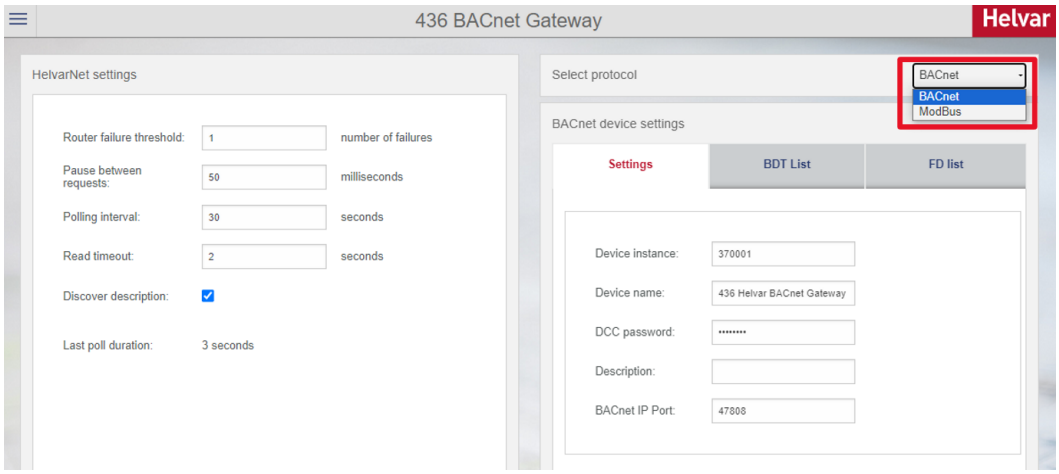
Press , and then select **Comms settings. This** page options allows users to configure the communication protocols needed to transmit data between:

- Helvar Routers to the 436 Gateway via HelvarNet
- Then to the BMS system as
    - Either: a BACnet over IP server for connection to a BMS BACnet IP Client (Default)
    - OR: a Modbus over IP slave for connection to a BMS Modbus IP Master

The 436's default protocol is BACnet over IP. To change the protocol to other supported by the 436. Choose from the "Select protocol" drop down menu.

Note: The protocol support is dependent on the firmware version of the 436. Modbus over IP is supported from version: v1-56-3918-B2 and above.

Caution: Changing protocol will result in erase any existing settings and mapped points.



4.1 HelvarNet comms settings

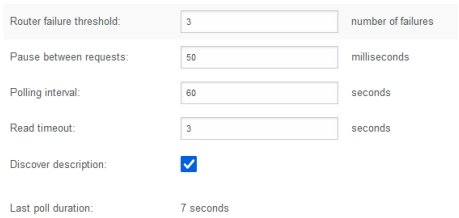
The comms settings allow users to configure the 436 as gateway from the Helvar Routers to the BMS IP network.

1. Press , and then select **Comms settings** to define the network connection details required for receiving and transmitting data between the Helvar Routers and the BMS IP network.
2. Configure the HelvarNet settings. These parameters define the connection details for communicating with the Helvar Routers. Do not modify the default values unless specifically instructed to do so.

- **Router (Router) Missing threshold**.

  Default: 3; range: 1–10 message missing.

  This value defines the number of consecutive failed requests from a Helvar Router and determines when a 'Router Missing' state is indicated.



- **Pause between requests**.

  Default: 50; range: 1 ms – 2000 ms

  This value defines the delay between sending a data request to one Helvar Router and the next Helvar Router.

- **Polling interval**.

  Default: 60; range: 10 s – 1800 s

  This value defines when the next data request cycle with the configured Helvar Routers is attempted; for example, every 60 seconds.

Caution: This value must be greater than the 'Last poll duration' value. Otherwise, 'Router Missing' BMS data point may be asserted.

- **Read timeout**.

  Default: 5; range: 2 s – 10 s

  This value defines the number of seconds that the device must wait for a response from a Helvar Router. After this period has elapsed, the device proceeds to the next configured Helvar Router. When a Helvar Router fails to respond to the number of consecutive requests set in the **Router Missing threshold** text box, a 'Router Missing' state is indicated.

- If necessary, set the '**Discover description**'.

  Default: Disabled

  This defines the use of the group and device descriptions in the Routers on the Helvar network. If disabled, the groups and device descriptions are automatically generated by this device. If enabled, the groups and device descriptions are taken directly from the Routers.

Caution When Discover descriptions is used, it will increase the time taken to display the Routers, networks, devices, and groups on the Map points page.

- **Last poll duration** value.

  This value shows the number of seconds that it has taken to poll all the configured Helvar Routers.

4.2 BACnet Comms and Device Settings

When the protocol under comms settings is selected as BACnet (default), this section describes the process of allowing a BACnet client on the BACnet/IP-based control system to access the data recorded by the connected Helvar Routers.

Configure the BACnet device settings. These settings define the connection details for the unit to appear as a BACnet device on the BACnet/IP based control system.

Note: Each BACnet device includes a default set of properties that are displayed in a BACnet Explorer. They are described in the BACnet PICS: see

Annex A – Protocol Implementation Conformance Statement (Normative).

- **Device instance**.

  Default: 370001; range: 1 – 999999.

  This number identifies the unit on the BACnet/IP based control system. Change this number if users have more than one 436 on the BACnet/IP network.

Caution: If the network has more than one 436, each unit requires individual **Device instance** numbers.

- **DCC password** (max. 30 characters).

  This is used to permit the DCC (Device Communication Control) and RD (Reinitialise Device) operations.

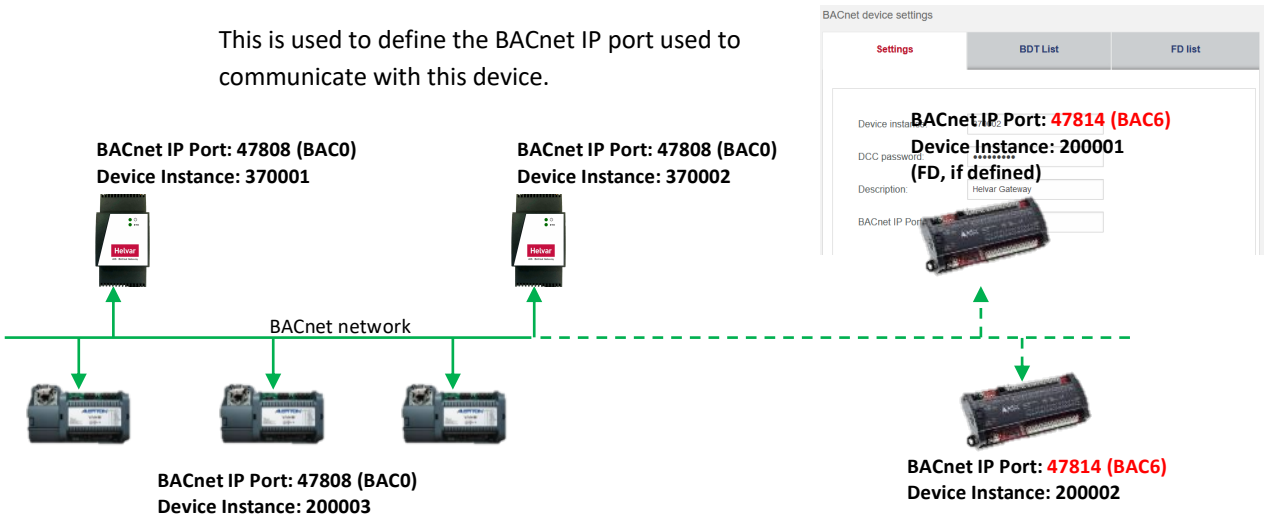
- **Description**.

  Users can enter any desired descriptive information in the BACnet/IP based control system. This information will be read by the communication partners.

- If necessary, edit the '**BACnet IP Port**'.

  Default: 47808(BAC0), range 1 to 65534.

  This is used to define the BACnet IP port used to communicate with this device.



Caution Ensure a unique 'Network number' is configured for each 436 Interface/Report on the BACnet IP network and all devices that need to communicate with each other are using the same 'BACnet IP Port'.

- If necessary, edit the '**APDU timeout**'.

  Default: 3000ms, range: 100ms - 6000ms

  This defines how much time a client waits for a response from a BACnet device.

- If necessary, edit the '**Retries**'.

  Default: 3, range: 1 - 9 retries

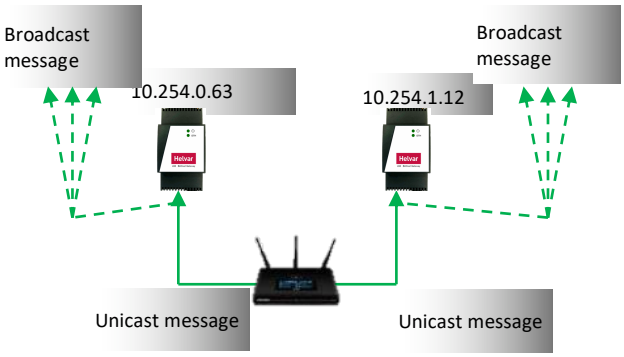
  This defines the number of consecutive failed requests by this device and any other BACnet devices it is communicating with.

Tip: The 'APDU Timeout' and 'Retries' may be increased for especially slow networks or networks with a high number of errors (e.g., wireless LANs).

Note The APDUs (Application Layer Protocol Data Units) are used in BACnet to convey the information contained in the application service primitives and associated parameters. BACnet APDUs consist of protocol control information and, possibly, user data. The variable portion of each APDU may contain service-specific information.

- If necessary, set '**BBMD enable**'.

  This manages when this device will be used to receive a unicast 'Who-is' message from a device on a different subnet range and send a 'Who-is' broadcast message to devices in this subnet range. It is used in conjunction with the 'BDT List' and 'FD List' pages shown beside the 'Settings' option.



Tip! IP Routers do NOT permit broadcast messages. A BBMD (BACnet Broadcast Message Device) sends a unicast message to the specified BBMD device on the other subnet range.

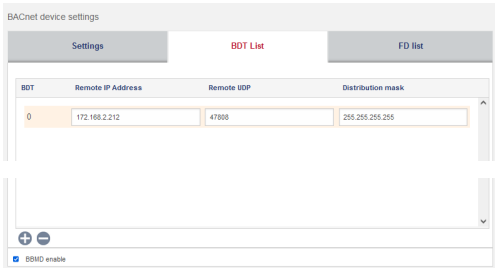
Note A 'Who-is' message is sent by other BACnet devices that need to acquire the address information of other devices without creating more network traffic. Other BACnet devices respond with an 'I-am' message. This hardware automatically send an 'I-am' message on start up.

- If necessary, manage the BBMD connections.

  Press ' ⊕ ' to add a BBMD reference. Enter the BACnet BBMD IP Address.

  If necessary, change the Remote UDP (BACnet network number).

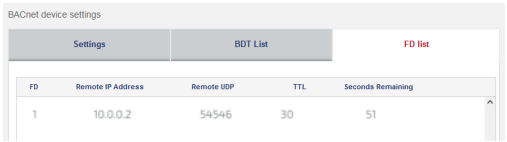
Tip! The 'Remote subnet' should remain at 255.255.255.255. This will allow the broadcast 'Who-is' message across the entire 'Remote IP Address' range.



  If necessary, press ' ⊖ ' to remove a selected BBMD reference.

- If necessary, view the ‘FD List’ (Foreign Device List) showing a list of devices on different subnet ranges, the TTL (Time To Leave) and Seconds Remaining.

Note An FD is a device on a different IP Subnet, or one that is using a different BACnet Port Number (e.g. Not 47808) registered to communicate via the BBMD according to the TTL timer.



Note The device details will be removed when the TTL has occurred.

4. Press **Save** to apply the changes.

4.3 Modbus Comms and Device Settings

Modbus over IP has simpler networking requirements compared to BACnet over IP. Configuration options consist of editing the TCP port number of the 436 and the server timeout period. Default settings, shown as below.

5.0 Map Points

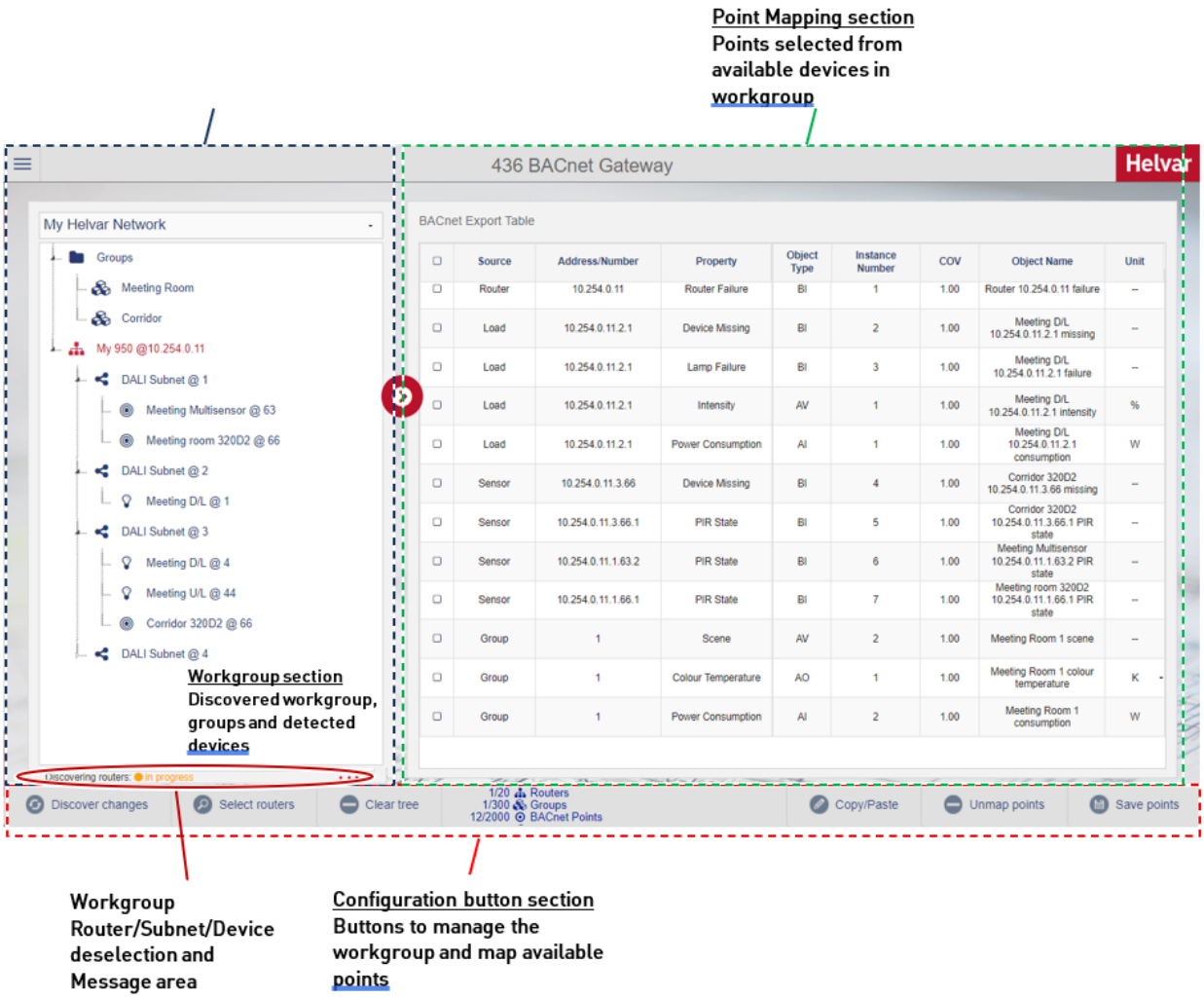
The **Map points** page is used to expose predetermined parameters in a single workgroup to a BMS IP system. These predetermined parameters are available from discovered Helvar Routers and Helvar Router subnet devices.

Tip: Use Helvar Designer software to configure the lighting system and to assign IP addresses to Helvar Routers. All Helvar programming should be completed before users map the points to the 436 Gateway.

Press ☰, and then select **Map points** to display the **Export Table**, where users can select Groups, Routers and Router Subnet device parameters from discovered workgroups.

Note: The 920 Router DMX subnet is not displayed as no export information is supported for DMX devices.

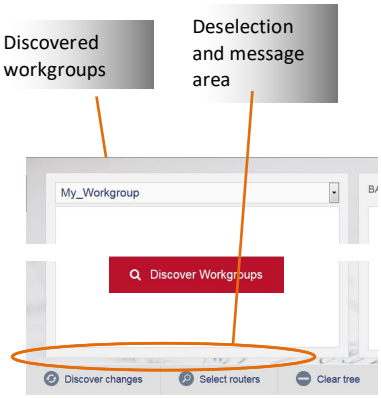
Example populated page after discovery and export:



5.1 Discover Helvar workgroups and devices

Once the IP config and comms settings have been correctly set on the 436. The Helvar workgroup and Routers can now be discovered in the Map oints page

1. Press **Discover workgroups** to populate the list of available workgroups and to display additional configuration buttons.



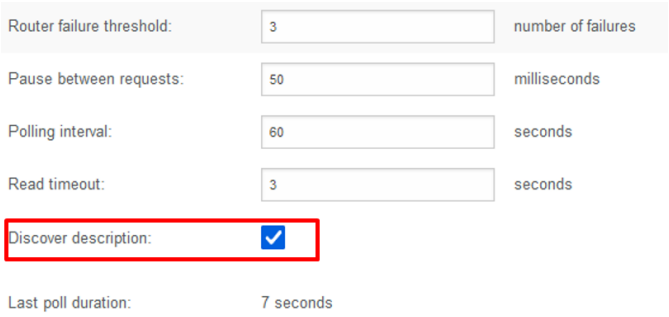
   - If there is only 1 workgroup on the network, it will appear in the Discovered workgroup drop down menu. If there are multiple workgroups on the network, drop down the menu and select the desired one to discover.
   - Press **Discover selected workgroup** to discover Helvar Routers in the selected workgroup.
   - If the desire workgroup is not found, try Discover workgroups again

2. If necessary, press **Discover changes** to detect changes to the selected workgroup.
3. Press **Select Routers** to show all Helvar Routers in the selected workgroup.

Note

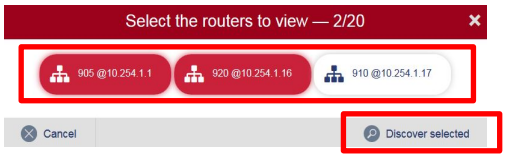
If device and group names are not discovered and required, ensure the “Discover description” option is ticked in the HelvarNet Settings (see section 4.1). If some devices or names are not discovered first time, try discovering changes or clearing the tree and discovering again. This could happen if there is a busy network.

Ticking this option will result in a longer discovery time.



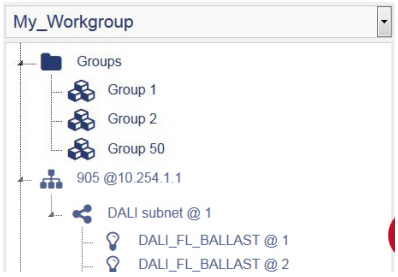
4.

5. Select the Routers with parameters that require mapping to the BMS. The maximum number that users can select is 20.



Tip: Detected Helvar Routers are identified by the Router type and IP Address, i.e. Router 905 at IP Address 10.254.1.1.

6. Press **Discover selected** to detect all Router and the devices connected to the available Router subnets. This will display the network tree associated with the selected workgroup.

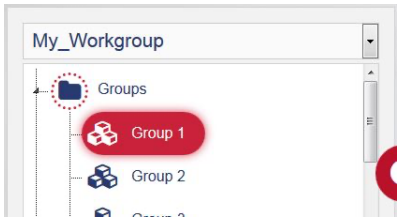


- Press **Clear tree** to remove all discovered Helvar Routers, groups and connected devices detected in the selected workgroup.

Tip: Users can use the workgroup tree to confirm that the expected Routers and connected devices are available.

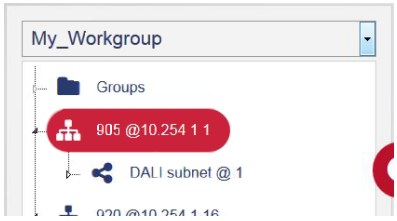
5.2 Map Helvar Points to Export Table (for BMS)

Each group, Helvar Router and connected device includes parameters that can be mapped as data points to the BMS IP network for the selected protocol.



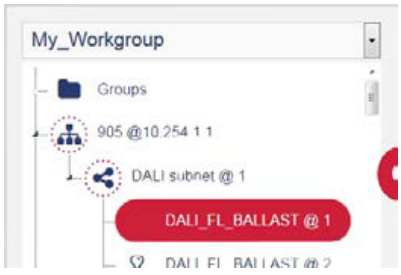
Note: For Modbus, the max group number is limited to 1500 due to Modbus related limitations.

1. Expand the **Groups** folder or the required Router.
   - Expand **Groups** to show all the groups configured in this workgroup.
   - Expand the Router (e.g. 905@ 10.254.1.1) to show all the available Router subnets in this workgroup.



2. Do the following to add parameters to predetermined BMS data point types
   i. Select a group in the applicable workgroup, and then press  to display the **Select points to export** dialog box.

Tip: To add group parameters from all groups, select the 'Groups' folder.



   ii. Turn on the switch corresponding to the parameter which requires mapping: e.g. **Scene**, **Direct Level** and **Power Consumption**.
   iii. For BACnet, if required, define the **Base BACnet instance number** for the equivalent group parameters.

iv. Press **Export** selected to add the enabled parameters and default properties to the export table.

Note: The **Groups** icon indicates that users have selected some parameters.

The exclamation mark icon shows that not all group or device parameters have been selected/exported.

Users need to add at least one Router to the export table for control and monitoring of groups.

To add Router parameters:

i. Select a Router shown in the defined workgroup, and then press to display a list of points which can be mapped.

ii. Turn on the **Router Missing** switch.

iii. If required type the BACnet instance number or Modbus Slave Assignment for the selected Router.

iv. Press **Export selected** to add the enabled parameters and default properties to the configuration table.

v. Check the default configuration applied.

To add subnet device parameters:

i. Expand the applicable Router subnet, select the required device, and then press to display the points that can be mapped.

ii. Turn on the switch corresponding to the parameter that users want to map: i.e. **Device Missing** or **Lamp Failure**.

iii. If required type the BACnet instance number or Modbus Slave Assignment for the equivalent subnet device parameters.

iv. Press **Export selected** to add the enabled parameters and default properties to the export table.

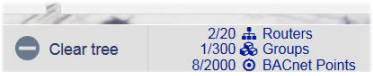
Notes: The Helvar Router and subnet icons indicate that parameters have been selected.

The exclamation mark icon indicates that not all 'Device' parameters have been selected/exported. i.e.

v. Check the default configuration applied.

7. Press **Save points** to apply the selected configuration and verify that the selected parameters are defined correctly.

Note: The bottom bar shows the current total number points maps vs the max allowed



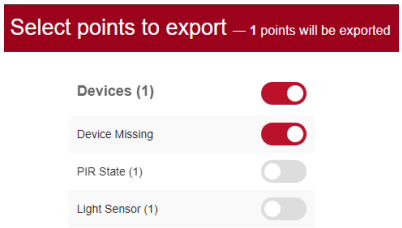
5.3 Default Export Points

To save commissioning time, selected essential export points have been turned on has default and the remaining off as default. The user can then further customise which points export during commissioning. The top toggle switch can be used to deselect or select all.

Group Defaults: Scene

Load and Emergency Default: Device Missing, Lamp Fail, Intensity

Sensor Default: Device Missing



Panel or Input Default: Device Missing

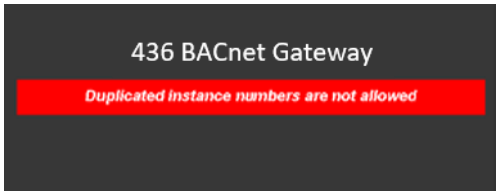
5.4 Edit the Export table

The Export table allows users to view and edit the mapping configuration of the group, the Helvar Router and the Helvar Router subnet device parameters to either the BACnet object instances or

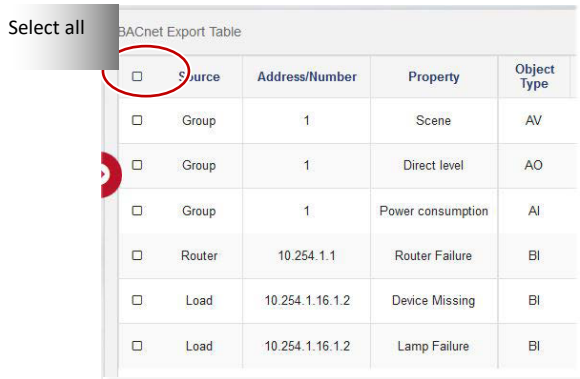
Modbus Registers (depending on selected protocol). Each exported data point includes a default set of properties which will be discoverable by the BMS IP

To edit the Export table:

1. Select a parameter in the table, and ensure that the **Source**, **Address/Number and Property** fields are correct.
    - **Address/Number**: Group number, Helvar Router IP Address or Helvar Router IP Address and subnet device address.
    - **Property**: Parameter label.



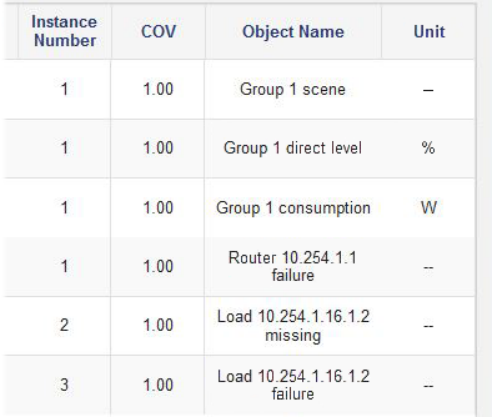
8. If necessary, remove a configuration point. Select the corresponding row (the first column shows ☑), and then press **Unmap points**.



Tip: To remove all configured points, set the top most tick box ☑, and then press **Unmap points**.

Note: Check the default name applied. Group parameters appear as '<Group No.> <parameter name>', Router parameters appear as 'Router <IP address> <parameter name>', and subnet devices appear as 'Load <IP address.subnet.device address>' <parameter name'.

Caution: A warning message appears if a duplicated exported data point is detected.



Instance Number	COV	Object Name	Unit
1	1.00	Group 1 scene	--
1	1.00	Group 1 direct level	%
1	1.00	Group 1 consumption	W
1	1.00	Router 10.254.1.1 failure	--
2	1.00	Load 10.254.1.16.1.2 missing	--
3	1.00	Load 10.254.1.16.1.2 failure	--

- For BACnet, If necessary, edit the **COV** (Change Of Value) field. This value determines when the BACnet device sends a COV message to the BACnet client. If the value changes by 1 or more, a COV message is sent. It is displayed as **Object Name** in the BACnet Explorer.

9. Press **Save points** to apply the changes.

6.0 Complete Export Points List

This table shows the list of points available via the 436 Gateway. For Modbus, also see Section 7.2 for exporting exact configurations to files which also contains further Modbus data such as register types and numbers. Sub note* information and best use can be found on the next page.

BACnet Object Type	Modbus Type and Access	Category	Parameter Name	Value (N = No Max Value)	Range (N = No Max Value)
AI (Analogue Input)	Analogue Read Only	Group	Active Power Consumption (DALI-2 Part 252 or Helvar Calculated) *1 *2	0..10..N	0 - N Watts (W)
			Set Point (for selected regions only and only for BACnet)	0..2..32	0 - 32 Degrees Celius (C)
			Temperature (for selected regions only and only for BACnet)	0..2..32	0 - 32 Degrees Celius (C)
		Device	Sensor Light Level *2	0..50..100	0-100 raw measurement (not lux)
			Active Power Consumption (DALI-2 Part 252 or Helvar Calculated) *1 *2	0..10..N	0 - N Watts (W)
			Control Gear Operating Time (DALI-2 Part 253) *1	0..100.. N	0 - N Seconds
			Light Sourcing Operating time (DALI-2 Part 253) *1	0..100.. N	0 - N Seconds
		Emergency (Group and Device)	Emergency Function Test State*4	0..2..32	0 = Pass 1 = Lamp Failure 2 = Battery Failure 4 = Faulty 8 = Failure 16 = Test Pending 32 = Unknown
			Emergency Duration Test State*4	0..2..32	0 = Pass 1 = Lamp Failure 2 = Battery Failure 4 = Faulty 8 = Failure 16 = Test Pending 32 = Unknown
			Emergency Battery Charge	0..50..100	0-100%
			Emergency Lamp Time	1..3..255	1 ... 255 hours
			Emergency Total Lamp Time	1..100..1020	1 ... 1020 hours
			Emergency Battery Endurance	0..100.. N	0 - N Seconds
			Emergency Test Duration	0..100.. N	0 - N Seconds
			Emergency Function Test Time	0..100.. N	0 - N Seconds as Epoch timestamp
			Emergency Duration Test Time	0..100.. N	0 - N Seconds as Epoch timestamp
AO (Analogue Output)	Analogue Write Only	Group	Intensity	0..50..100	0-100%
			Colour Temperature	2700..4000..5000	0-50000 Kelvin
			Colour Coordinates	80.90..N	80.90..N i.e. 0.80 (multiplied 100), 0.90 (multiplied 100). DALI Type 8 (X,Y)
			Direct Proportion	- 100..0..+100	-100 - +100%
			Modify Proportion	- 100..0..+100	-100 - +100%
			Store as Scene *3	1..2..16	1-16 Scene, current device(s) intensity levels will be store to scene number
		Device	Store as Scene *3	1..2..15	1-16 Scene, current device(s) intensity levels will be store to scene number
		Emergency	n/a		
AV (Analogue Value)	Analogue Read & Write	Group	Scene	1..2..16	Blocks of 16 scenes, default in each block the first 1-12=ON scenes, 13-16=OFF scenes. 001..016 -> Block 1 017..032 -> Block 2 033..048 -> Block 3 049..064 -> Block 4 065..080 -> Block 5 081..096 -> Block 6 097..112 -> Block 7 113..128 -> Block 8
		Device	Intensity	0..50..100	0-100%
			Colour Temperature	2700..4000..5000	0-50000 Kelvin
			Colour Coordinates	80.90..N	80.90..N i.e. 0.80 (multiplied 100), 0.90 (multiplied 100). DALI Type 8 (X,Y)
		Emergency	n/a		

Continued on next page

BACnet Object Type	Modbus Type and Access	Category	Parameter Name	Value	Range (N = No Max Range)
BI (Binary Input)	Binary Read Only	Group	n/a		
		Device	Router Missing	0 - 1	0 = Not missing 1= True (missing)
			Device missing	0 - 1	0 = Not missing 1= True (missing)
			Lamp failure	0 - 1	0 = No failure 1= True (failure)
			Sensor PIR State *2	0 - 1	0 = Inactive (Raw trigger, no hysteresis timeout) 1= Active (Raw trigger, no hysteresis timeout)
		Emergency (Group and Device)	Emergency Battery Failure	0 - 1	0 = No failure 1= True (failure)
BO (Binary Output)	Binary Write Only	Group	Temporary Max Level Enable	0 - 1	0 = Disable 1= Enable
			Temporary Min Level Enable	0 - 1	0 = Disable 1= Enable
		Device	n/a		
		Emergency (Group and Device)	Emergency Function Test *4	0 - 1	1= Initiate test 0 = Value will reset back to 0 if command initiated successfully
			Emergency Duration Test *4	0 - 1	1= Initiate test 0 = Value will reset back to 0 if command initiated successfully
			Stop Emergency Tests *4	0 - 1	1= Initiate test 0 = Value will reset back to 0 if command initiated successfully
			Reset Emergency Battery and Lamp Time	0 - 1	1= Initiate test 0 = Value will reset back to 0 if command initiated successfully

Sub notes Explanations

*1 DALI-2 Parts 252 and 253: This feature requires Routers with version 5.8.5 or above and DALI-2 LED drivers which support the relevant optional parts of the DALI-2 standard. The 436 is unable to determine if the DALI-2 LED driver supports these parts or not hence the option will show in the export window for all DALI loads and the user will need to deter which is appropriate to export.

Helvar Calculated Power Consumption data is supported for all loads and available from version 5.2 or above. This requires manual adding of data in Helvar Designer before meaningful data is available from the 436.

*2 Certain project installations will require reduced exported points and/or reduced DALI subnet loads if higher data frequency is required. The 436 has a system polling cycle typically between 1 to 5 minutes depending on how many points are mapped to the gateway and how many retries are required to retrieve data from the workgroup in case of high traffic, errors or bad comms.

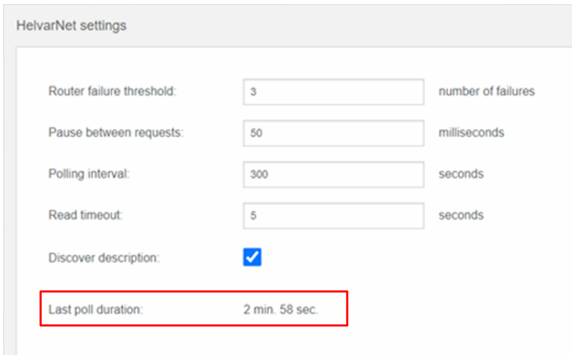
Note: **Helvar Routers have independent DALI subnet polling cycles to the 436 and depending on the loading and network traffic in the Router subnets, data available to the 436 from the Routers could take several minutes in addition to the 436 polling cycle. A typical Router DALI subnet polling cycle and refresh period for part 252 and 253 data is 30 mins with DALI subnets which are 70% loaded.**

Caution: If events and data such as PIR status and light level sensor measurements are required more frequently than 5 minutes, it is recommended to balance the capacity of points exported with the desired poll duration (i.e. reduce number of exported points to reduce poll cycle time). The "Last poll duration" timing is displayed in the HelvarNet comms settings described in section 4.1 (image below). The user can use this reading to balance the required timing vs the number of points exported on the 436.

The Sensor PIR state is the raw data from the sensor without any hysteresis. There may also be several sensors controlling the same group. The BMS system should incorporate their own hysteresis and grouping as required if for example turning on and off HVAC for the entire space based on this data. Alternatively if occupancy status for a group of sensors with hysteresis is required, this can be achieved by monitoring the different Group Scene points

instead of individual sensor PIR states. Group Scenes 1-12 are on (occupied) scenes 13 is automatic off by PIR (unoccupied) scene, 14 is a transition scene from occupied to unoccupied) and 15 and 16 are manual off scenes.

Do not modify the default values in the HelvarNet comms settings unless specifically instructed to do so.



*[3] Store as Scene. The value sent from the BMS system will be the **scene number** only for either the chosen group or device. Block 1 is only supported, and force store is fixed to "enabled" meaning if previously set to ignore in the Helvar Designer Scene Table, this will get over written.

Note whichever levels the load(s) is currently at will be automatically stored to the scene number sent by BACnet client overwriting any previous stored values including ignore.

*[4] AI Points: Emergency Function and Duration State are the primary result of the emergency device test result. The result of either Function or Duration state will return a value as shown in the table below which should be interrupted by the BMS system as the corresponding state (test result).

BO Points: Emergency Function Test and Emergency Duration Test are triggers to start the associated emergency test.

BO Point: Stop Emergency Tests will Stop any pending or started tests.

7.0 Helpful Features

7.1 BACnet Table Copy and Paste

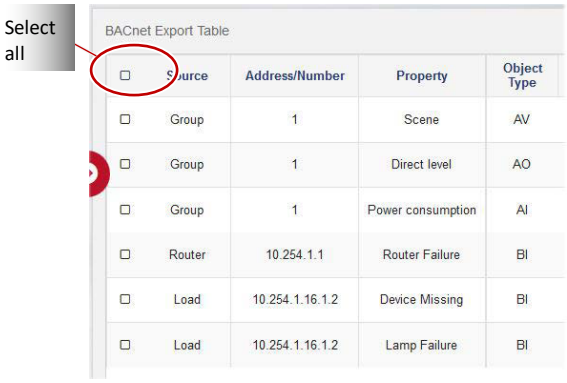
The Map points page includes a copy/paste function that is used to allow quick BACnet Object configuration of all selected points from the discovered Helvar Routers. This feature is not supported in other protocols i.e. Modbus.

Remember Use only alphanumeric characters, a-z, A-Z, 0-9, . and – when using a spreadsheet to define the Helvar Router points and the corresponding BACnet Object.

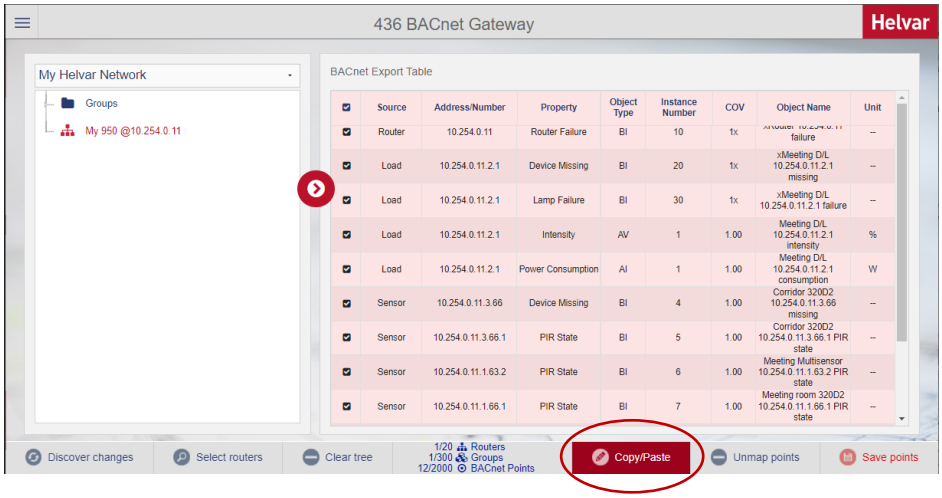
To copy the existing configuration, to get a template for future configuration or for a record of the mapping of Helvar Router points to BACnet Objects

1. Ensure all required points from all Helvar Routers are added to the BACnet Export Table before copying.
2. Select one or more points from the BACnet Export Table.

Tip: Enable the tickbox to the left of the Source in the table header to select all the existing configuration.

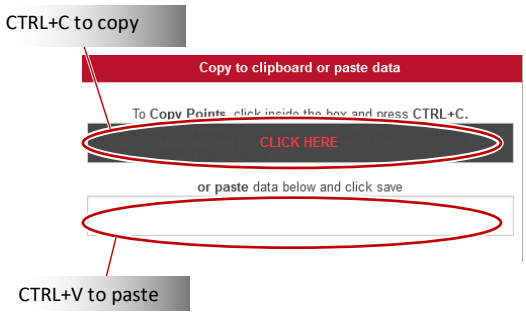


1. Press the Copy/Paste button to show the Copy/Paste page.



2. To copy the selected point configuration, use 'Copy to clipboard' to add all the selected rows to the computer clipboard, open a compatible spreadsheet application, e.g. Excel, and paste using keyboard shortcut commands.

   Edit the compatible spreadsheet application, as necessary.



Caution — Ensure each BACnet Object Type Instance MUST have a unique BACnet Instance Number (Col: F) and Object Name (Col: H).

H2 fx DALI Emergency Non-Maintained 10.254.0.2.3.1 missing

	A	B	C	D	E	F	G	H	I
1	ID	Source	Address	Property	Object Type	Instance Number	COV	Object Name	Units
2	1	Load	10.254.0.2.3.1	Device Missing	BI	1	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 missing	--
3	2	Load	10.254.0.2.3.1	Lamp Failure	BI	2	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 failure	--
4	3	Load	10.254.0.2.3.1	Emergency Function Test	BO	1	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 function test	--
5	4	Load	10.254.0.2.3.1	Emergency Duration Test	BO	2	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 duration test	--
6	5	Load	10.254.0.2.3.1	Stop Emergency Tests	BO	3	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 stop tests	--
7	6	Load	10.254.0.2.3.1	Function Test Time	AI	1	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 function test time	Sec
8	7	Load	10.254.0.2.3.1	Function Test State	AI	2	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 function test state	--
9	8	Load	10.254.0.2.3.1	Duration Test Time	AI	3	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 duration test time	Sec
10	9	Load	10.254.0.2.3.1	Intensity	AV	1	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 intensity	%
11	10	Load	10.254.0.2.3.1	Direct Proportion	AO	1	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 direct proportion	%
12	11	Load	10.254.0.2.3.1	Modify Proportion	AO	2	1	DALI Emergency Non-Maintained 10.254.0.2.3.1 modify proportion	%

Do NOT change in spreadsheet — Changes possible in spreadsheet

The Units (Col:I) must be set according to the corresponding BACnet Object Name.

Each column in the spreadsheet corresponds to the equivalent field in the BACnet Export Table.

10. To paste the spreadsheet configuration, select the first completed spreadsheet cell (e.g. A:1) and the last completed spreadsheet cell (e.g. I:n), copy configuration using standard keyboard shortcut (ctrl+c), then use the right hand mouse button in the white square and select 'Paste' from the context menu to add the copied information to this page.

Caution — The Paste function will not be able to populate a 436 Gateway that does NOT have devices/parameters from the connected Helvar Routers selected, and will overwrite an existing configuration. It will fail if the spreadsheet does not include an existing ID or if the ID cell of an existing point is not completed.

7.2 Modbus Table Export to File

The mapped Modbus table can be exported as either a PDF or CSV file. This allows users to easily share the current configuration of the 436 to a BMS engineer to allow an understanding of what has been mapped, the register numbers as well as other information.

To export to file, on the Map Points page press export 

at the bottom of the page.

The export is split as Groups then Router & Device data.

Group ModBus table

Source	Address	Name	Property	Slave	Function	Register	Data type	Range	Note
Group	1	Group 1	Scene	1	3 - Holding registers	1	Integer 32bit Unsigned	1..128	A.2

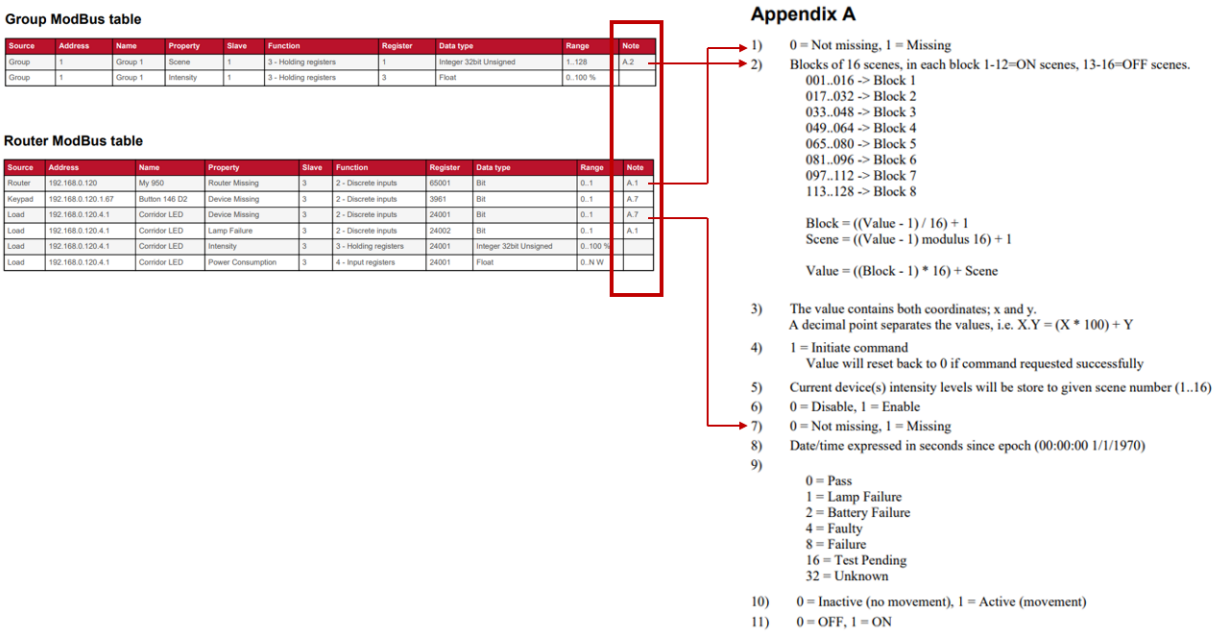
Router ModBus table

Source	Address	Name	Property	Slave	Function	Register	Data type	Range	Note
Router	192.168.0.120	My 950	Router Missing	2	2 - Discrete inputs	65001	Bit	0..1	A.1
Keypad	192.168.0.120.1.67	Button 146 D2	Device Missing	2	2 - Discrete inputs	3961	Bit	0..1	A.7

A timestamp for the export is also provided at the footer of the page for PDF files.

Generated from on Wed Dec 06 2023 13:06:31 GMT+0000 (Greenwich Mean Time)

The **Range** column defines the current state of the data point and the **Note** column is the **Appendix** reference for the definition of the state. For example, for a Device Missing data point, 0 = Not missing, 1 = Missing. See below the relationship between the references in the Note column and Appendix A for the export file



Group ModBus table

Source	Address	Name	Property	Slave	Function	Register	Data type	Range	Note
Group	1	Group 1	Scene	1	3 - Holding registers	1	Integer 32bit Unsigned	1..128	A.2
Group	1	Group 1	Intensity	1	3 - Holding registers	3	Float	0..100 %	

Router ModBus table

Source	Address	Name	Property	Slave	Function	Register	Data type	Range	Note
Router	192.168.0.120	My 950	Router Missing	3	2 - Discrete inputs	65001	Bit	0..1	A.1
Keypad	192.168.0.120.1.67	Button 146 D2	Device Missing	3	2 - Discrete inputs	3961	Bit	0..1	A.7
Load	192.168.0.120.4.1	Corridor LED	Device Missing	3	2 - Discrete inputs	24001	Bit	0..1	A.7
Load	192.168.0.120.4.1	Corridor LED	Lamp Failure	3	2 - Discrete inputs	24002	Bit	0..1	A.1
Load	192.168.0.120.4.1	Corridor LED	Intensity	3	3 - Holding registers	24001	Integer 32bit Unsigned	0..100 %	
Load	192.168.0.120.4.1	Corridor LED	Power Consumption	3	4 - Input registers	24001	Float	0..N W	

Appendix A

1) 0 = Not missing, 1 = Missing
2) Blocks of 16 scenes, in each block 1-12=ON scenes, 13-16=OFF scenes.
   001..016 -> Block 1
   017..032 -> Block 2
   033..048 -> Block 3
   049..064 -> Block 4
   065..080 -> Block 5
   081..096 -> Block 6
   097..112 -> Block 7
   113..128 -> Block 8

   Block = ((Value - 1) / 16) + 1
   Scene = ((Value - 1) modulus 16) + 1

   Value = ((Block - 1) * 16) + Scene
3) The value contains both coordinates; x and y.
   A decimal point separates the values, i.e. X.Y = (X * 100) + Y
4) 1 = Initiate command
   Value will reset back to 0 if command requested successfully
5) Current device(s) intensity levels will be store to given scene number (1..16)
6) 0 = Disable, 1 = Enable
7) 0 = Not missing, 1 = Missing
8) Date/time expressed in seconds since epoch (00:00:00 1/1/1970)
9)
   0 = Pass
   1 = Lamp Failure
   2 = Battery Failure
   4 = Faulty
   8 = Failure
   16 = Test Pending
   32 = Unknown
10) 0 = Inactive (no movement), 1 = Active (movement)
11) 0 = OFF, 1 = ON

Note The reference “N” in the Range column = No Max Value for that particular data point

Also see section 6 for the complete list of supported data points, values and ranges.

8.0 Backup, restore, firmware update and login settings

The **Backup and Restore** page provides functions that allows users to manage the configuration in the 436 BACnet Gateway. The functions generate a file that replicates the configuration contained in the unit. Users can then use this file to restore the unit to an earlier state without losing data. The IP configuration of the 436 may also change to the restore file settings (see Restore: Backup configuration or change device firmware).

8.1 Create a backup

The **Back up** button exports a copy of the configuration in this device. It creates a backup of the configuration to a defined media/location. Users can use this backup to restore the device to an earlier state (see Restore: Backup configuration or change device firmware).

Tip: Use the backup function ('Back up and restore' page), before performing any additional changes and after checking that any configuration changes operate correctly. If it is not possible to complete the update, this function will allow users to restore the unit to a known operating condition without losing data.

To create a backup file:

1. Press  , and then select **Back up** to prepare device specific configuration files ready for downloading an encrypted backup file. When completed, a confirmation dialog box appears.

Caution: Browsers may automatically download the file to the computer 'Downloads' folder. This will overwrite any file with the same filename.

Note: The **Backup** files do not have a file extension. They contain only configuration files, including the 'IP config' settings, 'HelvarNet settings', 'BACnet settings', and 'Map points' page configuration.

11. Rename the backup to clarify the origin, i.e. the IP address of the device, and then press **Save file**.

Caution: Do NOT select 'Open file'. Using 'Open file' may corrupt the backup file.

12. Locate the required back up destination, i.e. a hard drive, USB memory stick, or a removable drive, and then press **Save**.

8.2 Restore: Backup configuration or change device firmware

The **Restore** function returns the 436 Gateway to an earlier state without losing data. This is useful if it the unit is not operating correctly because of a configuration change or a problem with an application. It is also useful for disaster recovery if the unit fails completely.

By restoring the 436 Gateway to an earlier state (a version before), it may be possible to resolve the problems caused by a serious system issue or data loss. In addition, users can use the **Restore** function to configure another 436 before installing it to an existing system, thus reducing the repeat engineering time.

This feature is also used to apply firmware update files as necessary.

To restore a backup file or update device firmware:

1. Press ☰, and then select **Restore** to launch a browse dialog box.

13. Locate and select the required backup or firmware update file, and then press **Open**.

    This will upload the selected file and extract the information from the backup or update file.

    If restoring a backup file, the existing configuration will be overwritten.

    If restoring a firmware update file, the unit firmware will be overwritten, and the configuration files will remain unaffected.

Tip: The device beeps steadily while the backup or update files are being loaded. A fanfare indicates that the process is complete, and the device restarts automatically.
The 'Login' page will appear when the IP connection has been re-established. This may take several minutes and may require a Refresh of the browser.
To confirm that updates have been successfully applied, press 'Show version info' button on the 'Home' page.

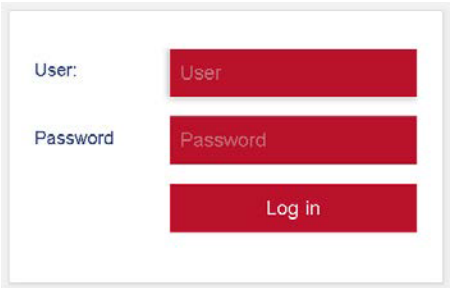
8.3 Configure the Login Security

When first installed, the configuration pages are protected by a user name and a default password (see the *Installation Guide*). Users must type them before they can access the configuration of the device. After the device has been installed, change the default password to prevent unauthorised access.

Caution: Changing and retaining the password is the responsibility of the user/customer. However, it may be possible to restore the default password. If required, contact your Helvar support representative for further details.

To configure the password:

1. Do one of the following:



- If necessary, press **Admin** (on the **Home** page) to display the **Change password** page.

  This page displays the **User**, **Password** and **New password** text boxes, which allow users to change the current password.

- Press ☰, and then select **Change Password** to display the **Change password** page.

Tip: Press **Go back** to return to the configuration pages.

Press **Logout** (at any time) to exit the configuration pages immediately.

2. Type the default **User** name `(Admin)`.
3. Type the current password.

Caution: Login security can be successfully controlled only if the password is carefully distributed.

4. Type a new password (40 characters max.) in the **New Password** text box. This password overwrites the previous password.

Tip: A random combination of numbers and uppercase and lowercase letters provide a secure password setup.

5. Press **Save** to apply the changes and return to the **Login** page.

9.0 BACnet Protocol Implementation Conformance (PIC) Statement

Helvar's 436 Gateway is an OEM product from Synapsys Solutions Ltd and is a variant of the Synapsys SIP2. The following Protocol Implementation Conformance (PIC) statement gives the full compliance by Synapsys for all variants of the SIP2 gateway.

The Helvar 436 variant offers a reduced selection of the full BACnet/IP capability that is available from the SIP2. The standard object types supported for the Helvar 436 are: **analogue value, analogue input, analogue output, and binary inputs.**

Annex A – Protocol Implementation Conformance Statement (Normative)

(This annex is part of this standard and is required for its use.)

BACnet Protocol Implementation Conformance Statement

Date: 1 March 2022

Vendor Name: Synapsys Solutions Ltd

Product Name: Synapsys SIP2

Product Model Number: N/A

Application Software Version: 1.05

Firmware Revision: 0.8.3

BACnet Protocol Revision: 12

Product Description

This software module is used across Synapsys SIP products range and exposes values typically from Helvar Routers other over BACnet IP.

BACnet Standardized Device Profile (Annex L):

- ☐ BACnet Operator Workstation (B-OWS)
- ☐ BACnet Advanced Operator Workstation (B-AWS)
- ☐ BACnet Operator Display (B-OD)
- ☐ BACnet Building Controller (B-BC)
- ☐ BACnet Advanced Router (B-AAC)
- ☒ BACnet Application Specific Controller (B-ASC)

☐ BACnet Smart Sensor (B-SS)

☐ BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B, DS-RPM-B, DS-WP-B, DS-WPM-B, DS-COV-B,

DM-DDB-A, DM-DDB-B, DM-DOB-B, DM-DCC-B, DM-TS-B, DM-UTC-B

Segmentation Capability:

None

Standard Object Types Supported:

DEVICE:

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Local_Time, UTC_Offset, Local_Date, Daylight_Savings_Status, Location, Active_COV_Subscriptions

Writable properties: –

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions:

APDU_Timeout: 0-65535

Number_Of_APDU_Retries: 0-255

ANALOGUE_INPUT

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, COV_Increment

Writable properties: Present_Value and Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: –

ANALOGUE_VALUE

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, Priority_Array, COV_Increment, Relinquish_Default

Writable properties: Present_Value, Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: –

ANALOGUE_OUTPUT

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, COV_Increment

Writable properties: Present_Value, Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: –

BINARY_INPUT

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability

Writable properties: Present_Value and Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: –

BINARY_VALUE

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, Priority_Array, Relinquish_Default

Writable properties: Present_Value, Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: –

BINARY_OUTPUT

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability

Writable properties: Present_Value, Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: –

MULTISTATE_INPUT

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, State_Text

Writable properties: Present_Value and Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: Max. 128 states, each state max. 19 characters.

MULTISTATE_VALUE

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, Priority_Array, State_Text, Relinquish_Default

Writable properties: Present_Value, Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: Max. 128 states, each state max. 19 characters

MULTISTATE_OUTPUT

Dynamically creatable: No

Dynamically deletable: No

Optional properties: Description, Reliability, State_Text

Writable properties: Present_Value, Reliability when Out_Of_Service is TRUE, Out_Of_Service (These are saved in volatile memory; changes are lost after reboot)

Conditionally writable properties: –

Proprietary properties: –

Property range restrictions: Max. 128 states, each state max. 19 characters

Data Link Layer Options:

- ☒ BACnet IP, (Annex J)
- ☐ BACnet IP, (Annex J), Foreign Device
- ☐ ISO 8802-3, Ethernet (Clause 7)
- ☐ ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ☐ ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) _____
- ☐ MS/TP master (Clause 9), baud rate(s): _____

☐ MS/TP slave (Clause 9), baud rate(s): _____

☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s): _____

☐ Point-To-Point, modem, (Clause 10), baud rate(s): _____

☐ LonTalk, (Clause 11), medium: _____

☐ BACnet/ZigBee (ANNEX O)

☐ Other: _____

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes ☒ No

Networking Options:

☐ Router, Clause 6 – List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Router, Clause 6 – List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP

☒ BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices? ☒ Yes ☐ No

Does the BBMD support network address translation? ☐ Yes ☒ No

Network Security Options:

☒ Non-secure Device – capable of operating without BACnet Network Security
☐ Secure Device – capable of using BACnet Network Security (NS-SD BIBB)
☐ Multiple Application – Specific Keys:
☐ Supports encryption (NS-ED BIBB)
☐ Key Server (NS-KS BIBB)

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☒ ISO 10646 (UTF-8) ☐ IBM /Microsoft DBCS ☐ ISO 8859-1

☐ ISO 10646 (UCS-2) ☐ ISO 10646 (UCS-4) ☐ JIS X 0208

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

This product is a gateway. It typically exposes lighting control system data to BACnet IP.