freedom in lighting

BACnet Gateway (435)

Installation Guide

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1.   Introduction

The 435 BACnet Gateway provides a simple interface to a Helvar router system and allows lighting system data to appear in a BACnet Building energy Management System (BeMS).
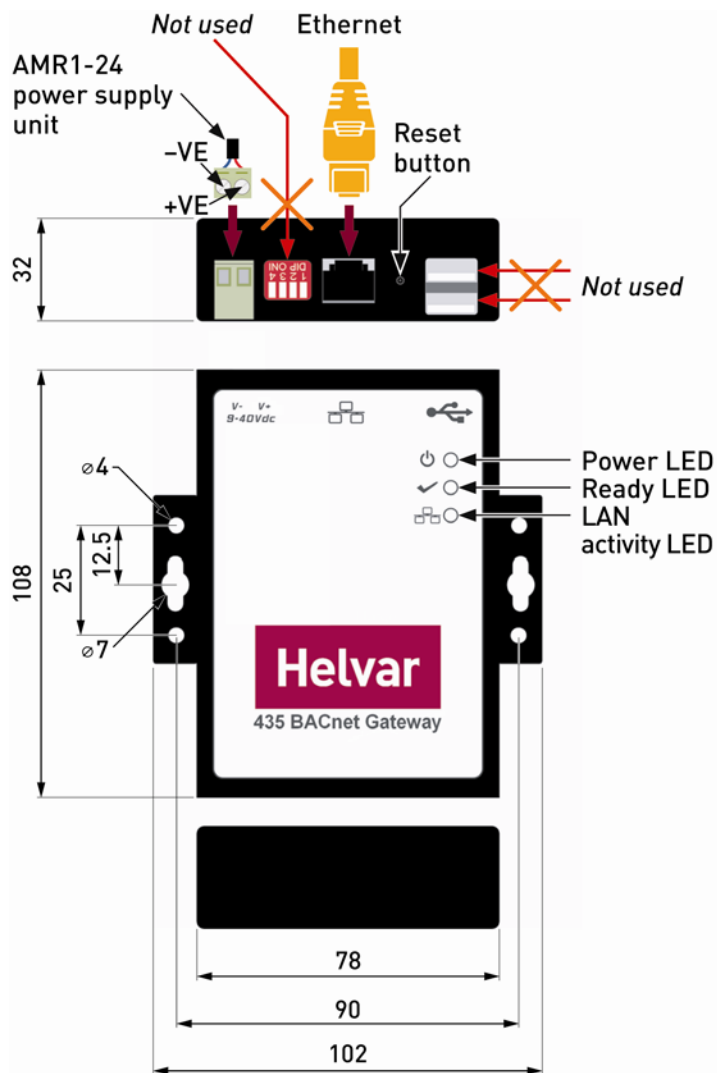
Note: Typically, individual systems (energy control, lighting, boiler and air-conditioning systems, etc.) are measured separately for CO_2 accountability. Therefore, installing the BACnet Gateway and combining the various systems can help an effective BeMS be more energy efficient and comply with national building regulations.

The 435 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 435 BACnet 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 BACnet/IP BMS can use this information to control and monitor the lighting, energy and environmental conditions.

The unit is designed and manufactured to comply with CE Class A, FCC Class A, WEEE (Waste Electrical and Electronic Equipment), RoHS (Restriction of Hazardous Substances) regulations and the identification of a substance as Substance of Very High Concern (REACH).

It also complies with the requirements defined in the Council of the European Union Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility (89/336/EEC). For the evaluation regarding the electromagnetic compatibility, refer to the Declaration of Conformity certificate (available on request).

1.1. Device limits and compatibility

The 435 BACnet Gateway has the following limitations and compatibility requirements:

- Limits:
    - Single workgroup
    - 20 routers
    - Max. 300 groups
    - Max. 2000 BACnet/IP points (overall limit)
- Compatibility:
    - Router firmware version 5.2 or above.
    - Router IP addresses need to have the same first and second octets, i.e. '10.254.x.x'.
    - Web browsers: Firefox (recommended), Chrome and Internet Explorer.

1.2. Description of the unit

The 435 BACnet 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. The connected Helvar routers appear as a single BACnet device in the BACnet/IP BeMS, whereas the predetermined parameters appear as predetermined BACnet object types.

From the configuration pages, you can do the following:

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

Reset button   DIP switches (not used)
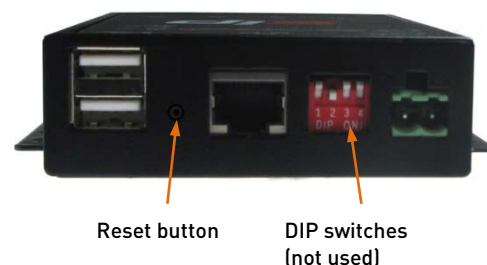
1.2.1. Front panel LEDs

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

- ⏻ Power LED

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

    'On' indicates that the 24 VDC power is supplied. 'Off' indicates that the power is not supplied or has failed.

- ✔ Ready LED

    This LED shows the status of the boot-up process.

    'On' indicates that the required files have been loaded to the RAM disk and that the unit has

successfully booted up. 'Off' indicates that the unit is not ready or has failed to boot up.

- 🖧 Ethernet Activity LED

    This LED shows the communication between the unit and the supervisory computer or controller connected via the Ethernet.

    'On' indicates incoming communications traffic. 'Off' indicates outgoing communications traffic.
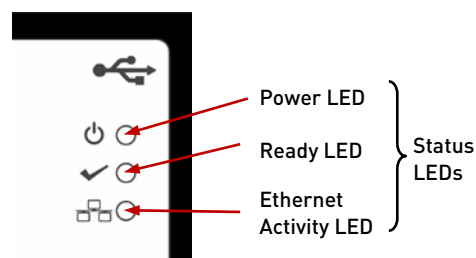
1.2.2. Button and switches

The BACnet Gateway is fitted with a recessed button for rebooting the unit, and with a bank of four DIP switches. The bank of DIP switches is not functional in this version.

While the reset button does not erase any configuration, we recommend that you use it only if the software reboot fails.

1.3.   System overview

The BACnet Gateway provides direct interface between Helvar routers, including the devices connected to them (such as ballasts, LED drivers, luminaires and sensors), and a BACnet/IP BMS. Thus, the BACnet/IP BeMS can access the values recorded in the Helvar 905, 910 and 920 routers and in the DALI devices.
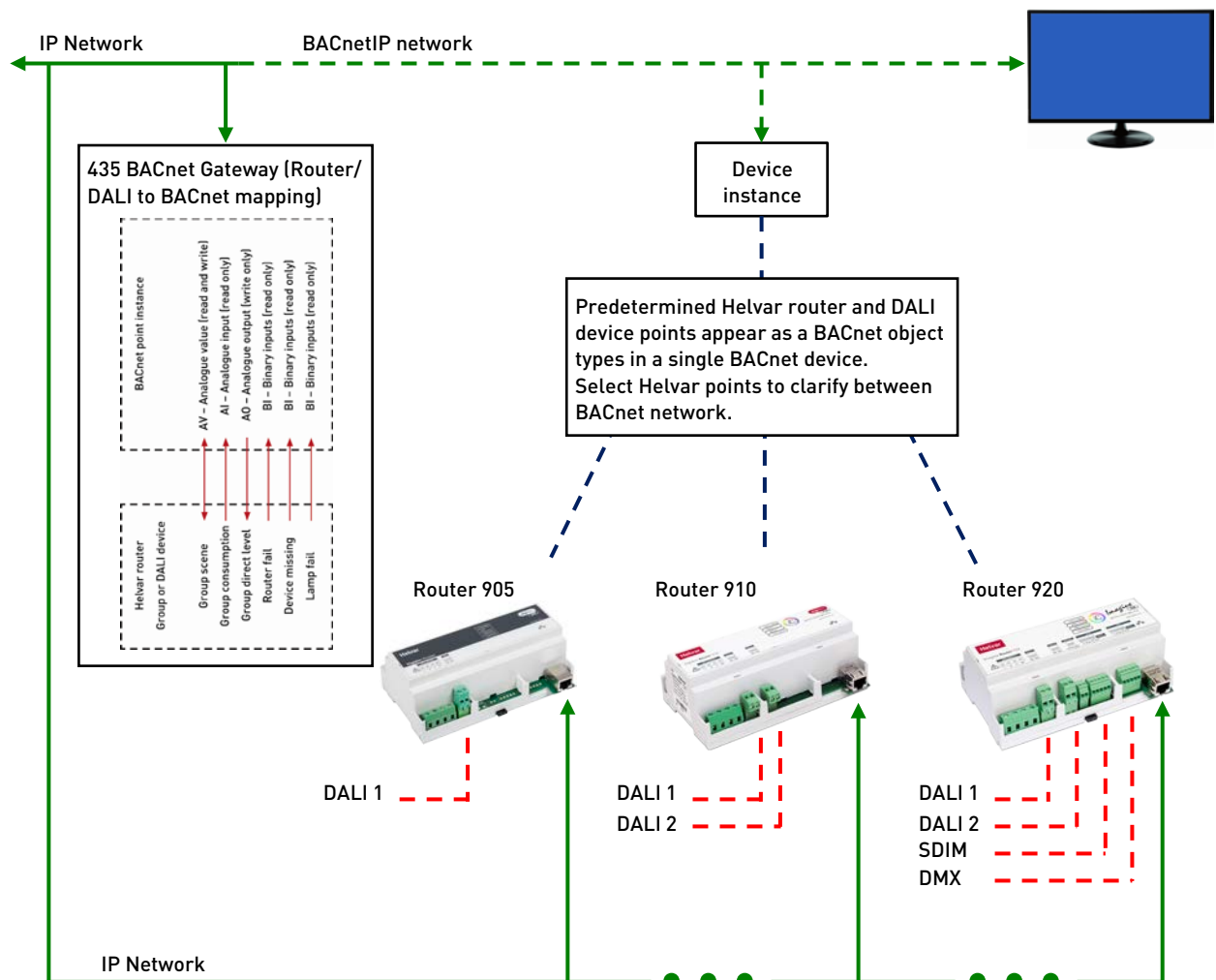
1.3.1. Helvar devices and DALI networks

The Helvar 905, 910 and 920 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 435 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 you to connect of up to 64 DALI devices on a single and simple two-wire network and communicate with them individually, collectively or in groups. You 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	SDIM	DMX (NOT EXPOSED)
905 router	64 devices	N/A	N/A	N/A
910 router	64 devices	64 devices	N/A	N/A
920 router	64 devices	64 devices	252 addresses	512 in/out addresses

SDIM and DMX are low-loss RS485 Type (multistranded, twisted and shielded), three or four cores and screen networks, max. 1 km cable length.

Tip: **For DALI, SDIM and DMX network installation, refer to the Helvar 905, 910 and 920 routers documentation. See also the D5 Recommended Best Practices document for networking and system guidelines.**

1.3.2. BACnet/IP network

Specifically designed for building automation and control networks, the BACnet/IP protocol provides a standard way of representing the functions from third-party devices to exchange data over a computer network. It operates on a client/server principle: the BACnet Gateway is the server, and either a BACnet device or the BACnet Explorer is the client. The network uses standard cat 5e cabling to transfer 'service' requests from each client to the server, which performs the service and then reports the result to the client. Local IP network policy is used to address BACnet devices.

Each 'service' request includes a default set of 'objects'. These may represent either a single physical point or logical groupings of points that perform a specific function. An 'object' is simply a collection of properties (such as 'Object_Name', 'Object_Type' or 'Present_Value') that describe the behaviour and operation of the BACnet device.

Note: **For BACnet compliance details, refer to the *User Guide.***

2. Hardware guide

This hardware provides an interface between Helvar devices (with connected products) communicating via the DALI protocol and BACnet (BACnet/IP) BMS communicating via Ethernet protocol.

General

Weight:	330 g per unit, including DIN Rail clips 410 g shipped, including DIN Rail clips
Power input:	9 VDC – 40 VDC
Power consumption:	300 mA @ 12 VDC, 150 mA @ 24 VDC
Default user name:	`Admin` (case-sensitive)
Default password:	`password` (case-sensitive)

Hardware Details

Button:	Reset
DIP switch:	Not applicable
Indicators:	Power, System Ready, Ethernet LAN Activity
Ethernet:	1 × 10/100 Mb/s port via RJ45 connector with 1.5 kV magnetic isolation
Serial:	Not applicable
USB:	Not applicable
SD memory card:	1 × internal 2 GB slot for storage expansion

Environmental

Operating temperature:	0 to +70 °C
Storage temperature:	−20 to + 80 °C
Relative humidity:	Max. 90 %, noncondensing
Regulations:	CE Class A, FCC Class A, REACH (Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals – European Chemicals Agency), RoSH (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment – EU Directive 2002/95/EC)

ROHS BANNED SUBSTANCES	MAXIMUM LIMIT (PPM)
Cadmium (Cd)	100
Lead (Pb)	1000
Mercury (Hg)	1000
Hexavalent chromium (Cr[VI])	1000
Polybrominated biphenyls (PBB)	100
Packing materials: cadmium, lead, mercury, hexavalent chromium and its components < 100 PPM	100

Dispose of the product and packaging according to WEEE Directive at an appropriate recycling centre. All parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover any appropriate metals.

3. Installation

This section explains the process of fitting the 435 BACnet Gateway in the required position and location. It also describes how to connect the cables to ensure that the unit can communicate via the BACnet/IP BeMS network and the connected devices. Finally, it gives the specific wiring conventions used by the connected communications protocols and the hardware fitted to the unit.

Note   **This is a class A product. When installing this product in a residential environment, ensure that adequate measures are taken to prevent radio interference.**

3.1. Installing the UNIT

The unit usually forms part of a larger assembly, and/or may be housed in a floor or wall-mounted enclosure. It can also be mounted to a DIN Rail in an enclosure using a DIN Rail kit.

Note   **When fitting this unit as part of a system, refer to the documentation accompanying the other equipment.**

To install the unit using the DIN Rail kit:

1. Fit the DIN Rail kit to the bracket on each side of the unit using the fixings supplied.

2. Click the unit, complete with the DIN Rail kit, onto the DIN Rail mounted in the enclosure.

Caution   **Do NOT mount directly to an enclosure.**

3. Connect the power supply to the unit (see **Connections and Wiring**).

Caution   **Before connecting power, ensure that all connections have been verified and the –V (0 V) terminal is NOT earthed/grounded.**

Note   **A 'beep' indicates the unit has started to boot up.**

4. Connect the unit to the IP network using an appropriate Cat5e cable (see **Connections and Wiring**).

Screw

DIN Rail Clip

Screw

DIN Rail Mounting Kit

4

3
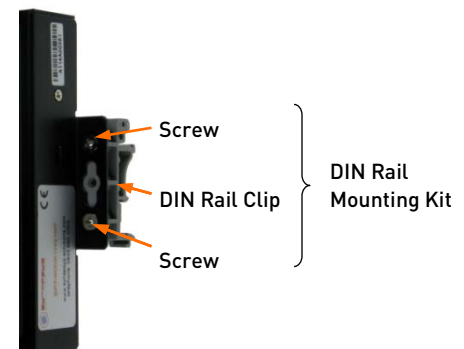
3.2. Connections and Wiring

This product may be supplied mounted in an enclosure or supplied as an individual part in kit form.

The BACnet Gateway is typically installed as part of a control system using an Ethernet hub/switch. Category 5 cables can be used for individual line lengths of up to 100 metres.

Caution   **Before connecting power to the unit, make sure that the Ethernet connection has been verified and the –V (0 V) terminal of the power connector is NOT earthed/grounded.**

Shielded RJ45 connectors and screened Category 5 cables are widely available, but specifications vary. Given the problems that can arise with inadequate cabling, we recommend that you use ready-made interconnecting cables.

3.2.1. Power supply

Each product requires a 9 VDC – 40 VDC power supply. When the power is correctly supplied, the Power LED is illuminated.
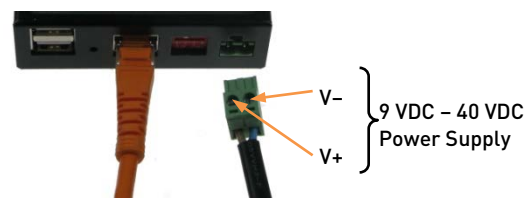
3.2.2. Communications

The RJ45 port, indicated by the symbol, is designed for Ethernet LAN.
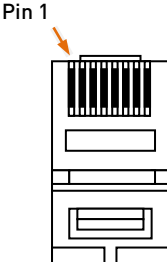
- Ethernet Communication Port

  Each unit contains 10/100 base T port for Ethernet communications via a standard RJ45 type connector. Connection to an Ethernet hub/switch requires a Category 5 RJ45-to-RJ45 cable assembly. When connecting to the Ethernet hub/switch, a 'straight-through' cable is used.

RJ45 MALE	FROM RJ45 PIN NO.	SIGNAL	COLOUR CODE (EIA/TIA 568B)	TO RJ45 PIN NO.
	1	Transmit+	White/Orange	1
	2	Transmit–	Orange	2
	3	Receive+	White/Green	3
	4	N/A	Blue	4
	5	N/A	White/Blue	5
	6	Receive–	Green	6
	7	N/A	White/Brown	7
	8	N/A	Brown	8

The image shows the flat side of RJ45 plug.

When connecting directly to another device supporting 10/100 base T Ethernet communications protocol, i.e. a laptop or computer used to configure and interrogate the unit, a 'crossover' cable is required.

RJ45 MALE	FROM RJ45 PIN NO.	SIGNAL	COLOUR CODE (EIA/TIA 568B)	TO RJ45 PIN NO.
	1	Transmit+	White/Orange	3
	2	Transmit–	Orange	6
	3	Receive+	White/Green	1
	4	N/A	Blue	4
	5	N/A	White/Blue	5
	6	Receive–	Green	2
	7	N/A	White/Brown	7

RJ45 MALE	FROM RJ45 PIN NO.	SIGNAL	COLOUR CODE (EIA/TIA 568B)	TO RJ45 PIN NO.
	8	N/A	Brown	8

The image shows the flat side of RJ45 plug.

4. Order Code

435+AMR1 PSU: BACnet Gateway with 24 VDC 1A PSU