VECTROLINK
TECHNOLOGIES

vMBT-02

Modbus to BACnet Gateway (BACnet/IP & MS/TP)

User Manual

Installation, Configuration & Operation Guide

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Confidential — intended for the customer and operating personnel of this device.

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Chapter 1

Introduction

1.1 About This Document

This manual describes the installation, configuration, and day-to-day operation of the **Vectrolink vMBT-02**, a gateway that connects Modbus RTU devices to a BACnet building management system. It is intended for technicians, system integrators, and operators who install, configure, or maintain the device on site.

This document covers:

- Hardware overview and physical interfaces
- Initial setup and first boot
- Full walkthrough of the embedded web configuration interface
- How Modbus values become BACnet objects, and how the BMS writes back
- Security notes relevant to operators and IT staff
- Troubleshooting common issues

The complete HTTP API is described in the separate *vMBT-02 API Reference*; Chapter 9 gives an overview.

1.2 What is the vMBT-02?

The vMBT-02 runs on the same hardware as the vMT-02 Modbus Translator, with firmware for a different task: it makes Modbus RTU field devices – energy and heat meters, heat pumps, frequency drives, air handling unit controllers – visible to a **BACnet** building management system (BMS).

The gateway polls the Modbus devices on its RS-485 channels and presents every configured value as a standard object of its own BACnet device. The BMS reads these objects, subscribes to changes (COV), and sends commands back, which the gateway writes to the Modbus devices. No PC or middleware is involved.



1.3 Points

The configuration of the gateway is a list of **points**. A point links one value in a Modbus device to one BACnet object:

- **Modbus side:** RS-485 channel, slave address, function (coils, discrete inputs, holding or input registers), address, data type and byte order, scale and offset.
- **BACnet side:** object type (Analog Input, Analog Value, Binary Input or Binary Value), instance number, name, description, engineering units, COV increment, and whether the BMS may write it.

Up to 500 points are supported. The point list is edited in the web interface or as a CSV file in Excel (Chapter 4).

1.4 Key Features at a Glance

Feature	Description
BACnet datalinks	BACnet/IP over Ethernet or Wi-Fi, or BACnet MS/TP on one RS-485 channel
BACnet objects	Analog Input, Analog Value, Binary Input, Binary Value – up to 500 points
Commands from the BMS	Analog and Binary Values with the 16-level priority array, written to the Modbus device
Change of Value (COV)	The BMS can subscribe to changes instead of polling
Data types	U16, S16, U32, S32, FLOAT32, single bits; four byte orders; scale and offset
Commissioning	Point list in the browser or as a CSV file; live values and per-device diagnostics
Embedded web UI	No software installation required – configure entirely from a browser
HTTPS web access	Encrypted access to the configuration interface

Chapter 2

Hardware Overview

2.1 Platform

The vMBT-02 runs on a dual-core microcontroller (240 MHz) with the following on-board interfaces:

Interface	Purpose
RS-485 – 2 independent channels (RS485-1, RS485-2)	Two separate RS-485 buses, each with its own baud rate, parity, and stop bits. Each channel polls Modbus RTU devices; one of them can instead carry BACnet MS/TP
10/100 Ethernet	BACnet/IP, web interface and Vectrolink Cloud – primary recommended connectivity
Wi-Fi 802.11 b/g/n	BACnet/IP, web interface and configuration access – secondary or backup connectivity
Status LED (RGB)	Visual indication of boot state, network activity, and Modbus traffic
Push-button	Temporary Wi-Fi activation and factory reset (see Section 2.4)

2.2 RS-485 Bus Termination

Each RS-485 channel has an on-board termination resistor that can be switched in or out using a jumper: **J5** for RS485-1, **J6** for RS485-2.

Both jumpers ship **open (termination disabled)** by default on every unit.

A correctly terminated RS-485 bus needs a termination resistor at each of its two physical ends, and nowhere else. Fitting the jumper on a device that is not at the end of the bus adds an extra resistor in parallel with the ones already there, which loads the bus and can cause intermittent communication errors that are hard to trace back to this cause.

Fit the jumper for a given channel only if the vMBT-02 is physically the last device on that RS-485 segment. Leave it open if the bus continues past the vMBT-02 to other devices, or if termination is already provided elsewhere on the segment.

2.3 Status LED Indications

The device has a single RGB status LED that communicates its current state:

The steady background colour reflects overall connectivity; brief pulses for Modbus activity and errors, and yellow/red flashes for button actions, briefly override it and then it returns to whichever background colour currently applies.

LED behaviour	Meaning
White, blinking	Device is starting up / initializing (approximately 10 seconds after power-on)
Green, steady	Normal operation: network connected (Wi-Fi or Ethernet) and Vectrolink Cloud reachable
Orange, steady	Network connected, but Vectrolink Cloud is not currently reachable (check internet access)
Red, steady	No network connection at all (neither Wi-Fi nor Ethernet)
Purple, steady	Access Point mode active – the device is broadcasting its own Wi-Fi hotspot (see Section 2.4)
Cyan, brief pulse	Modbus polling: the gateway is reading from or writing to a Modbus device
Red, brief flash	Modbus error: timeout, CRC error or exception from a Modbus device
Yellow, 1 flash	Push-button: short press recognised
Yellow, 2 flashes	Push-button: double press recognised
Amber, blinking (speeding up)	Push-button: held down, factory reset building up – starts blinking slowly around 2 seconds into the hold and blinks faster the closer it gets to 10 seconds; release before then to cancel
Yellow, 4 flashes, then red 6 flashes	Push-button: long press recognised, factory reset in progress

2.4 Push-Button Functions

The device has a single physical push-button with three distinct actions, depending on how it is pressed:

Short press (press and release quickly) Temporarily enables Wi-Fi in *station* mode for 10 minutes, then automatically reverts to the previous network configuration. Useful if Wi-Fi was disabled and you need temporary access.

Double press (two short presses within roughly half a second) Temporarily enables Wi-Fi in *access point* mode for 10 minutes – the device creates its own Wi-Fi hotspot you can connect to directly, then automatically reverts afterward. Useful if the device cannot be reached on the existing network at all.

Long press (hold for 10 seconds or more) Performs a **factory reset**: network settings, the point table, the BACnet and RS-485 settings, and user accounts are erased and reset to defaults. Starting about 2 seconds into the hold, the status LED blinks amber, speeding up the closer you get to 10 seconds – release before then to cancel without making any changes.

Factory reset erases the point table, the BACnet and RS-485 settings, user accounts, and network configuration – this cannot be undone. Export the point table as a CSV file (Section 4.3.2) and note the BACnet settings before performing a long press. The device's identity (name, serial number) and its connection to Vectrolink Cloud (including its TLS certificate) are *not* affected – you will not need to re-register the device afterward.

2.5 Power and Mounting

Refer to the datasheet supplied with your specific hardware revision for power supply voltage range, connector pinout, and mechanical (DIN-rail / enclosure) mounting details, as these may vary between hardware batches.

Chapter 3

Getting Started

3.1 Initial Power-Up

1. Connect the RS-485 wiring to your Modbus RTU field devices (and, if the BMS uses BACnet MS/TP, the MS/TP trunk to the other channel).
2. Connect an Ethernet cable if you intend to use BACnet/IP or a wired network connection.
3. Apply power to the device.
4. Observe the status LED: it will blink white for approximately 10 seconds while the device initializes, then show the network state (Chapter 2).

3.2 Connecting for the First Time

On first boot, no Wi-Fi network is configured. The device automatically falls back to creating its own access point so that it can always be reached:

1. On your laptop or phone, look for a Wi-Fi network named `vMBT-02_<SERIAL>`, where `<SERIAL>` is the 8-character serial number unique to your device (printed on the device label).
2. Connect to this network using the password `12345678`.
3. Open a web browser and navigate to:

   `https://192.168.4.1`

4. You will be presented with the login page of the embedded web interface.

> If the device is connected via Ethernet with DHCP, it obtains an address on your existing network. Check your router's DHCP client list for a device named `vMBT-02_<SERIAL>` – most routers show this alongside the assigned IP address. If you cannot locate it, use the push-button (Section 2.4) to temporarily force the device into access-point mode.

3.3 Default Login Credentials

The device ships with two pre-configured accounts for day-to-day use:

Username	Password	Access
`user`	`user`	Administrative access (web + API)
`api`	`api`	API access only (no web login)

Change both default passwords immediately after your first login. They are identical on every device of this model until changed, and are publicly documented in this manual. Note in particular that `user`/`user` is a full administrative account, not a restricted one. See Section 4.5 for instructions on changing passwords and creating additional accounts.

You may notice a third account named `cloud` in the Users list. It is reserved for the Vectrolink Cloud portal's single-sign-on feature (Section 6.5) and is not meant for direct login – please do not delete or repurpose it, or the "Open Device UI" button in the portal will stop working.

3.4 Network Configuration

After logging in, open the **Network** page to configure how the device connects to your network:

- **Ethernet** – DHCP (automatic) or static IP address, subnet mask, and gateway.
- **Wi-Fi** – select a network from a scan, or enter SSID/password manually; *station* mode (joining your network), *access point* mode, or both.

For BACnet/IP, a **static IP address** on Ethernet is recommended: BMS systems usually address devices by IP, and a changing DHCP address can make the gateway disappear from the BMS after a restart of the router.

3.5 Quick-Start Checklist

1. Power up the device and connect to it for the first time (Section 3.3).
2. Log in and immediately change all default account passwords.
3. Configure the network connection (Ethernet and/or Wi-Fi).
4. On the **BACnet & RS485** page: set the BACnet device instance and name, choose BACnet/IP or MS/TP, and set the baud rate, parity and stop bits of the Modbus channels to match your field devices.
5. On the **Points** page: add the points, or import a prepared CSV file; save the table.
6. Restart the device to apply the configuration (the yellow banner offers a button).
7. Check the **Points** page (live values, status OK) and the *Modbus Devices* table on the Dashboard.
8. In the BMS, discover the device (Who-Is) and read the objects.

Chapter 4

Web Interface Guide

The embedded web interface is the only configuration tool for the device – no desktop software or mobile app is required. This chapter walks through every page of the interface in the order it appears in the navigation menu.

4.1 How Changes Are Applied

The gateway builds its BACnet objects and its Modbus polling plan when it starts. Changes to the point table and to the BACnet/RS-485 settings are therefore **saved immediately but applied after a restart**: after saving, a yellow banner appears with a **Restart now** button. Several changes can be saved one after another and applied with a single restart. A restart takes about 10 seconds; the BMS sees the device go offline briefly and come back.

4.2 Dashboard

The Dashboard is the landing page after login and gives an at-a-glance overview of the gateway:

Device Info BACnet device name, serial number, firmware version, uptime, and device time.

BACnet Device instance in use, datalink (BACnet/IP or MS/TP), number of points; for MS/TP also frame, error and lost-token counters.

Connectivity Wi-Fi, Ethernet, and whether the Modbus devices are answering.

Modbus Polling Read requests and errors, writes from the BMS and their errors, duration of the last complete poll cycle, and the success rate.

Modbus Devices One line per Modbus device (RS-485 channel and slave address): state, requests, timeouts, CRC errors, exceptions, and average/maximum response time. This is the first place to look when values do not update (Chapter 7).

4.2.1 Configuration Backup

The *Configuration Backup* card at the bottom of the Dashboard keeps the whole configuration of the device in one JSON file: BACnet device and datalink settings, RS-485 channels, poll cycle and the point table.

Download backup Saves the file `vMBT-02_<serial>_config_<date>.json`.

Restore Loads such a file. The device checks the whole file first – a file of another product or with an invalid value is refused and nothing changes – then asks to restart to apply it.

Not in the file: passwords and certificates, user accounts and network settings. After restoring on another device, enter these again.

Download a backup before a factory reset and after every larger change. To set up several devices the same way, configure one, download its backup and restore it on the others; then adjust the device name and addresses.

4.3 Points

The Points page shows the point table with the live value and communication status of every point (refreshed every 2 seconds). Each row shows the name and description, the BACnet object (e.g. `AI 12`; a pencil sign marks points the BMS may write), the Modbus source (channel, slave, function, address), the data type, and scale/offset.

Add point Opens the point editor for a new point.

Edit / Copy / × Edit a point, copy it to the next free instance and the next register (handy for a series of similar values), or delete it.

Save table Saves all changes made in the table; then restart to apply them. **Discard changes** reloads the saved table.

CSV / CSV (Excel PL) Downloads the saved point table as a CSV file – comma separated, or semicolon separated with a decimal comma for Excel in Polish, German and most other European locales.

Import CSV Replaces the whole point table with a CSV file (Section 4.3.2).

4.3.1 Point Fields

Field	Description
Name	BACnet object name, max 31 characters; should be unique and meaningful for the BMS operator
Description	Optional BACnet description, max 47 characters
Object type	Analog Input (read), Analog Value (read/write), Binary Input (read), Binary Value (read/write)
Instance	BACnet object instance; unique per object type
Units	BACnet engineering units, e.g. °C, kWh, kW
COV increment	Minimum change of an analog value that is reported to COV subscribers
Writable from BMS	Analog/Binary Values only: commands from the BMS are written to the Modbus device
Enabled	Disabled points are not polled and are not BACnet objects: the BMS does not see them
Channel	RS485-1 or RS485-2
Slave ID	Modbus slave address, 1–247
Function	FC01 coils, FC02 discrete inputs, FC03 holding registers, FC04 input registers
Address	0-based register or bit address (holding register 40001 = address 0)
Data type	U16, S16, U32, S32, F32, or BIT (Chapter 5)
Byte order	ABCD, CDAB, BADC, DCBA – for 32-bit types
Bit	For BIT on registers: which bit (0–15)

Field	Description
Scale / Offset	BACnet value = raw value × scale + offset

4.3.2 CSV Import and Export

The CSV file has one header line naming the columns and one line per point:

```
name,description,enabled,port,slave,function,address,type,order,bit,
    scale,offset,object,instance,units,cov_increment,writable
"Supply air temp","AHU-1",1,1,3,3,4,F32,CDAB,0,1,0,AI,12,62,0.2,0
```

The columns may be in any order and only `name`, `address`, `object` and `instance` are required – missing columns take sensible defaults. Comma and semicolon separated files are both accepted. Before anything is saved, the whole file is checked; if a line is wrong, the import is refused with the line number and the reason (e.g. *line 7: FC01/FC02 need type BIT*), and the existing table stays unchanged.

Typical workflow: prepare the point list for one type of installation once, then for every new site export, adapt slave addresses, instances and names in Excel, and import. Keep the exported CSV file as the backup of the point table.

4.4 BACnet & RS485

4.4.1 BACnet Device

Field	Description
Device instance	BACnet device instance, 1–4194302. 0 = automatic: derived from the serial number, unique per unit. Follow the numbering plan of the site where there is one.
Device name	BACnet name of the device – must be unique on the BACnet network
Location	Free text shown in the BMS (e.g. plant room)
Datalink	BACnet/IP (Ethernet/Wi-Fi) or BACnet MS/TP (RS-485)
UDP port	BACnet/IP port, standard 47808
MS/TP channel	RS485-1 or RS485-2; this channel then carries BACnet only
MAC address	MS/TP station address 0–127, unique on the segment
Max_Master	Highest MS/TP master address; set it to the highest address used on the segment
Baud rate	MS/TP baud rate, the same for all stations on the segment

4.4.2 Modbus RTU Channels

For each RS-485 channel: baud rate (1200–115200 bps), parity (None/Even/Odd), stop bits (1 or 2), and the response timeout. The **poll cycle target** sets how often all points are read; if reading all points takes longer, the next cycle starts immediately.

4.5 User Management

Any account can see and use this page, but only `superadmin` can grant admin privileges or edit/delete the built-in `user`/`api`/`cloud` accounts. Every other account can create and manage additional accounts (up to 5).

Create User Creates a new account with a username and password, and independently toggleable *Web access* and *API access* permissions.

Users table Lists existing accounts and provides per-account actions (edit, delete) for the accounts you're allowed to manage.

4.6 Network Settings

4.6.1 Wi-Fi Configuration

Field	Description
Mode	AP Only (device hosts its own network), STA Only (device joins an existing network), or AP + STA
Enable Wi-Fi	Master on/off switch for the Wi-Fi radio
Scan Networks	Lists nearby Wi-Fi networks for easy selection
Saved Networks	Up to 5 networks with a priority each (0 = highest)
IP Configuration	DHCP (automatic) or static IP / netmask / gateway / DNS

4.6.2 Ethernet Configuration

Ethernet is always enabled. IP addressing can be set to DHCP or a static IP / netmask / gateway / DNS configuration. After changing any network setting, click **Save Network Settings**; the device may briefly become unreachable at its previous address.

4.6.3 Automatic Firmware Updates

The checkbox **Allow firmware update** in the sidebar (enabled by default) lets the device download and install firmware updates published by Vectrolink through the Cloud update service. When disabled, the device keeps working unchanged but does not install updates; a firmware file can still be installed manually. We recommend leaving it enabled to receive security fixes and new features.

4.6.4 Factory Reset

A **Factory Reset** button is available in the sidebar, next to Restart. It has the same effect as the push-button procedure (Section 2.4) and asks for confirmation first.

Chapter 5

Modbus and BACnet Reference

5.1 BACnet Objects

Object	Typical use
Analog Input (AI)	Measured values – temperature, energy, power, flow. Read-only for the BMS.
Analog Value (AV)	Set-points and parameters. The BMS can write it when the point is writable.
Binary Input (BI)	States and alarms – running, fault, door open. Read-only for the BMS.
Binary Value (BV)	On/off commands – pump on, enable. The BMS can write it when the point is writable.

Besides the point objects, the gateway has one **Device** object (name, instance, location, vendor, model, firmware revision) and one diagnostic Analog Input (instance 4194000, free memory).

5.2 Status of a Point in the BMS

When the Modbus device answers, the object's `Reliability` is *no fault detected*. When a read fails (no answer, CRC error, exception), `Reliability` becomes *communication failure* and the `FAULT` flag is set in `Status_Flags`; `Present_Value` keeps the last good value. Most BMS show such objects as faulty or offline – exactly what the operator needs to see.

5.3 Writing from the BMS

Analog Values and Binary Values are **commandable**: they have the standard BACnet priority array with 16 levels. The BMS writes a value at a priority (for example 8 = manual operator, 16 = schedule); the value of the highest active priority becomes the `Present_Value` and is written to the Modbus device:

Point	Modbus write
BV on a coil (FC01)	FC05 Write Single Coil
BV on a register bit (FC03, BIT)	read the register, set/clear the bit, FC06 write
AV, 16-bit type	FC06 Write Single Register
AV, 32-bit type	FC16 Write Multiple Registers (2 registers)

When the BMS releases all priorities (writes *NULL*), the object shows the value read from the device again – for example a set-point changed on the device's own display. Writes are executed before the next poll, normally within a fraction of a second.

5.4 Change of Value (COV)

Instead of polling every object, the BMS can subscribe to changes. The gateway then sends a notification when an analog value changes by at least its *COV increment*, when a binary value changes, and when the status (fault) of an object changes. Choose the COV increment to match the resolution the BMS needs – too small a value floods the network with notifications.

5.5 Data Types

Type	Registers	Description
U16	1	Unsigned 16-bit integer, 0–65535
S16	1	Signed 16-bit integer, −32768–32767
U32	2	Unsigned 32-bit integer
S32	2	Signed 32-bit integer
F32	2	32-bit IEEE 754 floating point
BIT	–	A coil or discrete input (FC01/FC02), or one bit (0–15) of a register (FC03/FC04)

5.5.1 Byte Order

32-bit values occupy two consecutive registers. Device manufacturers order the four bytes differently; with the bytes of the value named A B C D (A = most significant):

Setting	Registers	Typical use
ABCD	AB, CD	Big-endian – the Modbus standard, most meters
CDAB	CD, AB	Word swap – low word first, common for floats
BADC	BA, DC	Byte swap within each register
DCBA	DC, BA	Little-endian

If a 32-bit value looks absurd – for example 10^{-38} or 10^{30} instead of 230.5 – the byte order is wrong. Try CDAB first, then the others.

5.5.2 Scaling

The BACnet value is $raw \times scale + offset$. Example: a meter reports voltage in 0.1 V steps (raw 2305) – with scale 0.1 the BMS sees 230.5 V. Writes use the inverse calculation.

5.6 Polling

All enabled points are read in a cycle. Points of the same slave with neighbouring addresses are read together in one request (up to 125 registers), so a meter whose values lie close together costs one request per cycle, not one per value. If a device rejects such a combined request, the gateway automatically reads its points one by one. Writes from the BMS are executed before the next read.

Chapter 6

Security Notes

6.1 Device Integrity

The device runs only firmware signed by Vectrolink (Secure Boot): modified or foreign firmware is rejected, also when it is uploaded through the web interface or delivered as an update. The configuration and the stored passwords are kept in encrypted memory.

6.2 Encrypted Web Access (HTTPS)

The web interface is served over HTTPS. The device generates its own unique, self-signed TLS certificate the first time it starts – there is no central certificate authority involved, and no internet connection is required for this.

6.2.1 Why Your Browser Shows a Warning

Because the certificate is self-signed rather than issued by a publicly trusted certificate authority, your browser will show a warning similar to *"Your connection is not private"* or *"This site is not secure"* the first time you connect to the device. **This is expected behaviour for this class of device** – the same thing happens with most routers, managed switches, and industrial IP devices that you configure over your local network.

To proceed:

1. Click **Advanced** (or equivalent, depending on your browser).
2. Click **Proceed to <device IP> (unsafe)** or **Continue**.

The connection is still encrypted – the warning relates only to the browser being unable to verify the certificate's issuer, not to the strength of the encryption itself.

> If you want to remove this warning permanently across your organisation's computers, your IT department can import the device's certificate into the trusted certificate store of the browsers/computers that need access. Ask your system integrator for the procedure, as this requires access to the device's certificate file and is typically a one-time setup per device.

6.3 Accounts and Passwords

- Change **all** default account passwords immediately after first login (Section 3.3). They are the same on every unit until changed.
- Use strong, unique passwords – they are not subject to any complexity policy enforced by the firmware, so this is your responsibility.

- Create individual accounts for each technician or operator who needs access, rather than sharing one login, so that access can be revoked individually if needed.
- After 5 failed login attempts from the same source, the device temporarily locks out further attempts from it for 5 minutes. This slows down automated guessing but is not a substitute for strong, unique passwords – avoid placing the device's web interface directly on the public internet regardless.

6.4 Network Placement Recommendations

- Place the device on an isolated operational-technology (OT) network segment where practical, separate from general office IT traffic.
- Do not expose the device's web interface directly to the public internet with port forwarding. If remote access is required, use **Vectrolink Cloud** (Section 6.5) or a VPN provided by your IT department.
- Restrict network access to the device to the systems and personnel that genuinely need it (BMS servers, maintenance technicians).

BACnet itself (BACnet/IP and MS/TP) has no authentication: any device on the BACnet network can read and command the objects. Operate the gateway on the building automation network, separated from guest and office networks, as is usual for BACnet installations.

6.5 Remote Access via Vectrolink Cloud

When the device has internet access, its Web UI and REST API can be reached remotely through the Vectrolink Cloud portal, without a VPN and without forwarding any port on your router or firewall. The device only makes an outbound connection to the Cloud relay; no inbound port is ever opened on your network.

From the portal, clicking **Open Device UI** logs you into the device's web interface automatically – the portal signs you in on your behalf using a dedicated, restricted service account, so you are not prompted for the device's own login a second time. This does not replace or bypass individual user accounts on the device itself (Section 3.3); it only skips a redundant login step for someone who has already authenticated to the portal.

Vectrolink Cloud access is a separate service from the device hardware itself. Ask your Vectrolink representative about enabling it for your account if it is not already active.

6.6 Account Permissions

Accounts can be granted *Web access*, *API access*, or both, independently. Any logged-in account can change network settings, perform a factory reset, and create/manage additional accounts of its own. **Granting admin privileges, and editing or deleting the built-in `superadmin`/`cloud`/`user`/`api` accounts, is restricted to the `superadmin` account only.** See Section 4.5 for details.

Chapter 7

Troubleshooting

7.1 Common Issues

The BMS does not find the device. BACnet/IP: the gateway and the BMS must be in the same IP subnet (Who-Is is a local broadcast), and UDP port 47808 must not be blocked. Check that the device instance is not already used by another device on the network. MS/TP: see the MS/TP items below.

A point shows a communication failure / its value does not update. Look at the *Modbus Devices* table on the Dashboard:

- *Timeouts* increasing – the device does not answer: check (1) the slave address, (2) baud rate, parity and stop bits of the channel, (3) the wiring polarity (A/B) and that the device is powered, (4) the termination jumper if the vMBT-02 is at the end of the bus (Chapter 2).
- *CRC errors* increasing – the answer is corrupted: termination, cable quality, two devices with the same address, or a baud rate at the limit of the cable length.
- *Exceptions* increasing – the device answers but rejects the request: wrong function code or a register that does not exist; consult the device's register map.

The value updates, but the number looks wrong. For 32-bit values, try another byte order (Chapter 5). Check scale and offset, and whether the register address is 0-based (holding register 40001 = address 0).

The BMS writes a value, but the device does not change. The point must be an Analog or Binary Value with *Writable from BMS* switched on, on function FC01 or FC03. Check the *write errors* counter on the Dashboard – some devices accept only FC16 or refuse writes to certain registers.

MS/TP: the device does not appear, or the BMS loses it. All stations need the same baud rate; every MAC address must be unique; *Max_ Master* must be at least the highest MAC address on the segment. The MS/TP counters on the Dashboard help: *bad frames* increasing points to wiring, termination or biasing; *lost tokens* to duplicate addresses or noise.

My changes have no effect. Changes to points and BACnet settings are applied after a restart – use **Restart now** in the yellow banner.

I cannot reach the web interface after changing network settings. Use the push-button (Section 2.4): a short press re-enables Wi-Fi in station mode for 10 minutes, a double press creates a Wi-Fi access point for 10 minutes.

My browser shows a security warning when opening the device's web page. This is expected – see Chapter 6, Section "Encrypted Web Access (HTTPS)".

I forgot my account password and cannot log in with any account. The only way to regain access is a factory reset via a long press of the push-button (10 seconds or more), which erases the configuration and restores the default accounts (Section 3.3). Import your saved CSV point table afterwards.

Firmware upload fails with "Invalid firmware file". Select the plain application `.bin` file for the vMBT-02, not a merged flash image – and not a firmware file of another product, which the device refuses.

7.2 Getting Further Help

If an issue persists after the steps above, collect the following before contacting support:

- Firmware version and serial number (Dashboard).
- The point table as a CSV file.
- A screenshot of the *Modbus Devices* table and, for MS/TP, of the MS/TP counters.
- The name and model of the BMS and of the Modbus devices concerned.

Chapter 8

Specifications

8.1 Capacity Limits

Resource	Maximum	Note
Points (BACnet objects from Modbus)	500	AI + AV + BI + BV
COV subscriptions	500	from up to 16 devices
Registers per Modbus read request	125	
Additional user accounts (beyond defaults)	5	–
Saved Wi-Fi networks	5	–

8.2 BACnet

Property	Specification
Datalinks	BACnet/IP (UDP 47808, configurable) or BACnet MS/TP master (9600–115200 bps, MAC 0–127)
Protocol revision	16
Objects	Device, Analog Input, Analog Value, Binary Input, Binary Value
Commandable objects	Analog Value, Binary Value (16-level priority array)
Services	Who-Is/I-Am, Who-Has/I-Have, ReadProperty, ReadPropertyMultiple, WriteProperty, SubscribeCOV, DeviceCommunicationControl
Max APDU / segmentation	480 octets / not supported

8.3 Modbus

Property	Specification
Role	Modbus RTU master on RS-485-1 and/or RS-485-2
Read	FC01, FC02, FC03, FC04
Write	FC05, FC06, FC16
Data types	U16, S16, U32, S32, FLOAT32, bits; byte orders ABCD, CDAB, BADC, DCBA

8.4 Connectivity

Interface	Specification
RS-485	2 independent channels; 1200–115200 bps, parity None/Even/Odd, 1 or 2 stop bits, 8 data bits
Ethernet	10/100 Mbps, DHCP or static IP
Wi-Fi	802.11 b/g/n 2.4 GHz, built-in antenna, station and/or access point mode, DHCP or static IP

8.5 Physical and Electrical

Property	Specification
Power supply	10–24 V DC, less than 3 W
Protection rating	IP20, reverse-polarity protected
Operating temperature	−20 °C to +70 °C
Housing	DIN-rail (35 mm TS), 2-module width
Terminal wire gauge	24–12 AWG
Indicators	1 multicolour status LED – see Chapter 2, Section "Status LED Indications"

8.6 Account Permissions

Administrator and standard user accounts, with independently toggleable Web and API access – see Chapter 6.

8.7 Security

- Secure Boot: only firmware signed by Vectrolink runs on the device; configuration stored encrypted.
- HTTPS web interface with a per-device, self-signed TLS certificate generated on first boot.
- Password-based authentication with session tokens; temporary lock-out after repeated failed logins.

Chapter 9

API Reference

Everything available in the web interface is also available as a JSON HTTP API, which you can use to integrate the device with your own systems – for example a commissioning script that loads the point table of a whole building. This chapter gives an overview; every endpoint with its exact requests and responses is described in the separate **vMBT-02 API Reference**.

9.1 Connecting and Authentication

All endpoints are served over HTTPS. Because the device uses a self-signed certificate (Chapter 6), your HTTP client needs to trust that certificate or skip its verification for this host.

1. Obtain a session token by logging in:

   ```
   POST /api/auth/login
   {"username": "<username>", "password": "<password>"}
   ```

2. Include the token on every subsequent request:

   ```
   Authorization: Bearer <token>
   ```

> For machine-to-machine access, create a dedicated account with *API access* and without *Web access* (Section 4.5).

9.2 Endpoints

Endpoint	Description
`GET /api/status`	Firmware, uptime, network, BACnet summary, Modbus counters
`GET /api/bacnet/config`	BACnet device, datalink and RS-485 settings
`POST /api/bacnet/config`	Change them (applied after restart)
`GET /api/points`	Point table with live values
`GET /api/points/values`	Live values only, for frequent polling
`GET /api/points/csv`	Point table as CSV (`?sep=semicolon` for Excel)
`POST /api/points/csv`	Replace the point table (applied after restart)
`GET /api/gateway/stats`	Modbus counters per device, MS/TP counters
`GET/POST /api/backup`	Configuration backup: download / restore one JSON file
`POST /api/system/restart`	Restart the device
`GET/POST /api/network`	Network settings
`/api/auth/...`	Login, logout, sessions, user accounts, passwords