HomeMaster

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Installer & User Manual

OpenTherm Gateway

Part No.: OpenTherm Gateway-R1
Hardware Version: V1.0

Document number: MAN-OTGW-R1-V1.0
Manual revision: 1.0
Issued: April 2026

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Document Information

Manual title	OpenTherm Gateway — Installer & User Manual
Document number	MAN-OTGW-R1-V1.0
Applies to product	HomeMaster OpenTherm Gateway, Part No. OpenTherm Gateway-R1, Hardware V1.0
Manual revision	1.0
Issue date	April 2026
Language	English (original)
Manufacturer	ISYSTEMS AUTOMATION S.R.L., Deligentei 18, Ploiești, Romania
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Revision history

Rev.	Date	Author	Changes
1.0	April 2026	ISYSTEMS AUTOMATION	Initial release for OpenTherm Gateway-R1, hardware V1.0.

How to read this manual

This manual is intended for qualified electrical installers and competent end-users integrating the HomeMaster OpenTherm Gateway with an OpenTherm-compatible heating boiler and a Home Assistant installation. Read Chapter 1 (Safety) before unpacking the device.

Throughout this manual the following conventions are used:

- Bold blue headings mark new chapters.
- Coloured boxes flag information that requires attention. Yellow = caution, red = danger to persons or equipment, green = useful tip, blue = informational.
- Monospace text indicates terminal labels, GPIO numbers, file names or YAML keys.
- Cross-references in italics point to other chapters of this manual.

Disclaimer

Information in this manual was complete and accurate at the time of publication. ISYSTEMS AUTOMATION S.R.L. reserves the right to modify the product and its documentation without prior notice. The manufacturer is not liable for damages caused by improper installation, modification, or use of the product outside its declared scope. Installation by qualified personnel only.

Table of Contents

1. Safety

This chapter describes the safety rules that must be observed before installation, during installation, and during normal operation of the HomeMaster OpenTherm Gateway. Failure to follow these rules can result in personal injury, equipment damage, or fire.

1.1 Qualified personnel

Installation, wiring, commissioning, and maintenance of this device must be carried out exclusively by qualified electrical personnel familiar with local electrical codes and the safety requirements of the country in which the device is installed. End users must not open the enclosure or perform wiring.

1.2 Safety symbols used in this manual

Symbol	Meaning
⚠ Danger	Hazardous situation that can cause serious injury or death if not avoided. Typically associated with mains voltage.
⚠ Warning	Hazardous situation that can cause minor injury or significant equipment damage.
ⓘ Note	Information that helps the installer understand the device or avoid common mistakes.
✓ Tip	Recommended best practice.

1.3 Safety summary

⚠ Hazardous mains voltage on L / N terminals

The L and N terminals of this device carry hazardous mains voltage when the AC input is used. Disconnect all power before any wiring change. Installation by qualified personnel only. Mains terminals must be enclosed in a closed control cabinet with a protective front plate and a lockable door.

⚠ Use only one power input at a time

The device offers three alternative power inputs (24 V DC, 85–265 V AC, 120–370 V DC). Connect ONLY ONE of them at a time. Never connect more than one input simultaneously — doing so can damage the internal power supply and create a fire hazard.

⚠ Relay output is dry-contact and not internally fused

The relay output (terminals C and NC) is a potential-free dry contact. The device does not provide its own fuse on this output. Always add an external fuse or circuit breaker rated for the load. Use an external contactor for inductive loads above 3 A.

> ⚠ **Relay default state — load is energised when relay is OFF**
>
> Only the C and NC terminals of the SPDT relay are accessible externally. When the device is unpowered, rebooting, or the relay is commanded OFF, the NC contact is closed and any load wired to it is energised. Verify this default state is safe for the connected load (boiler call-for-heat, pump, valve) before commissioning.

> ⓘ **24 V DC input is SELV**
>
> The 24 V DC input is a Safety Extra-Low Voltage (SELV) circuit and is protected against reverse polarity by a Schottky diode. The 1-Wire bus, OpenTherm bus, +5 V auxiliary supply, and USB-C connector are also SELV.

> ⚠ **Relay output — use restriction (mandatory)**
>
> The relay output terminals (C, NC) shall be connected only to:
> - the same mains supply circuit as the L/N input of this device, OR
> - a SELV (Safety Extra-Low Voltage) circuit, OR
> - a Limited Power Source (LPS) circuit per EN 62368-1.
>
> Connection of the relay output to a different mains phase, an isolated mains source, or any circuit at a higher voltage class than the device's L/N input is NOT permitted. Failure to follow this restriction may cause dielectric breakdown between the device input and relay output circuits, presenting electric-shock and fire hazards.
>
> Rationale: the printed-circuit-board insulation between the L/N tracks and the C/NC tracks of the Relay board is rated as Basic per EN 62368-1 Table 11/14 (working voltage 250 V r.m.s.). The restriction will be lifted in the next hardware revision (REV2).

1.4 Conditions of use

- Indoor use only, inside a closed and ventilated control cabinet.
- Operating temperature: 0 °C to +40 °C inside the cabinet.
- Relative humidity: 0–90 %, non-condensing.
- Pollution degree: 2 (clean, dry environment).
- Altitude: up to 2 000 m above sea level.
- Not suitable for outdoor installation, unheated outbuildings, or areas exposed to direct sunlight.
- All wiring terminals must be protected against accidental contact by an insulating front plate, wiring duct, or terminal cover. Exposed live terminals are not permitted.

2. About this Product

The HomeMaster OpenTherm Gateway is an ESP32-based DIN-rail device that interfaces an OpenTherm-compatible boiler with a Home Assistant installation through ESPHome. It exposes the boiler's full set of OpenTherm registers as Home Assistant entities and provides one auxiliary SPDT relay output and two 1-Wire temperature inputs for additional sensing or control around the heating system.

2.1 Operating principle

The gateway operates as an OpenTherm master. It initiates all communication on the OpenTherm bus; the boiler must therefore be configured as an OpenTherm slave. This is the standard configuration of every OT-capable boiler.

If no boiler is connected to the OT terminals, the OpenTherm-related entities become unavailable in Home Assistant, but the relay output and 1-Wire temperature inputs continue to operate independently.

2.2 Key features

- OpenTherm interface (OT+ / OT−), polarity-independent input.
- One SPDT signal relay (C and NC terminals exposed; functionally SPST-NC). System limit 3 A @ 250 V AC, 90 W @ 30 V DC.
- Two independent 1-Wire buses for DS18B20-compatible temperature sensors.
- Power-supply options: 24 V DC, 85–265 V AC, or 120–370 V DC.
- Wi-Fi 2.4 GHz (pre-certified ESP32-WROOM-32U-N16 module) and Bluetooth LE.
- USB Type-C for local programming and recovery.
- ESPHome firmware pre-installed, with vendor-managed OTA updates over HTTPS.
- Improv Wi-Fi onboarding via USB or BLE.
- DIN-rail mounting, 2 modules wide.
- Modular hardware: MCU board + Relay board.

2.3 Typical applications

- Modulating control of an OpenTherm-capable gas boiler from Home Assistant, with full setpoint, modulation level, and fault-flag visibility.
- On/off control of a non-OpenTherm boiler via the relay output.
- Switching of zone valves, circulation pumps, or backup electric heaters via the relay output.
- Flow- and return-temperature monitoring on a heating loop, or buffer-tank temperature monitoring, via the 1-Wire inputs.
- Boiler fault monitoring and alerting in Home Assistant.

2.4 What is in the box

- 1 × HomeMaster OpenTherm Gateway device
- WiFi Antena
- Quick installation leaflet

USB-C cable, DS18B20 temperature sensors, and external fuse/breaker for the relay output are NOT supplied. Source these to local code requirements.

3. Specifications

3.1 Electrical

Microcontroller	ESP32-WROOM-32U-N16 (Espressif), dual-core, 16 MB flash
Power input — 24 V DC	24 V DC nominal at +V / 0V terminals (SELV, reverse-polarity protected)
Power input — AC mains	85–265 V AC at L / N terminals, 50/60 Hz
Power input — wide DC	120–370 V DC at L / N terminals
Typical power consumption	3 W
OpenTherm interface	1 × OpenTherm bus (OT+ / OT−), optocoupler-isolated, polarity-independent input
Relay output	1 × SPDT relay (component) — only C and NC terminals exposed externally; functionally SPST-NC. Dry contact, not internally fused.
Relay rated load	3 A @ 250 V AC (resistive); 750 VA @ 250 V AC max; 90 W @ 30 V DC max
1-Wire buses	2 × independent (D1 / D2), DS18B20-compatible. Auxiliary +5 V output, max 50 mA
USB	USB Type-C, ESD-protected, CC detection, data to ESP32
Wi-Fi	2.4 GHz IEEE 802.11 b/g/n (pre-certified ESP32 module)
Bluetooth	BLE — used for Improv Wi-Fi provisioning
Protection rating	IP20 (inside cabinet)

3.2 Mechanical and environmental

Operating temperature	0 °C to +40 °C (inside heated indoor control cabinet)
Storage temperature	−10 °C to +55 °C
Relative humidity	0–90 %, non-condensing
Pollution degree	2
Altitude	Up to 2 000 m above sea level
Mounting	35 mm DIN rail (EN 60715)
Width	2 DIN modules (≈ 36 mm)
Dimensions (L × W × H)	35.5 × 90.6 × 67.3 mm
Net weight	130 g
Gross weight (packed)	220 g
Pack size	140 × 96 × 95 mm

3.3 Wiring terminals

Terminal type	Pluggable screw terminal blocks, 5.08 mm pitch
Wire cross-section	0.2–2.5 mm² (AWG 24–12)
Conductor type	Solid or stranded copper
Stranded wire	Ferrules recommended
Tightening torque	0.4 N·m (max)

3.4 Compliance

CE marked. Compliant with EMC 2014/30/EU, LVD 2014/35/EU, RED 2014/53/EU, RoHS 2011/65/EU. Refer to Chapter 12 of this manual for the full list of harmonised standards.

4. Quick Start

This chapter is a five-step summary aimed at experienced installers. Refer to the detailed chapters that follow for full installation, wiring, and commissioning instructions.

> ⚠ **Read Chapter 1 (Safety) before starting**
>
> The procedure below assumes the installer is familiar with the safety rules in Chapter 1 and is qualified to work on mains-powered control equipment.

Five-step quick start

1. Mount the device on a 35 mm DIN rail inside a closed and ventilated control cabinet. Allow at least 10 mm of free air on each side.
2. Connect ONE power input only: either +V/0V (24 V DC) OR L/N (85–265 V AC or 120–370 V DC). Add an external fuse on the L conductor for AC mains input.
3. Wire OT+ and OT− to the boiler's OpenTherm terminals using a twisted-pair cable. Polarity does not matter.
4. Power up the device. Open https://improv-wifi.com on a phone or laptop, connect via USB-C or Bluetooth, and enter Wi-Fi credentials.
5. In Home Assistant, the device will appear automatically under Settings → Devices & Services → ESPHome. To manage firmware yourself, open the ESPHome dashboard and click Take Control.

Reference setup time

Typical first installation by a qualified installer: 30–45 minutes (mounting, wiring, commissioning, smoke test).

5. Mechanical Installation

5.1 Cabinet requirements

The OpenTherm Gateway is intended for installation inside a closed and ventilated electrical cabinet, in a clean and dry indoor environment. The cabinet must include a protective front plate covering all wiring terminals and a closing protective door. Outdoor installation, exposed installation in living spaces, and installation in unheated outbuildings are not permitted.

- Indoor cabinet only, IP20 device — protection grade is provided by the cabinet.
- Ventilation: leave at least 10 mm clear above and below the device for natural convection.
- Ambient temperature inside the cabinet: 0 °C to +40 °C.
- Mount on a clean and undamaged 35 mm DIN rail (EN 60715).

5.2 Mounting steps

6. Remove power from the cabinet. Verify with a tester.
7. Position the device with its DIN-clip facing down onto the upper edge of the rail.
8. Push the device down and rotate the bottom toward the rail until the lower clip snaps over the rail.
9. Verify the device is firmly attached and cannot be moved by hand. Slide adjacent modules left/right to close any gap.

5.3 Removal

10. Remove power. Verify with a tester.
11. Insert a flat-blade screwdriver into the lower clip release slot.
12. Pull the bottom of the device away from the rail while levering the screwdriver downward.
13. Lift the device off the rail.

5.4 Dimensions

Reference dimensions for cabinet planning:

Width	35.5 mm (2 DIN modules)
Height	90.6 mm
Depth (from rail surface)	67.3 mm
Pack size	140 × 96 × 95 mm

6. Wiring

⚠ Disconnect all power before wiring

Mains terminals (L / N) carry hazardous voltage. Always disconnect upstream supply and verify de-energised condition before any wiring change. Use insulated tools.

⚠ Relay output — load is energised when relay is OFF

Only the C and NC contacts of the SPDT relay are exposed externally. When the device is unpowered, rebooting, or commanded OFF, the NC contact is closed and any load wired between C and NC is energised. Verify this default state is safe for the connected boiler call-for-heat, pump, or valve before commissioning.

6.1 Terminal layout

The device has two banks of pluggable screw-terminal connectors:

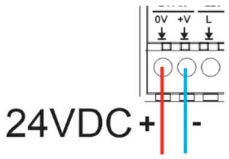
- Top bank — signal terminals: Gnd, D1, D2, +5V, O+, O−.
- Bottom bank — power and relay: 0V, +V, L, N, C, NC.

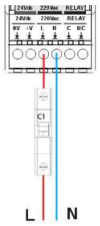
All terminals accept 0.2–2.5 mm² (AWG 24–12) solid or stranded copper conductors. Use ferrules for stranded wire. Tighten to 0.4 N·m maximum.

6.2 Power input wiring

The device offers three alternative power inputs. Connect ONLY ONE input at a time. Never connect more than one simultaneously.

Input	Terminals	Voltage range	Notes
24 V DC	+V / 0V	24 V DC nominal	SELV. Reverse-polarity protected.
AC mains	L / N	85–265 V AC	Add external fuse on L conductor. Connect L to live, N to neutral.
Wide DC	L / N	120–370 V DC	Connect + to L, − to N.





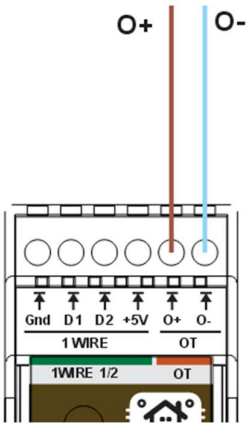
ⓘ Recommended overcurrent protection

AC mains input: external fuse or MCB rated 1 A or to local code. 24 V DC input: external fuse rated 1 A on the +V conductor is recommended.

6.3 OpenTherm bus wiring

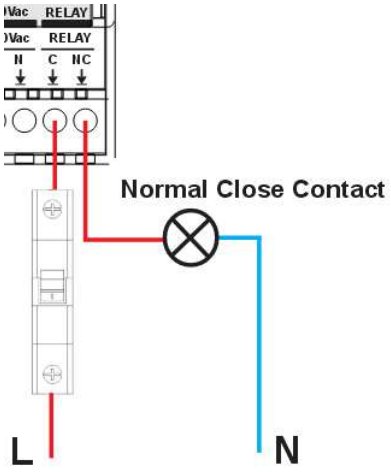
Connect the boiler's OpenTherm terminals to O+ and O− on the gateway. The OpenTherm input is bridge-rectified internally, therefore polarity does not matter at the gateway side. Use a twisted-pair cable, kept separate from mains and relay-output conductors.

- Cable construction: twisted pair.
- Recommended types: J-Y(ST)Y 2×2×0.5 mm² or LI2YCY PiMF 2×2×0.50.
- Maximum recommended bus length: 50 m for typical installations; consult boiler documentation for longer runs.
- Overall shield recommended in cabinets and high-EMI environments. Bond shield to cabinet PE/EMC ground at the gateway side only.



6.4 Relay output wiring

The relay output exposes only the C (common) and NC (normally-closed) contacts. The output is a potential-free dry contact and does not supply power; the load circuit must include its own external power source and overcurrent protection.



> ⚠ **External fuse mandatory**
> The relay output is not internally fused. Always add an external fuse or circuit breaker rated for the connected load. For inductive loads or loads above 3 A, use an external contactor controlled by the relay.

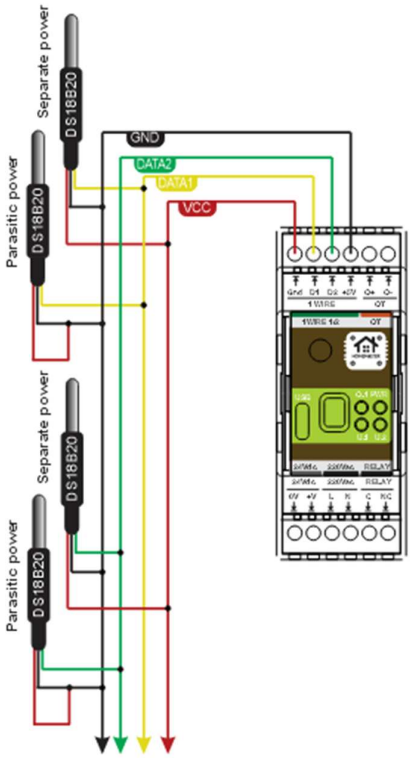
System load limits: 3 A @ 250 V AC (resistive); 750 VA @ 250 V AC max; 90 W @ 30 V DC max.

⚠ Use restriction — see also section 1.3
The relay output (C, NC) shall be connected only to the same mains supply as L/N, or to SELV / Limited Power Source circuits. Cross-phase or cross-source mains use is not permitted in hardware revision V1.0 — see safety chapter §1.3 for full rationale.

6.5 1-Wire sensor wiring

Two independent 1-Wire buses (D1 and D2) are available for DS18B20-compatible temperature sensors. The auxiliary +5 V terminal on the top bank powers the sensors and is rated for max 50 mA. Do not connect any other load to the +5 V terminal.

- Cable: shielded 3-core (+5 V / DATA / GND) for typical installations.
- Topology: daisy-chain (bus) only — star wiring is not supported.
- Sensor stubs must be ≤ 0.5 m.
- Maximum total bus length: 100 m (DS18B20 with external power, correct topology).
- Maximum recommended sensors per bus: 10.
- Default DATA pull-up: 4.7 kΩ; reduce to 2.2–3.3 kΩ for long or heavily loaded buses.



⚠ One sensor per bus by default
The shipped firmware does not pin sensor addresses. With multiple sensors on the same 1-Wire bus, ESPHome reads the first sensor it discovers and assignment is non-deterministic across reboots. For multi-sensor buses, set explicit sensor addresses in the YAML — see Chapter 9 for the link to the default firmware configuration.

6.6 Cable routing and shield grounding

- Route low-level signal cables (1-Wire and OpenTherm) separately from mains, relay output, contactor, and motor wiring.
- If signal and power cables must cross, cross them at 90°.
- Keep cable runs as short as practical. Avoid long parallel runs next to high-current conductors.
- Bond cable shields to cabinet PE/EMC ground at the controller side only (single-end bonding).
- Do not connect shields directly to signal terminals (1-Wire, OpenTherm).
- If both ends are inside equipotential-bonded cabinets, both-end bonding is permitted using proper 360° shield clamps.

7. Pinout and Terminal Reference

7.1 Top terminals — signal

Terminal	Signal	Description
Gnd	Ground	Common signal ground reference.
D1	1-Wire bus 1 (DATA)	DS18B20-compatible 1-Wire DATA line.
D2	1-Wire bus 2 (DATA)	DS18B20-compatible 1-Wire DATA line, independent of D1.
+5V	+5 V output	Auxiliary 5 V supply for 1-Wire sensors only. Maximum load 50 mA.
O+	OpenTherm +	OpenTherm bus, polarity-independent input.
O−	OpenTherm −	OpenTherm bus return.

7.2 Bottom terminals — power and relay

Terminal	Signal	Description
0V	DC ground	24 V DC negative / common.
+V	DC power +	24 V DC positive input. Reverse-polarity protected.
L	AC line / wide DC +	85–265 V AC live, or 120–370 V DC positive.
N	AC neutral / wide DC −	85–265 V AC neutral, or 120–370 V DC negative.
C	Relay common	Dry-contact relay common pole.
NC	Relay normally-closed	Closed when relay is de-energised.

+5 V terminal scope

The +5 V terminal on the top bank is intended exclusively for powering DS18B20-compatible 1-Wire sensors. Do not use it as a general-purpose 5 V supply for other loads.

8. LEDs and Button

8.1 LEDs

The front panel exposes four LEDs labelled PWR, O.1, U.1, and U.2. Their behaviour is summarised below.

LED	Behaviour	Meaning
PWR	Solid ON	Device is powered.
O.1	Solid ON	Relay is energised (C–NO closed internally; externally NC open).
U.1	Firmware-controlled	User-assignable from ESPHome firmware.
U.2	Solid ON	Normal operation: Wi-Fi connected and Home Assistant API online.
U.2	Fast blink	Wi-Fi is connecting or API is disconnected.
U.2	Pattern blink	OTA firmware update in progress.

U.2 is the ESPHome status LED. U.1 is intended for user automation, configurable via ESPHome YAML.

8.2 Button

A single recessed push-button is exposed on the front panel. The button is wired to GPIO35 of the ESP32 module and is presented in Home Assistant as a binary sensor named Button. Default behaviour is read-only — pressing the button changes the binary sensor's state, which can be used in Home Assistant or ESPHome automations to trigger any action (for example: toggle the relay, restart the device, run a service call).

9. First Boot and Network Setup

9.1 Network requirements

- The device and the Home Assistant host must be on the same IP subnet.
- Multicast DNS (mDNS) must be functional on the network. In VLAN setups, configure an mDNS repeater or assign a static IP via the ESPHome YAML.
- ESPHome API uses TCP port 6053. Ensure this port is reachable between the device and Home Assistant.
- Vendor-managed OTA updates require outbound HTTPS (port 443) access to GitHub Pages.

9.2 Wi-Fi provisioning — Improv (recommended)

Improv is the manufacturer-recommended onboarding method. It uses the device's USB-C port or Bluetooth LE to deliver Wi-Fi credentials securely from the installer's browser.

14. Power the device by connecting one of the supported power inputs.
15. On a phone or laptop, open https://improv-wifi.com using Google Chrome or Microsoft Edge.
16. Click Connect and choose the device, either via USB-C cable or via Bluetooth.
17. Enter the Wi-Fi SSID and password for the customer's network. Save.
18. Wait for the device to connect to Wi-Fi. The U.2 LED will go solid once the API is online.

> **BLE provisioning is open until first Wi-Fi success**
>
> BLE Improv provisioning runs without an authorisation code (authorizer: none) until the device successfully connects to Wi-Fi for the first time. Provision the device in a private location and avoid leaving an unprovisioned device powered on within BLE range of untrusted devices.

9.3 Wi-Fi provisioning — Fallback Access Point

If the device cannot connect to its configured Wi-Fi network, it automatically starts a temporary Access Point named HomeMaster OT Fallback.

19. Power on the device and wait approximately 60 seconds.
20. On a phone or laptop, connect to the Wi-Fi network named HomeMaster OT Fallback.
21. Open a browser and navigate to http://192.168.4.1. The captive portal page should load automatically; if it does not, type the address manually.
22. Enter the SSID and password of the target Wi-Fi network and save.
23. The device restarts and connects to the target network.

> **Mobile devices and captive portals**
>
> On some mobile devices, mobile-data connectivity prevents the captive portal page from loading. Disable mobile data temporarily during provisioning.

10. Home Assistant Integration

After Wi-Fi provisioning, the device appears automatically in two places:

- ESPHome Dashboard — for configuration, logs, and firmware management.
- Home Assistant — under Settings → Devices & Services → ESPHome.

Home Assistant exposes a comprehensive set of entities for the boiler (CH and DHW switches, setpoints, modulation level, fault flags), the relay, the two 1-Wire temperature inputs, and diagnostic entities (Wi-Fi signal, IP address, uptime, ESP32 internal temperature).

10.1 Take Control

By default the device runs the manufacturer-shipped firmware. To customise the YAML or add user automations, click Take Control in the ESPHome Dashboard. ESPHome will import the full configuration from GitHub and place it in your dashboard for editing.

> ⚠ **Take Control overwrites local edits on every import**
>
> import_full_config: true in the dashboard_import block will overwrite your local YAML edits every time the dashboard imports the configuration. After your first successful import, set import_full_config: false (or remove the dashboard_import block entirely) if you want to keep customisations.

10.2 Vendor-managed OTA — kept after Take Control

If you want to continue receiving manufacturer firmware updates after Take Control, keep the http_request, ota: platform: http_request, and update blocks unchanged in your YAML. If you remove these blocks, you will need to update the device manually via ESPHome OTA or USB.

10.3 ESPHome compatibility

The shipped firmware is built and tested with ESPHome version 2026.4.1 or newer. If you take control and rebuild the firmware, use ESPHome 2026.4.1 or a later release.

11. Firmware Updates

The device supports two firmware update methods, which can run side by side.

11.1 Vendor-managed OTA (HTTP)

By default, the device exposes a Firmware Update entity in Home Assistant. The device polls a manifest file hosted on GitHub Pages every 6 hours; if a newer firmware version is available, you can trigger the update directly from the Home Assistant entity card.

- Manifest URL: https://isystemsautomation.github.io/homemaster-dev/OpenthermGateway/Firmware/manifest.json
- Update interval: 6 hours.
- To disable vendor-managed OTA, take control in ESPHome Dashboard and remove the update:, http_request:, and ota: platform: http_request blocks from your YAML.

OTA security model

OTA updates are downloaded over HTTPS from GitHub Pages. Trust depends on the security of the HomeMaster GitHub account; firmware files are not separately signed. If you require a stricter trust model, take control in ESPHome Dashboard and manage updates yourself.

11.2 ESPHome OTA (user-controlled)

After Take Control, firmware can be built and uploaded from the ESPHome Dashboard via OTA over the local network or via USB-C. This is the appropriate path for users who have customised the YAML.

11.3 USB-C recovery flashing

If an OTA update is interrupted or the device becomes unreachable, the firmware can be re-flashed via USB-C using the ESPHome web installer at https://web.esphome.io (Chrome or Edge) or the ESPHome Dashboard's Install → Plug into computer option. The CP2102N USB-UART driver from Silicon Labs is required on Windows; macOS and Linux include the driver natively.

Do not interrupt OTA updates

If a firmware update is interrupted mid-flash, the device may fail to boot. ESPHome safe mode is active for the first 10 boot attempts after a failed OTA — connect via USB-C and re-flash to recover.

USB-C and external power are isolated

USB-C can be connected with or without external power applied — there is no backfeed risk to the AC mains or 24 V DC inputs.

12. Troubleshooting

12.1 Common symptoms

Device does not appear in Home Assistant or ESPHome Dashboard

- Check the PWR LED is solid ON. If not, verify the power input wiring and supply voltage.
- Check the U.2 LED. Fast blink means the device is still connecting to Wi-Fi or has lost the API connection. Wait at least 60 s.
- Verify the device and Home Assistant are on the same subnet and that mDNS works on the network.
- If U.2 keeps fast-blinking, the device may have lost its Wi-Fi credentials. Connect to the HomeMaster OT Fallback network and re-enter the credentials at http://192.168.4.1.

No OpenTherm communication — all OT entities unavailable

- Check OT+ and OT− are firmly connected at both ends, with no loose ferrules in the screw terminals.
- Verify OpenTherm is enabled in the boiler's installer menu — many boilers ship with OT disabled by default.
- Confirm the boiler is OT-compliant. Some Vaillant models use a proprietary eBus (e.g. VR66) and are not OpenTherm. Most Worcester models do not support OT. Consult the boiler manual.
- Inspect ESPHome logs for [opentherm] Timeout (no boiler response — recheck wiring and that boiler-side OT is enabled) or [opentherm] Invalid response (electrical noise — re-route OT cable away from mains and use shielded twisted pair).
- If 1-Wire and OpenTherm are running simultaneously, add sync_mode: true under the opentherm: block in the YAML.
- Power-cycle both the gateway and the boiler.

1-Wire sensor reads unknown or no value

- Verify wiring: +5 V, DATA, and GND must all be connected. Sensor stubs must be ≤ 0.5 m and the bus must be a daisy chain — star wiring is not supported.
- For long runs or a heavily loaded bus, reduce the DATA pull-up to 2.2–3.3 kΩ.
- If multiple sensors share one bus, set explicit sensor addresses in the YAML — sensor IDs are visible in the ESPHome boot logs.

Relay does not switch

- Verify the Relay switch entity is enabled in Home Assistant and is being commanded.
- Check wiring on C and NC.
- Verify the external fuse or circuit breaker on the load circuit.
- Remember: NC contact is closed by default, so the load is energised when the relay is OFF.

Relay switches but the load does not work

- The relay output is dry-contact and does not supply power to the load. Verify an external power source is connected to the load circuit.
- For inductive loads or loads above 3 A, use an external contactor controlled by the relay.

Firmware update fails

- Check the device has internet access and can reach https://isystemsautomation.github.io/homemaster-dev/OpenthermGateway/Firmware/manifest.json.

- If you have removed the http_request, ota, or update blocks from a customised YAML, vendor-managed OTA is no longer functional. Update the device via ESPHome OTA from your ESPHome Dashboard, or via USB-C.

Wi-Fi credentials changed, device unreachable

- After power-on, wait at least 60 s. If the device cannot reach the previous SSID, it falls back to its own AP.
- Connect to the HomeMaster OT Fallback Wi-Fi network and open http://192.168.4.1 to re-enter credentials.
- On mobile devices, disable mobile data so the captive portal can load.

Device completely unreachable, no fallback AP

- The device may be in a boot-loop after a failed OTA. Connect via USB-C and re-flash using https://web.esphome.io or the ESPHome Dashboard.
- USB-C can be connected with or without external power applied — there is no backfeed risk.

12.2 Device behaviour reference

The table below summarises how the device behaves under non-ideal conditions.

Condition	CH Enable	DHW Enable	Relay	OT Bus
Normal operation	Controlled by HA	Controlled by HA	Controlled by HA	Active polling
Wi-Fi lost	Holds last state	Holds last state	Holds last state	Continues polling
HA disconnected	Holds last state	Holds last state	Holds last state	Continues polling
ESP reboot	Restores to ON	Restores to ON	Restores to OFF (NC closes)	Restarts polling
OT communication failure	Remains ON	Remains ON	Unchanged	Retries
No boiler connected to OT	Unavailable	Unavailable	Unaffected	No response

> ⚠ **Behaviour after reboot**
> After a reboot, CH Enable and DHW Enable restore to ON. The relay restores to OFF, which means the NC contact closes and the load is energised. Verify this is safe for the connected load before deployment.

13. Compliance and Certifications

The HomeMaster OpenTherm Gateway is CE marked and designed to comply with the applicable European Union directives. Manufacturer ISYSTEMS AUTOMATION S.R.L. maintains the technical documentation and a signed EU Declaration of Conformity (document number DoC-OTGW-R1-V1.0).

13.1 Applicable EU directives

- Directive 2014/30/EU — Electromagnetic Compatibility (EMC).
- Directive 2014/35/EU — Low Voltage Directive (LVD).
- Directive 2014/53/EU — Radio Equipment Directive (RED).
- Directive 2011/65/EU and (EU) 2015/863 — Restriction of Hazardous Substances (RoHS).

13.2 Harmonised standards applied

Area	Standards
EMC — Emissions (Class B)	EN 55032:2015 + AC:2016-07 + A11:2020 + A1:2020
EMC — Immunity	EN 55035:2017 + A11:2020
Electrical safety	EN 62368-1
Radio (2.4 GHz)	EN 300 328 V2.2.2 (via integrated module)
Radio EMC — general	EN 301 489-1 V2.2.3 (via integrated module)
Radio EMC — wideband	EN 301 489-17 V3.2.4 (via integrated module)
RoHS technical documentation	EN IEC 63000

13.3 Radio module

Radio conformity for Directive 2014/53/EU is inherited from the integrated, pre-certified Wi-Fi module:

Module model	ESP32-WROOM-32U-N16
Module manufacturer	Espressif Systems (Shanghai) Co., Ltd.
EU Type-Examination certificate (Module B)	No. 172141367/AA/02, issued 02 March 2023
Issued by (Notified Body)	Kiwa Nederland B.V. (NB 0063), Wilmersdorf 50, 7327 AC Apeldoorn, The Netherlands
Frequency band	2.4 GHz ISM (2402–2480 MHz)

13.4 Manufacturer / EU importer (per GPSR)

Per Regulation (EU) 2023/988 (General Product Safety Regulation), the manufacturer / EU economic operator is:

ISYSTEMS AUTOMATION S.R.L. Deligentei 18, Ploiești, Romania Tel.: +40 721 389 963 Web: www.home-master.eu

13.5 Declaration of Conformity

The full EU Declaration of Conformity (DoC-OTGW-R1-V1.0) is available on request and is also published on the manufacturer's GitHub repository under OpenthermGateway/Manuals/.

14. Support and Resources

14.1 Support channels

Channel	Reference
Official support	home-master.eu/support
YouTube	youtube.com/@HomeMaster
Reddit	reddit.com/r/HomeMaster
Instagram	instagram.com/home_master.eu
GitHub repository	github.com/isystemsautomation/homemaster-dev

14.2 Online resources

- Product page: home-master.eu — for purchase and product news.
- GitHub repository: schematics, default firmware, manifest, and this manual in source form.
- ESPHome documentation: esphome.io/components/opentherm/ — for configuring custom OpenTherm options.

14.3 License

This product uses a hybrid licensing model. Hardware design files (schematics, PCB layouts, BOMs) are licensed under CERN-OHL-W v2. Firmware, ESPHome configurations, and software components are licensed under the MIT License. See the LICENSE files in each directory of the GitHub repository for the full terms.

15. Revision History of the Product

Hardware revision	Date	Notes
V1.0	April 2026	Initial public release.

— End of Manual —

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