Installer & User Manual

HomeMaster Thermostat for OpenTherm



Part No. OTT-R1 · Hardware V1.0 · Firmware 1.1.3 Document No.: MAN-OTT-R1-V1.0 · November 2026

ISYSTEMS AUTOMATION S.R.L. · HomeMaster®

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1. Safety

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

1.1 Qualified personnel

Installation, wiring and commissioning of this device must be carried out by personnel familiar with low-voltage wiring practice and with the boiler installation it is connected to. Work on the boiler itself, and on the mains supply feeding the 24 V power supply, must be carried out by qualified electrical personnel in accordance with the local electrical code.

End users must not open the enclosure or perform wiring.

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1.2 Safety symbols used in this manual

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

1.3 Safety summary

> **ℹ The device is SELV throughout** Every terminal and connector on this product is a Safety Extra-Low Voltage circuit: the 24 V DC input, the OpenTherm bus, and the USB-C connector. There is no mains circuit inside the enclosure and no hazardous voltage on any terminal.
>
> **⚠ Supply from 24 V DC only** Connect only a 24 V DC SELV supply to the +V / 0V terminals. Do not connect mains voltage to any terminal. Doing so destroys the device and creates a fire and electric-shock hazard. The input is protected against reverse polarity but not against overvoltage.
>
> **⚠ Disconnect power before wiring changes** The device clips onto its wall base. Remove the body from the base and disconnect the 24 V supply before changing any wiring.
>
> **⚠ The OpenTherm bus is not a mains circuit** OT+ and OT− carry the boiler's low-voltage OpenTherm signal. Do not run the OpenTherm pair in the same cable bundle or conduit as mains wiring. Do not connect it to a 230 V thermostat circuit — some boilers offer both a 230 V room-thermostat input and an OpenTherm input on adjacent terminals. Read the boiler's manual and identify the OpenTherm terminals before wiring.
>
> **⚠ This device commands the boiler** The thermostat is an OpenTherm master: it enables and disables central heating and sets the flow temperature. Commissioning it on a live heating system changes the boiler's behaviour immediately. Verify the boiler's own safety limits — maximum flow temperature, frost protection, overheat cut-out — are set and working before leaving the installation.
>
> **ℹ Frost protection** The firmware holds the comfort setpoint when it has no valid clock, so that a lost time source cannot let the house go cold. It does not replace the boiler's own frost-protection function. Leave the boiler's frost protection enabled.

1.4 Conditions of use

- Indoor use only, in dry locations.
- Operating temperature: 0 °C to +40 °C.
- 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, bathrooms with direct water exposure, unheated outbuildings, or positions in direct sunlight.

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2. About this Product

The HomeMaster Thermostat for OpenTherm is an ESP32-based wall-mounted room thermostat that controls a modulating boiler directly over the OpenTherm bus. It carries a 2.8″ colour display, a rotary encoder and four keys, a 24 GHz presence radar, and on-board temperature, humidity and ambient-light sensors.

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2.1 Operating principle

The thermostat 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.

The heating control loop runs on the device itself. Every 30 seconds the firmware:

1. picks the room target — the comfort setpoint inside the schedule window, the eco setpoint outside it, or comfort plus the boost offset while Boost is on;
2. compares it with the room temperature and applies hysteresis;
3. calculates the flow setpoint from the weather curve and caps it at the boiler's maximum, or uses the fixed flow setpoint when compensation is off or no outside temperature is available;
4. enables or disables central heating accordingly.

Home Assistant is used for visibility and remote control, never as a dependency. If the network or Home Assistant is unavailable, the room keeps being heated to the stored schedule, and the display, the encoder and the keys keep working.

2.2 Key features

- OpenTherm master with full boiler telemetry — flow, return, DHW, modulation, pressure, outside temperature, fault flags.
- Local control loop: schedule, hysteresis, weather compensation.
- 2.8″ IPS colour display, 320 × 240, with four pages.
- Rotary encoder and four keys.
- 24 GHz presence radar — wakes the screen on approach, blanks it when the room empties, and reports occupancy to Home Assistant.
- On-board temperature, humidity and ambient-light sensors.
- ESPHome pre-installed; native Home Assistant API.
- Improv Wi-Fi onboarding over Bluetooth and USB serial.
- OTA updates over HTTP (vendor-managed) and over the ESPHome API.

2.3 Typical applications

- Single-zone control of a modulating gas or oil boiler in a house or flat.
- Replacement of an OpenTherm room unit supplied by the boiler manufacturer, where the installation is to be brought into Home Assistant.

> ⚠ **One master per boiler.** OpenTherm allows exactly one master on the bus, and this thermostat is that master. It cannot share a boiler with a second master — including the HomeMaster OpenTherm Gateway, which drives the boiler itself despite its name. Choose one or the other: the gateway where the control is to live in the boiler room and be driven from Home Assistant, this thermostat where it is to live on the wall and keep working without a network. Remove the existing room unit from the OpenTherm terminals before connecting this one.

2.4 What is in the box

- HomeMaster Thermostat for OpenTherm (OTT-R1), assembled.
- Round wall base, or rectangular wall plate.
- Two wall screws and plugs.
- Quick-start card.

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The 2.4 GHz antenna is **fitted inside the enclosure**, on the U.FL connector of the radio module, beside the ambient-light sensor. Nothing has to be connected or ordered for the radio to work.

A 24 V DC power supply and the cabling are not supplied — see 4.3.

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3. Technical Data

3.1 Electrical

Item	Value
Supply voltage	24 V DC nominal, SELV, reverse-polarity protected
Supply current	50–100 mA across operating states
Input power, maximum	2.4 W
OpenTherm interface	Master, polarity-insensitive, 2-wire
USB	USB-C, serial only, CP2102 bridge
Wi-Fi	2.4 GHz, 802.11 b/g/n, U.FL antenna fitted inside the enclosure
Bluetooth	BLE, used for Improv provisioning
Presence radar	24 GHz, HLK-LD2410C

3.2 Mechanical and environmental

Enclosure: Italtronic EYE BOX, ABS, white (RAL 9003), wall mounted.

Dimension	Value	Italtronic part
Body outer diameter	Ø 94.6 mm	P61610001G frame ring
Front aperture (visible glass)	Ø 82.2 mm	P61610001G
Ring height	20.5 mm	P61610001G
Wall base, round	Ø 88.7 mm, 10.5 mm deep, keyhole centres 58 mm	P61610002B
Wall plate, rectangular	140 × 80 mm (149.9 mm over the tabs), 9 mm thick, cable aperture 45 × 30 mm, fixing centres 83.5 / 60 mm	P61610014A
PCB carrier	Ø 90.3 mm, 7.5 mm deep; PCB fixing pattern 58 × 36 mm, Ø 2.4 mm	P61610001V

- Indoor use only, dry locations.
- Operating temperature: 0 … 40 °C, non-condensing.
- Two-part construction: wall base or plate fixed to the wall, body clipped on.

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> **ℹ Room temperature accuracy.** The display backlight and the ESP32 raise the temperature inside the enclosure. The temperature sensor is mounted on a thermally isolated tab at the bottom of the board, below all heat sources, and the firmware exposes both the raw and the corrected reading so the offset can be verified on site. Use **Room Sensor Offset** to trim it against a reference thermometer after the device has been running for at least two hours in its final position.

3.3 Wiring terminals

Terminal	Function
+V	24 V DC supply
0V	0 V
OT+	OpenTherm bus, boiler terminal 1
OT−	OpenTherm bus, boiler terminal 2

3.4 Compliance

See Chapter 12.

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4. Installation

4.1 Choosing a position

- About 1.5 m above the floor, on an internal wall.
- Away from direct sunlight, draughts, radiators, and the swing of a door.
- Not above a heat source, a television, or a lamp.
- Not in an alcove or behind a curtain — the radar needs a clear view of the room, and the temperature sensor needs free air.

> **⚠ Radar and metal.** 24 GHz reflects off large metal surfaces. A steel door, a metal-clad flue, or a mirror directly in front of the device causes false presence. Keep the area in front of the device clear.
>
> **ℹ Radar and movement that is not a person.** The radar sees any movement, including a curtain over a radiator, a ceiling fan, and a pet. If the screen never blanks, reduce **Radar Max Still Gate** before suspecting a fault.

4.2 What the thermostat mounts on

The device is supplied with the Italtronic EYE BOX mounting parts and goes up one of two ways.

Straight to the wall. The round base, Italtronic P61610002B, Ø 88.7 mm and 10.5 mm deep, takes two screws into the wall at **58 mm** centres through its keyholes. Nothing else is needed; the cables come through the opening in the base.

On a flush-mounting box. The rectangular plate, Italtronic P61610014A, 140 × 80 mm and 9 mm thick, screws onto a box already in the wall. It carries two pairs of fixing holes, and Italtronic describes it as a *"wall mounting element for electrical box use UK/USA/EUROPE respectively Ø 60, 3 gang and Ø 60 + 3 gang"*:

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Hole centres	Fits
60 mm	The round device box used across continental Europe — bore Ø 68 mm, depth from 35 mm. Also the square boxes whose device screws sit at 60 mm
83.5 mm	The Italian three-module box, 503 or 503E

What decides whether a box fits is the **distance between its device screws**, not the shape of the box or the size of the hole in the wall. Measure that distance before ordering anything: 60 mm and 83.5 mm are the two the plate is drilled for.

The plate has a cable aperture of 45 × 30 mm, and it sets the body 9 mm off the wall, which is where the cable turns.

> ℹ **A box is not required.** The round base screws to bare plasterwork. A flush box is worth having for one reason: it is where the supply can live, and it keeps the cable joints out of the wall cavity.

Sequence

1. Fix the round base, or the plate on the box, with two screws.
2. Bring the 24 V DC supply and the OpenTherm pair through the opening.
3. Terminate the wires.
4. Clip the body on.

4.3 Power supply — not included

No mains power supply is shipped with the thermostat. The device takes **24 V DC SELV**, draws 50–100 mA and never more than 2.4 W, and that supply is the installer's to provide. Mains voltage must not reach any terminal on the device.

There are two sensible places to put it.

In the distribution board or the boiler cabinet. A DIN-rail 24 V supply feeds the thermostat over the same route as the OpenTherm pair. This is the tidier arrangement and the one to prefer: the supply is accessible, it is in a ventilated enclosure, and nothing mains-powered sits behind the thermostat.

In a deep flush box behind the thermostat. Only with a supply that is built for installation inside a closed box, in a box deep enough for it, and wired by someone qualified to work on mains. The room-temperature reading is the other reason to think twice: a supply dissipating a watt or two directly behind the sensor warms the wall it is screwed to.

Cabling. Two pairs reach the device — 24 V DC, and OpenTherm. They may share one cable or run separately; both are SELV, so a single four-core cable is fine. OpenTherm is polarity-insensitive, takes a twisted pair and must not exceed 50 m. Neither pair may be bundled with mains cabling.

4.4 Removal

Hold the body and pull it straight off the base. Disconnect the 24 V supply before touching the terminals.

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5. Wiring

5.1 Power input

Connect a 24 V DC SELV supply to +V and 0V. The input is reverse-polarity protected; a reversed supply does not damage the device but it will not start.

5.2 OpenTherm bus

Connect OT+ and OT− to the boiler's OpenTherm terminals. The interface is polarity-insensitive, so the two wires may be swapped.

- Use a twisted pair.
- Do not exceed 50 m.
- Do not run the pair in a bundle with mains cabling.

> ⚠ **Identify the boiler terminals before wiring.** Many boilers place a 230 V room-thermostat input next to the OpenTherm input. Connecting OT+/OT− to the 230 V terminals destroys the device.

5.3 Cable routing

Bring both cables through the wall base opening. Leave enough slack to pull the body away from the wall for service, but not so much that the cable fouls the clip.

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6. Controls and Display

Everything the thermostat does can be done from the glass. Home Assistant adds remote access and history; it does not add control that is missing here.

The screen is 320 × 240 pixels. It redraws every two seconds, and immediately after any key press or encoder movement.

6.1 Backlight and presence

The backlight rises to 85 % on any key press or encoder movement, and the presence radar lights it when somebody approaches. It turns off 45 seconds after the radar stops seeing anyone; while the radar still sees someone, it stays on.

When the screen blanks, the interface also returns to the **Climate** page with the menu closed, so the unit is in the same state every time you walk up to it.

The backlight is driven at 25 kHz, above the audible range. At lower frequencies the ceramic capacitors on the 5 V rail sing.

6.2 Navigation

Four keys and the encoder. The keys mean the same thing on every page.

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Control	Menu closed	Menu open
◀ Left	Previous page; wraps around	Closes the menu
▶ Right	Next page; wraps around	Closes the menu
▲ Up	Opens the menu on the first item	Moves the selection up; wraps
▼ Down	Opens the menu on the first item	Moves the selection down; wraps
Encoder	On Climate: changes the active setpoint, 0.5 °C per detent. On the other pages: nothing	Changes the selected item

The selected menu item is drawn as a dim band with a blue bar down its left edge. Changes take effect as you turn the encoder — there is nothing to confirm and nothing to save.

6.3 The header

The top strip is the same on every page.

Position	Shows
Left	Page name — `CLIMATE`, `BOILER`, `SCHEDULE`, `SYSTEM`
After the name	Four square dots, one per page; the current page is white, the others dim
Right	Clock, `HH:MM`, or `--:--` until the clock is set
Left of the clock	Wi-Fi — white when associated, dim and crossed out when not
Left of that	Boiler — red when the boiler reports a fault

The clock comes from Home Assistant when it is connected and from an internet time server otherwise.

6.4 Colour

Four colours, one meaning each. Nothing on the glass is coloured for decoration.

Colour	Means	Where you see it
Amber	A circuit is running	Burner alight, central heating active, hot water being drawn, boost on
Red	A fault, or a link that is down	`FAULT`, low water pressure, the boiler icon in the header, `BOILER LINK NONE`
Green	A healthy state, where a word says so	`OK` on the fault tile, `BOILER LINK OK`, `HOME ASSISTANT OK`
White	A measurement	Every number that is a reading
Dim grey	No reading — dashes stand in for the value	A sensor that is absent, or a value the boiler has not sent

Within a tile the icon and the number are coloured apart: the **icon** carries the state of the circuit, the **number** stays white because it is a measurement. Hot water stored at 59 °C reads white whether or not anyone is drawing it; only the boiler icon beside it goes dim when the circuit is idle.

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6.5 Icons

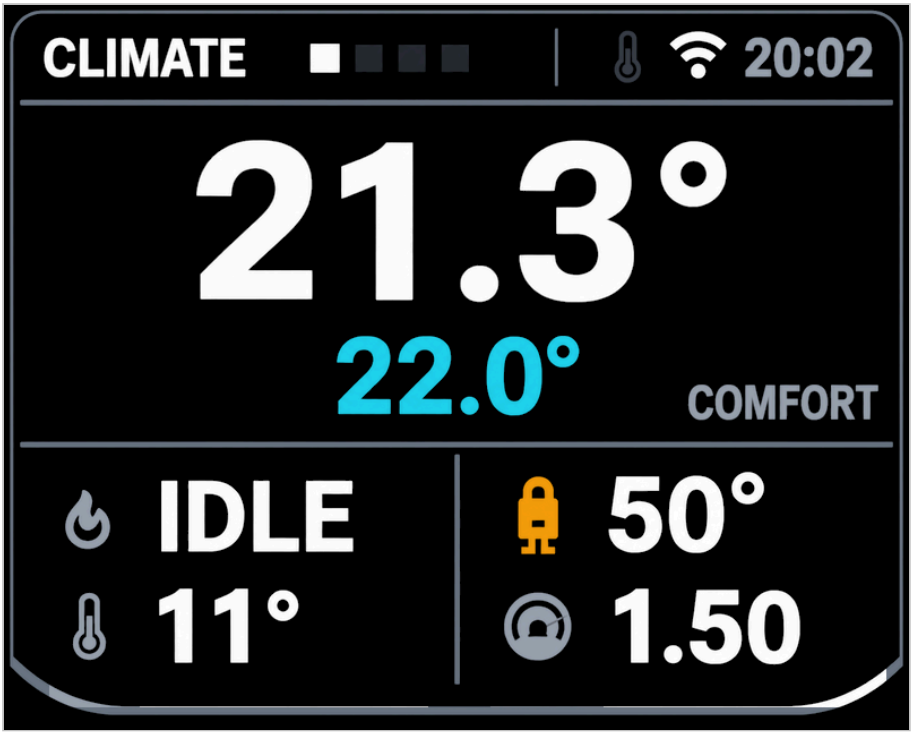
These are the only icons the interface uses.

Icon	Meaning	Colour
	Wi-Fi is associated	White
	No Wi-Fi connection	Dim. The Home Assistant link is a separate row on the System page
	In the header: the boiler reports a fault. In a tile: boiler water or hot-water temperature	Red on fault; amber while that circuit is active, grey otherwise
	Burner. The value is the relative modulation level, or `ON` / `IDLE` when the boiler does not report modulation	Amber while the flame is on, grey when it is out
	Outside temperature on the Climate page, return temperature on the Boiler page	Grey; the number beside it is white
	Central-heating water pressure, in bar	Red when the boiler reports low pressure, grey otherwise
	Boiler fault summary — `FAULT` or `OK`	Red on fault, green when clear

A reading the boiler has not sent, or a sensor that is absent, is shown as `--` or `---.-` in dim grey, never as a zero. A return temperature below 5 °C is treated as no reading: a boiler with no return sensor answers 0.00 instead of refusing the request, and 0 °C of return water beside 48 °C of flow is not a measurement.

6.6 Climate page

The page for day-to-day use.



- Room temperature, large, to one decimal.
- The setpoint currently in force below it, in cyan.

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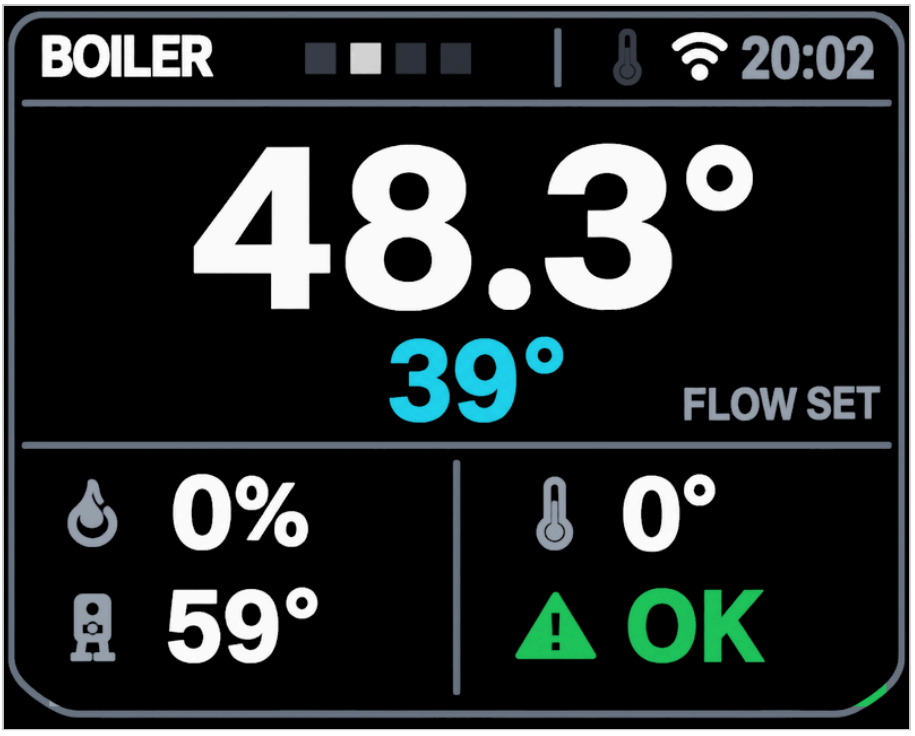
- To its right: `COMFORT`, `ECO` or `BOOST`.
- Four tiles: burner, boiler water temperature, outside temperature, system pressure.

Turning the encoder here changes the setpoint of whichever window is active — comfort during the comfort window, eco outside it.

Menu item	Effect
`COMFORT SETPOINT` / `ECO SETPOINT`	The active setpoint, 0.5 °C per detent
`HEATING`	`AUTO` or `MANUAL`; manual suspends the control loop
`BOOST`	Comfort plus the boost offset until the next scheduled change
`HYSTERESIS`	Switching band around the setpoint, 0.1 °C per detent

6.7 Boiler page

What the boiler itself reports.

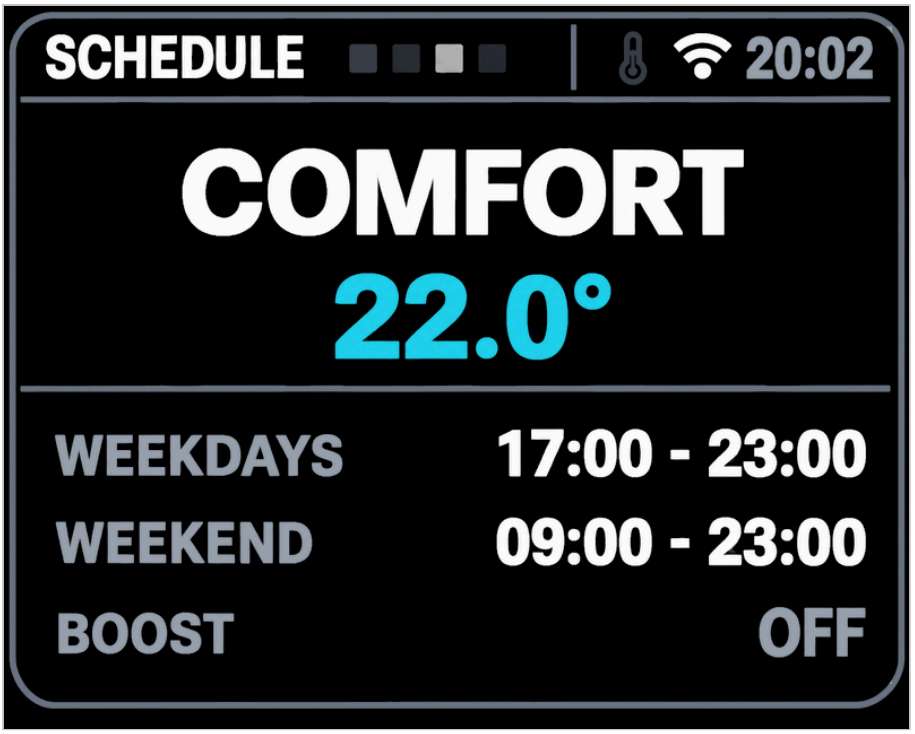


- Boiler water temperature, large.
- The flow setpoint the thermostat is asking for, in cyan, labelled `FLOW SET`.
- Four tiles: modulation level, return temperature, hot-water temperature, fault summary.

Menu item	Effect
`DHW SETPOINT`	Hot-water temperature, 1 °C per detent
`MAX FLOW`	Upper limit for the flow setpoint, 1 °C per detent
`DHW`	Hot water on or off at the boiler

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6.8 Schedule page



- Which window is in force now, and its setpoint.
- The weekday and weekend windows, as `HH:MM - HH:MM`.
- Whether boost is on.

The windows are set here, on the glass, and in Home Assistant through four time entities — whichever is to hand. The menu on this page is seven items long.

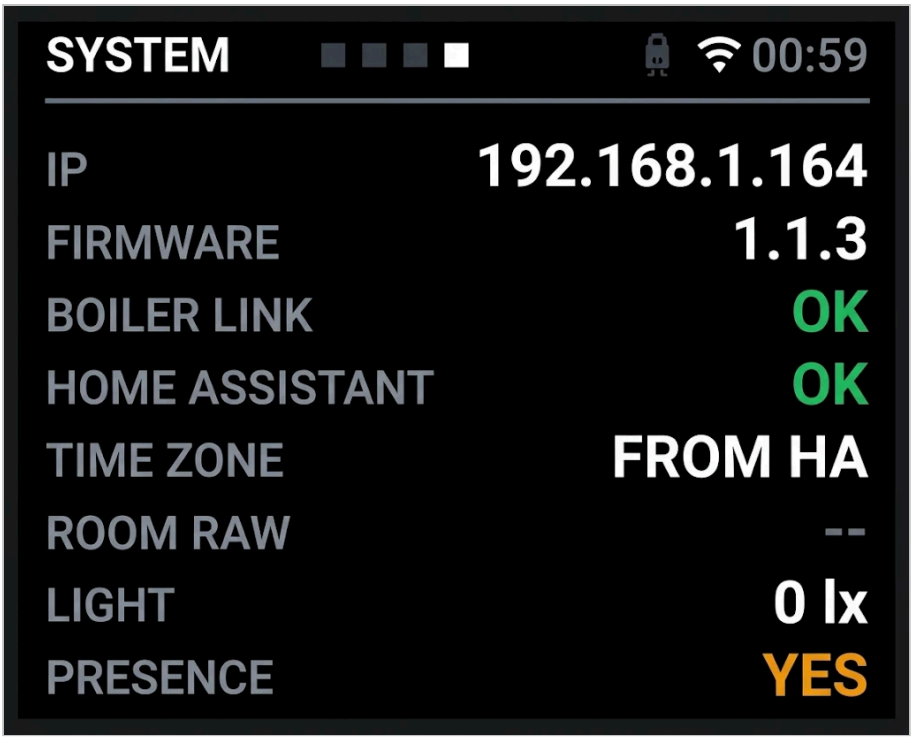
Menu item	Effect
`COMFORT`	Comfort setpoint, 0.5 °C per detent
`ECO`	Eco setpoint, 0.5 °C per detent
`BOOST OFFSET`	How far above comfort boost goes, 0.5 °C per detent
`WEEKDAY FROM`	Start of the weekday comfort window, 10 minutes per detent
`WEEKDAY TO`	End of it, 10 minutes per detent
`WEEKEND FROM`	Start of the weekend comfort window, 10 minutes per detent
`WEEKEND TO`	End of it, 10 minutes per detent

A window wraps at midnight: turning `WEEKEND TO` past `23:50` brings it to `00:00`. Boost is not repeated on this menu — it is on the Climate menu.

6.9 System page

Diagnostics, for commissioning and for support calls.

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Row	Shows
`IP`	Address on the network
`FIRMWARE`	Firmware version
`BOILER LINK`	Green `OK` once the boiler has answered, red `NONE` until then
`HOME ASSISTANT`	Green `OK` while the ESPHome API is connected, grey `NONE` otherwise. Heating does not depend on it
`TIME ZONE`	The zone the clock is keeping, as `UTC+1 EU`. `FROM HA` while Home Assistant is connected, because the zone then comes from there
`ROOM RAW`	The room sensor before the offset is applied
`LIGHT`	Ambient light in lux
`PRESENCE`	Whether the radar sees anyone right now

Menu item	Effect
`ROOM OFFSET`	Correction added to the room sensor, 0.1 °C per detent
`UTC OFFSET`	−12 to +14 hours, 0.25 h per detent
`SUMMER TIME`	`Off`, `Europe`, `North America`, `Australia`, `New Zealand`; one detent moves to the next

> ⚠ **Set these two on a thermostat that has no Home Assistant.** The device learns the time from an internet time server, and a time server sends the moment but never the zone. With Home Assistant connected the zone comes from there and both settings are ignored — the System page then reads `FROM HA`. Without it the schedule runs on what is set here, and a wrong setting shifts the comfort window by hours while the clock on the glass still looks perfectly correct.

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The offset moves in quarter hours because not every country is on the hour — India is on the half, Nepal and the Chatham Islands on the quarter. The four summer-time rules are every schedule in common use:

Rule	Turns forward	Turns back
`Europe`	Last Sunday in March	Last Sunday in October
`North America`	Second Sunday in March	First Sunday in November
`Australia`	First Sunday in October	First Sunday in April
`New Zealand`	Last Sunday in September	First Sunday in April

Anywhere else — most of Asia, Africa and South America, and the countries that keep dates of their own — choose `Off`. The clock then holds correct standard time the year round.

✓ Set the room offset after the unit has been on the wall for at least two hours: compare `ROOM RAW` against a reference thermometer in the middle of the room and enter the difference. The same reading is called **Room Temperature Raw** in Home Assistant, where it is one of the entities that arrive switched off — do this on the glass and nothing has to be enabled first.

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7. Network and Provisioning

7.1 Network requirements

- 2.4 GHz Wi-Fi.
- mDNS on the local subnet for ESPHome discovery.
- Outbound NTP (UDP 123) to `pool.ntp.org`, for a thermostat used without Home Assistant. There is no battery-backed clock on the board and no other way to learn the time; with Home Assistant connected the time comes from there instead.
- Outbound HTTPS to the vendor update manifest, only if managed updates are used.

The device holds no cloud dependency. Heating continues with Wi-Fi down.

7.2 The provisioning window

Wi-Fi credentials are accepted only during a **15-minute window that opens when the device is powered on**. When the window closes, the device logs that it has closed and accepts no further credentials until it is power-cycled.

> **ℹ Why there is no setup access point.** Earlier HomeMaster firmware raised an open access point with a captive portal when it could not join the stored network. That was removed under Article 3(3)(d) of the Radio Equipment Directive and EN 18031-1: an open access point that accepts new Wi-Fi credentials is an unauthenticated path to reconfigure the device. **This product raises no access point under any circumstance.** If the stored credentials stop working, power-cycle the device to reopen the provisioning window and set them again by one of the methods below.

7.3 Improv over Bluetooth (recommended)

1. Power the device. The provisioning window is now open for 15 minutes.
2. Open https://improv-wifi.com in Chrome or Edge on a computer or phone with Bluetooth. Safari and iOS cannot do this — they have no Web Bluetooth.
3. Select the thermostat and enter the Wi-Fi credentials.

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> ℹ **On Linux**, Web Bluetooth has to be enabled once in Chrome, under `chrome://flags/#enable-experimental-web-platform-features`.

7.4 Improv over USB serial

Connect USB-C and use the same page, choosing serial instead of Bluetooth. No driver is needed on current operating systems; the USB-serial bridge is a CP2102. This is the route to use when Bluetooth is unavailable.

7.5 Changing the network later

Power-cycle the device and re-provision within 15 minutes, by Bluetooth or by USB. There is no other path, by design.

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8. Home Assistant

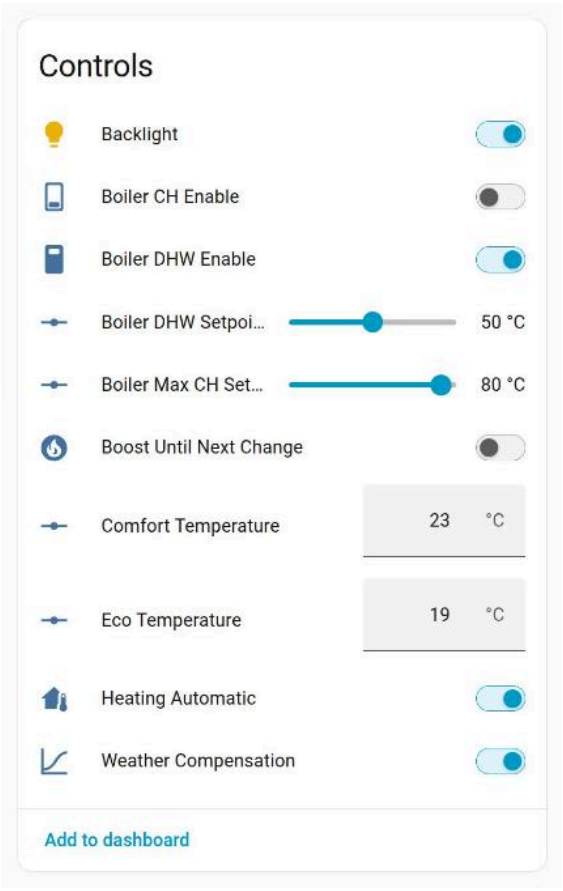
Add the device under Settings → Devices & Services → ESPHome. All entities appear automatically; no YAML is needed on the Home Assistant side.

> ⚠ **Taking control.** Importing the configuration in ESPHome Device Builder replaces the factory API encryption key with one of your own. Save that key before adding the device in Home Assistant.

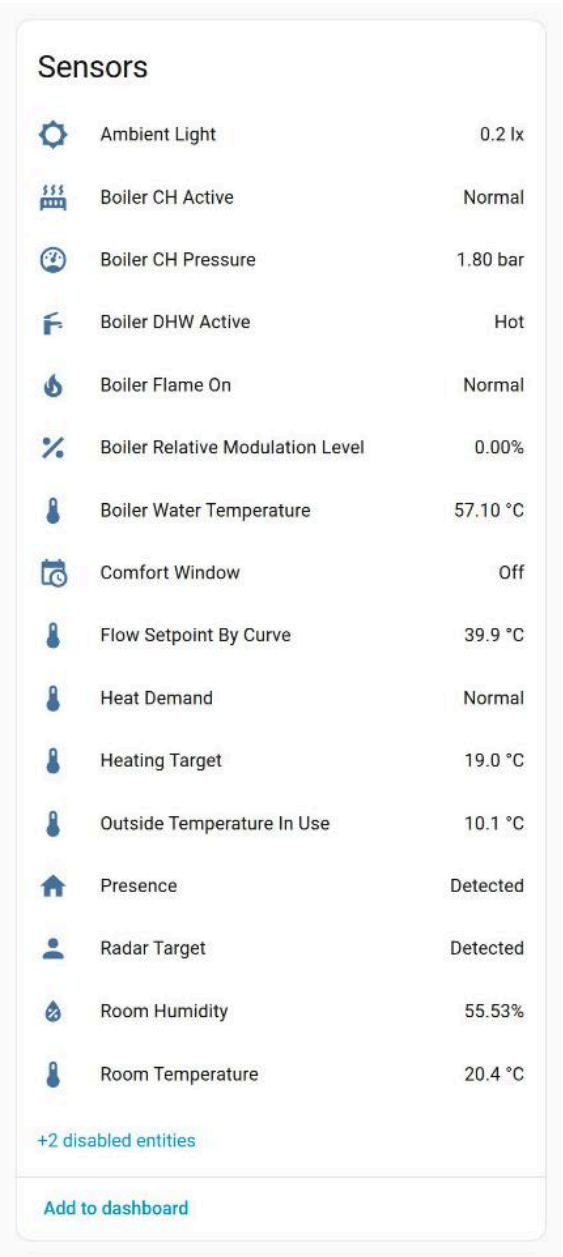
Home Assistant sorts the entities into four cards of its own accord. **Controls** is what you operate day to day; **Sensors** is what the thermostat and the boiler report; **Diagnostic** is for commissioning and support calls.

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Controls



Sensors

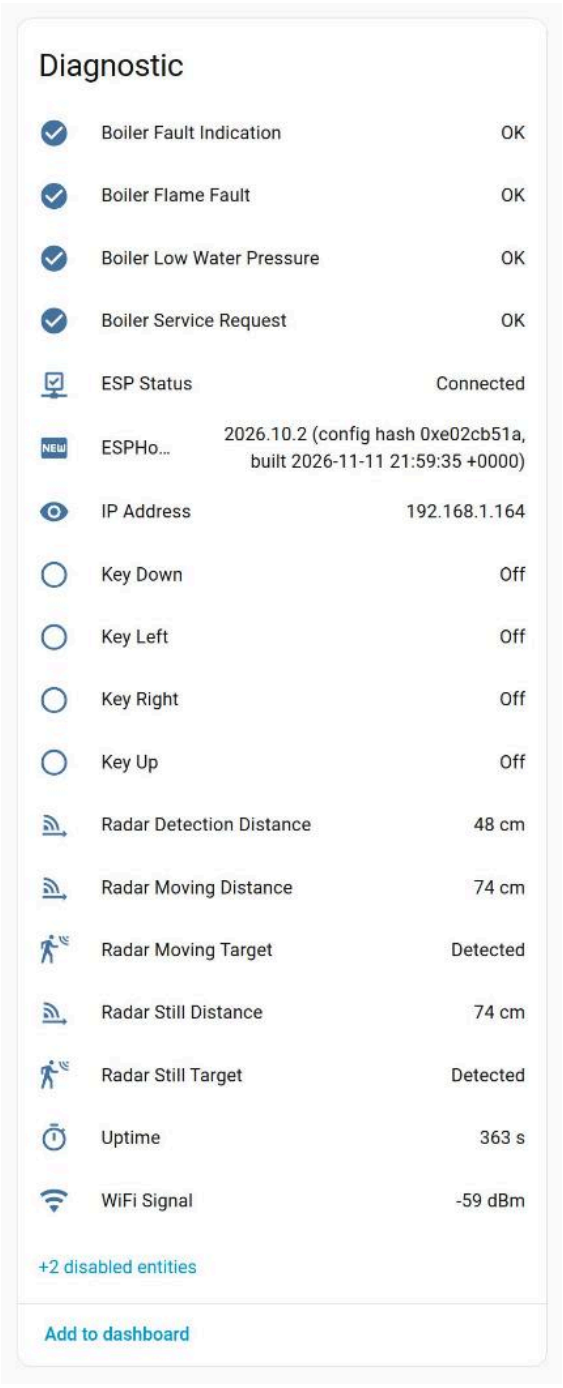


In the Sensors capture the boiler is heating water, not the house: the comfort window is closed and the room is above the eco setpoint, so there is no heat demand and central heating is switched off at the boiler. `Outside Temperature` is missing because that boiler has no outside sensor; `Outside Temperature In Use` shows what the control loop is actually working from, which here comes from Home Assistant.

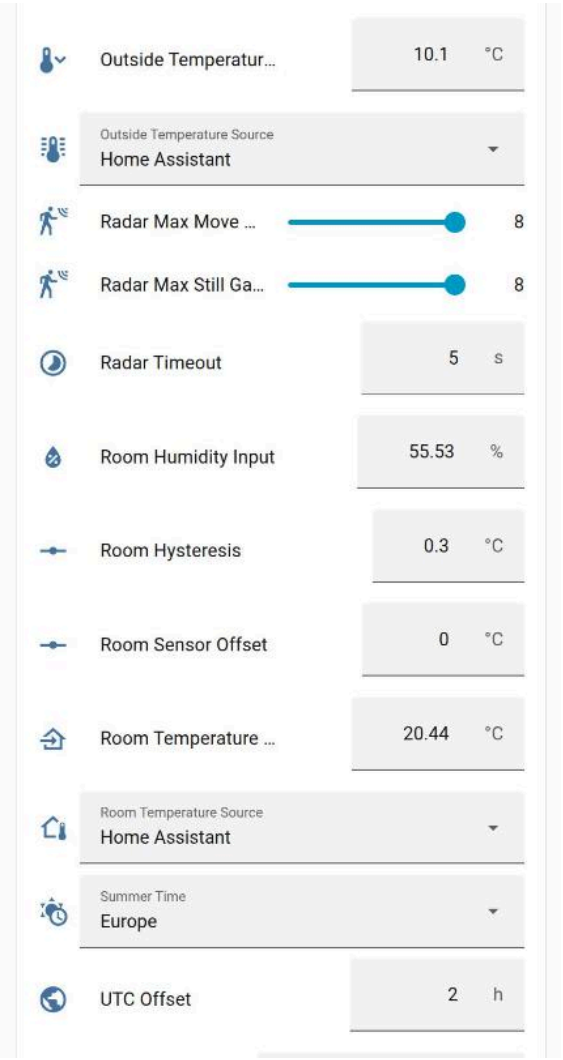
Configuration holds the settings — the weather curve, the hysteresis, the two source selectors, the time zone, the radar gates and the four comfort times. It is a long card; every entity on it is listed in 8.1, and it is reproduced in full on the device page in the repository.

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Diagnostic



The three inputs, in Configuration



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8.1 Entities

Entity	Type
Room Temperature	sensor
Room Temperature Raw	sensor (diagnostic, off by default)
Room Humidity	sensor
Room Humidity Raw	sensor (diagnostic, off by default)
Ambient Light	sensor
Comfort Temperature, Eco Temperature	number
Boost Offset, Room Hysteresis, Room Sensor Offset	number (config)
Curve Cold/Warm Outside, Curve Cold/Warm Flow	number (config)
Fixed Flow Setpoint	number (config)
Outside Temperature Source, Room Temperature Source	select (config)
Summer Time	select (config)
UTC Offset	number (config)
Boiler DHW Setpoint, Boiler Max CH Setpoint	number
Room Temperature Input, Outside Temperature Input, Room Humidity Input	number (config, written from Home Assistant)
Weather Compensation	switch
Outside Temperature In Use	sensor
Weekday / Weekend Comfort Start and End	datetime (config)
Heating Target, Flow Setpoint By Curve	sensor
Boiler Water Temperature, Pressure, Modulation, Outside	sensor
Boiler Return Temperature, Boiler DHW Temperature	sensor (off by default)
Boiler Flame On, CH Active, DHW Active, Fault Indication	binary_sensor
Boiler CH Enable, Boiler DHW Enable	switch
Heating Automatic, Boost Until Next Change	switch
Comfort Window, Heat Demand	binary_sensor
Presence, Radar Target	binary_sensor
Backlight	light
Firmware Update	update

i Four entities arrive switched off. **Room Temperature Raw**, **Room Humidity Raw**, **Boiler Return Temperature** and **Boiler DHW Temperature** are created disabled, so that a device added to Home Assistant does not bring a dozen rarely-read values with it. Home Assistant shows them on the device page as *disabled entities*; open that line, pick the entity and enable it. It starts recording from the moment it is enabled — there is no back-history.

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9. Firmware Updates

9.1 Vendor-managed OTA (HTTP)

The shipped configuration carries a **Firmware Update** entity backed by a vendor JSON manifest. New releases appear in Home Assistant under Settings → Updates and install over the air.

9.2 ESPHome OTA (user-controlled)

Adopt the device in ESPHome Device Builder and build from the published configuration. This is the route for anyone who wants to modify the firmware.

> ℹ **Taking control hands you the whole configuration**, not a reference to it, so the device stops following vendor releases from that point on. To go back to vendor updates, adopt the published configuration again.

9.3 USB-C recovery flashing

If the device no longer boots, connect USB-C and flash the factory binary with ESPHome Web or esptool.

9.4 ESPHome compatibility

Requires ESPHome 2026.10.0 or newer, for the `improv_ble` component. The `mipi_spi` display platform and the `opentherm` component have been available since 2026.7.0.

10. Heating Control

10.1 Setpoints

Setting	Default	Meaning
Comfort Temperature	21.5 °C	Target inside the schedule window
Eco Temperature	19.0 °C	Target outside it
Boost Offset	1.0 °C	Added to comfort while Boost is on
Room Hysteresis	0.3 °C	Dead band around the target

10.2 Schedule

Setting	Default
Weekday Comfort Start / End	17:00 / 23:00
Weekend Comfort Start / End	09:00 / 23:00

The clock comes from Home Assistant when it is available and from SNTP otherwise. With neither, the firmware holds comfort.

10.3 Weather compensation

The flow setpoint is interpolated between two points on a curve and capped at the boiler's maximum CH setpoint.

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Setting	Default
Curve Cold Outside / Curve Cold Flow	−15 °C → 65 °C
Curve Warm Outside / Curve Warm Flow	+15 °C → 35 °C
Fixed Flow Setpoint	55 °C
Weather Compensation	On

Weather Compensation turns the curve off. With it off, the boiler is asked for **Fixed Flow Setpoint** and nothing else — use this on a system that is balanced for one flow temperature, or while commissioning.

With no outside temperature available, from either source, the thermostat also asks for Fixed Flow Setpoint. It does not fall back to the warm end of the curve: on a January morning that is a silent under-heat which looks like a broken thermostat rather than a missing sensor.

Both limits still apply: the value is capped by **Boiler Max CH Setpoint**, and the room hysteresis still decides whether heat is called for at all.

10.4 Where the temperatures come from

Two selects decide the sources. Both default to the device's own source, so a thermostat that is never added to Home Assistant behaves as a self-contained unit.

Select	Options	Default
Outside Temperature Source	`Boiler, then Home Assistant` · `Boiler` · `Home Assistant`	Boiler, then Home Assistant
Room Temperature Source	`Built-in sensor` · `Home Assistant`	Built-in sensor

The default for the outside temperature prefers the boiler's own sensor and falls back to Home Assistant only when the boiler reports none. The boiler's sensor does not depend on the network, so it is the safer source when both exist.

> **i Most boilers have no outside sensor.** If yours does not, the curve has nothing to work from until you either fit one or point the thermostat at a Home Assistant entity — a weather integration is enough. Until then the thermostat uses Fixed Flow Setpoint.
>
> **⚠ Home Assistant as a source is a dependency.** With a source set to `Home Assistant`, that value stops arriving when the network or Home Assistant does. The room temperature then has no reading and heating stops being regulated; the outside temperature falls back to Fixed Flow Setpoint. Leave the room source on the built-in sensor unless you have a reason not to.

Room Sensor Offset applies to the built-in sensor only. A value coming from Home Assistant arrives from a thermometer that is already calibrated, and correcting it again here would be a second, invisible correction.

The sensor **Outside Temperature In Use** publishes the value actually feeding the curve, after the select has been applied, and the Climate page shows that same value. Use it to confirm which source is live.

Feeding a temperature from Home Assistant

The thermostat does not go looking for an entity by name. Home Assistant writes the value into the device, through three numbers that appear in the device's **Configuration** section:

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Number	Feeds
`Room Temperature Input`	The room temperature, when Room Temperature Source is set to Home Assistant
`Room Humidity Input`	The room humidity, under the same selector — a room whose temperature comes from Home Assistant takes its humidity from there too
`Outside Temperature Input`	The outside temperature, when the outside source is set to or falls back to Home Assistant

Any entity can feed them — a wall sensor, a weather integration, an average of several rooms — and nothing in the firmware has to change.

One automation per value. Replace the sensor in both places with your own:

```
yaml alias: Room temperature to the thermostat triggers: - trigger: state entity_id: sensor.your_room_sensor - trigger: time_pattern minutes: "/5" - trigger: homeassistant event: start actions: - action: number.set_value target: entity_id: number.homemaster_thermostat_room_temperature_input data: value: "{{ states('sensor.your_room_sensor') | float }}" mode: single
```

The outside temperature and the humidity are the same automation with `number.homemaster_thermostat_outside_temperature_input` and `number.homemaster_thermostat_room_humidity_input` and the matching sensors.

Humidity is not used for heating — it is reported for comfort and for damp rooms — so leaving `Room Humidity Input` unfed costs nothing but the reading.

> ⚠ **The repeating trigger is not optional.** A pushed value is ignored once it is older than **30 minutes**. Without the five-minute trigger a quiet sensor would silently take the thermostat out of regulation after half an hour. With it, the value is refreshed long before it expires.

The trigger on Home Assistant starting matters too: after a restart the value arrives at once instead of up to five minutes later.

What happens when the value stops arriving. The thermostat does not keep using it. The room temperature becomes unavailable and heating is no longer regulated; the outside temperature falls back to Fixed Flow Setpoint. This is deliberate — regulating a house on a reading from yesterday is worse than admitting the reading is gone.

Until something writes to them, both numbers read −50 °C, which is the bottom of their range rather than a measurement. The thermostat knows nothing has been written and ignores them.

10.5 Heating Automatic

Turning **Heating Automatic** off suspends the whole control loop and leaves the boiler in whatever state it was found. Use it when commissioning, or when the boiler is to be controlled from elsewhere.

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11. Troubleshooting

Symptom	Cause
Boiler entities unavailable	OpenTherm pair not connected, or the boiler is not in OpenTherm slave mode
Screen stays dark	Radar has not seen anyone and the timeout expired — approach the device
Screen never blanks	Radar still detects movement; reduce the still-distance gate
Wi-Fi icon crossed out	No Wi-Fi association. A normal icon in a dim colour means Wi-Fi is up but Home Assistant is not connected — that is not a fault
Cannot set Wi-Fi credentials	The 15-minute provisioning window has closed. Power-cycle the device and try again within 15 minutes
No setup access point appears	There is none, by design — see 7.2
Room temperature reads high	Device in direct sunlight or above a heat source; or the offset needs trimming after warm-up
Device not found in Home Assistant	mDNS blocked between VLANs; add the device by IP address
Setpoint changes on the wheel do not reach the boiler	Check Heating Automatic is on and `BOILER LINK` is `OK` on the System page
House is cool in cold weather although the boiler runs	No outside temperature, so the flow setpoint is the Fixed Flow Setpoint. Check `Outside Temperature In Use`; either raise the fixed value or give the thermostat an outside source (see 10.4)
Outside temperature shows `--`	The boiler reports none and no Home Assistant entity is configured or reachable
Room temperature unavailable after a network outage	Room Temperature Source is set to Home Assistant; switch it back to the built-in sensor
Device will not start	Supply polarity reversed, or the supply is below 24 V under load

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12. Compliance and Certifications

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

12.1 Applicable EU legislation

- Directive 2014/53/EU — Radio Equipment Directive (RED). Covers health and safety, electromagnetic compatibility, radio spectrum and cybersecurity for this product.
- Directive 2011/65/EU and (EU) 2015/863 — Restriction of Hazardous Substances (RoHS).
- Directive 2012/19/EU — Waste Electrical and Electronic Equipment (WEEE).
- Regulation (EU) 2023/988 — General Product Safety Regulation (GPSR).

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12.2 Harmonised standards applied

Area	Standards
Health and safety — Art. 3.1(a)	EN IEC 62368-1:2020 + A11:2020
RF exposure	EN 62479:2010
EMC — general	EN 301 489-1 V2.2.3
EMC — wideband data	EN 301 489-17 V3.2.4
EMC — short-range devices	EN 301 489-3 V2.3.2
Radio spectrum — 2.4 GHz	EN 300 328 V2.2.2
Radio spectrum — 24 GHz SRD	EN 300 440 V2.2.1
Cybersecurity — Art. 3(3)(d)	EN 18031-1:2024
RoHS technical documentation	EN IEC 63000

12.3 Radio

	2.4 GHz	24 GHz
Module	ESP32-WROOM-32U-N16	HLK-LD2410C
Manufacturer	Espressif Systems	Shenzhen Hi-Link Electronic
Band	2402–2480 MHz	24.00–24.25 GHz
Max. radiated power	≤ 20 dBm EIRP	−5.70 dBm e.i.r.p., measured

EU type-examination for the 2.4 GHz module: No. 172141367/AA/02, issued 02 March 2023 by Kiwa Nederland B.V. (Notified Body 0063), Wilmersdorf 50, 7327 AC Apeldoorn, The Netherlands.

12.4 Manufacturer / EU economic operator (per GPSR)

ISYSTEMS AUTOMATION S.R.L. Diligentei 18, Ploiești, Romania Tel.: +40 747 757 798 Web: https://www.home-master.eu

12.5 Declaration of Conformity

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

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13. Support and Resources

13.1 Support channels

- Support: https://www.home-master.eu/support
- Email: support@home-master.eu

13.2 Online resources

- Product page: https://www.home-master.eu

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- Repository: https://github.com/isystemsautomation/homemaster-dev/tree/main/OpenthermThermostat
- Firmware: `OpenthermThermostat/Firmware/thermostat.yaml`

13.3 License

Hardware — schematics, PCB layouts and bills of materials — is licensed under CERN-OHL-W v2. Firmware and ESPHome configuration are licensed under the MIT License.

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14. Disposal

The product and its packaging carry the crossed-out wheeled bin symbol.

This product must not be disposed of with household waste. At the end of its life, hand it to a collection point for waste electrical and electronic equipment, or return it to the manufacturer. Separate collection prevents hazardous substances reaching the environment and allows the materials to be recovered.

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