Datasheet

OpenTherm Gateway

Part No.: OpenTherm Gateway-R1

Manufacturer: ISYSTEMS AUTOMATION S.R.L.

Hardware Version: V1.0

Architecture: Modular (MCU Board + Relay Board)

Controller: ESP32-WROOM-32U-N16

Functional Overview

The OpenTherm Gateway is a compact embedded automation controller designed for integration with OpenTherm heating systems and environmental sensors. The system is built around the ESP32 platform and provides reliable communication with heating equipment while enabling local control logic and automation.

The Gateway supports multiple power input options (24V DC or widerange AC/DC) and integrates an OpenTherm interface for communication with compatible boilers and HVAC devices. Additional capabilities include a relay output for actuator control, 1-Wire temperature sensor support, USB connectivity for firmware programming, and Wi-Fi communication through the ESP32 module.

The system is implemented using two hardware boards:

Board	Function
MCU Board	CPU, USB interface, OpenTherm interface, logic
Relay Board	Power supply, relays, 1-Wire diodes

Technical Specifications

Specification	Details
Microcontroller	ESP32-WROOM-32U-N16(dual-core)
Power Input	24 V DC nominal (V+ / 0V) OR 85–265 V AC (L / N) OR 120–370 V DC (L / N + / −)
Relay Outputs*	1 × SPDT dry-contact relays *Note: PCB insulation between L/N and C/NC tracks rated as Basic per EN 62368-1. Use restriction applies — see Safety notice.*
Rated Load (System Limit)	3 A @ 250 VAC (resistive contact rating)
Max Load @ 250 VAC	750 VA (system limit)
Max Load @ 30 VDC	90 W (system limit)
Relay Component Rating (Informative Only)	Relay components are rated up to 12 A @ 250 VAC (resistive); however, this rating does not apply to the complete module, 1 × SPDT relay, C and NC contacts accessible
Temperature Inputs	2 × 1-Wire (DS18B20 compatible)
User Interface	1 buttons, 4x LEDs(PWR,1 user LED, 1 status LED, relay state)
Wi-Fi	Wi-Fi (ESP32)
OpenTherm Interface	1 × OpenTherm bus (OT+ / OT−) with optocoupler isolation
USB	USB-C (ESD protected, CC detection, data to ESP32)
Typical power consumption:	3W

*Relay outputs are **not internally fused**. External overcurrent protection must be provided in accordance with applicable standards and installation requirements. Use appropriately rated fuses or circuit breakers and consider external contactors for loads exceeding 3 A or for inductive and high inrush loads.

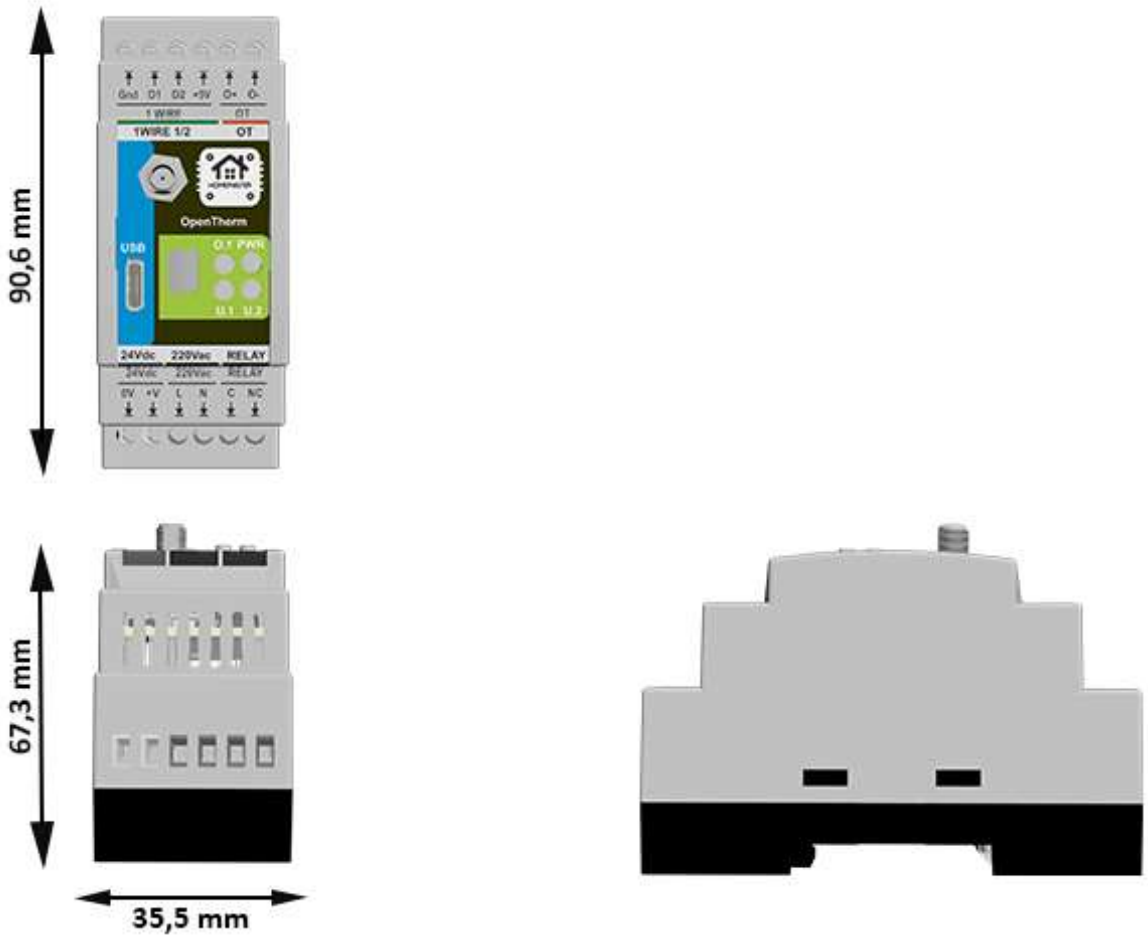
Installation, Environmental & Mechanical

Category	Specification	Details
Terminal Specifications	Terminal type	Pluggable screw terminal blocks, 5.08 mm pitch
	Terminal pitch	5.08 mm
	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 Nm (max)
Environmental Ratings	Operating temperature	0 °C to +40 °C
	Storage temperature	-10 °C to +55 °C
	Relative humidity	0–90 % RH, non-condensing
	Ingress protection	IP20 (inside cabinet)
	Installation	Indoor control cabinet only; not for outdoor or exposed installation
	Terminal protection	All wiring terminals must be protected against accidental contact
Mechanical & Packaging	Product dimensions	35.5 x 90.6 x 67.3 mm (L × W × H)
	DIN units	2 division units (≈ 36 mm DIN rail mounting width)
	Mounting	35 mm DIN rail
	Net weight	130 g
	Gross weight	220 g
	Pack size	140 × 96 × 95 mm (L × W × H)

	Mechanical drawing	Front + side views with DIN-clip depth (see below)
	Notes	All dimensions shown in millimeters unless stated otherwise

Install only inside a control cabinet with ventilation; the cabinet must include a protective front plate covering all module connection terminals and a closing protective door; not for outdoor or exposed installation.

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.



Cable Recommendations & Shield Grounding

This section applies to **Temperature (1-Wire)**, and **OT**. Use shielded, twisted constructions and bond shields correctly to reduce EMI and ground-loop issues.

General Routing Rules

- Route low-level signal cables (1-Wire/OT) separately from mains, relay outputs, contactors, VFD motor cables, and power wiring.
- If crossing power cables is unavoidable, cross at **90°**.
- Keep cable runs as short as practical and avoid parallel runs with high-current conductors.

Temperature Cable

1-Wire (DS18B20)

- **Recommended:** shielded 3-core (+5V / DATA / GND) for typical installations
- **High-EMI / long runs:** shielded pairs + overall shield (e.g. **LI2YCY PIMF 2×2×0.50**)
- **Topology:** daisy-chain (bus). Avoid star wiring.
- **Stubs:** keep sensor stubs ≤ **0.5 m**.
- **Pull-up (DATA): 4.7 kΩ** typical; **2.2–3.3 kΩ** for long/heavy loads.

OT Cable

- **Construction:** twisted pair
- **Shielding:** overall shield is recommended in cabinets; use individually shielded pairs + overall shield in high-EMI
- **Examples: J-Y(ST)Y 2×2×0.5 mm²** or **LI2YCY PiMF 2×2×0.50**

Shield Grounding

- **Default recommendation:** bond cable shield(s) to cabinet **PE/EMC ground at the PLC end only**.
- **Do not** connect shields to signal terminals (1-Wire/OT).
- If both ends are in equipotential bonded cabinets, shields may be bonded at both ends using proper 360° clamps.

Compliance & Certifications

The HomeMaster OpenTherm Gateway is CE marked and designed to comply with the applicable European Union directives. The manufacturer, ISYSTEMS AUTOMATION (HomeMaster brand), maintains the technical documentation and a signed EU Declaration of Conformity (DoC).

EU Directives

EMC 2014/30/EU · LVD 2014/35/EU · RED 2014/53/EU · RoHS 2011/65/EU

Harmonised Standards

Area	Standards
EMC	EN 61000-6-1 (Immunity) · EN 61000-6-3 (Emissions)
Electrical Safety	EN 62368-1

Radio	EN 300 328 · EN 301 489-1 · EN 301 489-17
RoHS	EN IEC 63000

Radio

The product integrates a pre-certified ESP32 Wi-Fi radio module (2.4 GHz). Final product conformity with the Radio Equipment Directive is demonstrated by the maintained technical documentation and conformity assessment of the complete device.

Safety notice

⚠ Relay output use restriction (mandatory): the relay output terminals (C, NC) shall be connected only to the same mains supply as the L/N input of this device, or to a SELV / Limited Power Source circuit. Cross-phase mains, cross-source mains, or any higher-voltage-class connection is NOT permitted. The PCB insulation between L/N and C/NC tracks is rated as Basic per EN 62368-1 (working voltage 250 V r.m.s.); cross-mains use would require Reinforced insulation, which is implemented in HW REV2 only.

L / N: hazardous voltage · 24 V DC: SELV · Qualified personnel only

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