

# 010-OT

## 0/10V-to-OpenTherm Converter

### Description

The 0/10V-to-OpenTherm converter can be installed in the electric panel or inside the generator chassis with which it communicates. The converter allows the 0/10V input signal to be used to control a heat generator via OpenTherm by controlling its temperature and/or power. The converter is equipped with 1 channel for communication via OpenTherm protocol with a single heat generator. The converter is also equipped with an output relay that can be used in different ways as shown below. All connections are made via non-removable terminals. The module is equipped with led for status indication:

- LED 1 (green) = communication via OpenTherm protocol with the boiler active (flashing)
- LED 2 (yellow) = 0/10 V input active (signal higher than 1,5 V)

### Main features

Installation	-	Storage and usage humidity	10...90% RH
DIN Bar Modules	unsuitable	Maximum consumption	NA
Weight	45 g	Power supply	from OpenTherm
Dimensions (WxHxD)	55 x 80 x 23 mm	Protection class IP	IP00
Storage temperature	-40...+85°C	Fire Resistance Class	A
Temperature of use	-20...+55°C	Number of generator	1

### Terms of Use

For safety reasons, the module must be installed and used in accordance with the manufacturer's instructions. The module must be adequately protected against water and dust. Have all installation and maintenance work carried out by qualified personnel.

### Safety and maintenance information

Never open the module's protection and containment chassis. If the module is damaged when opening the box or if liquid substances have penetrated inside, have it checked at an authorised service centre. Report any faults and/or anomalies immediately. Before carrying out installation, maintenance and repair work on the system, remember to switch off the power supply. Responsibility for installation, maintenance and repair work is borne by the person or organisation carrying out the work. The manufacturer of the system on which the module is installed is responsible for arranging the system parts adequately to avoid any possibility of the operator coming into contact with live utilities. It is the responsibility of the manufacturer of the system on which the device is installed to: assess the risks and potential dangerous situations, providing any devices for the safety of the operator; provide an adequate power source to the device in such a way as to ensure its correct operation, respecting the directives of the EN 60204-1 standard. All hardware and/or software modifications and/or tampering carried out on the device or to the safety systems of the final product if they are not expressly authorised, void any responsibility of the manufacturer regarding the "CE" conformity.

### We decline all responsibility in the event that:

- the above-mentioned rules are not complied with;
- anomalies or damage to persons and / or things due to improper use of the product occur;
- anomalies or damage to persons and / or things occur due to improper use of the information contained in the manual;
- anomalies or damage to persons and / or things occur due to non-compliance with the rules and instructions indicated in this documentation.

### Disposal regulations

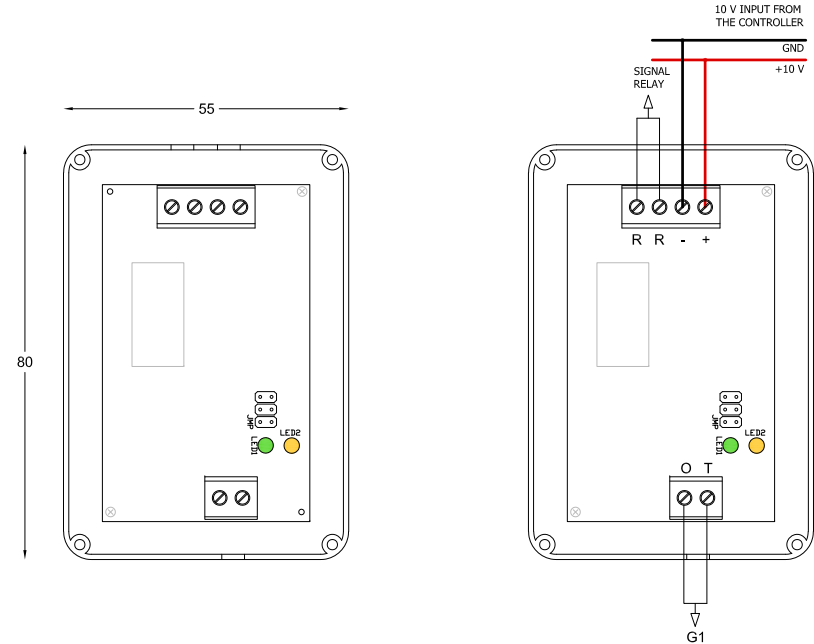


#### Disposal of electrical and electronic products at the end of the cycle of use

The symbol of the crossed-out bin above indicates that the product at the end of its useful life must be collected separately. Do not dispose of the device in household waste bins. Check local regulations for further information on product disposal.

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### Front View Module with Dimensions (mm) and Electrical Connections

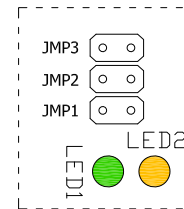


**Caution!** Always work on the electrical connections only with the module power OFF. The OpenTherm connection to the generator is not polarised, therefore the respective cables can be reversed. The OpenTherm connection is point-to-point, therefore do not connect 2 or more generators in parallel to the same output. OT output must be connected only to one generator. The 0/10V signal, on the other hand, is polarised: Do not reverse the cables!

### Note

Check with the boiler manufacturer on the suitability and compatibility of the boiler with this converter: there may be dedicated settings to be made on the generator itself in order for the converter to function correctly.

### JUMPER SETTINGS



	ON (set)	OFF (not set)
JMP1	Power Modulation (Characteristic 1) - JMP3 is ignored	Temperature Modulation (Characteristic 2 or 3 according to JMP3)
JMP2	Signal Output relay is ON if gas boiler flame is ON	Signal Output Relay is ON if gas boiler has an error
JMP3	Temperature Modulation proportional to the gas boiler range (Characteristic 2)	Direct Temperature Modulation (Characteristic 3, inside gas boiler limits range)

**Warning!** By default all jumpers are set!

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### CHARACTERISTIC 1

By setting JMP1 to ON, the boiler is managed by modulation of the maximum power, therefore if there is, for example, 9.0 V at the input, the maximum power at which the boiler can work is 90%.

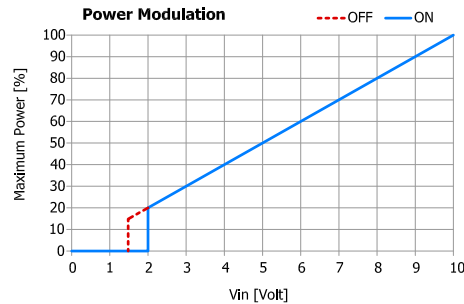
Caution: some boilers are designed on the basis of effective power, therefore they consider 0% power with the boiler off, while with the flame ON the power value is greater than 0%, so at minimum modulation they may be running at 15-17% power; others, instead, indicate the % of power with respect to the useful control range, so with 0% they indicate that the boiler is working at the minimum of its modulation (probably 15-20% of nominal power), but still on. This may have an impact on the settings of the controller that sends the 0/10V signal (although usually not a large one): for the first 3 V indicate a maximum power of 30% which is an actual 30%, while in the second case 3 V more likely indicate a value around an actual 40%, assuming the minimum is 15%, this would be  $[(100\%-15\%)*0.3+15\%]$ . Please refer to the boiler manual for more information.

With this setting, the boiler will always work at the maximum SET of the boiler's heating range. In addition, the boiler will autonomously modulate its output according to the current internal water outlet temperature up to a maximum power set by the 0-10V controller.

Example: if a manufacturer gave the following indications:

- 0 ÷ 2.0 V upward: boiler off (downward the boiler switches off at 1,5V)
- 2.0 V : Boiler ON at minimum power
- 9.7/10 V : Boiler ON at maximum power
- Between 2.0V and 9.5V: direct proportionality

Using the converter would result in the following graph:



### CHARACTERISTIC 2

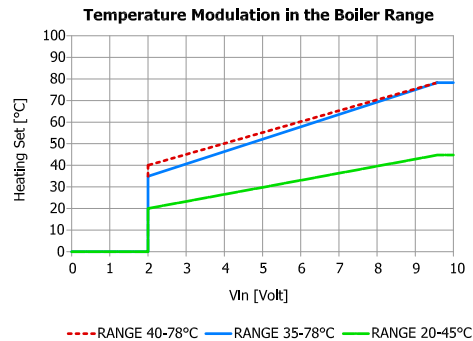
By setting JP1 to OFF and JP3 to ON, modulation of the boiler HEATING SET occurs on the temperature, but it is modulated within the specific range set in the boiler.

Therefore, assuming the following characteristics (always refer to the manual of the generator used):

- 0 ÷ 2.0 V upward: boiler off [downward boiler off for  $V_{in} < 1,5$  V] (no set point control)
- 2.0 V : boiler ON at the minimum set point allowed by the temperature range (settable)
- 9.5 V : boiler ON at the maximum set point allowed by the temperature range (settable)
- Over 9.5 V : boiler ON at the maximum set point allowed by the temperature range (settable)

Assume 3 different ranges:

- 35°C minimum and 78°C maximum
- 40°C minimum and 78°C maximum
- 20°C minimum and 45°C maximum

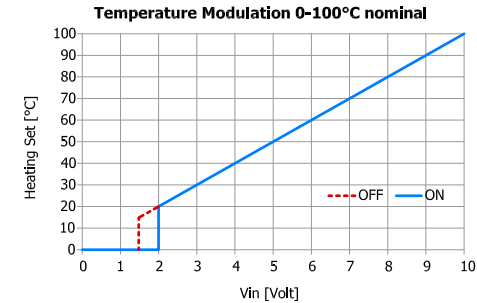


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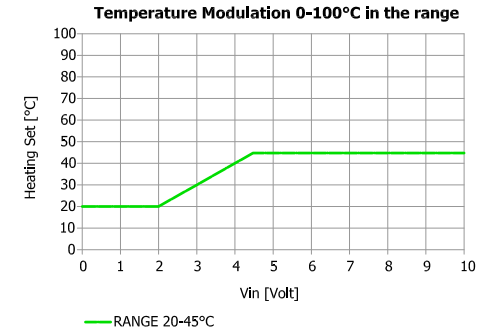
### CHARACTERISTIC 3

By setting JP1 to OFF and JP3 to OFF, temperature modulation occurs directly, therefore 5 V corresponds to 50°C, 3 V to 30°C etc.

Always assuming that between 0 and 2.0 V upward the boiler is switched off and that it switches OFF at 1.5 V downward, the following graph is obtained:



In this mode it could be that the generator still respects the set minimum and maximum limits, in this case if we assume to take the third range (20-45°C) the following graph is obtained:



### DRY CONTACT MANAGEMENT FOR EXTERNAL SIGNAL

A relay is provided to manage a dry contact [230Vac, 3A] with the following logic:

- 1) BOILER BLOCK signal selectable by Jumper JP2 in OFF state
  - OPEN contact: no boiler alarm
  - CLOSED contact: any boiler alarm (although it allows burner ignition)
- 2) BOILER FLAME signal Selectable by Jumper JP2 in CHARACTERISTIC 1 status ON
  - OPEN contact: burner OFF
  - CLOSED contact: burner ON