



#### Main Applications

- Heat Treatment Ovens and plants
- Float glass plants
- Chemical Hardening Plants
- Glass bending furnaces

#### Main Features

- 16, 32, 64 Power Units controlled
- Two Ethernet Modbus TCP networks
- Load Sharing algorithm
- Load Shedding algorithm
- Ethernet VNC connection for easy configuration and monitoring
- Graphic configuration pages
- Graphic status pages
- Graphic trend monitoring page
- Active Alarm and Historical Alarm
- User passwords management
- Data Logging and exporting in CSV file

#### PROFILE

The GSLM, Smart Load Manager, is a compact robust industrial device designed to limit current peaks and to optimize/reduce the instantaneous current consumption in heating ovens and plants equipped with Gefran GFW/GPC Power Controllers.

In configurations where multiple Power Controllers are used, the correspondence of load activation commands can occur simultaneously with the result of a considerable energy demand which in some cases can exceed the limits available in the system or in other cases exceed the contractual supply limits energy with possible economic penalties.

It is important to consider that the GSLM function does not change the amount of power required by each individual load but changes the period during which this power is delivered. This is thanks to the fact that GSLM distributes over time efficiently, on all controlled users, the quantities of power required, avoiding exceeding a pre-set maximum threshold.

For general operation, the individual GFW/GPCs connected to the network receive the power command (P%) from an analog signal wired in the terminal block, remotely (DCS / PLC) via the Modbus TCP network or manually directly from the GSLM interface.

This value is read by GSLM ( Modbus TCP) and, based on the set configuration (max total power) it sends the enable/disabled command via Modbus TCP, in Bust firing mode, to the individual GFW/GPCs.

In this way it is possible to manage networks with a maximum of 64 Power Controllers with a single GSLM.

The functionality of the GSLM can be divided in two concepts that work well together.

The first concept, named "Power distribution" ( or "load sharing" ), takes care of the firing distribution to all the Power Controllers in a way that minimizes the instantaneous current peaks with the capability to distribute the energy consumption along all the control period time ( fig.1, fig. 2 ).

The effect is a considerable reduction of current variation and peaks and a better power factor coefficient.

The second concept, named "Power limit" ( or "load shedding" ) takes care of the eventual total power limit that can be set for the plant.

This limit will never be overcome: the GSLM will insure to distribute the Power on all the zones inside the limit setted, meanwhile continuing to provide the load sharing control as well ( fig. 3. Fig. 4).

The result of these two algorithms working together will be a more stable power consumption, not superior to the set total power limit.

This virtuous behavior of the plant helps the users to respect the energy contract agreed with their energy suppliers, avoiding the risk to exceed the power values agreed and, in the end, allowing the money savings.

The configuration and monitoring of the GSLM is provided by a simple VNC connection via Ethernet port, with access protected by passwords.

Besides the graphic intuitive configuration pages GSLM offers other value added features like:

- Graphic Trend monitoring of 8 selectable Power values in kW
- Power management on line status, for each configured GFW/GPC
- Active Alarm and historical alarm pages with diagnostics info like communication lost, Power Controller Alarms
- Data Logging of all the Power zones, in kW, that can be exported in .CSV file format by USB key.
- Operator passwords management.

# FUNCTIONAL CONSIDERATION

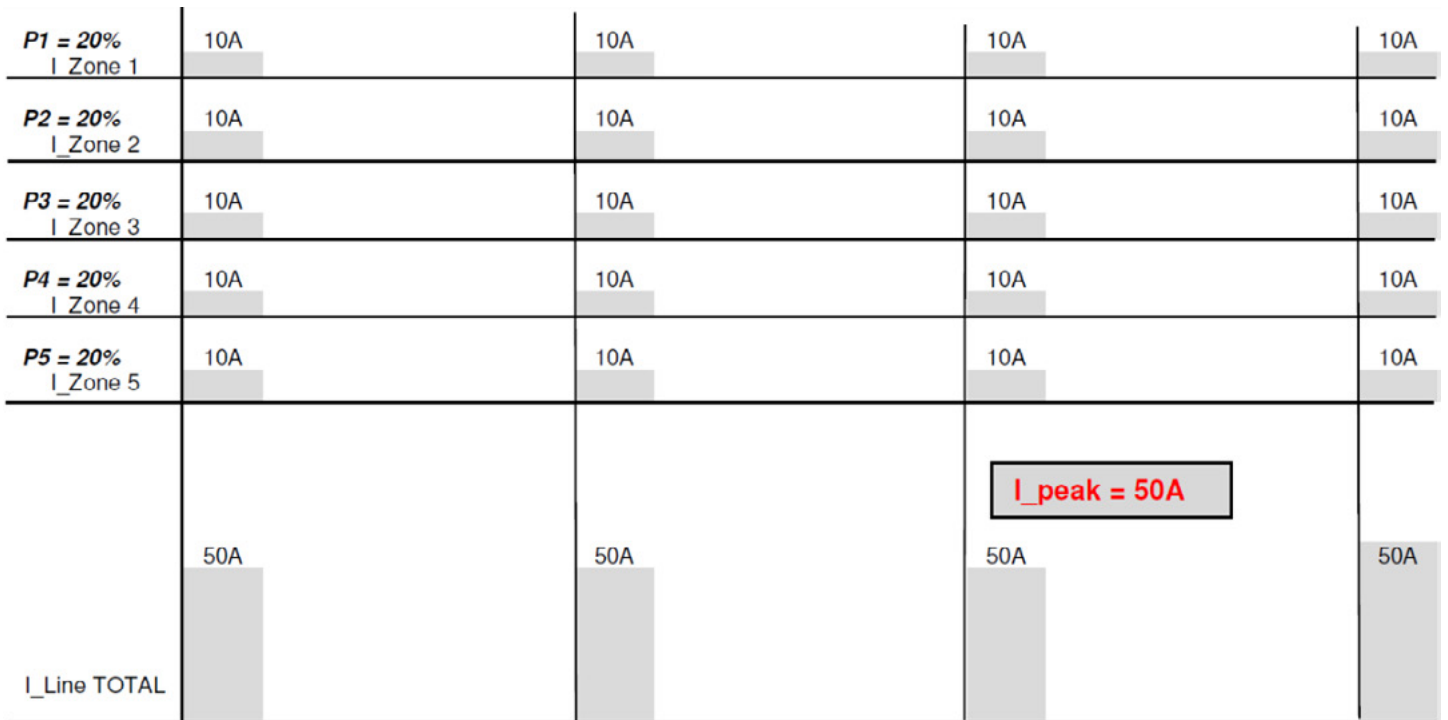


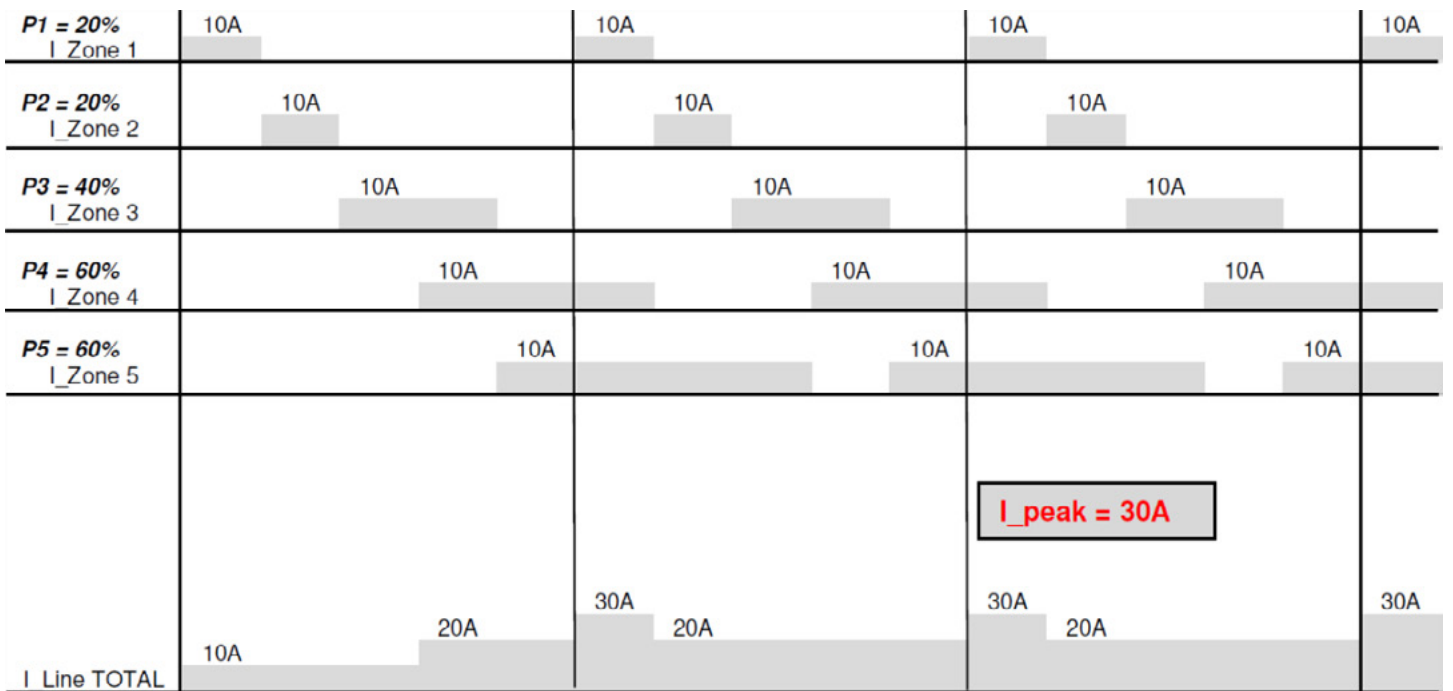
Fig. 1 Without Power Distribution, without Power Limit



Fig. 2 With Power Distribution, without Power Limit

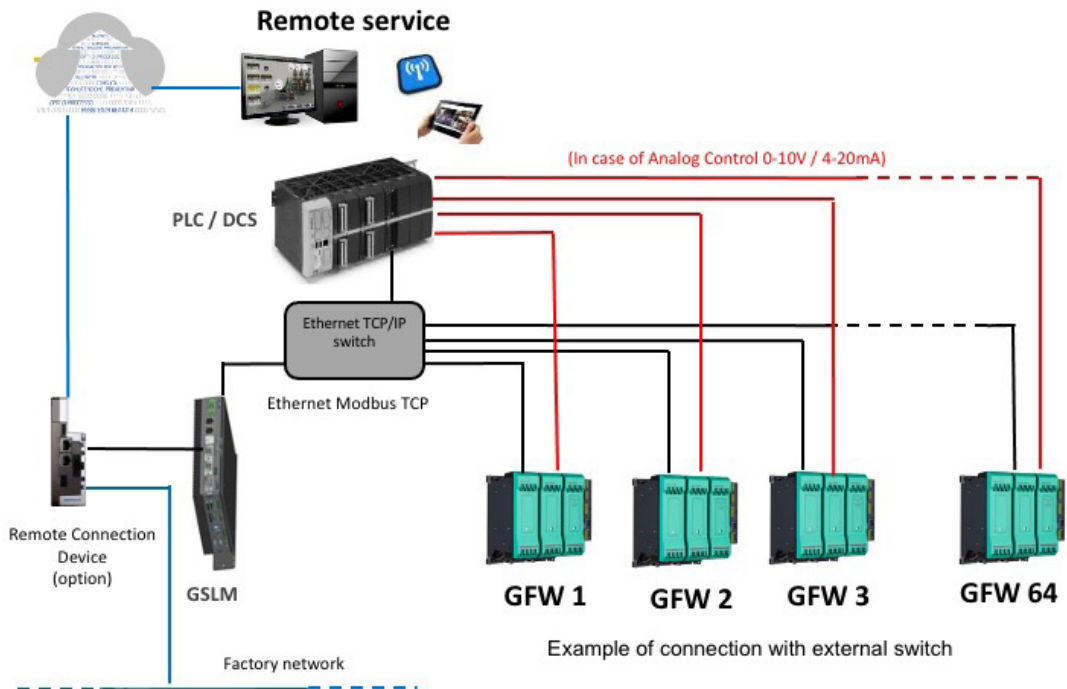
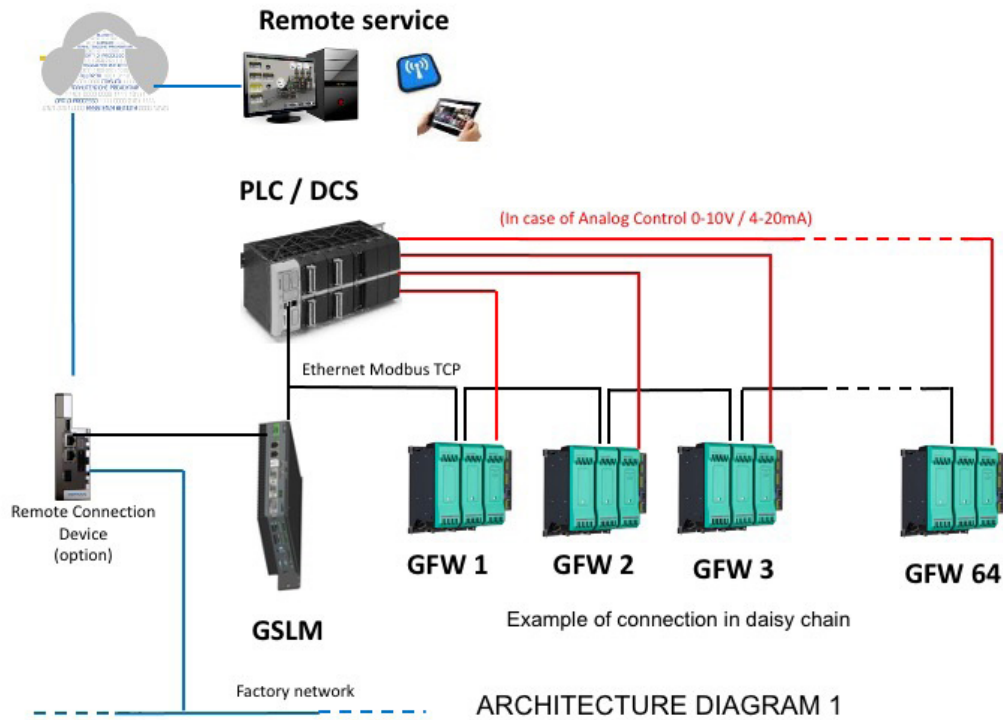


**Fig. 3** Without Power Distribution, without Power limit



**Fig. 4** With Power Distribution, with Power Limit

# ARCHITECTURE DIAGRAMS



## TECHNICAL DATA

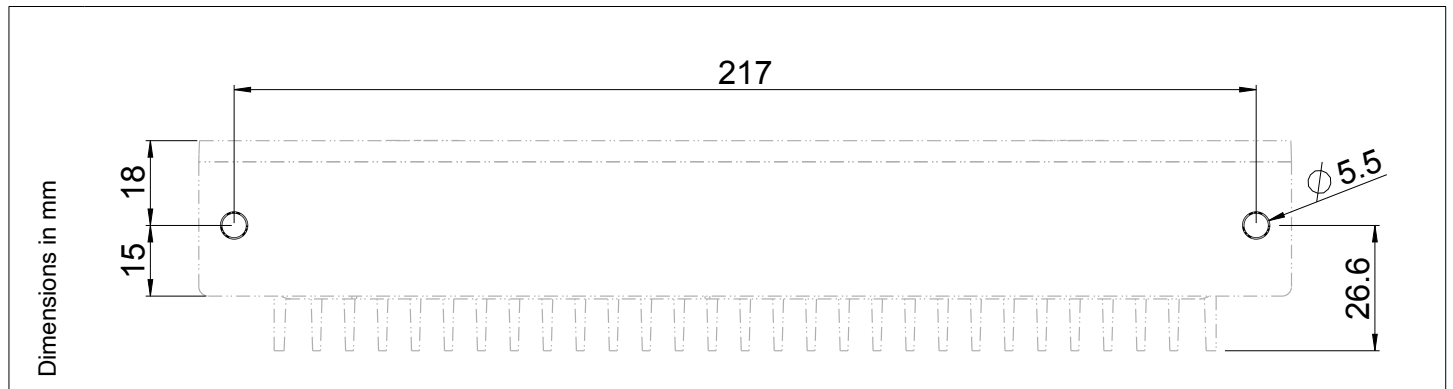
<b>POWER SUPPLY</b>	Operating voltage	24 VDC $\pm$ 25%
	Current draw (at 24 VDC)	500 mA max
	Power dissipation	12 W max
	Protections	Polarity inversion Short circuit
	Connection	3-pin polarized removable connector Screw terminals, max cable section 2.5 mm <sup>2</sup>
<b>CONNECTIONS</b>	Ethernet port (ETH)	Number of channels: 2 Connector: RJ45 Speed: 10 / 100 / 1000 Mbit/s Signals: green connection LED, yellow data LED
	USB port	Number of ports: 2 max Connector: type A Standard: USB 2.0 Protection: overload
<b>COMMUNICATION PROTOCOLS</b>	Ethernet	Modbus TCP/IP Master/Slave
<b>VIEWING ELEMENTS</b>	Diagnostics	PW LED (yellow): power supply on RN LED (green): SW program state LED E1 (red): HW Watchdog state LED E2 (red): SW program error
<b>MICROPROCESSOR</b>	Type and frequency	ATOM E640 1 GHz ATOM E660, 1.3 GHz
<b>MEMORY</b>	System	512 MB, DRAM type DDR II
	Mass	2 GB Flash memory
<b>AMBIENT CONDITIONS</b>	Operating temperature	0 ... +55 °C (as per IEC 68-2-14)
	Storage temperature	-20 ... +70 °C (as per IEC 68-2-14)
	Relative humidity	max 95% RH non condensing (as per IEC 68-2-3)
	Vibrations	5 to 9 Hz: sine constant 3.5 mm 10 to 150 Hz: sine acceleration 1G
<b>ASSEMBLY</b>		Mounting inside the control panel, horizontally with the DIN bar or vertically with fixing screws.
<b>PROTECTION LEVEL</b>		IP 20 (as per IEC 68-2-3)
<b>WEIGHT</b>		1,250 kg
<b>CE STANDARDS</b>	EMC (electromagnetic compatibility)	Conforms to Directive 2014/30/EU EN61131-2: Programmable controllers Part 2: Equipment requirements and tests.
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## ASSEMBLY AND INSTALLATION

Hole dimensions. For correct installation, observe the dimensions of the templates shown in the illustration

Attention: the panel on which the internal cabinet control panel is mounted has to have the following characteristics:

- Be sufficiently stiff and strong so that it does not bend during use;
- Be between 1 and 6 mm thick, to allow the fastening of the device with the terminals supplied.



### Protection against infiltrations of water

The internal cabinet control panel offers an IP20 protection level. If the product has to be used in an environment in which a protection level higher than IP20 is required, this must be guaranteed by the cabinet that hosts the product itself.

### Vibration

The internal cabinet control panel can support vibrations:

- From 5 to 9 Hz: sinusoidal 3.5 mm constant;
- From 9 to 150 Hz: sinusoidal with acceleration equal to 1 G

Should the device be mounted on a support that exceeds these limits it is necessary to envisage a system for the suspension and mitigation of the vibrations.

### Minimum spaces for ventilation

The temperature of the compartment that houses the internal cabinet control panel must not exceed 55°C.

The free spaces for ventilation show the minimum free distances recommended in the installation of the device in a closed compartment

### Positioning

The internal cabinet control panel has to be positioned in order to guarantee the following conditions:

- If necessary, screen direct rays, using an antiglare shutter for example;
- There must be no sudden temperature changes;
- There must be a low explosion risk: it can be connected to elements that operate in environments with a hazardous atmosphere (flammable or explosive) only through appropriate and suitable types of interface, compliant to the safety standards in force;
- Low presence of magnetic fields.

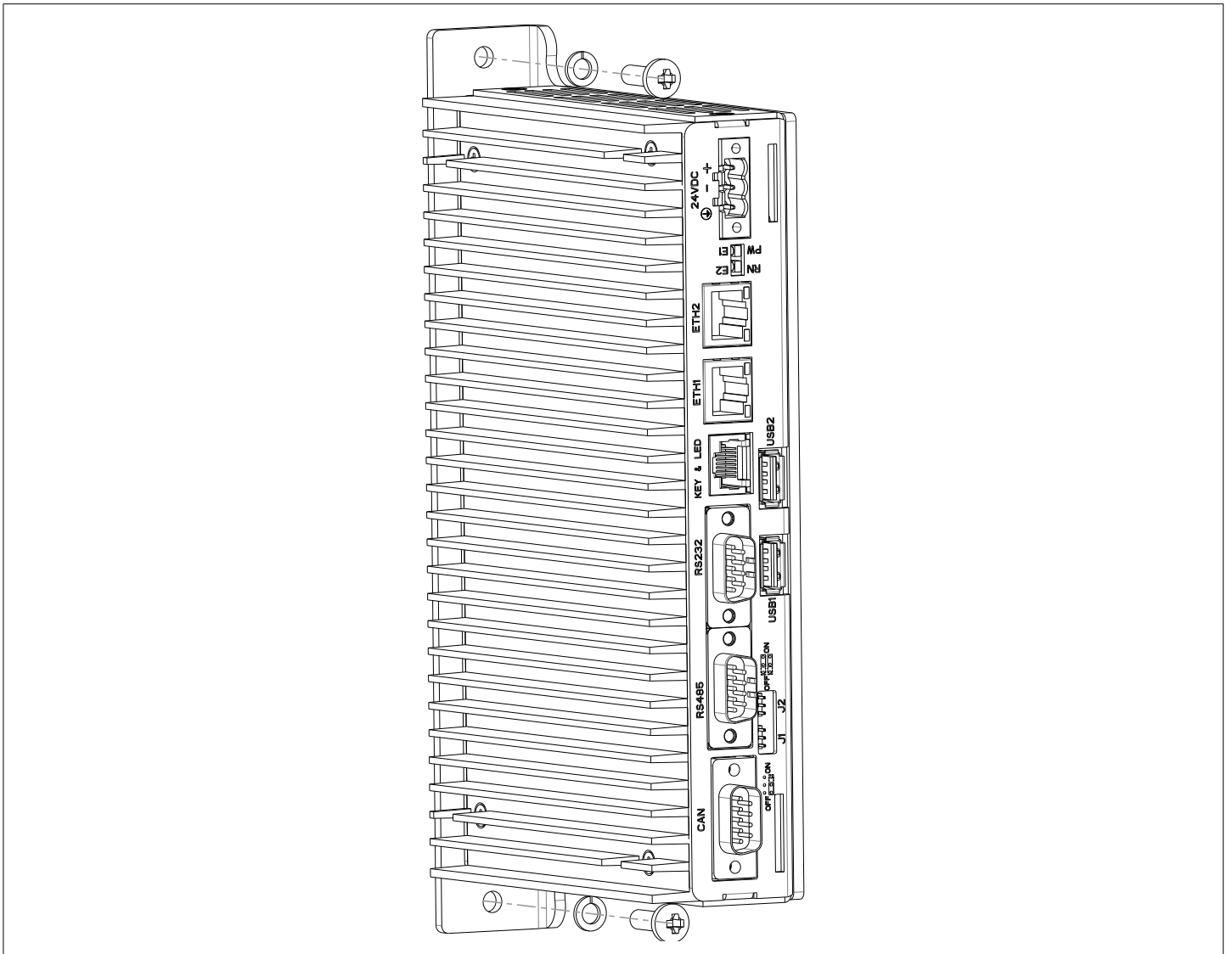
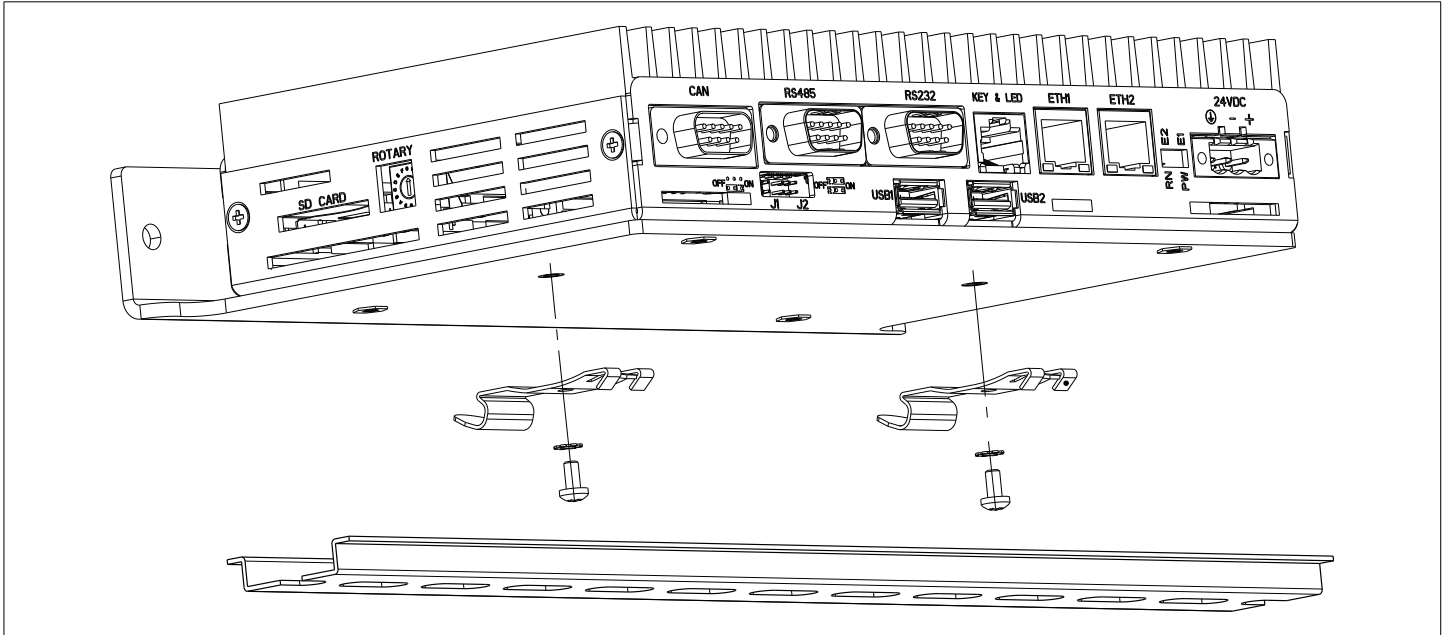
## Fastening

The internal cabinet control panel can be installed in two ways:

- Horizontal on DIN 35 mm track:
  - Install the 2 brackets for the DIN 35 track. Fasten the product and press hard to complete the operation, rotating downwards.
- Vertical mounting:

Prepare the M5 threaded holes, done with the template, position the product and screw in place.

**Warning:** install locking washers to prevent the screws from loosening!



## ORDER CODE

Code	Model	Description
F081440	GSLM-16	Load control module up to 16 Power Controllers series GFW/GPC
F081441	GSLM-32	Load control module up to 32 Power Controllers series GFW/GPC
F081442	GSLM-64	Load control module up to 64 Power Controllers series GFW/GPC



**NOTES ON ELECTROMAGNETIC COMPATIBILITY:**

**CE: Conformity EMC (electromagnetic compatibility)** in compliance with Directive 2014/30/EU.LV EN61131-2: Programmable controllers  
Part 2: Equipment requirements and test.