

## INSTALLATION AND CONNECTION

This section contains the instructions needed for correct installation of GPC modular power controller on the machine/host system control panel and for correct connection of the power supply, inputs, outputs and interfaces.

Carefully read the following warnings before installing the instrument!  
Disregard of such warnings could create electrical safety and electromagnetic compatibility problems, as well as void the warranty.

### ELECTRICAL POWER SUPPLY

the controller DOES NOT have an On/Off switch: the user must install switch/isolator conforming to safety requisites (CE mark) to cut off the power supply up-line of the controller.

The switch must be installed in the immediate vicinity of the controller in easy reach of the operator. A single switch can be used for multiple devices.

the earth connection must be made with a specific lead  
if the product is used in applications with risk of harm to persons or damage to machines or materials, it MUST be equipped with auxiliary alarm devices.

It is advisable to provide the ability to check for tripped alarms during regular operation.

### NOTES ON ELECTRICAL SAFETY AND ELECTROMAGNETIC COMPATIBILITY:

**CE: Conformity EMC (electromagnetic compatibility) conformity** in compliance with Directive 2014/30/EU and following modifications. Series GPC are mainly intended for industrial use, installed on panels or control panels of production process machines or systems. For purposes of electromagnetic compatibility, the most restrictive generic standards have been adopted, as shown on the table.

**LV (low voltage) conformity** in compliance with Directive 2014/35/EU.

EMC conformity has been verified with the connections indicated on table 1 (see user's manual).

### RECOMMENDATIONS FOR CORRECT INSTALLATION FOR PURPOSES OF EMC Instrument power supply

The power supply for the electronic instrumentation on the panels must always come directly from a cut-off device with fuse for the instrument part.  
Electronic instrumentation and electromechanical power devices such as relays, contactors, solenoids, etc., MUST ALWAYS be powered by separate lines.

When the power supply line of electronic instruments is heavily disturbed by switching of thyristor power groups or by motors, you should use an isolation transformer only for the controllers, grounding its sheathing.

It is important for the system to be well-grounded:  
- voltage between neutral and ground must not be > 1V

- Ohmic resistance must be < 6Ω;

If the grid voltage is highly unstable, use a voltage stabilizer.

In proximity of high-frequency generators or arc welders, use adequate grid filters.

The power supply lines must be separate from instrument input and output lines.

Supply from Class II or from limited energy source.

**GEFRAN S.p.A. assumes no liability for any damage to persons or property deriving from tampering, from incorrect or improper use, or from any use not conforming to the characteristics of the controller and to the instructions in this User Manual.**

<b>ERC</b>	Conformity TC RU-C-ITA/132.B.00422
<b>CE</b>	The device conforms to European Union Directive 2014/30/EU and 2014/35/EU with reference to standards: EN 60947-4-3:2014.
<b>UL</b>	Conformity C/UL/US file no. <b>E243386 vol. 1 sez. 5</b>
<b>SCCR RMS SYM 100KA / 600V</b>	Short Circuit Current Rating 100KA / 600V according to UL 508

### Input and output connections

Before connecting or disconnecting any connection, always check that the power and control cables are isolated from voltage. Appropriate devices must be provided: fuses or automatic switches to protect power lines.

The fuses present in the module function solely as a protection for the GPC semiconductor.

Connected outside circuits must be doubly isolated.  
To connect analog inputs, strain gauges, linears, (TC, RTD), you have to:  
- physically separate the input cables from those of the power supply, outputs, and power connections.  
- use braided and shielded cables, with sheathing grounded at a single point.

### Installation notes

Use the extra-rapid fuse indicated in the catalogue according to the connection example equipped.

Moreover, the applications with solid-state units require a safety automatic switch to section the load power line. To ensure the high reliability of the device, it is necessary to install it properly inside the panel so to obtain an adequate thermal exchange.

Fit the device vertically (maximum angle 10° to the vertical axis)

Vertical distance between a device and the panel wall >100mm

Horizontal distance between a device and the panel wall at last 10mm

Vertical distance between a device and the next one at last 300mm.

Horizontal distance between a device and the next one at last 10mm.

Check that the cable holder runners do not reduce these distances, in this case fit the cantilever units opposite the panel so that the air can flow vertically without any obstacles.

Dissipation of device thermal power with effects on installation room temperature.

Thermal power dissipation with limits on installation room temperature.

Requires exchange with external air or an air conditioner to transfer dissipated power outside the panel.

Maximum limits of voltage and derived power of transients on the line, for which the solid state power unit contains protective devices (based on the model).

Presence of dispersion current in GPC in non-conducting state (current of a few mA due to RC Snubber circuit to protect the thyristor).

Suitable for use on a circuit capable of delivering not more than 100,000A RMS Symmetrical Amperes, 600 Volts maximum when protected by class J fuses rated xxxA. (Refer to the "SCCR fuse protection table this report for the details of the current size fuses for each model)

Use fuses only.

**WARNING: The opening of the branch-circuit protective device may be an indication that a fault has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the device should be examined and replaced if damaged. If burnout of the device occurs, the complete device must be replaced or equivalent.**

**ATTENTION: l'ouverture du dispositif de protection du circuit peut indiquer l'événement d'un défaut. Pour réduire le Risque d'incendie ou d'électrocution, les pièces conduisant le courant et les autres composants de l'appareil doivent être examinées et remplacées si sont endommagées. Si le produit est complètement**

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## ELECTRICAL CONNECTIONS

### REPLACING THE INTERNAL FUSE (OPTIONAL)

#### CUT OFF POWER BEFORE AND DURING FUSE SUBSTITUTION PROCEDURE

- Undo the cover fastening screw (1)

- Remove the cover following the movement indicated by the arrow (2)

- In this way the fuse is discovered (3)

- Slacken the two bolts fixing the fuse in place with a No.19 spanner (GPC 500/600A) or a No.17 spanner (GPC 400A). There is no need to remove the bolts, as the fuse is pulled out of its housing as shown by the arrows (5).

- Insert the new fuse as indicated by the arrows (6)

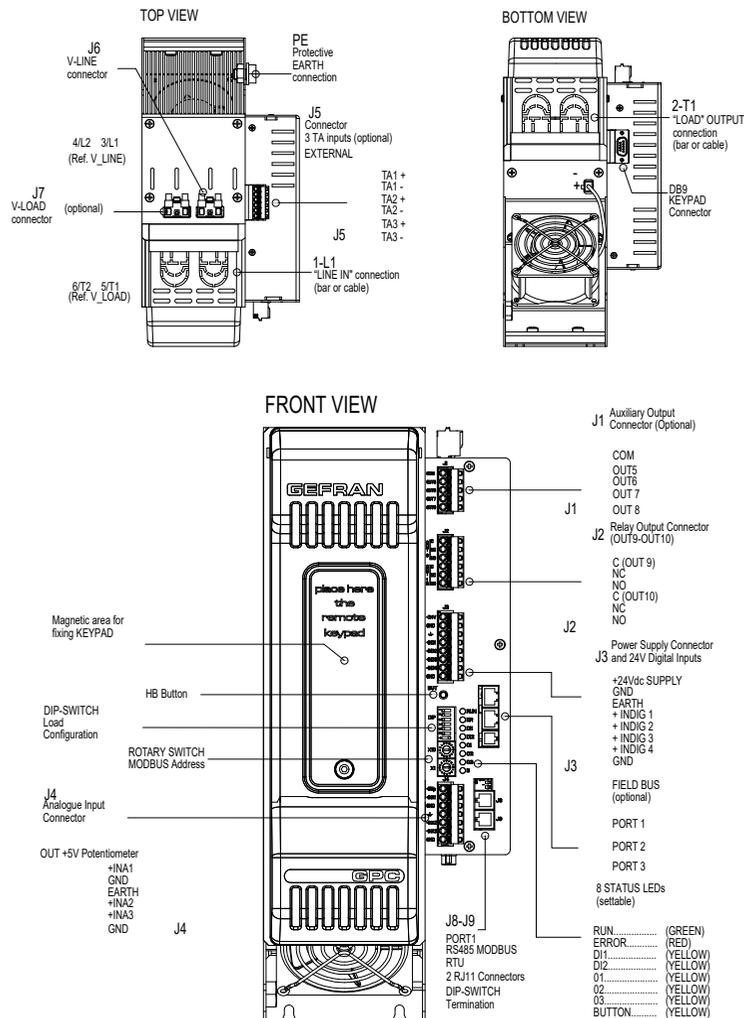
**WARNING:** the washer must be between the bolt and the copper strap (NOT under the fuse).

- Tighten the two nuts with a No. 19 spanner (GPC 500/600A) or a No. 17 spanner (GPC 400A), to a torque of 12 N m.

- Put the cover back in place, pinning down the top part first (be careful to hook it on the tooth as shown in the figure).

- Fasten the cover by the specific screw in side (1)

### CONNECTIONS



# GEFRAN

## GPC400...600A

MODULAR POWER CONTROLLER



code 81081 - 01-2021 - ENG

### INSTALLATION AND OPERATION MANUAL

Side 1 Installation and Connection  
Electrical connections

Side 2 Technical-Commercial information  
General Information  
Dimensions  
Fixing/Installation  
Derating curves

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### RECOMMENDED WIRE GAUGES

GPC CURRENT LEVEL	TERMINAL	TYPE CABLE / SECTION TYPE RAIL / SECTION	TERMINAL TYPE CABLE / RAIL	TIGHTENING / TOOL TORQUE
400 A	1/L1, 2/T1	Single cable 300 mm <sup>2</sup> (600kcmil)	Wire crimped at terminal tube Cembre A60-M12	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m) (**) (***)
400 A	1/L1, 2/T1	Double cable 2 x 95 mm <sup>2</sup> (3/0 AWG)	Wire crimped at terminal tube Cembre A19-M10	N. 2 Bolts M10x25mm UNI 5739 hex head wrench n. 17 Pair: 354.0 lb.in. (40 N m) (***)
400 A	1/L1, 2/T1	Double cable 2 x 95 mm <sup>2</sup> (3/0 AWG)	Wire stripped for 30mm inserted in ILSCO AU-350 lug (Accessory)	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m) (*) see note
400 A	1/L1, 2/T1	Copper rail (W= width H = height) W = 40 32 24 mm H = 2 2 3 mm	Insulated copper rail with terminal non-insulated for L= 60-65mm max	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m)
400 A	PE	Cable 95 mm <sup>2</sup> (3/0 AWG)	Wire crimped at terminal tube Cembre A19-M10	N. 1 Bolt M10x20mm UNI 5739 hex head wrench n. 17 Pair: 354.0 lb.in. (40 N m) (***)
500 A	1/L1, 2/T1	Double cable 2 x 120 mm <sup>2</sup> (350 kcmil)	Wire crimped at terminal tube Cembre A24-M10	N. 2 Bolts M10x25mm UNI 5739 hex head wrench n. 17 Pair: 442.5 lb.in. (50 N m) (***)
500 A	1/L1, 2/T1	Double cable 2 x 120 mm <sup>2</sup> (350 kcmil)	Wire stripped for 30mm inserted in ILSCO AU-350 lug (Accessory)	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m) (*) see note
500 A	1/L1, 2/T1	Copper rail (W= width H = height) W = 50 40 32 mm H = 4 4 5 mm	Insulated copper rail with terminal non-insulated for L= 60-65mm max	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m)
500 A	PE	Cable 185 mm <sup>2</sup> (350 kcmil)	Wire crimped at terminal tube Cembre A24-M10	N. 1 Bolt M10x20mm UNI 5739 hex head wrench n. 17 Pair: 354.0 lb.in. (40 N m) (***)
600 A	1/L1, 2/T1	Double cable 2 x 185 mm <sup>2</sup> (350 kcmil)	Wire crimped at terminal tube Cembre A37-M10	N. 2 Bolts M10x25mm UNI 5739 hex head wrench n. 17 Pair: 354.0 lb.in. (40 N m) (***)
600 A	1/L1, 2/T1	Double cable 2 x 185 mm <sup>2</sup> (350 kcmil)	Wire stripped for 30mm inserted in ILSCO AU-350 lug (Accessory)	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m) (*) see note
600 A	1/L1, 2/T1	Copper rail (W= width H = height) W = 50 40 32 mm H = 4 4 5 mm	Insulated copper rail with terminal non-insulated for L= 60-65mm max	N. 1 Bolt M12x25mm UNI 5739 hex head wrench n. 18 Pair: 442.5 lb.in. (50 N m)
600 A	PE	Cable 185 mm <sup>2</sup> (350 kcmil)	Wire crimped at terminal tube Cembre A37-M10	N. 1 Bolt M10x20mm UNI 5739 hex head wrench n. 17 Pair: 354.0 lb.in. (40 N m) (***)
400 / 500 / 600 A	J6, J7	Cable 0.25 ... 2.5 mm <sup>2</sup> (23 ...14 AWG)	Cable peeled for 8mm or with a tag terminal	4.425 ... 5.310 lb.in. (0.5 ... 0.6 N m) / 0.6 x 3.5mm slotted screwdriver

(\*) NOTE: Wires on the ILSCO accessory must be tightened with a hex head wrench n. 8. Torque: 275 lb.in. (31 N m).

(\*\*) NOTE: Use the IP20 grid of ILSCO accessory code F067432.

(\*\*\*) NOTE: Use only UL cable terminals with their stapler

# TECHNICAL CHARACTERISTICS / GENERAL DATA

POWER (SOLID-STATE RELAY)			
CATEGORY OF USE (Tab. 2 EN60947-4-3)	AC 51 resistive or low inductance loads AC 55b short wave infrared lamps (SWIR) AC 56a transformers, resistive loads with high temperature coefficient		
Trigger mode	<b>PA</b> - load control via adjustment of firing phase angle <b>ZC</b> - Zero Crossing with constant cycle time (settable in range 1-200s) <b>BF</b> - Burst Firing with variable cycle time (GTT) optimized minimum. <b>HSC</b> - Half Single Cycle corresponds to Burst Firing that includes ON and OFF half-cycles. Useful for reducing flicker with short-wave IR loads (applied only to calibrate each time you change feedback mode)		
Feedback mode	<b>V, V2</b> : Voltage feedback: proportional to RMS voltage value on load to compensate possible variations in line voltage. <b>I, I2</b> : Current feedback: proportional to RMS current value on load to compensate variations in line voltage and/or variations in load impedance. <b>W</b> : Power feedback: proportional to real power value on load to compensate variations in line voltage and/or variations in load impedance. You have to calibrate each time you change feedback mode.		
Max rated voltage	480Vac	600Vac	690Vac
Work voltage range	90...530Vac	90...660Vac	90...760Vac
Non-repetitive voltage	1200Vp	1600Vp	1600Vp
Rated frequency	50/60Hz auto-determination		
Critical Dv/dt with output deactivated	1000V/μsec		
Held nominal voltage of on the impulse	4KV		
Nominal current for short circuit condition	5KA		
Protection	RC, extrarapid fuses		
Rated current AC51 non-inductive or slightly inductive loads, resistance furnaces	<b>GPC 400</b> Nominal current 400 Arms @50°C in continuous service Non-repetitive overcurrent t=10ms: 8,000 A Melting fuse I <sup>2</sup> t: 320,000 A <sup>2</sup> s  <b>GPC 500</b> Nominal current 500 Arms @50°C in continuous service Non-repetitive overcurrent t=10ms: 15,000 A Melting fuse I <sup>2</sup> t: 1,125,000 A <sup>2</sup> s  <b>GPC 600</b> Nominal current 600 Arms @50°C in continuous service Non-repetitive overcurrent t=10ms: 15,000 A Melting fuse I <sup>2</sup> t: 1,125,000 A <sup>2</sup> s  <b>NOTE (for all models)</b> Minimum load controllable: 5 % of product current rated level.		
Thermic Dissipation	GPC models dissipate thermic power based on load current: $P_{dissipation} = I_{load\_Arms} * 1.3V (W)$ For models with integrated fuse, also consider dissipated power at rated current shown on the fuse table		
Rated current AC56A permitted trigger modes: ZC, BF with DT (Delay Triggering), PA with softstart	Derating: 20% of rated current value.		

Graphic simbol	
	Indicates contents of sections, general instructions, notes, and other points to which the reader's attention needs to be called.
	Indicates a particularly delicate situation that could affect the safety or correct operation of the controller, or an instruction that MUST be followed to prevent hazards.
	Indicates a risk to the user's safety due to high voltage at the points indicated.

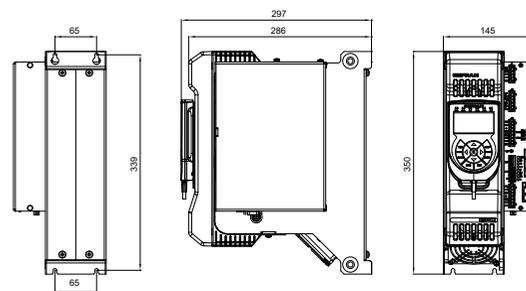
GENERAL DATA				
Power supply	GPC 1PH-400/500/600A: 24 Vdc ± 10% max 38W GPC 2PH-400/500/600A: 24 Vdc ± 10% max 66W GPC 3PH-400/500/600A: 24 Vdc ± 10% max 94W			
Signals	Eight led: <b>RN</b> (Green) run state of CPU <b>ER</b> (Red) error signal <b>DI1, DI2</b> (Yellow) state of digital inputs INDIG1, INDIG2 <b>O1, O2, O3</b> (Yellow) state of power control <b>BT</b> (Yellow) state key HB			
Protection	IP20			
Work/storage temperature	0...50°C (refer to dissipation curves) / -20 °C - +85 °C			
Relative humidity	20...85% Ur non-condensing			
Ambient conditions for use	indoor use, altitude up to 2000m			
Installation	panel with screws			
Installation requirements	Installation category II, Pollution degree 2 enviroN ment, double isolation. Max. temperature of air surrounding device 50°C for temperature >50°C refer at derating curves UL enviroN mental designation "open type Equipment"			
Weight	Model with internal fuse	GPC-1PH	GPC-2PH	GPC-3PH
	GPC 400	8 kg	15.5 kg	22.5 kg
	GPC 500/600	11 kg	21 kg	31 kg

Overvoltage protection: only for installation in Canada, the device must be protected by a protective device from external overvoltage, R/C (VZCA2/8) or CSA Certified.

**ATTENTION** This product has been designed for class A equipment. Use of the product in domestic enviroN ments may cause radio interference, in which case the user may be required to employ additional mitigation methods.  
**EMC filters** are required in PA mode (Phase Angle, i.e., SCR trigger with phase angle modulation). The filter model and current level depend on the configuration and load used. The power filter **MUST** be connected as close as possible to the GPC. You can use a filter connected between the power line and GPC or an LC group connected between the GPC output and the load.

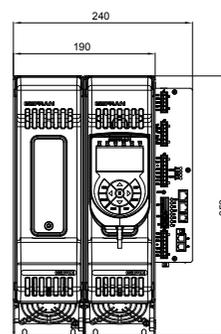
## DIMENSIONS

### GPC SINGLE-PHASE

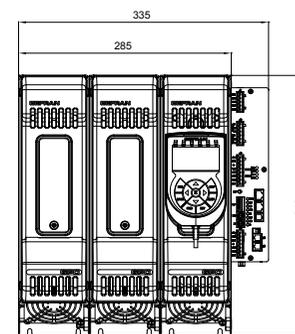


Lateral view with keypad

### GPC DUAL-PHASE (Master + 1 Expansion)



### GPC THREE-PHASE (Master + 2 Expansions)



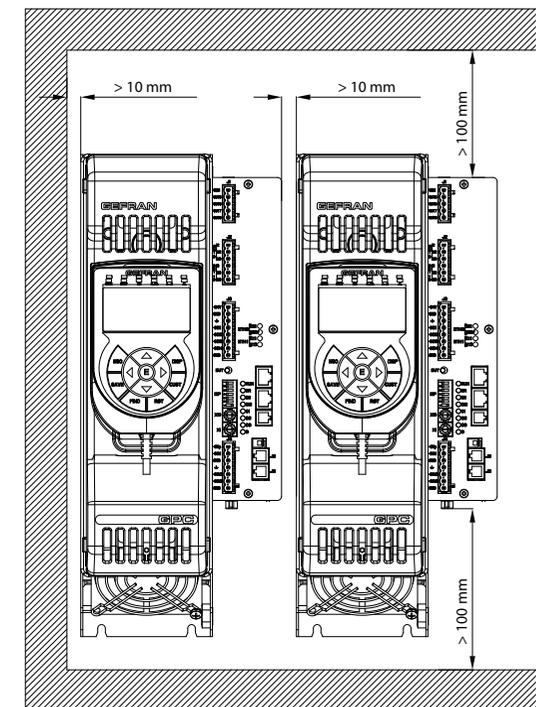
Model	EXTRARAPID FUSES			
	Size I <sup>2</sup> t	Code Format	Model Code	Power Dissipated @ In
GPC 400	630 A 310000 A <sup>2</sup> s	FUS-630S	PC32UD69V630TF 338213	60 W
GPC 500	1000 A 970000 A <sup>2</sup> s	FUS-1000	PC33UD69V1000TF 338160	50 W
GPC 600	1000 A 970000 A <sup>2</sup> s	FUS-1000	PC33UD69V1000TF 338160	60 W

SCCR RMS SYM 100KA / 600V		UL508 SCCR FUSES TABLE			
Model	Configuration	"Short circuit current [Arms]"	"Max fuse size [A]"	Fuse Class	"Max Voltage [VAC]"
GPC 400	1PH or 2PH or 3PH	100.000	400	J	600
GPC 500	1PH or 2PH or 3PH	100.000	600	J	600
GPC 600	1PH or 2PH or 3PH	100.000	600	J	600

The fuses on the above table are representative of all the fuses of the same class with lower current ratings

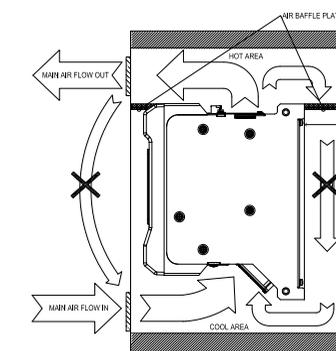
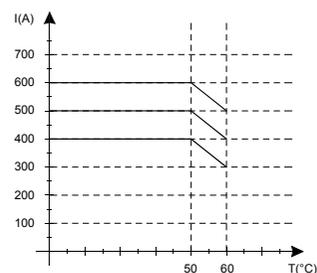
## FIXING / INSTALLATION

- Panel mounting and cut-out dimensions
- Installation



## DERATING CURVES

GPC 400 / 500 / 600A



**Attention:** respect the minimum distances shown in figure to provide adequate air circulation.