GEFRAN

# GRZ 40... / GRZ 48...

*3-PHASE SOLID STATE RELAYS WITH HEATSINK*

***Main applications***

- *Plastics extrusion lines and injection moulding machines*
- *Polymerization plant for synthetic fibre production*
- *Rubber moulding machinery*
- *Climatic chambers and test benches*
- *Driers for ceramics and components for the building industries*
- *Chemical and pharmaceutical industries*
- *Food processing plants Packaging machinery*
- *Goldsmiths' ovens and machinery*
- *Industrial ovens and furnaces*

***Main features***

- *Alternating current solid state relay*
- *Zero crossing switching*
- *Copper/semiconductor coupling technology*
- *25, 40, 55A nominal 3-phase current*
- *Integrated overvoltage suppressor*
- *Non-repetitive voltage: up to 1200 Vp*
- *Nominal Voltage: up to 480VCAms*
- *Input control range 10...40VCC*
- *4000 Vrms optoinsulation (input-output)*
- *Component selection to operate at max. declared current with ≤ 40°C temperature*
- *35 mm Omega rail mounting (DIN 46277/3 - CENELEC EN 50022) with fast clip-on.*
- *Possibility to choose among different sizes with 100 mm max. height heatsinks (excluding fan)*
- *CE Marking*

***PROFILE***

*Zero crossing relay with antiparallel thyristor output is the most used solid state relay in industrial applications. In fact, it can be used for resistive, inductive and capacity loads.*
*"Zero crossing" relay is energised when voltage meets the zero point and disenergised when current meets the zero point, depending on the signal control on the input circuit.*
*GRZ solid state relays are available in different voltage and current versions and equipped with suitable heatsinks and DIN rail clip-on.*
*An eventual replacement of the solid state relay is possible directly from the front , without removing the whole group.*
*Fuses, thermostats and fans are available as fittings.*

***TECHNICAL DATA***

***General features***

**GRZ 40...**
Nominal voltage: 24...400 VCArms
Max. operating voltage: 440VCArms
Non-repetitive voltage: ≥ 1000 V
Nominal frequency: 45...65 Hz

**GRZ 48...**
Nominal voltage: 24...480 VCArms
Max. operating voltage: 550VCArms
Non-repetitive voltage: ≥ 1200 Vp
Nominal frequency: 45...65 Hz

***Inputs***

Control voltage range: 10...40Vcc
Turn ON voltage: ≥ 10 Vcc
Turn OFF voltage: ≤ 3 Vcc
Input current: 18mAcc @ 10Vcc
22mAcc @ 24Vcc
28mAcc @ 40Vcc
Energising response time: ≤ 1/ 2 cycle
Disenergising response time: ≤1/2 cycle

***Outputs***

**GRZ 25**
Nominal current: AC1: 25Arms;
AC3: 5Arms
Min operating current: 100mArms
Repetitive overcurrent t=1 s: ≤ 37 Arms
Non-repetitive overcurrent t=20ms: 230Ap
Current drop at nominal voltage and frequencies: ≤ 10 mArms
$I^2t$ for fusing t=1-10 ms: ≤ 265 $A^2s$
Critical dI/dt: ≥ 50 A/µs
Voltage drop at nominal current: ≤ 1,6Vrms
Critical dV/dt OFF-state: ≥ 500V/µs

**GRZ 40**
Nominal current: AC1: 40Arms;
AC3: 8Arms
Min operating current: 200mArms
Repetitive overcurrent t=1 s: ≤ 60Arms
Non-repetitive overcurrent t=20 ms:300Ap
Current drop at nominal voltage and frequencies: ≤ 10mArms
$I^2t$ for fusing t=1-10 ms:≤ 450 $A^2s$
Critical dI/dt: ≥ 100 A/µs
Voltage drop at nominal current: ≤ 1,6 Vrms
Critical dV/dt OFF-state: ≥500V/µs

**GRZ 55**
Nominal current: AC1: 55Arms;
AC3: 15Arms
Min operating current: 200mArms
Repetitive overcurrent t=1 s: ≤ 85 Arms
Non-repetitive overcurrent t=20 ms: 550Ap
Current drop at nominal voltage and frequencies: ≤ 10mArms
$I^2t$ for fusing t=1-10 ms: ≤ 1500$A^2s$
Critical dI/d: ≥ 100 A/µs
Voltage drop at nominal current: ≤1,6Vrms
Critical dV/dt OFF-state: ≥ 500V/µs

***Insulation***

**VCArms 3 cycles**

Nominal insulation voltage:
Input/Output: ≥ 5660V
Input/Auxiliary contact: ≥ 5660V
Input/Heatsink: ≥ 5660V
Nominal insulation voltage:
Output/Heatsink: ≥ 4240V
Output/Output: ≥ 4240V

**VCArms 1 min**

Nominal insulation voltage:
Input/Output: ≥ 4000V
Input/Auxiliary contact: ≥ 4000V
Input/Heatsink: ≥ 4000V
Nominal insulation voltage:
Output/Heatsink: ≥ 2500V
Output/Output: ≥ 2500V

***Operating Temperature:***

-20...40°C with derating for higher temperatures
(depending on dissipation diagrams)

**Mechanical Characteristics**
**Terminals:**

Control terminal
Mounting screws: M3 x 6
Mounting torque: ≤ 0,5 Nm

Power terminal
Mounting screws: M5 x 6
Mounting torque: ≤ 1,5 Nm

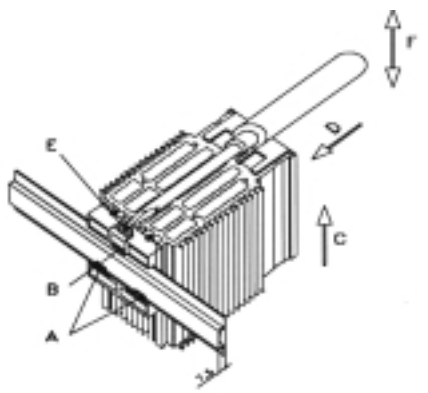
***Dimensions and weight:***

| Model | Dimensions (mm) | Weight (gr) |
|---|---|---|
| GRZ 25 | 127 x 80 x155 | 1150 |
| GRZ 40 | 127x150 x155 | 1750 |
| GRZ 55 | 127x150 x155 | 1750 |

***Note:***

40A/55A model are supplied by default with thermostat and fan.
Fan supply:
230Vac standard
115Vac optional

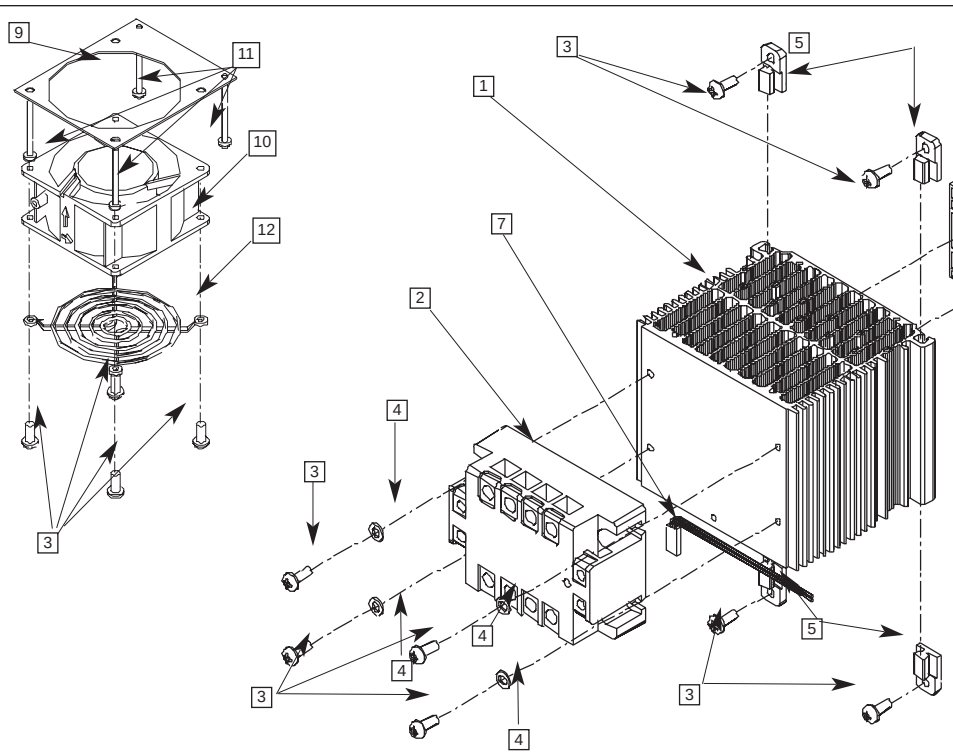
## *DIN RAIL MOUNTING*




**Mounting notes:**
- Press on **C** axis to fix **A**
- Press on **D** axis until **B** hooks on the DIN rail

**Dismounting Notes:**
- Put the screwdriver in **E** hole
- Press on **F** axis to obtain **B** release

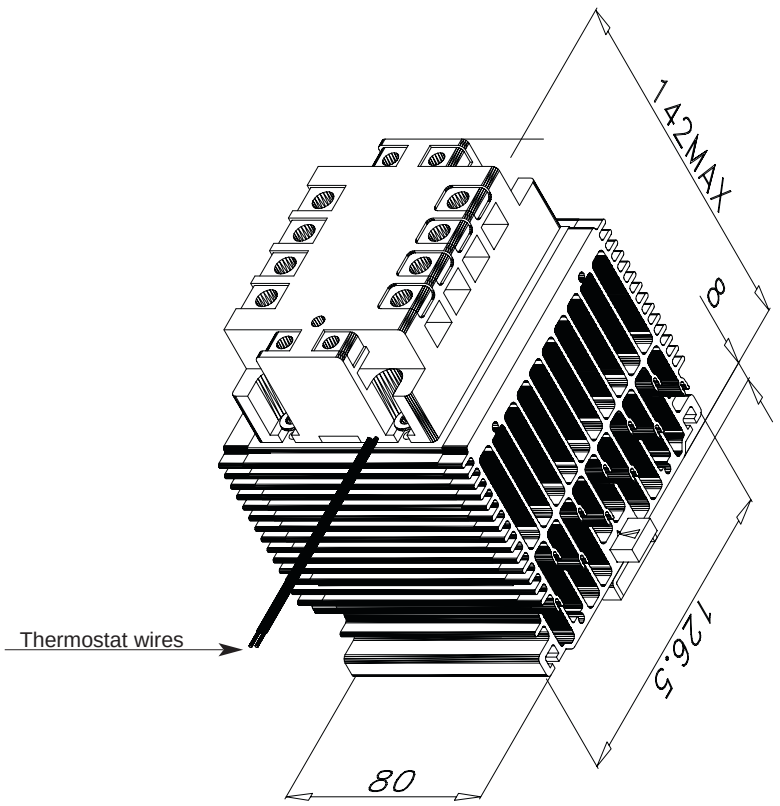
## *PART AND OPTION LIST*



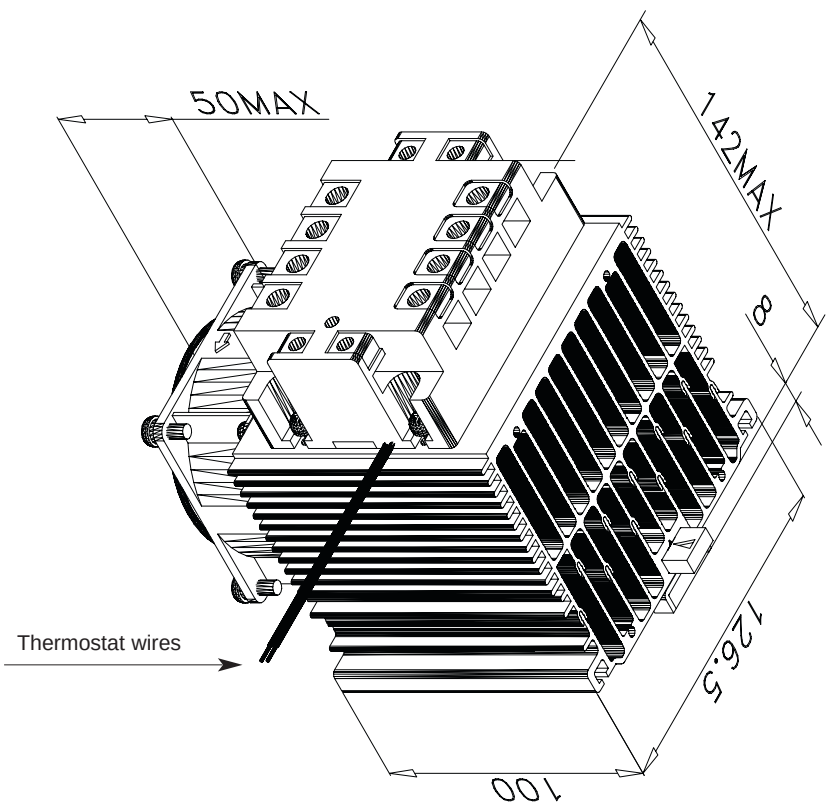

**1** Heat sink
**2** Solid state relay
**3** TCB CROSS M5x12 UNI 7687 screw
**4** Plain washer ø5,3xø1x1 UNI6592
**5** Panel mounting kit
**6** TCEI M3x10 UNI 5931 screw
**7** Thermostat
**8** DIN rail mounting clip
**9** Fan support
**10** Fan
**11** TCB CROSS M4x20 UNI 7687 screw
**12** Fan safety

## *CUT-OUT DIMENSIONS*

**Model GRZ 25A**




**Model GRZ 40A - GRZ 55A**

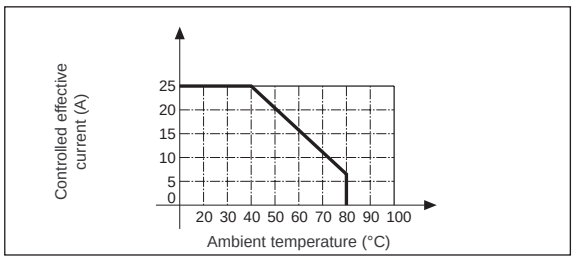


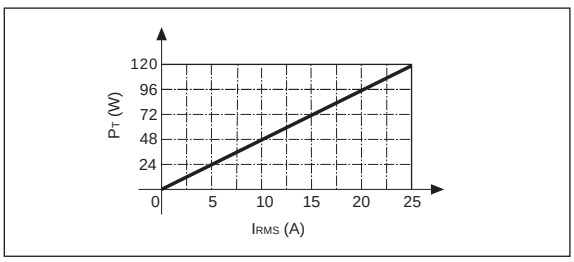
## *DISSIPATION DIAGRAMS*

Effective current derating vs. ambient temperature

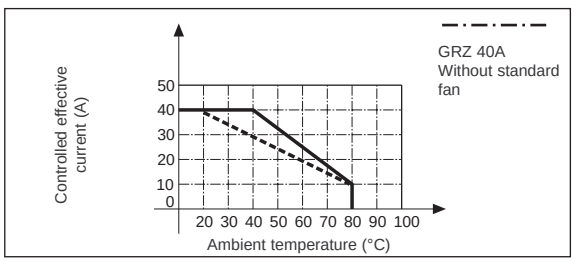
Dissipated thermal power vs. load current

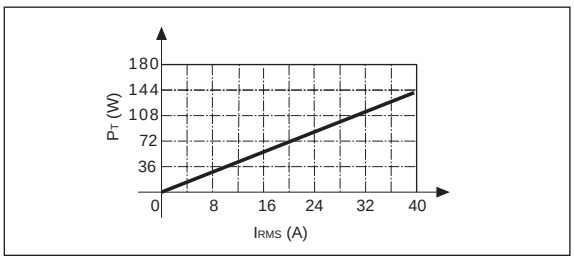
**GRZ (25A)**



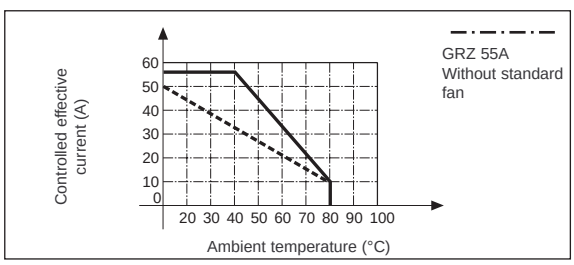



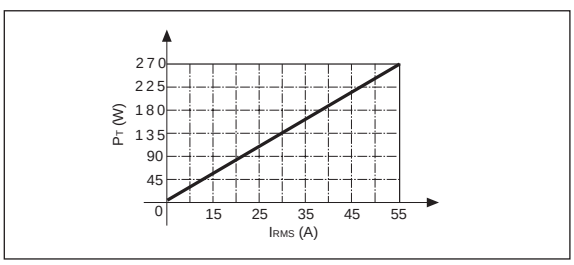

**GRZ (40A)**




**GRZ (55A)**



***APPLICATION NOTES***

## *Remarks and restraints for a correct installation*

A Solid State Relay has to be used when the application requires:
- A very high number of operations (millions)
- A high operation frequency
- Mechanical resistance
- Environmental pollution resistance (i.e.: humidity and dust)
- Silentness
- No maintenance
- Low control power
- Noise or overvoltage reduction due to arc lack when commutating

## *It might be useful to know that:*

- Incandescence lamps have a pickup current with cold filament which can reach 10 times the nominal one.
- Resistances of cold industrial furnaces have a starting transitory current equal even to 5 times the nominal one.
- Transformer power supply requires, when starting, a pickup current equal to 20-30 times the nominal one, because of initial magnetization.

## *Main use limits*

- Dissipation of thermic power on the relay with restraints on the ambient temperature of the installation
- Equip the cabinet with an external air change or air-condition it, to put out dissipated power.
- Line transistor max. voltage and derivative limits, for which the solid state relay is equipped with inside safety devices.
- Leakage current (about 2 mA) caused by thyristor, about 20 mA for RC filter .
- Bigger sizes if compared with the relative electromechanical counter.
- Installation restraints (distances to be respected to grant dissipation with natural convection)
- GRZ are designed with zero-crossing firing, that is with conduction of the first zero voltage crossing after turning on.

## *Forced ventilation*

Forced ventilation is necessary only if min. air distances near the relay itself are not respected, if max. temperature inside the cabinet exceeds 40°C and if stated current/temperature curves are not applied.

## *GRZ Power dissipation calculation*

When designing a control panel which includes many GRZs, it is important to calculate the max. dissipated thermal power to dimension properly the flow of air-change fans inside the cabinet itself. Such system has to grant **in any operative condition** a temperature of the inside air temperature **inferior to 40°C** in any plant (if derating curves are not applied).

$P_T$ dissipated thermal power is shown in the graphics depending on applied load current

## *Notes*

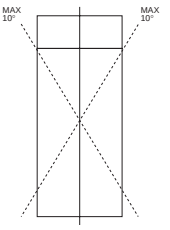
**Gefran spa** is ready to inform and suggest customers who have to mount several solid state relays in a single panel about ventilation and air-conditioning systems.

**WARNINGS**

- M5 screw of the heatsink has to be used to bond the device correctly.
- 100°C degrees can be reached by the heatsink when working continuously: contact with people or electrical cables are extremely dangerous!
- Respect installation instructions.
- Before working on power devices, disconnect cabinet supply voltage.
- The cover must be fitted with internal wings close to power terminals.

## *INSTALLATION*

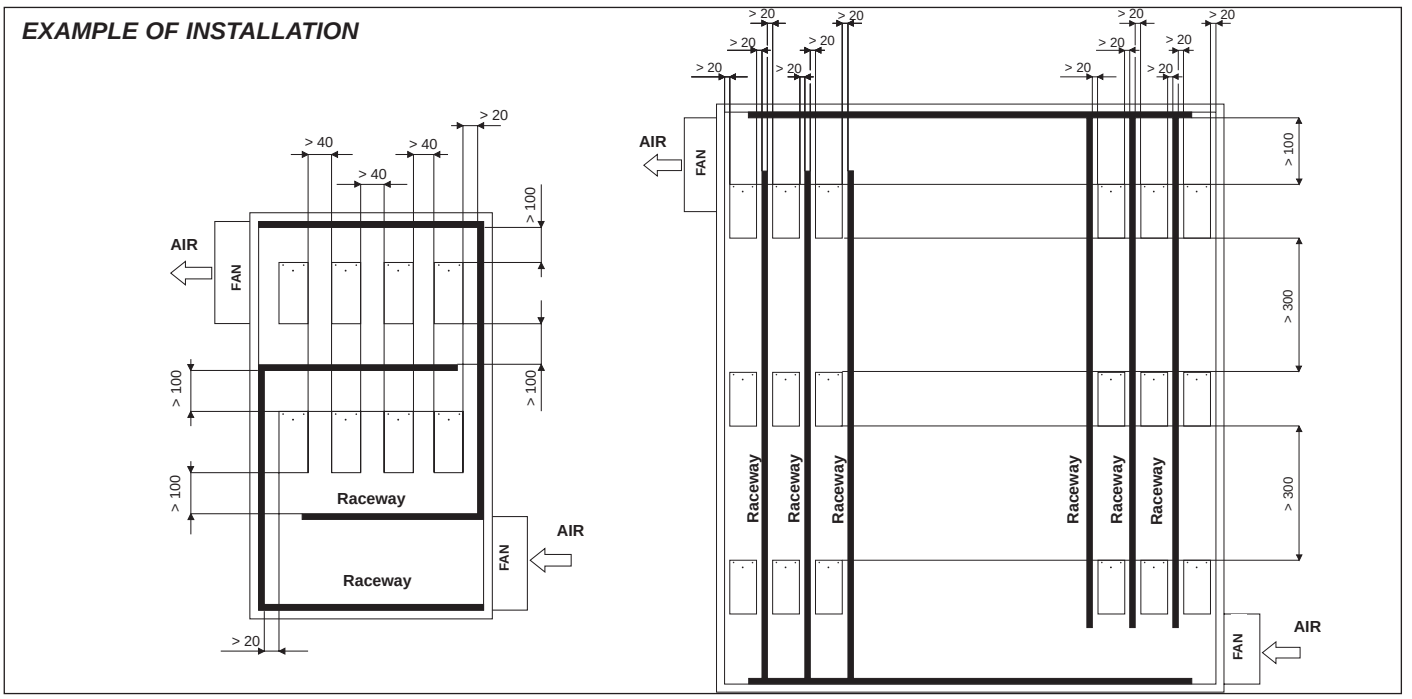
In order to obtain best reliability, it is important to install a heatsink correctly inside the panel, to reach an adequate thermal exchange between the device and the surrounding air in natural convection conditions.




***How to install it correctly:***
Mount it vertically ( max. 10  inclination from the vertical axis)
- Vertical distance between a heatsink and the panel wall: 100 mm at least.
- Horizontal distance between a heatsink and the panel wall: 20 mm at least.
- Vertical distance between two heatsinks: 300 mm at least.
- Horizontal distance between two heatsinks: 40 mm at least.

Check that cable raceways do not reduce these distances; should it happen, mount the relays overhanging from the panel, so that the air can flow vertically on the heatsink without obstables (see Fig.1)

***EXAMPLE OF INSTALLATION***




Mount min. two fans in the cabinet, disposed as shown in the drawing, with enough air flow to keep internal air temperature under 40°C. Necessary air flow depends on max. dissipated power inside the panel and on max. air temperature outside the panel.
It is suggested to use an exhaust fan in the low part of the cabinet and a blower one in the upper part to limit the load/pressure loss of fans and grant a good air recycling.
Fan air filters have to be periodically cleaned .
Example: how to calculate fan dimensioning

Cabinet dimensions: 0,8x0,8x1,8m = 1,15m³ cubic volume , fan flow 450 m³/h = 0,125 m³/sec = a complete air changement each 10 seconds. Such air changement  is sufficient if cabinet dissipated power is inferior to 500W and outside air temperature is inferior to 35°C. When installations in particularly hot ambients are required, mount an air conditioner on the plants itself.
Connect the control cables separatly the from power ones.
In order to reduce the vertical distance among the devices, mounting on DIN rail and fan installation have to follow the drawing below (fig. 2 and 3: pay attention to GRA and fan position with respect to both inferior and superior raceways). In any case, it is important to remind that, should the fan near the device fail, its reliability is no more granted.

**Fig. 1**

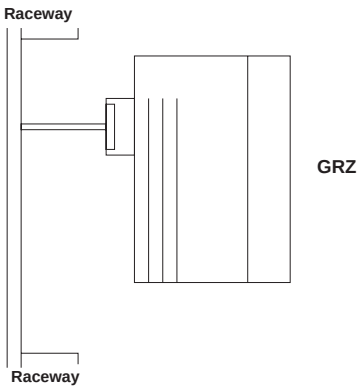



**Fig. 2**

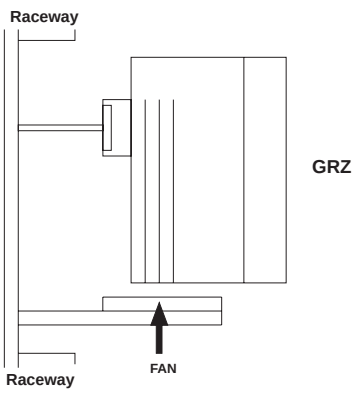
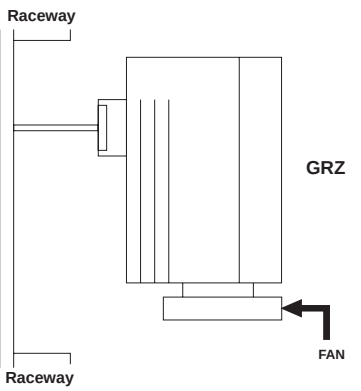
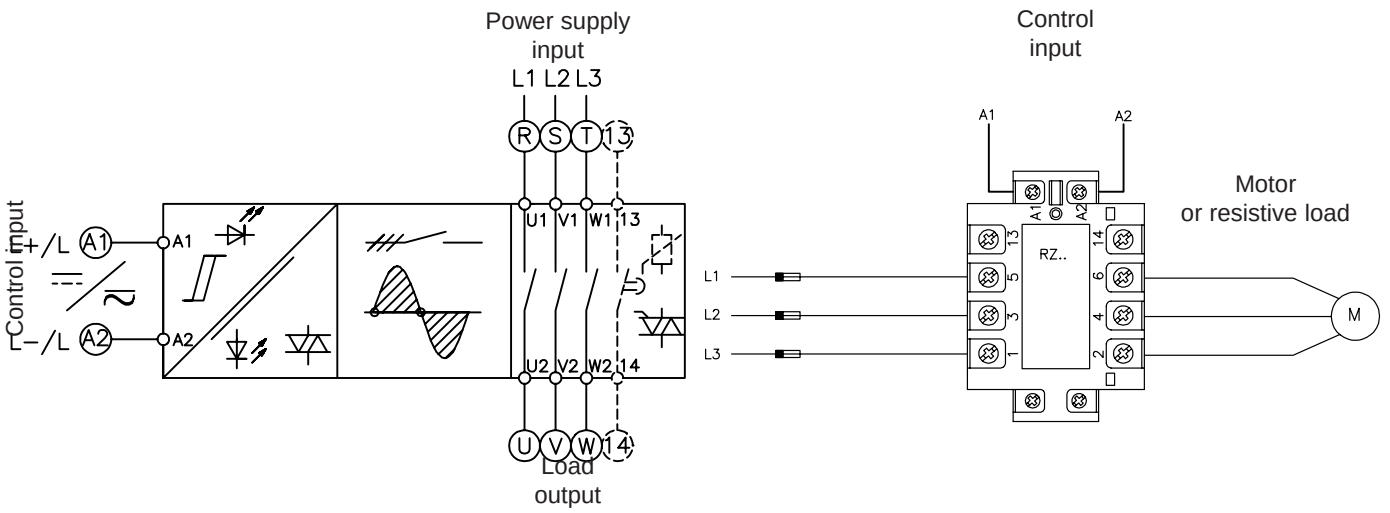



**Fig. 3**

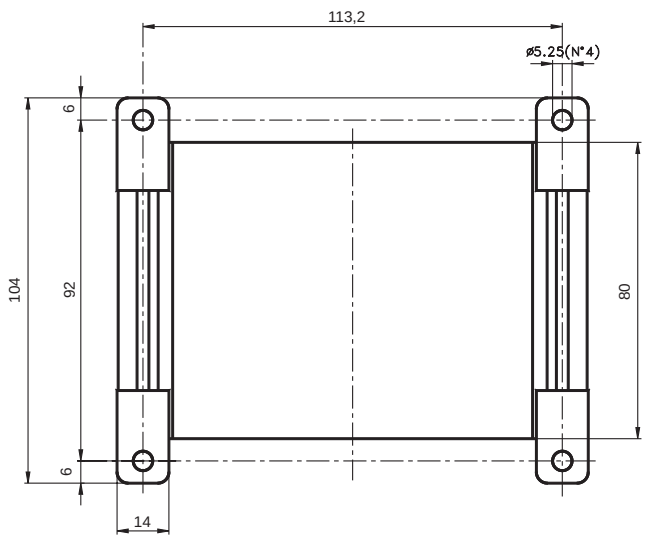


## *CONNECTION DIAGRAM*

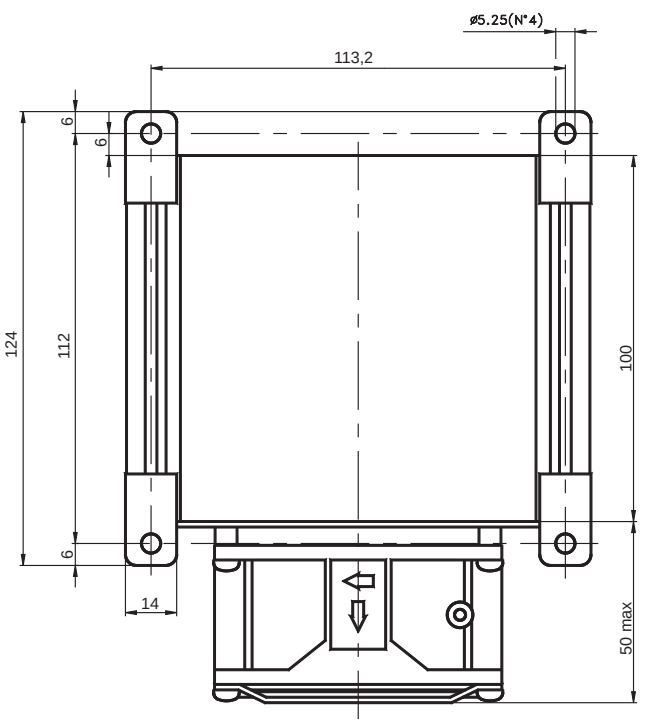



## *DIMENSIONS FOR PANEL MOUNTING*

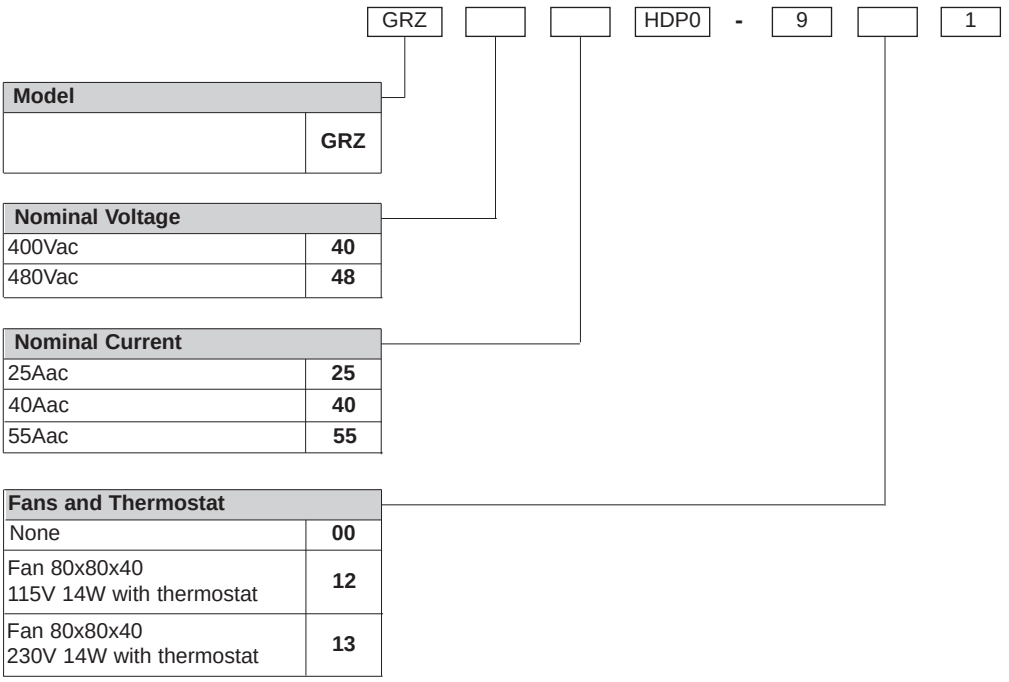
**Model GRZ 25**




**Model GRZ 40- 55**



## *ORDER CODE*




| Model | |
|---|---|
| | **GRZ** |

| Nominal Voltage | |
|---|---|
| 400Vac | **40** |
| 480Vac | **48** |

| Nominal Current | |
|---|---|
| 25Aac | **25** |
| 40Aac | **40** |
| 55Aac | **55** |

| Fans and Thermostat | |
|---|---|
| None | **00** |
| Fan 80x80x40<br>115V 14W with thermostat | **12** |
| Fan 80x80x40<br>230V 14W with thermostat | **13** |

Please, contact GEFRAN sales people for the codes availability.

CE

In conformity to ECC 89/336/CEE and 73/23/CEE with reference to standards:
**CEI-EN 61000-6-2** (immunity in industrial enviroment)- **EN 50081-1** (emission in residential enviroment) - **EN 61010-1** (safety)

GEFRAN

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