



#### Main applications

- Thermoforming
- Plastic extrusion lines
- Industrial ovens and furnaces
- Heat treatments
- Control applications with high switching speed
- Mold heating/cooling control units
- Refrigeration
- Air conditioning

#### Main features

- 3-phase alternating current solid state relay
- Zero crossing switching
- 3-phase nominal current 3x10/25/40/55A
- Nominal voltage up to 600VCArms
- Control range: 5...32Vdc
- Optoisolation (input/output) 4000Vrms
- Integrated overvoltage suppressor
- Non-repetitive voltage up to 1200Vp
- In Conformity with EN60947-4-3 and UL508

#### PROFILE

3-phase "zero crossing" solid state relay for control of resistive and inductive loads. Integrated device designed for industrial applications demanding control of high power levels and frequent switching, with loads up to 3 x 55A (AC51) at 400/480/600Vac. Control is logic type (Vdc), signaled by LEDs. Each phase is controlled by means of semiconductors. The constructive elements, special production process, and new, sturdy case, provide excellent reliability and continuity of service. All versions are protected against overvoltages and against junction overtemperature, with signal LEDs and (optional) solid state alarm output. The device is supplied complete with covers to protect against direct contacts (covers are removable for wiring). Accessories available: heatsink, thermostats, fans, fuses and fuse holders.

**WARNING:** The GZ models must be used in conjunction with an appropriate heatsink (Accessory). Installation must precisely observe the warnings contained in the installation notes.

#### TECHNICAL DATA

##### General features

Category of use: AC51, AC53a  
 Nominal voltage (Ue):  
 400Vac (max. range 24...440Vac) (TRIAC)  
 480Vac (max. range 24...530Vac) (SCR)  
 600Vac (max. range 24...660Vac) (SCR)  
 Nominal frequency: 50/60Hz  
 Isolation nominal voltage (Ui):  
 600Vac  
 Peak voltage:  
 >800Vdc for models with Ue=400Vac  
 >1200Vdc for models with Ue=480Vac,  
 Ue=600Vac  
 Uninterrupted nominal service.  
 Critical dV/dt OFF-state:  
 500V/μs for models with Ue=400Vac  
 1000V/μs for models with Ue=480Vac,  
 Ue=600Vac  
 Switching voltage for zero:  
 < 20V  
 Activation time: ≤1/2 cycle  
 Deactivation time: ≤1/2 cycle  
 Potential drop at rated current:  
 ≤ 1,4Vrms  
 IP20 protection  
 Weight: 300g

##### Control inputs

Voltage of command circuit (Uc):  
 5...32Vdc  
 Activation voltage: >4.5Vdc

Deactivation voltage: <3Vdc

Max. input:  
 18mA @5Vdc - 22mA @32Vdc  
 Max. reverse voltage: 36Vdc

##### Outputs

##### GZ 10/...

Nominal current (Imax):  
 AC51: 3x10 A  
 AC53a: 3x2 A

##### GZ 25/...

Nominal current (Imax):  
 AC51: 3x25 A  
 AC53a: 3x5 A

##### GZ 40/...

Nominal current (Imax):  
 AC51: 3x40 A  
 AC53a: 3x8 A

##### GZ 55/...

Nominal current (Imax):  
 AC51: 3x55 A  
 AC53a: 3x15 A

##### Thermal features

##### GZ 10,25

Junction temperature: ≤125°C  
 Rth junction/case = 1.5 K/W

##### GZ 40

Junction temperature: ≤125°C  
 Rth junction/case = 1 K/W

##### GZ 55

Junction temperature: ≤125°C  
 Rth junction/case = 0.6 K/W

### Insulation

Nominal insulation voltage

input/output:

2.5KV ac for models with Ue=400Vac

4KV ac for models with Ue=480Vac,

Ue=600Vac

Nominal impulse withstand voltage

(Uimp): 2500Vac

### Solid State Relay Dissipated Power Calculation

Three-phase relay

$P_d = 3 \times 1,4 \times I_{RMS} [W]$

$I_{RMS}$  = three-phase load current

### Heatsink Thermal Resistance Calculation

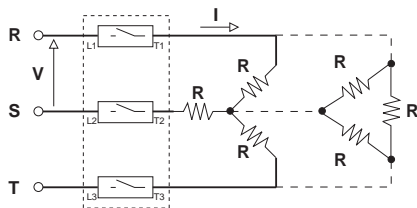
$R_{th} = (90^\circ C - T_{amb.max}) / P_d$

$P_d$  = dissipated power

$T_{amb.max}$  = max air temperature inside the electrical cabinet.

Use a heatsink with thermal resistance inferior to the calculated one ( $R_{th}$ )

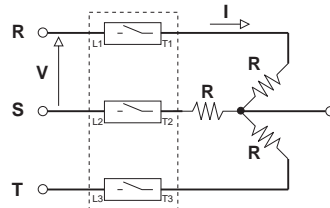
Three-phase Star or Triangle closed control



$V_{nominal} = V$

$$I_{nominal} = \frac{P}{\sqrt{3} \cdot V} + 10\%$$

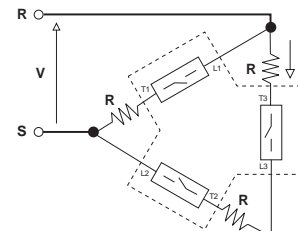
Three-phase Star control with neutral



$$V_{nominal} = \frac{V}{\sqrt{3}}$$

$$I_{nominal} = \frac{P}{\sqrt{3} \cdot V} + 10\%$$

Three-phase Triangle open control



$V_{nominal} = V$

$$I_{nominal} = \frac{P}{3 \cdot V} + 10\%$$

### TECHNICAL DATA OF THE MAIN CIRCUIT

Model	I <sub>max</sub> [Arms]	R <sub>th,heatsink</sub> @ Ta=40°C [K/W]	I <sub>e</sub> (*) [Arms]	R <sub>th,heatsink</sub> @ Ta=40°C [K/W]	Dimension heatsink (accessories)	Non-repetitive overcurrent t=20ms [A]	I <sup>2</sup> t [A²s]
GZ 10/400	3x10	1.78	3x10	1.19	100x127x80	120	100
GZ 25/400	3x25	0.57	3x25	0.38		250	450
GZ 25/480	3x25	0.57	3x25	0.38		400	645
GZ 40/480	3x40	0.36	3x40	0.24		600	1010
GZ 55/480	3x55	0.19	3x55	0.16		1150	6600
GZ 40/600	3x40	0.36	3x40	0.24	100x127x100 (with fan)	600	1010
GZ 55/600	3x55	0.19	3x55	0.16		1150	6600

(\*) I<sub>e</sub> = Nominal current(Standard CEI EN 60947-4-3)

### Ambient conditions

- Working temperature:  
-20°C...80°C
- Max. relative humidity: 50% to 40°C
- Max. installation altitude: 1000 slm
- Pollution level : 3
- Storage temperature: -20...85°C
- Class: A (industrial device)
- Suitable for use in pollution degree 2 environmental

### Thermal protection

Junction temperature is constantly monitored inside the device. If the maximum temperature limit is exceeded (T=110°C), current to the load is interrupted and the yellow signal LED lights up.

### Options

An optional thermal protection alarm output is available. In this case, the alarm is signaled with an output generated by a solid state relay (max. 32 VAD/DC, 150mA, resistance ≤ 15Ω in alarm state)

### Installation notes

Use the high speed fuses specified in the catalog according to the connection example provided.

Applications with solid state power units must also include an automatic safety switch to cut out the load power line. Protect the solid state relay by using an appropriate heat sink (accessory). The heat sink must be sized according to room temperature and load current (see the technical documentation). Procedure for mounting on heat sink: The module-heat sink contact surface must have a maximum planarity error of 0.05mm. and maximum roughness of 0.02mm. The fastening holes on the heat sink must be threaded and countersunk. Spread 4 gram of thermoconductive silicone (we recommend DOW CORNING 340 HeatSink) on the dissipative metal surface of the module. The surfaces must be clean and there must be no impurities in the thermoconductive paste. Use 4 M4x10 or M5 x 10 screws with flexible washer for attachment. Alternately tighten the fastening screws until reaching a torque of 0.60Nm. Wait 30 minutes for any excess paste to drain. Alternately tighten the four fastening screws until reaching a torque of 1.2 Nm for the M4 screws and 1.5 Nm for the M5 screws.

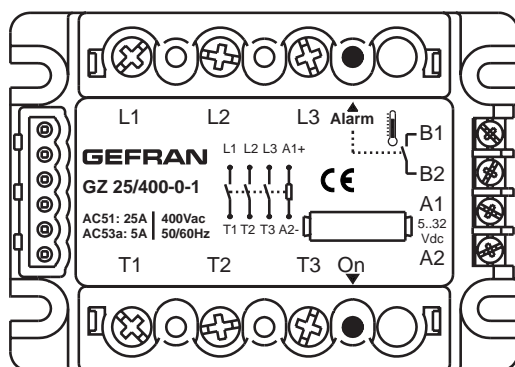
It is advisable to make random checks of correct installation by disassembling the module and checking that there are no air bubbles under the copper plate. Install the units cantilevered to the panel so that air can flow vertically over the heatsink without obstructions.

- Maximum surrounding air temperature 40°C (for UL).
- Open type equipment

### Limits of use

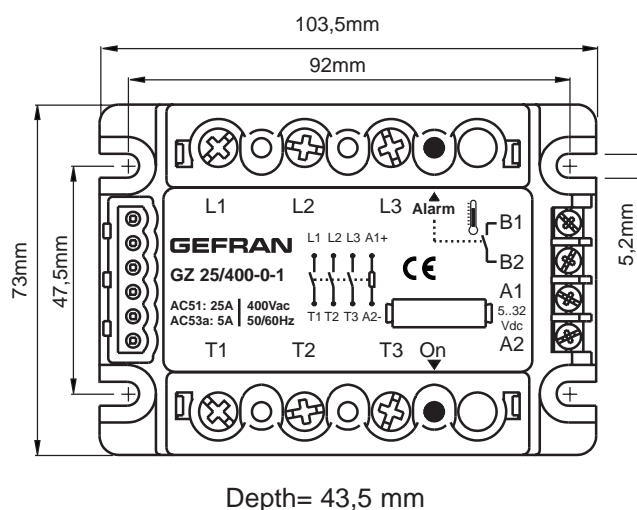
- dissipation of thermal power of device with restrictions on temperature of installation site.
- requires exchange with outside air or an air conditioner to transfer dissipated power outside the panel.
- max. voltage limits and derivative of transients in line, for which the solid state unit has internal protection devices.
- presence of dispersion current < 10mA (max. value with rated voltage and junction temperature of 125°C).

## FACEPLATE DESCRIPTION



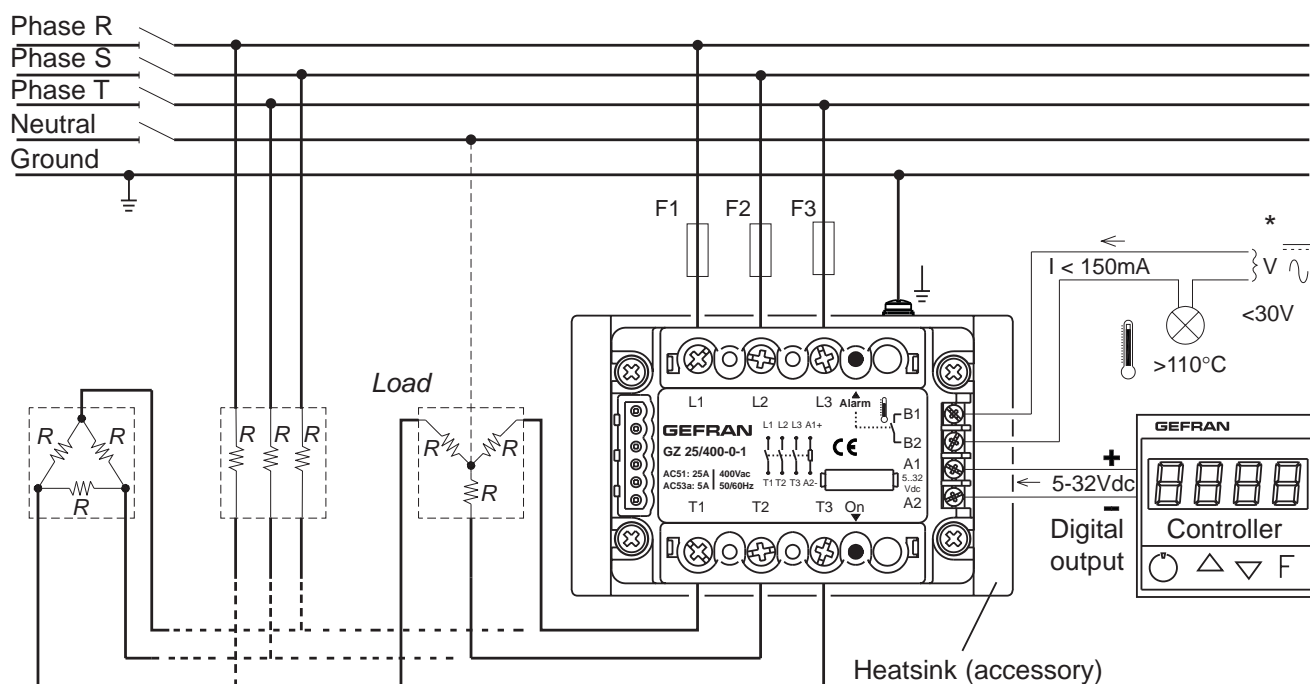
- L1 : Phase 1 input
- L2 : Phase 2 input
- L3 : Phase 3 input
- T1 : Phase 1 output
- T2 : Phase 2 output
- T3 : Phase 3 output
- A1 : Control signal (+)
- A2 : Control signal (-)
- B1 : Alarm output (+) option
- B2 : Alarm output (-) option
- Led1: Red led signal indicator
- Led2: Yellow led (alarm overtemperature junction)

## DIMENSIONS



## CONNECTION EXAMPLES

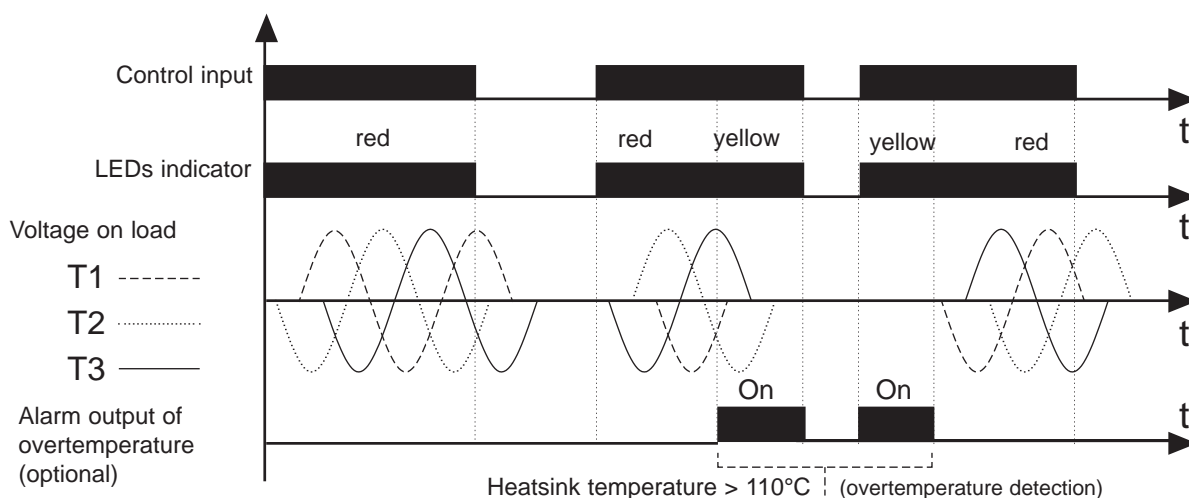
Three-phase Triangle or Star connection (with and without neutral)



\* Only in the version with option overtemperature alarm output

## TYPE OF OPERATION

Voltage logic output control and protection activation of overtemperature:



## TABLE OF TERMINALS AND CONDUCTORS

Model	Control terminal (A1, B2, B1, B2)			Power terminal (L1, L2, L3, T1, T2, T3)		
	Contact area (LxP) screw type	Type of preisolated terminal	Section. * conductor / tightening torque	Contact area (LxP) screw type	Type of preisolated terminal	Section. * conductor / tightening torque
10A	6,3x9 M3	eye / fork / tip	min. 0.35 mm <sup>2</sup> max. 2.5 mm <sup>2</sup> 0,6 Nm Max	12x12 M5	eye / fork / tip	min. 1 mm <sup>2</sup> max. 10 mm <sup>2</sup> (tip)
25A						min. 1 mm <sup>2</sup> max. 16 mm <sup>2</sup> (eye/fork)
40A						1,5 - 2,2 Nm
55A						

(\*) The max. sections specified refer to unipolar copper wires isolated in PVC.

Note: For the ground terminal, you have to use an eye wire terminal.

(LxP) = width x depth [mm]

The minimum acceptable nominal section based on the nominal currents of the power solid state units is given below for copper conductors isolated in PVC, under continuous operating conditions and at 40°C ambient temperature according to standards CEI 44-5, CEI 17-11, IEC 408 in accordance with EN60204-1.

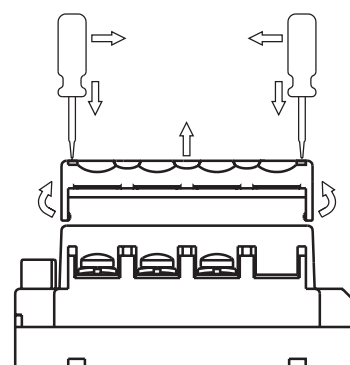
Nominal current	Nominal section cable on mm <sup>2</sup>
10A	2,5
25A	6
40A	10
55A	16

### Terminal covers

If an eye terminal lug is used, the terminal covers can be removed more easily by inserting a Phillips screwdriver (max. width 3.5 mm) into the side slots.

With the point of the screwdriver, widen the side of the cover and raise it.

Insert the screwdriver to facilitate opening of the cover



## ACCESSORIES

A wide range of accessories is available heatsink, fuses and fuse holders , current transformer, thermostats.

To choose accessories, see the section "Solid state relays - Accessories".

## ORDER CODE

MODEL	
	<b>GZ</b>

NOMINAL CURRENT	
10Aac	<b>10</b>
25Aac	<b>25</b>
40Aac	<b>40</b>
55Aac	<b>55</b>

NOMINAL VOLTAGE	
400Vac (only for models $\leq 25A$ )	<b>400</b>
480Vac (only for models $\geq 25A$ )	<b>480</b>
600Vac (only for models $\geq 40A$ )	<b>600</b>

OPTIONS	
<b>0</b>	None
<b>1</b>	Alarm output thermal protection

INPUT	
<b>0</b>	5...32Vdc

**GZ**    /  -  -

Please contact GEFTRAN personnel for information on availability of codes.

## •WARNINGS



**WARNING:** this symbol indicates danger.

**Read the following warnings before installing, connecting or using the device:**

if the solid state relay is used in applications with risk of injury to people, machines, or materials, auxiliary alarm devices **MUST** be employed. It is also advisable to be able to check for tripping of alarms during normal operation;

- follow instructions precisely when connecting the heatsink;
- always use cables that are suitable for the voltage and current levels indicated in the technical specifications;
- **DO NOT** operate the device in rooms with dangerous (flammable or explosive) atmosphere;
- During continuous operation, the heat sink can reach up to 100°C, and stays at a high temperature even after the device is turned off due to thermal inertia; therefore, **DO NOT** touch it and avoid contact with electrical wires;
- do not work on the power part without first disconnecting electrical power to the panel;
- do not remove the cover when the device is powered!

**Installation:**

- ground the heatsink connected to the power module;
- power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label;
- avoid dust, humidity, corrosive gases and heat sources;
- respect the installation distances between one device and another (to allow for dissipation of generated heat).
- to keep air in movement, we advise you to install a fan near the GZ group in the electrical panel containing the GZs.;
- size the heatsink adequately according to the indicated parameters.



**Maintenance:**

- at regular intervals, check operation of the cooling fans and clean all air ventilation filters;
- repairs must be done out only by trained and specialized personnel. Cut power to the device before accessing internal parts.
- do not clean the box with solvents derived from hydrocarbons (trichloroethylene, gasoline, etc.). Using such solvents will compromise the device's mechanical reliability. Use a clean cloth moistened with ethyl alcohol or water to clean external parts in plastic.

**Service :**

GEFRAN has a service department.

The warranty excludes defects caused by any use not conforming to these instructions.

	This device conforms to European Union Directive 89/336/CEE and 73/23/CEE as amended with reference to product: <b>CEI-EN 60947-4-3</b> (Low voltage switchgear and controlgear - Contactors and Motor-starters)
	In Conformity with <b>UL508</b>