



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

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 (available from 2005)

GZ 25/...

Nominal current (Imax):
AC51: 3x25 A
AC53a: 3x5 A (available from 2005)

GZ 40/...

Nominal current (Imax):
AC51: 3x40 A
AC53a: 3x8 A (available from 2005)

GZ 55/...

Nominal current (Imax):
AC51: 3x55 A
AC53a: 3x15 A (available from 2005)

Thermal features

GZ 10,25

Junction temperature: $\leq 125^{\circ}\text{C}$

Rth junction/case = 1.5 K/W

GZ 40

Junction temperature: $\leq 125^{\circ}\text{C}$

Rth junction/case = 1 K/W

GZ 55

Junction temperature: $\leq 125^{\circ}\text{C}$

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

$P_d = 3 \times I_{RMS} \cdot V$ [W]

I_{RMS} = three-phase load current

Heatsink Thermal Resistance Calculation

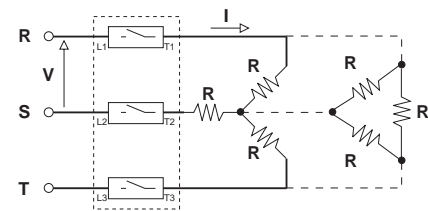
$R_{th} = (90^{\circ}\text{C} - T_{amb.max}) / P_d$

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})

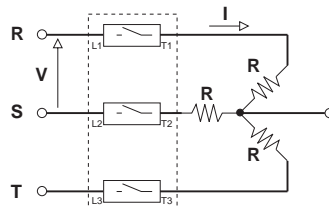
Three-phase Star or Triangle closed control



$V_{nominal} = V$

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

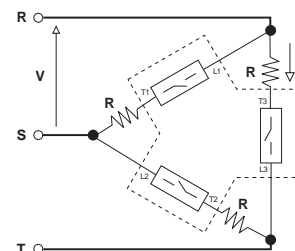
Three-phase Star control with neutral



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

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

Three-phase Triangle open control



$V_{nominal} = V$

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

TECHNICAL DATA OF THE MAIN CIRCUIT

Model	I _{max} [Arms]	R _{th} , heatsink @ Ta=40°C [K/W]	I _e (*) [Arms]	R _{th} , heatsink @ Ta=40°C [K/W]	Non-repetitive overcurrent t=20ms [A]	I ² t [A ² s]
GZ 10/400	3x10	1.78	3x10	1.19	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	600	1010
GZ 55/600	3x55	0.19	3x55	0.16	1150	6600

(*) I_e = 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)

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 $\leq 15\Omega$ 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.

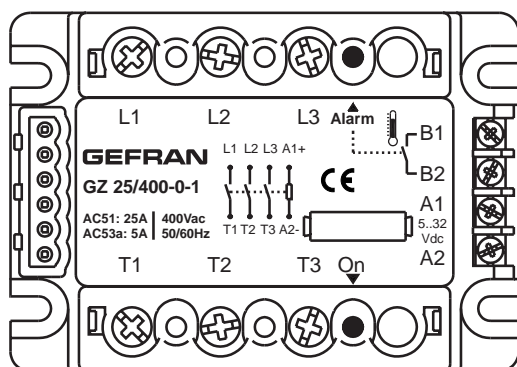
It is advisable to make random checks of correct installation by disassembling the module and checking that there are no air bubbles under the copper plate

Install the units cantilevered to the panel so that air can flow vertically over the heatsink without obstructions.

Limits of use

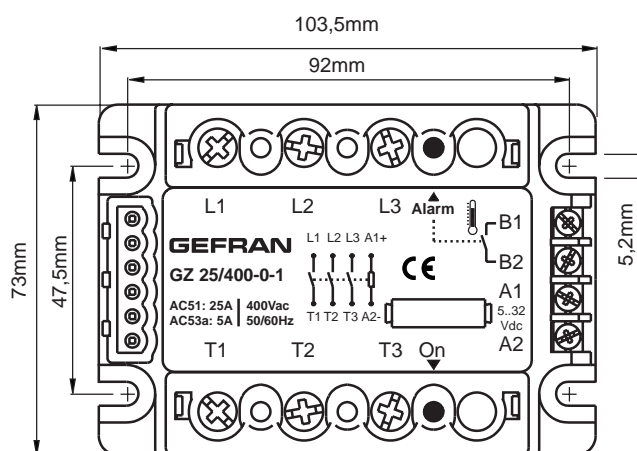
- dissipation of thermal power of device with restrictions on temperature of installation site.
- requires exchange with outside air or an air conditioner to transfer dissipated power outside the panel.
- max. voltage limits and derivative of transients in line, for which the solid state unit has internal 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)

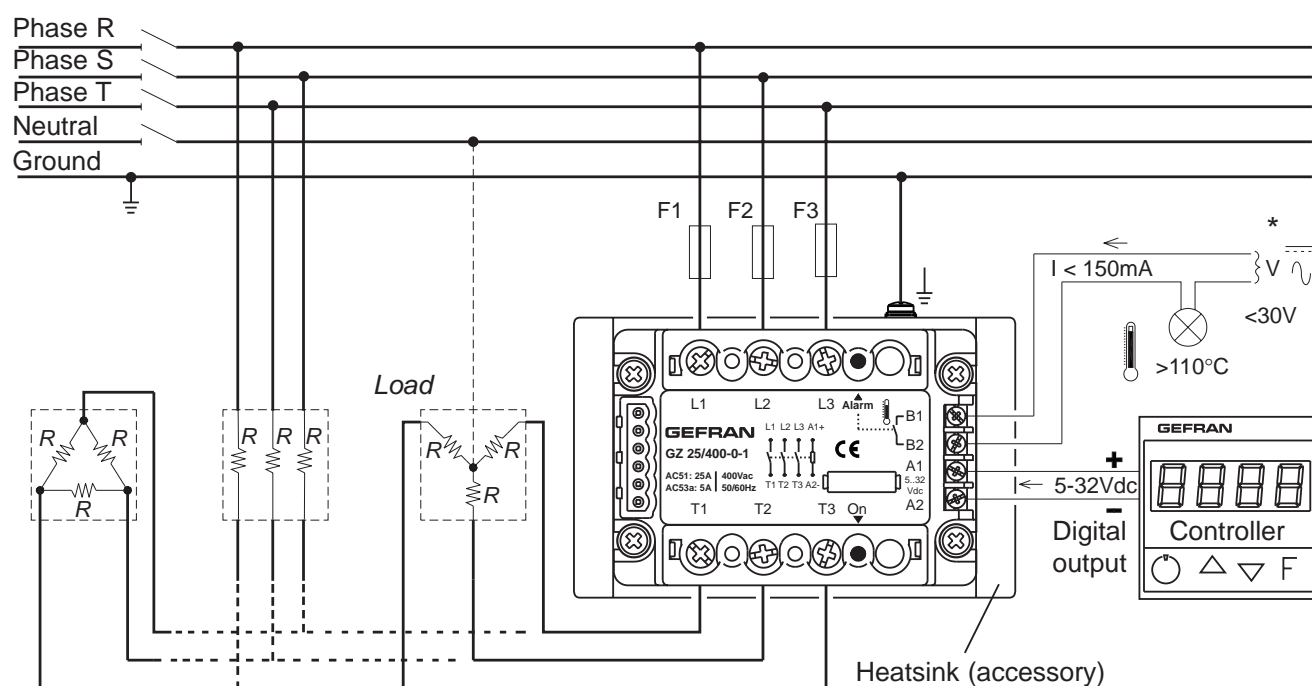
DIMENSIONS



Depth= 43,5 mm

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:

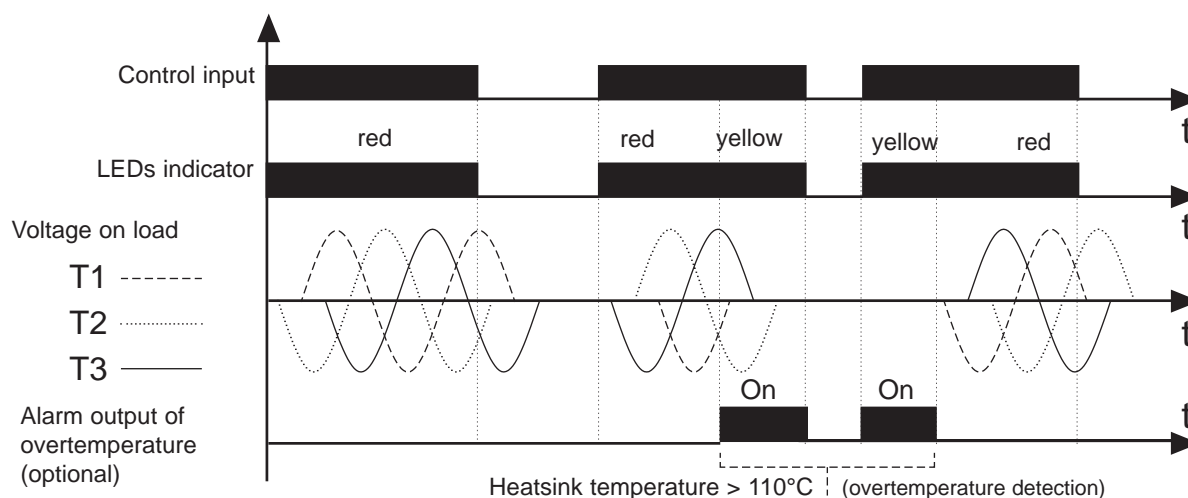


TABLE OF TERMINALS AND CONDUCTORS

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 ² max. 2,5 mm ² 0,6 Nm Max	12x12 M5	eye / fork / tip	min. 1 mm ² max. 10 mm ² (tip)
25A						min. 1 mm ² max. 16 mm ² (eye/fork) 1,5 - 2,2 Nm
40A						
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.

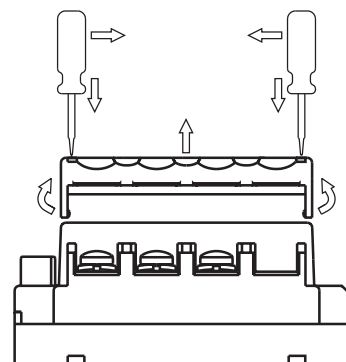
Nominal current	Nominal section cable on mm ²
10A	2,5
25A	6
40A	10
55A	16

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	
	GZ

NOMINAL CURRENT	
10Aac	10
25Aac	25
40Aac	40
55Aac	55

NOMINAL VOLTAGE	
400Vac (only for models ≤ 25A)	400
480Vac (only for models ≥ 25A)	480
600Vac (only for models ≥ 40A)	600

OPTIONS	
0	None
1	Alarm output thermal protection

INPUT	
0	5...32Vdc

GZ / - -

Please contact GEFRA 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:
CEI-EN 60947-4-3 (Low voltage switchgear and controlgear - Contactors and Motor-starters)