

Main applications

- Plastics extrusion lines and injection moulding machines
- Packing and packaging machines
- Polymerization plant for synthetic fibre production
- Chemical and pharmaceutical industries
- Industrial electric ovens
- Food processing plants



Main features

- AC solid state relays with logic signal control
- Switching at voltage zero crossing
- Built-in heatsink
- Rated current: 25Arms, 40Arms
- Non-repetitive voltage: 1200 Vp
- Rated voltage: up to 530VCArms
- Input control range: 5...30 Vdc
- Optical isolation: 4000Vrms (input/output)
- Built-in HB diagnostics (partial heater break, junction in short circuit)
- Overheat protection (optional)
- 2-color control signal LED in input/alarm state
- On-board MOV (varistor)

PROFILE

The GD series of solid state relays (zero crossing type) are solid state actuators with heater break diagnostics (Hb function), selectable current scale, and adjustable setpoint.

Junction overheat protection is available as an option.

An alarm signal is provided in output.

The GD series of solid state relays are offered with currents of 40A, rated voltage 480 Vac, and Vdc input control signal.

Voltage transistors are protected by MOV (varistor).

See the dissipation curves for other performance conditions.

The GD series of relays must be used with an appropriate heatsink.

Thanks to their high performance, they are appropriate for very short switching times, with millions of operations without wear on components.

Various accessories are available, such as heatsinks, fuses and fuse holders.

TECHNICAL DATA

General features

Category of use: AC1

Nominal voltage:

480Vac (max. range 48...530Vac)

Nominal frequency: 50/60Hz

Non-repetitive voltage: 1200Vac

Zero switching voltage: < 20V

Activation time: =1/2 cycle

Deactivation time: =1/2 cycle

Voltage drop at nominal current:
= 1,4Vrms

Power factor = 1

Control inputs

Max. input: < 5mA@30V

Max. reverse voltage: 36Vdc

Control voltage: 5...30Vdc

Activation voltage: > 4,25Vdc

Deactivation voltage: < 3Vdc

Power supply

Vs = 20...30Vdc ±10%

Input 30mA at 30Vdc

Outputs

Nominal current: 40A@40°C in continuous service

Non-repetitive overcurrent t=20ms: 600A

I²t for blowout: 1010A²s

dV/dt critical with output deactivated:
1000V/μs

Thermal characteristics

Junction temperature: ≤ 125°C

Rth junction/case: ≤ 0,65K/W

Rth junction/ambient: ≤ 12K/W

DIAGNOSTIC

Heater break Alarm (Hb)

Checks load by measuring current inside the device.

Current full scale is selectable: 5, 10, 15, 20, 25, 30, 35, 40A.

The alarm setpoint can be set at 10 levels within the selected scale.

Overtemperature alarm (optional)

Provides protection against junction overtemperature in "or" with the Hb alarm.

Alarm output

The alarm output is PNP type (non protected against short circuit)

(output voltage = Vs - 0.7Vdc,

Rout = 82Ω, Iout max. = 20mA).

The alarm is signaled by a yellow LED.

Isolation

Rated isolation voltage for power control/output: 4000VACrms

Ambient conditions

- Working temperature: 0...80°C (see the dissipation curves)
- Max. relative humidity: 50% at 40°C
- Max. installation altitude: 2000 slm
- Pollution level: 3
- Storage temperature: -20...+85°C

Calculation of dissipated power of solid state relay

Single phase solid state relay

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

I_{RMS} = single phase load current.

Calculation of dissipated resistance of heat sink

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

with P_d = dissipated power

$T_{amb. \max}$ = maximum temperature of air in electrical cabinet.

Use a heat sink with thermal resistance lower than the one calculated (R_{th}).

Installation notes

The instrument must be protected by an appropriate high-speed fuse (accessory). Applications with solid state relays must provide an automatic safety switch to cut power to the load.

Protect the solid state relay against over-temperature by using an appropriate heat sink (accessory).

The heat sink must be grounded.

The heat sink must be sized in relation to room temperature and load current (see the technical documentation).

Installation procedure on the heat sink: the module-heat sink contact surface must have a maximum planarity error of

0.05 mm and maximum roughness of 0.02 mm.

The fastening holes on the heat sink must be threaded and countersunk.

Warning: spread 1 gram of heat-conducting silicon paste (we recommend DOW CORNING 340 HeatSink) on the metal dissipating surface of the module.

The surfaces must be clean, and the heat-conducting paste must be free of impurities.

Alternately tighten the two fastening screws until reaching a torque of 0.60 Nm for the M4 screws.

Wait 30 minutes for any excess paste to run off.

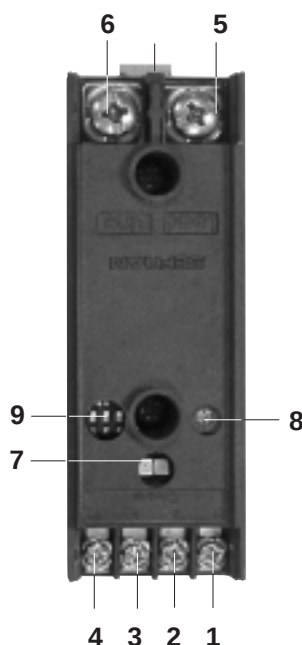
Alternately tighten the two fastening screws until reaching a torque of 1.2 Nm for the M4 screws.

We advise you to randomly check proper installation by disassembling the module and checking that there are no air bubbles under the copper plate

Limits of use

- Dissipation of thermic power on the device 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.
- Installation restraints (distances to be respected to grant dissipation with natural convection).
- Line transistor max. voltage and derivative limits, for which the solid state relay is equipped with inside safety devices (based on the models).
- Leakage current < 3mA (max. value with rated voltage and junction temperature of 125°C)

FACEPLATE DESCRIPTION



- 1: Aux. power supply 24Vdc (Vs)
- 2: Common (0V)
- 3: Control signal (+)
- 4: Alarm output
- 5: Load terminal
- 6: Line terminal
- 7: 2-color signal LED (red/yellow)
- 8: Internal trimmer to set Hb diagnostics setpoint
- 9: Dip switch to select Hb diagnostics scale
- 10: LAB-1 relay ID label

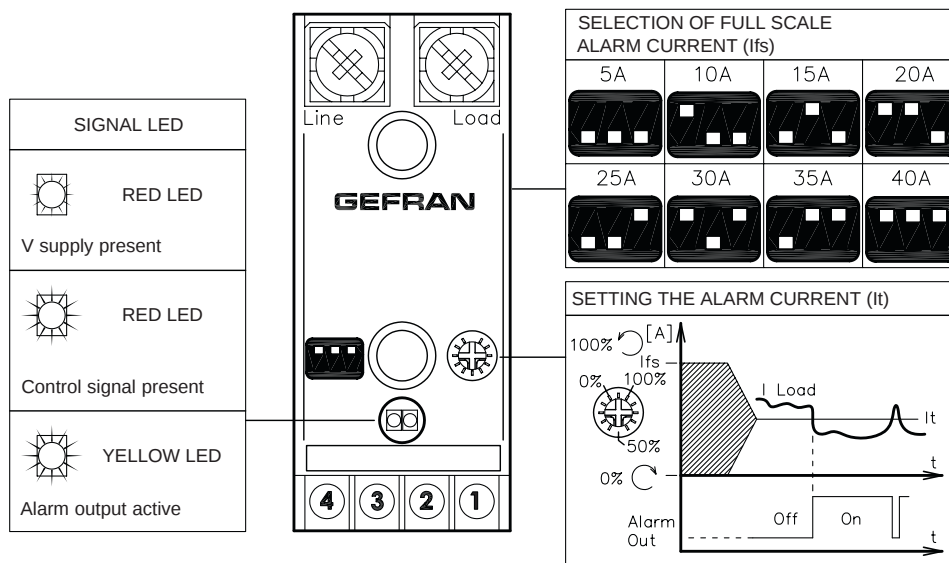
HEATER BREAK (Hb) ALARM FUNCTION

The heater break (Hb) alarm function lets the instrument diagnose a drop in load current (I_l) below a settable limit (I_t) during operation. The unit in short circuit is also diagnosed by monitoring any current conducted in the absence of the control signal.

Setting the alarm

The full scale (maximum value) of the limit is set with the dip switches located under the instrument cover.

With the single-turn trimmer, you can shift the set point from 0% (turning the trimmer clockwise) to 100% (turning the trimmer counterclockwise) on the set full scale.



Example:

$V_n = 230V$ Rated voltage of load

$I_l = 26.5 A$ Load current

$I_t = 21 A$ Alarm setpoint: alarm trips if current drops below this value.

(*) When setting the alarm current (I_t), remember that line fluctuations (normally $\pm 10\%$) vary the value of current I_l by the same percentage.

Therefore, you have to set the setpoint with the necessary margins to prevent false alarm signals.

With the dip switches, set the full scale value of the alarm current (I_{fs}) according to the following table:

Load current (I_l) @ V_n	Full scale alarm current (I_{fs})
0...4A	5A
4...9A	10A
9...13A	15A
13...18A	20A
18...22A	25A
22...27A	30A
27...31A	35A
31...40A	40A

Therefore, with $I_l = 26.5 A$, set the full scale current at $I_{fs} = 30A$

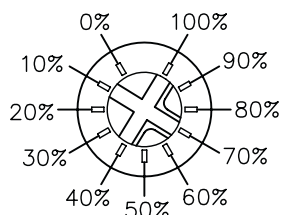


30A

With the trimmer, set the alarm current (I_t) according to the following formula:

$$TR\% = I_t / I_{fs} * 100$$

In the example $TR\% = 21[A] / 30[A] * 100 = 70\%$



Checking the Hb alarm

Activate the device by feeding the load to maximum current.

With current-sensing pliers, check current to the load (I_l).

The yellow alarm LED must be off.

Turn the trimmer counterclockwise: alarm current I_t increases.

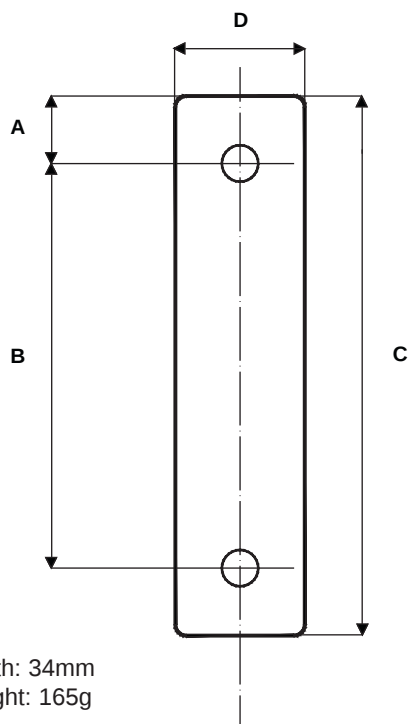
When the yellow alarm LED lights up, the alarm current equals load current ($I_t = I_l$).

The alarm is active.

Turn the trimmer clockwise to reduce alarm current I_t until the trimmer returns to its original position (with the yellow LED off).

TEMPLATE FOR FASTENING TO HEAT SINK; OVERALL DIMENSIONS

CONNECTION EXAMPLES



Depth: 34mm
Weight: 165g

	A(mm)	B(mm)	C(mm)	D(mm)	
GD40	20	47,5	100	35	M4

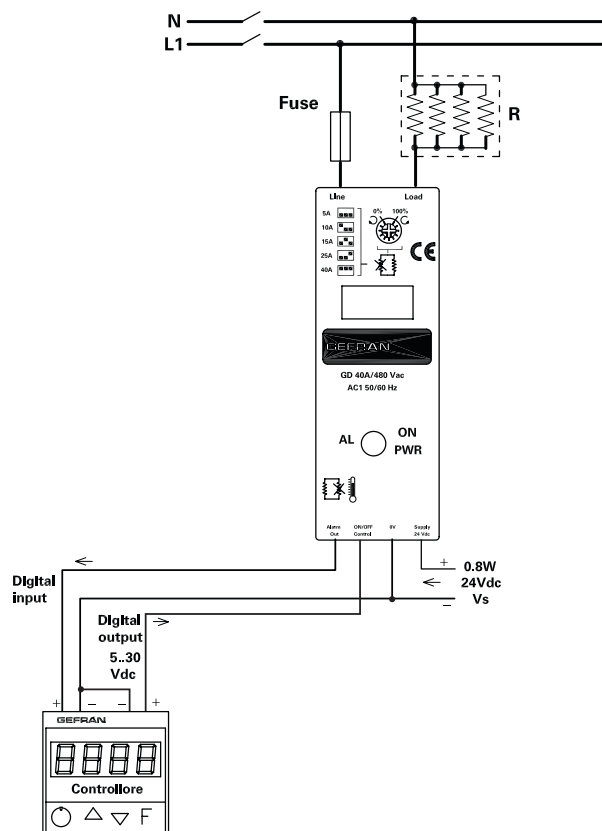


TABLE FOR TERMINAL CHOICE OF POWER TERMINAL BOARD

Model	Control terminal (1, 2, 3, 4)			Power trminal (LINE, LOAD)		
	Contact area (WxD) screw type	Pre-isolated wire terminal	Sez. * conduttore / coppia di serraggio	Contact area (WxD) screw type	Pre-isolated wire terminal	Wire section * / tightening torque
40A	6,3x9 M3	Eye / fork / tip	min. 0.35 mm ² max. 2,5 mm ² 0,6 Nm Max	11,5x12 M5	Eye / fork / tip	min. 1 mm ² max. 10 mm ² (tip) min. 1 mm ² max. 16 mm ² (eye/fork) 1,5 - 2,2 Nm

(*) The maximum sections indicated refer to unipolar copper wires with PVC insulation.

Note: you have to use an eye terminal for the ground connection.

(WxD) = width x depth

Described below is the minimum permissible rated section based on the rated currents of solid state power units, for copper wires isolated in PVC in continuous operation and at 40°C room temperature, according to standards CEI 44-5, CEI 17-11, IEC 408 in compliance with EN60204-1.

Rated current	Rated wire section in mm ²
10A	2,5
25A	6
40A	10

ACCESSORIES

A wide range of accessories is available (including fuses and fuse holders, heatsinks, ID plates.
To choose accessories, see the section "Solid state relays - Accessories".

ORDER CODE

MODEL

GD

NOMINAL CURRENT

40Aac40

NOMINAL VOLTAGE

480Vac480

GD40 / 480 -

DIAGNOSE

0	Hb
1	Hb with overheat protection

Please contact GEFTRAN personnel for information on availability of codes.

GEFRAN spa reserves the right to make any kind of design or functional modification at any moment without prior notice

•WARNINGS



WARNINGS: this symbol indicates danger.

Before installation, please read the following advices:

- follow the indications of the manual scrupulously when making the connections to the instrument.
- use a cable that is suitable for the ratings of voltage and current indicated in the technical specifications.
- if the instrument is used in applications where there is risk of injury to persons and damage to machines or materials, it is essential that it is used with an auxiliary alarm device.
- Power controllers are designed to assure a switching function that does not include protection of the load line or of devices connected to it. The customer must provide all necessary safety and protection devices in conformity to current electrical standards and regulations. It is advisable to verify frequently that the alarm device is functional even during the normal operation of the equipment.
- the instrument must NOT be used in environments where there could be the presence of dangerous atmospheres (inflammable or explosive).
- during continuous operation, the heatsink may reach 100°C and remain at a high temperature due to thermal inertia even after the device is switched off. Therefore, do not touch the heat sink or the electrical wires.
- do not operate on the power circuit unless the main supply is disconnected.
- do not open the cover if device is "ON"!
- we recommend installing a cooling fan inside the electrical cabinet near the GTD devices!

Installation:

- connect the device to the ground using the proper ground terminal.
- the power supply wiring must be kept separate from that of inputs and outputs of the instrument; always check that the supply voltage corresponds to that indicated on the instrument cover.
- avoid dust, humidity, corrosive gases and heat sources;
- keep away from dust, humidity, corrosive gases and heat sources.
- respect the installation distances between one device and another (to allow for dissipation of generated heat).
- we recommend installing a cooling fan inside the electrical cabinet near the GD devices;

Maintenance:

- Periodically check the operation of any cooling fans and clean the cabinet air filters at regular intervals.
- Repairs must be performed only by specialized or appropriately trained personnel.

Cut off 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 mechanical reliability of the device. To clean external plastic parts, use a clean cloth wet with ethyl alcohol or water.

Technical service:
GEFRAN has a technical service department.
Defects caused by use not conforming to the instructions are excluded from the warranty.