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GEFRAN

GQ 15 / 25 / 50 / 75 / 90 A

SINGLE PHASE SOLID STATE RELAYS



Main applications

- *Packaging Machinery*
- *Thermoforming*
- *Plastic extrusion lines*
- *Industrial ovens and furnaces*
- *Control application with high switching speed*

Main features

- *Alternating current solid state relay*
- *Zero crossing switching*
- *15, 25, 50, 75 e 90 Arms nominal current*
- *Non-repetitive voltage: up to 1600Vp*
- *Nominal Voltage: up to 600 Vac*
- *Control voltage : 3...32Vcc and 20...260Vac/Vcc with connector*
- *Isolation ((input-output) 4000Vrms*
- *Green LED drive active signal*

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.
This relay has been designed to stand high-value transitory applications .
When the relay has to stand high currents for a long period, it is necessary to grant a proper dissipation and an adequate electrical connection between relay terminals and the load.
Fuses, thermostats and fans are available as fittings.
Use the relay with an opportune heatsink (see section accessories).

TECHNICAL DATA

General features

Rated frequency: 45...65Hz
Activation time:
GQ...-D- ≤1/2 cicle GQ...-A- ≤1 cicle
Deactivation time:
GQ...-D- ≤1/2 cicle GQ...-A- ≤1 cicle
Power factor: ≥0,5
Protection level: IP20
• U_{imp} = 4,8KV
• U_i = 660V
• Overload current profile = 10
• Conditional short circuit current = 5KA with type 1 coordination and respective fuse protections.

GQ15/25	fuse type	aM6A
GQ50	fuse type	aM16A
GQ75/90	fuse type	aM20A

GQ...- 24-
Nominal voltage: 24...230 Vac
(max range 20...253Vac)
Non-repetitive voltage: ≥ 600 Vp
Zero switching voltage: ≤ 20V

GQ...- 48-
Nominal voltage: 48...480 Vac
(max range 40...528Vac)
Non-repetitive voltage: ≥ 1200 Vp
Zero switching voltage: ≤ 40 V

GQ...- 60-
Nominal voltage: 48...600 Vac
(max range 40...660Vac)
Non-repetitive voltage: ≥ 1200 Vp
Zero switching voltage: ≤ 40V

Control input A1 - A2

GQ...-D-
Control voltage: 3...32Vcc
Turn ON voltage: ≥ 2,7Vc.c
Turn OFF voltage: ≤ 1Vcc
Reverse voltage: < 36Vcc
Consumption: ≤ 13mA@32V
UL Overvoltage category II or III

GQ...-A-
Control voltage: 20...260Vac/Vcc
Turn ON voltage: ≥ 15Vac/Vcc
Turn OFF voltage: ≤ 6Vac/Vcc
Consumption: ≤ 8mAac/cc@260Vac/Vcc
Series connection of control inputs: max. no. GQ...-A in series = Vcontrol -10% / 20
UL Overvoltage category II

Output L1 - T1

UL Overvoltage category III

GQ - 15 -
Nominal current: AC51: 15Arms;
AC53A (*): 3Arms
Min load current: 0,1Arms
Repetitive overcurrent t=1 s: ≤ 35Arms
Non-repetitive overcurrent t=20ms:200Ap
Current drop at nominal voltage and frequencies: ≤ 8mArms
I^2t for fusing t=1-10ms: ≤ 200A^2s
Critical dI/dt: ≥ 100A/μs
Voltage drop at nominal current: ≤1,45Vrms
Critical dV/dt off-state: ≥ 1000V/μs
I_{th} = 15A

GQ - 25 -
Nominal current :
AC51: 25Arms; AC53A (*): 5Arms
Min load current: 0,3Arms
Repetitive overcurrent t=1 s: ≤ 60Arms
Non-repetitive overcurrent t=20ms: 300Ap
Current drop at nominal voltage and frequencies: ≤ 8 mArms
I^2t for fusing t=1-10ms: ≤ 450A^2s
Critical dI/dt: ≥ 100A/μs
Voltage drop at nominal current: ≤ 1,45Vrms
Critical dV/dt off-state:≥ 1000V/μs
I_{th} = 25A

GQ - 50 -
Nominal current :
AC51: 50Arms; AC53A (*): 15Arms
Min load current: 0,3Arms
Repetitive overcurrent t=1 s: ≤ 125Arms
Non-repetitive overcurrent t=20ms: 600Ap
Current drop at nominal voltage and frequencies: ≤ 8mArms
I^2t for fusing t=1-10ms: ≤ 1800A^2s
Critical dI/dt: ≥ 100A/μs
Voltage drop at nominal current: ≤1,35Vrms
Critical dV/dt off-state: ≥ 1000V/μs
I_{th} = 50A

GQ - 75 -
Nominal current : AC51: 75Arms;
AC53A (*): 18Arms
Min load current: 0,5Arms
Repetitive overcurrent t=1 s: ≤ 150Arms
Non-repetitive overcurrent t=20ms: 1600Ap
Current drop at nominal voltage and frequencies: ≤ 10mArms
I^2t for fusing t=1-10ms: ≤ 12800A^2s
Critical dI/dt: ≥ 100A/μs
Voltage drop at nominal current: ≤1,3Vrms
Critical dV/dt off-state: ≥ 1000V/μs
I_{th} = 75A

GQ - 90 -
Nominal current AC51: 90Arms;
AC53A (*): 20Arms
Min load current: 0,5Arms
Repetitive overcurrent t=1 s: ≤ 150Arms
Non-repetitive overcurrent t=20ms: 1600 Ap
Current drop at nominal voltage and frequencies: ≤ 10mArms
I^2t for fusing t=1-10ms: ≤ 12800A^2s
Critical dI/dt: ≥ 100A/μs
Voltage drop at nominal current:≤ 1,3Vrms
Critical dV/dt off-state: ≥ 1000V/μs
I_{th} = 90A

(*) Only versions: GQ-XX-24-X-1
GQ-XX-48-X-1

Insulation

Nominal insulation voltage Input/output: ≥ 4000 Vac
Nominal insulation voltage Output/case: ≥ 2500 Vac
Insulation resistance Input/output: ≥ $10^{10}\Omega$
Insulation resistance Output/case: ≥ $10^{10}\Omega$
Insulation capacity Input/Output: ≤ 8pF
Insulation capacity Output/case: ≤ 100pF

Ambient conditions

- Ambient temeparure: -25...+80°C
- Storage Temperature: -55...+100°C
- Maximum relative humidity: 90% a 40°C
- Maximum installation height: 2000 slm
- Pollution level: 2

UL Enviromental Ratings

- Open Type Device
- Surrounding Air Temperature 40°C
- Pollution degree 2

Thermal features

GQ - XX -
Junction Temperature: ≤ 125°C

GQ - 15 - / GQ - 25 -
Rth junction/case: ≤ 1,25 K/W

GQ - 50 -
Rth junction/case: ≤ 0,65 K/W

GQ - 75 -
Rth junction/case: ≤ 0,4 K/W

GQ - 90 -
Rth junction/case: ≤ 0,3 K/W

Solid State Relay Dissipated Power Calculation

Single phase state relay
Pd GQ .. 15/25 = 1,45 . Irms [W]
Pd GQ .. 50 = 1,35 . Irms [W]
Pd GQ .. 75/90 = 1,3 . Irms [W]
IRMS = single-phase load current

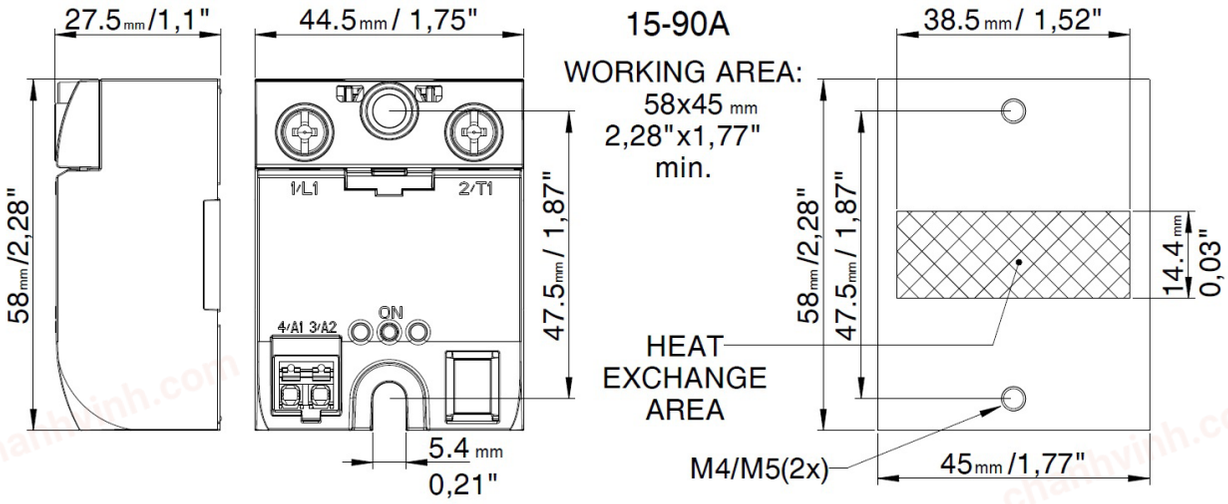
Heatsink Thermal Resistance Calculation

Rth = (90°C - T.amb. max) / Pd
where Pd = dissipated power
Max. amb. T = max air temperature inside the electrical cabinet.
Use a heatsink with thermal resistance inferior to the calculated one (Rth).

Installation notes

The device must be protected by a high speed fuse (accessory).
Applications with power solid state relays must also have a switch to isolate the power line.
Protect the solid state relay against overheating by using a heatsink (accessory).
The heatsink must be sized according to room temperature and load current (see technical data).
Heatsink installation procedure:
spread 1 gram of thermoconductive silicone paste (we recommend DOW CORNING 340) on the dissipative metal surfaces of the module.
The surfaces must be clean and the thermoconductive paste must not contain any impurities.
Alternately tighten the two fastening screws until reaching a torque of 0.4…0.6 Nm.

DIMENSIONS



Wait 5 minutes for any excess paste to run off.
Alternately tighten the two fastening screws until reaching a torque of 1.2…1.4 Nm.

The heatsink must be grounded.

be examinated and replaced if damaged. If burnout of the device occurs, the complete device must be replaced or equivalent.

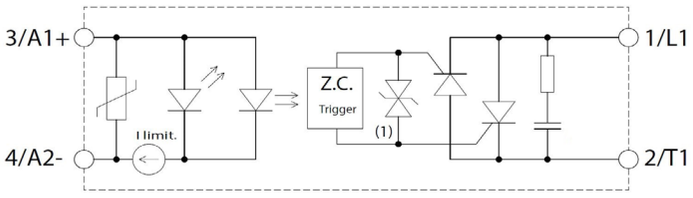
Attention
The contact surface of the heatsink module may have a maximum planarity error of 0.1 mm and maximum roughness of 0.02 mm. The fastening holes on the heatsink must be threaded and countersunk.

Attention
The opening of the branch-circuit protective device may be an indication tha a fault has been interrupted. To reduce the risk of firee or electric shocks, current-carryng parts and other components of the device should

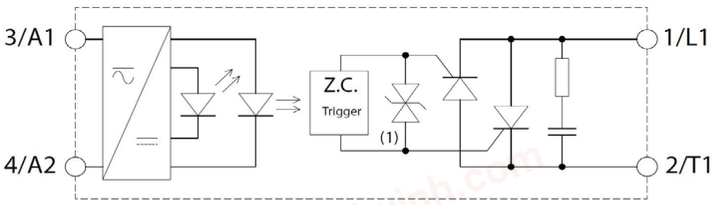
ELECTRICAL CONNECTIONS

Functional Diagram

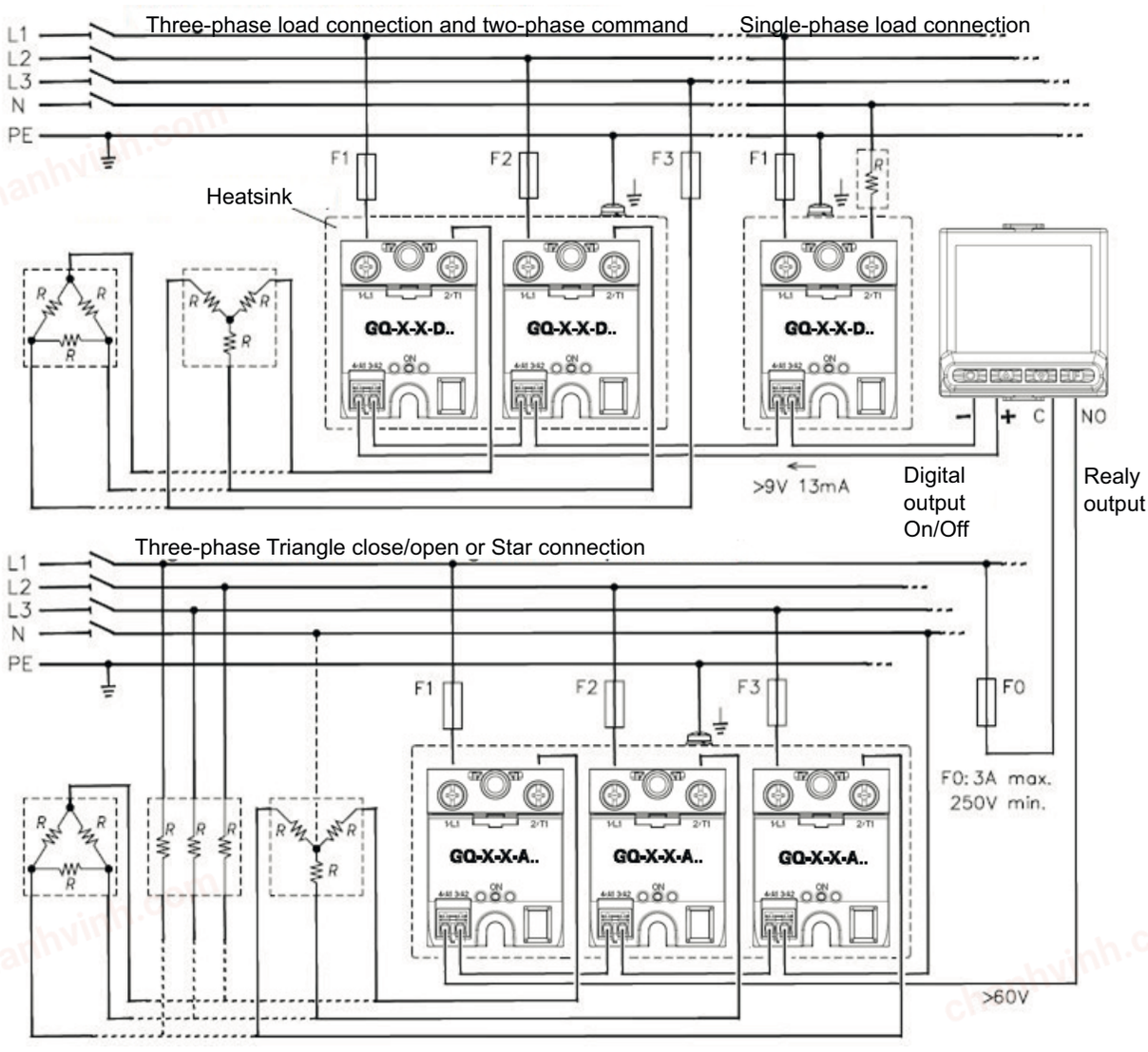
GQ-xx-xx-D-x-x



GQ-xx-xx-A-x-x



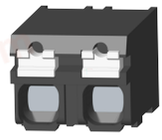
Only GQ-xx-xx-x-1-x



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TERMINALS AND LEADS: SPECIFICATIONS

POWER TERMINALS		
Nominal current	15-25-50-75-90	
Wiring type	Rigid / flexible / ferrule conductor	Fork or eyelet cable
Contact area (WxD) screw type	13 x 11mm M5	
Stripping length	11mm	-
Minimum allowed section 1 Conductor / 2 Conductors	1 x 1.5 mm2 / 2 x 1.5 mm2	1x1.5 mm2
	1 x 15 AWG / 2 x 15 AWG	1 x 15 AWG
Maximum allowed section 1 Conductor / 2 Conductors	1 x 6 mm2 /2 x 6 mm2	1 x 25 mm2
	1 x 10 AWG /2 x 10 AWG	1 x 3 AWG
Tightening torque	2 - 2,4 Nm 18 - 21,3 lb·in	
Note: Use 75°C (167°F) copper (CU), multi-stranded conductors		

CONTROL/SIGNAL TERMINALS Rigid / flexible / cable lug conductor cross section				
	MORS1	**MORS2**	**MORS3**	**MORS4**
				
Connector	Extractable			Integrated
Wire locking type	Self-locking spring	Spring double connection	Screw M3	Push-in
Minimum allowed section 1 Conductor / 2 Conductors	1 x 0.2 mm2 / 2 x 0.2 mm2	2x (1 x 0.25 mm2) / 2x (2 x 0.25 mm2)	1 x 0.25 mm2 / 2 x 0.25 mm2	1 x 0.5 mm2 / 2 x 0.5 mm2
	1 x 24 AWG / 2 x 24 AWG	2x (1 x 23 AWG) / 2x (2 x 23 AWG)	1 x 23 AWG / 2 x 23 AWG	1 x 20 AWG / 2 x 20 AWG
Maximum allowed section 1 Conductor / 2 Conductors	1 x 1.5 mm2 / 2 x 0.75 mm2	2x (1 x 2.5 mm2) / 2x (2 x 0.75 mm2)	1 x 2.5 mm2 / 2 x 1 mm2	1 x 1.5 mm2 / 2 x 0.5 mm2
	1 x 15 AWG / 2 x 18 AWG	2x (1 x 13 AWG) / 2x (2 x 18 AWG)	1 x 13 AWG / 2 x 17 AWG	1 x 15 AWG / 2 x 20 AWG
Stripping length / cable lug	10mm	10mm	7mm	6mm
Note: Use 75°C (167°F) copper (CU), multi-stranded conductors				

SCCR FUSES

SCCR CO-ORDINATION FUSES TABLE				
Model	**Short circuit current [Arms]**	**Max fuse size [A]**	**Bussmann Model Number**	**Max Voltage [VAC]**
GQ 15	100.000	25	DFJ-25	600
GQ 25	100.000	25	DFJ-25	600
GQ 50	100.000	50	DFJ-50	600
GQ 90	100.000	100	DFJ-100	600

“The fuses on the above table are representative of all the Bussmann DFJ fuses with lower current ratings”

“The devices protected with the fuses reported above, still be functional after the short circuit”

Short circuit protection:The product variants listed in the table “SCCR COORDINATION FUSES” are “Suitable For Use On A Circuit Capable Of Delivering Not More Than 100,000 A rms Symmetrical Amperes, 600 Volts Maximum when Protected by fuses. Attention: the opening of the branch-circuit protective device may be an indication tha a fault has been interrupted. To reduce the risk of firee or electric shocks, current-carryng parts and other components of the device should be examinated and replaced if damaged. If burnout of the device occurs, the complete device must be replaced or equivalent.

TERMINALS AND LEADS: SPECIFICATIONS

HIGH SPEED FUSES					FUSE HOLDER		
Model	**Size I^2T**	**Code Format**	**Model Code**	**Dissipated power @ In**	**Model Code Approval**	**Max power dissipated**	**Max continuative current**
GQ15...	16A 150A²S	FUS-016 10x38	FWC16A10F 338470	3,5W	**PFI-10x38 337134 UR 30A@690V**	3W	13A
GQ25...	25A 390A²S	FUS-025 10x38	FWC25A10F 338474	6W			13A
	375A²S	FUS-026 14x51	FWC25A14F 338130	7W	**PFI-14x51 337503 UR 50A@600V**	5W	18A
GQ50...	50A 1800A²S	FUS-051 14x51	FWC50A14F 338079	9W			27A
	50A 1600A²S	FUS-050 22x58	FWC50A22F 338127	9,5W	**PFI-22x58 337223 UR 80A@600V**	9,5W	50A
GQ75...	80A 6600A2s	FUS-80 22x58	FWP80A22F 338199	14W			50A
GQ90...	80A 6600A²S	FUS-080 22x58	FWP80A22F 338199	14W			50A
	100A 12500A²S	FUS-100 22X58	FWP100A22F 338478	16W			60A

HEATSINK/ THERMAL RESISTANCE

Heatsink description	GQ current rating	Max current [A]	Rth Heatsink [°C/W]	Dimension WxHxD [mm] / [in]
HS-60-10	**15**	15	≤2,6	60x10x100 2,36x0,39x3,93
	25	15		
HS-52-50	**25**	25	≤1,5	52,5x50x90 2,07x1,97x3,54
	50	30		
HS-70-67	**50**	35	≤0,96	70x67x90 2,76x2,64x3,54
	75	40		
DIS-90G	**75**	65	≤0,63	127x100x100 5x3,94x3,94
	90	75		
HS-52-50-FAN	**50**	50	≤0,45	52,5x50x125 2,07x1,97x4,92 24Vdc Fan inlcu-ded
	75	75		
HS-70-67-FAN	**90**	90	≤0,36	70x67x130 2,76x2,64x5,12 24Vdc Fan inlcu-ded

Data related to 40°C operating temperature, heatsink in vertical position, using Gefran Thermal PAD (order code 10-PAD-GQ)

SECTION CABLE

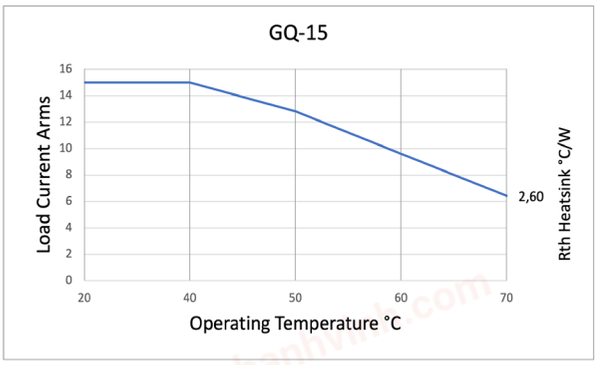
Model	Section
GQ15...	2,5mm²
GQ25...	6mm²
GQ50...	12mm²
GQ75/90...	25mm²

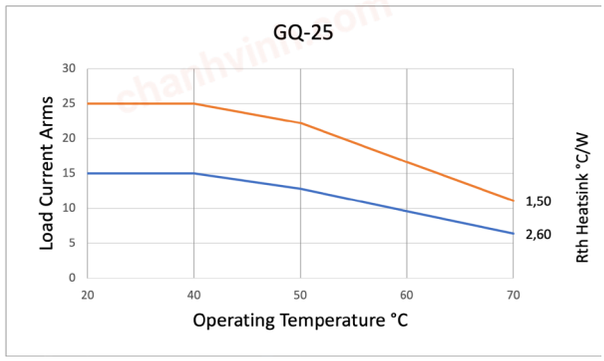
Minimum allowed rated section based on the rated currents of the power solid state relays, for copper leads isolated in PVC in continuous use and at room temperature of 40°C, according to standards CEI 44-5, CEI 17-11, IEC 408 pursuant to standard EN60204-1.
Power terminals in compliance with standard EN60947-1

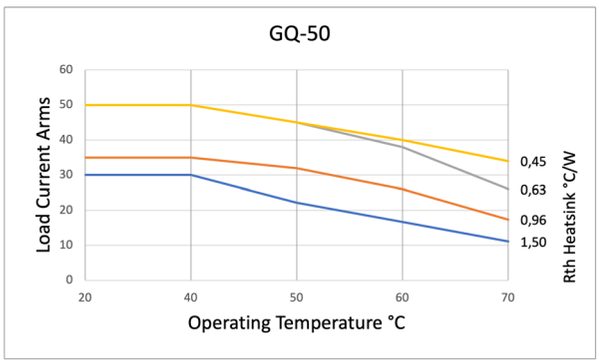
REFERENCE NORMS

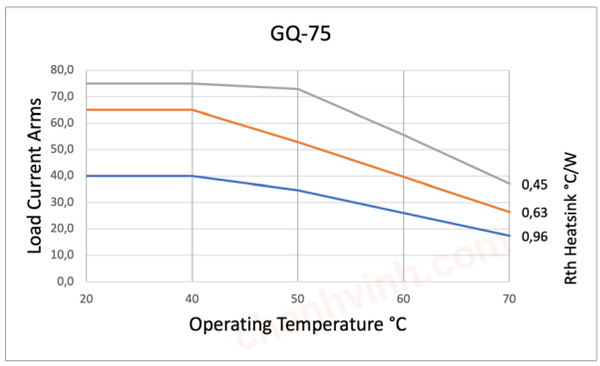
EMC Emission		
EN 61000-6-4	Emissions conducted at radiofrequency	Class A (Industrial devices)
EN 61000-6-4	Emissions irradiated at radiofrequency	Class A (Industrial devices)
The product is designed for type A environments. Use of the product in type B environments may cause undesired electromagnetic noise. In this case, the user should take appropriate steps for improvement.		
EMC Immunity		
EN 61000-6-2	Immunity for industrial environments	
EN 61000-4-2	Electrostatic discharges	4kV by contact; 8 kV in air. Performance criterion 2.
EN 61000-4-6	Electromagnetic field at radiofrequency 0,15-80MHz	Test level 3. Performance criterion 1.
EN 61000-4-3	Electromagnetic field at radiofrequency 80-1000MHz	Test level 10V/m. Performance criterion 1.
EN 61000-4-4	Immunity to burst	LTest level 2kV/100 KHz. Performance criterion 2.
EN 61000-4-5	Immunity to surge	Test level: 2kV (Phase-ground); 1kV (Phase-phase). Performance criterion 2.
Safety		
EN 61010-1	Safety requirements	

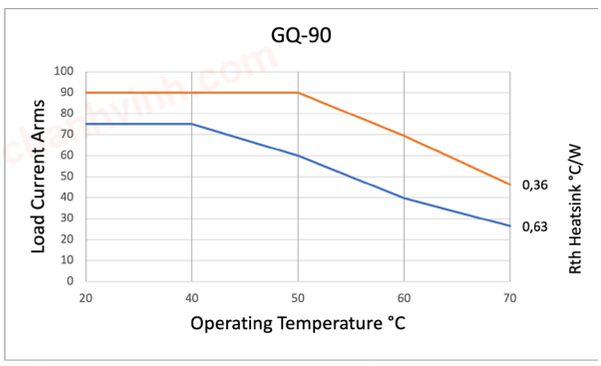
CURVES OF DISSIPATION











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ORDER CODE

GQ | | | | | |

MODEL	
	GQ

NOMINAL CURRENT	
15ACArms	15
25ACArms	25
50ACArms	50
75ACArms	75
90ACArms	90

NOMINAL VOLTAGE		
230VACrms		24
480VACrms		48
600VACrms	(*)	60

(*) Available only in versions GQ-XX-60-X-1-X
(overloading protection always present)

Please, contact GEFRAN sales people for the codes availability

CONNECTORS	
0	Without connector
1	(MORS1) Two-pin spring connector,enclosed
2	(MORS2) Two-pin double spring connector, enclosed
3	(MORS3) Two-pin screw connector, enclosed
4	(MORS4) Two-pin PUSH-IN connector, low profile enclosed

OVERVOLTAGE PROTECTION	
0	External
1	Internal

CONTROL VOLTAGE	
D	3...32Vc.c.
A	20...260Vac/Vcc

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

·WARNINGS

WARNING: 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.
- 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 untless the main supply is disconnected.
- DO NOT open the cover if device is “ON”!

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;
- keep away from dust, humidity, corrosive gases and heat sources;
- is recommended in the electrical panel containing the GQ, install a fan near the group of GQ that keep air in movement.

Maintenance

- Check the correct operation of the cooling fans at regular intervals; clean the ventilation air filters of the installation 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.

CE	This device conforms to European Union Directive 2014/30/EU and 2014/35/EU as amended with reference to generic standards: EN 61000-6-2 (iammunity in industrial environment) EN 61000-6-4 (emission in industrial environment) - EN 61010-1 (safety regulations).
c UL us	Conformity UL508 - File: E243386
SCCR RMS SYM 100KA / 600V	100 KA when protected by proper fuse
EAC	Conformity TC RU C-IT.АЛ32.B.00422

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