SSR and Solid State Relays

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GEFRAN

Our Know how,
Your Solution.

SSR and Solid State Relays

FAST, STURDY, COMPACT

GEFRAN solid state relays are solid state devices that control resistive loads, partially inductive loads, and infrared heating elements. We offer various families of products, each specifically designed to satisfy different application criteria. Connections: single-phase, 2-phase, 3-phase loads, with star (with or without neutral) and delta connections, current ranges up to 600 Amp (per phase), voltage ranges up to 660 VAC, according to model.

RA

GS-L

GTZ

GTS

GS

W211

TECHNOLOGY

High product reliability is the result of intense research and avant-garde production cycles, performed entirely at Gefran's technology sites. Special construction give the solid state element excellent temperature performance and long life. Stringent final tests ensure maximum quality.

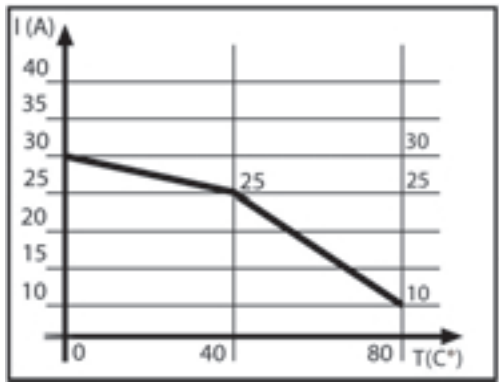
WIDE CHOICE OF APPLICATIONS

For applications with very little space in the electrical panel, Gefran offers “space saver” models with reduced horizontal dimensions on the DIN rod.

For applications where working temperature and optimum heat dissipation are critical factors, various models with integrated heatsink are offered, designed with strict criteria and power margins that ensure a reliable, ready-to-use solution.

GS25

DIS25G



DISSIPATION CURVE-GTS 25

DIAGNOSTICS AND INTEGRATED ALARMS

Among the most interesting features of Gefran relays and power solid state relays are their many diagnostic and alarm functions.

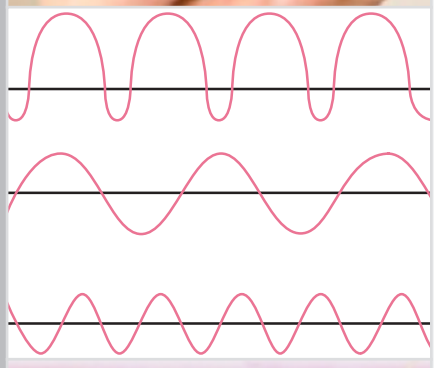
The efficiency and status of the load and of the power solid state relay can be monitored continuously. By means of settable ammeter alarm limits, the unit detects the smallest variation in load current (“partial load interrupt”) and automatically compensates variations due to line voltage.

Visual signals and alarm contacts are available for applicative faults such as overheating or junction break.

ADVANTAGES

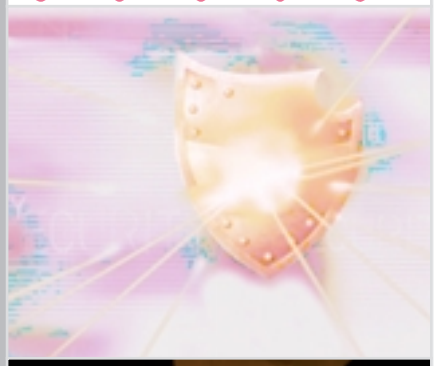
LONG LIFE, LESS DOWNTIME

Using solid state relays in modern switching, temperature control, and control system offers undeniable advantages over electromechanical relays. The absence of moving mechanical parts and contacts subject to wear guarantee longer product life, meaning less downtime and lower maintenance costs.



SWITCHING SPEED

The power junction created with semiconductors achieves very high switching frequencies, with “slicing” of the waveform for direct phase angle control. Ideal for applications with rapid system dynamics and for extremely precise adjustments.



CONFORMITY TO STANDARDS

Versions with “zero crossing” control ensure the absence of electrical noise during switching to prevent interference with the operation of control devices and conformity to international standards.

HEAVY-DUTY APPLICATIONS

Compact and sturdy construction guarantees high immunity from demanding industrial work environments with dust, shock and vibration.

SPACE-SAVER SOLUTIONS

Innovative mechanical solutions provide new and more compact arrangement of the relays and power solid state relays in the panel, saving both space and money.

MODELS

RA, GS-L, GS-T, GS, GD: Solid State Relays

From standard size solid state relays (45x58mm) to Gefran's innovative "space-saver" solutions with minimum width. "Zero crossing" switching, control signal in Vdc and Vac, TRIAC and double SCR in antiparallel with internal protection. Mounting holes with standard center distance of 47.5 mm for all models.
Models with load current and overtemperature diagnostics, with settable current limit and alarm output.

Applications: plastics processing, packing and packaging, small ovens, climate-controlled cells, test benches

RA

GS-L

GS

GD

GTS-L, GTS-T, GTS, GTD: power solid state relays with heatsink

Power solid state relays with incorporated heatsink, designed to provide continuous rated current at 40°C room temperature in electrical panels.
"Ready to use" save-spacer devices, "zero crossing" switching, control signal in Vdc, TRIAC and double SCR in antiparallel with internal protections. Ultra-compact versions with 4 independent solid state relays on a singe heatsink. Models with load current and overtemperature diagnostics, with settable current limit and alarm output.

Applications: plastics processing, packing and packaging, small ovens, climate-controlled cells, test benches

GTS-L

GTS-L4

GTS-T GTS

GTD

MODELS

GT, GTT: solid state relays and power solid state relays for fast, accurate adjustments

Analog control, with 0/4-20mA, 0-10V signals or potentiometer, plus “zero crossing” activation with fast, optimized cycle time, provide extremely accurate and quick modulation of loads, resistive loads, partially inductive loads, and infrared heaters.

Synchronized master-slave connections and diagnostics of load current and overtemperature, with adjustable current setpoint and alarm output.

Applications: ovens, heat treatments, wood-working machines, packing and packaging

GT

GTT

GZ, GTZ: solid state relays and 3-phase power solid state relays

Designed to control 3-phase loads with switching on 3 phases with “zero crossing” mode, diagnostics for overtemperature and alarm output (optional).

Applications: plastics processing, ovens

GZ

GTZ

GI: MOTOR CONTROLLER

Three-phase power solid state relay specifically to control 3-phase asynchronous motors in both directions with non-simultaneous control.

Applications: gate motors, conveyor belt motors

GI

W211, W212, W312, W401: power solid state relays for heavy-duty applications

The models in the WATTCOR family have extremely sturdy thyristors and outstanding heat dissipation, which makes them perfect for heavy-duty industrial applications with working temperatures from –5°C to +50°C, current up to 600 Amps, and voltage up to 660 Vac.

W211 and W212 have “zero crossing” activation, control signals in Vdc, Vac (W211) and analog signals (W212), optional diagnostic functions for load current, with adjustable current setpoint and alarm output. They can be used in synchronized master-slave configurations for single-phase and 3-phase configurations.

W312 accepts analog control signals and checks load via “phase angle” activation, with power soft-start at switch-on.

The W401 series receives the control signal via RS485 serial communication line, with Modbus protocol (for networks up to 16 nodes), has real-value current and load voltage converters for remote checking and diagnostics of loads by means of “recipes” managed by a supervisor.

Applications: ovens, heat treatments (W211, W212)
transformer primaries, infrared heaters (W312)
tyre machines and production lines, electrical cables (W401)

MODELS

series RA, GS-L, GS-T, GS, GD Solid State Relays: single phase, "zero crossing" switching, control signal Vdc and Vac

		 RA	 GS-L	 GS-T	 GS	 GD
DESCRIPTION		Outputs: TRIAC and double SCR in antiparallel for resistive loads, LED indicator, dimensions normalized to 45x58mm	Output: TRIAC for resistive loads, LED indicator, faston connections, "space saver" version in width	Output: TRIAC for resistive loads, LED indicator, screw connections, "space saver" version in width	Output: double SCR in antiparallel for resistive loads, LED indicator, screw connections, "space saver" version in width	Output: double SCR in antiparallel for resistive loads, LED indicator, screw connections, load current read, current alarm limit settable with LED signal and PNP alarm output, optional overheat alarm
INPUT						
Control signal in Vdc		5...32Vdc	3...32Vdc	5...32Vdc	6...32Vdc	5...30Vdc
Control signal in Vac		90...280Vac	-	-	-	-
OUTPU						
Rated load current						
	5A	-	x	-	-	-
	10A	-	x	x	-	-
	15A	-	x	-	x	-
	20A	-	-	x	-	-
	25A	x	-	x	x	-
	40A	-	-	-	x	x
	50A	x	-	-	x	-
	60A	-	-	-	x	-
	75A	-	-	-	x	-
	90A	x	-	-	x	-
	120A	-	-	-	x	-
Rated voltage						
	230Vac	x	x	x	x	-
	400Vac	x	x	-	-	-
	480Vac	x	-	-	x	x
MOUNTING, PROTECTIONS						
Panel mounting (2 holes standard center distance 47.5mm)		x	x	x	x	x
IP 20 protection with removable front panel		x	-	x	x	x
Internal overvoltage protection		x	x	x	x	x
DIAGNOSTICS, ALARM						
"ON" LED signal		x	x	x	x	x
Diagnostics for partial and total load interrupt (HB) with internal CT, LED, alarm ouput		-	-	-	-	x
Diagnostics for overtemperature with LED and alarm output		-	-	-	-	x (option)

series GTS-L, GTS-T, GTS, GTD power solid state realys with heatsink: single phase, "zero crossing" switching, control signal Vdc

		 GTS-L4	 GTS-T	 GTS	 GTD
DESCRIPTION		TRIAC output for resistive loads, LED signal, faston connections. GTS-L-4 models with four independent TRIACs.	TRIAC output for resistive loads, LED signals, screw connections	Double SCR output in antiparallel for resistive loads, LED signal, screw connections.	Double SCR output in antiparallel for resistive loads, LED signal, screw connections, load current reading, current alarm limit settable with LED signal and PNP alarm output. Optional thermal alarm.
INPUT					
Control signal in Vdc		3...32Vdc	5...32Vdc	6...32Vdc	5...30Vdc
OUTPU					
Rated load current					
	5A	x [4x5A (GTS-L4)]			
	10A	x [4x10A (GTS-L4)]	x		
	15A	x [4x14A (GTS-L4)]		x	
	20A		x		
	25A		x	x	x
	40A			x	x
	50A			x	-
	60A			x	
	75A			x	
	90A			x	
	120A			x (with 115Vac or 230Vac fan)	
Rated voltage					
	230Vac	x	x	x	
	400Vac	x			
	480Vac			x	x
MOUNTING, PROTECTIONS					
Mounting on standard base		x (based on models)			
Mounting on DIN rail (included)		x (based on models)	x	x	x
Panel mounting (with accessories)		x (based on models)	x	x	x
IP 20 protection with removable front panel			x	x	x
Internal overvoltage protection		x	x	x	x
DIAGNOSTICS, ALARM					
"ON" LED signal		x	x	x	x
Diagnostics for partial and total load interrupt (HB) with internal CT, LED, alarm ouput					x
Diagnostics for overtemperature with LED and alarm output					x (opzione)

MODELS

		Series GT solid state relay and series GTT power solid state relays with heatsink: single phase, "zero crossing" switching with fast cycle, 0/4-20mA, 10V analog control signal and potentiometer		Series GZ solid state relay and series GTZ power solid state relyas with heatsink: 3-phase, "zero crossing" switching, control signal Vdc		Controller for 3-phase motors
		 GT	 GTT	 GZ	 GTZ	 GI
DESCRIPTION		Output: double SCR in antiparallel, LED indicators, screw connections, load current read, current alarm limit settable with LED signal and alarm output, overheat alarm	Output: double SCR in antiparallel, LED indicators, screw connections, load current read, current alarm limit settable with LED signal and alarm output, overheat alarm	Three TRIAC outputs or double SCR in antiparallel, LED indicator, screw connections, optioan overheat alarm	Three TRIAC outputs or double SCR in antiparallel, LED indicator, screw connections, optioan overheat alarm	Inverters for 3-phase asynchronous motors, with “forward” and “reverse” controls.
INPUT						
0/4-20mA control signal, 0-10V, potentiometer		x	x			
Power inhibit inout		x	x			
Control signal in Vdc				5...32Vdc	5...32Vdc	
Vdc double control signal						5...32Vdc
OUTPU						
Rated load current						
	6A					x (AC53)
	10A			x		
	25A	x	x	x	x	
	40A	x	x	x	x	
	50A	x	x			
	55A			x	x	
	60A	x	x			
	75A	x	x			
	90A	x	x			
	120A	x	x			
Rated voltage						
	400Vac			x(I<=25A)	x(I<=25A)	x
	480Vac	x	x	x(I>=25A)	x	
	600Vac			x(I>=40A)	x(I>=40A)	
MOUNTING, PROTECTIONS						
Mounting on DIN rail (included)			x		x	
Panel mounting (with 2 screws)		x	x (with accessories)			
Panel mounting (with 4 screws)				x	x (with accessories)	x
IP 20 protection with removable front panel		x	x	x	x	x
Internal overvoltage protection		x	x	x	x	x
DIAGNOSTICS, ALARMS						
"ON" LED signal		x	x	x	x	x (green Led "forward", red led "reversing")
Diagnostics for partial and total load interrupt (HB) with internal CT, LED		x (optional)	x (optional)			
Diagnostics for overtemperature with LED		x	x			
Diagnostics for overtemperature with LED and alarm output				x (optional)	x (optional)	

WATTCOR series of power solid state relays with heatsink: single phase, "zero crossing" and "phase angle" activation, Vdc/Vac control signal, 0/4-20mA analog, 0-10V, potentiometer, via Modbus

		 W211	 W212	 W312	 W401
DESCRIPTION		"Zero crossing" switching, double SCR output in antiparallel for resistive loads, LED indicator, screw connections, optional load current read, current alarm limit settable with LED signal and alarm relay output, overheat alarm.	"Zero crossing" switching, double SCR output in antiparallel for resistive loads, LED indicator, screw connections, optional load current read, current alarm limit settable with LED signal and alarm relay output, overheat alarm.	"Phase angle" switching , double SCR output in antiparallel, LED indicator, screw connections, optional load current read, current alarm limit settable with LED signal and alarm relay output, overheat alarm.	"Zero crossing" switching, double SCR output in antiparallel for resistive loads, LED indicator, screw connections, RMS read of load current and voltage, Modbus RS485 serial communication line.
INPUTS					
Control signal in Vdc		x		x	x
Control signal in Vac		x			
0/4-20mA analog control signal, 0-10V, potentiometer			x	x	
Control from Modbus serial line					x
Power inhibit input		x	x	x	x
OUTPUTS					
Rated load current					
	25A	x	x	x	
	40A	x	x	x	
	45A				x
	75A	x	x	x	
	100A	x	x	x	x
	150A	x	x	x	
	250A	x	x		
	400A	x	x		
	600A	x	x		
Rated voltage					
	460Vac				x
	660Vac	x (with opt. RPC max.400Vac)	x (with opt. RPC max.400Vac)	x	
MOUNTING, PROTECTIONS					
Mounting on base					x
Mounting on DIN rail (included)		x (<=150A)	x (<=150A)	x	
Panel mounting (with accessories)		x	x	x	
IP20 Protection		x	x	x	x
Internal overvoltage protection		x	x	x	x
DIAGNOSTICS, ALARMS					
"ON" LED signal		x	x	x	
Diagnostics for partial and total load interrupt with internal CT, LED, alarm ouput (RPC)		x (optional)	x (optional)		
Diagnostics for total load interrupt and short circuit SSR, LED, alarm output (DTC)		x (optional)	x (optional)		
Alarm output for overtemperature		x (>=150A)	x (>=150A)	x (>=150A)	

ACCESSORIES

HEAT SINK KIT

Order code	Description (dimensions HxLxP)	Use	Accessories
DIS-15G	57x35x40 extruded aluminum heat sink	GS-L 10/15A	M4 screws to attach relay attachment for DIN
DIS-25G	100x24x65 extruded aluminum heat sink	GS-L 10/15A GS-T 10/20A GS 15/20/25A	
DIS-25GD	100x35x54 extruded aluminum heat sink	GS 40A GD GS-L / GS-T	
DIS-40G	100x35x100 extruded aluminum heat sink	GS 40A GS-T 10/20/25A GD 40A	
DIS-50G	100x60x100 extruded aluminum heat sink	GS≥50A GT RA	M5 screws to attach relay attachment for DIN
DIS-50G SL	100x60x100 extruded aluminum heat sink	4 GS-L	
DIS-60G	100x80x100 extruded aluminum heat sink	GS≥50A GT RA	
DIS-90G	100x126x100 extruded aluminum heat sink	GS≥50A GT RA	
DIS-908	80x126x100 extruded aluminum heat sink	GZ	
DIS-910	100x126x100 extruded aluminum heat sink	GZ	
DIS-25G-1M	extruded aluminum heat sink for mounting in batteries of multiple relays, profile as per DIS-25G L=1m		
DIS-40G-1M	extruded aluminum heat sink for mounting in batteries of multiple relays, profile as per DIS-40G L=1m		
DIS-50G-1M	extruded aluminum heat sink for mounting in batteries of multiple relays, profile as per DIS-50G L=1m		
DIS-60G-1M	extruded aluminum heat sink for mounting in batteries of multiple relays, profile as per DIS-60G L=1m		
DIS-90G-1M	extruded aluminum heat sink for mounting in batteries of multiple relays, profile as per DIS-90G L=1m		

MOV OVERVOLTAGE PROTECTION

Order code	Working voltage	Main characteristics
RV03	120-290Vac	Note: all GS and GTS series models already have the MOV protection installed
RV04	291-400Vac	
RV05	401-500Vac	

THERMOSTATS AND HEAT DETECTOR

Order code	Use	Main characteristics
T-GR	For all heat sink model	90°C thermostat + screw + support
T-GRZ	for GZ/GTZ (three-phase)	90°C thermostat
VIR-1	for temperature W12x ≥150A	Heat detector

Supports for DIN bar and panel mounting

Order code	Description	For SSR/heat sink	Accessories
DIN-2	Support for attachment to DIN rail	GTS-L5/10/15A GTS-T 10/20A GTS 15/25A DIS15G, DIS25G	Fastening
DIN-4	Support for attachmen to DIN rail with spring	W211 25/40/75/100/150A W212 25/40/75/100/150A W312 25/40/75/100/150A	
DIN-5	Support for attachmen to DIN rail with spring	GTS-L 10/15A GTS-T, GTS,GTD, GTT, GTZ DIS15G, DIS25GD, DIS25G, DIS40G, DIS50GSL, DIS60G, DIS90G, DIS908, DIS910	
F19672	Relay base with hook for DIN guide	GTS-L5/10/15A	
PAN-1	Kit for panel mounting	GTS-T, GTS, GTT, GTS-L, GTZ	nr.2 plastic supports nr.2 screws
1886001	Kit for panel mounting	Wattcor series	

ACCESSORIES

COOLING FAN KIT

Order code	Main characteristics
VEN-60	24 Vdc fan kit for DIS-50G. DIS-60G (60x60x25 fan, 24Vdc, with 4 screws, 4 plastic fastening rivets for attachment directly on heat sink (finger guard incorporated).
VEN-90	230 Vac fan for DIS-90G. DIS-910 (80x80x40 fan, 230Vac, with 4 M4 screws, 4 toothed washers, 4 plastic fastening rivets for attachment directly on heat sink that accepts relay type GS, GT ≥ 60A and RZ ≥ 40A, GTS 120A, GTT 120A (finger guard incorporated).
VEN-91	115Vac fan kit for DIS-90G. DIS-910 (80x80x40 fan, 115Vac, with 4 M4 screws, 4 toothed washers, 4 plastic fastening rivets for attachment directly on heat sink that accepts relay type GS, GT ≥ 60A and RZ ≥ 40A, GTS 120A, GTT 120A (finger guard incorporated).
VEN-92	24 Vdc fan kit for DIS-90G. DIS-910 (80x80x25 fan, 4W, with 4 M4 screws, 4 toothed washers, 4 plastic fastening rivets for attachment directly on heat sink that accepts relay type GS, GT ≥ 60A and RZ ≥ 40A, GTS 120A, GTT 120A (finger guard incorporated).

SET OF PLASTIC PLATES

Order code	Use	Main characteristics
LAB-1	For faceplate GS, GS-T, GTS, GTS-T, GT, GTT	set of 20 white plastic plates

COVERS

Order code	Use	Main characteristics
COP-GS-0	Pad-printed cover for GS-T da 10A, 20A e GS da 15A, 25A.	Press on cover
COP-GS-1	Pad-printed cover for GS-T 25A e GS40A.	Press on cover
COP-GS-2	Pad-printed cover for GS 50A, GS 60A, GS 75A, GS 90A, GS 120A.	Press on cover
COP-GD-0	Pad-printed cover for GD40	Press on cover
COP-GTS-0	Pad-printed cover for GTS-T 10A, 20A e GTS 15A, 25A	Press on cover
COP-GTS-1	Pad-printed cover for GTS-T 25A e GTS 40A.	Press on cover
COP-GTS-2	Pad-printed cover for GTS 50A, 60A, 75A, 90A, 120A	Press on cover
COP-GTD-0	Pad-printed cover for GTD-25	Press on cover
COP-GTD-1	Pad-printed cover for GTD-40	Press on cover
COP-GT-0	Pad-printed cover for GT 25A, 40A, 50A, 60A, 75A, 90A, 120A.	Press on cover
COP-GTT-0	Pad-printed cover for GTT 25A, 40A, 50A, 60A, 75A, 90A, 120A.	Press on cover
COP-GTS-L-0	Cover for GTS-L5	Press on cover
COP-GTS-L-1	Cover for GTS-L10 / GTS-L15	Press on cover
BBR	Protective cover for RA single-phase solid state relays	Press on cover

SILICONE PASTE

Order code	Use	Main characteristics
SIL-1	For mounting DIS heat sinks	High thermal conductivity 100 gr.tube

KIT TO ADAPT GTS TO GEFLEX

Order code	Use	Main characteristics
CGK-25	for adapting GTS-25A to GFX BASE 25A-40A	Includes set of copper contact reeds, pad-printed cover and cursor to mount cover to heat sink in channel.
CGK-40	for adapting GTS-40A to GFX BASE 25A-40A	
CGK-60	for adapting GTS-60A to GFX BASE 60-120A	
CGK-75	for adapting GTS-75A to GFXBASE60-120A	
CGK-90	for adapting GTS-90A to GFX BASE 60-120A	
CGK-120	for adapting GTS-120A to GFX BASE 60-120A	

ACCESSORIES

FUSES
FUSE HOLDER

Type of relay	I^2t	Rated voltage	Fuse	Size (mm)	Order code for fuse	Order code for fuse holder	Notes
GS-L / GTS-L / GTS-T / GTS / GS / GTD / GTT (single-phase with thyristor in antiparallel or Triac)							
GS-L5 / GTS-L5	45	230 440	5A	10x38	FUS-06-L	PF-10x38	removable
GS-L10 / GTS-L10	100	230 440	10A	10x38	FUS-10-L	PF-10x38	removable
GS-L15 / GTS-L15	180	230 440	15A	10x38	FUS-16-L	PF-10x38	removable
GTS-T 10	72	230	10A	10x38	FUS-010	PF-10x38	removable
GTS-T 20	315	230	25A	10x38	FUS-025	PF-10x38	removable
GTS-T 25	315	230	25A	10x38	FUS-025	PF-10x38	removable
GTS / GS 15	450	230 480	16A	10x38	FUS-016	PF-10x38	removable
GTS / GS / GTT / GT / GTD 25	645	230 480	25A	10x38	FUS-025	PF-10x38	removable
GTS / GS / GTT / GT / GTD 40	1010	230 480	40A	14x51	FUS-040	PF-14x51	removable
GTS / GS / GTT / GT 50	6600	230 480	63A	22x58	FUS-063	PF-22x58	removable
GTS / GS / GTT / GT 60	6600	230 480	80A	22x58	FUS-080	PF-22x58	removable
GTS / GS / GTT / GT 75	8000	230 480	80A	22x58	FUS-080	PF-22x58	removable
GTS / GS / GTT / GT 90	11200	230 480	100A	22x58 size 0-0-0-	FUS-100	PF-22x58	removable
GTS / GS / GTT / GT 120	11200	230 480	125A	TN/80 100x51x30	FUS-125N	PF-DIN	not removable
GTZ, GZ (3-phase with thyristor in antiparallel)							
GZ 10A	100	400	10A	10x38	FUS-10-L	PF-10x38	removable
GTZ, GZ 25A	450 645	400 480	25A	12x32	FUS-025	PF-10x38	removable
GTZ, GZ 40A	1010	480 600	40A	14x51	FUS-040	PF-14x51	removable
GTZ, GZ 55A	6600	480 600	63A	22x58	FUS-063	PF-22x58	removable
W21X / W401 (single-phase with thyristor in antiparallel)							
W21x25A	1800	660	50A	22x58	FUS-050	PF-22x58	removable
W21x40A	11200	660	63A	22x58	FUS-063	PF-22x58	removable
W21x75A	14450	660	100A	22x58	FUS-100	PF-22x58	removable
W21x100A	86200	660	250A	27x60	FUS-250	PF-27x60	removable
W21x150A	86200	660	250A	27x60	FUS-250	PF-27x60	removable
W21x250A	200000	660	450A	-	FUS-450N	-	*
W21x400A	1125000	660	630A	-	FUS-630N	-	*
W21x600A	1125000	660	900A	-	FUS-900N	-	*
W401 100A	86200	460	250A	27x60	FUS-250	PF-27x60	

* integrated on the SSR

GUIDELINES FOR PRODUCT SELECTION

LOAD TYPE

GEFRAN's range of solid state relay consists of various families of products, with single-phase and 3-phase versions, with or without aluminum heatsinks, and with logic, analog, potentiometer, and serial line control. Versions with heatsink, called "Power Solid State Relays", are designed to provide the declared rated current at 40°C room temperature (50°C for the Wattcor series) and at 100% of the control signal.
To select the best product, we advise you to begin with information on the application.
A careful check of the characteristics of the load to be controlled and of installation conditions will help you make the best choice with regard to price, performance, and duration.

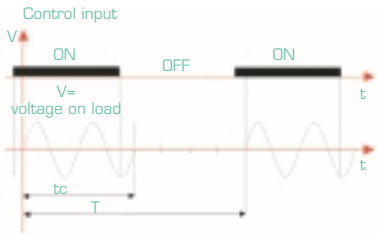
Selection of series based on load type, control signal, activation type.

			zero-crossing		Phase angle
Load type			Logic input	Analog input	Analog input ramp power-up
	Resistive elements whose ohm value does not change significantly with temperature (low heat coefficient)	Ex. chrome nickel, iron chrome nickel	GTS-L, GTS-T, GTS, GTD, GTZ, W211	GTT, W212	W312
	Resistive elements whose ohm value changes with temperature (high heat coefficient)	Ex. tungstene, molybdenum, molybdenum disilicide, platinum			W312
	Resistive elements whose ohm value changes with time	Ex. Silicon Carbide			W312
	Long-wave infrared heating elements		GTS-L, GTS-T, GTS, GTZ, W211	GTT, W212	W312
	Medium- and short-wave infrared heating elements				
	Resistive heating elements powered by transformer	Ex. molybdenum, graphite			W312
	Inductive loads in general				W312

THE BEST MODULATION FOR THE LOAD

GEFRAN solid state relays and power solid state relays are available with different types of power junction activation, based on the type of load to be switched and on the level of accuracy required for the control. These functions give the Gefran range high applicative flexibility.

"**Zero crossing**", switching for excellent control of most resistive loads without creation of electromagnetic noise.



Supplied power = Installed power xTC/T

Logic Control

"**Zero-crossing with optimized fast cycle**", switching for high-dynamic resistive loads (rapid heating systems), infrared heaters. This type of modulation transfers to the load a power proportional to an analog input signal, guaranteeing a variable cycle time optimized from 40msec to 400msec.

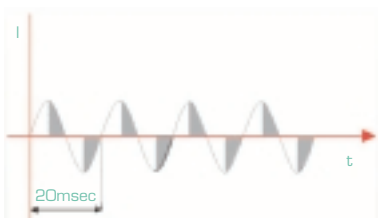
Example with input 20% = 2V (IN 0-10V)
or 4mA (IN 0-20mA)
V = voltage on load

Example with input 50% = 5V (IN 0-10V)
or 10mA (IN 0-20mA)
V = voltage on load

Analog Control

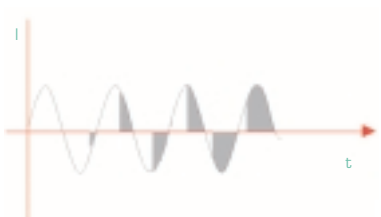
"**Phase-angle**", switching for inductive loads such as transformers, infrared heaters, normally for very accurate adjustment and very rapid heating systems. This type of modulation transfers to the load a power proportional to an analog input signal, guaranteeing a cycle time of 20msec with slicing of single sinusoidal waves on the load. The soft-start power function is available.

Example with input 50%
= 5V(IN 0-10) o 10mA (IN 0-20mA)



Analog Control

Soft Start

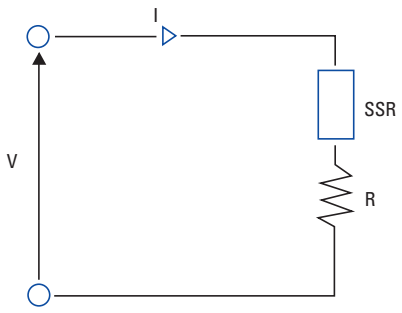


SIZING THE SSR

Once you have identified the series that offers the best modulation for the load, you should consider the following (in sequence) to select the product:

- connection scheme (single-phase, 3-phase, 3-phase with only 2 controlled phases)
- line voltage
- load power to be controlled (total power in case of 3-phase).
- type of control required (logic or analog)
- any options, such as load diagnostics

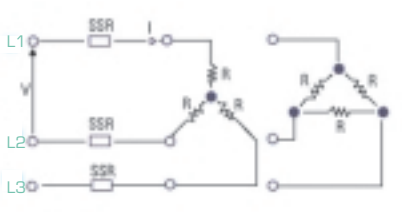
Single-phase



$$I = \frac{P}{V}$$

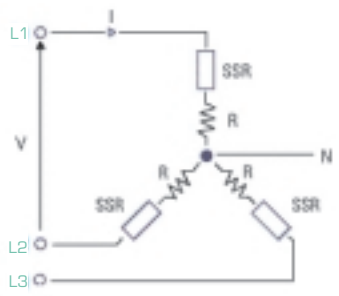
3-phase

Star without neutral or delta ("in line", or "closed")



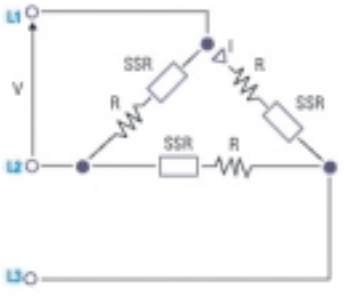
$$I = \frac{P}{V\sqrt{3}*V}$$

Star with neutral



$$I = \frac{P}{V\sqrt{3}*V}$$

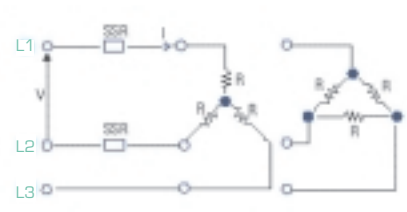
"Open" delta



$$I = \frac{P}{3*V}$$

3-Phase with two controlled phases

Star without neutral or delta ("in line", or "closed")



$$I = \frac{P}{V\sqrt{3}*V}$$

WARNING:
Even if this application works, it causes a large unbalance on the lines during switch on and switch off.

LEGEND

P= (watt) Total power on load
V= (Volt) Line voltage
I= rated current* in SSR for sizing
* In 3-phase configurations, this is the current in each branch of the load.

Rapid Selection of Power Solid State Relays

Installation on electrical panel with T=40°C (50°C for series W..). For different uses, refer to the heat curves on the product technical sheet.

HOW TO USE THE TABLES

Once you have identified the load type (single-phase/3-phase), the best modulation (zero-crossing/phase angle - table 1), the connection scheme and the line voltage, by setting the load power in kW, the type of control and any diagnostics option, you generate the order code for the power solid state relay.
For details and/or to check the application, always refer to the product technical manual or contact Gefran.

SINGLE-PHASE LOAD 230V

ZERO CROSSING								PHASE ANGLE
Total load power up to [kW]	Current I [A]	CODE	logic control + HB diagnostic	+ RPC/DTC diagnostic		analog control + HB diagnostic	+ RPC/DTC diagnostic	analog control
1	4	GTS-L 5 230	GTD 25 480 0					

SINGLE-PHASE LOAD 230V

		ZERO CROSSING						PHASE ANGLE
Total load power up to [kW]	Current I [A]	CODE	logic control + HB diagnostic	+ RPC/DTC diagnostic		analog control + HB diagnostic	+ RPC/DTC diagnostic	analog control
1	4	GTS-L 5 230	GTD 25 480 0					
2	9	GTS-L 10 230 GTS-T 10 230	GTD 25 480 0					
3	13	GTS-L 15 230 GTS 15 230	GTD 25 480 0					
4,5	20	GTS-T 20 230	GTD 25 480 0					
5,5	24	GTS-T 25 230 GTS 25 230	GTD 25 480 0	W211 025 660 ... xxx	GTT 25 480 0	GTT 25 480 1	W212 025 660 ... xxx	W312 025 660 ... xxx
9	39	GTS 40 230	GTD 40 480 0	W211 040 660 ... xxx	GTT 40 480 0	GTT 40 480 1	W212 040 660 ... xxx	W312 040 660 ... xxx
11,5	50	GTS 60 230		W211 075 660 ... xxx	GTT 50 480 0	GTT 50 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
13,5	59	GTS 60 230		W211 075 660 ... xxx	GTT 60 480 0	GTT 60 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
17	74	GTS 75 230		W211 075 660 ... xxx	GTT 75 480 0	GTT 75 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
20,5	89	GTS 90 230		W211 100 660 ... xxx	GTT 90 480 0	GTT 90 480 1	W212 100 660 ... xxx	W312 100 660 ... xxx
27,5	120	GTS 120 230		W211 150 660 ... xxx	GTT 120 480 0	GTT 120 480 1	W212 150 660 ... xxx	W312 150 660 ... xxx
34,5	150	W211 150 660		W211 150 660 ... xxx	W212 150 660		W212 150 660 ... xxx	W312 150 660 ... xxx
57,5	250	W211 250 660		W211 250 660 ... xxx	W212 250 660		W212 250 660 ... xxx	
92	400	W211 400 660		W211 400 660 ... xxx	W212 400 660		W212 400 660 ... xxx	
138	600	W211 600 660		W211 600 660 ... xxx	W212 600 660		W212 600 660 ... xxx	

SINGLE-PHASE LOAD 400V

		ZERO CROSSING						PHASE ANGLE
Total load power up to [kW]	Current I [A]	CODE						
			logic control			analog control		analog control
			+ HB diagnostic	+ RPC/DTC diagnostic		+ HB diagnostic	+ RPC/DTC diagnostic	
2	5	GTS-L 5 440	GTD 25 480 0					
4	10	GTS-L 10 440	GTD 25 480 0					
6	15	GTS-L 15 440 GTS 15 480	GTD 25 480 0					W312 025 660 ... xxx
10	25	GTS 25 480	GTD 25 480 0	W211 025 660 ... xxx	GTT 25 480 0	GTT 25 480 1	W212 025 660 ... xxx	W312 040 660 ... xxx
16	40	GTS 40 480	GTD 40 480 0	W211 040 660 ... xxx	GTT 40 480 0	GTT 40 480 1	W212 040 660 ... xxx	W312 075 660 ... xxx
20	50	GTS 50 480		W211 075 660 ... xxx	GTT 50 480 0	GTT 50 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
24	60	GTS 60 480		W211 075 660 ... xxx	GTT 60 480 0	GTT 60 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
30	75	GTS 75 480		W211 075 660 ... xxx	GTT 75 480 0	GTT 75 480 1	W212 075 660 ... xxx	W312 100 660 ... xxx
36	90	GTS 90 480		W211 100 660 ... xxx	GTT 90 480 0	GTT 90 480 1	W212 100 660 ... xxx	W312 150 660 ... xxx
48	120	GTS 120 480		W211 150 660 ... xxx	GTT 120 480 0	GTT 120 480 1	W212 150 660 ... xxx	W312 150 660 ... xxx
60	150	W211 150 660		W211 150 660 ... xxx	W212 150 660		W212 150 660 ... xxx	
100	250	W211 250 660		W211 250 660 ... xxx	W212 250 660		W212 250 660 ... xxx	
160	400	W211 400 660		W211 400 660 ... xxx	W212 400 660		W212 400 660 ... xxx	
240	600	W211 600 660		W211 600 660 ... xxx	W212 600 660		W212 600 660 ... xxx	

3-PHASE LOAD 400V

		ZERO CROSSING							PHASE ANGLE
		STAR with neutral, DELTA in line							STAR with neutral
		CODE							
		Logic control				Analog control (*)			Analog control
Total load power up to [kW]	Current I [A]	1 controlled phase	3 controlled phases	1 controlled phase + HB diagnostic	1 controlled phase + RPC/DTC diagnostics	1 controlled phase	1 controlled phase + HB diagnostic	1 controlled phase + RPC/DTC diagnostics	1 controlled phase
3,5	5	GTS-L 5 440		GTD 25 480 0					
7	10	GTS-L 10 440		GTD 25 480 0					
		GTS-L 15 440							
10,5	15	GTS 15 480		GTD 25 480 0					
17,5	25	GTS 25 480	GTZ 25 400	GTD 25 480 0	W211 025 660 ... xxx	GTT 25 480 0	GTT 25 480 1	W212 025 660 ... xxx	W312 025 660 ... xxx
28	40	GTS 40 480	GTZ 40 480	GTD 40 480 0	W211 040 660 ... xxx	GTT 40480 0	GTT 40480 1	W212 040 660 .. xxx	W312 040 660 .. xxx
34,5	50	GTS 50 480	GTZ 55 480		W211 075 660 ... xxx	GTT 50 480 0	GTT 50 480 1	W212 075 660 .. xxx	W312 075 660 .. xxx
38,0	55	GTS 60 480	GTZ 55 480		W211 075 660 ... xxx	GTT 60 480 0	GTT 60 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
41,5	60	GTS 60 480			W211 075 660 ... xxx	GTT 60 480 0	GTT 60 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
52	75	GTS 75 480			W211 075 660 ... xxx	GTT 75 480 0	GTT 75 480 1	W212 075 660 .. xxx	W312 075 660 .. xxx
62,5	90	GTS 90 480			W211 100 660 ... xxx	GTT 90 480 0	GTT 90 480 1	W212 100 660 .. xxx	W312 100 660 .. xxx
69	100	GTS 120 480			W211 100 660 ... xxx	GTT 120 480 0	GTT 120 480 1	W212 100 660 ... xxx	W312 100 660 ... xxx
83	120	GTS 120 480			W211 150 660 ... xxx	GTT 120 480 0	GTT 120 480 1	W212 150 660 ... xxx	W312 150 660 ... xxx
109	157	W211 150 660			W211 150 660 ... xxx	W212 150 660 ... xxx		W212 150 660 .. xxx	W312 150 660 .. xxx
173	250	W211 250 660			W211 250 660 ... xxx	W212 250 660 .. xxx		W212 250 660 .. xxx	
277	400	W211 400 660			W211 400 660 ... xxx	W212 400 660 .. xxx		W212 400 660 ... xxx	
416	600	W211 600 660			W211 600 660 ... xxx	W212 600 660 ... xxx		W212 600 660 ... xxx	

* 1 GTT master + 2 GTS slaves can be used for analog control,
3 GTTs (1 master + 2 slaves) must be used for analog control and RPC function)

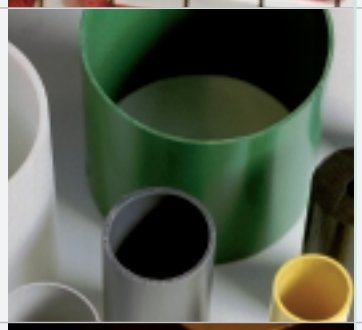
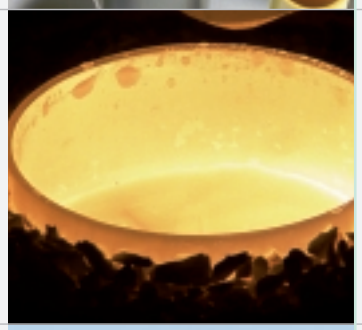
		Open TRIANGLE							Open TRIANGLE
		CODE							
		Logic Control				Analog control (*)			Analog control
Total load power up to [kW]	Current I [A]	1 controlled phase	3 controlled phases	1 controlled phase + HB diagnostic	1 controlled phase + RPC/DTC diagnostics	1 controlled phase	1 controlled phase + HB diagnostic	1 controlled phase + RPC/DTC diagnostics	1 controlled phase
6,5	5	GTS-L 5 440		GTD 25 480 0					
12	10	GTS-L 10 440		GTD 25 480 0					
		GTS-L 15 440							
18	15	GTS 15 480							
30	25	GTS 25 480	GTZ 25 400	GTD 25 480 0	W211 025 660 ... xxx	GTT 25 480 0	GTT 25 480 1	W212 025 660 ... xxx	W312 025 660 ... xxx
48	40	GTS 40 480	GTZ 40 480	GTD 25 480 0	W211 040 660 ... xxx	GTT 40480 0	GTT 40480 1	W212 040 660 .. xxx	W312 040 660 .. xxx
60	50	GTS 50 480	GTZ 55 480	GTD 40 480 0	W211 075 660 ... xxx	GTT 50 480 0	GTT 50 480 1	W212 075 660 .. xxx	W312 075 660 .. xxx
65	54	GTS 60 480	GTZ 55 480		W211 075 660 ... xxx	GTT 50 480 0	GTT 50 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
72	60	GTS 60 480			W211 075 660 ... xxx	GTT 60 480 0	GTT 60 480 1	W212 075 660 ... xxx	W312 075 660 ... xxx
90	75	GTS75 480			W211 075 660 ... xxx	GTT 75 480 0	GTT 75 480 1	W212 075 660 .. xxx	W312 075 660 .. xxx
108	90	GTS 90 480			W211 100 660 ... xxx	GTT 90 480 0	GTT 90 480 1	W212 100 660 .. xxx	W312 100 660 .. xxx
120	100	GTS 120 480			W211 100 660 ... xxx	GTT 120 480 0	GTT 120 480 1	W212 100 660 ... xxx	W312 100 660 ... xxx
144	120	GTS 120 480			W211 150 660 ... xxx	GTT 120 480 0	GTT 120 480 1	W212 150 660 ... xxx	W312 150 660 ... xxx
180	150	W211 150 660			W211 150 660 ... xxx	W212 150 660 ... xxx		W212 150 660 .. xxx	W312 150 660 .. xxx
300	250	W211 250 660			W211 250 660 ... xxx	W212 250 660 .. xxx		W212 250 660 .. xxx	
480	400	W211 400 660			W211 400 660 ... xxx	W212 400 660 .. xxx		W212 400 660 ... xxx	
720	600	W211 600 660			W211 600 660 ... xxx	W212 600 660 ... xxx		W212 600 660 ... xxx	

* 1 GTT master + 2 GTS slaves can be used for analog control,
  3 GTTs (1 master + 2 slaves) must be used for analog control and RPC function)

DIAGNOSTICS FUNCTION

CODE	DESCRIPTION	FUNCTION	SERIES				
			GS,GTS	GD,GTD	GT,GTT	GZ,GTZ	WATTCOR
HB RPC	Detects total and partial load interrupt	With continuous reading of load current, with CT integrated in the power solid state relay, and a settable current limit, total load interrupt (no current) and partial load interrupt (reduced load current) can be detected. Detects interruption of a single element in a battery of elements connected in parallel. Any current variations due to line voltage variations are compensated (GTT and WATTCOR).		x	x (opt)		W211, W212 x (opz.)
HB	SCR in short circuit	Detects passage of current in case of control to OFF, which corresponds to condition of junction in short circuit		x			
DTC	Detects total load interrupt and SCR in short-circuit	Detects total lack of load current (load interrupt, fuse break, junction open,...) Detects junction in short circuit.					W211, W212 x (opt)
	Overtemperature of power thyristor	Signals junction overheat.	x(>=50A)	x(opt)	x	x	
	Overtemperature of heatsink	Signals heatsink overheat		with external accessories			W211, W212 W312 x(>=150A)
	Output alarm	Alarm contact		x	x(opt)	x(opt)	x(opt)
	Fuse break microswitch	Alarm contact					W211, W212 x(>=250A)

APPLICATIONS

PACKAGING		PHARMACEUTICAL	
EXTRUSION		BLOW MOLDING	
HEAT TREATMENT		FURNACES FOR GLASS	
SEMICONDUCTORS		HOT CHANNELS	
THERMOFORMING		INJECTION	

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