



### Main application

- Machines and lines for processing silicon for solar cells and semiconductors
- PET blowing machines and lines
- Plastic welding machines for the automotive industry
- Coating, screen printing and drying lines
- Cooking and sanitizing ovens for the food industry
- Wood binding machines
- Glass bending and tempering lines
- Applications with IR SWIR lamps

### Main features

- Current sizes 16, 32, 40 Amps per channel
- Integrated current transformers
- Fuses with fuse-holder disconnectors on the front (option)
- 4 universal process inputs ( TC, RTD, mA, V )
- 4 independent hot/cold PIDs
- 4 main outputs (directly connected to the static unit)
- 4 auxiliary analogue inputs (option)
- 4 settable outputs (option): relay/logic/TRIAC/analogue
- 2 settable relay outputs
- 2 settable digital inputs
- Modbus RTU communication port
- Communication port for Fieldbus (option): Profinet, Profibus DP, Ethernet IP, EtherCAT, Modbus TCP/RTU, CANopen, DeviceNET
- ODVA (Ethernet/IP) and PI (ProfiNET) certification
- DIN rail or panel mounting
- CE, UL, CSA certifications and SCCR UL 508 100KA approval

### PROFILE

GFX4-IR series four-channel power and temperature controllers are a condensate of advanced control technology and functionality in an extremely small space. An "all-in-one" solution that saves large amounts of space in electrical panels or on board the associated machines, with a drastic reduction of wiring and engineering and start-up times for electric heating systems.

A large number of devices, already interconnected, calibrated and ready to use, are concentrated on a single block with a surface area of only 110x110mm:

- 4 universal electric power controllers
- 4 PID temperature controllers
- 4 SCRs with heat sink for currents up to 40 A per channel
- A processor-controlled cooling fan
- 4 current transformers ( TA )
- 4 extra-rapid fuses with 4 fuse-holder disconnectors at the front
- a Modbus RTU communication port
- a communication port for the most popular fieldbuses

### CONFIGURABILITY

Configurability is complete at all levels, for control signals, SCR control mode, feedback functions and available hardware and software resources.

The device can handle loads such as

linear and non-linear resistors with high thermal coefficients, such as molybdenum disilicon (MoSi<sub>2</sub>), silicon carbide (SiC), all types of infrared lamps (SWIR, MWIR, LWIR), single-phase and three-phase transformers, and graphite heating elements.

### CONTROL

Retroactive feedback functions V, V<sub>2</sub>, I, I<sub>2</sub> and P cover all types of non-linear load control, with adjustable current limits for current peaks, RMS values and different soft-start modes.

These functions compensate for different values and/or line fluctuations and ageing of the heating elements, and ensure that loads always receive the required energy, as calculated in the design phase.

Each of the four control channels can operate completely independently and can be used as an intelligent power actuator, which receives the power value to be supplied by an external PID with analogue signals or Fieldbus, or can use the internal PID functions to regulate temperature loops independently, always providing HMI and external supervisors with multiple process and diagnostic information.

### DIAGNOSTICS

Diagnostic capabilities operate on temperature, current and voltage loops and include:

#### Current Diagnostics

- Interrupted, total and partial load alarm
- Alarm threshold self-learning function for interrupted load.
- SCR short circuit alarm
- Short circuit or surge load alarm
- Unbalanced three-phase line alarm

#### Voltage Diagnostics

- Phase loss alarm in three-phase configurations
- Correct phase sequence control

#### Temperature Diagnostics

- Overheating alarm

In addition, alarm thresholds connected to temperature loops or auxiliary analogue variables can be set for both linear and temperature signals.

### DEVICE CONFIGURATION

The great flexibility permitted by multiple functions does not affect the simplicity of configuration using the universal tool GF<sub>express</sub>, which provides a special "Smart configuration" mode based on a few questions about the application capable of preconfiguring the controller without knowing the meaning of the parameters and bringing the device to a safe first power-on.

With the GF\_express tool, always updated on the site [www.gefran.com](http://www.gefran.com), you can save entire machining recipes, monitor variables with the oscilloscope function, and configure parameters with simplified wizard pages.

GFX4-IRs are supplied with some of the most widely used initial configurations, which can be called up whenever necessary.

## MODELS

(see table in order code)

3 different sizes, depending on the electric power managed, are available.

### GFX4-IR 80

Maximum contemporaneous power up to 80kW@480V.

Each zone can manage up to 19,2 kW.

This limit can be extended to 27,3 kW using the "smart power management" (not all the zone contemporaneous).

Nominal current 40A for zone, not contemporaneous maximum 57A.

### GFX4-IR 60

Maximum contemporaneous power up to 60kW@480V.

Each zone could reach up to 15,3 kW.

Nominal current 32A for zone (UL30A).

Fuse holder could be provided as an option.

### GFX4-IR 30

Maximum contemporaneous power up to 30kW@480V.

Each zone could reach up to 7,6 kW.

Nominal current 16A for zone. Fuse holder could be provided as an option.

## INPUTS

### Process analogue

4 universal process input can accept:

- thermocouple
- thermoresistance
- linear current & voltage.

Input type can be selected by software, no external devices are required.

### Digital

2 digital input.

The function can be selected from a wide range, including setpoint selection, MAN/AUTO, alarm memory reset and many other.

### Incorporated CT

Four CTs are integrated in the product to control currents delivered to each zone and to manage the related alarms (HB...).

### Auxiliary analogue (option)

4 further analogue inputs are available, typically for external current transformer reading.

## OUTPUTS

Output alarms configurable via software.

### Heating control

For each zone, the heating control is internally linked to the power output, no other connections are necessary.

### Cooling control (option)

For each zone, one of five types of cooling output is available:- relay, logic, triac or continuous and analog.

A current transformer is furnished with TRIAC output.

### Alarms

Two relay outputs are available, configurable as minimum or maximum alarms.

### LEDs

Eight monitoring led are available in order to provide diagnostic information.

RN	RUN state of the CPU
ER	error
DI1	DI1 digital input state
DI2	DI2 digital input state
O1	Output 1 state
O2	Output 2 state
O3	Output 3 state
O4	Output 4 state

By default a different meaning is applicable.

## POWER

The solid-state power unit (SSR) is integrated in the product. The SSR is built with 4 pairs of SCR in antiparallel.

### Configurable start-up modes

**ZC** - Zero Crossing constant cycle time (settable in range 1-200sec)

**BF** - Burst Firing variable cycle time (GTT)

**HSC**- Half Single Cycle corresponds to Burst Firing that manages single semi-cycles of conduction or stop cycles.

Useful for reducing flicker with short wave IR loads (applied only to single-phase load or 3-phase open delta 6 leads)

**PA** - Phase Angle that manages the firing angle.

### Load type:

- 4 single-phase
- 3 independent single-phase in open delta
- 1 3-phase open delta, 6 leads
- 1 3-phase delta, 3 leads
- 1 3-phase star without neutral, 3 leads
- 1 3-phase star with neutral, 4 leads

## SHORT CIRCUIT PROTECTION

Products listed in table "UL508 SCCR FUSES TABLE" are suitable for use on a circuit capable of delivering not more than 100,000 A rms Symmetrical Amperes, 480 Volts maximum when protected by fuses. Use fuses only

According to UL508, test at 100.000A were carried out with class J fuses or RK5 rated xxxA (refer to table "SCCR fuse protection table" to details of the current size

fuses for the fuse).

After a shortcircuit the functioning of the device is not guaranteed.

After a short circuit the operation of the device is not guaranteed. To guarantee the functioning of the device after the short circuit, it is recommended the use of extra rapid fuses as in table "EXTRARAPID FUSES".

### ATTENTION:

The opening of the branch-circuit protective device may be an indication that a fault has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the device should be examined and replaced if damaged. If burnout of the device occurs, the complete device must be replaced or equivalent.

### FUSES (OPTION)

The fuses are orderable on the GFX4-IR 30KW and 60kW model.

Thanks to this, you save time, wiring is simplified, and dimensions in the panel are reduced.

## PROGRAMMING

The module is configured by setting simple parameters.

No knowledge of programming language is required.

The module can be configured in various ways:

- using GFX-OP
- using GF\_express tool software
- using Industrial PC or PLC.

## FUNCTIONS

### Control

The Geflex control algorithm works with any type of thermal process.

Different control modes are available: from a simple ON/OFF control to PID single or double acting heat/cool (for cooling, simply indicate the fluid used).

Sophisticated and efficient automatic tuning algorithms for control parameters provide precise process control without the presence of an operator.

### Alarms

There are 8 alarm assignable to each single channel or to all (AND / OR logic) and configurable as absolute, relative, direct, reverse, window, latching or not, inhibit at power-on.

### Diagnostics

Geflex assures efficient process monitoring from a thermal and electrical point of view, allowing the operator to foresee breakdowns or malfunctions and take timely action (for example, in case the temperature safety limit is exceeded, broken probe, load fault).

The LBA alarm precisely checks the control loop.

### Current read (RMS)

- HB alarm load interrupted or partially interrupted
- Calibration of HB alarm threshold via automatic procedure starting from load current level.  
Alarm threshold is determined from settable %  
(ex.: if measured current =10A and %=20, HB alarm threshold = 8A)  
The procedure includes:
  - start of requested power to maximum
  - sampling of load current
  - return to previous requested power level for 3-phase load, three separate alarm thresholds
- SCR in short circuit alarm
- Load in short circuit or overcurrent alarm
- Unbalanced 3-phase load

### Voltage read (RMS)

- Incorrect phase rotation diagnosis in 3-phase configuration.
- Phase loss alarm in 3-phase load configuration
- Over temperature alarm

The software can be used to define the state of alarm outputs or a preset power level to be supplied in case of broken probe. This assures continuity of service in the individual zone.

### Tuning

- Self-tuning: calculation of PID parameters at system start.
- Auto-tuning continuous: continuous adjustment of PID
- Autotuning one-shot: output modulation and event-driven automatic PID parameters re-calculation

### Special functions

- Software Off: disabling of the control, outputs are turned off.
- Inputs/outputs: direct management of inputs/outputs, independently from internal firmware.
- Simulation of four independent Geflex units.
- Smart power management.
- Option:
  - Soft start at timed power-on with or without control of maximum current reactivation after a settable shut-off time.
  - Current limit
  - DT: Delay Triggering 0-90° on first cycle (for inductive loads in modality ZC or BF)
- Option for PA
  - Soft start at timed power-on with or without control of maximum current reactivation after a settable shut-off time.
  - Soft stop at times power-off
- Feedback modes:

### V or V<sup>2</sup>

- Voltage feedback with maximum

voltage limit: controls by maintaining constant voltage on the load (proportional to P%\_pid) regardless of changes in line voltage

### I or I<sup>2</sup>

- Current feedback with maximum current limit: controls by maintaining constant current on the load (proportional to P%\_pid) regardless of changes in line voltage or load impedance

### P

- Power feedback with maximum power limit: controls by maintaining constant power on the load (proportional to P%\_pid) regardless of changes in line voltage or load impedance.

You have to set the autocalibration parameter each time you change feedback mode.

## DIGITAL COMMUNICATION

The product is furnished with standard digital communication [PORT 1] used as GFX4 connection to a HMI or Industrial PC.

Also by a dedicated connector (10 pins) it's possible to connect the actual range of Geflex.

A second standard digital communication (PORT 2) configurable by most popular protocol: CANopen, Euromap66, DeviceNet, Profibus DP, Modbus RTU Modbus TCP, Ethernet IP, EtherCAT, ProfiNET is available as option.

### Net address

Assigned by two rotative selectors.

## INPUTS

### IN1...IN4 [process analog inputs]

Connector: J4

Function: default process variable (configurable)

Sampling time: 120msec the four inputs  
Accuracy: 0,2% FS ±1 steps at 25°C.  
(16000 points)

Thermal drift: 0,005% FS/°C

Type

- *Thermocouples ITS90*: J, K, R, S, T, custom (IEC584-1, CEI EN 60584-1, 60584-2). Internal cold junction compensation with automatic compensation.

Selectable temperature range: °C/°F

- *Thermoresistance*: Pt100 DIN 43760

Max. resistance 20Ω

Selectable temperature range: °C/°F

- *Voltage*: range 0/12...60mV, Ri > 1MΩ  
0/0,2...1V, Ri > 1MΩ custom 60mV at 32 sections

- *Current*: range 0/4...20mA, Ri = 50Ω  
custom 20mA at 32 sections

### IN5...IN8 [auxiliary analogue inputs]

Connector: J3

Function: default analog inputs reading

Sampling time: 480msec per TC, voltage  
Accuracy: 1% FS ±1 steps at 25°C.

Type

- *Thermocouple ITS90*: J, K, R, S, T, custom (IEC584-1, CEI EN 60584-1, 60584-2).

Internal cold junction compensation with automatic compensation.

- *Voltage*: range 0/12...60mV, Ri > 1MΩ  
Measurement of line Voltage and Current

- RMS current measurement function  
Load current read; minimum measurable current: 2A (30kW model), 4A (60kW model), 6A (80kW model)

- Accuracy of RMS current measurement 2% f.s. at room temperature of 25°C in ZC and BF firing modes; 3% f.s. in PA mode with phase angle >90°, 10% f.s. with phase angle <90°

- RMS voltage measurement function  
Line voltage read; (acquisition of voltage values is valid for voltage in range 90...530VAC)

- Accuracy of RMS voltage measurement 1% f.s. with neutral connected; 3% f.s. without neutral.

- Current and voltage sampling time 0.25 ms

### DI1, DI2 [digital inputs]

Connector: J2

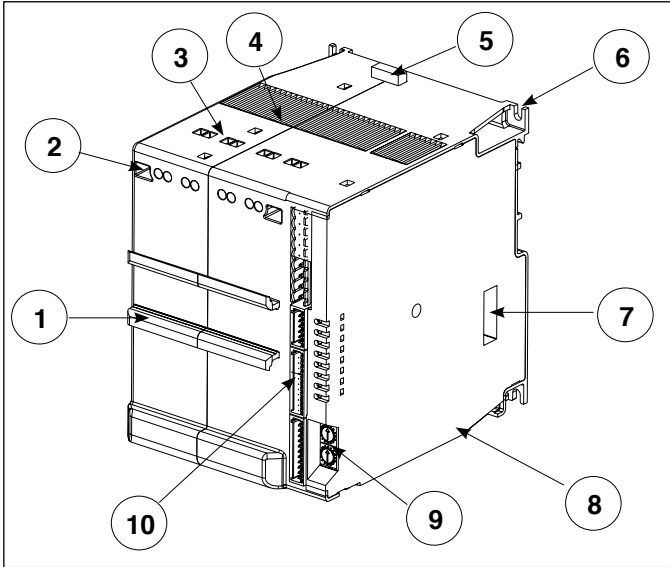
Function: default not enable (configurable)

Type

PNP, 24Vdc, 8mA (isol. 3500V)

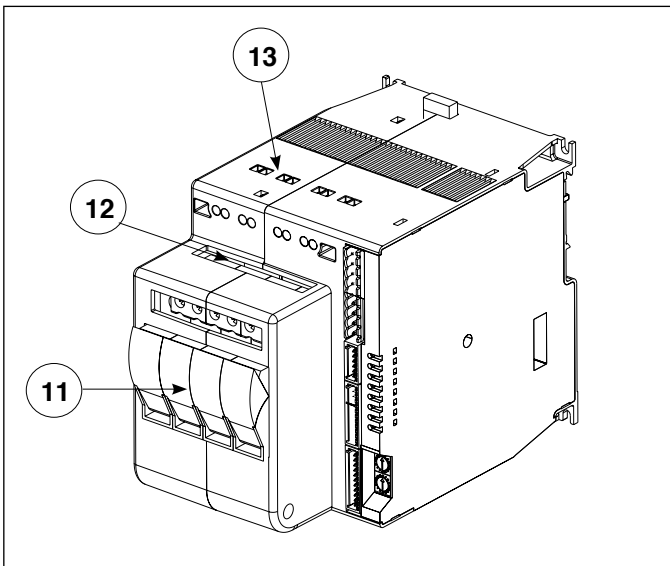
## GENERAL DESCRIPTION

Figure 1



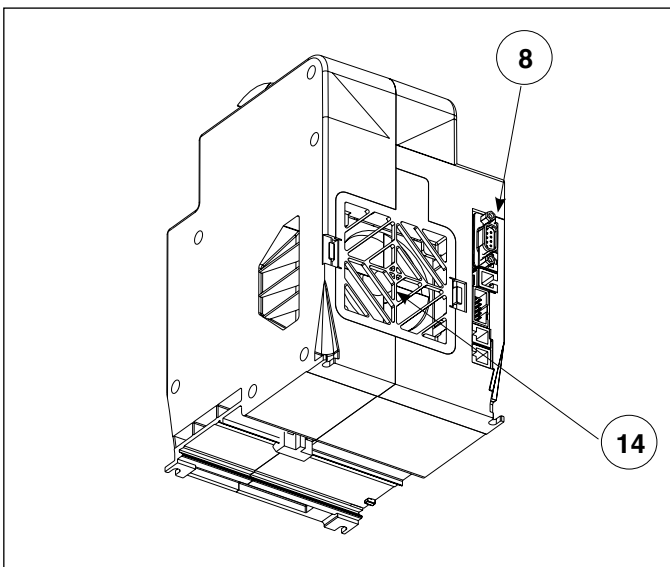
- 1 DIN bar for modules, for example, signal converters (only on models without fuse holders).
- 2 access for screwdriver to power connector screws
- 3 power connection terminals
- 4 ventilation grill: DO NOT OBSTRUCT
- 5 cursor for insertion/removal of DIN bar attachment
- 6 screw seats for fastening module on plate
- 7 dip switches for function configuration
- 8 connectors for communication ports (Port1, Port2)
- 9 rotary switches for setting node address or number
- 10 signal and power supply connectors (J1, J2, J3, J4)

Figure 2



11. fuse holder (only for models 30KW and 60KW)
- 12 terminals for fuse holder connection (F1, F2, F3, F4/N)
13. terminals for load power connection (U1, U2, U3, U4)

Figure 3



14. ventilation air intake grill: DO NOT OBSTRUCT

### Trigger modes

The GFX4-IR provides the following power control modes:

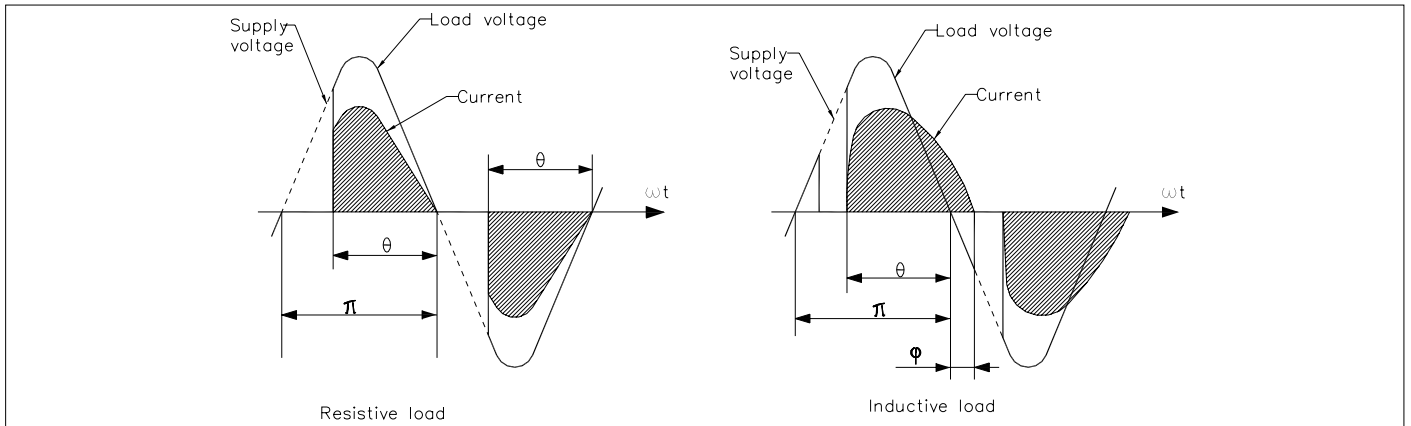
- modulation via variation of phase angle: PA modality
- modulation via variation of number of conduction cycles with "zero crossing" trigger": ZC, BF, HSC modality.

#### PA - Phase angle

This mode manages power on the load by modulating load phase angle  $\theta$

ex: if power to be transferred to the load is 100%,  $\theta = 180^\circ$

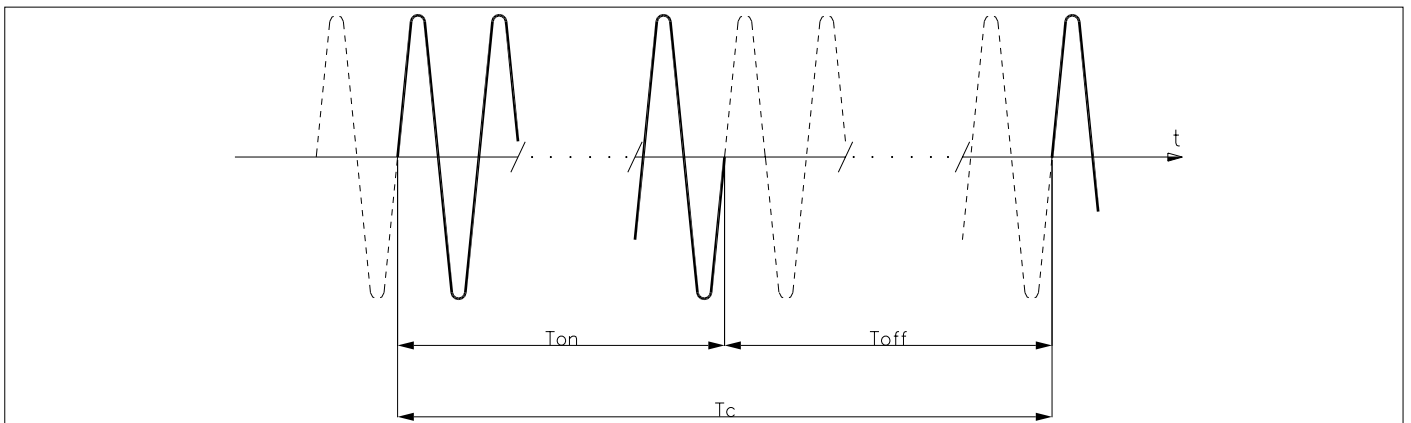
ex: if power to be transferred to the load is 50%,  $\theta = 90^\circ$



#### Zero Crossing mode

This function eliminates EMC noise. This mode controls power on the load via a series of conduction ON and non conduction OFF cycles.

ZC - constant cycle time ( $T_c \geq 1$  sec, settable from 1 to 200 sec) Cycle time is divided into a series of conduction and non conduction cycles in proportion to the power value to be transferred to the load.

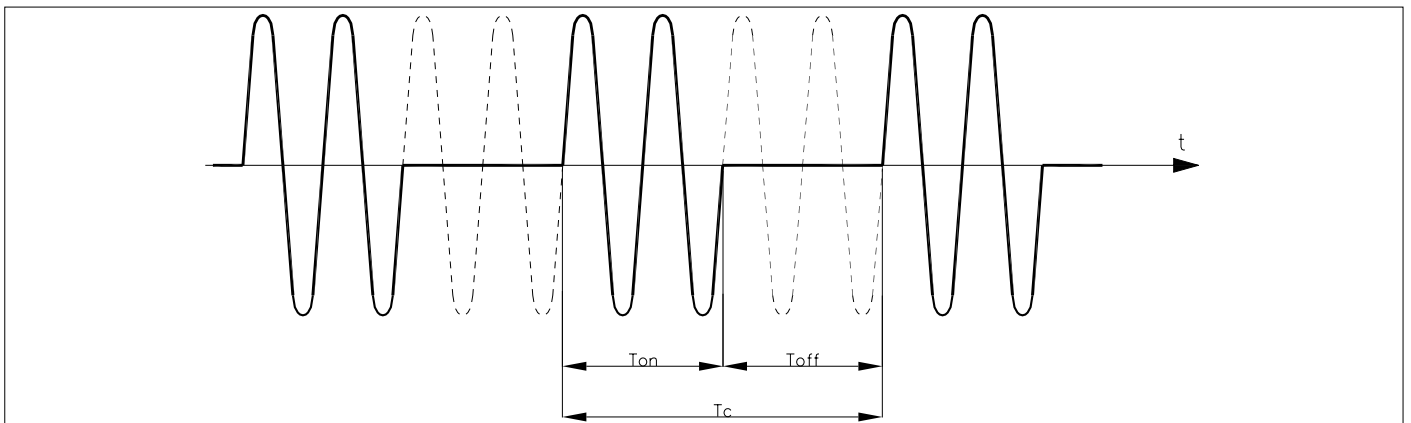


For example, if  $T_c = 10$ sec, if the power value is 20% there is conduction for 2 sec (100 conduction cycles @ 50Hz) and non conduction for 8 sec (400 non conduction cycles @ 50Hz).

#### BF - variable cycle time (GTT)

This mode controls power on the load via a series of conduction ON and non conduction OFF cycles. The ratio of the number of ON cycles to OFF cycles is proportional to the power value to be supplied to the load.

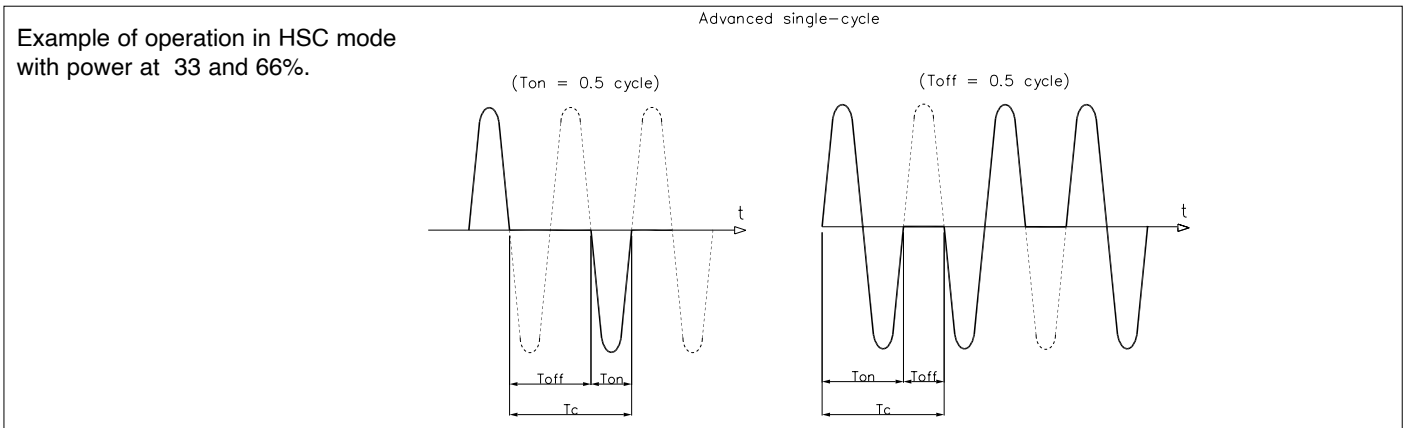
The CT repeat period is kept to a minimum for each power value (whereas in ZC mode the period is always fixed and not optimized).



Example of operation in BF mode with power at 50%. A parameter defines the minimum number of conduction cycles settable (from 1 to 10). In the example, this parameter = 2.

### HSC - Half single cycle

This mode corresponds to Burst Firing that includes single conduction cycles and half non-conduction cycles.



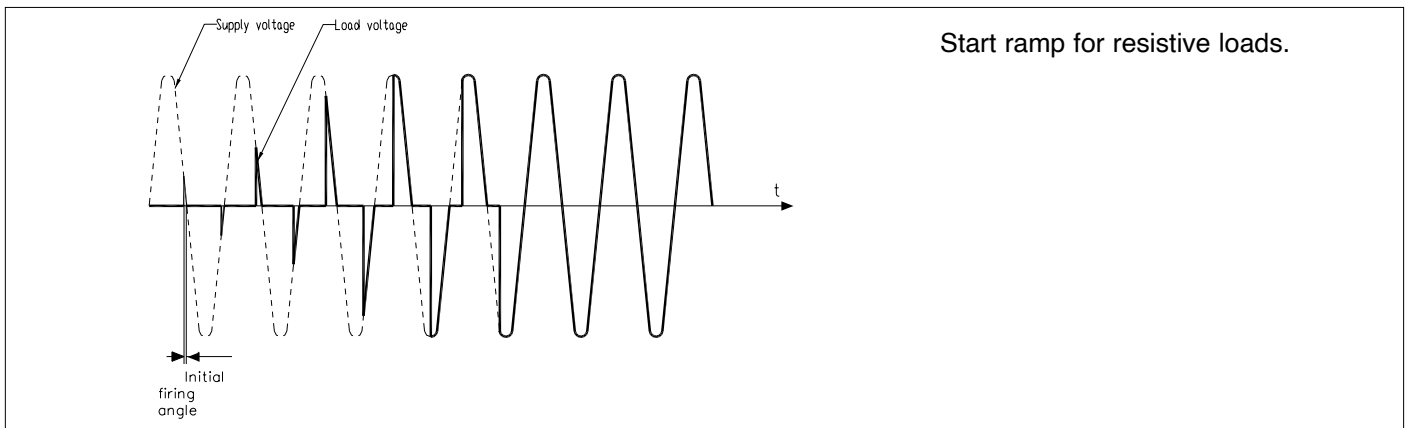
### Softstart or Ramp at power-on

This type of start can be enabled in either phase control or pulse train mode.

With phase control, the increment of firing angle  $\theta$  stops at the corresponding power value to be transferred to the load.

The control of maximum current spike can be enabled during the ramp phase (this is useful in case of short circuit on the load or loads with other temperature coefficients to automatically adjust the start time of the load).

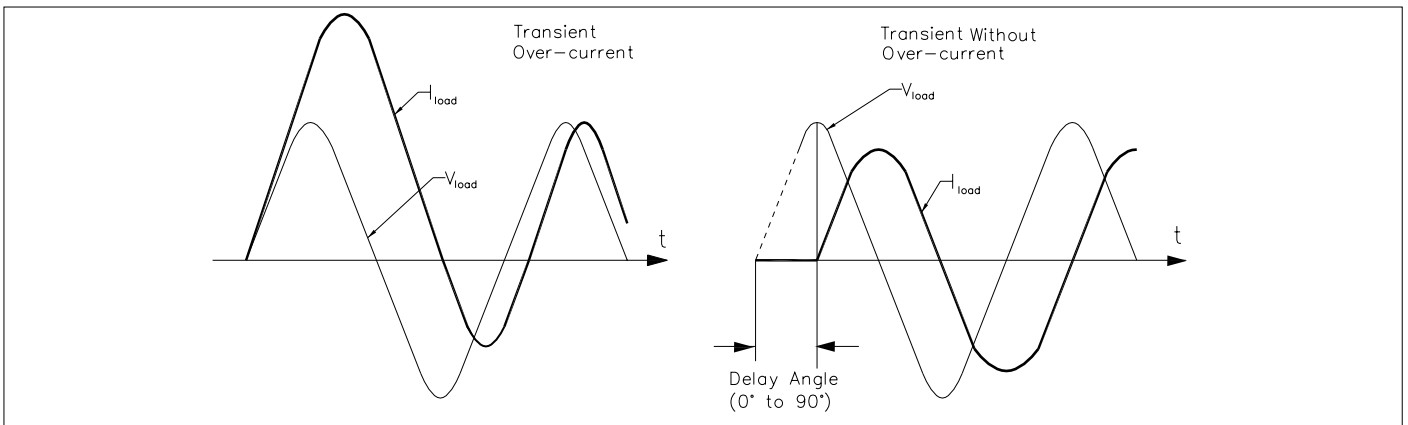
The ramp is automatically re-enabled if the GFX4-IR remains off for a (settable) time.



### DT - "Delay triggering" of first cycle (only for control modes ZC, BF)

Settable from  $0^\circ$  to  $90^\circ$ .

Useful for inductive loads (transformer primaries) to prevent current spike that could in certain cases trip the high-speed fuses that protect the SCRs.



## DIMENSIONS - INSTALLATION

Fastening may be done on DIN guide (EN50022) or with (5MA). See Figure 1 and Figure 2. All dimensions are expressed in mm.

Figure 4 Model without fuse holder

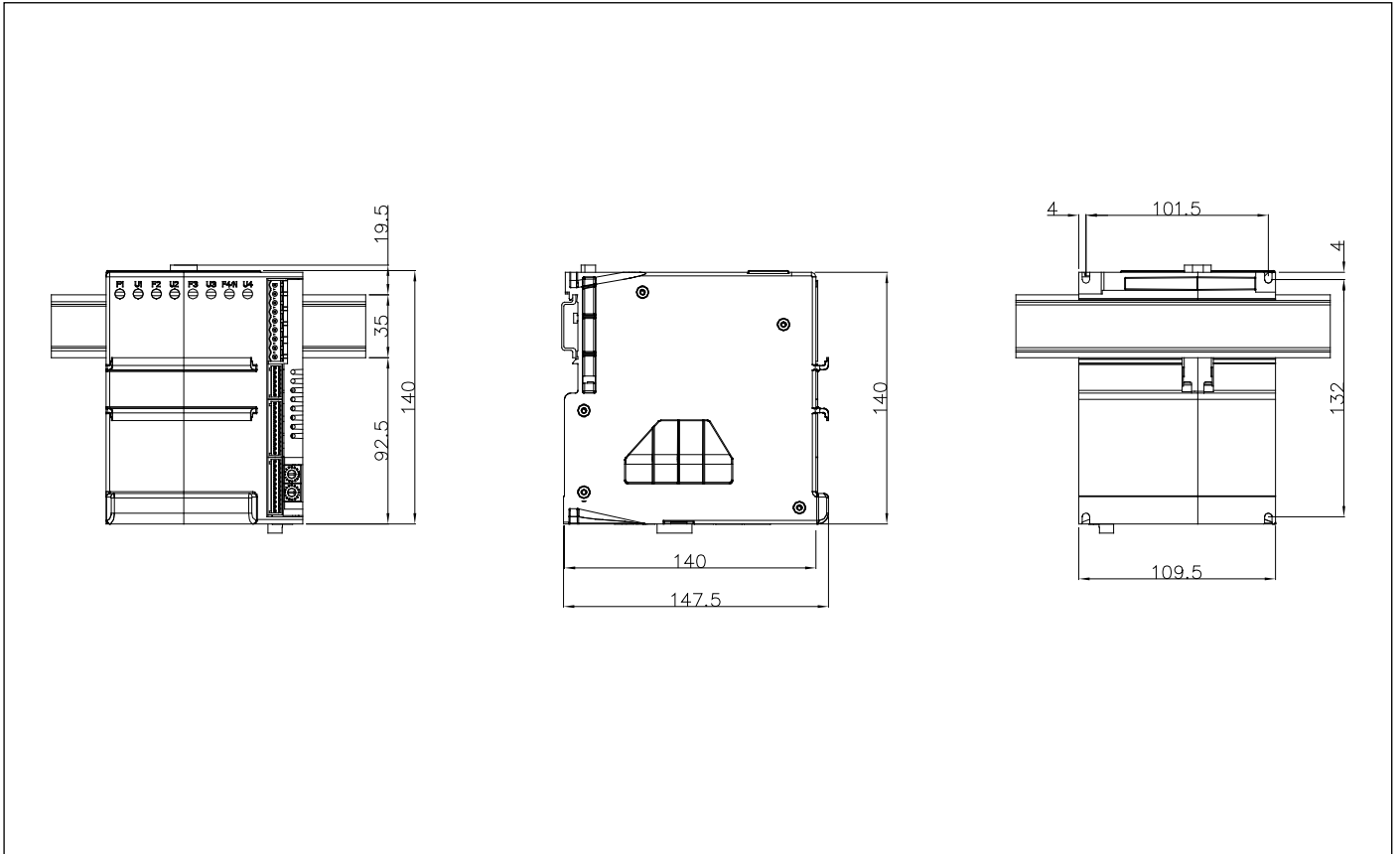
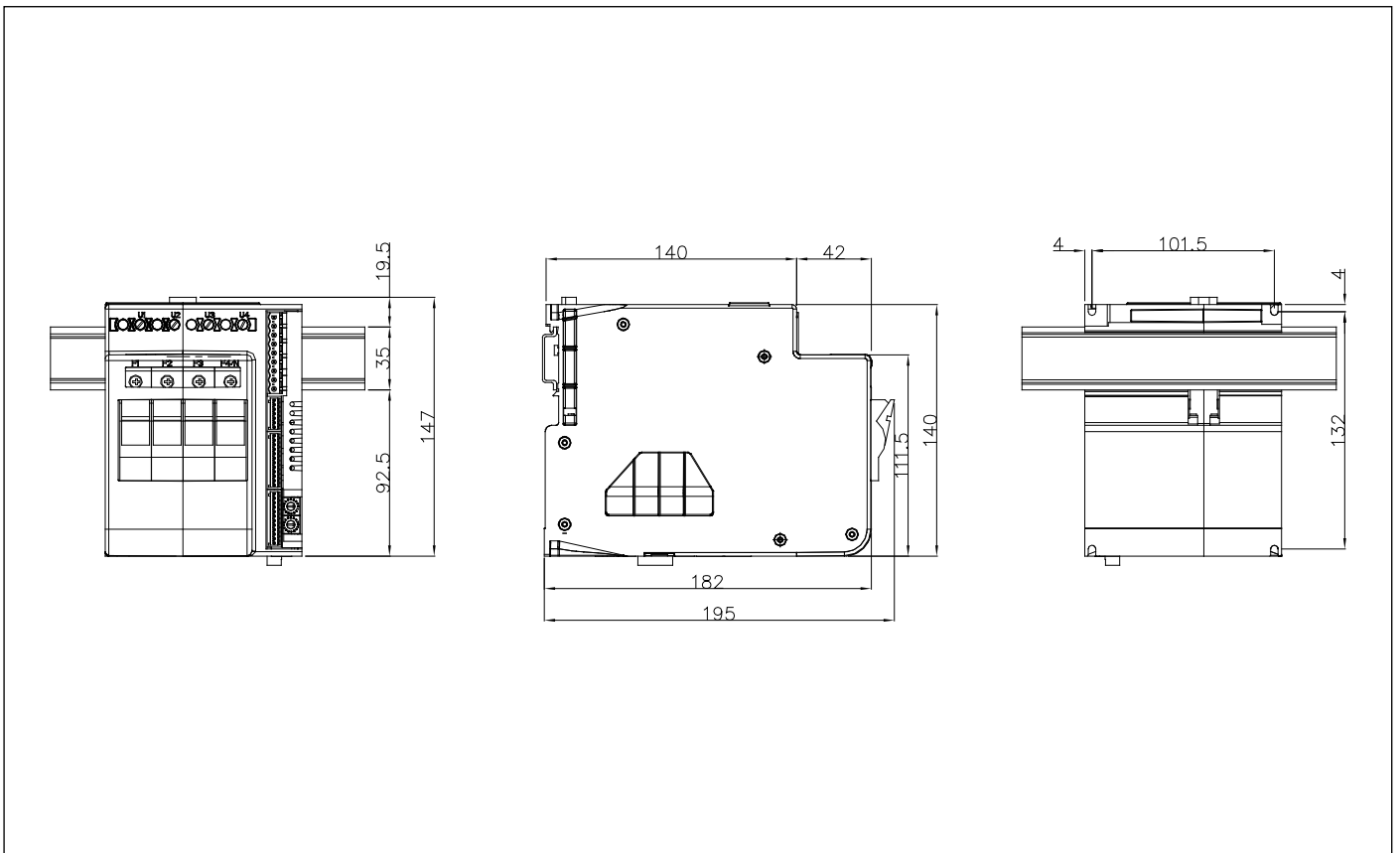


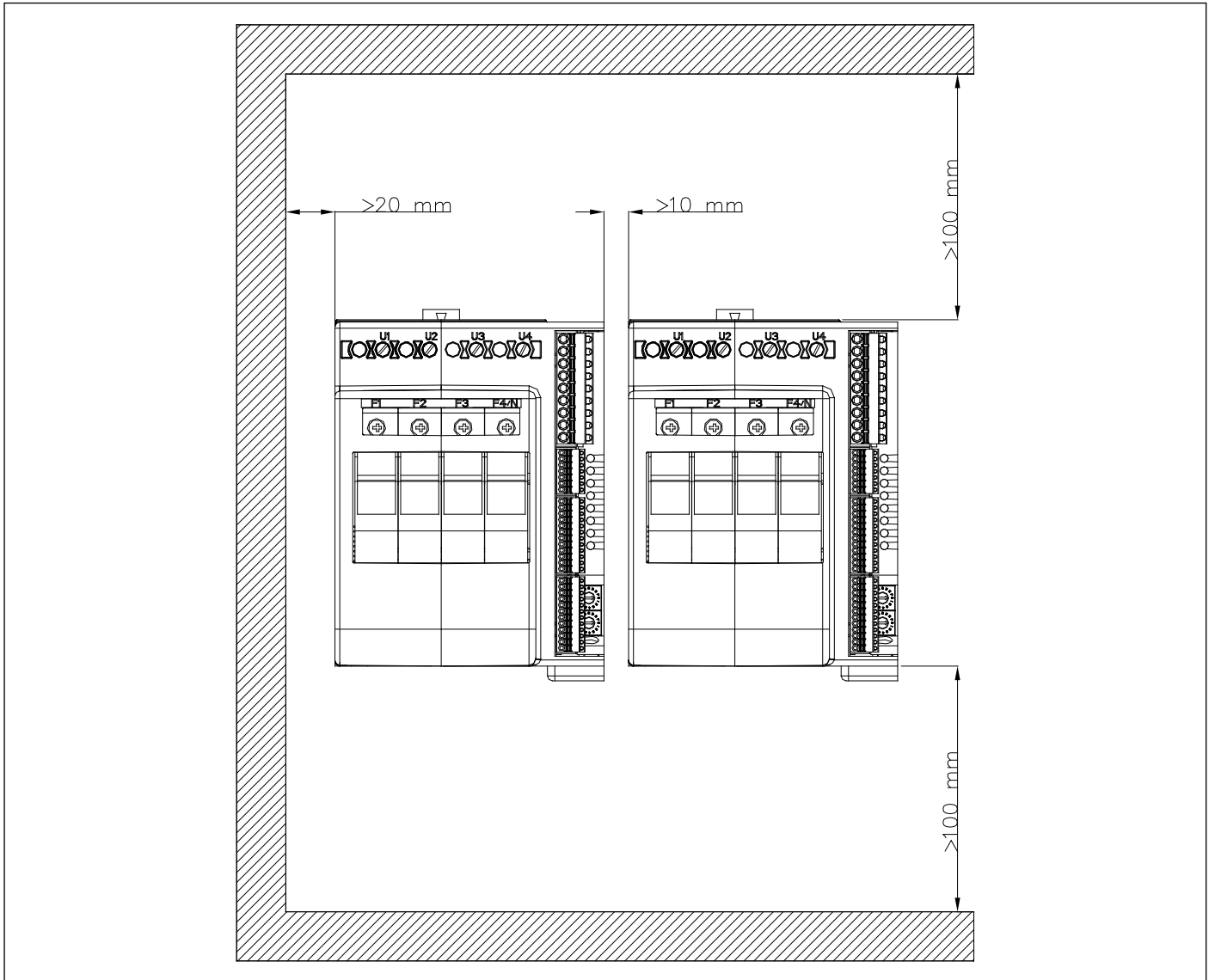
Figure 5 Model with fuse holder





Attention: respect the minimum distances shown in Figure 3 to provide adequate air circulation.

Figure 6



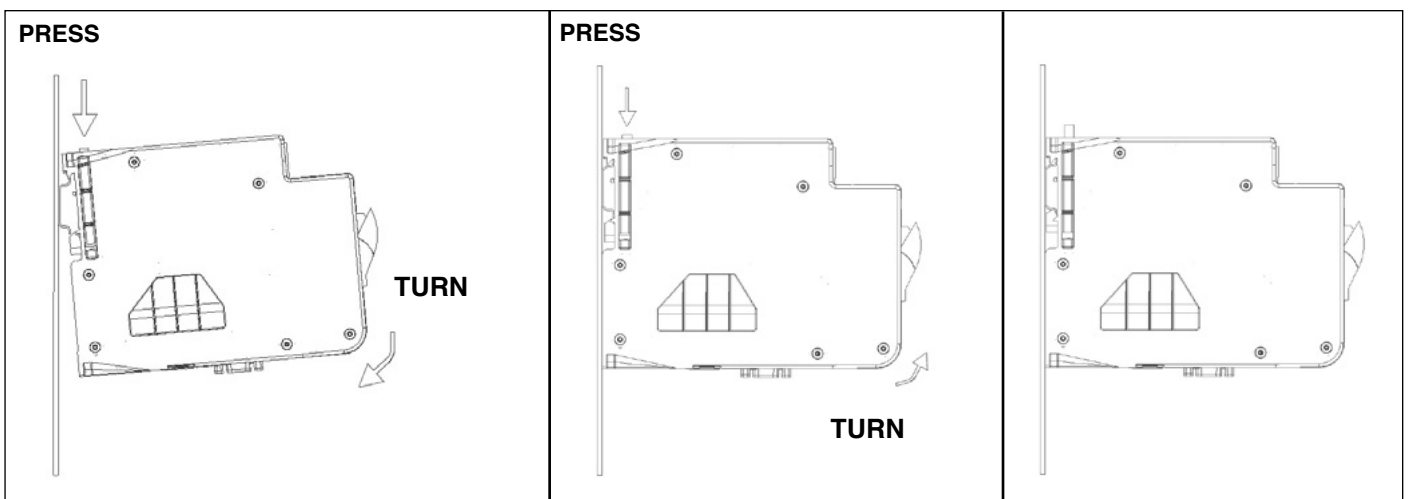
For correct attachment/release of the module on the DIN guide, do as follows:

- keep the attach/release cursor pressed
- insert/remove the module
- release the cursor

Figure 7

Figure 8

Figure 9





## TECHNICAL SPECIFICATIONS

<b>INPUTS</b>	
<b>IN1,...,IN4 analog process inputs</b>	
Function	Acquisition of process variable
Max. error	0.2% f.s. $\pm$ 1 scale point at room temperature of 25°C
Thermal drift	< 100 ppm/°C on f.s.
Sampling time	120 ms
Thermocouple Tc (ITS90)	J,K,R,S,T (IEC 584-1,CEI EN 60584-1, 60584-2) Error cold junction comp. 0,1°C
Resistance thermometer RTD (ITS90)	Pt100 (DIN 43760) Max line resistance 20ohm
Voltage	Linear: 0...60mV, Ri>1MOhm; 0...1V, Ri>1MOhm; 0...10V, Ri>1MOhm
Current	Linear: 0/4...20mA, Ri =50ohm a 32-segment custom linearization can be inserted
<b>IN5,...,IN8 auxiliary analog inputs (option)</b>	
Function	Acquisition of variables (mV or Thermocouple)
Accuracy	1% f.s. $\pm$ 1 scale point at room temperature of 25°C
Thermocouple Tc (ITS90)	480 ms
Resistance thermometer RTD (ITS90)	J,K,R,S,T (IEC 584-1,CEI EN 60584-1, 60584-2) Error cold junction comp. 0,1°C
Voltage	Linear: 0,...,60mV, Ri>1MOhm
<b>Line Voltage and Current measurement</b>	
RMS current measurement function	Load current read; minimum measurable current.
Accuracy RMS current measurement	2% f.s. at room temperature of 25°C in start mode ZC and 3% f.s. a temperatura ambiente di 25°C in modalità di accensione PA.
RMS voltage measurement function	Line voltage read; (acquisition of voltage values is valid for voltage in range 90...530Vac)
Accuracy RMS voltage measurement	1% f.s. with neutral connected; 3% f.s. without neutral.
Current and Voltage sampling time	0,25 ms
<b>DI1,...,DI2 digital inputs</b>	
Function	Configurable (default: disabled)
Type	PNP, 24Vdc, 8mA isolation 3500V
<b>OUTPUTS</b>	
<b>OUT1,...,OUT4 heat control outputs connected directly to solid-state units</b>	
Function	Configurable (default: heat control) State of control is displayed by LED (O1,...,O2)
<b>OUT5,...,OUT8 auxiliary (option)</b>	
Function	Configurable (default: cooling control)
Relay	Contact NO 3A, 250V/30Vdc $\cos\phi = 1$
Continuous	0/2...10V (default), max 25mA short circuit protection 0/4...20mA, max. load 500ohm isolation 1500V
Logic	24Vdc, > 18V a 20mA
Triac	230V/ max 4A AC51 (1A for each channel)
Analog type:	0/2...10 V (default), max 25 mA protezione dal corto circuito 0/4...20 mA, carico massimo 500ohm Isolated: 500 V Resolution: 12 bit Accuracy: 0.2% fs
<b>OUT9, OUT10 alarms</b>	
Function	Configurable (default alarms)
Relay	Contact NO 5A, 250V/30Vdc $\cos\phi = 1$
<b>COMMUNICATION PORTS</b>	
<b>PORT1 (always present)</b>	
Function	Local serial communication
Protocol	ModBus RTU
Baudrate	Settable 1200,...,115200, (default 19,2Kbit/s)
Node address	Settable with rotary-switches
Type	RS485 isolation 1500V, double connector RJ10 telephone type 4-4

<b>PORT 2 (Fieldbus option)</b>	
Function	Fieldbus serial communications
Protocol	ModBus RTU, tipo RS485, baudrate 1200...115000Kbit/s CANOpen 10K...1Mbit/s DeviceNet 125K...0,5Mbit/s Profibus DP 9,6K...12 Mbit/s Ethernet Modbus TCP, Ethernet IP 10/100Mbps EtherCAT, ProfiNET 100Mbps
<b>POWER (Solid-state power units, 4 units)</b>	
Load type	<b>AC 51</b> resistive or low inductance loads <b>AC 55b</b> short wave infrared lamps (SWIR) <b>AC 56a</b> transformers, resistive loads with high temperature coefficient
Trigger mode	<b>PA</b> - load control via adjustment of firing phase angle <b>ZC</b> - Zero Crossing with constant cycle time (settable in range 1-200sec) <b>BF</b> - Burst Firing with variable cycle time (GTT) optimized minimum. <b>HSC</b> - Half Single Cycle corresponds to Burst Firing that includes ON and OFF half-cycles. Useful for reducing flicker with short-wave IR loads (applied only to single-phase resistive or 3-phase 6-wire open delta loads).
Feedback mode	<b>V</b> Voltage feedback: proportional to RMS voltage value on load to compensate possible variations in line voltage. <b>I</b> Current feedback: proportional to RMS current value on load to compensate variations in line voltage and/or variations in load impedance. <b>W</b> Power feedback: proportional to real power value on load to compensate variations in line voltage and/or variations in load impedance. You have to calibrate each time you change feedback mode.
Max rated voltage	480Vac
Work voltage range	90...530Vac
Non-repetitive voltage	1200Vp
Rated frequency	50/60Hz auto-determination
Rated current AC51 non-inductive or slightly inductive loads, resistance furnaces	30KW      60KW      80KW 4x16A      4x32A (4x30)*      4x40A (4x40)* (single channel 57A $\Sigma I = 160A$ )
Nominal current AC55b short wave infrared lamps	30KW      60KW      80KW 4x8A      4x16A      4x20A for applications in which you can set a minimum power output limit (ex: Lo.P = 10%) by also limiting the lamp power variation speed with gradient limit (ex: G.out = 20%, PS.TM = 20s). Under these conditions, the nominal currents shown on the table can be raised up to the values indicated for AC51 type loads.
Rated current AC56A load transformer permitted trigger modes: ZC, BF con DT (Delay Triggering), PA with softstart	30KW      60KW      80KW 4x12A      4x25A      4x32A
Non-repetitive overcurrent (t=20msec)	400A      600A      1150A
I <sup>2</sup> t for melting (t=1...10msec)	645A <sup>2</sup> s      1010A <sup>2</sup> s      6600A <sup>2</sup> s
Critical Dv/dt with output deactivated	10,000V/μs High static dv/dt
Rated isolation voltage	4000V
<b>FUNCTION</b>	
Safety	Detection of short circuit or opening of inputs, absence of input feed, LBA alarm, HB alarm
Selection of °C/°F	Configurable
Linear scale range	-1999...9999
Control actions	4 control loops: Double action (heat/cool) PID, on-off Self-tuning at start, continuous Autotuning, one-shot Autotuning
PID Parameters: pb-dt-it	0,0...999,9 % – 0,00...99,99 min – 0,00...99,99 min
Action – control outputs	heat/cool – ON/OFF, PWM, GTT
Max limit heat/cool power	0,0...100,0 %
Fault power setting	-100,0...100,0 %
Shutdown function	Maintains sampling of PV; maintains control off
Configurable alarms	The alarm is assignable to an output and configurable as: maximum, minimum, symmetrical, absolute/deviation, LBA, HB
Alarm masking	Exclusion at power-on, latch, reset from digital input

<b>OPTIONS</b>					
Options	<ul style="list-style-type: none"> <li>- Timed Soft-Start firing ramp, with or without peak current control</li> <li>- Soft-Start firing ramp, specific for infrared lamps</li> <li>- Timed shut-off ramp</li> <li>- Limitation of RMS current in load</li> <li>- 0-90° Delay-Triggering for firing inductive loads in ZC and BF mode</li> </ul>				
Diagnostic	<ul style="list-style-type: none"> <li>- SCR in short circuit (presence of current with OFF control)</li> <li>- No voltage</li> <li>- No current due to open SCR/interrupted load</li> <li>• Overheat alarm</li> <li><u>Current read</u></li> <li>• HB alarm interrupted or partially interrupted load</li> <li>• Automatic calibration of HB alarm setpoint starting from current value in load</li> <li>• Alarm for load in short circuit or overcurrent</li> <li><u>Voltage read</u></li> <li>• 3-phase line imbalanced</li> <li>• Incorrect phase rotation in configuration of 3-phase load</li> <li>• Segnalazione rotazione fasi 1-3-2 in configurazione di carico trifase</li> </ul>				
Type of connection and load Selection via dip-switches	<ul style="list-style-type: none"> <li>4 single-phase loads</li> <li>3 independent single-phase loads open delta</li> <li>1 3-phase load open delta</li> <li>1 3-phase load closed delta</li> <li>1 3-phase load star with neutral</li> <li>1 3-phase load star without neutral</li> </ul>				
<b>GENERAL DATA</b>					
Power supply	24Vdc ±25%, max 8VA Class II				
Signals	Eight LEDs: RN run state of CPU ER error signal DI1, DI2 state of digital inputs O1,...,O4 state of SCR control				
Protection	IP20				
Work/storage temperature	0...50°C (refer to dissipation curves) / -20...70°C				
Relative humidity	20...85% RH non-condensing				
Ambient conditions for use	indoor use, altitude up to 2000m				
Installation	DIN bar EN50022 or panel with screws				
Installation requirements	Installation category II, pollution level 2, double isolation Max. temperature of air surrounding device 50°C Device type: "UL Open Type"				
Weight	<table style="width: 100%; border: none;"> <tr> <td style="width: 60%;">30Kw, 60Kw, 80Kw models</td> <td style="text-align: right;">1200g.</td> </tr> <tr> <td>30Kw, 60Kw models with fuses</td> <td style="text-align: right;">1600g</td> </tr> </table>	30Kw, 60Kw, 80Kw models	1200g.	30Kw, 60Kw models with fuses	1600g
30Kw, 60Kw, 80Kw models	1200g.				
30Kw, 60Kw models with fuses	1600g				
(*) UL Certification					

# ELECTRICAL CONNECTIONS

## 1.1 POWER CONNECTIONS

Figure 10 model without fuse holder

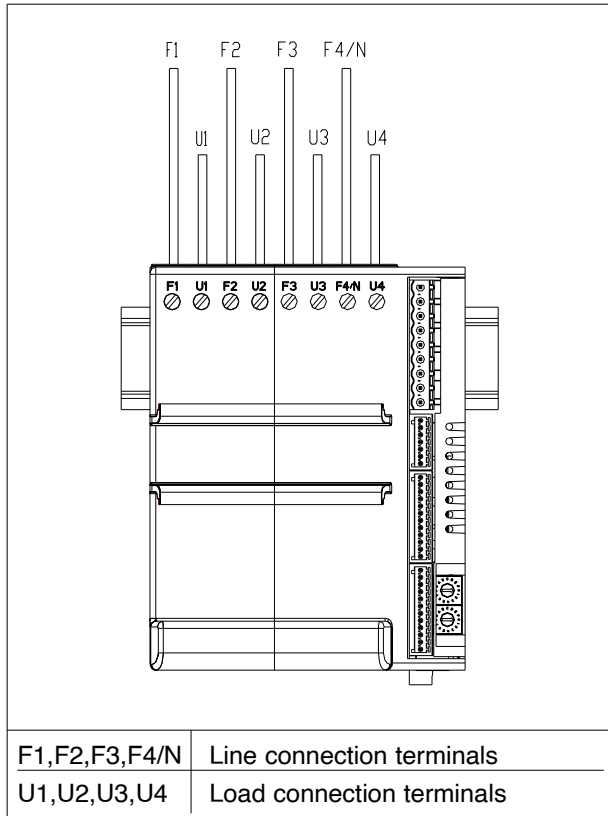


Figure 11 model with fuse holder

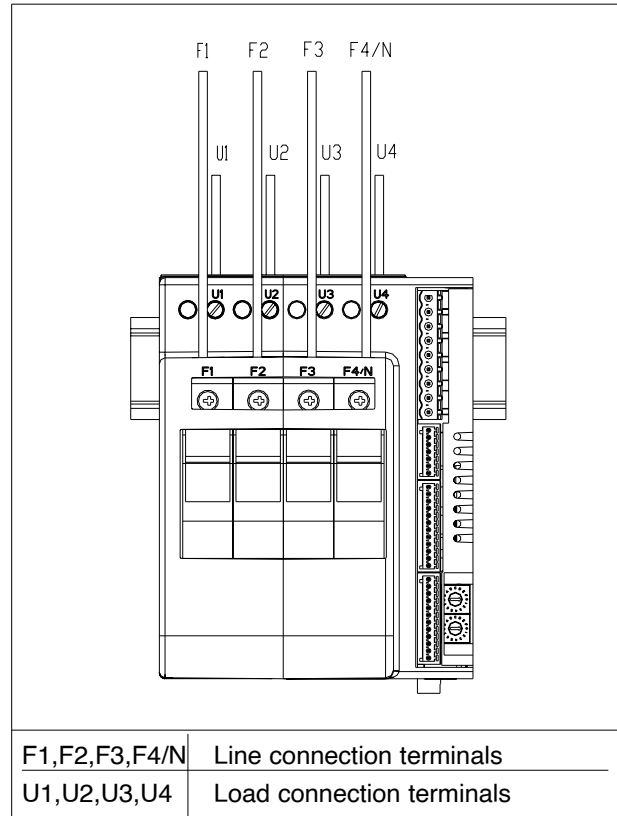


Table 1

Model	30kW		60kW		80kW	
max current	16A		32A (30A)*		57A (40A)*	
 rigid	0,2 - 6mm <sup>2</sup>	24-10AWG	0,2 - 6mm <sup>2</sup>	24-10AWG	0,5 - 16mm <sup>2</sup>	20-6AWG
 flexible	0,2 - 4mm <sup>2</sup>	24-10AWG	0,2 - 4mm <sup>2</sup>	24-10AWG	0,5 - 10mm <sup>2</sup>	20-7AWG
	0,25 - 4mm <sup>2</sup>	23-10AWG	0,25 - 4mm <sup>2</sup>	23-10AWG	0,5 - 10mm <sup>2</sup>	20-7AWG
	0,25 - 4mm <sup>2</sup>	23-10AWG	0,25 - 4mm <sup>2</sup>	23-10AWG	0,5 - 10mm <sup>2</sup>	20-7AWG
	0,5 - 0,6Nm		0,5 - 0,6Nm		1,2 - 1,5Nm	

\* UL certification

## 1.2 VOLTAGE/CURRENT TABLE

Model GFX4-IR	Current (Amp)		Voltage (Vac)			Power (kW)		
	max for channel		range	nominal	working	total contemporary	single channel	max for single channel
30 (4x16A)	16		90...530	480	110	(4x16x110) 7	(16x110) 1,7	(1x16x110) 1,7
					230	(4x16x230) 14,7	(16x230) 3,6	(1x16x230) 3,6
					400	(4x16x400) 25,6	(16x400) 6,4	(16x400) 6,4
					480	(4x16x480) 30,7	(16x480) 7,6	(1x16x480) 7,6
60 (4x32A) (4x30A)*	32 (30)*		90...530	480	110	(4x32x110) 14	(32x110) 3,5	(32x110) 3,5
					230	(4x32x230) 29,4	(32x230) 7,3	(1x32x230) 7,3
					400	(4x32x400) 51,2	(32x400) 12,8	(1x32x400) 12,8
					480	(4x32x480) 61,4	(32x480) 15,3	(1x32x480) 15,3
80 (4x40A)	40*	57	90...530	480	110	(4x40x110) 17,6	(40x110) 4,4	(1x57x110) 62,7
					230	(4x40x230) 36,8	(40x230) 9,2	(1x57x230) 13,1
					400	(4x40x400) 64	(40x400) 16	(1x57x400) 22,8
					480	(4x40x480) 76,8	(40x480) 19,2	(1x57x480) 27,3

\* UL certification

## ORDER CODE

NOMINAL POWER		AUXILIARY OUTPUTS		AUXILIARY INPUTS		FIELDBUS - Port 2		FUSES	
30KW	30	Absent	0	Absent	2	0	Absent	0	Absent
60KW	60	Relay	R	4 Linear inputs (**)	4	M	Modbus RTU	F	fuses-holder + fuses extrarapid (*)
80KW	80	Logic	D			P	Profibus DP		
		Analog continuous	C			C	CANopen		
		Triac	T			C1	Euromap 66		
		Analog 12bit 0/2-10V; 0/4-20mA	W			D	DeviceNet		
						E	Ethernet Modbus TCP		
						E1	Ethernet IP (***)		
						E2	EtherCAT		
						E4	ProfiNET		
						E5	Ethernet IP (ODVA Certification - C.T. 9) (***)		
						E8	Ethernet IP (ODVA Certification - C.T. 15) (***)		

(\*) Available only for 30, 60kW power.

(\*\*) Option NOT available with fieldbus E1, E2, E4, E5, E8.

(\*\*\*) To check the compatibility between the different product releases please look at the specific technical documentation on the web site [www.gefran.com](http://www.gefran.com).






GEFRAN spa reserves the right to make any aesthetic or functional changes at any time and without notice.

## FUSES

Model	EXTRARAPID FUSES				FUSES-HOLDER ISOLATORS
	Size I <sup>2</sup> t	Code Format	Model Code	Power Dissipated @ In	Approval Code
GFX4-IR 30 kw	16A 150 A <sup>2</sup> s	FUS-016 10x38	FWC16A10F 338470	3,5 W	PFI-10x38 337134 UR30A@690V
GFX4-IR 60 kw	30A 675 A <sup>2</sup> s	FUS-030 10x38	FR10GR69V30 338481	4,8 W	PFI-10x38 337134 UR30A@690V
GFX4-IR 80 kw	63A 3080 A <sup>2</sup> s	FUS-063 22x58	FWP63A22F 338191	11 W	PFI-22x88 337223 UR80A@600V

UL508 SCCR FUSES TABLE				
Model	"Short circuit current [Arms]"	"Max fuse size [A]"	Fuse Class	"Max Voltage [VAC]"
GFX4-IR 30	100.000	30	RK5	600
GFX4-IR 60	100.000	30	RK5	600
GFX4-IR 80	100.000	100	J	600

The fuses on the above table are representative of all the fuses of the same class with lower current ratings

	Conformity TC N° РУД-ИТ.А132.б.01762
	Conformity C/UL/US File no. E243386
	The instrument conforms to the European Directives 2014/30/EU and 2014/35/EU with reference to the generic standards: <b>EN 61326-1</b> (Product) <b>EN 61010-1</b> (safety)
	Short Circuit Current Rating 100KA / 480V according to UL 508
	ODVA Conformant (only E8 opt)