

# GEFLEX

## thermodul system

GEFRAN

# the performances of temperature controllers plus the advantages of a PLC

**- Modularity 1**
each GEFLEX independently controls a temperature control zone

**- Reliability**
designed to guarantee continuous service under all conditions

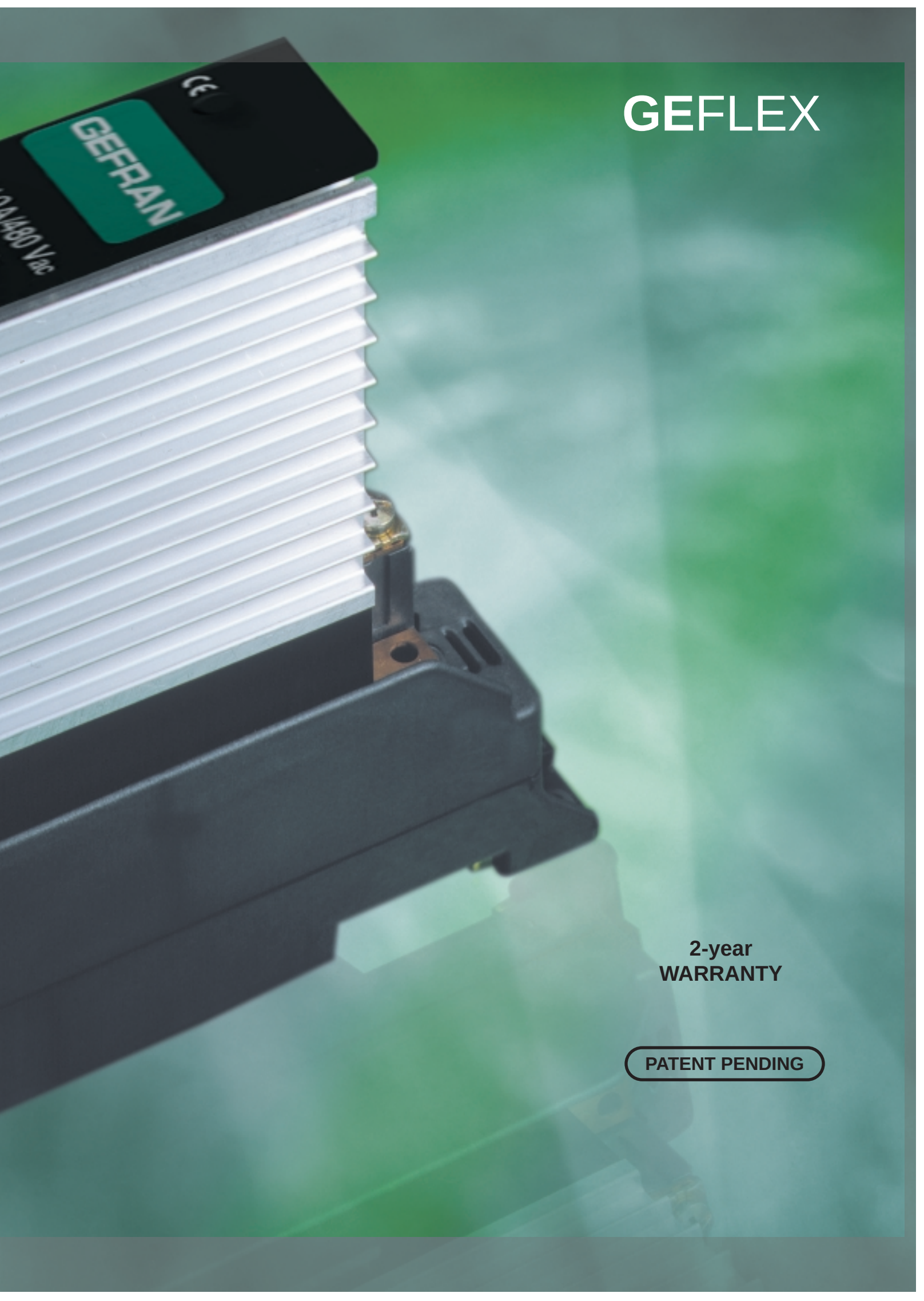
**- Stronger together**
multiple GEFLEX units working in a battery can create an expandable multizone system

**- Easy configuration**
the system can be programmed from the operator terminal, PC or Palm PC

**- Recipe management**
parameter sets for changes and for production lots are transmitted from the operator terminal

**- Auxiliary I/Os**
GEFLEX features programmable digital inputs and outputs, just like a PLC





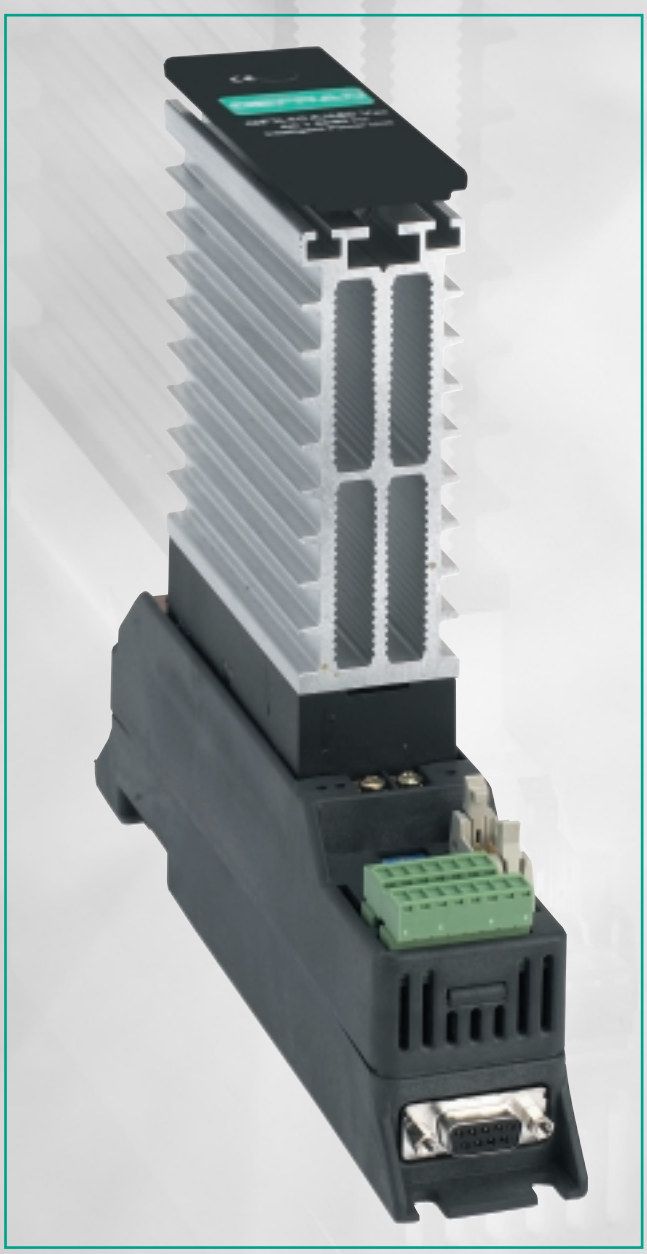

# GEFLEX

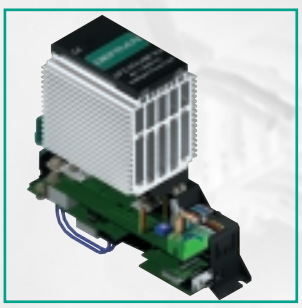
**2-year WARRANTY**

**PATENT PENDING**

# GEFLEX

## integrated control and power system for multizone temperature control

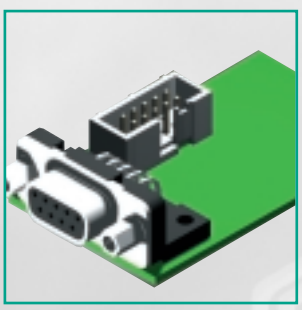




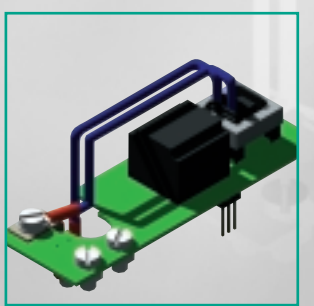
integrated smart unit and static relay



Programmable I/Os and cooling control output



communication in standard field bus



CT incorporated as standard

PROFIBUS

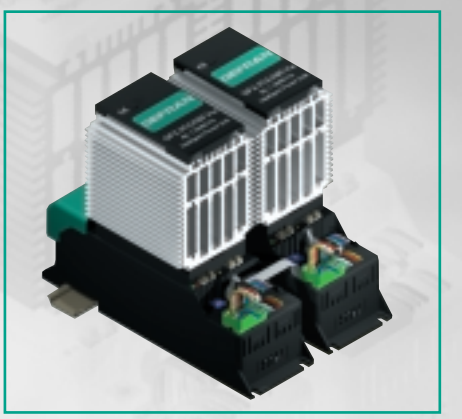
CANopen

DeviceNet

# GEFLEX

## GEFLEX's stats

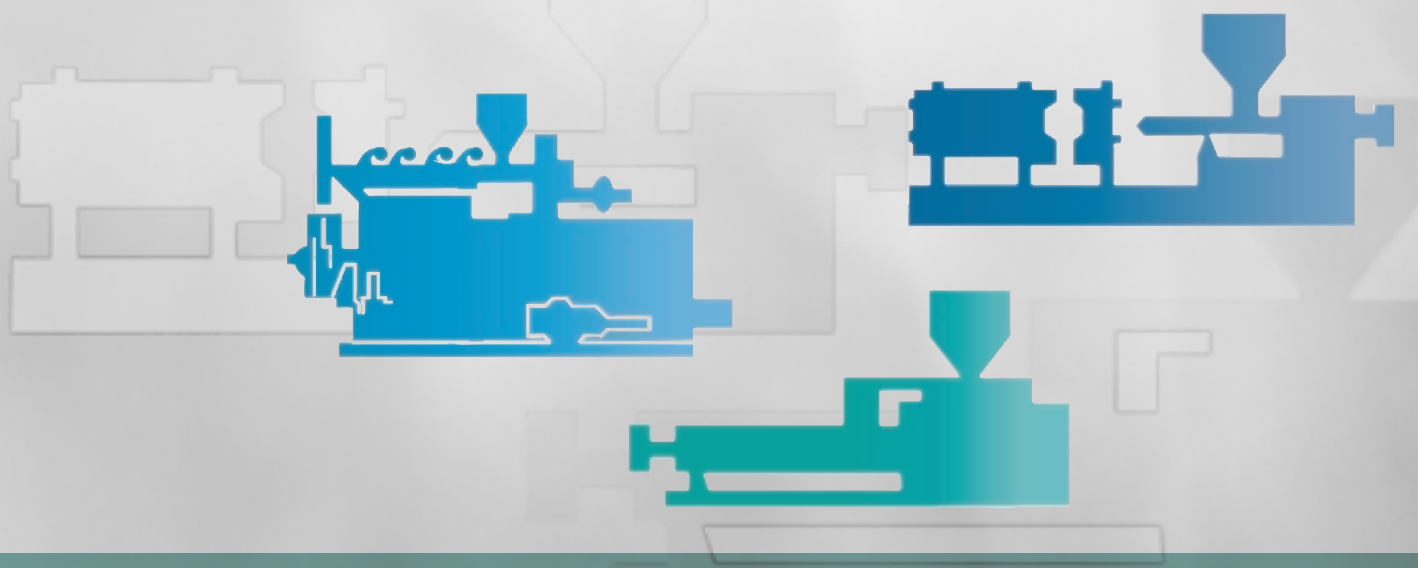
- Sizes up to 120A, 480V single- or three-phase
- Up to 6 configurable alarms
- Up to 3 programmable outputs
- Over 50 types of probes can be connected
- 120msec sampling
- 14 PID, selftuning, autotuning modes



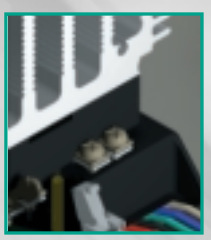



## Applications

plastic and rubber processing machines, extruders, injection molding, blow molding, packaging machines, packing machines, and all other thermal processes with electrical heating.



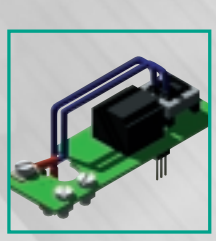
# easy
# to install



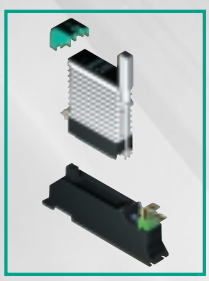
**No connections needed between control board and power board**
Thanks to total integration, the SCR control is internal. You save time, wiring is simplified, and dimensions in the panel are reduced.



**The bus is connected to the module in a single step.**
All signals have quick connections.

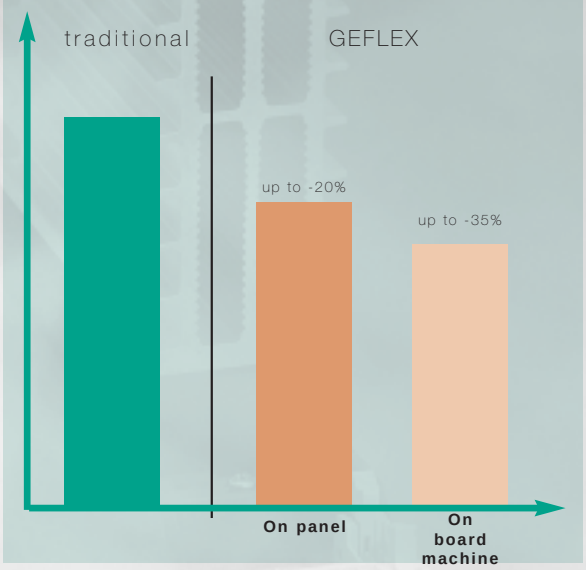


**No connections needed to monitor current.**
The current transformer is always incorporated.



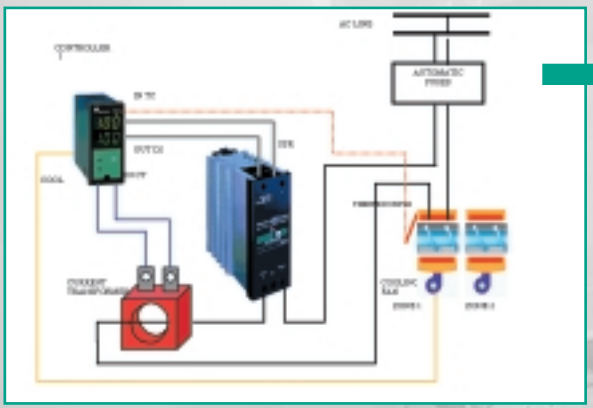
**Easy maintenance.**
The power module is easy to replace if the system is expanded or modified.

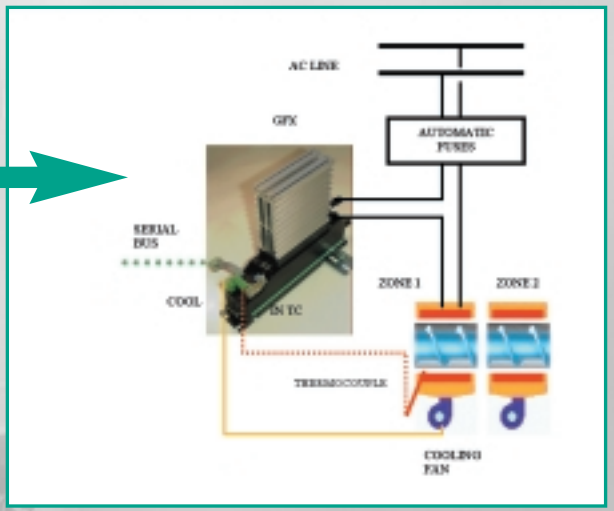
**SAVE INSTALLATION TIME IN 10 TEMPERATURE CONTROLLED ZONES**




**GEFLEX can also be installed on-board machine, i.e., near the process.**
This solution saves you even more on wiring for sensors, alarms, controls, power supply.

# from the traditional solution
# to the GEFLEX system





# GEFLEX

## easy to program

Communication with the outside is of primary importance. Two areas are involved: the first is operative management of the automation system (of which the GEFLEX units are a part); the second is programming, configuration and putting into service. GEFLEX dialogs with the operator terminals according to the most popular standard protocols: from the simple and efficient MODBUS to the by-now indispensable PROFIBUS DP and CAN OPEN field buses. The bus is the means by which the supervisor transmits commands and parameters to be saved, while GEFLEX confirms execution and responds with the required information.

### RECIPES

GEFLEX lets you manage "recipes," i.e., sets of parameters (set-point, alarm, PID) assigned to each specific machine, process, material, temperature control zone. Thanks to its communication abilities, GEFLEX is extremely flexible and appropriate for applications such as plastic processing, which call for a variety of carefully tested and implemented "work recipes."



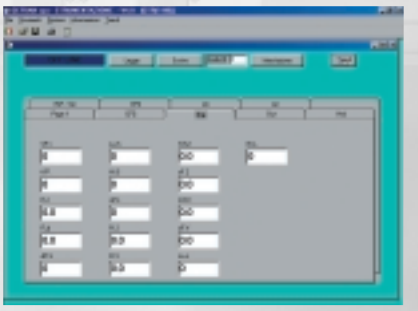
### SUPERVISION

In addition to monitoring temperature, load current, and alarms, GEFLEX supplies all the data needed to analyze the thermal process so that you can refine control parameters or analyze plant energy efficiency.



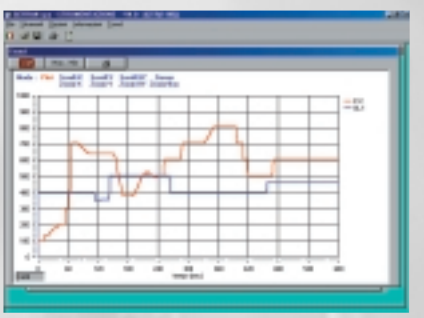
### CONFIGURATION

The operator terminal integrated in the automation system is used for programming. The terminal can access both the master and the individual slaves by means of the internal bus. To simplify the interface, the slaves can self-learn transmission speed (baud rate) and parity.



### WINSTRUM

To program single GEFLEX units, you can also use the wireless WINSTRUM KIT - an efficient software tool that lets you configure all internal parameters in just a few seconds, using the serial interface for connection to WINDOWS® compatible portable PCs or Palm PCs.



# intelligence and power

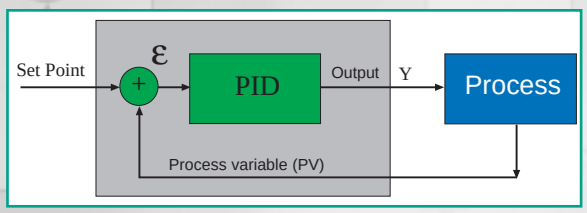
## UNIVERSAL TEMPERATURE INPUT

GEFLEX lets you connect various types of signals: thermocouples, resistance thermometers, input from 4-20mA transmitters or custom probe, all simply definable by software without the need for outside adapter shunts. 0.2% precision assures excellent control of the thermal process.

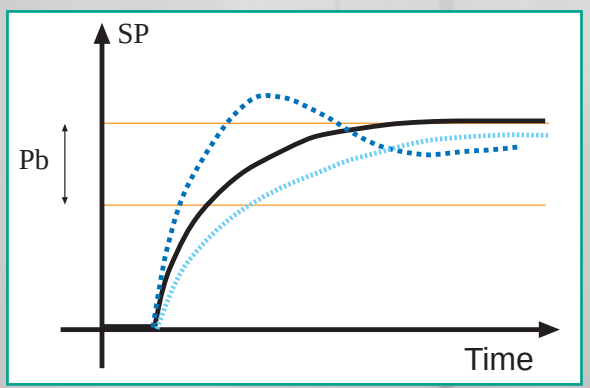
## CONTROL

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

Up to 14 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. Functions such as softstart, double set, bumpless man/auto, make GEFLEX suitable for a wide range of applications.

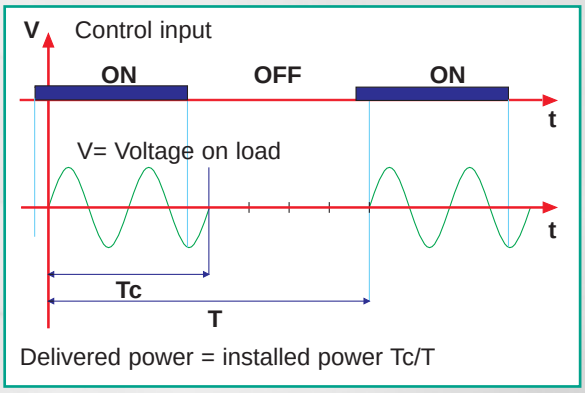



## POWER

Power is controlled with double SCR in anti-parallel, zero crossing switching principle, with configurable proportional cycle time.

Five current levels are available: 25, 40, 60, 90 and 120A, with rated voltage 480V single-phase.

To control two-phase or three-phase loads for one master unit for PID control and one "expansion" unit with SSR module only.




## DIGITAL I/OS

Up to 3 outputs are available: one for relay cooling (3A, 250V) or logic (12Vdc, 20mA) and two optional alarm relay outputs (3A, 250V).

The outputs are freely configurable via software. There is also an isolated digital input that can be used, for example, to select between 2 setpoints, Manual-Automatic switching, reset of alarm memory, or "software shutdown" of the temperature controlled zone.

# safety and diagnostics

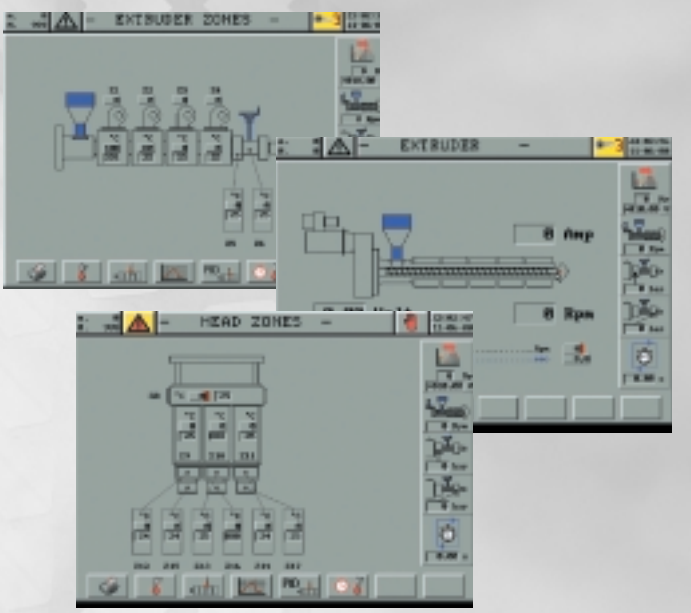
GEFLEX assures efficient process monitoring from a thermal and electrical point of view, allowing the operator to foresee breakdowns or malfunctions and take timely action (for example, in case the temperature safety limit is exceeded, broken probe, load fault).

## Alarms management

There are **4 generic alarms** with independent set-points, completely configurable via software as absolute or deviation, maximum or minimum, saved or not saved, with option to inhibit at power-on. The **LBA alarm** precisely checks the control loop, while the on-board **current transformer** lets you directly monitor load and trip the **HB alarm** in case of current failure or SSR in short circuit. In addition, the optional (on-board) **voltage transformer** (available in December 2002) lets you monitor the mains voltage and power and energy levels, with important benefits for plant safety and efficiency. 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. Alarms can be managed directly by means of the available relay outputs, and can be integrated in the plant supervision system by means of the serial communication bus..

## Alarms in logic wired to bus

Special functions implemented in the GEFLEX bus system permit even simpler wiring and increase system safety. Two of the master relay outputs create the wired "OR" function and "AND" function of all of the slave alarms.




For example, this ingenious system lets you very easily create a main maximum temperature alarm or a signal of minimum temperature reached in all the zones for clearance to start the machine. The system is pre-wired, requires no additional procedure, and works even if the master is out of service.

## Zone exclusion

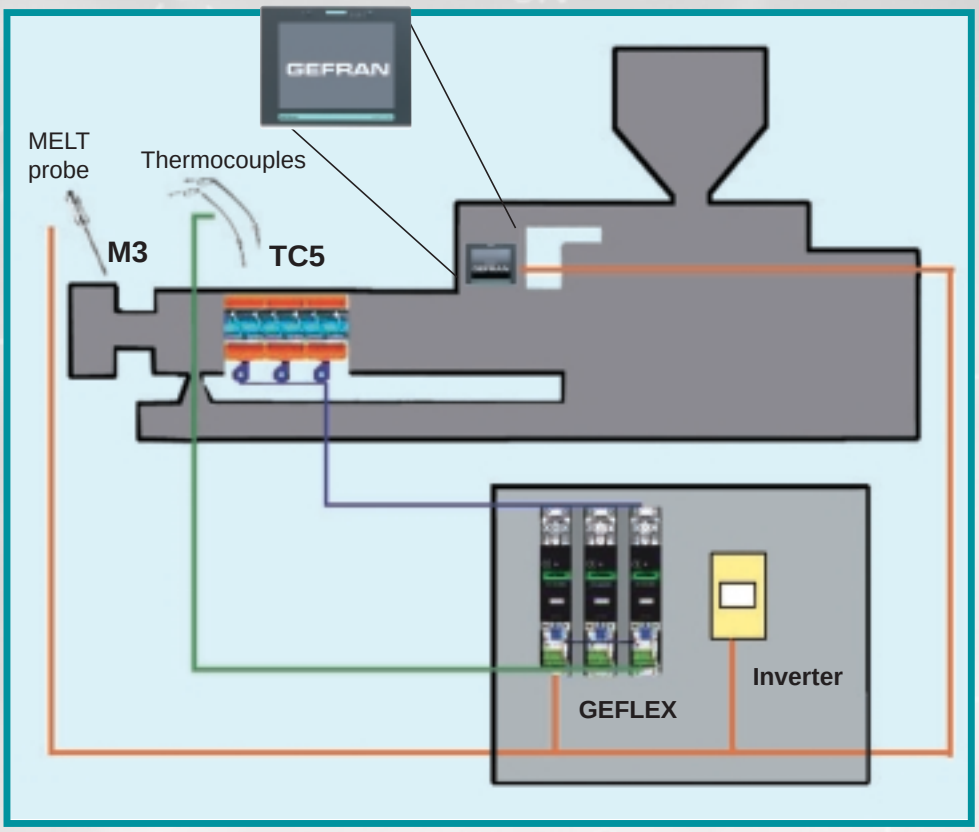
With a simple digital input command, the control zone can be deactivated by "shutting down the software" of the individual GEFLEX unit.

## Signals

The lower section has 3 LEDs that indicate: operating state of field bus, temperature sensor errors, power unit conduction state.

# the applications

## ALLEX: the GEFRAN solution for extrusion automation




The CHATTY touchscreen provides efficient monitoring of main quantities, recipe creation, parameter setting. The following work menus are easily accessed from the main menu:

- Setting of temperature setpoints in zones. Temperatures are displayed in numerical form or as bargraph. All zones are displayed on a single page.
- Creation and saving (with name) of production recipes, call-up of recipe using name.
- Setting of alarm setpoints for melt pressure, screw turns, motor Amperes. Setting of temperature setpoints in zones.
- Printing of reports, list of alarms and events.

The operator terminal communicates with the GEFLEX units and with other smart components via standard field bus.

Temperature control in the zones is managed by the GEFLEX controllers, which supply power to the heating elements.

The zones work independently, assuring continuous service in case of a broken thermocouple.

Control parameters are calculated automatically when the selftuning procedure is launched.
This lets the operator work at maximum efficiency without having to worry about optimizing the temperature control.
The PID heating-cooling algorithm with selection of cooling fluid assures precise temperature control.
The temperature in the zones is acquired by means of TC5 thermocouples, one in each zone.

Alarm states are indicated on a specific page on the terminal display. Thanks to the current transformer integrated in GEFLEX, load current control in each zone is a standard function.

# the architectures

## MODBUS ARCHITECTURE

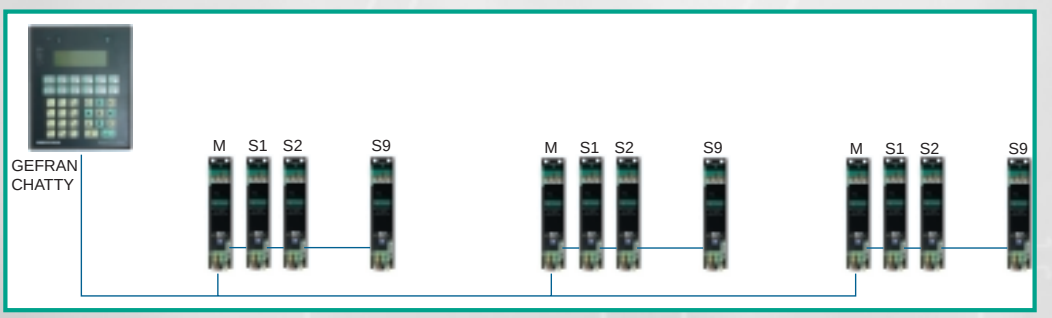
**Up to 3 master - slave groups without relays**
**Up to 9 master - slave groups with relays**
**Each GEFLEX is a MODBUS address (1-90)**



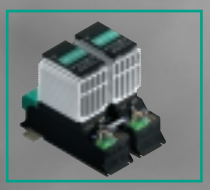

## CANopen, PROFIBUS and DeviceNet ARCHITECTURE

**Up to 9 master - slave groups**
**Each GEFLEX MASTER is a CAN bus node**

CANopen
DeviceNet
PROFIBUS



# technical data



## GEFLEX

### CONTROL MODULE

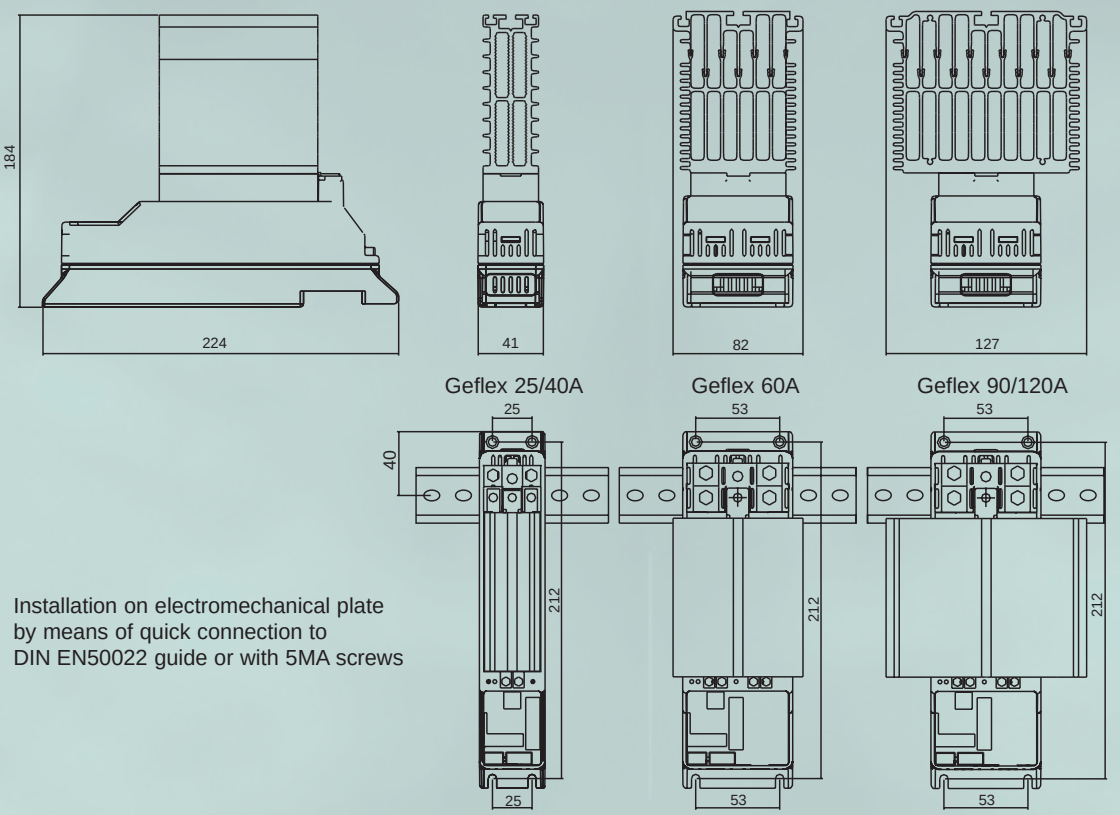
| | | |
|---|---|---|
| **INPUTS** | Input range | 0…60mV |
| | Sampling interval | 120ms |
| | Precision | 0.2% fs; ±1 scale point to 25°C |
| | Resolution | < 2uV for 60mV range |
| | Input filter | 0…20.0 sec |
| | Zero offset | Adjustable in range -999…+999 scale points |
| MAIN INPUT | Type | Thermocouple, resistance thermometer, linear |
| | Application | Process variable |
| THERMOCOUPLES | Type | ITS90: J, K, R, S, T, B, E, N, U, G, D, C, custom |
| | Cold junction compensation | Internal, with automatic compensation |
| RESISTANCE THERMOMETERS | Type | Pt100 DIN 43710, JPt100, custom |
| LINEARS/TRANSMITTERS | Range | 0…60mV, 0…20mA, 0…1Vdc (configurable within limits); |
| | Type | possible 32-segment custom linearization |
| **AUXILIARY INPUTS** | Type | TA, TV internal, digital input |
| AMMETER | Range | 0…25, 40, 60, 90, 120Aac |
| | Application | Control of current absorbed by load |
| MAINS VOLTAGE | Range | 0…480Vac |
| | Application | Control of mains voltage, power |
| DIGITAL INPUTS | Number/Type | 1/ PNP 24V, 8mA (isol. 3500V) |
| | Application | Man/auto, Loc/rem, Hold, Alarm reset, Setpoint selection, Software shutdown |
| **OUTPUTS** | Number/Type | Up to 3/ relay, logic |
| RELAY | Type | (up to a 3), NO, max 5A, 250V resistive load |
| | Application | Cooling, Alarm |
| LOGIC | Type | 24Vdc, 100mA |
| | Application | Cooling, Alarm |
| **DIGITAL COMMUNICATION, FIELD BUS** | Transmission | Asynchronous serial |
| | Standardprotocol | MODBUS RTU RS485 2 fili 1200...19.200 baud |
| | Optional protocol | PROFIBUS DP/V19,6K...1,5Mbit/sec |
| | Optional protocol | CAN OPEN 10K...1Mbit/sec |
| **SAFETY** | | Detection of short circuit or opening of input probe, open loop alarm (LBA), interrupted load alarm (HB) |
| **PROCESS CONTROL FUNCTIONS** | | |
| **CONTROL** | Modes | PID, PI, PD, P, On/Off, heat, cool, heat+cool with fluid selection |
| | Manual/Automatic | Bumpless or with forcing of output in manual |
| **TUNING** | Selftuning | Calculation of PID parameters at system start |
| | Autotuning | Continuous adjustment of PID values |
| **SPECIAL FUNCTIONS** | | Soft-start, limitazione potenza, spegnimento software |
| **ALARMS** | Number/Type/Modes | Up to 4/ Absolute, deviation, symmetrical, direct, inverse, Latching and non, LBA and HBB |
| | Reference | alarms PV, SP, TA and TV input (for HB) |
| **MULTISET** | SP number, selection | 2 set, gradient, selectable by digital input |
| **POWER SUPPLY** | Type | Continuous |
| | Voltage | 24Vdc; ±25%, 3W |

### POWER MODULE

| | | 25A | 40A | 60A | 90A | 120A |
|---|---|---|---|---|---|---|
| RATED VOLTAGE | | 480Vac | | | | |
| WORK VOLTAGE RANGE | | 24…530Vac | | | | |
| NON-REPETITIVE VOLTAGE | | 1200Vp | | | | |
| SWITCHING VOLTAGE FOR ZERO | | ≤20V | | | | |
| RATED FREQUENCY | | 50…60Hz | | | | |
| POWER FACTOR | | ≥ 0,5 | | | | |
| RATED CURRENT AC1 | | 25A | 40A | 60A | 90A | 120A |
| REPETITIVE OVERCURRENT (t=1s) | | ≤ 50A | ≤ 50A | ≤ 100A | ≤ 150A | ≤ 150A |
| NON-REPETITIVE OVERCURRENT (t=20ms) | | ≤ 400A | ≤ 400A | ≤ 1300A | ≤ 1700A | ≤ 01700A |
| $I^2t$ FOR MELT (t=1…10ms) | | ≤ 800A²s | ≤ 800A²s | ≤ 11200A²s | ≤ 25300A²s | ≤ 25300A²s |
| dv/dt CRITICAL WITH DEACTIVATED OUTPUT | | 1000V/us | | | | |
| RATED INSULATION VOLTAGE IN/OUT | | 4000V | | | | |
| WORKING TEMPERATURE | | 0…80°C (according to dissipation curves) | | | | |
| **MECHANICAL** | | | | | | |
| DIMENSIONS | Height (mm) | 225 | | | | |
| | Width (mm) | 42 | 42 | 82 | 127 | 127 |
| | Depth (mm) | 160 | 195 | 195 | 195 | 195 |
| WEIGHT (g) | | 650 | 850 | 1300 | 1500 | 1600 |
| PROTECTION CLASS | | IP20 | | | | |
| INSTALLATION | | DIN guide or panel | | | | |
| **CERTIFICATIONS** | | International certifications applied for | | | | |
| NOTES | | MOV Protection | | | | |
| HIGH-SPEED FUSES | | FUS-025 | FUS-040 | FUS-080 | FUS-100 | FUS-125N |

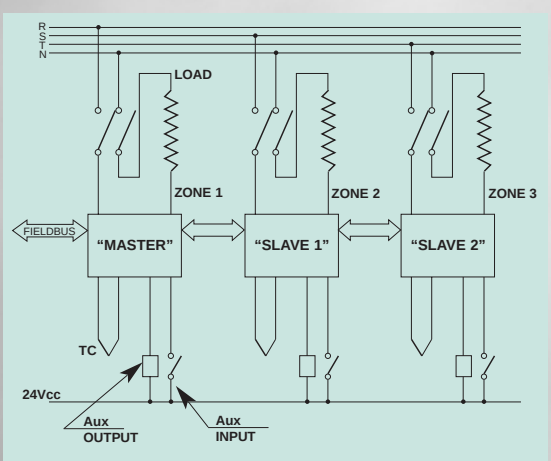
# dimensions and cut-out

GEFLEX

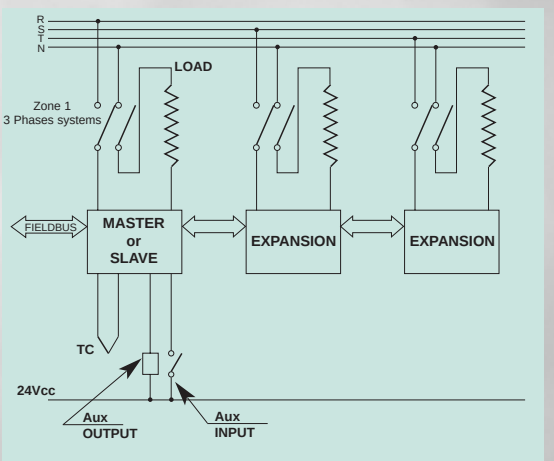



Installation on electromechanical plate
by means of quick connection to
DIN EN50022 guide or with 5MA screws

# connections

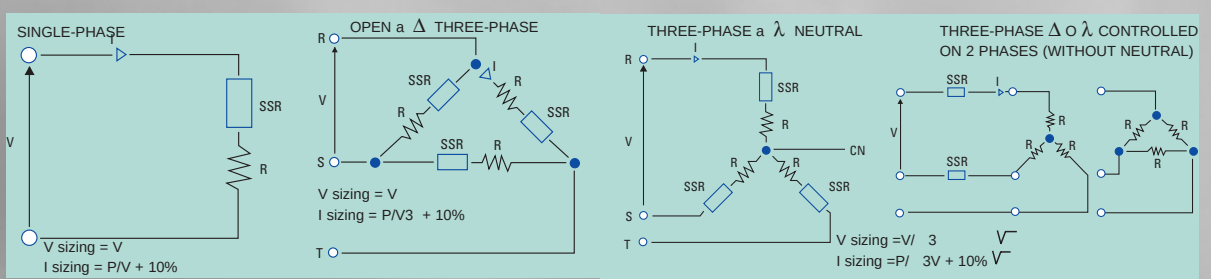



single-phase connection




three-phase connection

## Example of calculation of rated currents



# range
# models

## Master

GFX-M1 [ ] / 480 [ ] [ ] RR P [ ]

| RATED CURRENT | |
|---|---|
| 25A | 25 |
| 40A | 40 |
| 60A | 60 |
| 75A | 75 |
| 90A | 90 |
| 120A | 120 |

| RATED VOLTAGE | |
|---|---|
| 480Vac | 480 |

| FIELD BUS INTERFACE | |
|---|---|
| RS485 MODBUS | M |
| PROFIBUS DP | P |
| CAN OPEN | C |
| DEVICE NET | D |

| DIAGNOSTICS | |
|---|---|
| 00 | None |
| C0 | Current transformer |
| CV | Voltage + Current transformer |

| DIGITAL INPUT | |
|---|---|
| P | PNP digital input |

| AUXILIARY OUTPUT | |
|---|---|
| RR | 2 Relays |

| COOLING OUTPUT | |
|---|---|
| 0 | None |
| D | Logic |
| R | Relay |
| C | Continuous output 0...10V (0/4...20mA) |

## Slave

GFX-S1 [ ] / 480 0 [ ] [ ] P [ ]

| RATED CURRENT | |
|---|---|
| 25A | 25 |
| 40A | 40 |
| 60A | 60 |
| 75A | 75 |
| 90A | 90 |
| 120A | 120 |

| RATED VOLTAGE | |
|---|---|
| 480Vac | 480 |

| COOLING OUTPUT | |
|---|---|
| None | 0 |
| Logic | D |
| Relay | R |
| Continuous output 0...10V (0/4...20mA) | C |

| DIAGNOSTICS | |
|---|---|
| 00 | None |
| C0 | Current transformer |
| CV | Voltage + Current transformer |

| DIGITAL INPUT | |
|---|---|
| P | PNP digital input |

| AUXILIARY OUTPUTS | | |
|---|---|---|
| 00 | None | (*) |
| RR | 2 Relays | |

**(*) Option not available for 75A, 90A and 120A current levels**

## Expansion

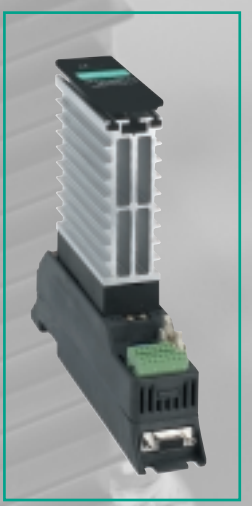
GFX-E1 [ ] / 480 0 0 00 0 [ ]

| RATED CURRENT | |
|---|---|
| 25A | 25 |
| 40A | 40 |
| 60A | 60 |
| 75A | 75 |
| 90A | 90 |
| 120A | 120 |

| DIAGNOSTICS | |
|---|---|
| 00 | None |
| C0 | Current transformer |
| CV | Voltage + Current transformer |

| RATED VOLTAGE | |
|---|---|
| 480 | 480Vac |

# GEFLEX





**To receive more information on GEFLEX, please fill in this form and fax it to Gefran Spa at +39 0309839063, or fill in the form on the site www.gefran.com**

Company

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