



## INSTALLATION AND OPERATION MANUAL

code 80960H - 06-2021 - ENG



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### GRAPHIC SYMBOLS

Per differenziare la natura e l'importanza delle informazioni fornite nelle presenti Istruzioni per l'Uso, sono stati utilizzati dei simboli grafici di riferimento che contribuiscono a rendere più immediata l'interpretazione delle informazioni stesse.



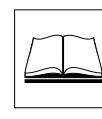
Indicates contents of sections, general instructions, notes, and other points to which the reader's attention needs to be called.



Indicates a suggestion based on the experience of GEFTRAN's Technical Personnel that could be especially useful under certain circumstances.



Indicates a particularly delicate situation that could affect the safety or correct operation of the controller, or an instruction that **MUST** be followed to prevent hazards.



Indicates a reference to Detailed Technical Documents available on the GEFTRAN website [www.gefran.com](http://www.gefran.com).



Indicates a risk to the user's safety due to high voltage at the points indicated.

# 1 · PRELIMINARY INSTRUCTIONS

## 1.1 PROFILE

The “GTF” series of microprocessor advanced solid state power units controls, in compact and optimized size, high electric powers with different types of heating elements, single-phase, biphasic or triphase.

Current levels range from 10A to 250A, nominal voltage from 480 VAC to 600VAC.

The command input is configurable and accepts 0-10V, 0/4-20mA signals, potentiometer, logic signals, including with PWM modes for cost effective solutions.

The device can also be operated via Modbus RTU serial communication, with IN/OUT chain connections facilitated by plug-in RJ10 (telephone) connectors.

The several trigger modes are software configurable and provide:

- **ZC:** Zero Crossing constant cycle time (settable in range 1-200sec), for conventional loads
- **BF:** Burst-Firing, Zero crossing with optimized minimum cycle time, for systems with low thermal inertia, medium-wave IR lamps
- **HSC:** Half Single Cycle Zero Crossing corresponds to Burst Firing that manages single semi-cycles of conduction or stop cycles, useful for short-wave IR lamps, reduces flickering and limits generation of EMC noise on the power line (applied only to single-phase load or open delta).

- **PA:** Phase angle control, useful for short-wave IR lamps, transformer primaries. Completely eliminates flickering of load filaments, but generates EMC noise on power line (harmonics).

Soft Start and soft stop ramp functions can be assigned to these controls with limitation of current peaks and/or maximum RMS current level.

Thanks to sophisticated Hardware and Software solutions, you can precisely control different types of loads.

Phase angle control (the only control method that completely eliminates IR lamp flickering), matched with current, voltage, or load power feedback functions, allows the easy use of “critical” applications such as (for example), special resistors such as special Super Khantal™ heating elements, Silicon Carbide resistors, or transformer primaries either single-phase or triphase.

GTF runs complete diagnostics of current, voltage, power, and temperature levels:

### Current Diagnostics:

- Total and partial load interrupt alarm
- Self-learn function of alarm limit for interrupted load
- Alarm for SCR in short circuit
- Alarm for load in short circuit or overcurrent

### Voltage Diagnostics:

- Alarm for absence of phase

### Temperature Diagnostics:

- Alarm for over temperature of power module

Power control with Soft start ramp limits load, optimizes the consumptions and increases the load operating duration.

Device parameters can be configured from PC, by means of a simple configuration SW which lets you save all parameters in a configuration file that is easy to manage and to copy to other devices. Moreover, an RS485 serial connection of GTF is offered with Modbus RTU protocol to control currents, voltages, powers, load status, and device status from the supervisor terminal (HMI) or PLC.



*The section contains general information and warnings to be read before installing, configuring and using the controller.*

## 1.2 GENERAL DESCRIPTION

GTF is single-zone advanced solid state power unit, extremely compact, equipped with different optional functions; it offers an exclusive combination of performance, reliability, and flexibility. In particular, this new line of Gefran controllers is the ideal solution for sectors demanding high performance and continuity of service, such as:

- Thermoforming
- Blowing
- Hot runners for injection presses
- Texturizing of fibers
- Heat treatment furnaces
- Woodworking machines
- Glass tempering furnaces

The modules series GTF controllers are based on an extremely versatile hardware and software platform, with options to select the best I/O configuration for your system.

GTF is used for the power control of single-phase and 2-phase loads, including resistive loads with high and low temperature coefficient, short wave IR lamps, or transformer primaries.



*Attention: the description of programming and configuration parameters are contained in the “Programming and configuration” manual, downloadable from the website [www.gefran.com](http://www.gefran.com).*

### 1.3 PRELIMINARY INSTRUCTION



*Read the following preliminary instructions before installing and using the GTF modular power controller. This will make start-up faster and avoid some problems that could be mistakenly interpreted as malfunctions or limitations of the controller*

Immediately after unpacking the unit, check the order code and the other data on the label attached to the outside of the container.

Write them on the following table.

This data must always be available and given to Gefran Customer Care representatives are available if technical service is needed.

|        |                    |
|--------|--------------------|
| SN     | (Serial number)    |
| CODE   | (Product code)     |
| TYPE   | (Order code)       |
| SUPPLY | (Power Supply)     |
| VERS   | (Firmware version) |

Check that the controller is in perfect condition, was not damaged during shipment, and that the package also contains the “Configuration and Programming” manual.

Immediately report any errors, shortages, or signs of damage to your Gefran dealer.

Check that the order code matches the configuration requested for the intended application by consulting the section: “Technical-Commercial Information.”

|                        |     |    |     |   |   |   |   |
|------------------------|-----|----|-----|---|---|---|---|
| Example                | GTF | 90 | 480 | 0 | 1 | 0 | M |
| Model                  |     |    |     |   |   |   |   |
| Nominal current        |     |    |     |   |   |   |   |
| Nominal voltage        |     |    |     |   |   |   |   |
| Control option, Absent |     |    |     |   |   |   |   |
| Diagnostic option: HB  |     |    |     |   |   |   |   |
| Fuse: absent           |     |    |     |   |   |   |   |
| Serial Modbus          |     |    |     |   |   |   |   |

See paragraph 2.1 “Dimensions and mounting” before installing the GTF on the machine/host system control panel.

To configure the PC use the SW Gefran GF-Express kit and the relative connection cable.

For the order code, see Section: “Technical-Commercial Information”.



Users and/or system integrators who want detailed information on serial communication between Gefran standard and/or industrial PCs and Gefran Programmable Instruments can access Technical Reference Documents on serial communication and MODBus protocol, etc., in Adobe Acrobat format on the Gefran website [www.gefran.com](http://www.gefran.com):

- Serial Communication
- MODBus Protocol

Before calling Gefran Customer Care in case of assumed malfunctions, please see the Troubleshooting Guide in the “Maintenance” section and, if necessary, the F.A.Q. (Frequently Asked Questions) section on the Gefran website [www.gefran.com](http://www.gefran.com)

## 2 • INSTALLATION AND CONNECTION



*This section contains the instructions needed for correct installation of GTF controllers on the machine/host system control panel and for correct connection of the power supply, inputs, outputs and interfaces.*



### CAREFULLY READ THE FOLLOWING WARNINGS BEFORE INSTALLING THE INSTRUMENT!

**Disregard of such warnings could create electrical safety and electromagnetic compatibility problems, as well as void the warranty.**

#### 2.1 ELECTRICAL POWER SUPPLY

- the controller DOES NOT have an On/Off switch: the user must install switch/isolator conforming to safety requisites (CE mark) to cut off the power supply up-line of the controller.  
The switch must be installed in the immediate vicinity of the controller in easy reach of the operator.  
A single switch can be used for multiple devices.
- \* the earth connection must be made with a specific lead
- if the product is used in applications with risk of harm to persons or damage to machines or materials, it MUST be equipped with auxiliary alarm devices.  
It is advisable to provide the ability to check for tripped alarms during regular operation.  
DO NOT install the product in rooms with hazardous (inflammable or explosive) atmosphere; it may be connected to elements that operated in such atmosphere only by means of appropriate interfaces that conform to current safety standards.

#### 2.2 NOTES ON ELECTRICAL SAFETY AND ELECTROMAGNETIC COMPATIBILITY:

##### 2.2.1 CE MARKING: EMC

###### (electromagnetic compatibility) conformity

in compliance with Directive 2014/30/EU and following modifications. Series GTF controllers are mainly intended for industrial use, installed on panels or control panels of production process machines or systems. For purposes of electromagnetic compatibility, the most restrictive generic standards have been adopted, as shown on the table.

##### 2.2.2 LV (low voltage) conformity

in compliance with Directive 2014/35/EU.



EMC compliance has been verified with respect to the information in Tables 1 and 2.

#### 2.3 RECOMMENDATIONS FOR CORRECT INSTALLATION FOR PURPOSES OF EMC:

##### 2.3.1 Instrument power supply

- The power supply for the electronic instrumentation on the panels must always come directly from a cut-off device with fuse for the instrument part.
- Electronic instrumentation and electromechanical power devices such as relays, contactors, solenoids, etc., MUST ALWAYS be powered by separate lines.
- When the power supply line of electronic instruments is heavily disturbed by switching of thyristor power groups or by motors, you should use an isolation transformer only for the controllers, grounding its sheathing.
- It is important for the system to be well-grounded:
  - voltage between neutral and ground must not be  $> 1V$
  - Ohmic resistance must be  $< 6\Omega$ ;
  - If the grid voltage is highly unstable, use a voltage stabilizer.
  - In proximity of high-frequency generators or arc welders, use adequate grid filters.
- The power supply lines must be separate from instrument input and output lines.
- Supply from Class II or from limited energy source

##### 2.3.2 Input and output connections

Before connecting or disconnecting any connection, always check that the power and control cables are isolated from voltage

Appropriate devices must be provided: fuses or automatic switches to protect power lines.

The fuses present in the module function solely as a protection for the GTF semiconductors.

- Connected outside circuits must be doubly isolated.
- To connect analog inputs, strain gauges, linears, (TC, RTD), you have to:
  - physically separate the input cables from those of the power supply, outputs, and power connections.
  - use braided and shielded cables, with sheathing grounded at a single point.

##### 2.3.3 Installation notes

Use the extra-rapid fuse indicated in the catalogue according to the connection example equipped.

- Moreover, the applications with solid-state units require a safety automatic switch to section the load power line.

To ensure maximum reliability, the device must be correctly installed in the panel in such a way as to obtain adequate heat exchange between the heat sink and the surrounding air under conditions of natural convection.

Fit the device vertically (maximum angle 10° to the vertical axis) see figure 3.

- Vertical distance between a device and the panel wall >100mm
- Horizontal distance between a device and the panel wall at last 10mm
- Vertical distance between a device and the next one at last 300mm.
- Horizontal distance between a device and the next one at last 10mm.

Check that the cable holder runners do not reduce these distances, in this case fit the cantilever units opposite the panel so that the air can flow vertically on the dissipator without any obstacles.

- Dissipation of device thermic power with effects on installation room temperature.
- thermal power dissipation with limits on installation room temperature.

- requires exchange with external air or an air conditioner to transfer dissipated power outside the panel.)
- maximum limits of voltage and derived power of transients on the line, for which the solid state power unit contains protective devices (based on the model).
- presence of dispersion current in GTF in non-conducting state (current of a few mA due to RC Snubber circuit to protect the thyristor).



**GEFRAN S.p.A. assumes no liability for any damage to persons or property deriving from tampering, from incorrect or improper use, or from any use not conforming to the characteristics of the controller and to the instructions in this User Manual.**

**Table 1**

**EMC Emission**

|  |                                      |                 |
|--|--------------------------------------|-----------------|
| AC semiconductor motor controllers and conductors for non-motor loads                              | EN 60947-4-3                         |                 |
| Emission enclosure compliant in firing mode single cycle and phase angle if external filter fitted | EN 60947-4-3<br>CISPR-11<br>EN 55011 | Class A Group 2 |

**Table 2**

**EMC Immunity**

|  |   |  |
|--|---|--|
| Generic standards, immunity standard for industrial environments | EN 60947-4-3  |  |
| ESD immunity   | EN 61000-4-2  | 4 kV contact discharge<br>8 kV air discharge   |
| RF interference immunity   | EN 61000-4-3 /A1  | 10 V/m amplitude modulated 80 MHz-1 GHz<br>10 V/m amplitude modulated 1.4 GHz-2 GHz              |
| Conducted disturbance immunity                                   | EN 61000-4-6  | 10 V/m amplitude modulated 0.15 MHz-80 MHz   |
| Burst immunity   | EN 61000-4-4  | 2 kV power line<br>2 kV I/O signal line  |
| Surge immunity   | EN 61000-4-4/5  | Power line-line 1 kV<br>Power line-earth 2 kV<br>Signal line-earth 2 kV<br>Signal line-line 1 kV |
| Magnetic fields immunity   | Test are not required. Immunity is demonstrated by the successfully completion of the operating capability test |  |
| Voltage dips, short interruptions and voltage immunity tests     | EN 61000-4-11   | 100%U, 70%U, 40%U  |

**Table 3**

**LVD Safety**

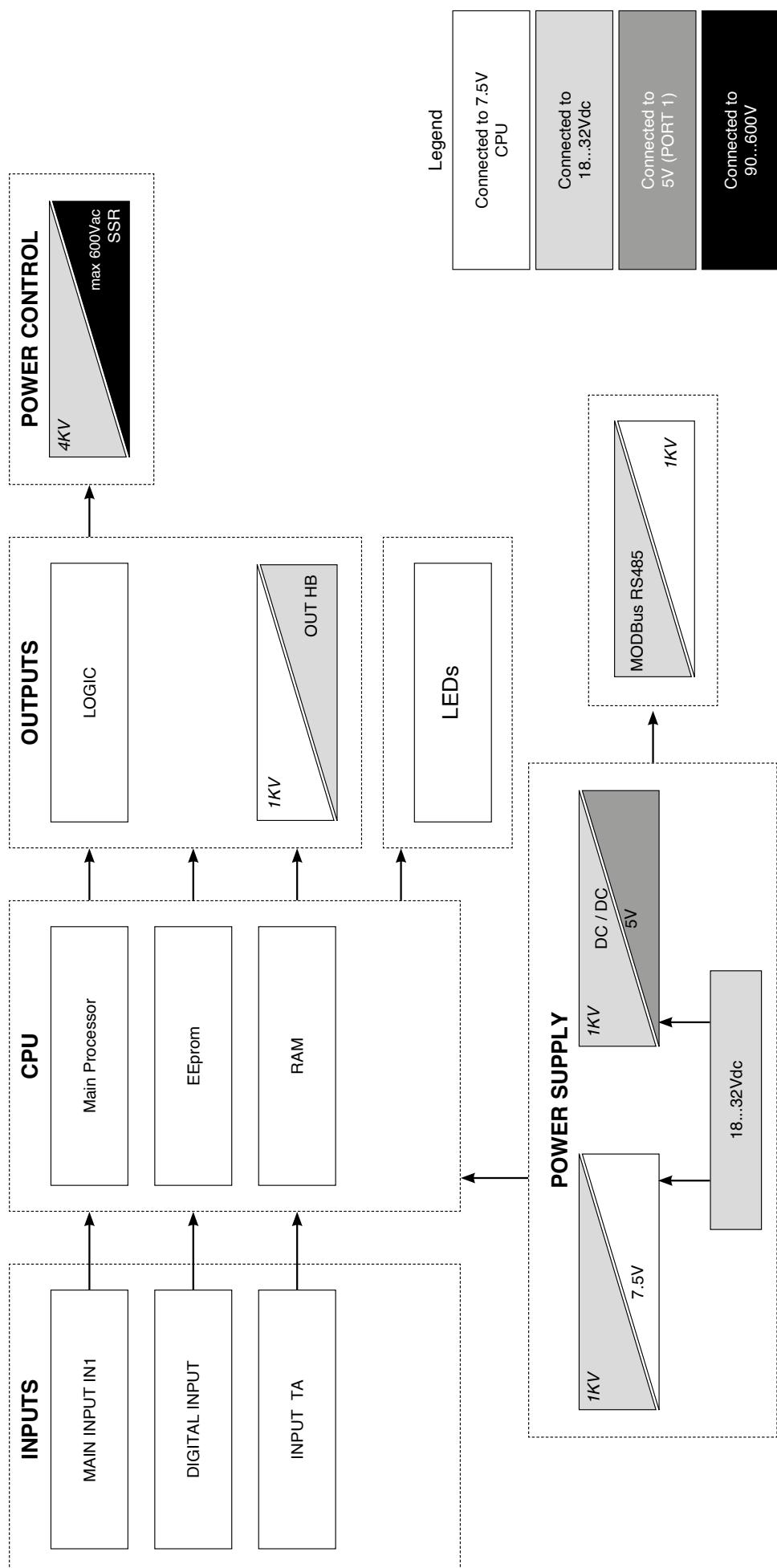
|  |                      |
|--|----------------------|
| Safety requirements for electrical equipment for measurement, control and laboratory use | EN 61010-1<br>UL 508 |
|--|----------------------|

**ATTENTION**

This product has been designed for class A equipment. Use of the product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.

**EMC filters are required in PA mode** (Phase Angle, i.e., SCR trigger with phase angle modulation). The filter model and current level depend on the configuration and load used. The power filter MUST be connected as close as possible to the GTF. You can use a filter connected between the power line and GTF or an LC group connected between the GTF output and the load

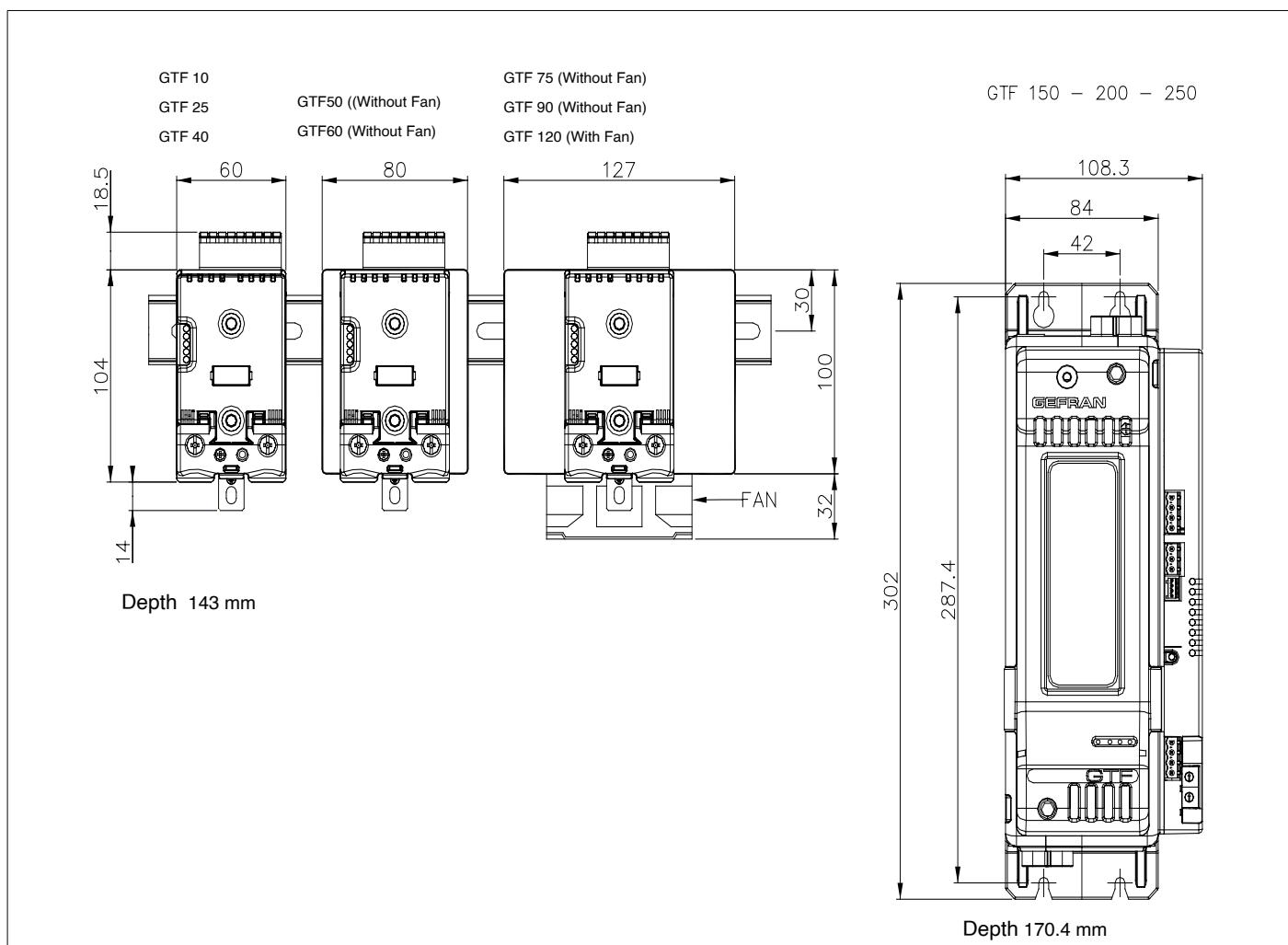
The CE declaration of conformity is available on request



## 2.4 DIMENSIONS

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

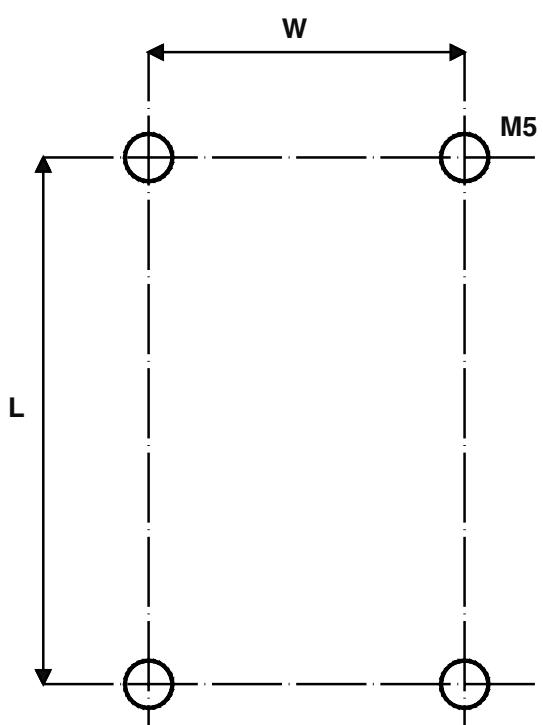
Figure 1



### 2.4.1 Template dimensions

Figure 2

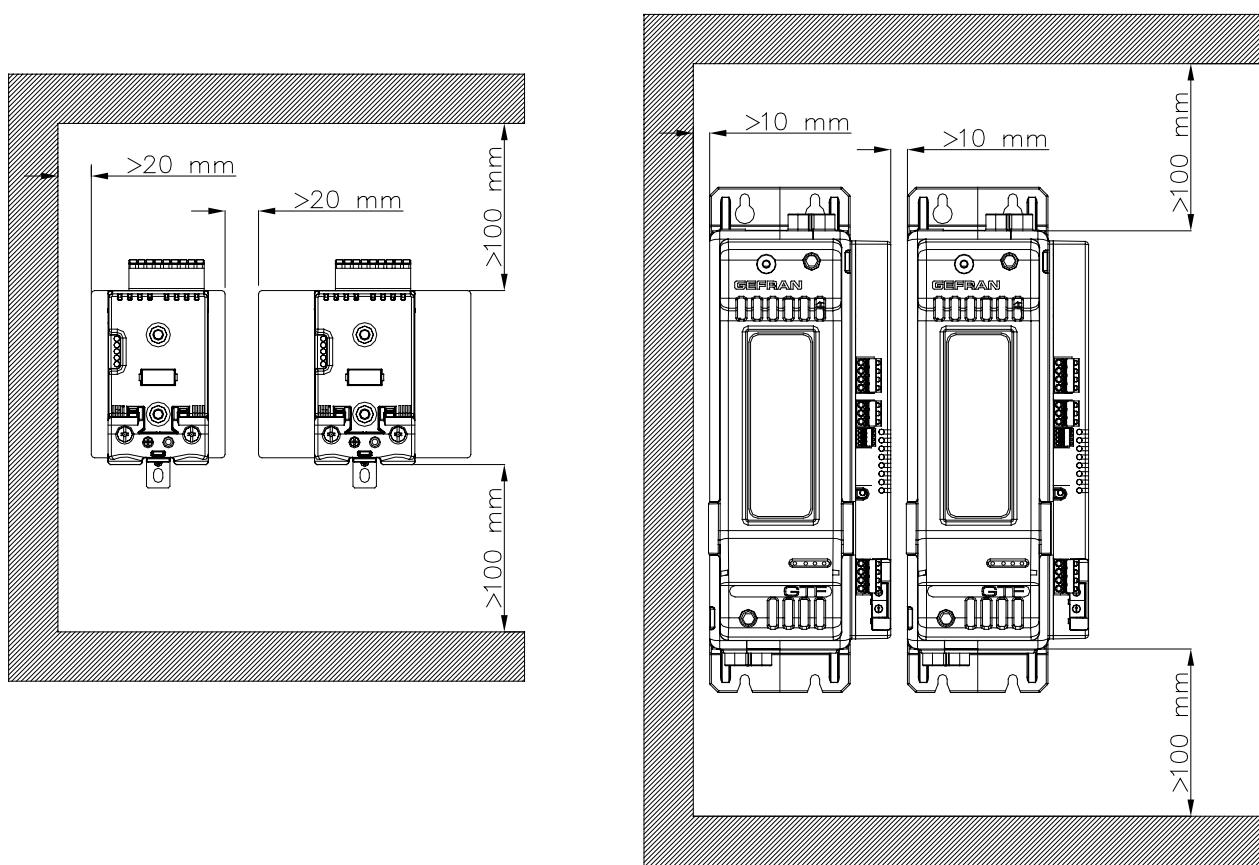
| Models               | L (mm) | W(mm) |
|----------------------|--------|-------|
| GTF 10-25-40-50-60A: | 112    | 44    |
| GTF 75-90-120A:      | 112    | 113   |
| GTF 150-200-250A     | 287    | 42    |





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

Figure 3



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 4

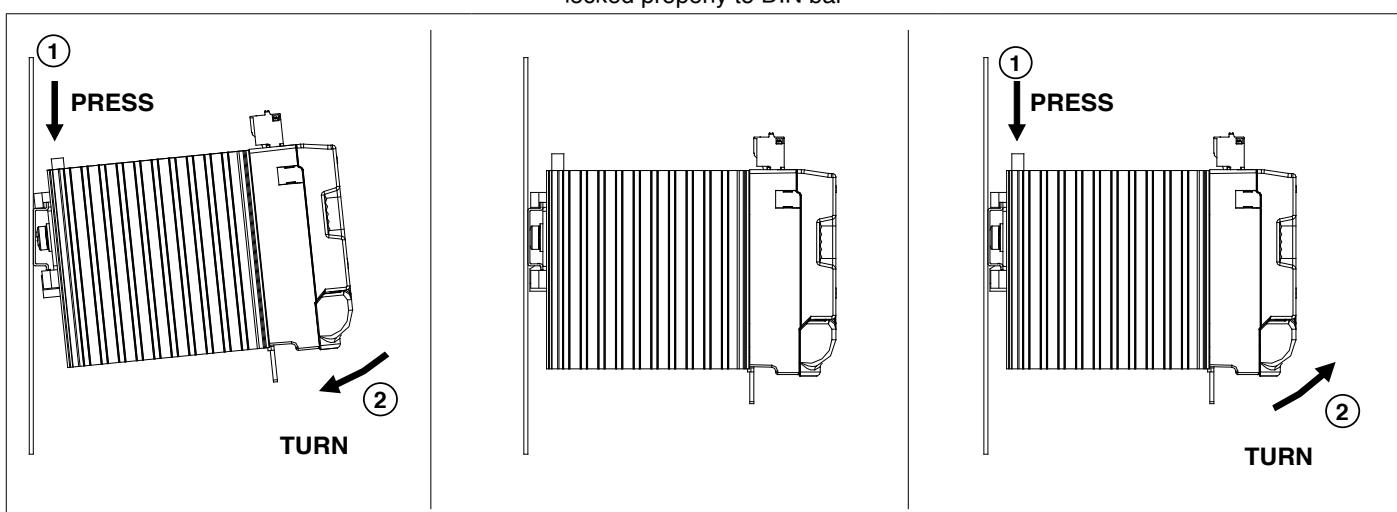
Figure 5

Figure 6

PHASE ATTACHMENT

GTF  
locked properly to DIN bar

PHASE RELEASE



## 2.6 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, 600 Volts maximum when protected by fuses.  
Use fuses only

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

For products complying with the UL508 standard, the use of fuses in the "UL508 SCCR FUSES TABLE" table does not guarantee the operation of the device following a short circuit.

To guarantee the functioning of the device after the short circuit, it is recommend the use of extra rapid fuses as in table "EXTRARAPID FUSES".

For products GTF up to 120A, the use of fuses in the "SCCR CO-ORDINATION FUSES TABLE" guarantee the operation of the device following a short circuit.

**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.

**Table 4**

| <b>UL508 SCCR FUSES TABLE</b> |            |
|-------------------------------|------------|
| <b>GTF 200A 600V</b>          | Class J    |
| <b>GTF 250A 600V</b>          | to up 400A |

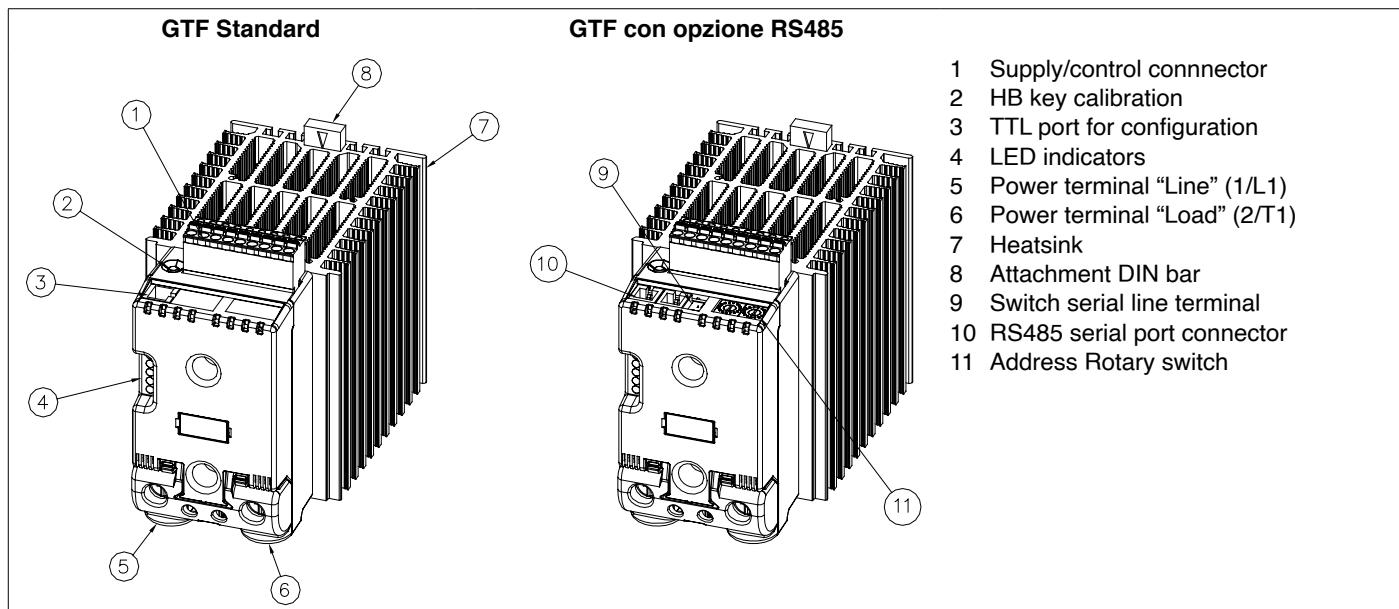
**Table 5**

| <b>SCCR CO-ORDINATION FUSES TABLE</b> |                                     |                          |                              |                          |
|---------------------------------------|-------------------------------------|--------------------------|------------------------------|--------------------------|
| <b>Model</b>                          | <b>Short circuit current [Arms]</b> | <b>Max fuse size [A]</b> | <b>Bussmann Model Number</b> | <b>Max Voltage [VAC]</b> |
| GTF 10                                | 100.000                             | 25                       | DFJ-25                       | 600                      |
| GTF 25                                | 100.000                             | 25                       | DFJ-25                       | 600                      |
| GTF 40                                | 100.000                             | 50                       | DFJ-50                       | 600                      |
| GTF 50                                | 100.000                             | 50                       | DFJ-50                       | 600                      |
| GTF 60                                | 100.000                             | 100                      | DFJ-100                      | 600                      |
| GTF 75                                | 100.000                             | 100                      | DFJ-100                      | 600                      |
| GTF 90                                | 100.000                             | 100                      | DFJ-100                      | 600                      |
| GTF 120                               | 100.000                             | 125                      | DFJ-125                      | 600                      |

The fuses on the above table are representative of all the Bussmann DFJ fuses with lower current ratings  
The devices protected with the fuses reported above, still be functional after the short circuit

## 2.7 GENERAL DESCRIPTION GTF 10-120A

Figure 7



## 2.8 GENERAL DESCRIPTION GTF 150-250A

Figure 8

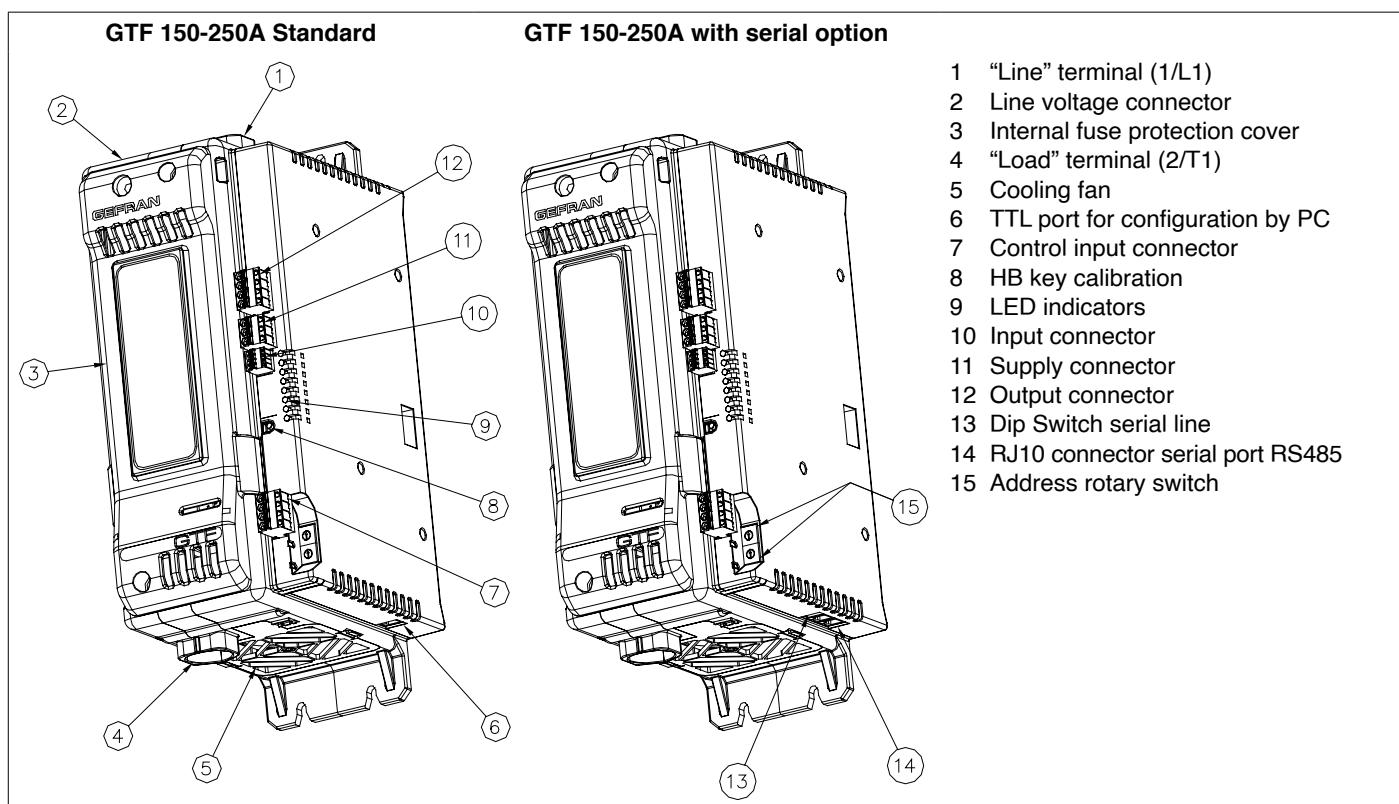
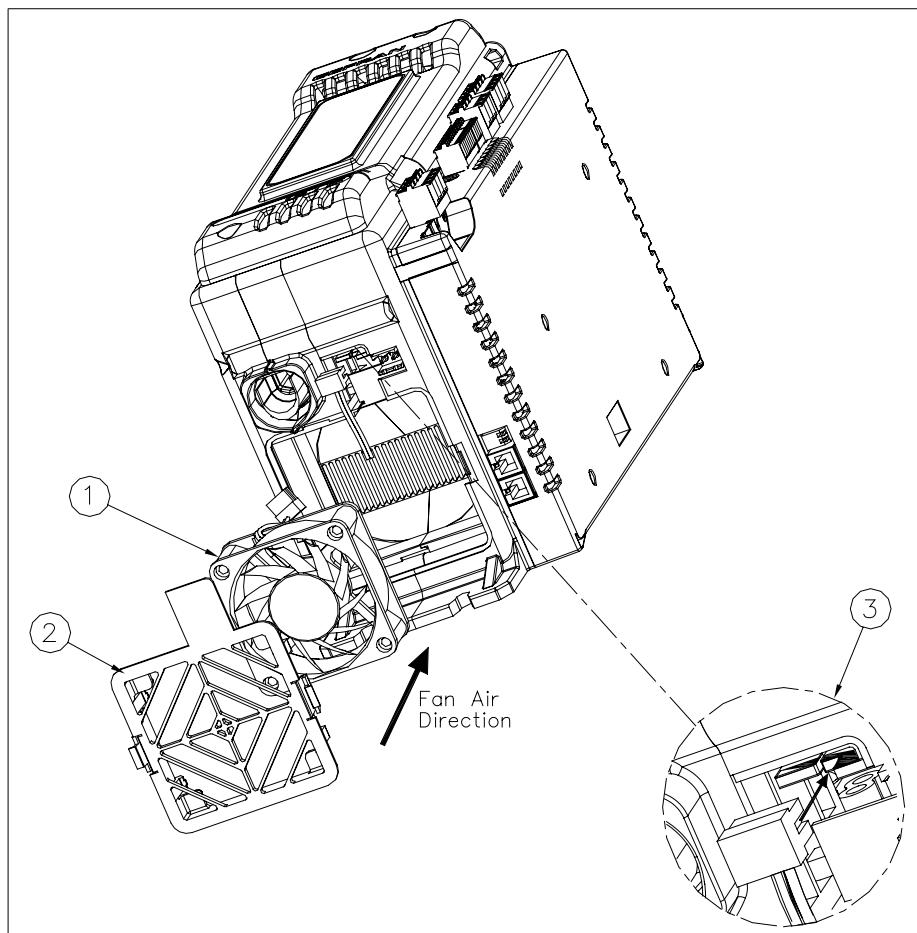


Figure 9



- 1 Fan
- 2 Lower grille (ventilation intake)
- 3 Detail of insertion of fan connector in PCB



### PERIODIC CLEANING

Every 6-12 months (depending on the dust level of the installation) blow a compressed air jet downward through the upper rectangular cooling grilles (on the side opposite the fan).

This will clean the internal heat dissipater and the cooling fan.



### IN CASE OF OVERHEAT ALARM

Before and during the inspection/maintenance cut power to the fan controller and verify that the system is isolated for operator safety. If periodic cleaning does not eliminate the problem, do as follows:

- a Remove the fan support grille by detaching the two support tabs
- b Disconnect the fan connector from the board
- c Check the condition of the fan
- d Clean or replace the fan
 

Attention: check that the arrow (on the fan indicating the direction of air flow is pointing to the heat sink)
- e Insert the connector into the board
- f Insert the fan support grille until it attaches
- g Power up the device and check fan rotation when at least one load is on



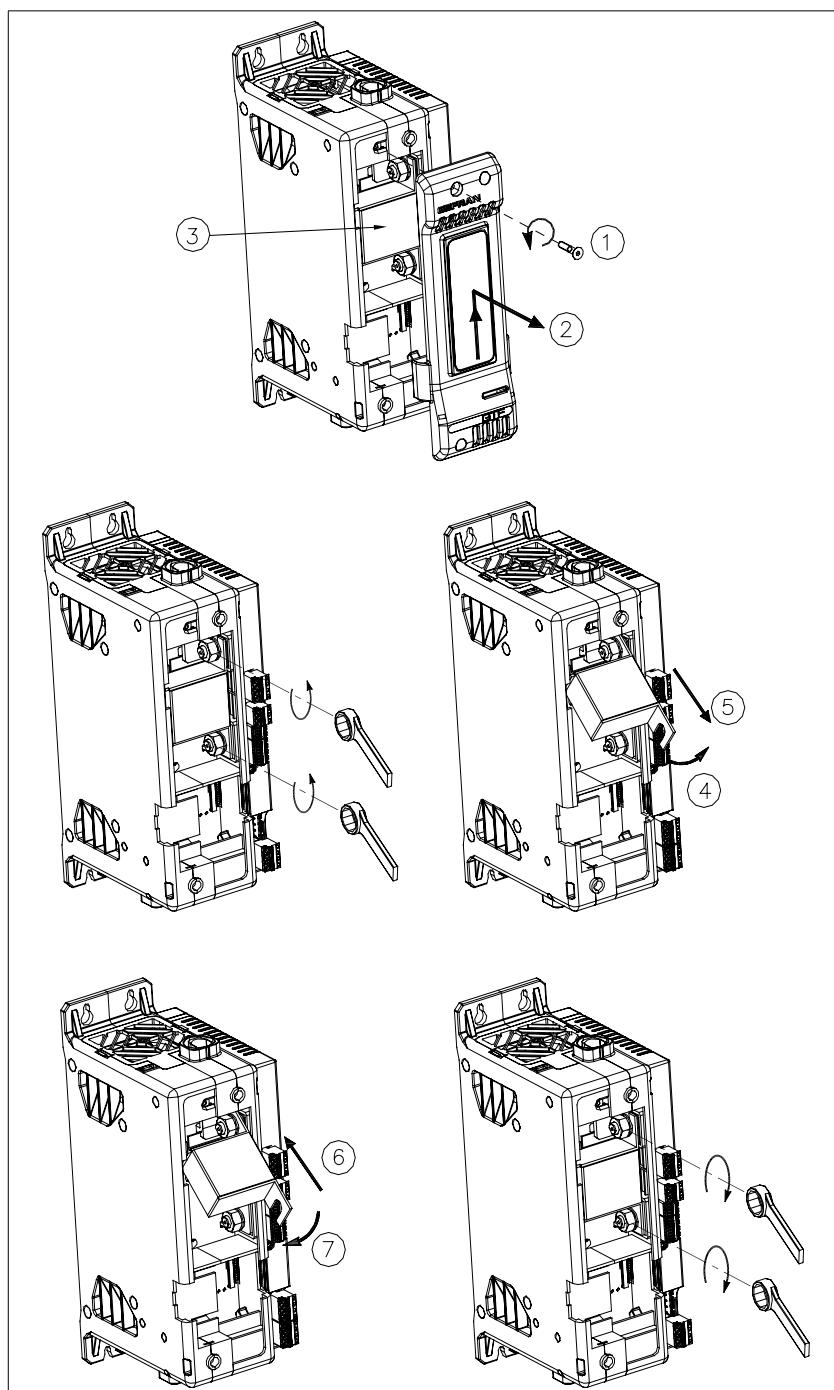
## ATTENTION

Before and during the inspection/maintenance cut power to the fuse controller and verify that the system is isolated for operator safety.

- Undo the cover fastening screw (1)
- Remove the cover following the movement indicated by the arrow (2)
- In this way the fuse is discovered (3)
- Loosen the two fastening nuts of fuse by means of fixed spanner N.13 (GTF 150)
- It is not necessary to remove the nuts as the fuse N.17 (GTF 200-250A) is slipped off its seat by turning it (4) and extracting it (5) as indicated by the arrows
- Insert the new fuse as indicated by the arrows (6,7)

**ATTENTION:** the washer must remain between the dice and the fuse (NOT under the fuse).

Figure 10



- Fasten the two nuts by the 3-4 Nm torque tube-shaped spanner N. 16
- Replace the cover pointing it to the lower part (pay attention to the connection tooth)
- Fasten the cover by the specific screw

#### 3.1 POWER CONNECTIONS

##### RECOMMENDED WIRE GAUGES

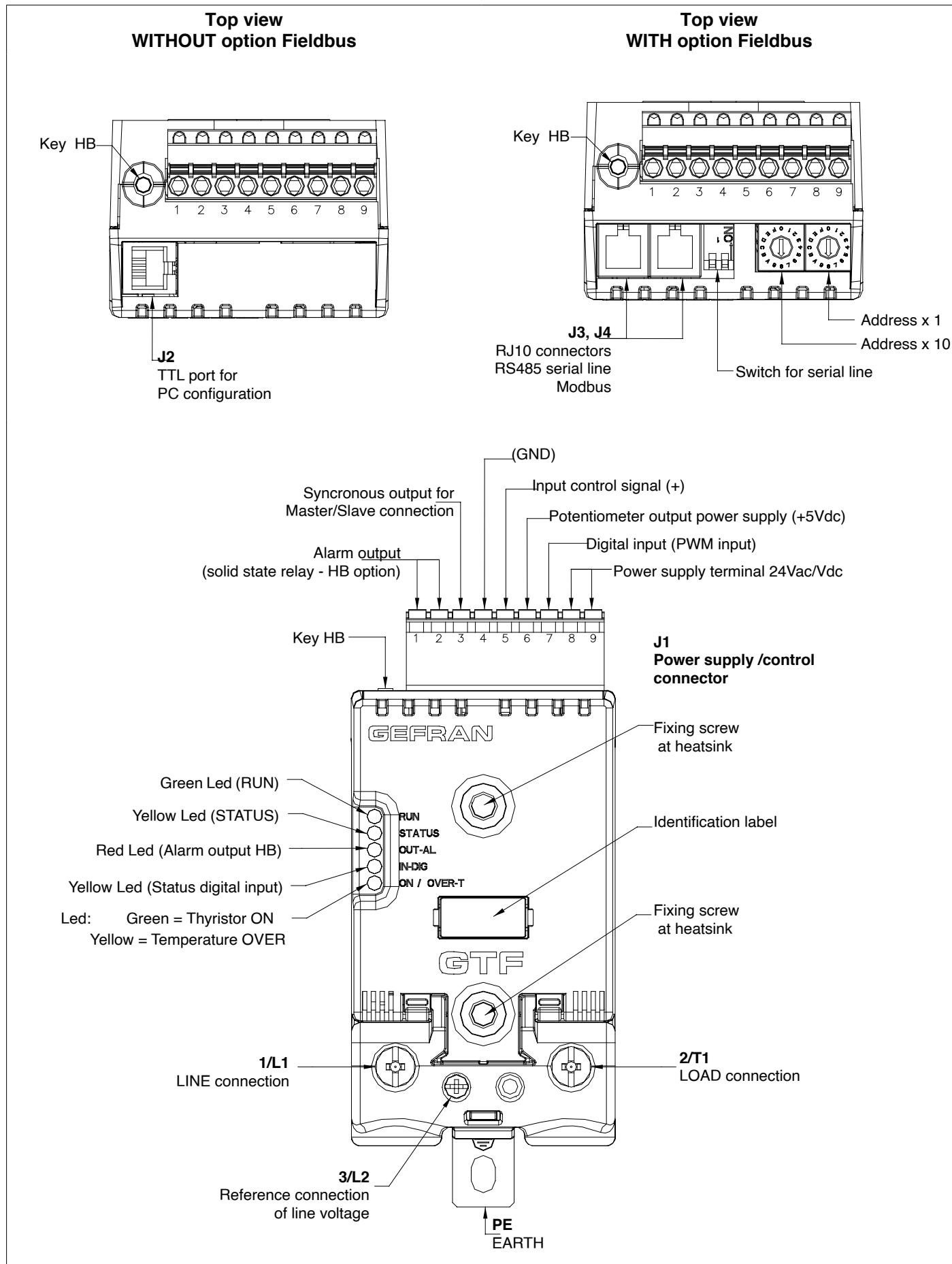
*Table 6*

| CURRENT LEVEL<br>GTF | TERMINAL          | CABLE WIRE                                  | WIRE TERMINAL  | TIGHTENING TORQUE /<br>TOOL                                |
|----------------------|-------------------|---|--|--|
| 10A                  | 1/L1, 2/T1, PE    | 4 mm <sup>2</sup><br>10 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 25A                  | 1/L1, 2/T1, PE    | 4 mm <sup>2</sup><br>10 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 40A                  | 1/L1, 2/T1, PE    | 10 mm <sup>2</sup><br>7 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 50A                  | 1/L1, 2/T1, PE    | 10 mm <sup>2</sup><br>7 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 60A                  | 1/L1, 2/T1, PE    | 16 mm <sup>2</sup><br>5 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 75A                  | 1/L1, 2/T1, PE    | 25 mm <sup>2</sup><br>3 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 90A                  | 1/L1, 2/T1, PE    | 35 mm <sup>2</sup><br>2 AWG                 | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| 120A                 | 1/L1, 2/T1, PE    | 50 mm <sup>2</sup><br>1/0 AWG               | Wire terminal / Eye<br>D. 6mm  | 2.5 Nm / Phillips screwdriver<br>PH2 - PH3                 |
| -                    | 3/L2 (Ref. Vline) | 0.25 ... 2.5 mm <sup>2</sup><br>23...14 AWG | wire terminal tip  | 0.5 ... 0.6 Nm / Screwdriver blade<br>0.6 x 3.5 mm         |
| 150A                 | 1/L1, 2/T1        | 70 mm <sup>2</sup><br>2/0 AWG               | Wire stripped for 25 mm or<br>with crimped pre-insulated<br>terminal tube CEMBRE<br>PKC70022 | 6 Nm / No. 6 hex head wrench                               |
| 200A                 | 1/L1, 2/T1        | 95 mm <sup>2</sup><br>4/0 AWG               | Wire stripped for 25 mm or<br>with crimped pre-insulated<br>terminal tube CEMBRE<br>PKC95025 | 6 Nm / No. 6 hex head wrench                               |
| 250A                 | 1/L1, 2/T1        | 120 mm <sup>2</sup><br>250 AWG              | Wire stripped for 25 mm  | 6 Nm / No. 6 hex head wrench                               |
| -                    | 3/L2 (Ref. Vline) | 0.25 ... 2.5 mm <sup>2</sup><br>23...14 AWG | Wire stripped for 8 mm<br>or with tag terminal   | 0.5 ... 0.6 Nm / Flat-head screwdriver<br>tip 0,6 x 3.5 mm |

**Note:**

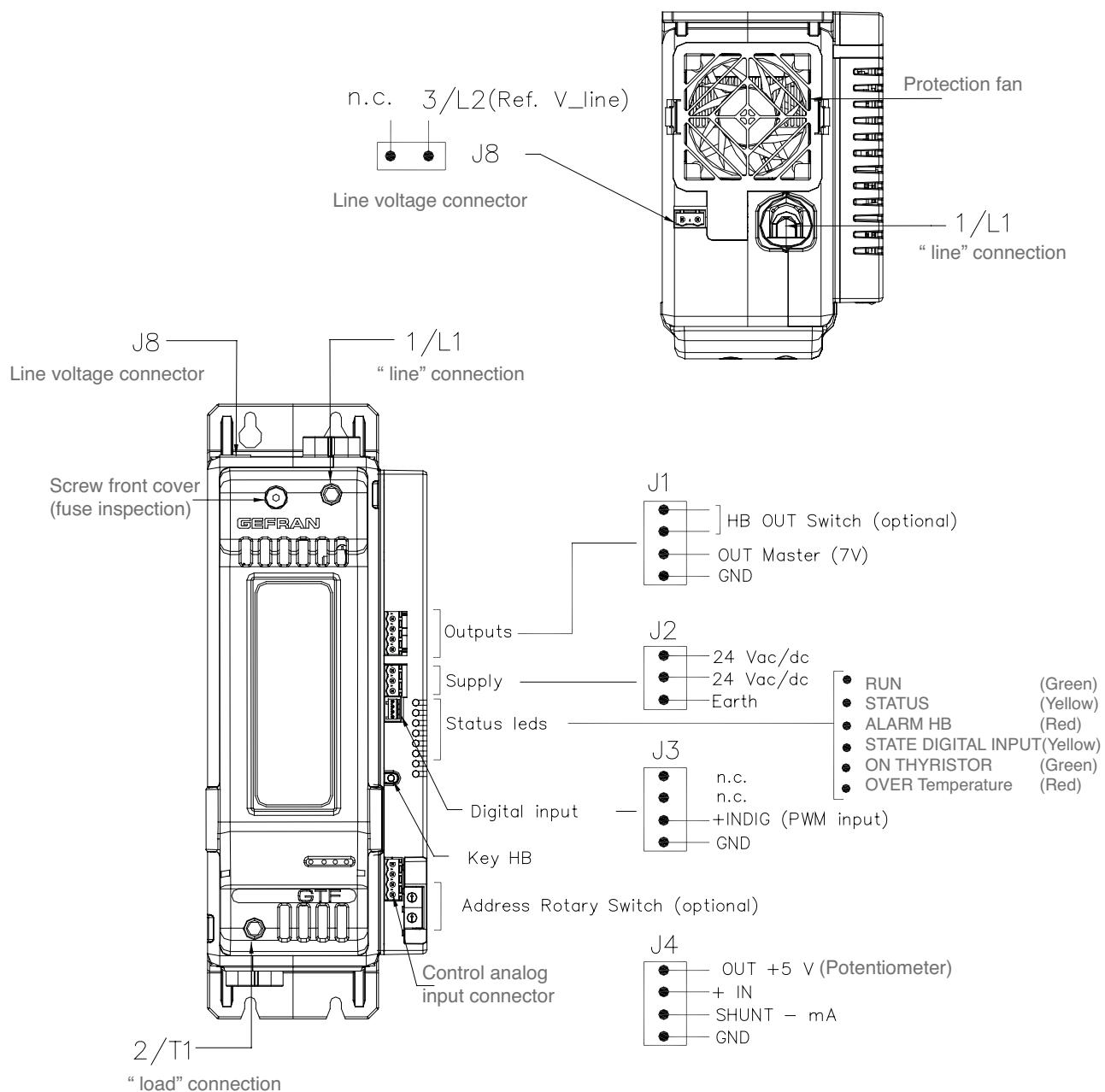
Cables must be copper "Stranded Wire" or "Compact-Stranded Wire" type with maximum operating temperature 60/75°

Figure 11

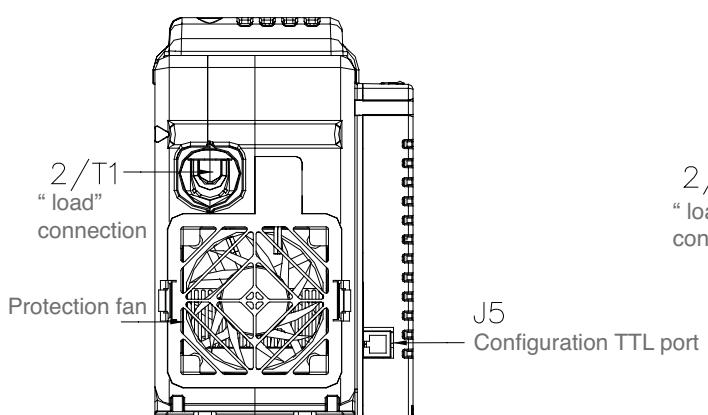


### 3.3 CONNECTIONS INPUT/OUTPUT GTF 150-250A

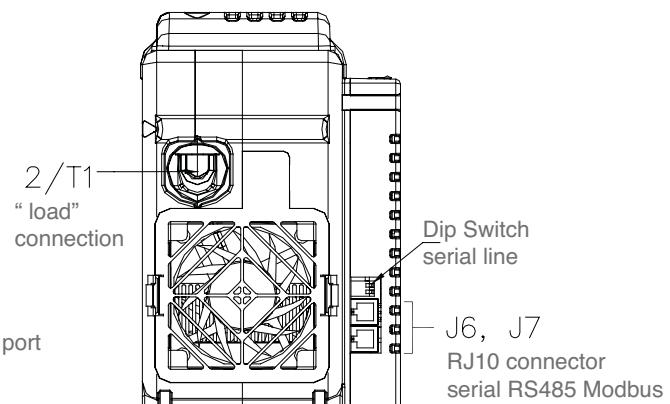
Figure 12



**Low view**  
**WithOUT option RS485 serial line**



**Low view**  
**With option RS485 serial line**



### 3.4 FUNCTIONS OF INDICATOR LEDS

#### Description of LEDs

Table 7

| LED   | DESCRIPTION   | COLOR  |
|---|---|--------|
| RUN   | Flashing during normal operation  | green  |
|   | On steadily: according to FW setting (see SW manual)  |        |
| STATUS  | Off : during normal operation   | yellow |
|   | On : according to FW setting (see SW manual)  |        |
| ALARM   | State HB alarm output / Power Fault Alarm / Fuse Open   | red    |
| DI  | State digital input   | yellow |
| ON / OVER-TEMP  | .Green: thyristor on control state  | green  |
|   | Yellow: ON Thyristor overtemperature alarm  | yellow |
|  | The state of the LEDs matches the corresponding parameter, except in the following special cases:<br>- LED 1 (green) + LED 2 (yellow) both flashing rapidly: autobaud in progress<br>- LED 2 (yellow) flashing rapidly: SSR temperature sensor broken or SSR Over Heat or Rotation Error or Fuse_open (GTF 150...250A) or Short_Circuit_Current or Line-Load Terminals Over Heat (GTF 150...250A) |        |

### 3.5 CONTROL CONNECTOR

#### 3.5.1 Connector J1 GTF 10-120A

Figure 13

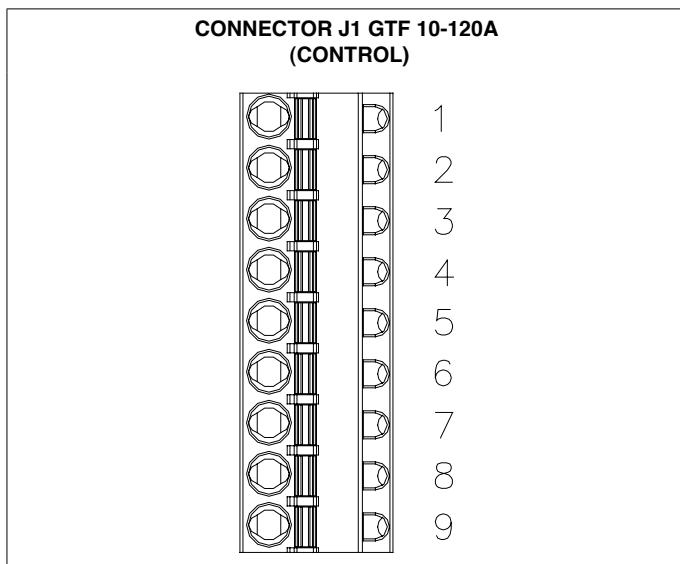


Table 8

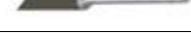
|  |                           |          |
|--|---------------------------|----------|
|  | 0,2 - 2,5mm <sup>2</sup>  | 24-14AWG |
|  |                           |          |
|  |                           |          |
|  | 0,25 - 2,5mm <sup>2</sup> | 23-14AWG |

Figure 14

Connection schema J1 GTF for 10-120A

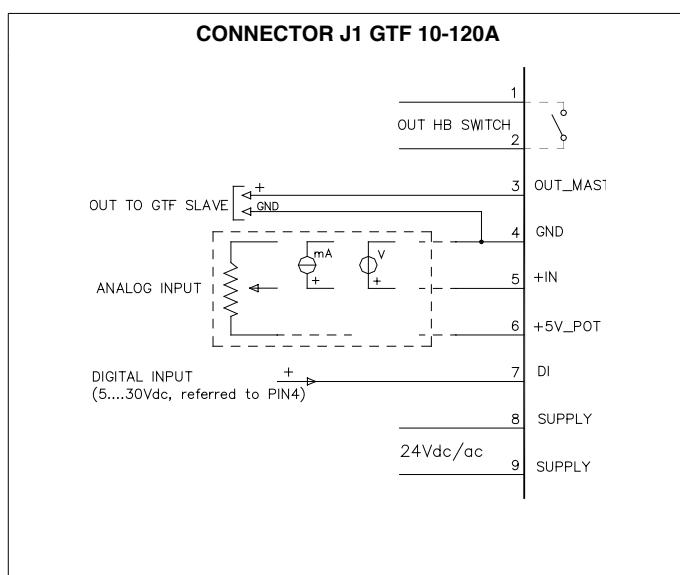


Table 9

| PIN | NAME       | DESCRIPTION                |
|-----|------------|----------------------------|
| 1   | OUT AL HB  | OUT Alarm Switch (HB)      |
|     |            |                            |
| 2   | OUT_Master | Control output Slave (+7V) |
| 3   | GND        | GND Control analog input   |
| 4   | + IN       | + Control analog input     |
| 5   | +5V_POT    | Output alim. potentiometer |
| 6   | IN_DIG     | Digital input & PWM Input  |
| 7   | 24V Supply | Supply 18...32 Vac/Vdc     |
| 8   | 24V Supply |                            |
| 9   | 24V Supply |                            |

### 3.5.2 Connector J1 GTF 150-250A OUTPUTS

Figure 15

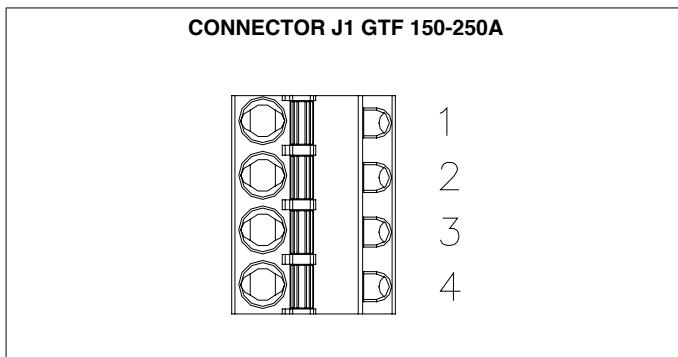


Table 10

|  |                           |          |
|--|---------------------------|----------|
|  | 0,2 - 2,5mm <sup>2</sup>  | 24-14AWG |
|  | 0,25 - 2,5mm <sup>2</sup> | 23-14AWG |

Figure 16

Connection scheme J1 GTF for 150-250A

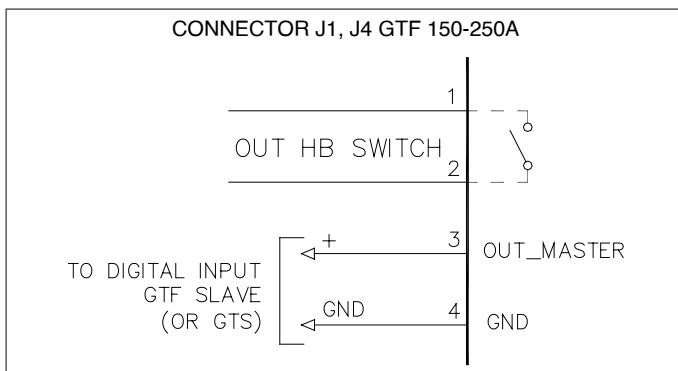


Table 11

| PIN | NAME        | DESCRIPTION                          |
|-----|-------------|--------------------------------------|
| 1   | OUT AL HB   | Contact output N.A. Alarm HB         |
| 2   |             |                                      |
| 3   | +OUT_Master | Output 7Vdc for control slave module |
| 4   | GND         | GND output OUT_Master                |

### 3.5.3 Connector J2 GTF 150-250A Supply 24V

Figure 17

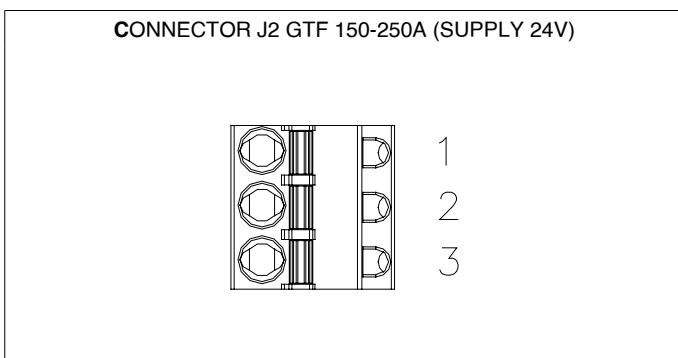


Table 12

|  |                           |          |
|--|---------------------------|----------|
|  | 0,2 - 2,5mm <sup>2</sup>  | 24-14AWG |
|  | 0,25 - 2,5mm <sup>2</sup> | 23-14AWG |

Figure 18

Connection scheme J2 GTF for 150-250A

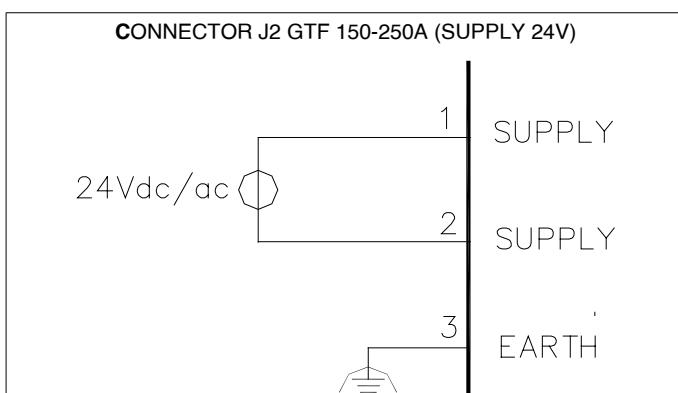


Table 13

| PIN | NAME      | DESCRIPTION |
|-----|-----------|-------------|
| 1   | 24Vdc/Vac | 24V Supply  |
| 2   | 24Vac/Vdc |             |
| 3   | EARTH     | Earth EMC   |

### 3.5.4 Connector J3 GTF 150-250A Digital inputs

Figure 19

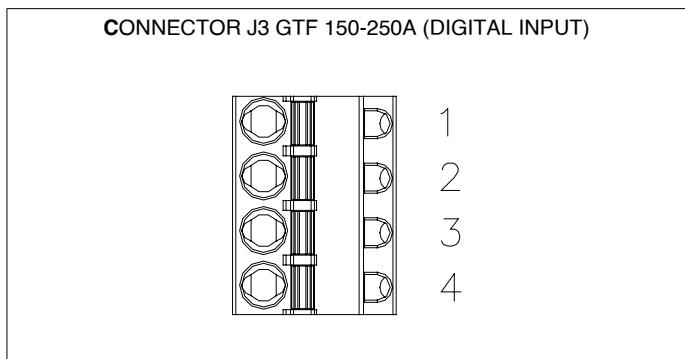


Table 14

|  |                           |          |
|--|---------------------------|----------|
|  | 0,2 - 2,5mm <sup>2</sup>  | 24-14AWG |
|  |                           |          |
|  | 0,25 - 2,5mm <sup>2</sup> | 23-14AWG |
|  |                           |          |

Figure 20

Connection scheme J3 for GTF 150-250A

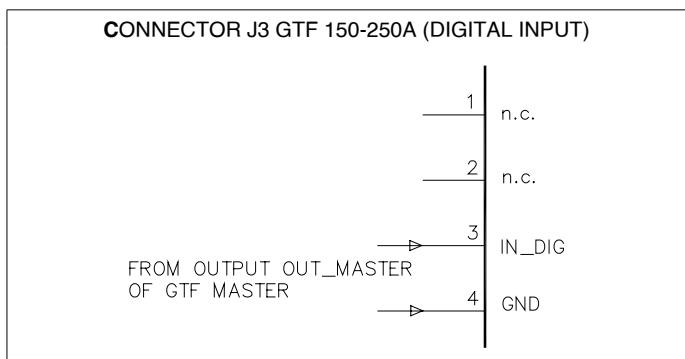


Table 15

| PIN | NAME    | DESCRIPTION                 |
|-----|---------|-----------------------------|
| 1   | ---     | Not connected               |
| 2   | ---     | Not connected               |
| 3   | +IN_DIG | Digital input (& PWM input) |
| 4   | GND     | 24V Supply                  |

### 3.5.5 Connector J4 GTF 150-250A Control Analog Input

Figure 21

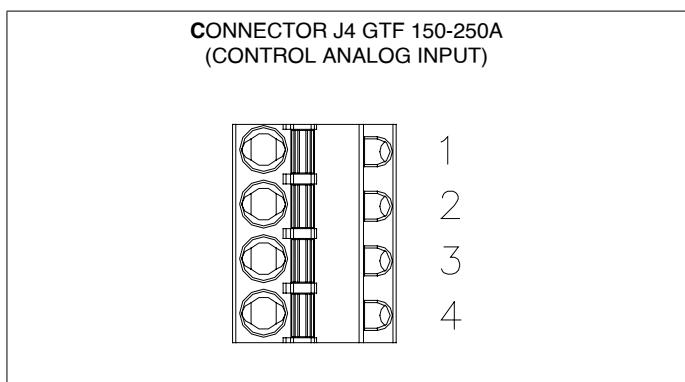


Table 16

|  |                           |          |
|--|---------------------------|----------|
|  | 0,2 - 2,5mm <sup>2</sup>  | 24-14AWG |
|  |                           |          |
|  | 0,25 - 2,5mm <sup>2</sup> | 23-14AWG |
|  |                           |          |

Figure 22

Connection scheme J4 for GTF 150-250A

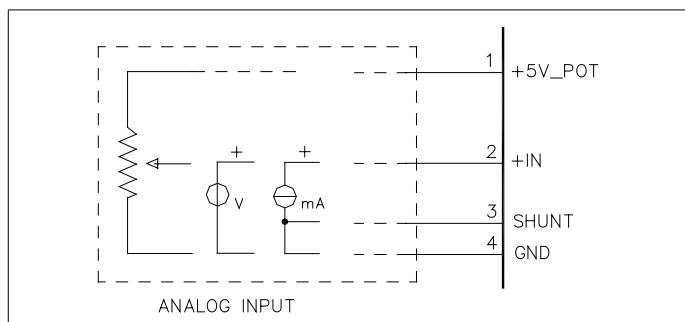
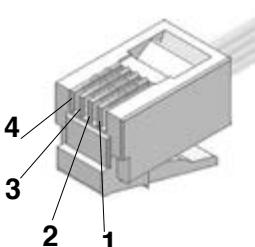


Table 17

| PIN | NAME      | DESCRIPTION                    |
|-----|-----------|--------------------------------|
| 1   | OUT AL HB | Supply output 5V potentiometer |
| 2   | +IN       | Control voltage input          |
| 3   | SHUNT     | Shunt for input mA             |
| 4   | GND       | GND control signal             |

### 3.6 CONFIGURATION TTL PORT (GTF STANDARD)

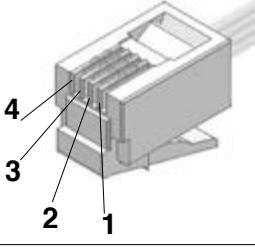
#### Connector J2 GTF 10-120A - Connector J5 GTF 150-250A

| Connector S1/S2<br>RJ10 4-4 pin   | Nr. Pin | Name              | Description                  | Note   |
|---|---------|-------------------|------------------------------|--|
|  | 1       | GND               | Ground                       |  |
|   | 2       | RX_TTL            | Data reception TTL from GTF  |  |
|   | 3       | TX_TTL            | Data transmission TTL to GTF |  |
|   | 4       | (Reserved Gefran) | DO NOT connect               |  |
|   |         |                   |                              | The use of this port is recommended to configure parameters by Accessory Gefran cable code F049095 (USB / TTL) or Gefran cable code F043956 (RS232 / TTL) ONLY |

Cable type: flat telephone cable for pin 4-4 conductor 28AWG

### 3.7 SERIAL COMMUNICATION PORTS MODBUS RS485 (OPTION)

#### Connector J3-J4 GTF 25-120A - Connector J6-J7 GTF 150-250A

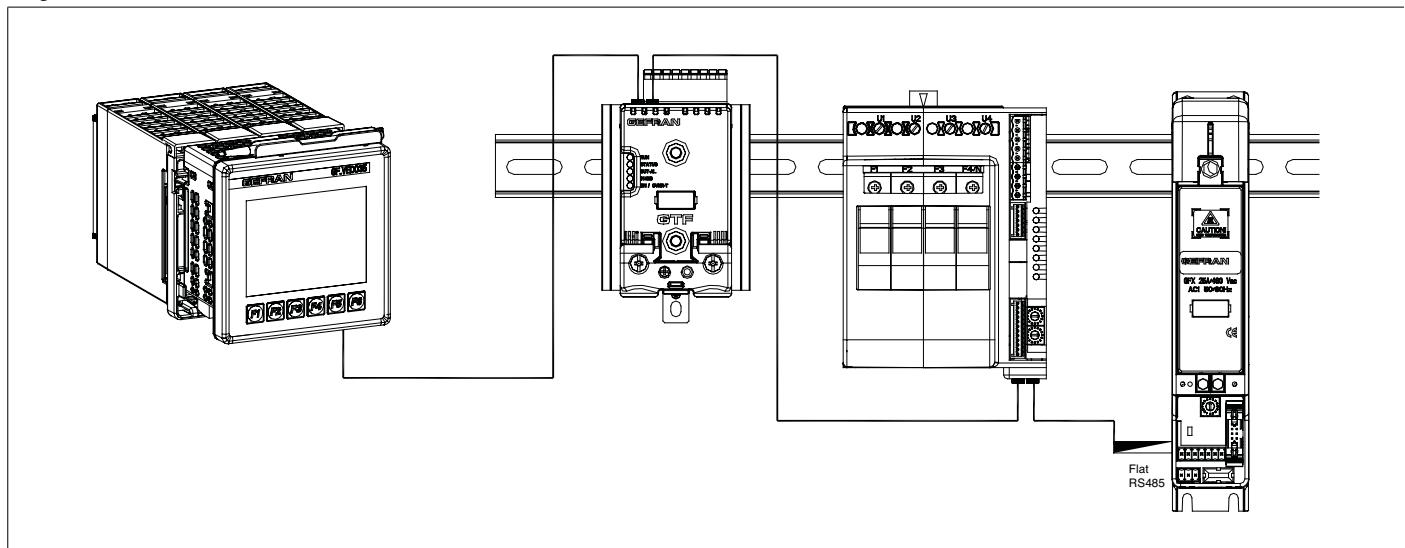
| Connector S1/S2<br>RJ10 4-4 pin  | Nr. Pin | Name          | Description                      | Note   |
|--|---------|---------------|----------------------------------|--|
|  | 1       | GND1 (**)     |                                  |  |
|  | 2       | Tx/Rx+        | Data reception/transmission (A+) | (*) Insert the RS485 line termination in the last device on the Modbus line, see dip-switches. |
|  | 3       | Tx/Rx+        | Data reception/transmission (B-) |  |
|  | 4       | +V (reserved) |                                  | (**) Connect the GND signal between Modbus devices with a line distance > 100 m.               |
|  |         |               |                                  |  |

Cable type: flat telephone cable for pin 4-4 conductor 28AWG

### 3.8 CONNECTION EXAMPLE: COMMUNICATION PORTS

Integration of GTF with GEFLEX modules connected in RS485 Modbus

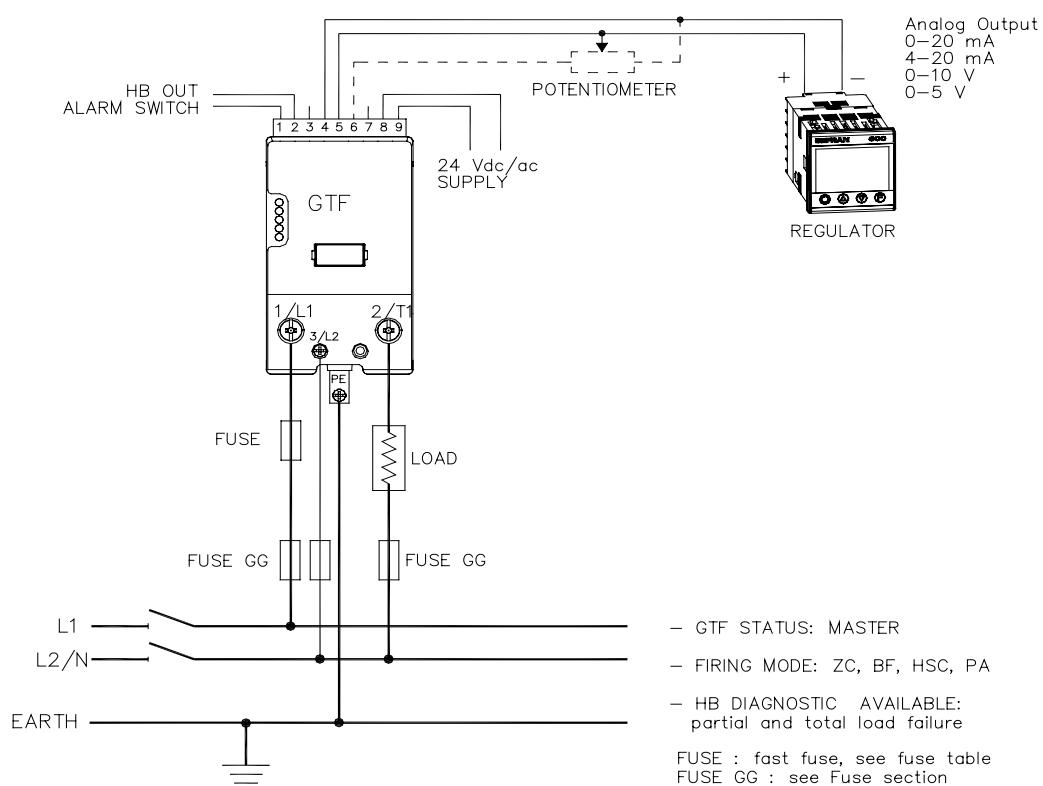
Figure 23



### 3.9 CONNECTION EXAMPLE: POWER SECTION

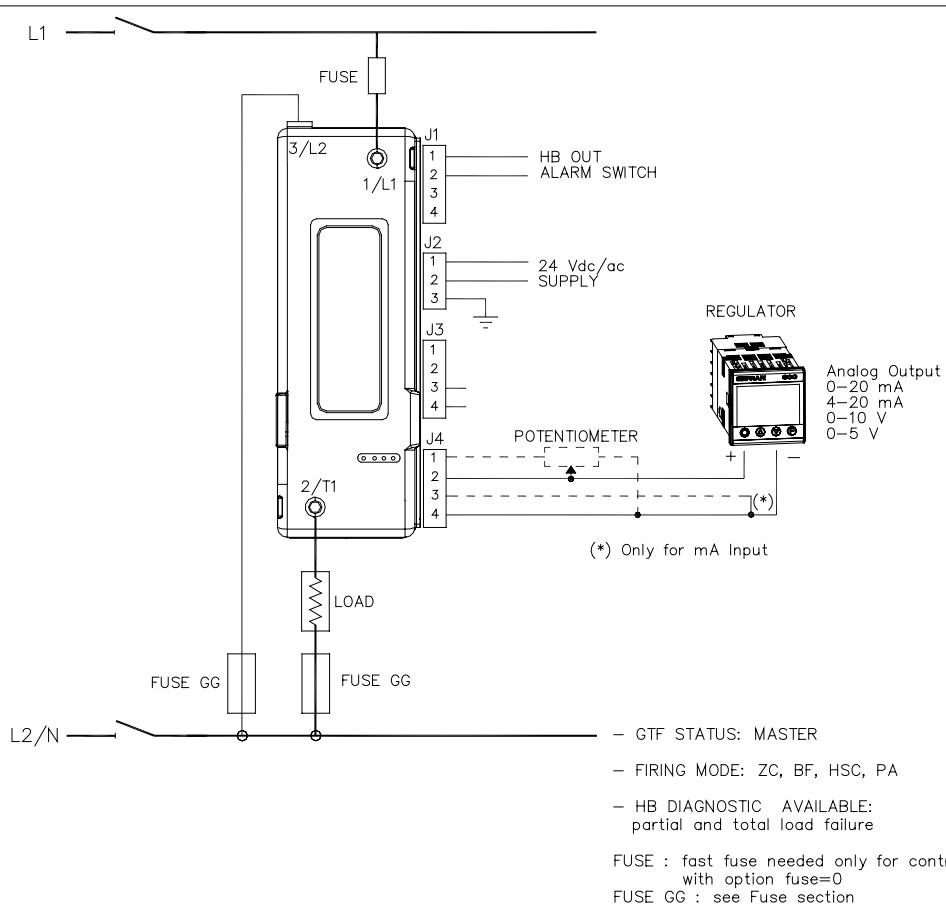
Connection example GTF 10-120A for 1 single-phase load, single-phase line (L1-N) or open delta (L1-L2)

Figure 24



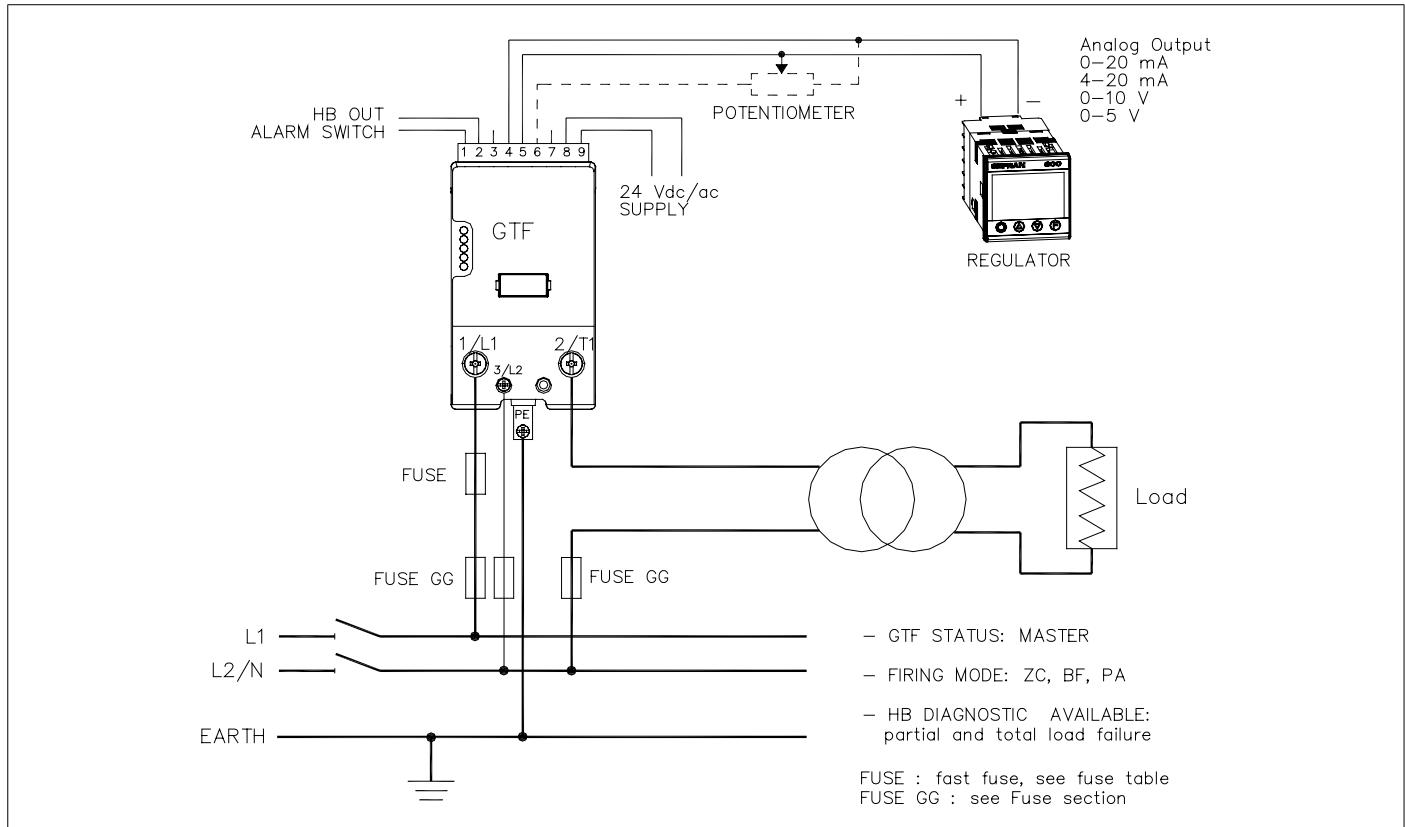
Connection example GTF 150A -250A 1 single-phase load, single-phase line L1-L2/N

Figure 25



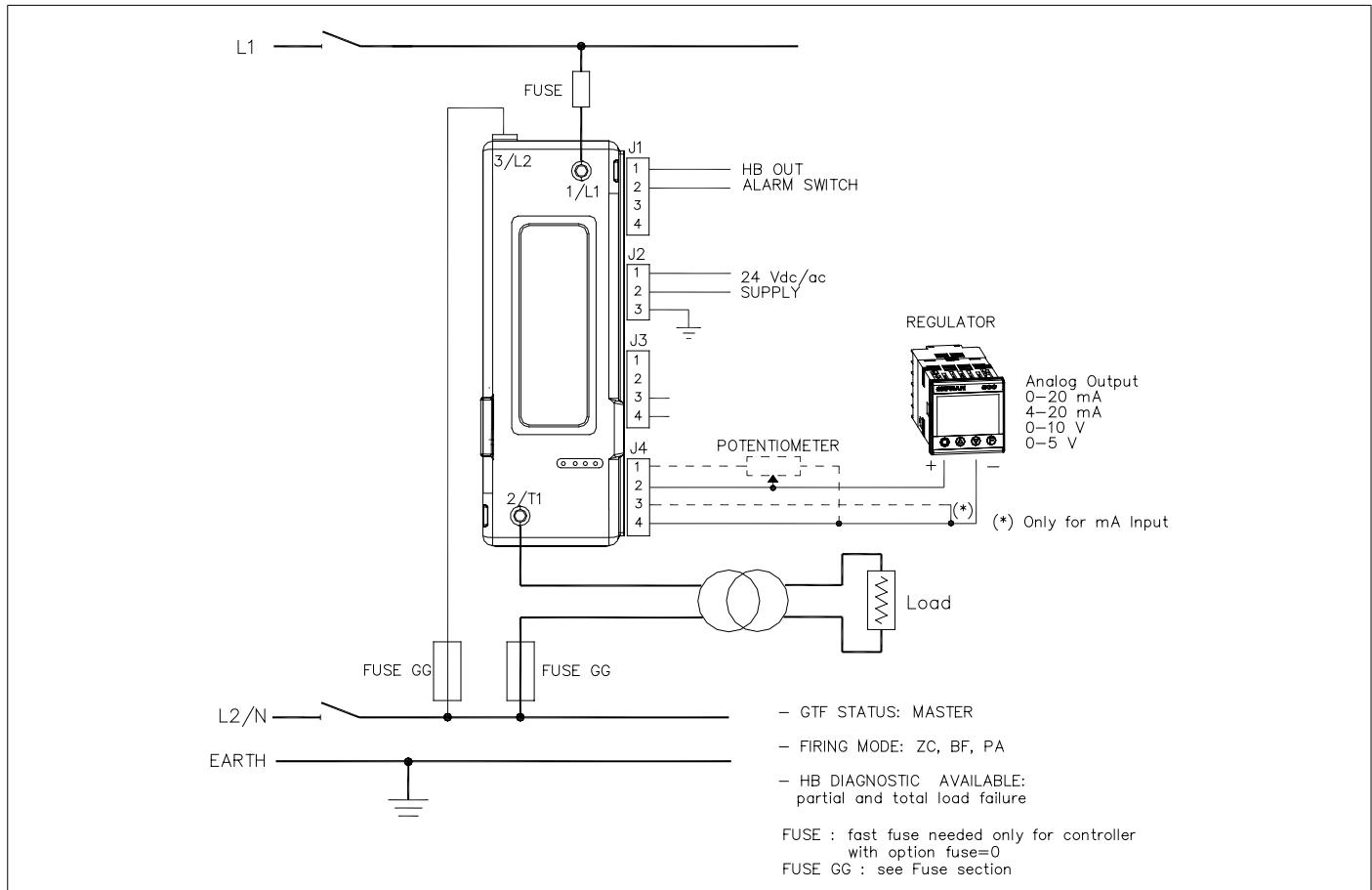
Connection example GTF 10-120A for 1 single-phase load with transformer single-phase line (L1-N) or open delta (L1-L2)

Figure 26



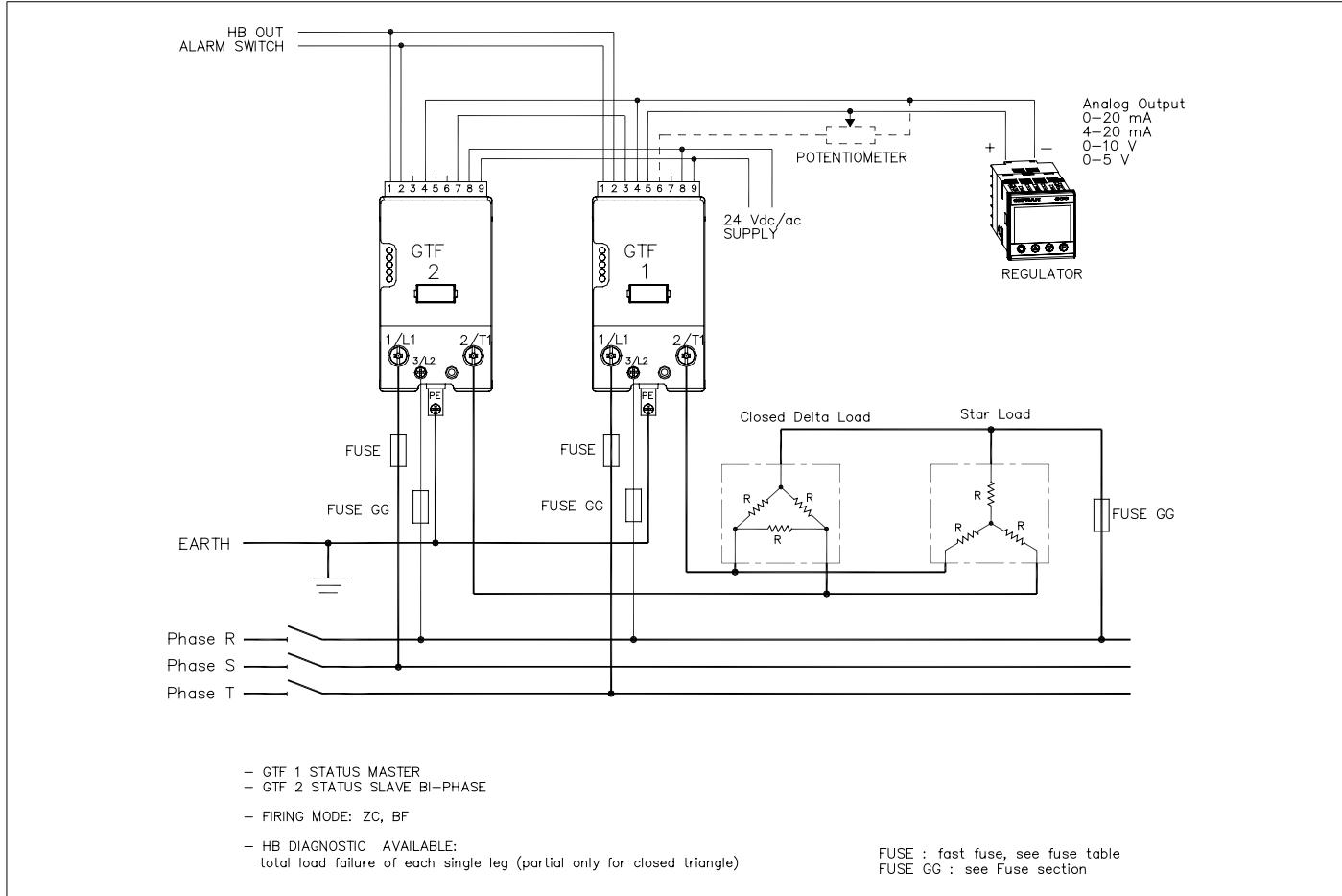
Connection example GTF 150A -250A for 1 single-phase load with transformer single-phase line L1-L2/N.

Figure 27



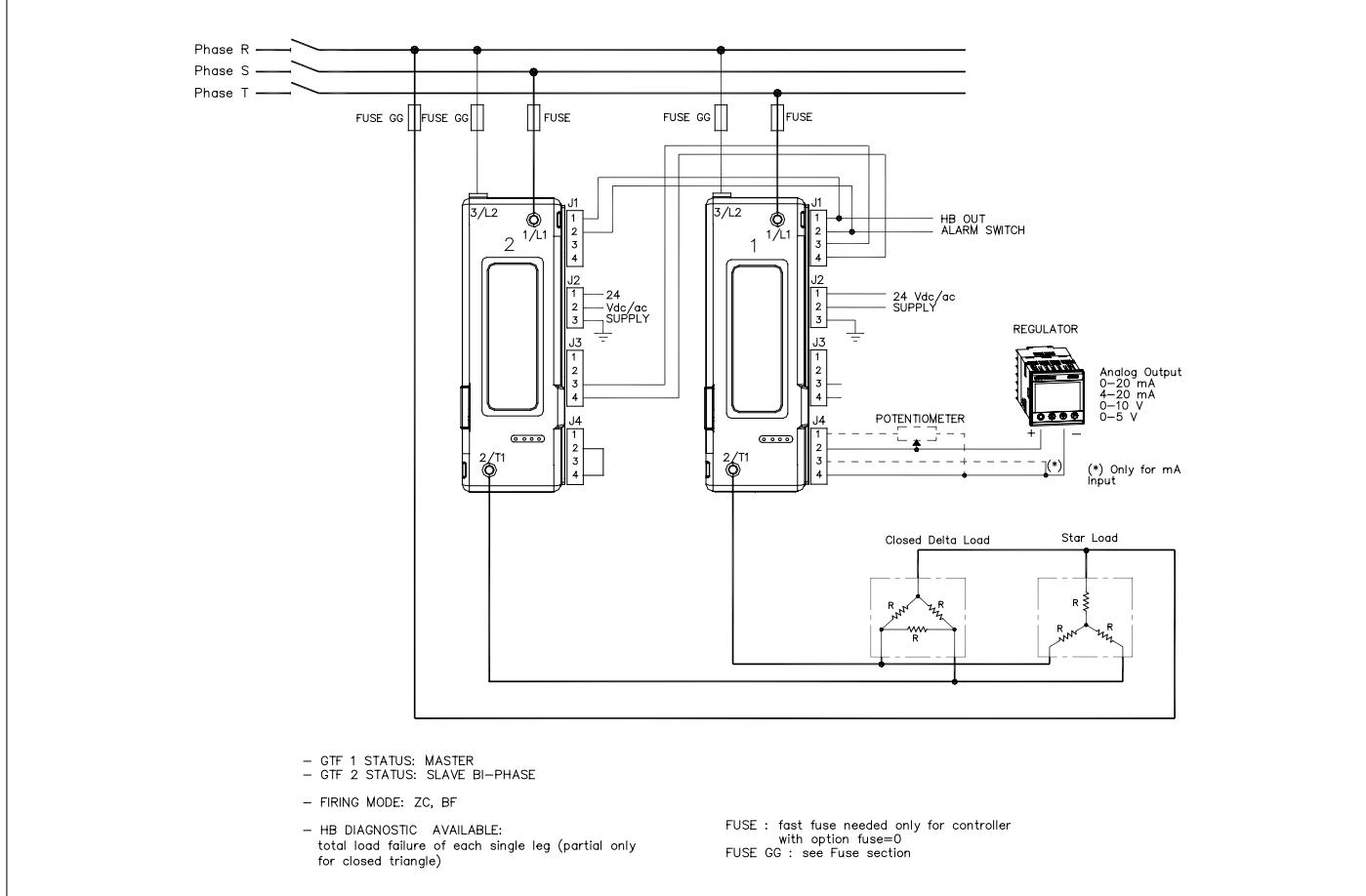
Connection example 2-phase (Master-Slave) GTF 10-120A for one load 3-phase.

Figure 28



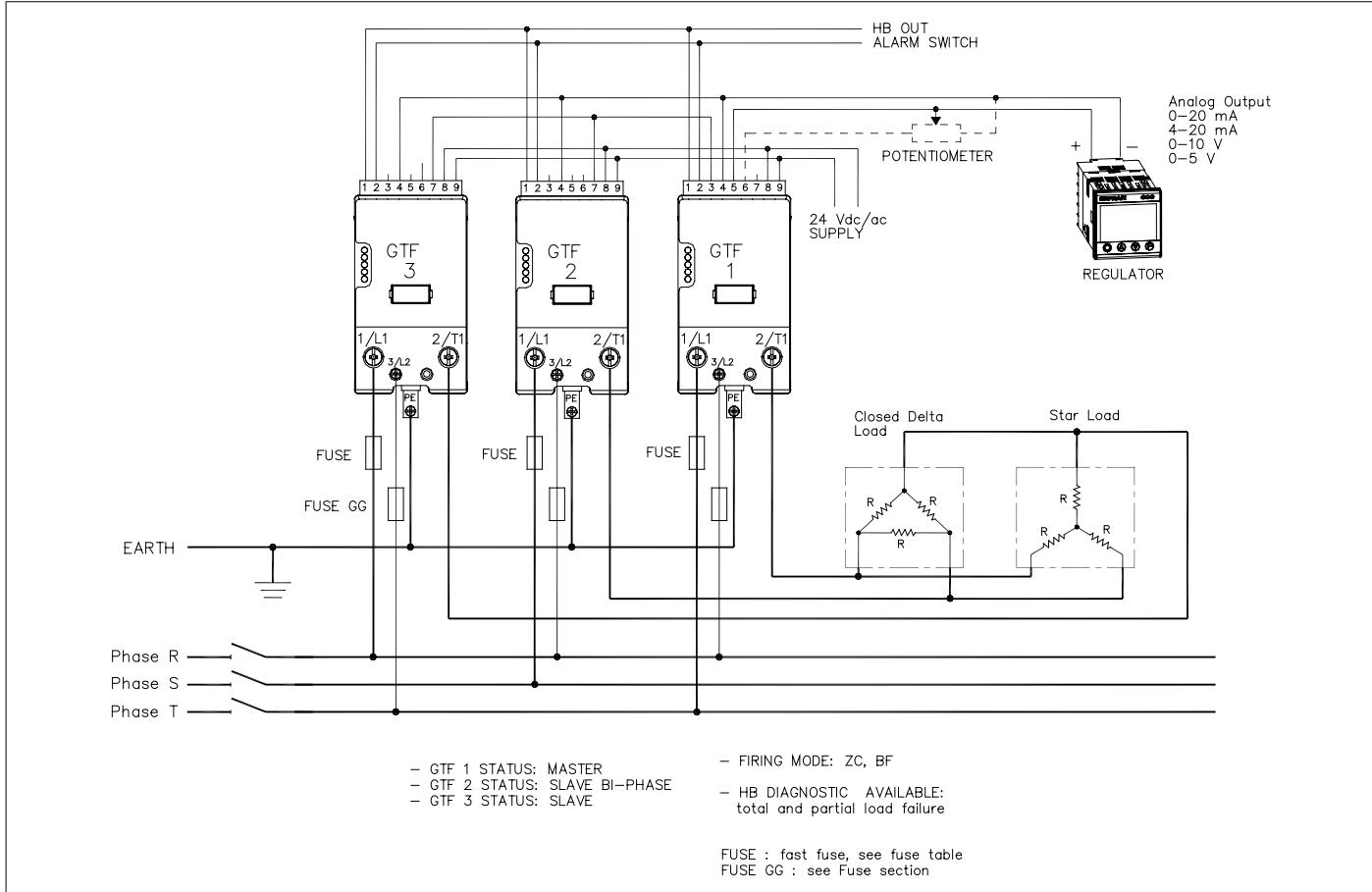
Connection example 2-phase (Master-Slave) GTF 150-250A for one load 3-phase

Figure 29



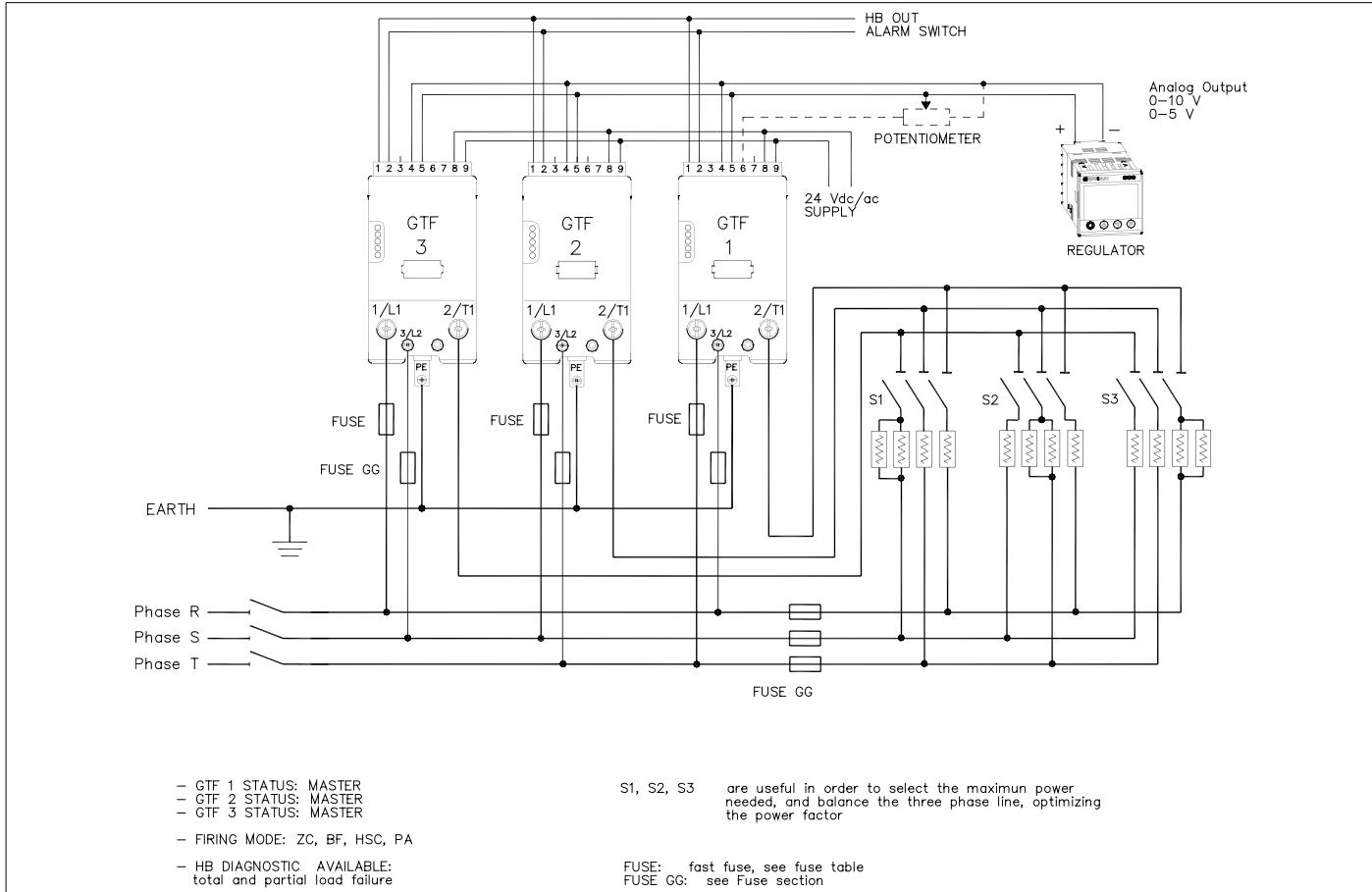
Connection example 3-phase (Master-Slave with control on 3 lines) GTF 10-120A for one load 3-phase.

Figure 30



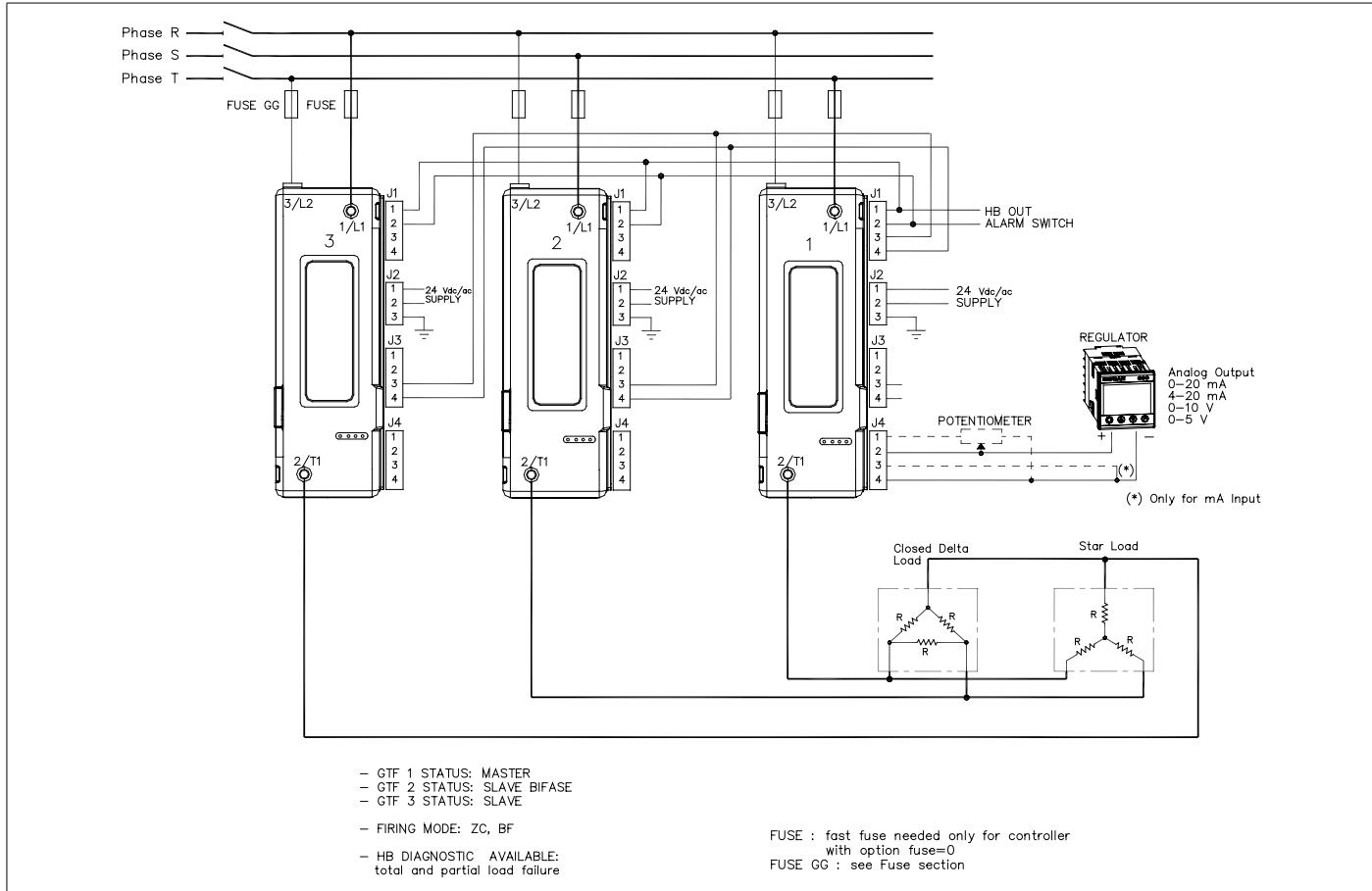
Connection example GTF 10-120A three-phase (3 master units) for single-phase loads, with division of maximum load with isolators S1, S2, S3, maintaining balance of three-phase line.

Figure 31



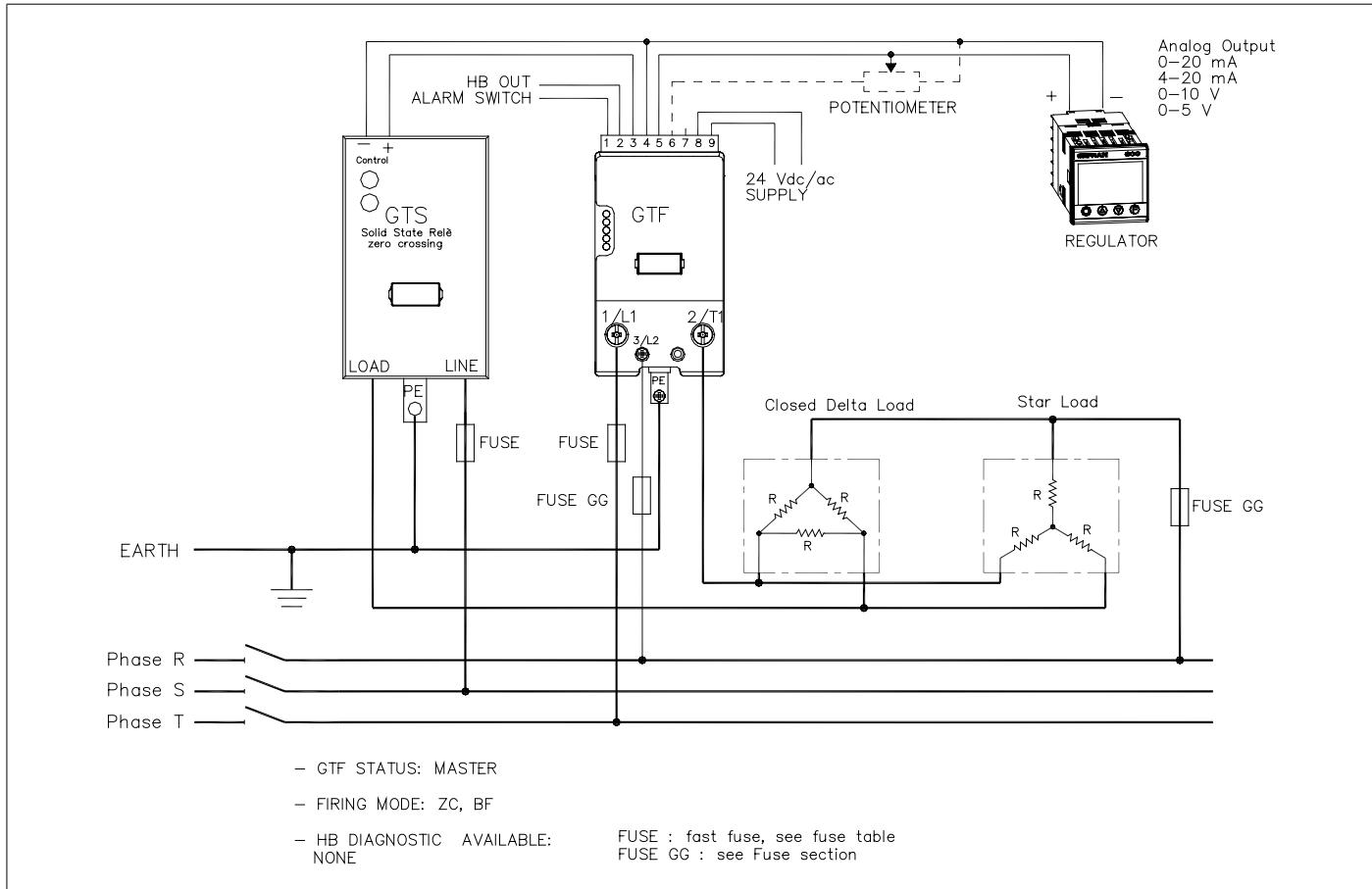
Connection example 3-phase GTF 150A-250A (Master-Slave control on 3 lines) for one load 3-phase.

Figure 32



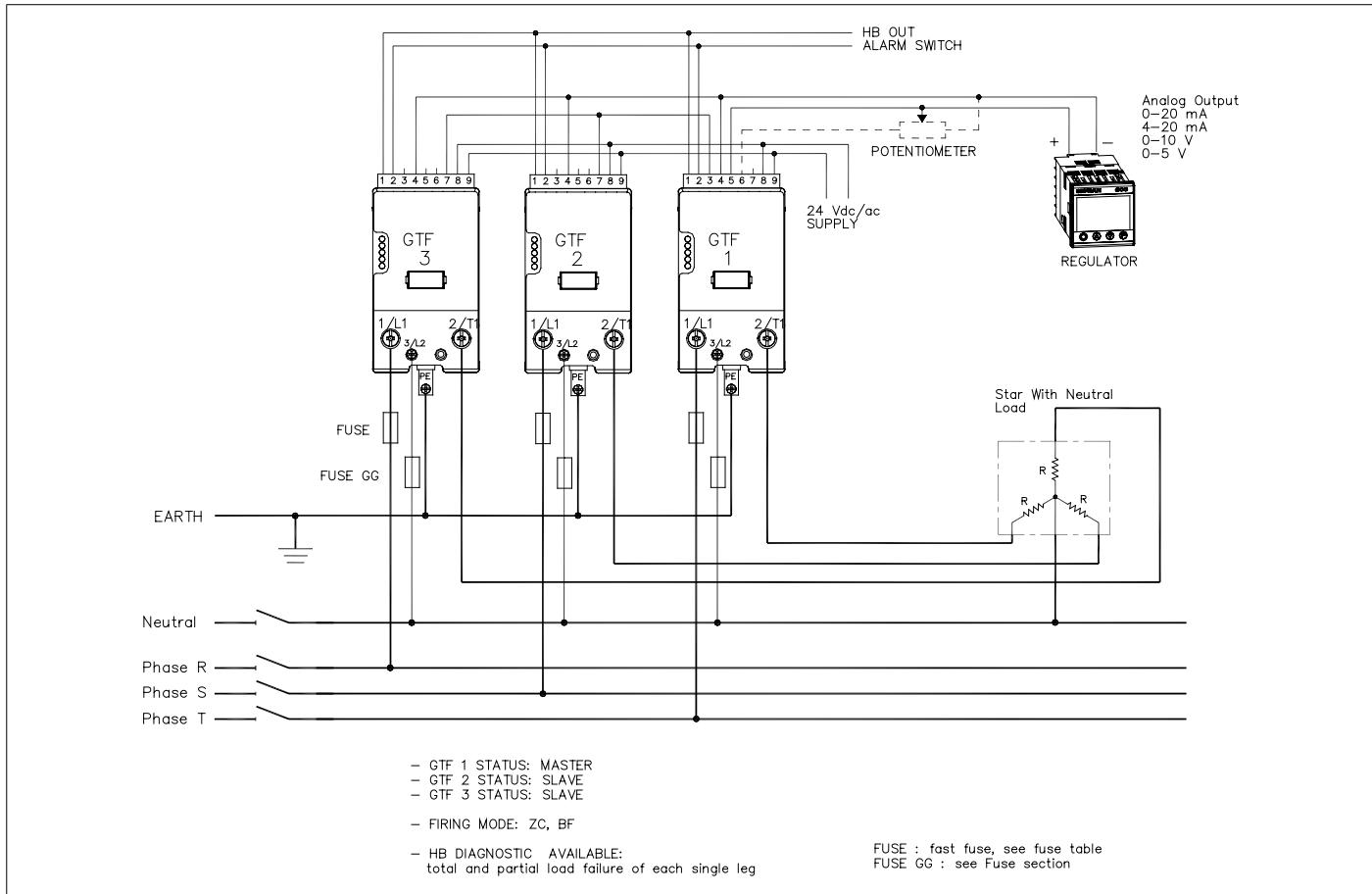
Connection example 2-phase GTF 10-120A (Master) with GTS (slave) for one load 3-phase.

Figure 33



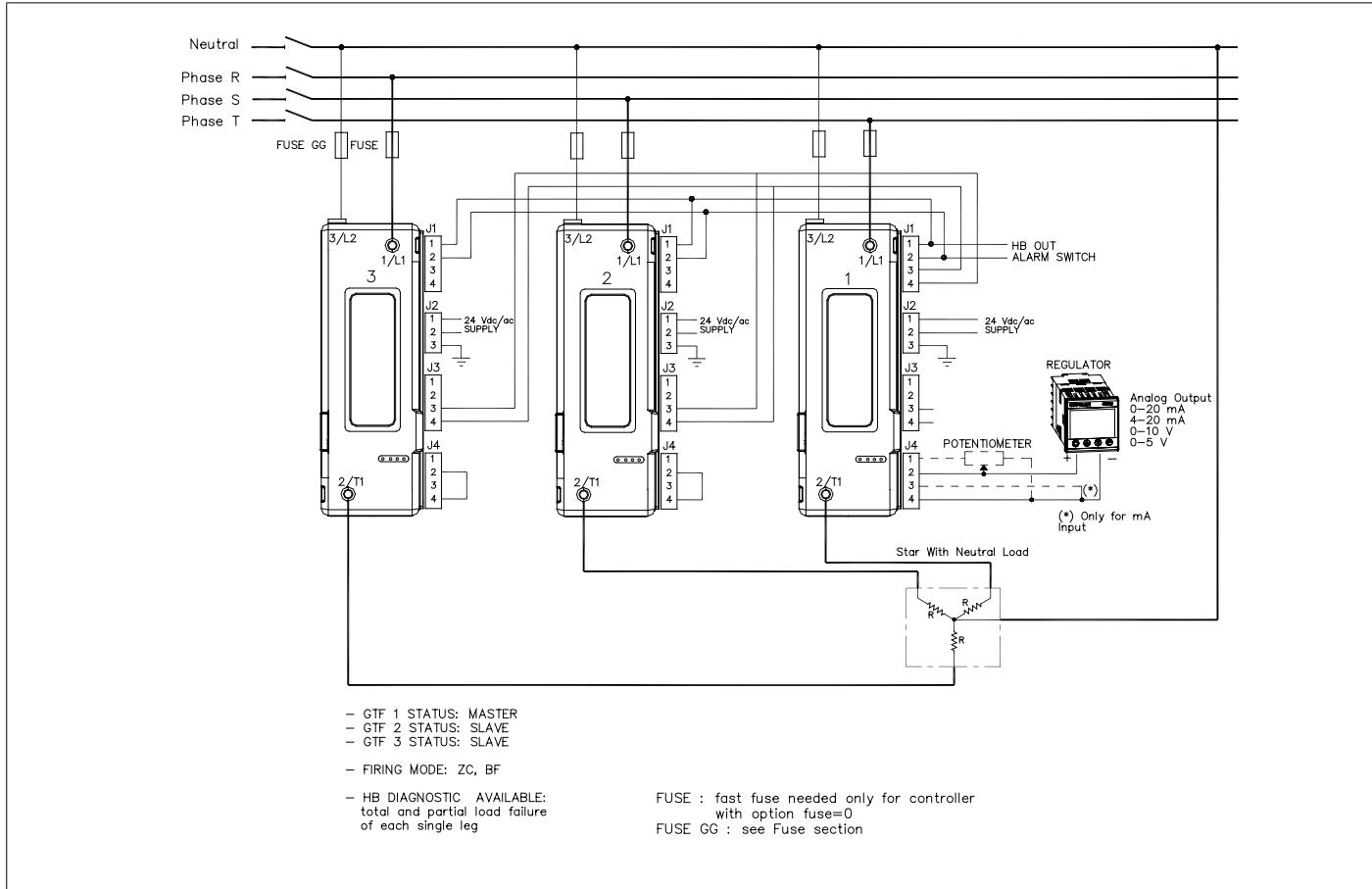
Connection example GTF 10-120A (with N. 3 GTF) for 3-phase star load with neutral.

Figure 34



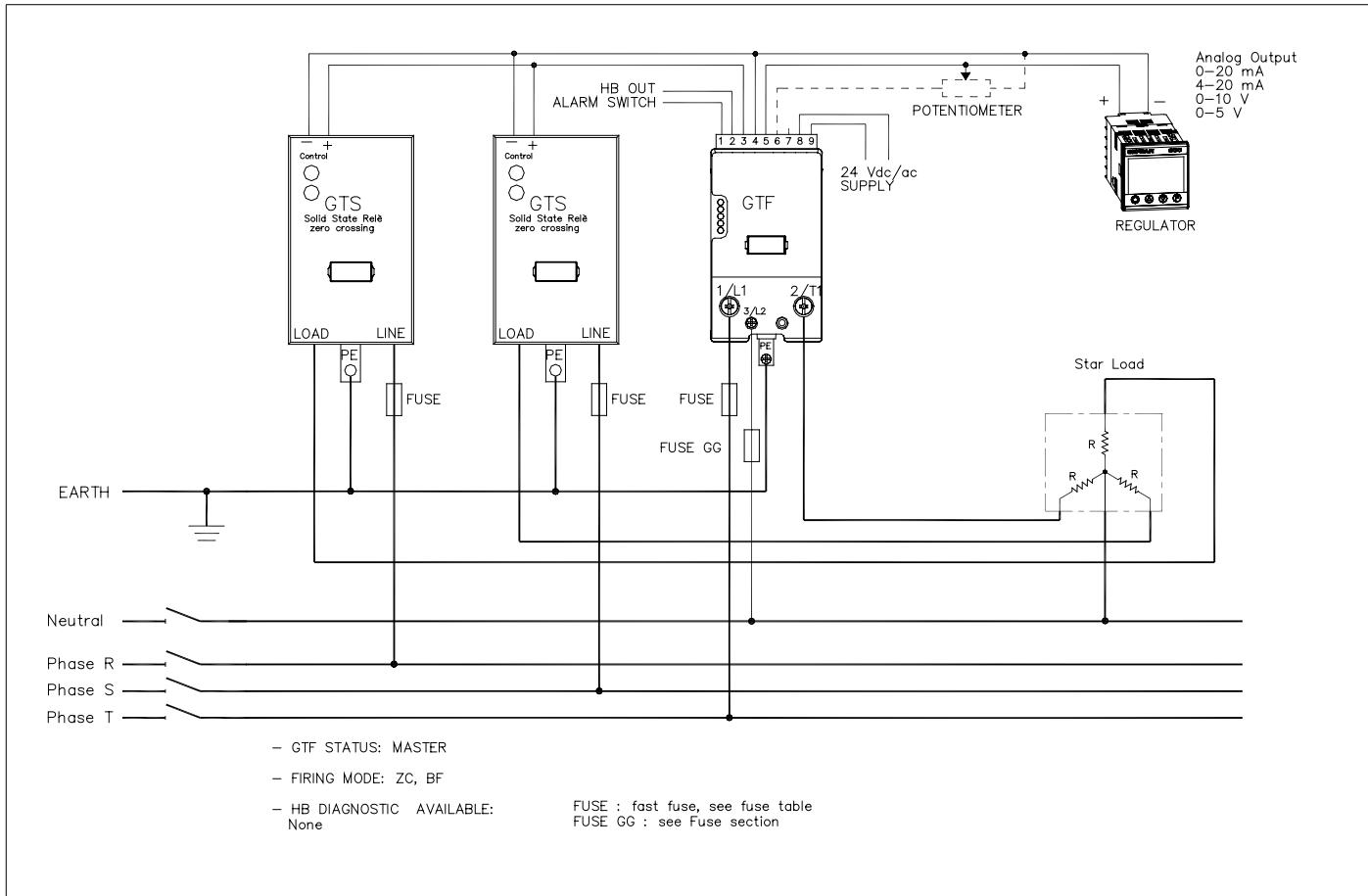
Connection example GTF 150-250A (with N. 3 GTF) for 3-phase star load with neutral.

Figure 35



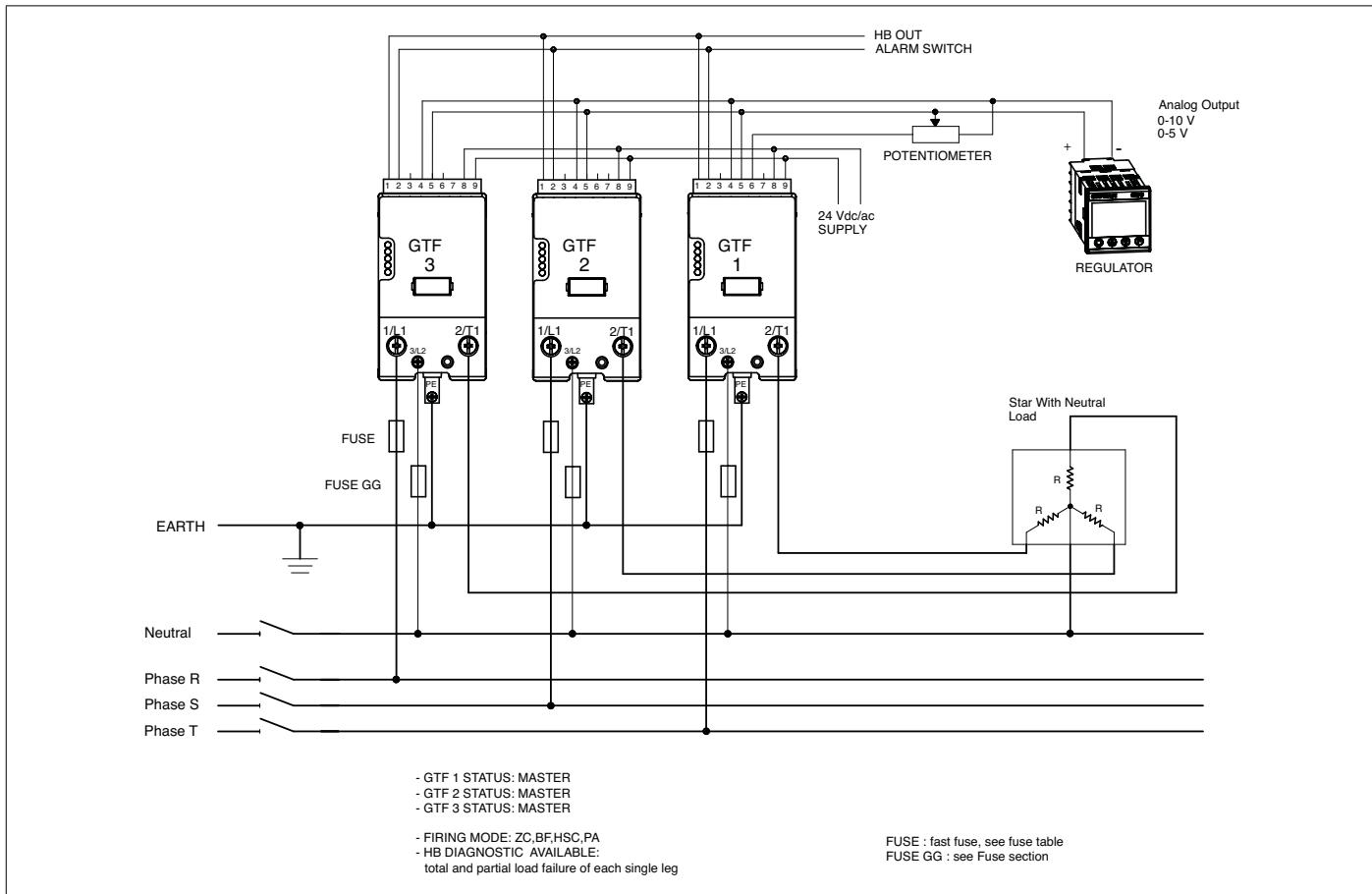
Connection example GTF 10-120A (Master with 2 Slave GTS) for 3-phase star load.

Figure 36



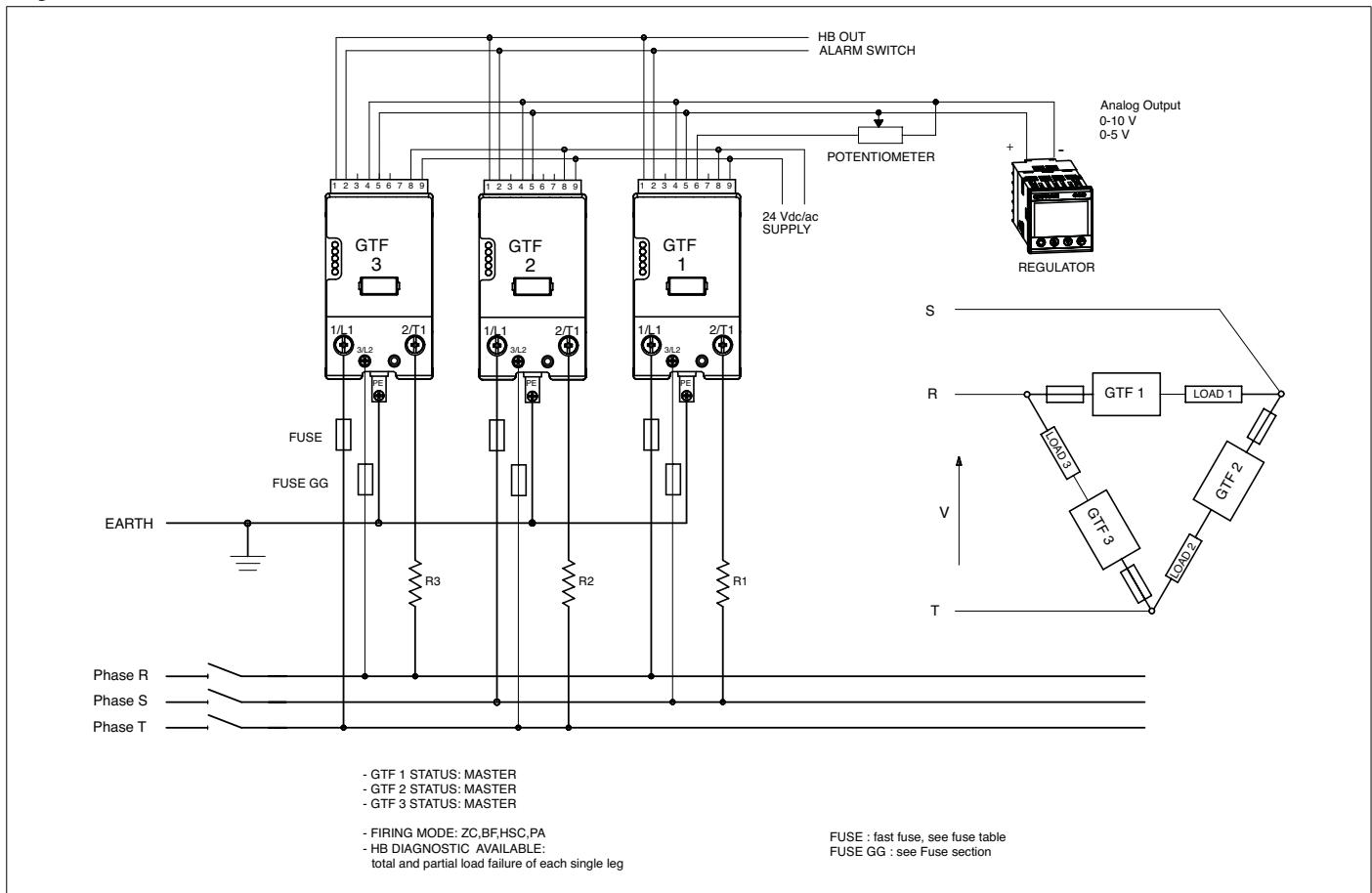
Connection example GTF 10-120A (3 Master) for 3-phase star load with neutral.

Figure 37



Connection example GTF 10-120A (3 Master) for a three-phase open delta load.

Figure 38





## NOTES: USE WITH INDUCTIVE LOADS AND TRANSFORMERS

- a** Connect a varistor (MOV) between each wire of the primary transformer and ground.  
Varistor data: rated voltage 660Vrms,..., 1000Vrms; minimum energy 100J
- b** The maximum current controllable by the device is less than the product's rated value (see technical data).
- c** In ZC and BF trigger mode, use the Delay-triggering function to limit peak magnetization current.
- d** In PA trigger mode, use the Softstart function.
- e** DO NOT use HSC trigger mode.
- f** DO NOT connect RC snubbers in parallel to the transformer primary.
- g** Select the inductive load using the Hd.1 parameter (ref. Software manual)

### Trigger modes

The GTF has the following power control modes:

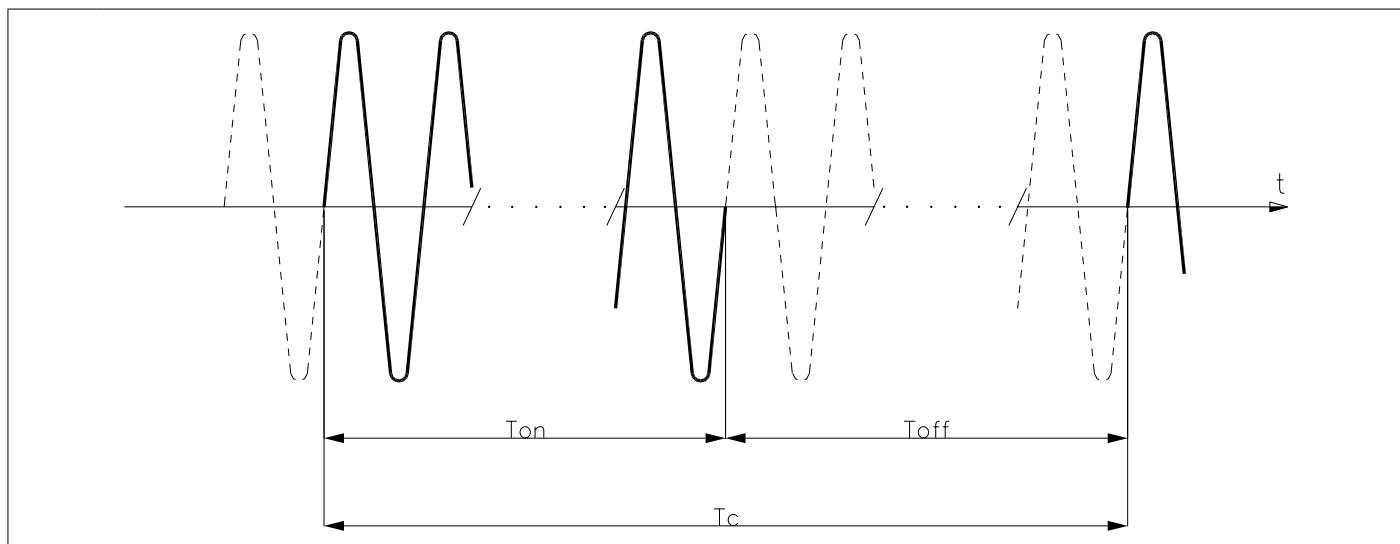
- modulation via variation of number of conduction cycles with zero crossing trigger.
- modulation via variation of phase angle

### 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.

Figure 39



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.

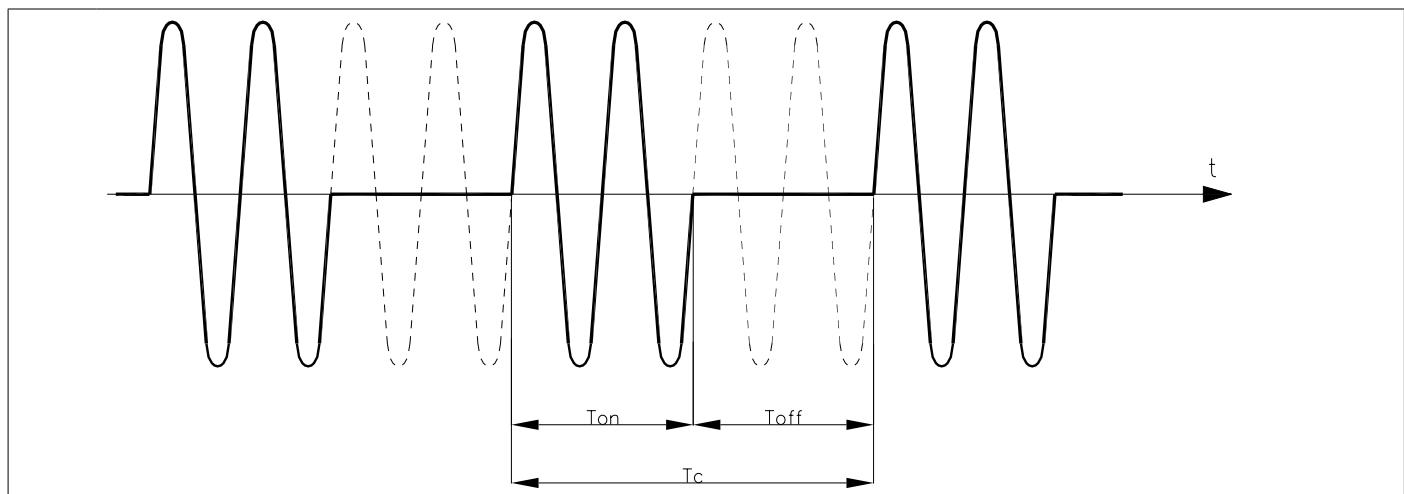
The ratio of the number of ON cycles to OFF cycles is proportional to the power value to be supplied to the load.

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).

A parameter bF.Cy defines the minimum number of conduction cycles settable from 1 to 10.

In the following example, the parameter = 2.

Figure 40



Example of operation in BF mode with power equal to 50%

**HSC** Half single cycle

This mode corresponds to Burst Firing that manages ON and OFF half-cycles. It is useful for reducing the flickering of filaments with short/medium-wave IR lamp loads. With these loads, to limit operating current with low power, it is useful to set a minimum power limit (for example, Lo.p = 10%).



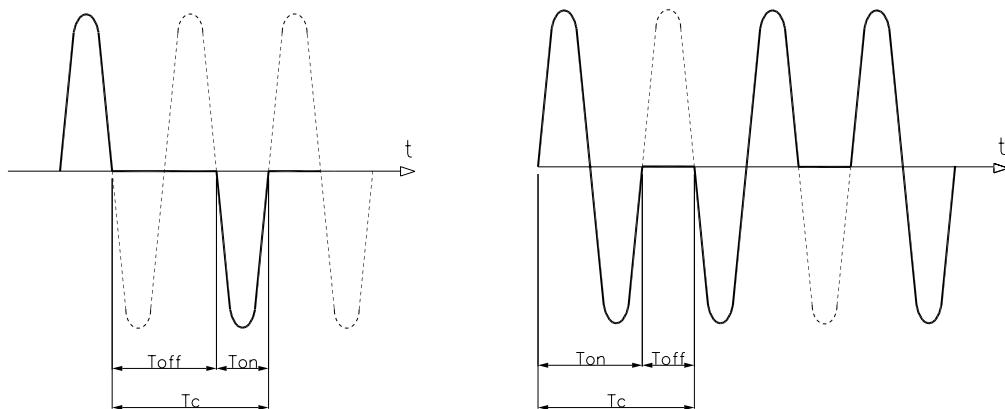
NB: This mode is NOT allowed with inductive loads (transformers) It is used with resistive loads in single-phase, star with neutral, or open delta configuration.

Figure 41

## Advanced single-cycle

(Ton = 0.5 cycle)

(Toff = 0.5 cycle)



Example of operation in HSC mode with power at 33 and 66%

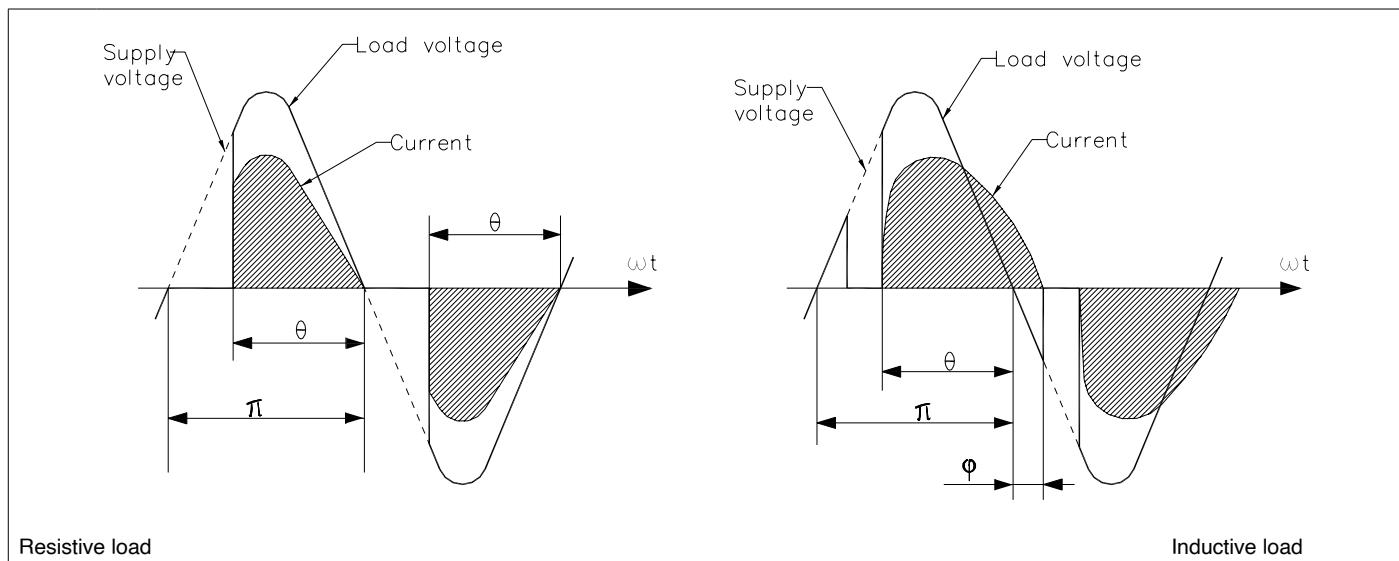
## Phase angle (PA)

This mode controls power on the load via modulation of trigger angle  $\theta$

Example:

if power to be transferred to the load is 100%,  $\theta = 180^\circ$  or if power to be transferred to the load is 50%,  $\theta = 90^\circ$

Figure 42



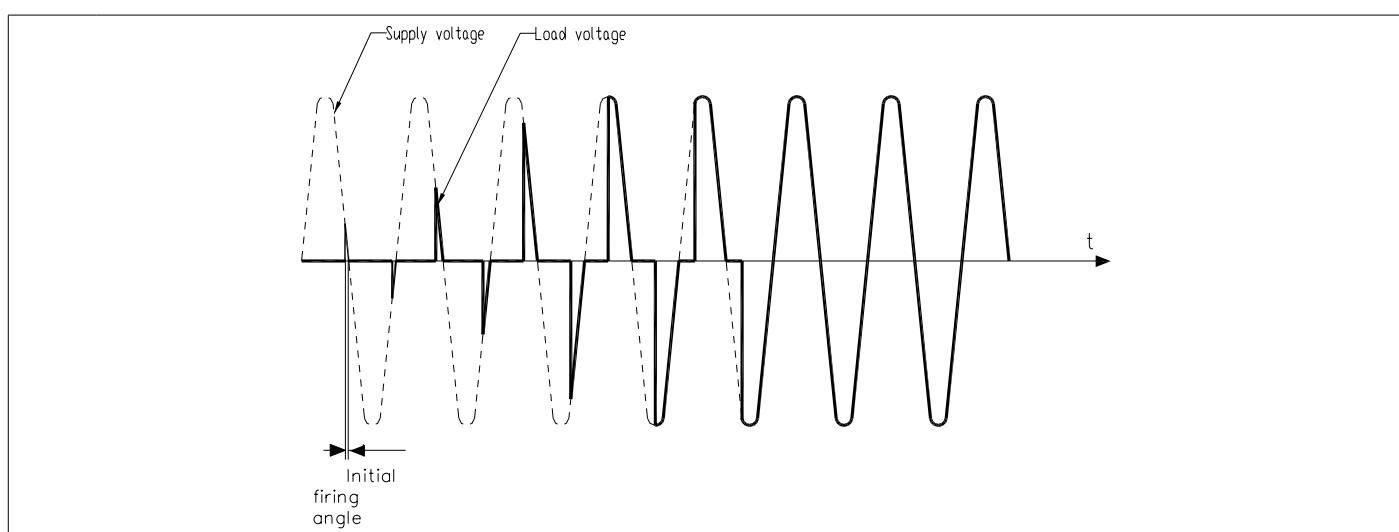
## ADDITIONAL FUNCTIONS

### Softstart

This type of start can be enabled either in phase control or pulse train mode and in zero-crossing mode (ZC, BF, HSC). In phase control, the increment of conduction angle  $\alpha$  stops at the corresponding value of the power to be transferred to the load.

Control of maximum peak current (useful in case of short circuit on the load or of loads with high temperature coefficients to automatically adjust start time to the load) can be enabled during softstart. When the load shut-off time (settable) is exceeded, the ramp is reactivated at the next power-on.

Figure 43



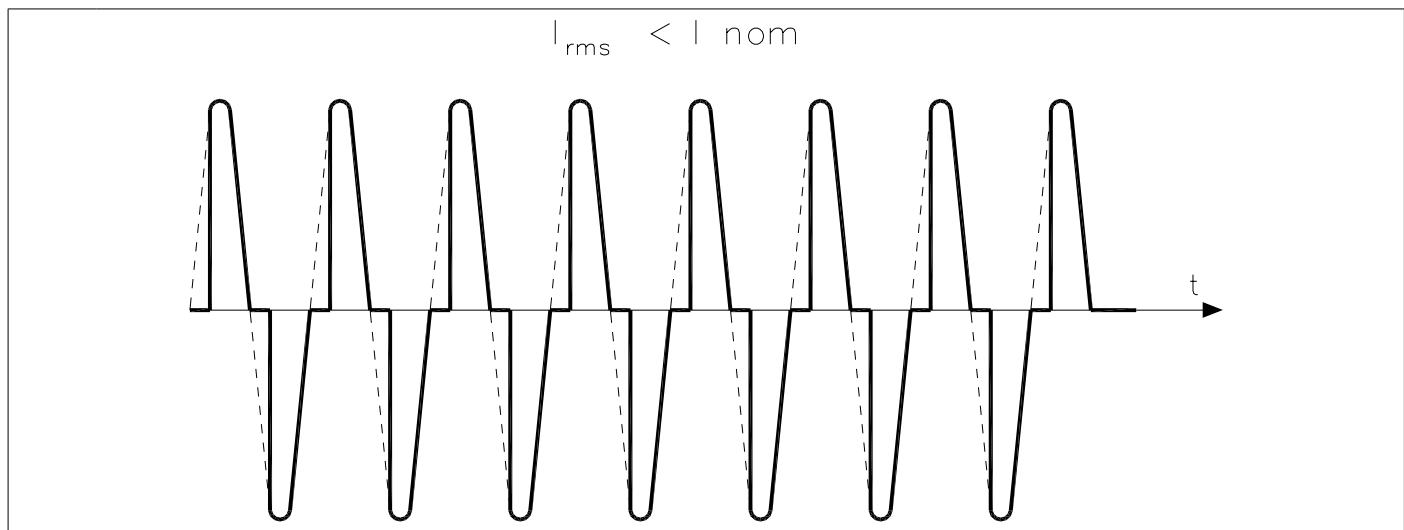
### RMS current limit

The option for controlling the load current limit is available in all work modes.

If the current value exceeds the limit (settable in the nominal full-scale range) in mode PA the conduction angle is limited, while in zero-crossing mode (ZC, BF, HSC) the cycle time conduction percentage is limited.

This limitation ensures that the RMS value (i.e., not the instantaneous value) of the load current does NOT exceed the set RMS current limit.

Figure 44

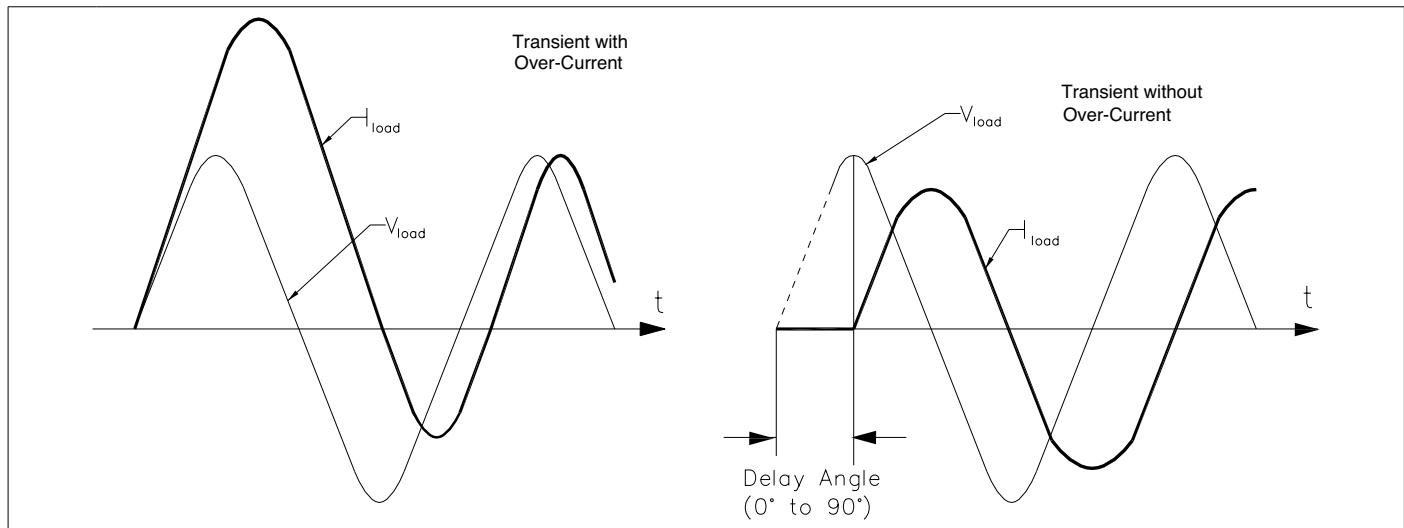


Example of conduction angle limitation in PA mode to respect an RMS current limit below the nominal current of the load.

**DT** “Delay triggering” (for ZC, BF control modes only) Settable from 0° to 90°.

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

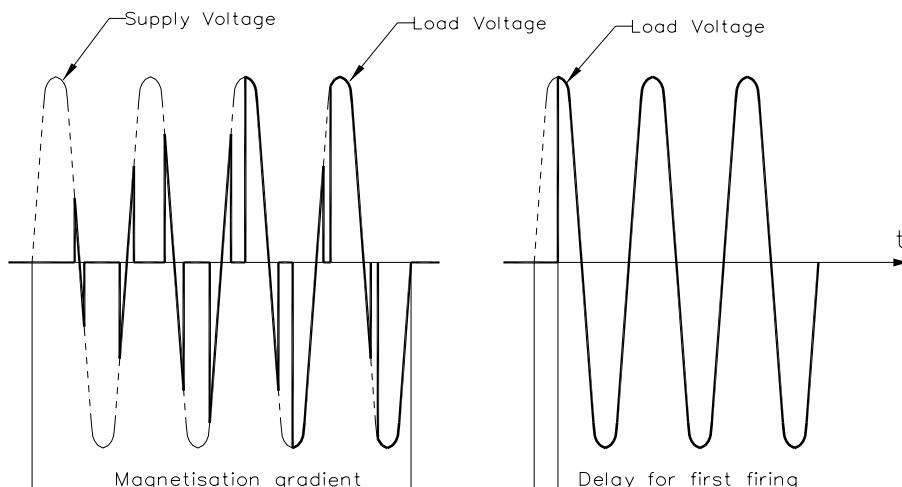
Figure 45



Example of firing of inductive load with/without delay-triggering.

To conduct inductive loads controlled in PA mode, do not use delay triggering; instead, use the phase Soft-Start ramp.

Figure 46



Example of phase ramp to fire a transformer in PA mode

Example of firing with Delay-Triggering of a transformer in ZC mode

Comparison of method to fire a transformer: Soft-Start Ramp (for PA mode) / Delay triggering (for ZC and BF mode)

### 3.10 DIGITAL INPUT (PWM)

This digital input can be used to receive information on the % of power to be supplied to the load. The signal can be generated by a controller or external plc via digital outputs (logic output for Gefran instrumentation). This is obtained by alternating the output in ON for time TON with the output in OFF for time TOFF. The sum of TON+TOFF is constant, and is called CycleTime.

CycleTime= TON+TOFF

The power level is given by the ratio = TON/ CycleTime and is normally expressed in %.

The GTF digital input automatically adapts to the cycle time from 0.03Hz to 100Hz and obtains the power % to be supplied to the load from the TON/(TON+TOFF) ratio.

Connection example

Temperature control with Gefran 600 with D type logic output (out2) (cycle time: 0.1sec), logic output can drive max 3 GTF in series (preferable), connection allowed only if GTFs do not have interconnected GNDs (if so, make parallel connection).

To use Digital PWM the GTF can be ordered with the configuration 5 -x - M or must be configured with the parameter DIG (digital input) = 7 (see Fig. 46, 47).

Figure 47

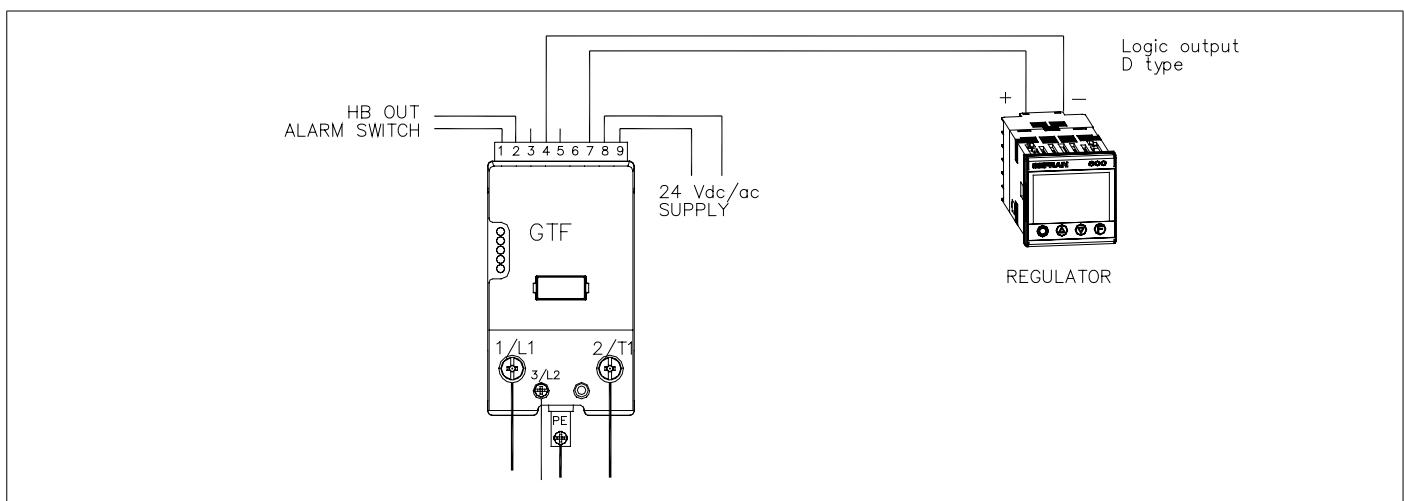
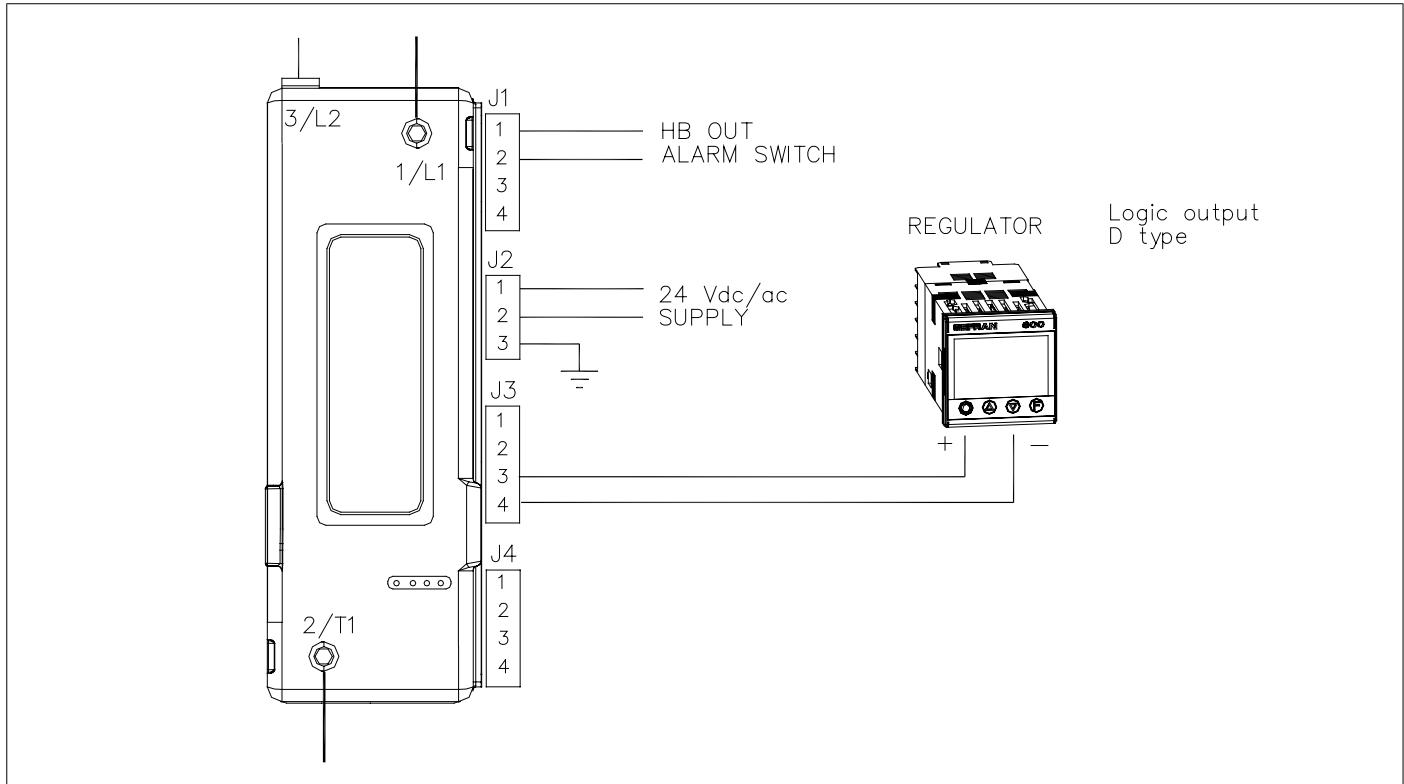


Figure 48



## 4 • INSTALLATION OF THE SERIAL PORT

A network typically has a Master that “manages” communication by means of “commands,” and Slaves that carry out these commands.

GTF modules are considered Slaves to the network master, which is usually a supervision terminal or a PLC.

It is positively identified by means of a node address (ID) set on rotary switches (tens + units).

A maximum of 99 GTF, modules can be installed in a serial network, with node address selectable from “01” to “99”

GTF modules have a ModBus serial (Optional)

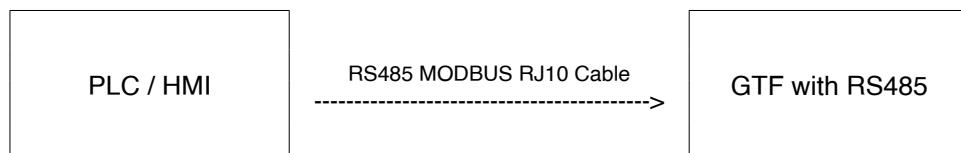
The MODBUS RTU port 1 has the following factory settings (default):

| Parameter | Default    | Range             |
|-----------|------------|-------------------|
| ID        | 1          | 1...99            |
| BaudRate  | 19,2Kbit/s | 1200...19200bit/s |
| Parity    | None       | Odd/Even/None     |
| StopBits  | 1          | -                 |
| DataBits  | 8          | -                 |

The following procedures are indispensable for the Modbus protocol.

Set the rotary switch at “0+0” for AutoBaud function

| Parameter | Position<br>rotary switches<br>tens      unit |   |
|-----------|---|---|
| AutoBaud  | 0      0                                      | Allows setting of the correct BaudRate value automatically detecting the master transmission frequency. |



### NOTE

The standard products DO NOT feature the communication RS485 Modbus serial port, but can be configured via PC with Gefran GF-Express Software, by connecting it to TTL port of GTF to PC, by means of TTL cable equipped with SW.



NEVER connect TTL adaptator to RS485 serial port of GTF.

NEVER connect TTL connector or GTF to a RS485 serial web .

Danger of product damage!!

### Function

Adapt the serial communication speed and parity of the GTF modules to the connected supervision terminal or PLC.

 The "RUN" and "STATUS" LEDs mentioned in the procedure can vary its behavior based on the parameters Ld.1 e Ld.2

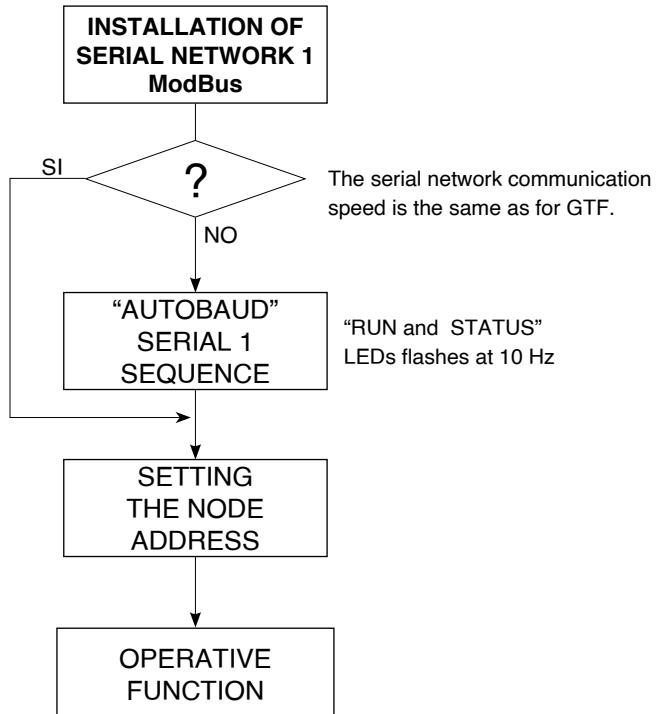
### Procedure

- 1 Connect the serial cables for all modules on the network and to the supervision terminal.
- 2 Set the rotary switch on the GTF modules to be installed, or on all modules present in case of first installation, to position "0+0". \*
- 3 Check that the "RUN" and "STATUS" LEDs flash at high frequency (10Hz).
- 4 The supervision terminal must transmit a series of generic "MODBUS" read messages to the network.
- 5 The procedure is over when all of the "RUN" and "STATUS" LEDs on the GTF modules flash at a normal frequency (2Hz) (if parameter 50 Ld.1 = 16 as default).

The new speed parameter is saved permanently in each GTF; therefore, the "AUTOBAUD SERIAL" sequence does not have to be run at subsequent power-ups.

 When the rotary switch is turned, the green "STATUS" LED stays on steadily for about 6 seconds, after which it resumes normal operation and saves the address.

**\* Note:** the address set by the rotary switches is acquired only at power-on.



## 5 • TECHNICAL CHARACTERISTICS

### INPUTS

#### IN1 Analogic control inputs

|                         |   |
|-------------------------|---|
| Function                | Acquisition of control power  |
| Max. error              | 1% f.s.+/- 1 scale point at ambient temperature of 25°C   |
| Thermal drift           | < 100 ppm/°C of f.s.  |
| Sampling time           | 60 ms   |
| Scale 0 -10V            | Input impedance > 40 Kohms  |
| Scale 0-5V              | Input impedance > 40 Kohms  |
| Scale 0-20mA or 4-20mA  | Internal Shunt resistance: 125 ohm  |
| Potentiometer input     | Potentiometer resistance: from 1 Kohm to 47 Kohm<br>Potentiometer supply: +5V (supplied by GTF, max 10mA) |
| Linear input read scale | 0 .... 100.0 %  |

#### INDIG Digital Input

|                             |  |
|-----------------------------|--|
| Function                    | Power Disable input or PWM input                                     |
| Voltage range               | 5-30V (max 7 mA)   |
| State "0" read safe voltage | < 2 V  |
| State "1" read safe voltage | > 5V   |
| PWM input                   | Maximum frequency: (0.03Hz,...,100 Hz) maximum resolution 1% (0.1ms) |

#### Measures voltage and line current

|                                       |  |
|---------------------------------------|--|
| Function measures the load current    | Measures RMS voltage by integral calculation of sampled values<br>Meas. range: 0 ... 2 * rated_product               |
| Accuracy RMS current measurement      | 3 % f.s. at room temperature of 25°C<br>In PA mode with conduction angle >90° : 5% fs<br>Thermal drift: < 200 ppm/°C |
| RMS line current measurement function | RMS voltage meas. by integral calculation of sampled values<br>Work voltage range: 90...600Vac)                      |
| Accuracy RMS voltage measurement      | 1 % f.s. at room temperature of 25°C<br>Thermal drift: < 100 ppm/°C  |
| Sampling time current/voltage         | 0,25 ms  |
| Line frequency                        | 50 / 60 Hz   |

### OUTPUTS

#### CONTROL OUTPUT MASTER/SLAVE

|          |  |
|----------|--|
| Function | Control for synchronising another GTF or GTS slave (4 slave max.)<br>Voltage: 7.5V , max 25 mA |
|----------|--|

#### HB ALARM OUTPUT (Optional)

|          |  |
|----------|--|
| Function | HB alarm output or of other configurable alarms  |
| Type     | Solid state relay (MOS opto)<br>Isolated contact, normally open<br>Imax: 150mA Vmax. 30 Vac / Vdc<br>Closing resistance < 15 ohm |

### COMMUNICATIONS PORTS

#### RS485 Modbus (Optional)

|              |   |
|--------------|---|
| Function     | Local serial communication                          |
| Protocol     | ModBus RTU  |
| Baudrate     | Settable 1200 ...19200 bit/s (default 19,2Kbit/s)   |
| Node address | Settable with two rotary-switches (rotary-switches) |
| Type         | RS485 - double connector RJ10 telephone type 4-4    |
| Isolation    | 500V  |

#### TTL serial connector (Standard)

|           |   |
|-----------|---|
| Function  | For product initial configuration only, via PC.<br>Use a PC connected to GTF, ONLY via Gefran adapter<br>Code F049095 (PC with USB) or Code F043957 (PC with RS232) |
| Isolation | TTL serial NOT isolated of CPU  |

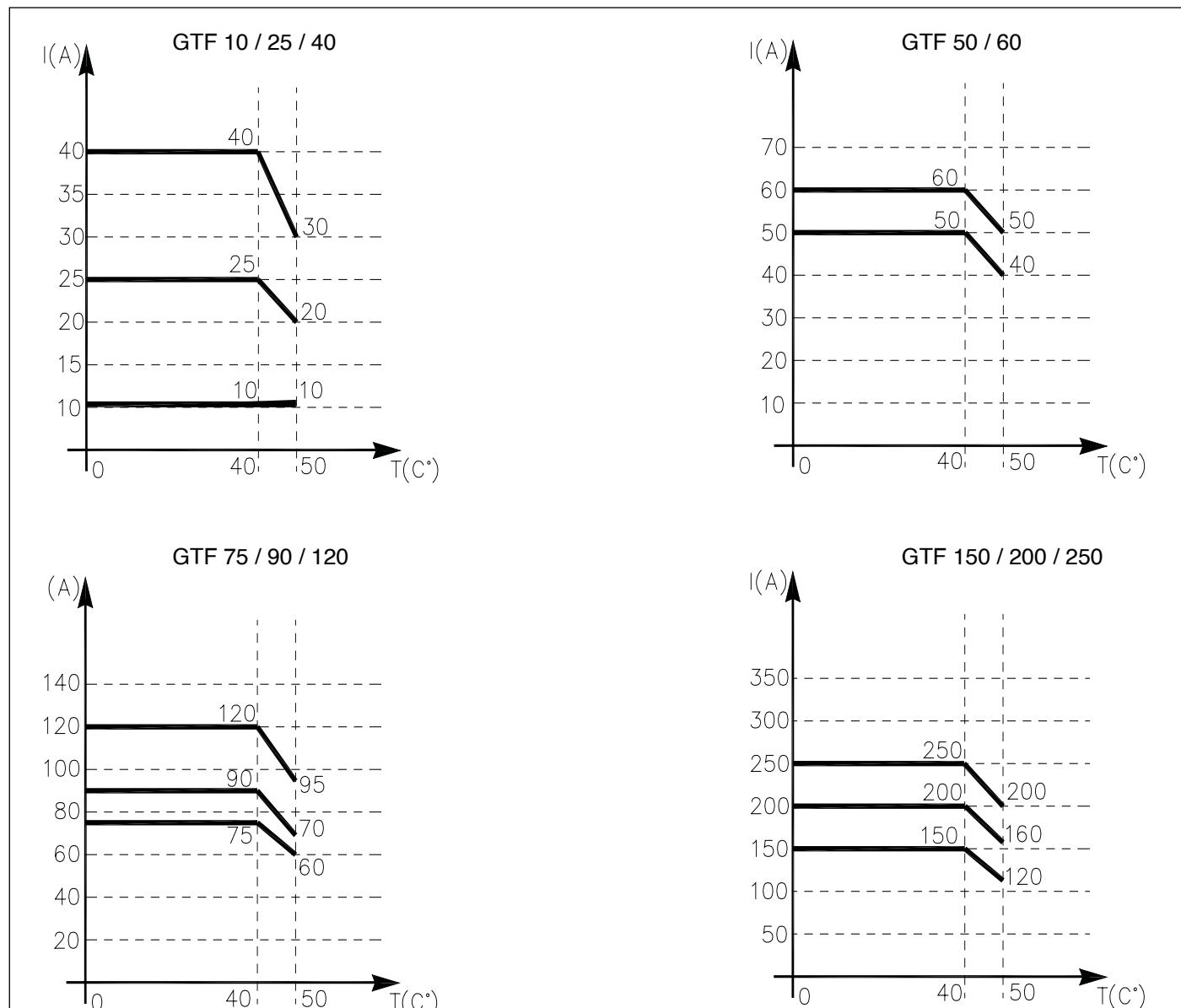
| POWER (SOLID-STATE)   |   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
|---|---|------|------|------|-------------|-------|-------|-------|-------------|--------|--------|--|--|--|--|--|--|--|
| CATEGORY OF USE<br>(Tab. 2 EN60947-4-3)   | AC 51 resistive or low inductance loads<br>AC 55b infrared lamps<br>AC 56a: transformer   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Trigger mode  | <b>PA</b> - Load management by adjusting the firing angle (only configuration single-phase or delta open)<br><b>ZC</b> - Zero Crossing with constant cycle time (settable in range 1-200sec)<br><b>BF</b> - Burst Firing with variable cycle time (GTT) optimized minimum.<br><b>HSC</b> - Half Single Cycle corresponds to Burst Firing that includes ON and OFF half-cycles.<br>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, V2:</b> Voltage feedback proportional to RMS voltage value on load (useful to compensate possible variations in line voltage).<br><b>I, I2:</b> Current feedback: bound to RMS current value on load to compensate variations in line voltage and/or variations in load impedance.<br><b>P:</b> Power feedback: proportional to real power value on load (useful to keep constant values of electrical power assigned regardless of load impedance or line voltage variations).                               |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Max rated voltage   | 480Vac  |      |      |      | 600Vac      |       |       |       | 690Vac      |        |        |  |  |  |  |  |  |  |
| Work voltage range  | 90...530Vac   |      |      |      | 90...660Vac |       |       |       | 90...760Vac |        |        |  |  |  |  |  |  |  |
| Non-repetitive voltage  | 1200Vp  |      |      |      | 1600Vp      |       |       |       | 1600Vp      |        |        |  |  |  |  |  |  |  |
| Rated frequency   | 50/60Hz auto-determination  |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Rated current AC51 -AC55b<br>non-inductive or slightly inductive<br>loads, IR lamps (@ Tamb = 40°C)                   | MODEL GTF   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
|   | 10  | 25   | 40   | 50   | 60          | 75    | 90    | 120   | 150         | 200    | 250    |  |  |  |  |  |  |  |
|   | 10A   | 25A  | 40A  | 50A  | 60A         | 75A   | 90A   | 120A  | 150A        | 200A   | 250A   |  |  |  |  |  |  |  |
| Rated current AC56A<br>permitted trigger modes: ZC, BF con DT<br>(Delay Triggering),PA with softstart (@ Tamb =40 °C) | 8A  | 20A  | 32A  | 40A  | 50A         | 60A   | 75A   | 100A  | 125A        | 160A   | 200A   |  |  |  |  |  |  |  |
| Non-repetitive overcurrent (t=10msec)   | 400A  | 400A | 520A | 520A | 1150A       | 1150A | 1500A | 1500A | 5000A       | 8000A  | 8000A  |  |  |  |  |  |  |  |
| I <sup>2</sup> t for melting (t=1...10msec) A <sup>2</sup> s  | 450   | 450  | 1800 | 1800 | 6600        | 6600  | 11200 | 11200 | 125000      | 320000 | 320000 |  |  |  |  |  |  |  |
| Critical Dv/dt with output deactivated  | 1000V/usec  |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Held nominal voltage of on the impulse  | 4KV   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Nominal current for short circuit condition   | 5KA   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| FUNCTION  |   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Diagnostics   | Detection of short load circuit absence line voltage, HB alarm (partial breakage of load)   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| OPTIONS   |   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Options   | - Timed Soft-Start firing ramp, with or without peak current control<br>- Soft-Start firing ramp, specific for infrared lamps<br>- Timed shut-off ramp<br>- Limitation of RMS current in load<br>- 0-90° Delay-Triggering for firing inductive loads in ZC and BF mode  |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Diagnostic  | - SCR in short circuit (presence of current with OFF control)<br>- Absence of SCR current when under load.<br>- Overtemperature alarm<br><u>Current read</u><br>• HB alarm interrupted or partially interrupted load<br>• Automatic calibration of HB alarm setpoint starting from current value in load<br>• Alarm for load in short circuit or overcurrent<br><u>Voltage read</u><br>• No line voltage  |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| GENERAL DATA  |   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Power supply  | GTF 10-120A: 24 Vac 50-60 Hz / Vdc ± 25%, max 3VA<br>GTF 150-250A: 24 Vac 50-60 Hz / Vdc ± 25%, max 11VA  |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Power supply external fan<br>(only for GTF120A model)   | 24 Vdc ± 10%, max 200mA   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |
| Signals   | 5 leds: RUN: run state of CPU<br>STATUS: operating state<br>ALARM: state of alarm output<br>DIGITAL INPUT: state of digital inputs<br>ON / OVER-TEMP.: state control tirystor / Alarm for overheating   |      |      |      |             |       |       |       |             |        |        |  |  |  |  |  |  |  |

## GENERAL DATA

|                            |   |
|----------------------------|---|
| Load type and connection   | Single phase load<br>Independent single-phase load in open delta<br>3-phase load<br>3-phase load (star without neutral or closed triangle) with bi-phase control  |
| Protection                 | IP20  |
| Work/storage temperature   | 0...40°C (refer to dissipation curves) / -20 °C - +70 °C<br>average temperature over a period of 12:0 am not exceeding 35°C<br>(according to EN 60947-4-3 § 7.1.1)  |
| 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 (only for model >120A):<br>- Max. temperature of air surrounding device 40°C; for temperature >40°C refer at derating curves<br>- Device type: "UL Open Type" |
| Weight                     |   |
| GTF 10, 25, 40A            | 0,81 Kg   |
| GTF 50, 60A                | 0,97 Kg   |
| GTF 75, 90A                | 1,3 Kg  |
| GTF 120A                   | 1,5 Kg  |
| GTF 150, 200, 250A         | Max 2,6 Kg  |

### 5.1 DERATING CURVES GTF

Figure 49



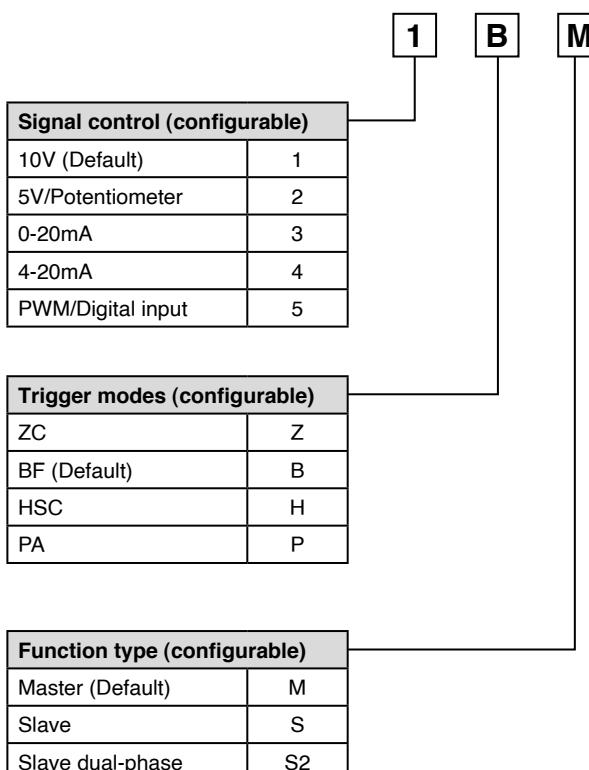
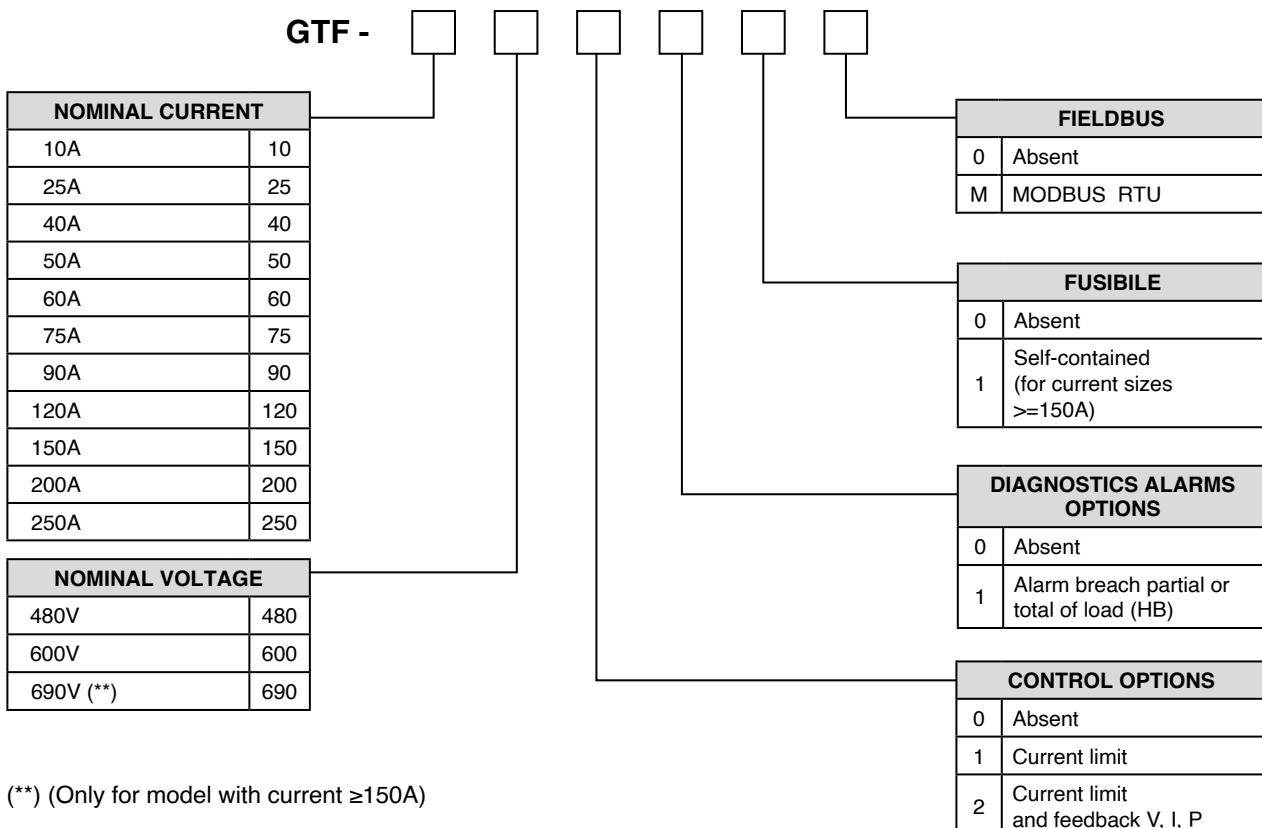
## 6 · TECHNICAL / COMMERCIAL INFORMATION



Questa sezione riporta le informazioni riguardanti le sigle di ordinazione del Controllore e dei principali accessori previsti.

Come indicato nelle Avvertenze Preliminari delle presenti Istruzioni per l'Uso, una corretta interpretazione della sigla

di ordinazione del Controllore permette di individuare immediatamente la configurazione hardware del controllore stesso ed è quindi indispensabile comunicare sempre il codice di ordinazione ogniqualvolta si renda necessario rivolgersi al Servizio Customer Care Gefran per la soluzione di eventuali problemi.



### Note:

Configurator Standard 1-B-M, if not differently specified.

Substitution model:

GTS      **GTF - X - 480 - 0 - 0 - 0 - 0 - 5 - Z - S**

GTT      without load interrupted option

**GTF - X - 480 - 0 - 0 - 0 - 0 - 1 - B - M**

GTT      with load interrupted option

**GTF - X - 480 - 0 - 1 - 0 - 0 - 1 - B - M**

## 6.1 ACCESSORIES

### CONFIGURATION KIT



kit for PC via the USB port (Windows environment) for GTF standard configuration (TTL port) for configuration of GTF with the RS485 option

Lets you read or write all of the parameters of a single GTF  
A single software for all models

- Easy and rapid configuration
- Saving and management of parameter recipes
- On-line trend and saving of historical data

*Component Kit:*

- Connection cable PC USB <----> GTF port TTL
- Connection cable PC USB <----> GTF RS485 port
- Serial line converter
- CD SW GF Express installation

**ORDERING CODE**

GF\_eXK-2-0-0.....Cod. F049095

## 6.2 FUSE / FUSEHOLDERS

| Model                    | EXTRARAPID FUSES               |                  |                         |                           | FUSEHOLDERS                       |
|--------------------------|--------------------------------|------------------|-------------------------|---------------------------|-----------------------------------|
|                          | Size<br>$I^2 t$                | Sign<br>Form     | Model<br>Code           | Power<br>dissipation @ In |                                   |
| GTF 10                   | 10A<br>70A <sup>2</sup> s      | FUS-010<br>10x38 | FWC10A10F<br>338474     | 2.5W                      | PFI-10X38<br>337134<br>UR30A@690V |
| GTF 25                   | 25A<br>390A <sup>2</sup> s     | FUS-025<br>10x38 | FWC25A10F<br>338474     | 6W                        | PFI-10X38<br>337134<br>UR30A@690V |
| GTF 40...<br>GTF 50...   | 50A<br>1600A <sup>2</sup> s    | FUS-050<br>22x58 | FWP50A22F<br>338127     | 9W                        | PFI-22X58<br>337223<br>UR80A@600V |
| GTF 60...                | 63A<br>3080A <sup>2</sup> s    | FUS-063<br>22x58 | FWP63A22F<br>338191     | 11W                       | PFI-22X58<br>337223<br>UR80A@600V |
| GTF 75...                | 80A<br>6600A <sup>2</sup> s    | FUS-080<br>22x58 | FWP80A22F<br>338199     | 14W                       | PFI-22X58<br>337223<br>UR80A@600V |
| GTF 90...                | 125A<br>6950A <sup>2</sup> s   | FUS-125N         | 660RF00AT125<br>338106  | 25W                       | PF-DIN<br>337092<br>UR400A@1000V  |
| GTF 120...               | 125A<br>6950A <sup>2</sup> s   | FUS-125N         | 660RF00AT125<br>338106  | 25W                       | PF-DIN<br>337092<br>UR400A@1000V  |
| GTF 150...               | 200A<br>31500A <sup>2</sup> s  | FUS-200S         | DN000UB69V200<br>338930 | 19W                       |                                   |
| GTF 200/250<br>480V/600V | 450A<br>196000A <sup>2</sup> s | FUS-450S         | DN00UB60V450L<br>338932 | 17W                       |                                   |
| GTF 200/250<br>690V      | 400A<br>150000A <sup>2</sup> s | FUS-400S         | DN00UB69V400L<br>338936 | 20W                       |                                   |

| EXTRARAPID FUSE FOR GTS WHEN USED AS A SLAVE OF GTF |                    |
|---|--------------------|
| Model   | Fuse Model size    |
| GTS-T 10/230  | FWC10A10F 10x38    |
| GTS 15/230, GTS 15/480                              | FWC16A10F 10x38    |
| GTS 25/480, GTS-T 20/230, GTS-T 25/230              | FWC25A10F 10x38    |
| GTS 40/230, GTS 40/480                              | FWP40A14F 14x51    |
| GTS 50/230, GTS 50/480                              | FWP63A22F 22x58    |
| GTS 60/230, GTS 60/480, GTS 75/230, GTS 75/480      | FWP80A22F 22x58    |
| GTS 90/230, GTS 90/480                              | FWP100A22F 22x58   |
| GTS 120/230, GTS 120/480                            | 170M1418 000-TN/80 |

### 6.2.1 Fuse GG

The electric protection device called FUSE GG must be done in order to grant the protection against the electric cable short circuit (see EN60439-1, par. 7.5 "Short-circuit protection and short-circuit with stand strength" and 7.6 "Switching devices and components installed in assemblies", otherwise the equivalent EN61439-1 paragraphs)