RGF 300
Three-phase voltage regulator

WARNING !

HIGH LEAKAGE CURRENT: first connect to earth !

The rgf300 is a voltage regulator for three phase motors which operates connected to the three phase mains voltage. The regulator must be installed by qualified personnel who will connect the electric supply, attach the cables in their permanent positions and commission the plant.
Incorrect installation of the rgf300 voltage regulator or the fan connected to it may cause damage to objects or people so ensure the instructions in this manual and all required security measures are read and followed carefully.

- **When receiving the goods, check that the packing is intact; in the event of any damage due to transportation, notify the forwarding agent according to legal requirements.**
- **The rgf series of products shown in this manual has been manufactured to the highest standards.**
- **The manufacturer declines all responsibility for accident, loss or damage caused by the use of these appliances. These must be correctly installed by qualified personnel in conformity with their destined use and, whenever needed, must undergo correct maintenance which should be carried out while ensuring the safety of people, domestic animals and goods.**
- **The purchaser must previously ascertain the suitability of the product for the use it is intended for and assume all consequent risks and responsibility.**
- **The rgf300 is a mains voltage regulator which uses the phase-cut principle completely controlled over the three phases. It has been designed to vary the effective voltage on three phase asynchronous motors for fans following a control signal (either mA, VDC or Ohm). The appliance is manufactured for industrial use and therefore meets the EMC standards that relate to industrial environments.**
- **Using the appliance for purposes other than the ones described above will be considered incorrect. In particular, the appliance may NOT be used to supply machine tools or any other machines where the motor torque-speed characteristic is not quadratic.**
- **If the equipment is intended for civil, commercial and/or light industrial use, supplementary components and other types of equipment are required which can be supplied on specific request from the purchaser. In this case, the purchaser must provide a suitable design of the plant in which the appliance is to be installed (compliant with EN 60555 - 2/3 standards regarding disturbance produced by electrical household appliances and the like.**

- **We decline all responsibility for any errors in the catalogues, publications or other written documents. The information in this manual is not binding and we reserve the right to make changes to the products without prior notice, at any time and in any way that we deem convenient for production purposes or useful for increasing functionality and performance.**

SAFETY RULES !

This appliance has been designed to give excellent performance provided it is installed and used carefully in a suitable electric environment by qualified personnel.
The following rules **must be obeyed** when installing the regulator :

- **Follow the instructions in this manual exactly and observe all safety measures in force.**
- **Do NOT tamper with or disassemble the regulator's internal components; doing so will INVALIDATE THE GUARANTEE and may cause unnecessary damage.**
- **The regulator does not contain components that can be repaired by the user.**
- The regulator must be suitably and effectively earthed by the installer according to the standards in force; earthing is essential for the EMC filter to operate correctly.
- The user must be protected from the electric supply and the motor must be protected from possible overloads in compliance with the standards in force.
- **DO NOT** supply the regulator without the internal protection panel made from lexan.
- **DO NOT** touch the electrical parts of the circuit when the power supply is connected under any circumstances.
- Before supplying power to the unit, check carefully that the power and earth are correctly connected.
- If the mains supply is "disturbed", which may be due to other electrical power components causing irregularities in the supply (power contactors), it is recommended that supplementary three phase **'SURGE ARRESTER'** filters are installed directly on the regulator supply.
- Avoid repeatedly connecting and disconnecting the power supply to the regulator; a constant supply keeps the regulator at working temperature and eliminates problems caused by condensate inside the protection case.
- Alternatively, use the remote terminal board contact 'MB' S2 = ON/OFF.
- The S2 = ON/OFF contact on the MB terminal board does not cut the mains supply and therefore cannot be used as a safety switch.
- Install the regulator out of direct sunlight so that the container cannot get overheated and cause a reduction in the maximum load current.
- The appliance may operate at environmental temperatures up to 50°C. Do not install it where this temperature may be exceeded or the integrity of the regulator will be compromised and the appliance may make the user appliance operate at full load (100%) with all consequent effects.
- The appliance must be stood vertically to encourage heat dissipation and to ensure there is a sufficient air circulation and free space measuring **150 mm** above and below the regulator. If several regulators are to be grouped together on a single electric board, provide forced air circulation with a fan or cooling unit of sufficient power.
- Use the holes on the lower and power terminal board sides of the appliance, for entrance of the connection cables. This will prevent water, dust etc. from getting in and will ensure the **IP55** protection level is maintained using adequately sized cables and sheaths of suitable quality.
- **Reassemble and check the cover of the external protection panel is properly closed.**
- **DO NOT alter or damage the identification stickers on the equipment.**
- **DO NOT force the trimmers to rotate beyond their set mechanical travel.**
- **Only alter the trimmers intended for regulation.**
- **Under no circumstances alter the trimmers marked with the spot of red paint.**

WARNING !

HIGH LEAKAGE CURRENT: first connect to earth !

CONTENTS

1.0 PRESENTATION

THANK YOU for choosing an **rgf300** series three phase voltage regulator, designed specifically to give the maximum yield and greatest ease of use.
Like all our products, it has been built to the very highest quality standards using electronic components of the utmost reliability which have undergone functional tests that guarantee use of the product for at least **30,000 hours** of continuous operation without problem.

The **rgf300** regulator is a power unit designed to meet requirements of quality and flexibility of use in plants and machines in which proportional variation of the speed of rotation of the fans is essential.
The regulator is housed in a **GEWISS GW Plast® 120°C** case (**fig. 1**) which guarantees high heat resistance during ordinary use (**120°C**), increased mechanical impact resistance (**IK = 08**) and a protection level (**IP55**) that allows the regulator to be installed out of doors.
Inside the case there is a lexan protection panel displaying instructions for use and commissioning of the **rgf300**.
The **12A rgf300** is shown in **fig. 1.**

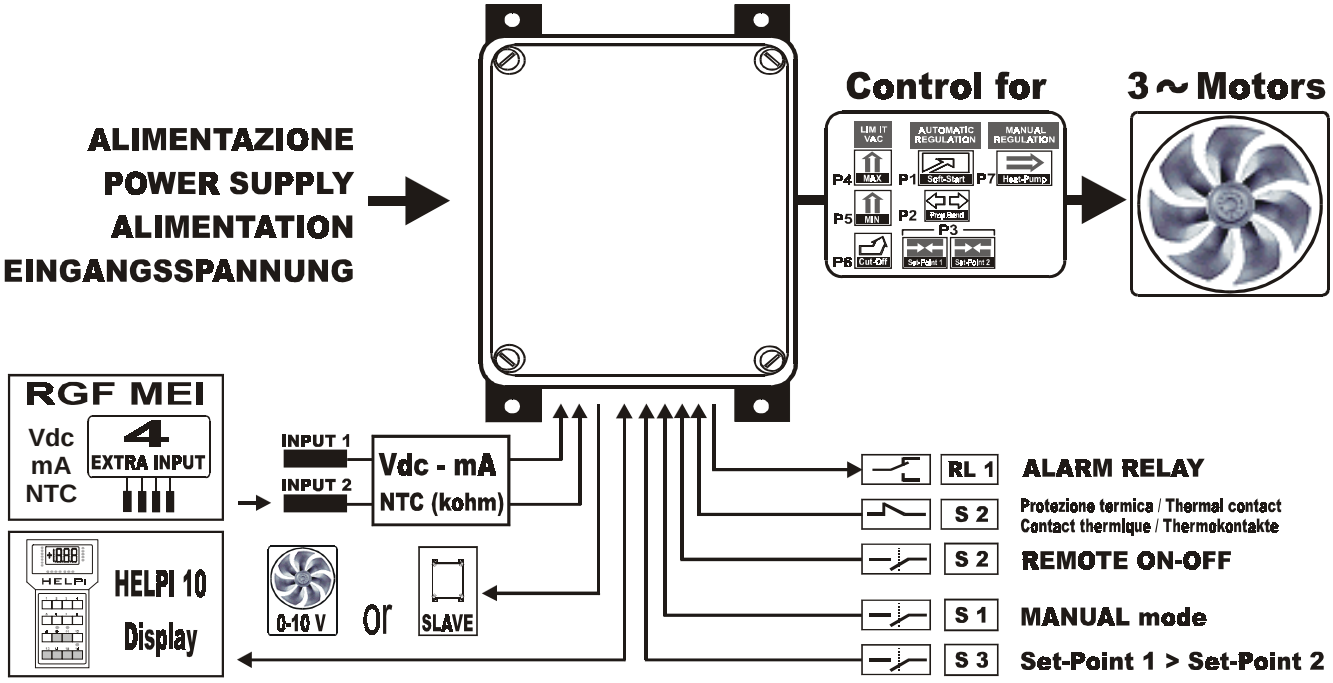
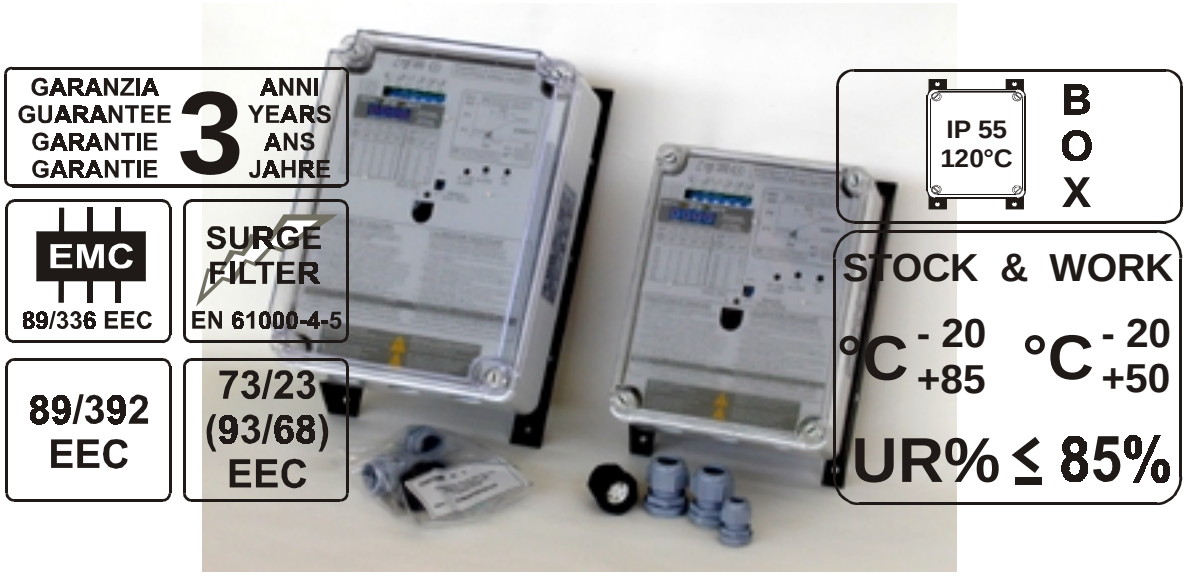


fig. 1

Before installing the device, you are invited to read this manual which describes the necessary procedures for correct installation and commissioning of the machine.

rgf300

Like all our products, the **rgf300** series bears **CE** marking as required by directive **89/336/ECC** and its subsequent modification **EEC/92/31** on electromagnetic compatibility.
Since all these products are not used as "**stand alone**" appliances but incorporated into other plants or machines, the standards' compatibility test was carried out under typical operating conditions.
The essential requirements of the directive are satisfied by conformity to "**generic standards**" for heavy industry.



EN 50081-2 emission standard, **EN 50082-2** immunity standard, and in particular:

EN 55011	class B, for radiated disturbances
EN 55011	class A, for conducted disturbances
ENV 50140 (IEC 801-3)	for susceptibility (on the power supply)
ENV 50141	for conducted susceptibility on power lines
IEC 801-4	for fast transistors (bursts / high frequency disturbances)
IEC 801-2	for electrostatic discharge (**ESD**)

The tests and checks for conformity have been carried out according to the procedures described in the product's technical documentation. The system used was formed by an **rgf300** voltage regulator, a control cable and relative controls, a power supply cable, a motor cable and a fan.

fig. 2

Responsibility for the final characteristics of the system or plant regarding the EMC directive rests with the installer. The equipment must be installed in observance of the regulations in force using the information presented in this manual.

Fig. 3 represent the **rgf300** regulator with the general contents

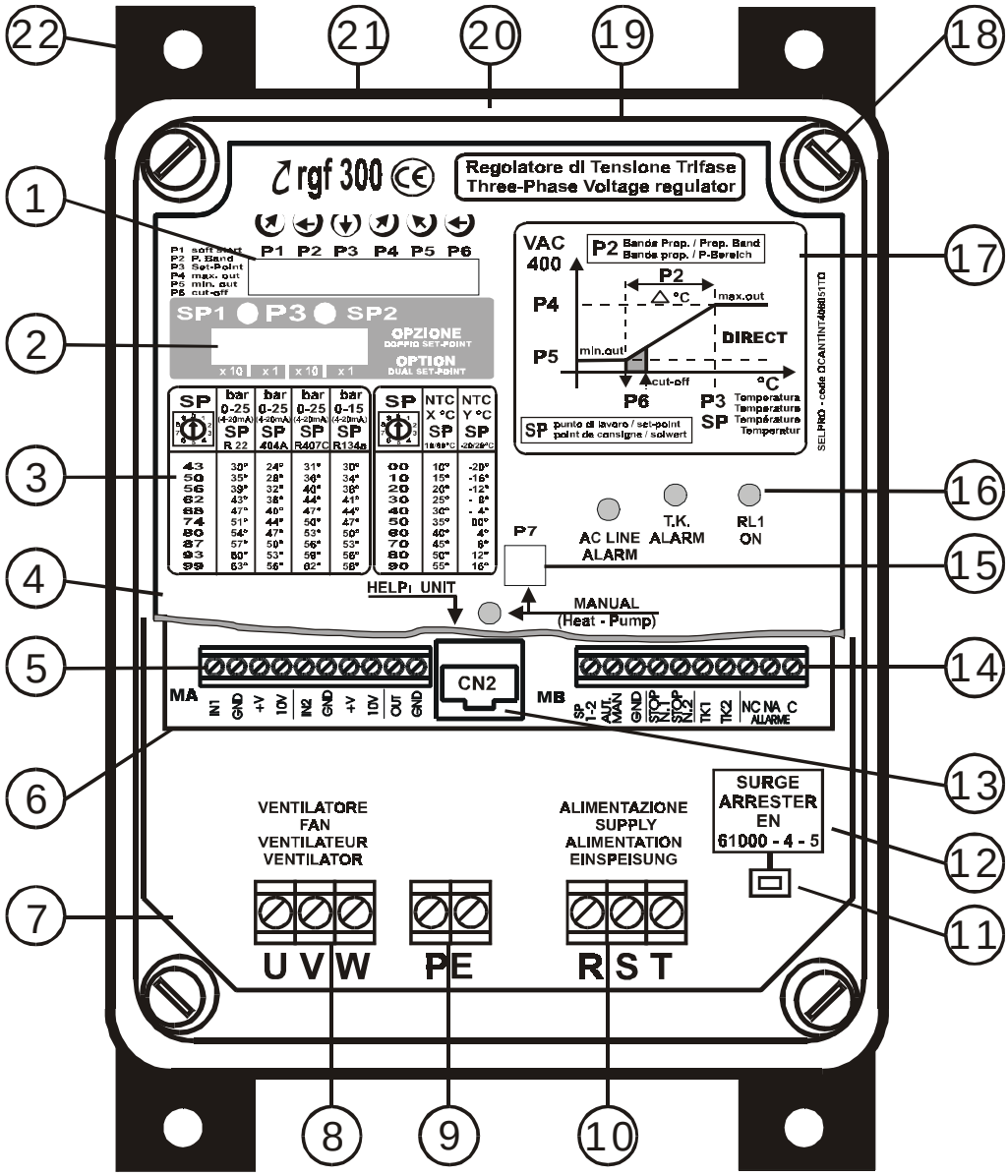


fig. 3

CONTENTS of rgf300 regulator

1.	Control Trimmer for work parameters regulation	**2.**	Double 10 positions rotary switch for Set-point (optional)
3.	Reference table for Set-point rotary centesimal switch	**4.**	Lexan internal panel for protection against direct contact
5.	Terminal block for analog inputs/output signals	**6.**	Control card (upper)
7.	Power card (lower)	**8.**	Terminal block for load connection (U-V-W)
9.	Terminal block for PE connection	**10.**	Terminal block for threephase power supply (R-S-T)
11.	SURGE ARRESTER circuit / PE faston connection	**12.**	SURGE ARRESTER circuit like EN 61000-4-5
13.	CN2 connector for HELPI display unit	**14.**	Terminal block ON-OFF auxilary inputs/output signals
15.	Control Trimmer for Manual mode (heat-pump) regulation	**16.**	Status LED
17.	Characteristic with function parameters	**18.**	Cover screws
19.	Macrolon cover of the case	**20.**	GEWISS GW Plast ® 120°C case
21.	Black anodized heat sink	**22.**	Screws hole for wall installation

1.1 DESCRIPTION

The **rgf300** series three-phase cutting regulators comprises two electronic cards on a vetronite support mounted inside the **GEWISS IP55 GW Plast® 120°C** case.
The two cards represent the **control** section (upper) and **power** section (lower).

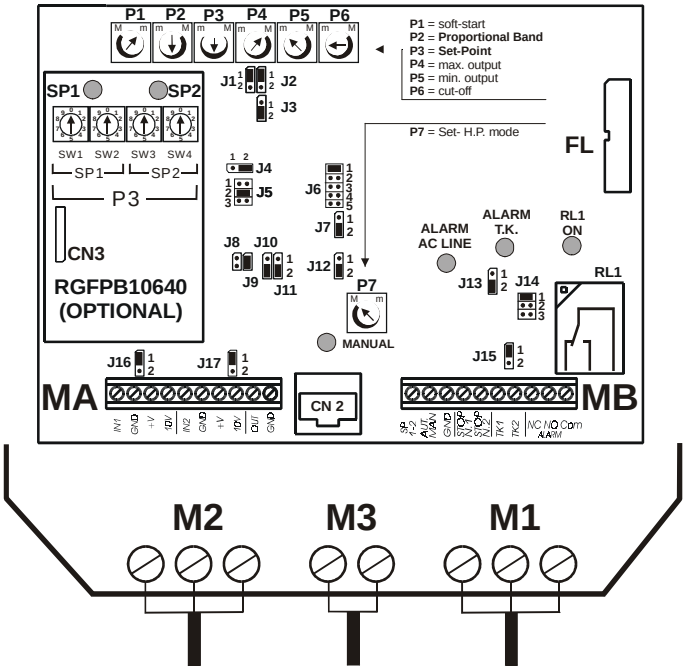


fig. 4

The **control card** contains the following regulation, connection and signalling components:

• **trimmers**	Marked "**Pn**"; used to set working parameters
▪ **centesimal switch**	Marked "**SW**"; used for the **simply** Set-Point parameter, with **100** working points on the transducer skale (only with **PB 1064** option)
• **relay**	Marked "**RL1**" Relay with commutation contact for external signalling of correct operation or stop (see selection jumper **J14**).
• **Leds** **AC LINE ALARM** **T.K. ALARM** **RL1 ON** **MANUAL**	Marked "**Dln**" **RED Led DL1** to signal "regulator stop/fault" **RED Led DL2** to signal "external heat protection (**T.K**)." **GREEN Led DL3** to signal commutation relay **RL1** in the **N.O.** position **YELLOW Led DL4** to signal **"HEAT PUMP"** mode
• **jumpers**	Marked '**Jn**'; used to change preset operational modes
• **flat cable**	Marked '**FL**' The flat allows connection to the control and power cards. Check the flat is securely fixed during maintenance or commissioning.
• **CN2**	Rapid connector to the portable **HELPI10** unit for display of the **rgf300**'s work parameters
• **Inputs/output signals terminal boards**	**Terminal board MA** for connection of the control analogue input signals **Terminal board MB** for connection of the ON-OFF inputs and outputs

The **power card** contains the following connection components:

• **power supply terminal boards**	'**M1**' for three-phase input supply **R,S,T** '**M2**' for three-phase output **U, V, W** **'M3'** for the **Earth / PE** connection

1.2 INSTALLATION AND MECHANICAL DIMENSIONS

The **rgf300** regulator must always be securely assembled and fixed using the four (**4**) attachment screws on the side fins before connecting to the power supply.
The holes provided on the lower part of the regulator are for entry of the electric connection cables:

- four pole line (**three phase + Earth**) to power the regulator,
- four pole line (**three phase + Earth**) to power the load,
- signal cable lines for the analogue inputs and digital outputs.

To make installation simpler, all regulators are also fitted with stuffing boxes in **PA6** polyamide, class **V2**, **IP68**, for use with the power and signal cables.

The regulator is cooled by natural convection and so air must be able to pass freely below and above the appliance.
Therefore ensure there is at least **150 mm.** of free space above and below the regulator.

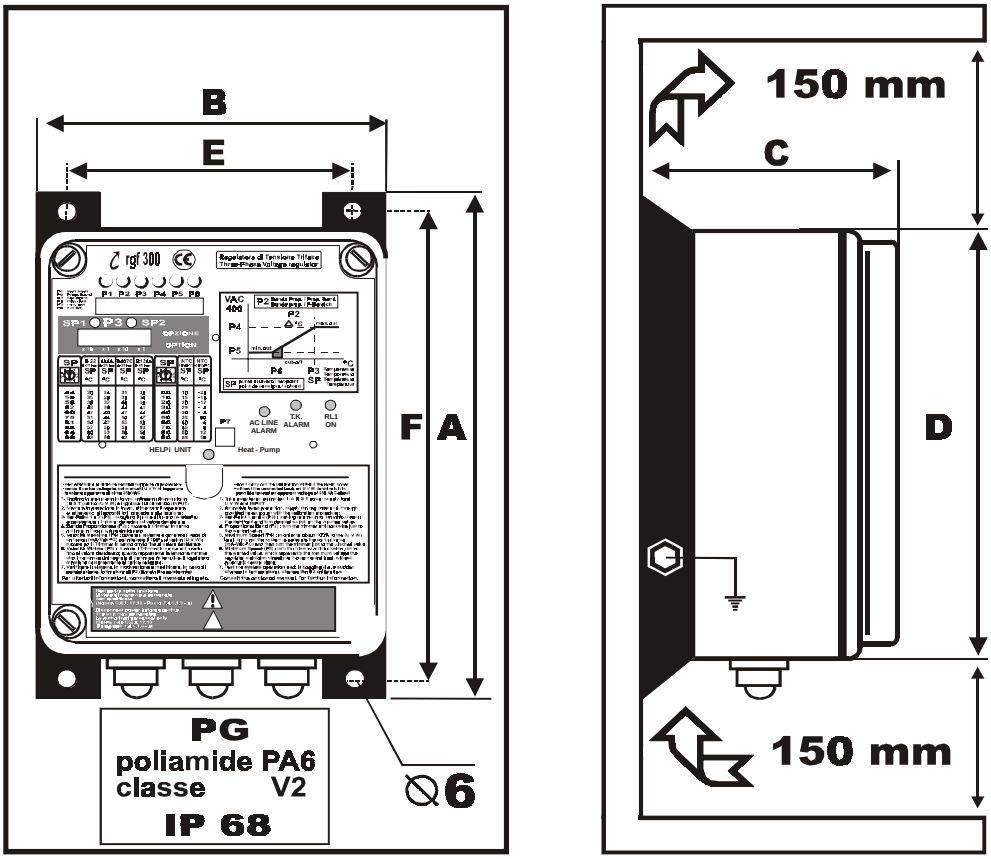


fig. 5

Mechanical Dimensions

MODELS	*A*	*B*	*C*	*D*	*E*	*F*	*kg.*	*⌀ Fixing screw holes*
rgf 312	286	201	130	255	181	255	4.0	⌀ 6
rgf 320	351	237	181	317	185	320	5.5	⌀ 6
rgf 325	351	237	201	317	172	320	8.0	⌀ 6
rgf 340	416	318	178	397	275	385	11.0	⌀ 6
rgf 360	460	318	228	397	260	410	17.0	⌀ 8

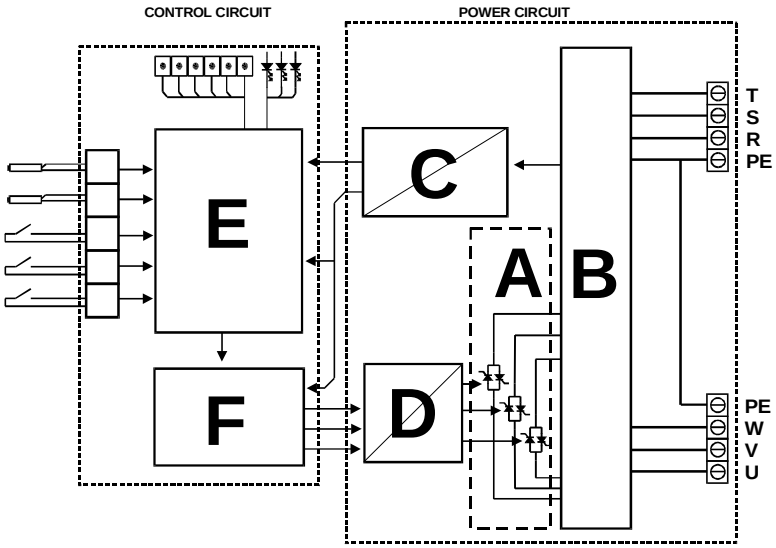
Table 1

1.3 PRINCIPLE OF OPERATION

The **rgf300** series appliances are voltage regulators that use the phase cutting principle totally controlled over three phases.
The regulators, also referred to as speed controls, have been designed to change the average voltage on the following types of equipment, according to a control signal:

- asynchronous three phase motors connected to **fans, pumps, agitators, mixers**;
- electrical resistor devices with sectioned **single / three phase**.

Regulation occurs as a result of cutting of the input sinusoid. Regulation does not generate any torque knock or pulsation and is particularly quiet. Any voltage loss is contained within a maximum limit of **1%**.
Fig. 6 shows a block diagram of regulator **rgf300**.



A - Power circuit
B - Mains filter and EMC protective devices
C - Power supply and synchronism signals
D - Insulators for the control signals of the power devices
E - Regulation and control circuit
F – Modulator for control of the power devices

fig. 6

The speed regulators are sized to withstand a starting current equal to more than twice the rated current; therefore, when choosing a regulator, it is essential to take into consideration both the motor starting current and the type of motor.
It is actually well-known that, while the starting current in axial fans is equal to 2 or 3 times the rated current, the same current in centrifugal fans can have values around 7 or 8 times the rated current.
As far as the choice of motor is concerned, it is advisable to choose motors suited to the type of regulation.
As a general rule, the best suited are:

- **motors with high slipping resistive motors**
- **defluxed motors**
- **tropicalised motors**
- **CLASS H motors**

as these allow better performance to be obtained with speed changes, they are quieter and start with lower current.

When choosing a motor, it is always advisable to contact your own supplier and order a motor which is suitable for speed control by voltage change. Subsequently, practical trials should be carried out on the motors or prototype machines in order to check their correct operation.

After choosing the motor, the speed regulator must be ordered according to

- the **rated voltage**,
- **maximum power** required (load-Amperes) bearing in mind the **starting current**.

After the motor characteristics have been checked, the following should be defined in order to identify the type of operating mode and application.

1.3.1 Operating mode

The **rgf** controls allow two different types of operation depending on which type of input is available:

- **operation as REGULATOR (also called MASTER)**

the phase cutting regulators is directly connected to one or more sensors; the phase cutting is a function of the values selected for:

- **Set-Point P3** (trimmer or centesimal switch)
- **Proportional band P2** (trimmer)

- **operation as POWER UNIT (also called SLAVE)**

In this case, the **rgf** is set up to be controlled by an external Master regulator which decides the phase cutting of the voltage by sending the control signal to the slave.

The incoming control signal to the **rgf300** regulators can be:

For a **MASTER (mA – Vdc)**	Active sensors with control in current (**mA**) or voltage (**Vdc**)
For a **MASTER (ohm)**	**NTC** sensors with control in **°C/ohm (10 kohm @ 25 °C)**
For a **SLAVE (mA – Vdc)**	Control signals in current (**mA**) or voltage (**Vdc**)

1.3.2 Application

It is generally possible to connect one or two sensors/control signals to all **'MASTER'** and **'SLAVE'** models; with two (**2**) sensors-signals connected, the regulator automatically selects the greater or lesser signal.
In the case of active sensors, this can be directly powered (**24Vdc / max. 40 mA**).
The principal applications are for measuring pressure (**bar**), temperature (**°C**), humidity (**%RH**), delivery (**cu.m/h**), superpressure (**mm.**), static pressure (**Pa**), supertemperature (**destratification**) etc. in plants and machines.

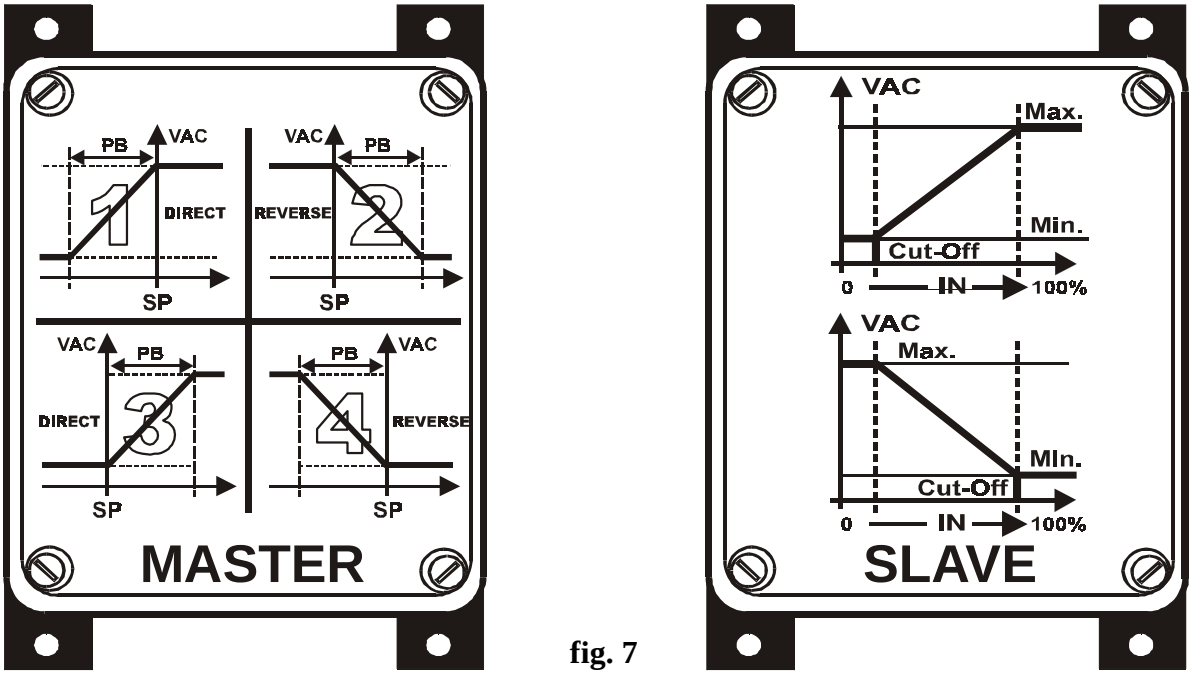


fig. 7

1.4 ELECTRIC MOTORS

Three phase asynchronous motors can be connected to the **rgf300** regulator in applications where the torque-motor speed characteristic is quadratic.
This mainly allows phase cutting application with axial and centrifugal fans used for control purposes.
The correct electrical connection and the supply voltage are given on the motor's specifications plate.
The sense of rotation of the motor can be altered by swapping the connections of two of the three supply cables.
It is important to keep the motor power supply cable as short as possible to reduce the level of interference and leakage currents to a minimum **(10 / 15 mt)**; if the cable has to be long, an auxiliary three-phase filter of exactly the same power as the regulator must be installed on the regulator output.
The figure below shows the star and delta connection configurations.

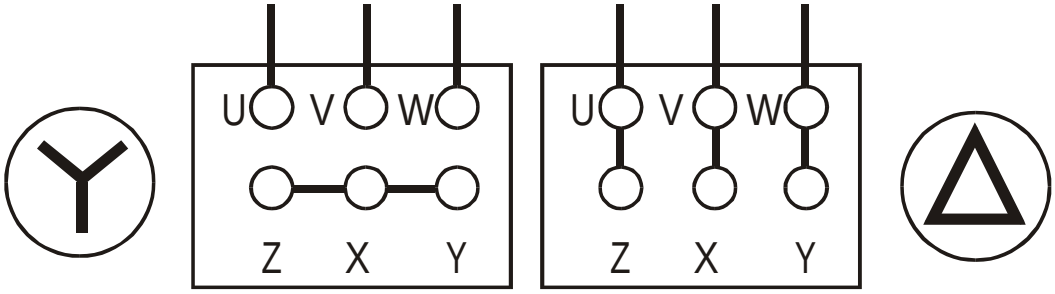


fig. 8

The **rgf300** regulator can control several motors connected in parallel but the absorption of the motors' total current must never exceed the rated current as given on the **rgf300**'s specification plate.
The speeds of the motors vary at the same time though any differences in behaviour during start up and at low speeds are due to slight differences between the motors even if they are of the same type. However, if the required speeds of the motors are different, motors must be used with different rated speeds. Bear in mind though that motors with very different characteristics create different electrical situations and these may cause problems on start up and at low speeds caused by different resistances of the stators which require different voltages on start up and at low speeds.

1.4.1 Magnetothermal protection

rgf300 devices must be protected by a magnetothermal switch fitted upstream of the cutting regulators. **Installation of magnetothermal protections is the responsibility of the installer**.
It is advisable to fit an automatic magnetothermal protection with a 'C' intervention curve having the following capacity:

RGF 300 models	magnetothermal carrying capacity
rgf 312	20 A
rgf 320	30 A
rgf 325	36 A
rgf 340	60 A
rgf 360	80 A

Table 2

1.5 rgf 300 TECHNICAL CHARACTERISTICS

SUPPLY	Voltage		**420VAC +/- 10 %** three-phase (**230VAC** and **500VAC** on request)			
	Frequency		**50 Hz** (**60 Hz**)			
	Overvoltage protection		for installation Category **II** (**4 KV**)			
CURRENT	Rated		**RGF 312**	**12 A** up to **50°C** environment, over decrease by **0.6 A/°C**		
			RGF 320	**20 A** up to **50°C** environment, over decrease by **1.0 A/°C**		
			RGF 325	**25 A** up to **50°C** environment, over decrease by **1.2 A/°C**		
			RGF 340	**40 A** up to **50°C** environment, over decrease by **1.8 A/°C**		
			RGF 360	**60 A** up to **50°C** environment, over decrease by **2.5 A/°C**		
	Overload		**200%** of the rated current (max. **10"** every **3'**)			
POWER	Control circuits		**10VA**			
	Thermally dissipated		**RGF 312**	**72 W @ 12A**		
			RGF 320	**120 W @ 20A**		
			RGF 325	**150 W @ 20A**		
			RGF 340	**240 W @ 40A**		
			RGF 360	**360 W @ 60A**		
OPERATING PRINCIPLE	Totally controlled three-phase cutting, with compensation for inductive loads and motors, without need for connection to NEUTRAL					
OPERATING CHARACTERISTIC	POWER unit (Vers. **M , V**)		The output voltage depends on the control signal prevailing between the two available at the inputs, which is chosen by means of the pre-established mode, according to the specific appliance regulating curve. The action can be : **DIRECT**, with the output increasing as the input increases, or **REVERSE,** with the output decreasing as the input increases. **Standard Config.** : output increasing as the controlled variable increases			
	Regulator (Vers. **M , V , X , Y**)		The output voltage changes to keep set to the target point, selected with the Set-Point, the quantity measured by the transducer prevailing between the two available at the inputs, which is chosen by means of the pre-established mode (greater or lesser in value). The action mode, either **direct** or **reverse,** is chosen in consideration of the controlled quantity, transducer characteristic and load action. **Standard**: output increasing as the controlled variable increases			
INPUT SIGNALS	Control	Vers. **M**	Two **0-20 mA, Ri = 100 hom** analog inputs, priority to the greater std.			
		Vers. **V**	Two **0-10 Vdc, Ri = 10 khom** analog inputs, priority to the greater std.			
		Vers. **X, Y**	Two **kohm** analog inputs for the **NTC** sensors supplied (**10KΩ @ 25°C)**, priority to the hottest sensor std.			
	Heat protection		**ON/OFF** input, motor protection NC thermal contact			
	Start/Stop		**ON/OFF** input **: Off Vin=0** = Start / **ON** (**VIN=24V**) : Stop			
	Automatic/Manual		**ON/OFF** input**: Off (Vin=0)** =Automatic /**ON** (**VIN=24V**)=Manual			
	Set-Point 1 / Set-Point 2		**ON/OFF** input for Set-point 1/2 commutation (Only with **PB1064**)			
OUTPUT SIGNALS	Transducer supply		Two **+22Vdc (-10% / +20%) 40 mA** non-stabilised outputs, protected from short circuit			
	Potentiometer supply		Two **+10Vdc / 5 mA** stabilized outputs			
	Auxiliary control		**0-10V / 1 mA** analog output for cascade control of other **SLAVE** units			
	RL1 service relay		**NO/NC** relay contact, free from potential, for separate or joint signalling of : **alarm signals absent / start enabling / voltage supply**			
ADJUSTMENTS AND PRESETTINGS	**Version & Input**		**M: 0-20 mA**	**V: 0-10 Vdc**	**X: +10/+60°C**	**Y: -20/+20°C**
	Target value		**0 ... 20 mA**	**0 … 10 Vdc**	**+10 ... +60 °C**	**-20 ... +20 °C**
	Proportional range		**0.4 … 4 mA**	**0.3 … 3.5 Vdc**	**3 … 30 °C**	
	Minimum limit / Cut-Off		Adjustable from **0%** to **100%**			
	Maximum limit		Adjustable from **100%** to **0%**			
	Acceleration ramp		Adjustable from **1"** to **10"**			
	Direct/Reverse presetting		Action mode of input prevailing over output : **Direct or Reverse**			
	Prevailing input presetting		Selection mode for prevailing input : **greater** / **smaller**			
LED SIGNALLING	**AC LINE ALARM ON**	**Red**	Signals locked state due to absence of one supply phase			
	T.K. ALARM ON	**Red**	Signals locked state due to motor thermal protection **NC** contact opening			
	RL1 ON	**Green**	Signals **RL1** service relay energised state			
	MANUAL MODE ON	**Yellow**	Signals "**MANUAL**" operation state at fixed speed			

PROTECTIONS	Mains surveillance		Continually checks presence of the three mains phases; when one phase is absent, it stops the appliance and switches on the "phase absent" alarm signal LED (**AC LINE ALARM**)		
	EMC integrated mains filter		According to **EN 55011** (**CEI 110-6**) Class **B**: **ISM** appliances directly connected to low voltage power mains		
	Overvoltage protection		According to **EN 61000-4-5** : overvoltage Category **II** (**4 KV**)		
CASE	Dimensions and Weight		**RGF 312**	**286 x 201 x 130 mm**	**4.0 kg**
			RGF 320	**351 x 237 x 181 mm**	**5.5 kg**
			RGF 325	**351 x 237 x 201 mm**	**8.0 kg**
			RGF 340	**416 x 318 x 178 mm**	**11.0 kg**
			RGF 360	**460 x 318 x 220 mm**	**17.0 kg**
	Materials		**GW-Plast 120°C** and black anodised aluminium		
	Degree of protection		**IP 55**		
	Environmental pollution		Strong pollution		
	Fire resistance		Category **D**		
INSULATION	Case		Class **I** (use of earthed protection cable)		
	Control circuits		**4000V** between control input and mains voltage components		
TEMPERATURE	Working		**-20 T 50** (from –20°C to + 50°C)		
	Storing		**-30 T 85** (from –30°C to + 85°C)		
HUMIDITY	**RH < 85%**				
INSTALLATION	Vertical wall-mounting only, with **N° 4 ∅ 6** mm. holes (RGF350 with **N° 4 ∅ 8** slotted holes)				
ELECTRICAL CONNECTIONS	**SIGNAL**		Trailing cable with rated cross section **1.5 sq mm / 22-14 AWG Cu**		
	POWER	**RGF 312**	Trailing cable with rated cross section **2.5 sq mm / 20-12 AWG Cu**		
		RGF 320	Trailing cable with rated cross section **4.0 sq mm/ 24-10 AWG Cu**		
		RGF 325	Trailing cable with rated cross section **10 sq mm / 20-6 AWG Cu**		
		RGF 340	Trailing cable with rated cross section **10 sq mm / 20-6 AWG Cu**		
		RGF 360	Trailing cable with rated cross section **10 sq mm / 20-6 AWG Cu**		
TECHNICAL STANDARDS	**89/392/EEC** Directive **73/23/EEC** Directive **(93/68)**		**CEI-EN 60204-1** : " Safety of machinery"		
	89/336/EEC Directive		**EN 50081-2** Generic standard for industrial environment emission		
			EN 50082-2 Generic standard for industrial environment immunity		
			EN 55011 class **B**, for radiated disturbance		
			EN 55011 class **B**, for conducted disturbance		
			ENV 50140 (**IEC 801-3**) for susceptibility (on the supply)		
			ENV 50141 for conducted susceptibility on the signal lines		
			IEC 801-4 for fast transients (burst / high-frequency disturbance)		
			IEC 801-2 for electrostatic discharge (**ESD**)		

Table 3

2.0 ELECTRICAL CONNECTIONS

2.1 POWER CARD ELECTRICAL CONNECTIONS

For supply and load connection, reference should be made to the diagrams shown in **fig. 8,** making sure the section of the cables is adequate to the connected load.
The power cables (supply and load) must be installed separately from the control cables (analogue inputs and ON-OFF inputs/outputs) keeping the maximum distance possible between the conductors.
Do not place power cables with signal cables in the same raceway. If the cables cross one another, ensure it is at 90°.

ATTENTION : connect the earth conductor to the screw placed purposely beside the dissipator. Use heat resistant cables able to withstand temperatures greater than 90°C.

SURGE ARRESTER : electric protection placed between the regulator supply and the earth to protect the device from transitory mains excess voltage.
ATTENTION : disconnect the PE faston contact from the earth reference, in the 'ELECTRIC STRENGTH TEST'.

The **rgf300** regulators allows connection of three-phase loads *without requiring connection of the* ***NEUTRAL.***
This simplifies installation and facilitates the star or delta load configuration.
It is advisable to provide a by-pass switch to allow load activation even when the cutting regulators is faulty (**emergency by-pass**).

When connecting the by-pass, the following precautions should be taken into consideration:
i) connection made through the by-pass switch must keep phase correspondence unaltered so as to avoid destructive shortcircuits and maintain the motor's sense of rotation.
ii) before supplying the load with maximum voltage, supply to the regulator should be disconnected, therefore:
• it is advisable to use a three-position manual switch as a commutation device
• if automatic commutation is carried out by means of contactors, make sure there is some delay (at least 2 seconds) between regulator disconnection and load activation operations.

Electrical connection of the supply and load,
for **rgf300** regulators is shown in **fig. 9**

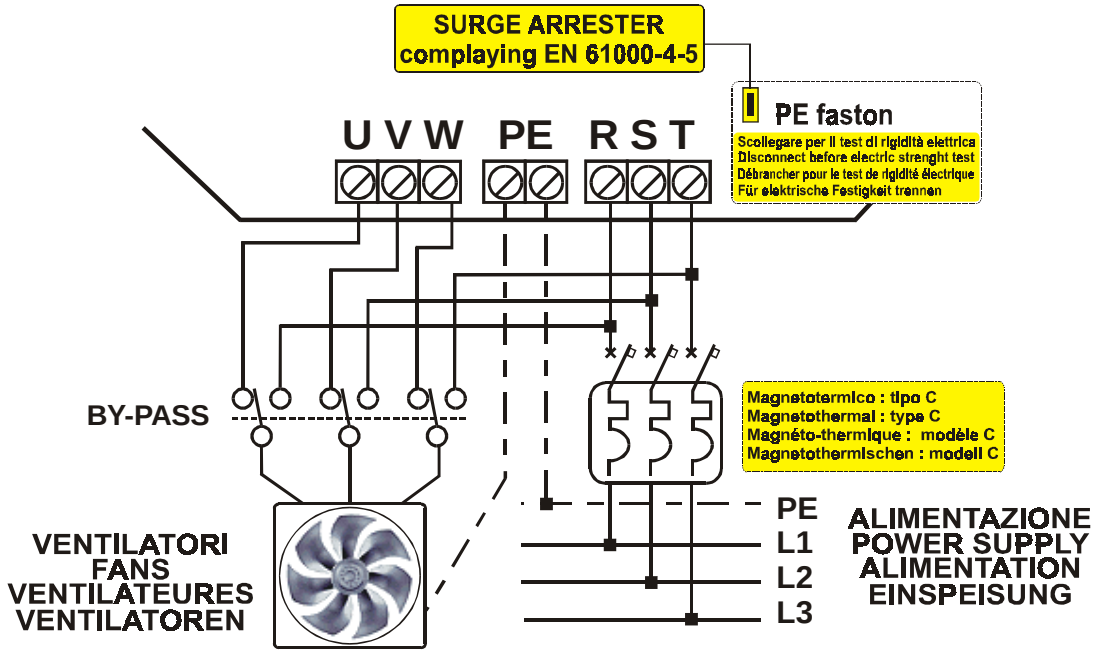


fig. 9

2.2 ELECTRICAL CONNECTIONS, ANALOGUE INPUT SIGNALS

The connections for the control analogue inputs are described below.
They can be connected to the **MA** terminal board, in particular:

MASTER version	Active sensors with control in current (**mA**) or voltage (**Vdc**)
MASTER version	**NTC** sensors with control in **°C** (**10 kohm @ 25 °C**)
SLAVE version	Control signals in current (**mA**) or voltage (**Vdc**)

By connecting the second sensor it is possible to obtain regulation control on the basis of the **GREATER SIGNAL VALUE** (STANDARD version) provided by one of the two sensors.

Warning : when two active type sensors with current or voltage output are connected, use the +V terminal for supply to **+22 Vdc / 40mA** (**MA 3** for **IN 1** and **MA 7** for **IN 2**)

There is also a control output available on the terminal board to pilot the **rgf** unit, single phase or three phase, that executes regulation on differentiated loads using the same automatic regulation parameters of the main **rgf300**.

CONNECTIONS	Trailing cable with rated cross section **1.5 sq mm / 22-14 AWG Cu**

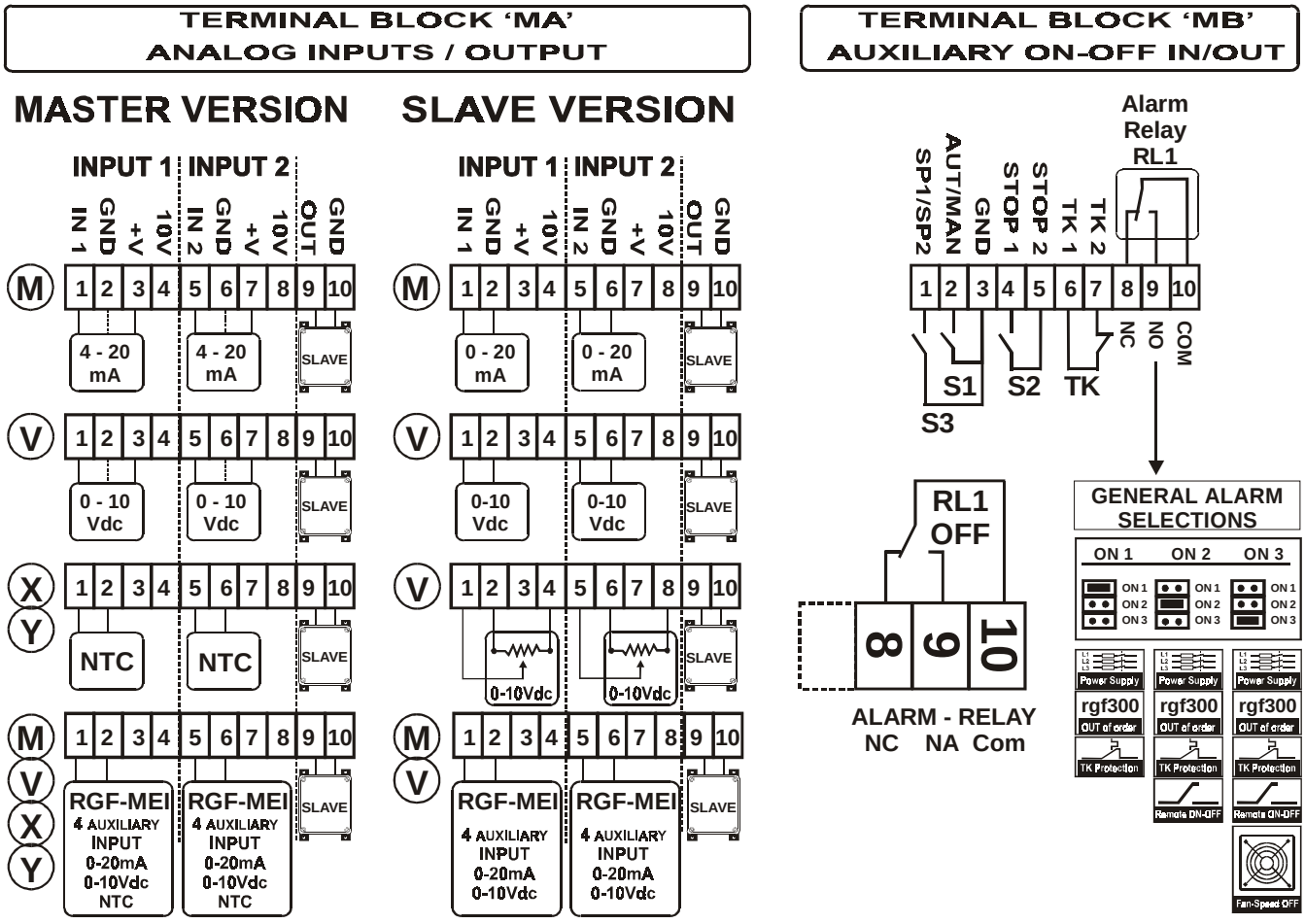


fig. 10

One of the main applications of the **rgf300** series regulators is the control of voltage and speed of rotation of fans. This is modulated to keep temperature or pressure constant as a work point for one or more refrigerating circuits (condensator or evaporator mode).
In the **STANDARD** condition, the fan reaches maximum voltage in output (**P4**) coinciding with the work **Set-point**.
Directions are given below for connection or calibration of **rgf300** regulators with **active pressure sensors**, **NTC** temperature sensors and other possible applications for **direct or remote regulation**.

2.2.1 Connection of XSK pressure transducers (4-20 mA)

The table below lists the information necessary for calibration of the **Set-point** (**page 34**) with the position of **P3** referred to the Centesimal Commutators (**Com**.) or Trimmer (**Trim**.), and for calibration of the **Proportional Band** with the position of **P2**.

Set-Point SP / P3 for 4-20mA, setting with SP / P3 Trimmer — **START position** — **Centesimal Switch**

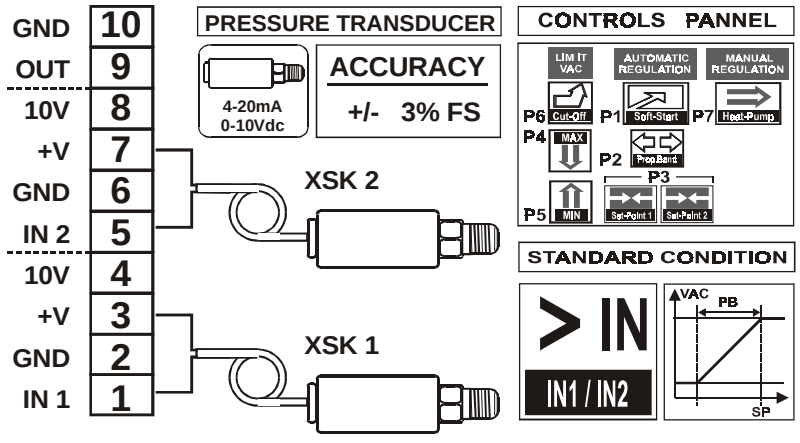
Setting Trimmer		mA	V(*)	0-15 bar	0-25 bar	0-30 bar	N°
	m	**4**	**0.4**	**0.00**	**0.00**	**0.00**	**00**
		5	0.5	0.93	01.56	01.87	06
		6	0.6	1.87	03.12	03.75	12
		7	0.7	2.81	04.68	05.62	18
		8	0.8	3.75	06.25	07.50	25
		9	0.9	4.69	07.81	09.37	31
		10	1.0	5.63	09.37	11.25	37
		11	1.1	6.56	10.94	13.12	44
	c	**12**	**1.2**	**7.50**	**12.50**	**15.00**	**50**
		13	1.3	8.44	14.06	16.87	56
		14	1.4	9.38	15.63	18.75	62
		15	1.5	10.31	17.19	20.62	68
		16	1.6	11.25	18.75	22.50	74
		17	1.7	12.19	20.31	24.37	80
		18	1.8	13.13	21.88	26.25	87
		19	1.9	14.07	23.44	28.12	93
	M	**20**	**2.0**	**15.00**	**25.00**	**30.00**	**99**

Proportional Band PB / P2 setting for 4-20 mA pressure transducers — **START position**

Set. Trim	mA	0-15 bar	0-25 bar	0-30 bar
m	**0.4**	**0.37**	**0.62**	**0.75**
c	**2.1**	**1.94**	**3.28**	**3.93**
M	**4.0**	**3.74**	**6.24**	**7.50**

Tab. 4

(*) Column **V** gives the voltage values legible with a multimeter (**20Vdc** scale limit) on the **IN**/**Gnd** terminals of the analogue inputs, corresponding to the **mA** control signal generated by the **4-20mA** transducer in regulation.
Fig. 11 shows the connection of two pressure transducers plus the type of operation (standard) and the operating regulation controls.



WARNING :
do not invert the transducer cables (IN / +V) when connection is made to terminals 1/3 and 5/7 as the transducer may be damaged.

ATTENTION :
at standard configuration P3/Set-point = max. output fan

fig. 11

2.2.2 Connection of NTC temperature sensors (10kohm @ 25 °C)

Two versions of **NTC** temperature sensors are available for **rgf300** models:

- **X** for scale **+10 °C to +60 °C**
- **Y** for scale **- 20 °C to +20 °C**

The table below lists the information necessary for calibration of the **Set-point** (**page 34**) with the position of **P3** referred to the centesimal Commutators (**Com**.) or Trimmer (**Trim**.), and for calibration of the **Proportional Band** with the position of **P2**.

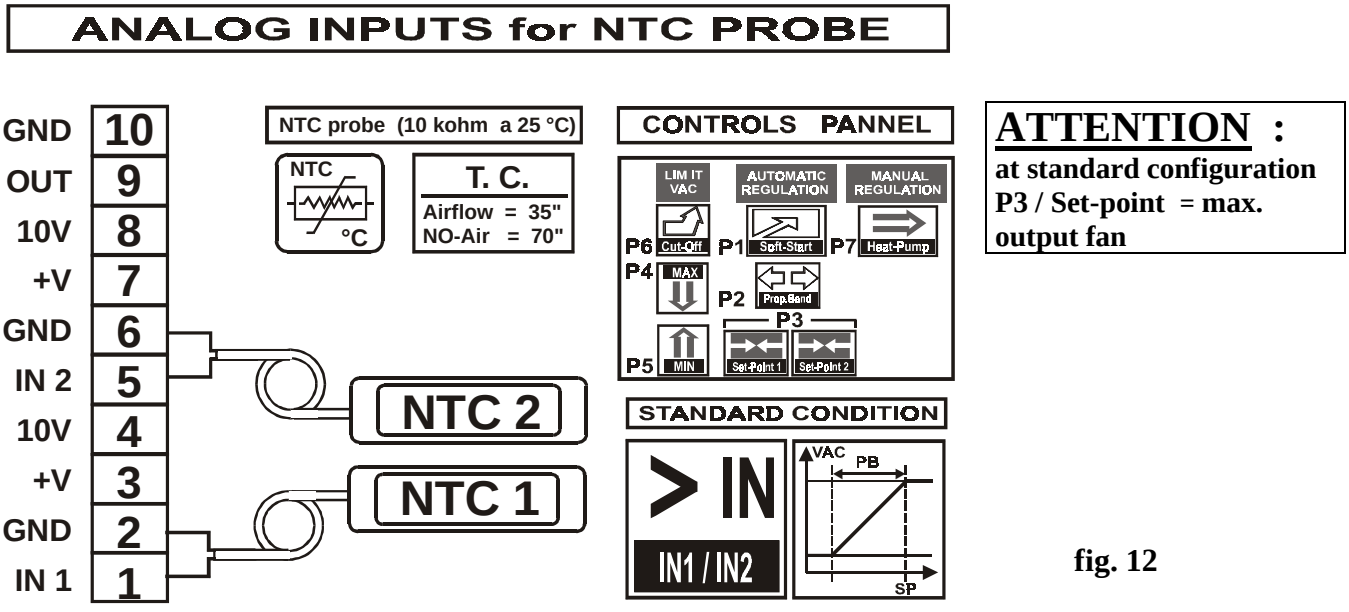
Setting of work point SP / Set-point P3 with NTC probe SP > Trimmer P3 START position			Setting of work point SP / Set-point P3 with NTC probe SP > Centesimal switch START position			Proportional Band PB/P2 with NTC probe START position	
TRIMMER SETTING	**X (°C) 10°/60°**	**Y (°C) -20°/20°**	**CENTESIMAL SETTING N°**	**X (°C) 10° / 60°**	**Y (°C) -20°/ 20°**	**TRIMMER SETTING**	**For X & Y Skale**
m	**6°**	**-22°**	**00**	**10°**	**-20°**	**m**	**3 °C**
			10	15°	-16°		
			20	20°	-12°		
			30	25°	-8°		
			40	30°	-4°		
c	**35°**	**0°**	**50**	**35°**	**00°**	**c**	**18 °C**
			60	40°	4°		
			70	45°	8°		
			80	50°	12°		
			90	55°	16°		
M	**64°**	**23°**	**99**	**60°**	**20°**	**M**	**30 °C**

Tab. 5

Connection of the two **NTC** sensors is shown in **fig. 12** below.
Also shown is the type of operation (standard) and operating regulation controls.

Master X for scale +10 C° to +60 C°

Master Y for scale -20 C° to +20 C°



ATTENTION :
at standard configuration P3 / Set-point = max. output fan

fig. 12

2.2.3 Connection of other sensors and control signals

Active sensors with : **0-20 / 4-20 mA current output (M vers.), and**
0-10 Vdc voltage output (V vers.)

Connection can usually be made to the **rgf300** regulator with one or two active sensors, with current output control signal (**0-20 mA**) or voltage output (**0-10 Vdc**) with conductors having two or three wires.
If the sensors have an earth (**Gnd**) as well as a signal (**IN**) reference, and they accept a **+24Vdc** (max. **40 mA** supply), they can be directly connected to and supplied by the **rgf300** regulator (**fig. 13**).
The diagram below shows the connection of two differential pressure transducers used to maintain constant pressure / air delivery from a fan in a controlled air flow plant (laminar flow); also shown is the type of operation (standard) and the operating regulation controls.

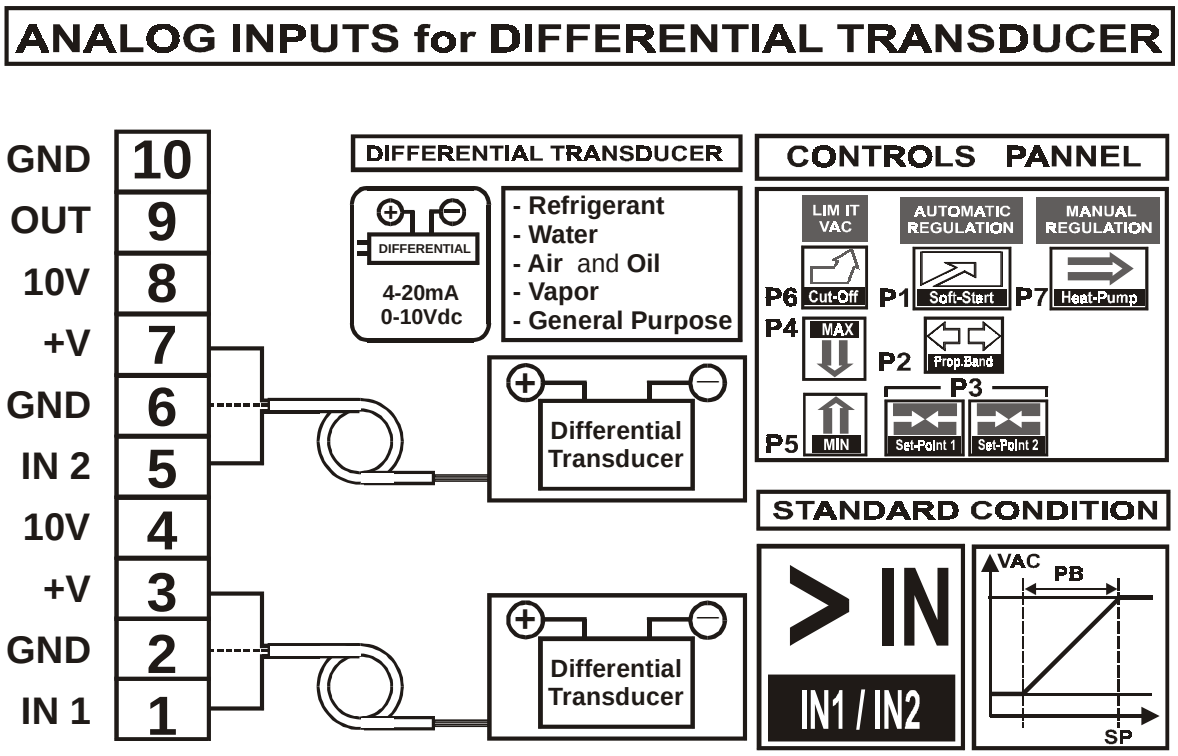


fig. 13

2.2.4 Remote connection for a current (mA) or voltage (Vdc) control signal

Connection of an external control unit (for SLAVE M, V)

If regulator control from an external unit is required, choose one of the following versions:

SLAVE M when the external control unit uses a current control signal (**0-20 mA**), or
SLAVE V when the external control unit uses a voltage control signal (**0-10 Vdc**).

This configuration allows a grid of several regulators to be controlled via a single regulation control signal in either mA or Vdc, even if the regulators are a mixture of single phase and three phase.
It is therefore possible to control totally and automatically several ventilation units and, if necessary, to release one or more regulators from automatic regulation that, using a local manual control signal (only with **0-10 Vdc** control), are regulated to the requested voltage.
The number of inputs available for differentiated control is **2** with priority going to the greater value.
See **fig. 14** for the layout of the connections.

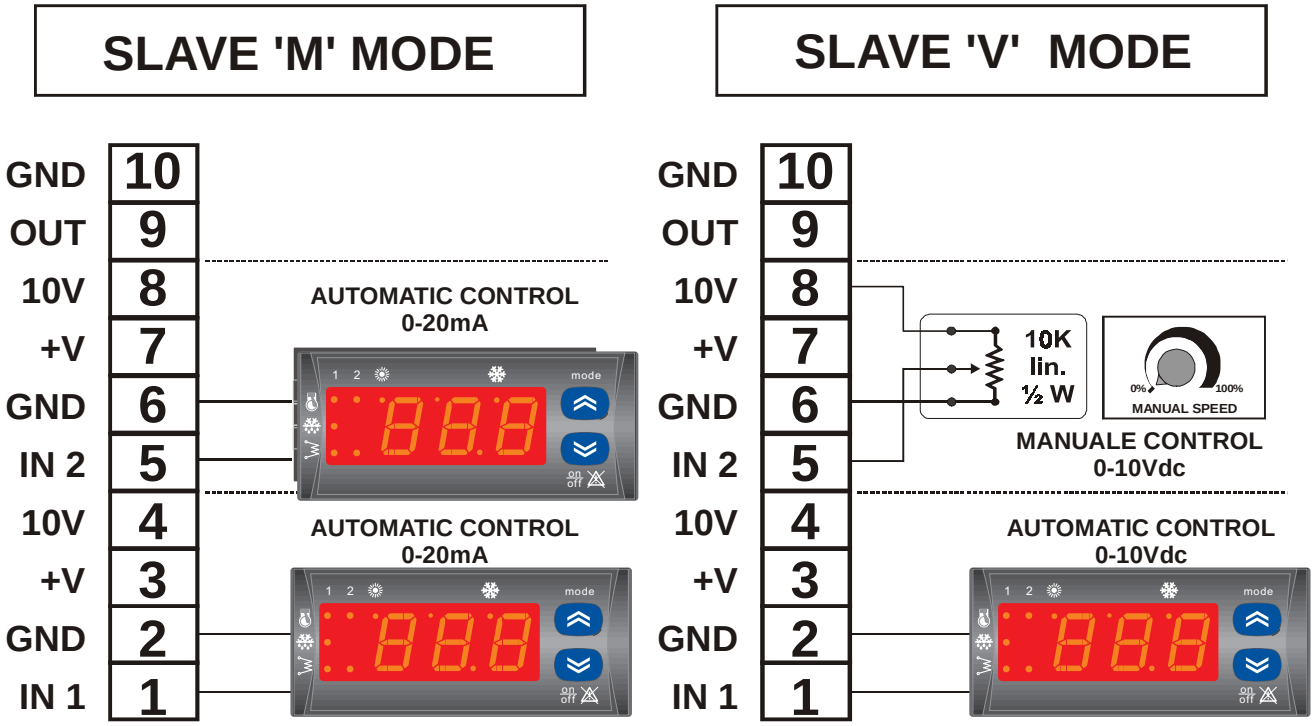


fig. 14

2.2.5 Connection of the rgf MULTIDRIVER control

In this configuration, the **rgf300** regulator is able to guide other single or three phase **rgf** regulators through the **MA 9 (OUT)** and **MA 10 (GND)** terminals.
The control output controlled by jumper **J6** allows a signal to be sent to several **SLAVE** (M or V) units.
The signal takes account of the work settings on the main **rgf300**.
Using a single control / sensor, it is therefore possible to control several single or three phase regulation units, that act both simultaneously and proportionally, starting from the transmitted regulation control signals.
Each unit can be used singly with other work limits (**MIN** and **MAX OUTPUT**).
The electrical connection and controls available are shown in **fig. 15**.

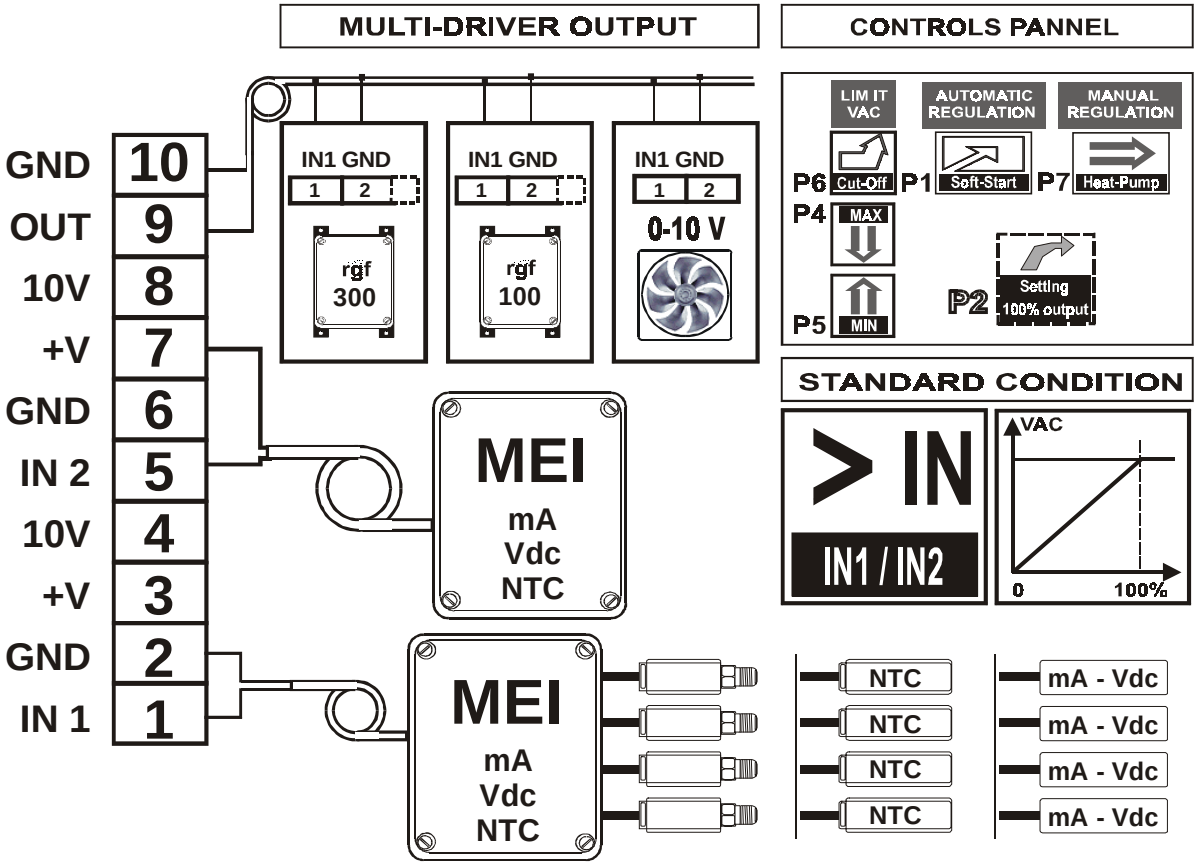


fig. 15

Connection of the **rgfMEI** expansion module is also shown in **fig. 15**.
With this module it is also possible to increase the number of sensors (max. **16**), which either use current (**0-20mA**), voltage (**0-10Vdc**) or kohm (**NTC sensor**), that can be connected to the regulator.
Four sensors can be connected to this module; the control signal automatically selected is the one with the **greatest value** and as this module is supplied separately.
For more information, consult the user manual for regulator **rgfMEI**.

2.3 ELECTRICAL CONNECTIONS, ON-OFF INPUTS/OUTPUT

This paragraph describes the connections to the auxiliary **S1 - S2 - S3** and **TK,** ON-OFF inputs / output available on the '**MB**' terminal board for which the electrical connection is made with **0-POTENTIAL** signal cables.
Also described is the operation of the **RL1 ALARM** relay and its use based on jumper **J14**.

CONNECTIONS	Trailing cable with rated cross section **1.5 sq mm / 22-14 AWG Cu**

2.3.1 Operating selection

The operating selection is obtained by activating the **1/3, 2/3, 4/5** and **6/7** terminals on the '**MB**' terminal board.
Fig. 16 shows an example of connection using switches and safety devices.
In particular:

S1 indicates a **normally open** (**NO)** switch for commutation from **AUTOMATIC** to **MANUAL** operation.

S2 indicates a **NO** contact for activation/inhibition of operation (**remote ON-OFF**);

S3 represents a **NO** contact to activate commutation from **Set-point 1** to **Set-point 2** (**SP1 – SP2**)
N.B. : this control is only operative if the RGFPB10640 optional card is present on the regulator

TK indicates a **normally closed** (**NC**) safety device, e.g. a **HEAT PROTECTION** positioned on the motor, which would halt operation if were open (only if **J15=ON2**).

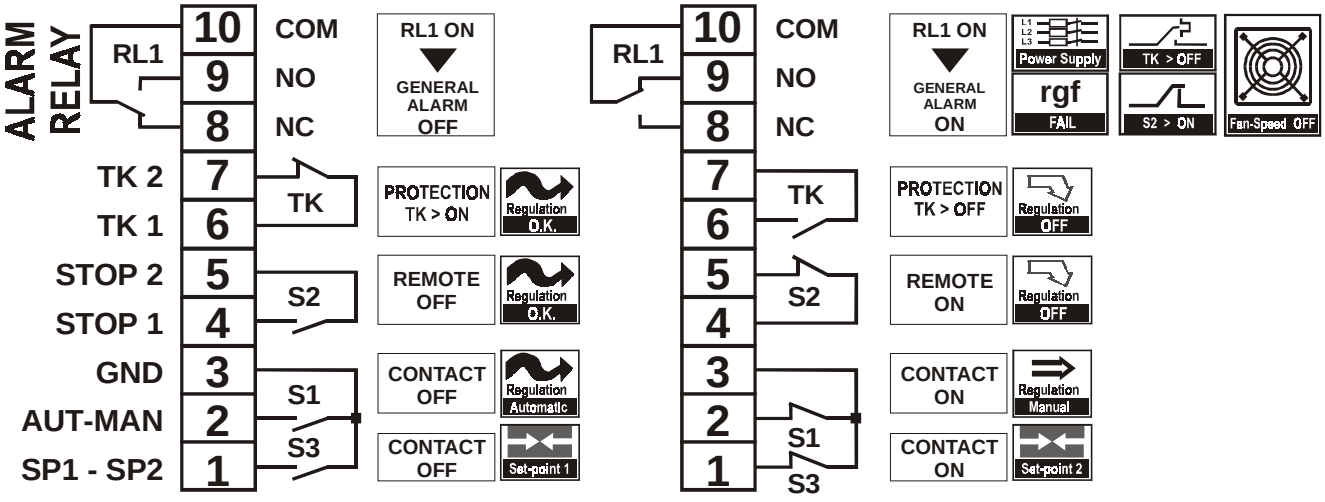


fig. 16

S1: AUT / MAN (MB 2 – MB 3 terminals)

S1 = OPEN	**operation with variable speed regulation (Led heat-pump = OFF)**
S1 = CLOSED	**MANUAL operation at fixed speed (Led heat-pump = ON)**

The S1 contact allows the regulation to be commutated from "AUTOMATIC OPERATION" (power supplied according to the control signal) to "MANUAL OPERATION" with fixed supply power.
Activation of this function is displayed by the **heat-pump Led** lighting up.

Application example : WINTER / SUMMER OPERATION of heat pumps.
The fans, connected to the regulator, can be activated depending on the temperature or pressure detected; or, by switching **S1= CLOSED**, voltage to the fans can be kept constant, equal to the value set with **P4 (100% - 0%)**, for the required time.

CALIBRATION: switch the **S1** contact to **CLOSED (Led heat-pump = ON)** and regulate the position of the **P7** trimmer to the desired voltage; then open **S1 (Led heat-pump = OFF)**.
This will reset the automatic speed regulation on the basis of the control signal.

The operation described here can be achieved by means of electromechanical devices. However it is extremely simple if the cutting regulators is controlled by an external regulator (e.g. Energy Light - type **Eliwell**), which can automatically control the **S1** contact.

S2: STOP (MB 4 – MB 5 terminals)

S2 = OPEN	**Regulator operational**
S2 = CLOSED	**Operation stop**

With **S2** = CLOSED operation of the cutting regulators is stopped via a remote contact.
This is useful, for example, to stop fans during defrosting or to link fan operation to activation of a central unit (e.g. compressor) or an alarm (e.g. max./min. temperature).

S3: SP1 / SP2 (MB 1 – MB 3 terminals)

S3 = OPEN	**Automatic regulator operation with SET-POINT 1**
S3 = CLOSED	**Automatic regulator operation with SET-POINT 2**

The **S3** contact allows the reference Set-point to be commutated from **SP1** to **SP2.**
With **S3** = OPEN, the regulator works with **SET-POINT 1**.
With **S3** = CLOSED, the regulator works with **SET-POINT 2**.
Activation of this function is displayed by the **SP1** and **SP2** Leds lighting up on the optional **RGFPB10640** card.
This function is useful, for example, for day / night or winter / summer operations.
Selection is made by means of an external contact in automatic or manual commutation mode.
N.B. : this control is only operative if the optional RGFPB10640 card is present on the regulator.

TK: TK1 – TK2 (MB 6 – MB 7 terminals)

TK = CLOSED	**Regular operation (Led TK ALARM = OFF)**
TK = OPEN	**Operation stop (Led TK ALARM = ON)**

Intervention of an external safety device opens a **0 V** potential contact and halts operation of the regulator. **Led TK ALARM (ON)** is lighted up.
In plants with fans in parallel, individual protection devices must be used for each motor connected so as to reduce the risk of a total stop.
To restore normal conditions (**RESET**), see the position of jumper **J13**.
For operation with **J15=2,** the configuration required is : **MB 6/7 = NC**

RL1: ALARM relay (MB 8-9-10 terminals) with J14 selection jumper

The **RL1** relay is mounted on the **control card**. The relay has a commutation contact for external signalling of the operating status.
For the operation mode of this output relay, configure jumper **J14** so that all alarms are enabled, as shown in the table below:

J14	RL1	POWER SUPPLY R S T	T.K.	STOP (S2)	FAN SPEED U V W	RGF
ON1	ON	ON	ON	Unable	Unable	O.K.
	OFF	OFF	OFF	Unable	Unable	K.O.
ON2	ON	ON	ON	OFF	Unable	O.K.
	OFF	OFF	OFF	ON	Unable	K.O.
ON3	ON	ON	ON	OFF	ON	O.K.
	OFF	OFF	OFF	ON	OFF	K.O.

Table 6

Besides relay RL1 in rest conditions, **fig. 17** shows the three positions for:

J 14 : **ON1** (**standard = factory selection**).
ON2
ON3

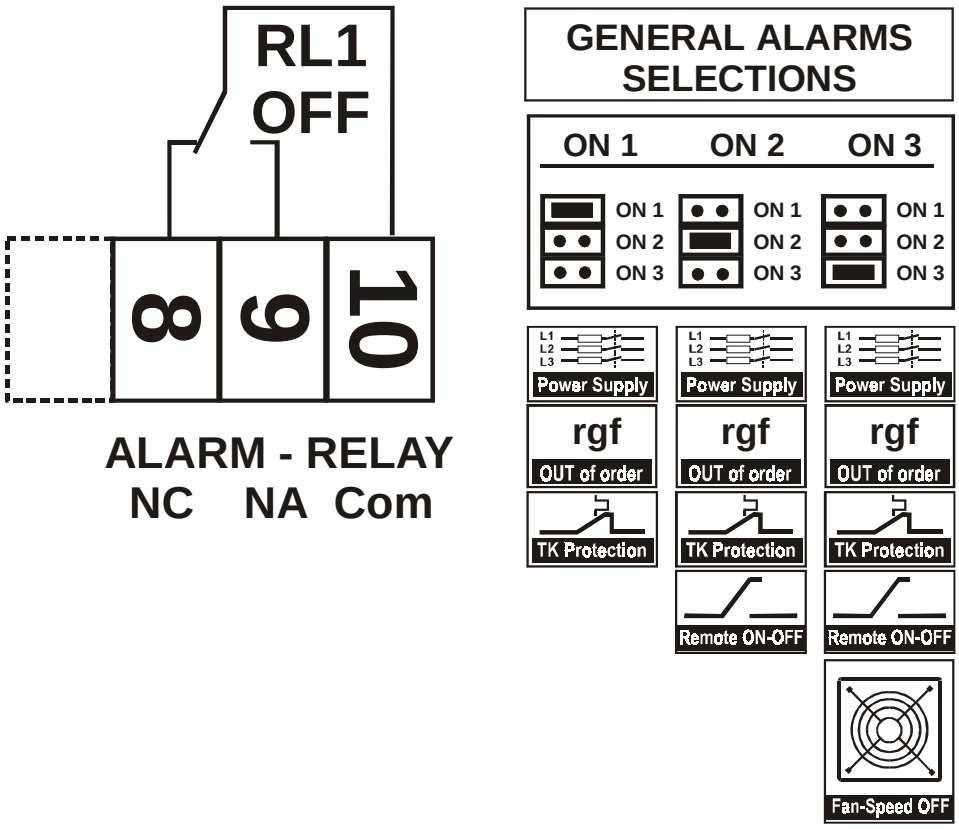


fig. 17

3.0 COMMISSIONING PROCEDURE

Having carried out the electrical connections to the regulator, it is time to perform the configuration, regulation and commissioning operations for the **rgf300** regulator by following the procedure below.
It is important to remember that the settings of the **jumpers** (**Jn**) are only to be modified to change the configuration or the operating mode of the regulator set in the factory (check the label on the right side of the casing).

3.1 Jumpers

This paragraph describes the preset functions of the programming **jumpers**; the jumpers used on the card are of the following types - **2, 3, 6** and **10 contacts** (see **fig. 18**).
The term "**Jumper**" refers to the moveable element which connects two (2) contacts.

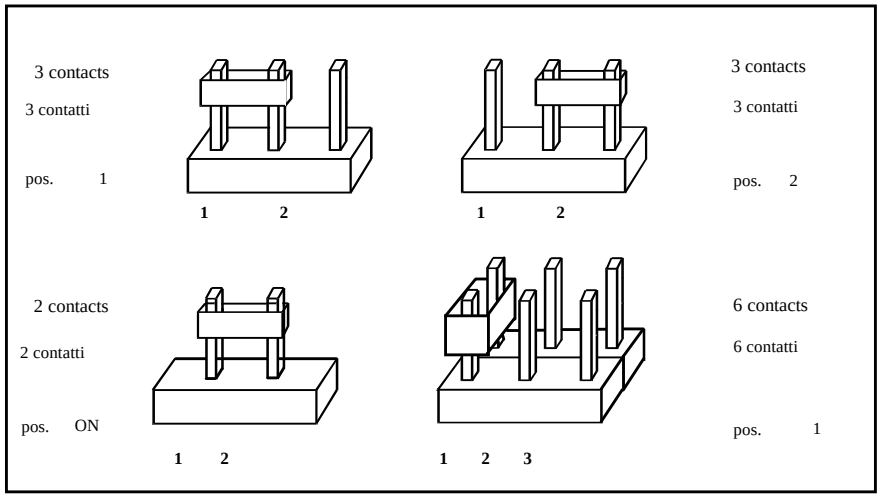


fig. 18

For **2** contact jumpers, the function is activated when the **jumper** is present (position **ON**).
For **3** contact jumpers, there are two selection types:

- position '**1**' i.e. the middle jumper connected to jumper no. **1**
- position '**2**' i.e. the middle jumper connected to jumper no. **2**

For **6** contact jumpers (**J5** and **J14**), there are **3** selection types (pos.**1, 2, 3**); **fig. 18** shows position **1**.
For **10** contact jumpers (**J6**), there are **5** selection types (pos.**1, 2, 3, 4, 5**).
The main jumpers on the **rgf300** cutting regulators **control card** are described below.

J1	Selects the work field of the **Set-point P3** :
J1 = ON1	**P3** with control from active sensors for **4-20mA** or **NTC** (**ohm**) sensors for **°C**
J1 = ON2	**P3** with control from active sensors for **0-10 Vdc**

J2	Activates the standard **Set-point** or the auxiliary, optional, double digital **Set-point**: (**this control is only operative if the RGFPB10640 card is present on the regulator)**
J2 = ON1	**Set-point** (**P3**), with trimmer mounted on the **PB 1018/3** basic regulation card
J2 = ON2	**Set-point** (**P3**), with double digital commutators in 99 positions, mounted on the **RGFPB10640;** it also inhibits operation of **P3** (standing) when in the **SLAVE** configuration, **J2 = ON2**

J3	Selects the operation of the regulator at the **Set-point** :
J3 = ON1	**Set-point** (**P3**) corresponds to the minimum control value of the fan
J3 = ON2	Il **Set-point** (**P3**) corresponds to the maximum control value of the fan
	The standard position is ON2.

J4	Selects the operating mode of output **MA 9/10** in combination with jumper **J6.**
J5	Selects the work field of the **Proportional Band** in **°C, mA, Vdc** :
J5 = ON1	**P2** scale for control input with **NTC** (**ohm**) sensors for **°C** (range **3 – 30 °C**)
J5 = ON2	**P2** scale for control input with active sensors from **4-20 mA** (range **0.4 – 4 mA**)
J5 = ON3	**P2** scale for control input with active sensors from **0-10 Vdc** (range **0.3 – 3.5 Vdc**)
J6	Selects the type of output control signal from the **rgf300** on terminal **MA 9/10** :
J6 = ON1	**0-10 V** signal proportional to the power output (for **J4 = 2**)
J6 = ON2	**10-0 V** signal proportional to the power output (for **J4 = 1**)
J6 = ON3	Control signal with **OFFSET** (for **J4 = 1**)
J6 = ON4	Signal to indicate the shift of the input signal from the **Set-point** (for **J4 = 1**)
J6 = ON5	Input signal (greater or lesser) (for **J4 = 1**)
J7	Selects the size of the value in % C (of control) to display on the portable unit:
J7 = ON1	displays control signal **%C** with **OFFSET**
J7 = ON2	displays control signal **%C** without **OFFSET (0 – 100%)**
J8 = ON	**Selection** for '**DIRECT**' operation with **J3 = ON1** If **J 8** is **ON,** the voltage supplied to the fans increases with the increase in input signal. **Selection** for '**REVERSE** ' operation with **J3 = ON2** If **J 8** is **ON,** the voltage supplied to the fans increases with the decrease in input signal.
J9 = ON	**Selection** for '**REVERSE** ' operation with **J3 = ON1** If **J 9** is **ON,** the voltage supplied to the fans increases with the decrease in input signal. **Selection** for '**DIRECT**' operation with **J3 = ON2** If **J 9** is **ON,** the voltage supplied to the fans increases with the increase in input signal. The selection of one excludes the other. In the versions with **NTC** sensor, the operation of **J8** and **J9** with **J3 ON1/ON2,** is inverted.
J10	Selects the **MASTER** or **SLAVE** operating mode:
J10 = ON1	selects **SLAVE** mode for the **rgf300**
J10 = ON2	selects **MASTER** mode for the **rgf300**
J11	Selects the input signal priority:
J11 = ON1	selects the **LESSER** value
J11 = ON2	selects the **GREATER** value
	• In the version with **NTC** sensor, selecting **J11=ON1** is the equivalent of selecting the sensor with the greater **°C** value
J12	Selects the type of input for use of the portable unit :
J12 = ON1	displays the voltage signal in **V (0-10 Vdc)**
J12 = ON2	displays the current signal in **mA (0-20** and **4-20 mA)**
	• In the version with **NTC** sensor, selecting **J12=ON1** is equivalent to automatic setting of the work field of the sensor (**X = +10 to +60 °C** and **Y = -20 to +20 °C**)

J13	Selects the **RESET** operating mode of the **TK** contact (terminal board **MB 6/7**):
J13 = ON1	when selected, if the **TK** protection intervenes, the regulator must be switched off and on again to reset the system after the cause has been eliminated (**MANUAL RESET**).
J13 = ON2	when selected, if the **TK** protection intervenes, the system restarts automatically after the contact has been reset (**AUTOMATIC RESET**).
	The standard position is ON2.

J14	Selects the operation of the **RL1** relay:
J14 = ON 1	when selected the relay is active (**position ON**), in the absence of alarms (**Alarm Led = OFF**)
J14 = ON 2	when selected the relay is active (**position ON**), in the absence of alarms (**Alarm Led = OFF**) and with open remote **STOP** control signal
J14 = ON 3	when selected the relay is active (**position ON**), in the absence of alarms (**Alarm Led = OFF**), with open remote **STOP** control signal and with **supply** of voltage to the load in course.
	The standard position is ON3.

J15	Selects the operation of the heat protection:
J15 = ON 1	when selected, the **TK** heat protection contact is excluded.
J15 = ON 2	when selected, the **TK** heat protection contact must be connected to the terminal board
	The standard position is ON1.

J16	Selects the type of input on the **IN 1** channel:
J16 = ON 1	when selected, the input is activated for control signals in **mA**.
J16 = ON 2	when selected, the input is activated for control signals in **Vdc** and **ohms** (**NTC** sensor)

J17	Selects the type of input on the **IN 2** channel:
J17 = ON 1	when selected, the input is activated for control signals in **mA**.
J17 = ON 2	when selected, the input is activated for control signals in **Vdc** and **ohms** (**NTC** sensor)

WARNING !

- **Check the position of jumpers 'Jn' during commissioning.**
  If the rgf300regulator work mode is altered (MASTER / SLAVE), refer to fig.s 19, 20, 21, 22 and 23 which give the standard work configurations of the jumpers.

- **The regulator is already set for the operations indicated on the label on the side of the casing; if modifications are required, describe and indicate the modifications made on the TECHNICAL ASSISTANCE MODULE.**

WARNING !

- **The configuration with NTC temperature sensors is not compatible with other configurations.**

It is not therefore possible to alter the position of the jumpers to pass from operation with NTC sensors to operation with active sensors or control signals in mA or Vdc, nor to change the °C work field/scale of the rgf regulator.

3.2 MASTER, version M (4-20 mA), for 1 or 2 control INPUTS

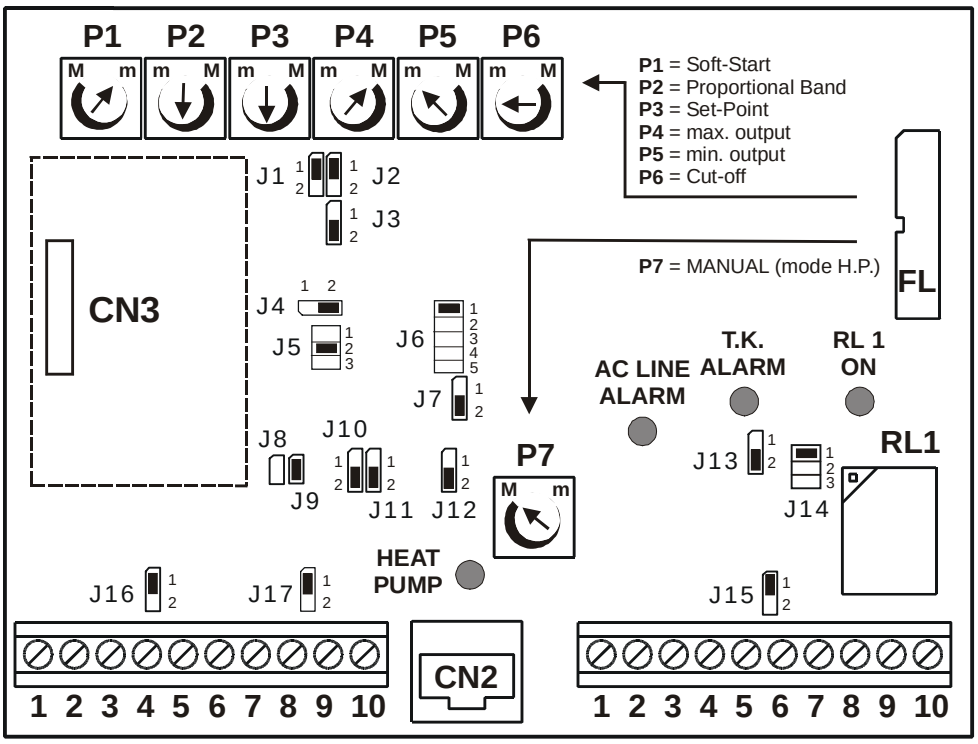


fig. 19

3.3 MASTER, version V (0-10 Vdc), for 1 or 2 control INPUTS

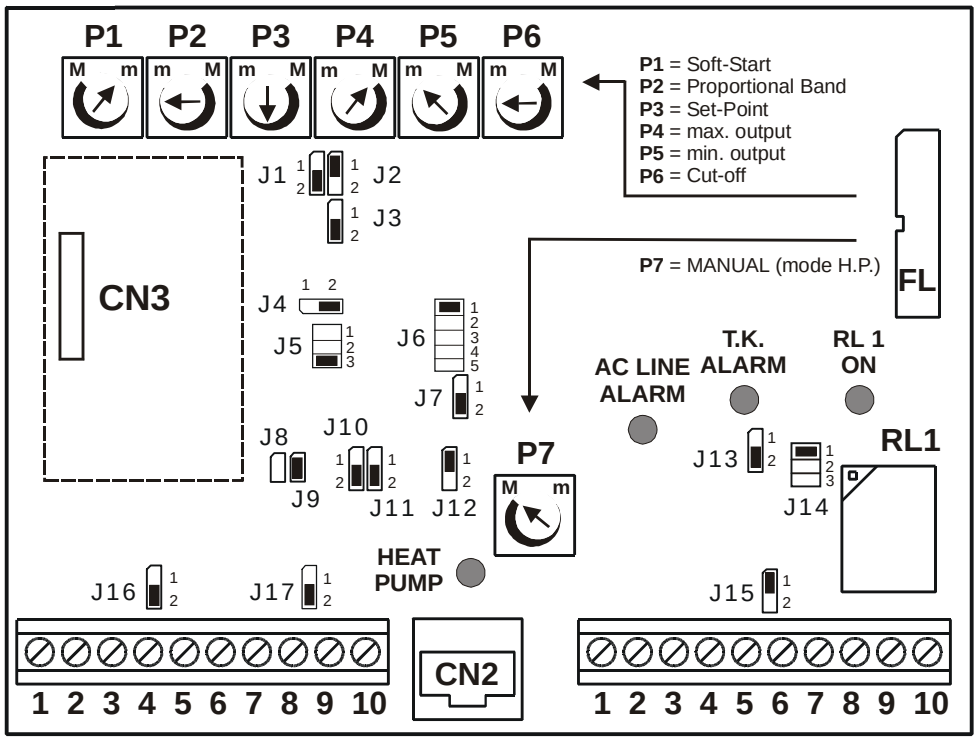


fig. 20

3.4 SLAVE, version M (0-20 mA), for 1 or 2 control INPUTS

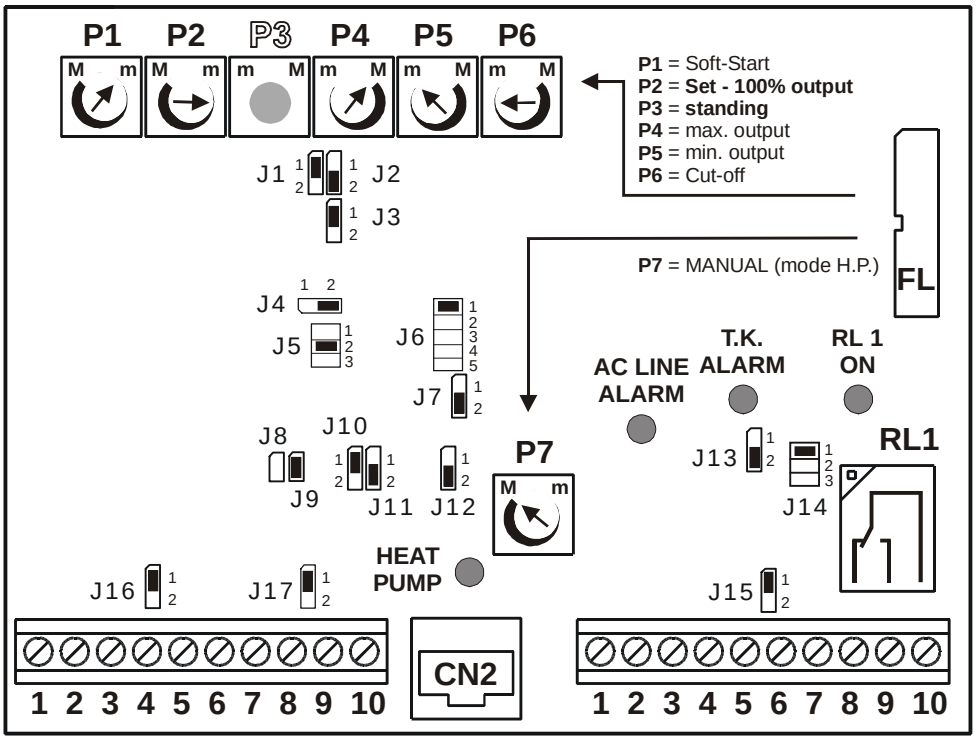


fig. 21

3.5 SLAVE, version V (0-10 Vdc), for 1 or 2 control INPUTS

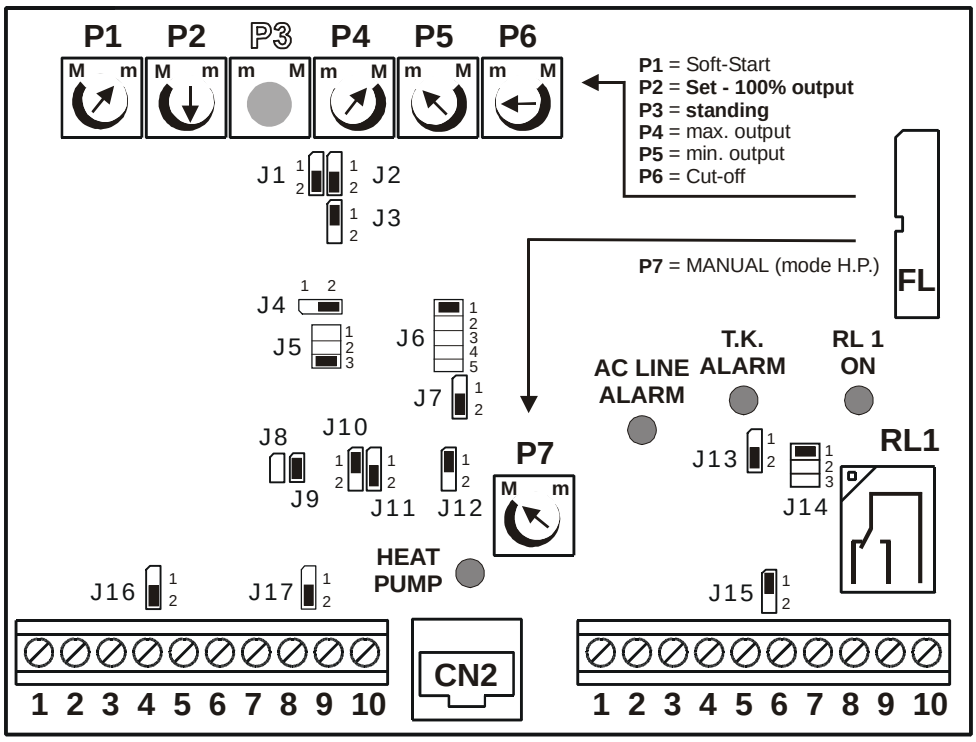


fig. 22

3.6 MASTER, version X or Y (NTC °C), for 1 or 2 control INPUTS

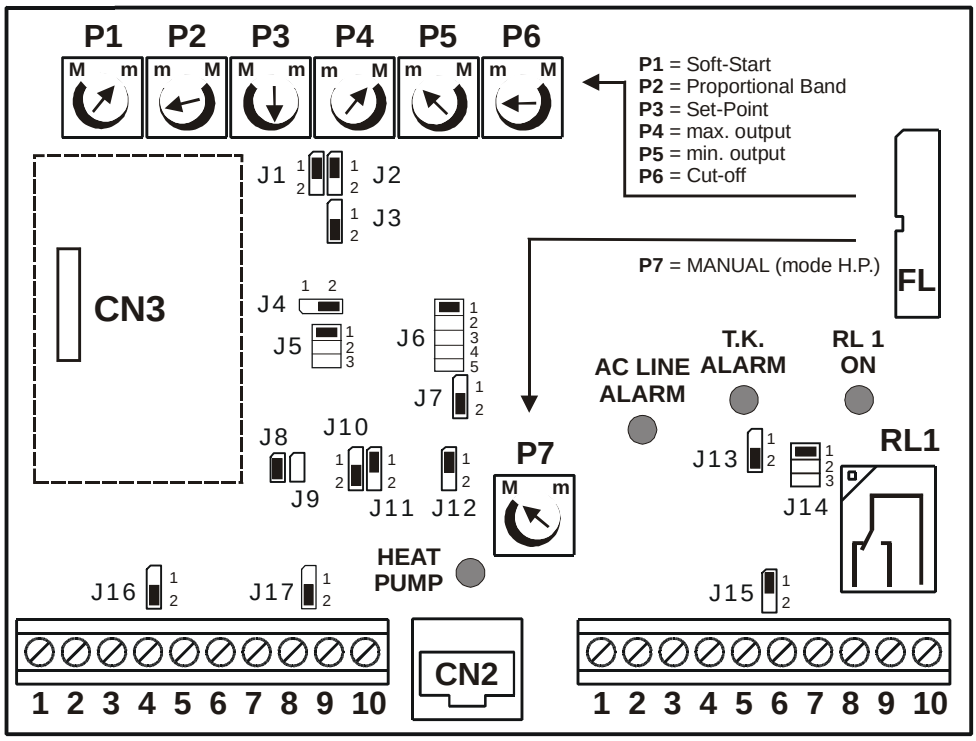


fig. 23

The **rgf300** version for temperature control inputs with **NTC** sensors is available in two **°C** scales:
MASTER X with temperature scale **+10 to +60 °C**
MASTER Y with temperature scale **-20 to +20 °C.**
The scale limit values for the Trimmer with **P3** Set-point calibration are inverted compared to the current (**mA**) and voltage (**Vdc**) scales for the active sensors.

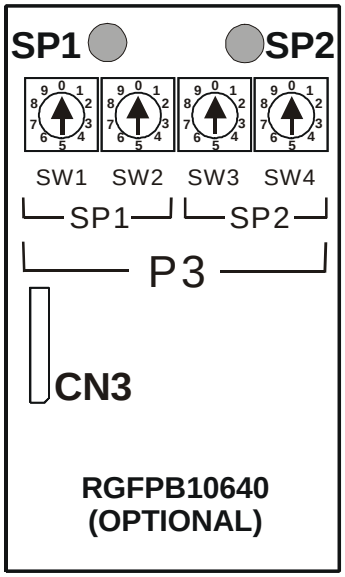
WARNING !

- **The configuration with NTC temperature sensors is not compatible with other configurations.**

It is not therefore possible to alter the position of the jumpers to pass from operation with NTC sensors to operation with active sensors or control signals in mA or Vdc, nor to change the °C work field/scale of the rgf regulator.

3.7 Optional module for dual Set-point configuration (SP1 – SP2)

The **rgf300** regulator can be used in versions **MASTER M, V, X, Y** with a **reference dual Set-point** by using the **optional** module card **RGFPB10640** for double control Set-points.
Insert the card in the **CN3** connector on the **rgf300** regulator (see the position in **fig. 25**).
When the card is positioned, with **J2=ON2**, Trimmer **P3** is disabled (**standing**) and substituted by two pairs **99** position **digital commutators**.
Activating the contact on terminal board **MB 1/ 3**, it is possible to change the regulator's work point. The commutation is shown by the lighting up of the **SP1** and **SP2 Leds** on the card above the centesimal commutator for setting of the Set-points.
Fig. 26 shows the **RGFPB10640** card and the reference table for inputs in:
mA (**bar/°C** for pressure transducers) and **°C** (for **NTC** sensors) in the different work ranges.



SP	SPK 0-30 bar TC	△	Check mA/Vdc IN GND 1 2 3
00	00.00	4	04 = 0.4
06	01.87	4	05 = 0.5
13	03.75	4	06 = 0.6
19	05.63	4	07 = 0.7
25	07.50	4	08 = 0.8
31	09.37	4	09 = 0.9
37	11.25	4	10 = 1.0
44	13.12	4	11 = 1.1

SP	SPK 0-30 bar TC	△	Check mA/Vdc IN GND 1 2 3
50	15.00	4	12 = 1.2
57	16.87	4	13 = 1.3
63	18.75	4	14 = 1.4
69	20.62	4	15 = 1.5
76	22.50	4	16 = 1.6
81	24.37	4	17 = 1.7
87	26.25	4	18 = 1.8
93	28.12	4	19 = 1.9
99	30.00	4	20 = 2.0

SP	TC °C	△	Check kohm IN GND 1 2 3
00	0	7	27.28
07	5	6	22.05
13	10	6	17.96
20	15	6	14.68
27	20	5	12.09
35	25	5	10.00
42	30	5	8.31

SP	TC °C	△	Check kohm IN GND 1 2 3
50	35	5	6.94
58	40	5	5.82
66	45	5	4.91
73	50	5	4.16
80	55	6	3.53
87	60	6	3.02
93	65	7	2.58
99	70	8	2.22

fig. 24

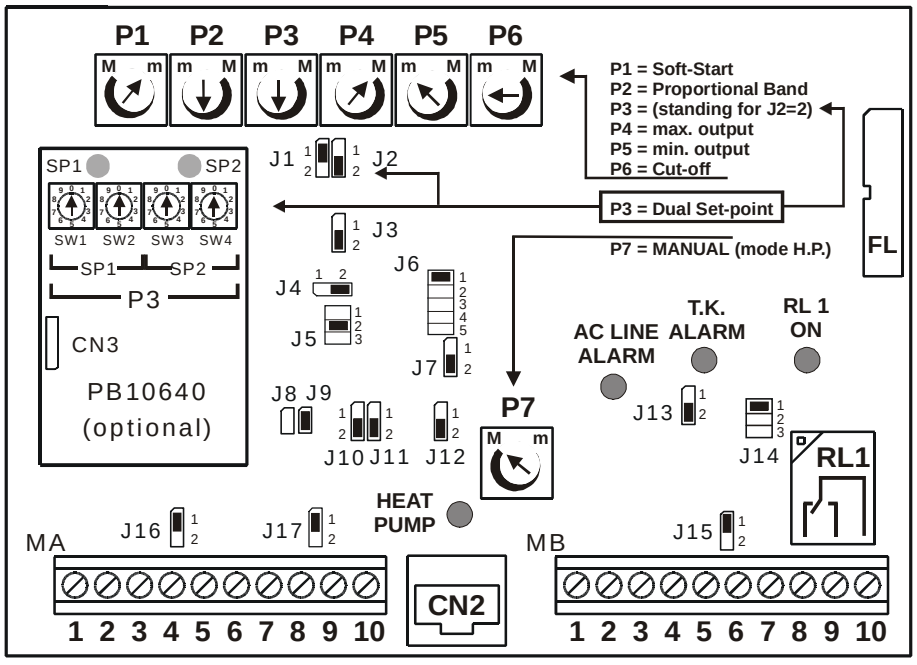


fig. 25

4.0 CONTROL TRIMMER

WARNING : Before starting the regulator calibration phase, check the position of the trimmers as shown in figs. 26 and 27.
The position of the trimmers marked with a spot of red paint (factory calibrated trimmers) must not be altered.

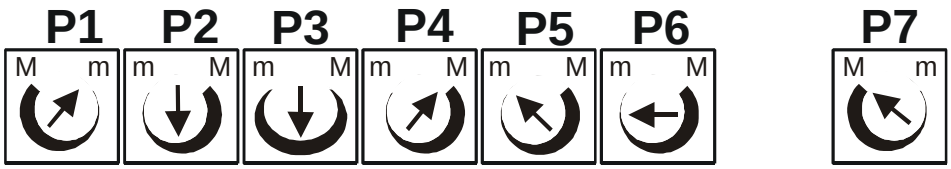


fig. 26 **STARTING configuration for 'MASTER' regulator calibration trimmers**

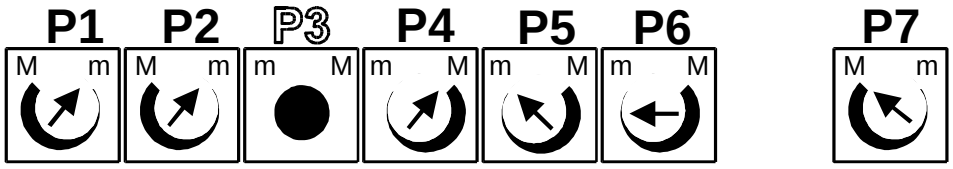


fig. 27 **STARTING configuration for 'SLAVE' regulator calibration trimmers**

The work parameters regulation can be divided into **TWO PHASES:**

1. **definition of regulator work limits**: the values of **P4** and **P5/P6** are defined in this phase.
2. **definition of regulator work field**: the values of **P2** and **P3** are defined in this phase.

With **SLAVE** type regulators, the regulator calibration is completed during **PHASE 1**.
With **MASTER** type regulators, **PHASE 1** is necessarily followed by **PHASE 2** which defines the **Work Range** and **Set-point**.

N.B.: it is possible to read the work parameters by connecting the **HELP1** portable display unit; press the keys as shown in **fig. 28** to display the readout of the value set with the calibration trimmers.

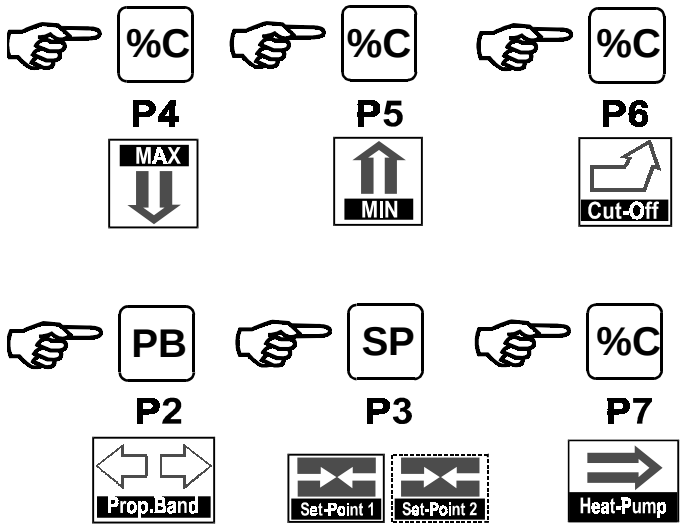


fig. 28

4.1 MAX. OUTPUT regulation (P4 trimmer) - PHASE 1

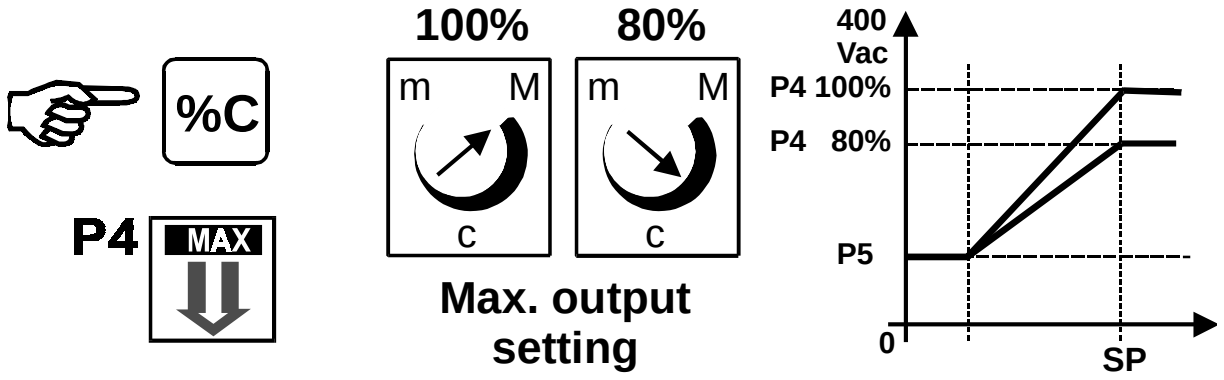


fig. 29

P4
MAX.OUTPUT
M = 100%
m = 0%

Limits the maximum operating voltage (from 100% to 0%).
It is useful for limiting the maximum capacity or noise of the fan when turning at max. speed.
It is set in the factory to the max. value '**M'** which corresponds to the max. voltage supplied to the fan and equal to 100% of the control value.

To regulate the **MAX. OUTPUT** voltage correctly, proceed as follows:

1) bring the **P5** trimmer (manual control of minimum voltage) to position '**M';**
2) turn the **P4** trimmer starting from position '**M**' as far as the desired MAX. voltage value;
3) bring the **P5** trimmer to minimum value '**m'**: the output voltage to the load will have the **P4** value as **MAX**.

4.2 MIN. OUTPUT regulation (P5 trimmer) - PHASE 1

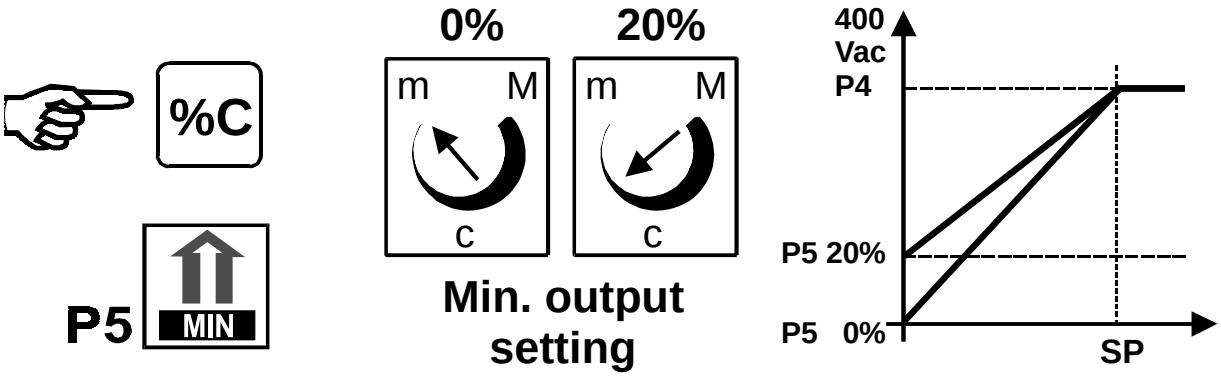


fig. 30

P5
MIN.OUTPUT
m = 0%
M = 100%

Allows manual regulation of the minimum output voltage from 0 to 100%.
During the calibration starting phase, it is used to check the regulator for correct cutting regulators and the fans for correct rotation.
It is also used as reference for **CUT-OFF** calibration (**P6**) and calibration of the max. output voltage (**P4**).

Regulation of trimmer **P5** supplies the fan with a constant minimum voltage when the automatic control is not working or the control input is disconnected.
Rotate **P5** anticlockwise starting from position '**m**' until the desired minimum voltage is reached.

4.3 CUT-OFF regulation (P6 trimmer) - PHASE 1

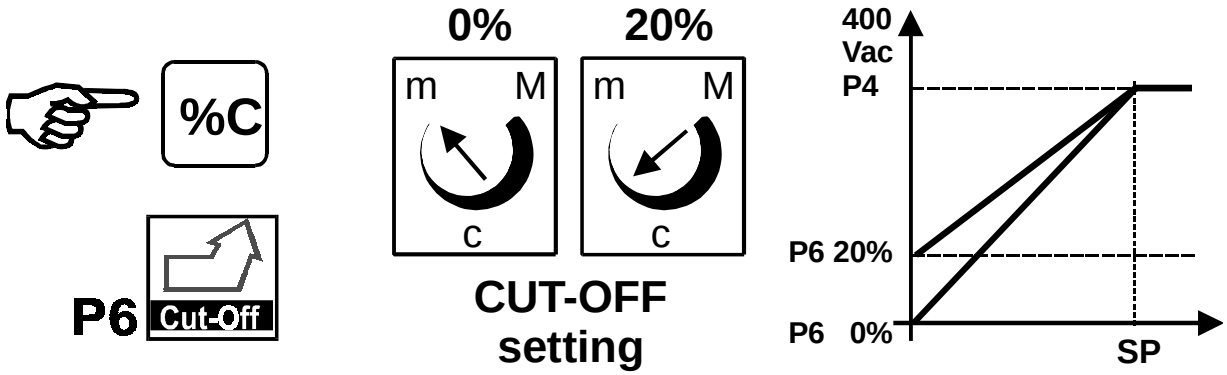


fig. 31

P6
CUT-OFF
m = 0%
M = 90%

Adjusts the minimum voltage being supplied to the fan during automatic operation:
the fan will not be supplied with voltage lower than the predetermined value; this avoids the supply of minimum voltage which would not be sufficient to provide a starting torque for the fan rotation.

In order to adjust the **'CUT-OFF'** correctly, proceed as follows:

1) turn the **P5** trimmer (manual speed control) starting from position '**m**' until the desired minimum rotation voltage is obtained;

2) turn the **P6** trimmer starting from position '**m**' until the **P6** value overlaps the **P5** value;
fix the **P6** trimmer position exactly and check the state of the **RL1 ON** Led which must move from the 'off' position to the 'on' position (only if **J14 = ON3**);

3) bring the **P5** trimmer to minimum value '**m'**: the load will now be supplied starting from the minimum voltage selected.

4.4 PROPORTIONAL BAND regulation (P2 trimmer) - PHASE 2

P2 **PROPORTIONAL BAND** **- mA** **- Vdc** **- °C**

Trimmer **P2** takes on different roles depending on the model of **rgf300** chosen:
- on '**Master**' operation models (**M,V,X,Y**), **P2** adjusts the proportional band.
- on **'Slave'** operation models (**M** and **V**), trimmer **P2** is set at the factory to give maximum voltage to the load corresponding to the maximum control signal sent to the regulator.

4.4.1 Versions with MASTER regulator operation

In **MASTER** regulator versions the range determines the value in **mA / V / °C** of the input signal that, once set, passes the fan from the maximum voltage (**MAX.OUT P4**) to the minimum set (**MIN. OUT P5** or **P6**).
The **P2** work field is different for different versions.

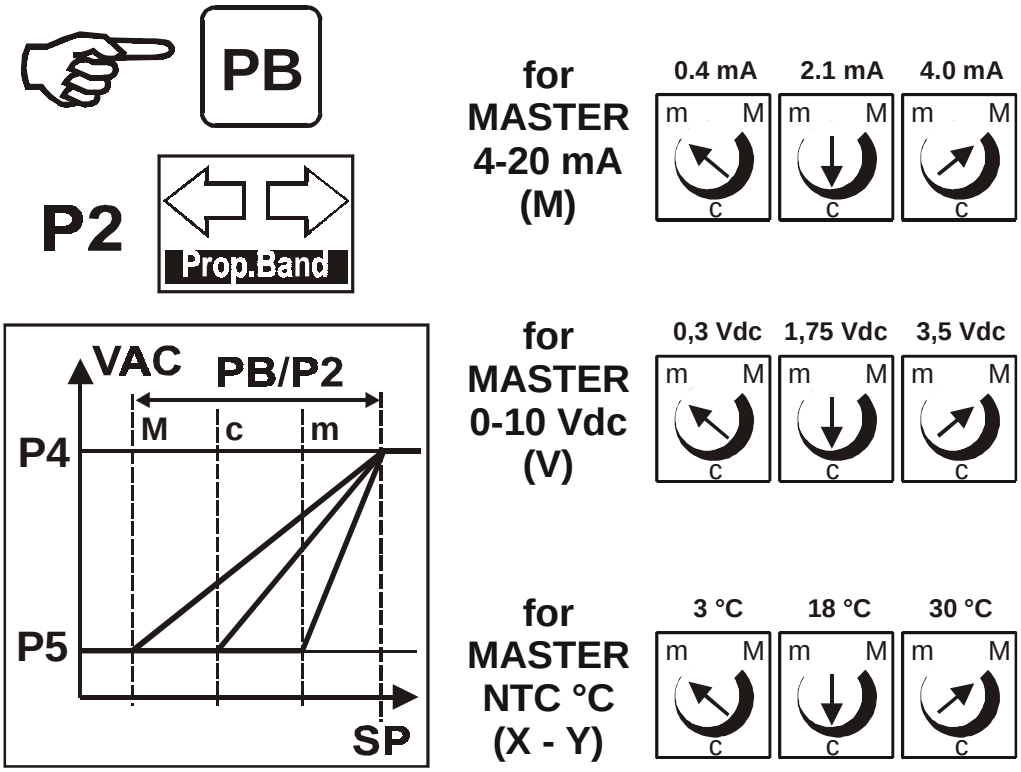


fig. 32

Version M for 4/20 mA active sensors:

ranges from:
- **0.4 mA** (trimmer in position '**m**')
- **2.1 mA** (trimmer in position '**c**')
- **4.0 mA** (trimmer in position '**M**').

The current signal is tied to the scale amplitude of the transducer used.
In the case of pressure control (which occurs most frequently), the value of the **mA/Bar** ratio changes depending on the pressure transmitter scale.

Version V for 0/10 Vdc active sensors:

ranges from:
- **0.30 Vdc** (trimmer in position '**m**')
- **1.75 Vdc** (trimmer in position '**c**')
- **3.50 Vdc** (trimmer in position '**M**').

For **Vdc / set physical quantity** correspondence, refer to the characteristics of the sensor used.

Versions X and Y for NTC sensors (°C) :

ranges from:
- **3.0 °C** (trimmer in position '**m**')
- **18.0 °C** (trimmer in position '**c**')
- **30.0 °C** (trimmer in position '**M**').

4.4.2 Versions with SLAVE regulator operation

In this case, the **rgf300** is subjected to a control signal (automatic or manual) generated by a remote controller.
Trimmer **P2** only determines the maximum voltage supplied to the fan corresponding to the maximum control signal received by the regulator from the remote controller:
20 mA for the **SLAVE M** version, and
10 Vdc for the **SLAVE V** version.
Starting with the trimmer in position '**m**' and remote control at maximum (**20 mA** or **10 Vdc**), check the value of the voltage supplied to the load.
It is at maximum (100%) when the trimmer is roughly in the position shown in **fig. 33** with the control signal in mA and Vdc.
In this configuration, the **DIRECT** or **REVERSE** mode is determined by the external controller.
N.B.: **in the SLAVE configuration the P2 trimmer is already calibrated and varnished to hold its position in the factory and must NOT be altered.**

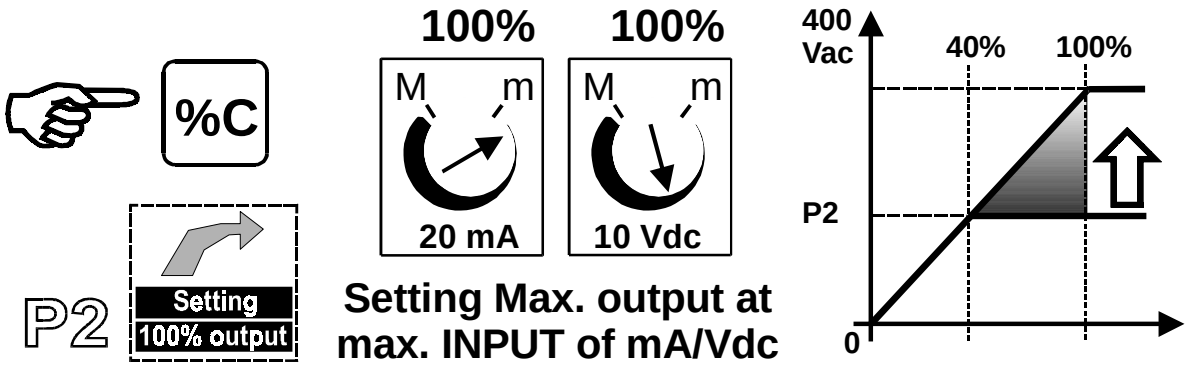


fig. 33

4.5 SET-POINT regulation (models M, V, X, Y) P3 trimmer - PHASE 2

P3

SET POINT

- mA
- Vdc
- °C

It is possible to activate the **SET-POINT** (the automatic regulation start point) by activating the **P3** trimmer.

In the standard configuration, the Set-Point coincides with the maximum value of supply (100% or value of P4 max. output).

The regulation scales are as follows in '**Master**' versions:

- model **M** : from **0 mA** **to** **20 mA**
- model **V** : from **0 Vdc** **to** **10 Vdc**
- model **X** : from **10 °C** **to** **60 °C**
- model **Y** : from **-20 °C** **to** **20 °C**

The direction of regulation goes from '**m**' (low values) to '**M**' (high values).
In **SLAVE** versions **(M** and **V)**, this trimmer **is not operative (STANDING)** even if present.
Note:
- for **M** versions, the regulation refers to the current control signal (**mA**)
- for **V** versions, the regulation refers to the voltage control signal (**Vdc**).
- for **X** and **Y** versions, the trimmer regulation refers directly to the temperature in **°C**.

It is therefore necessary to change the "**range**" of the sensor being used to work out the corresponding measured quantity / control signal.

Fig. 34 shows the values and positions of the trimmers for the different '**MASTER**' configurations.

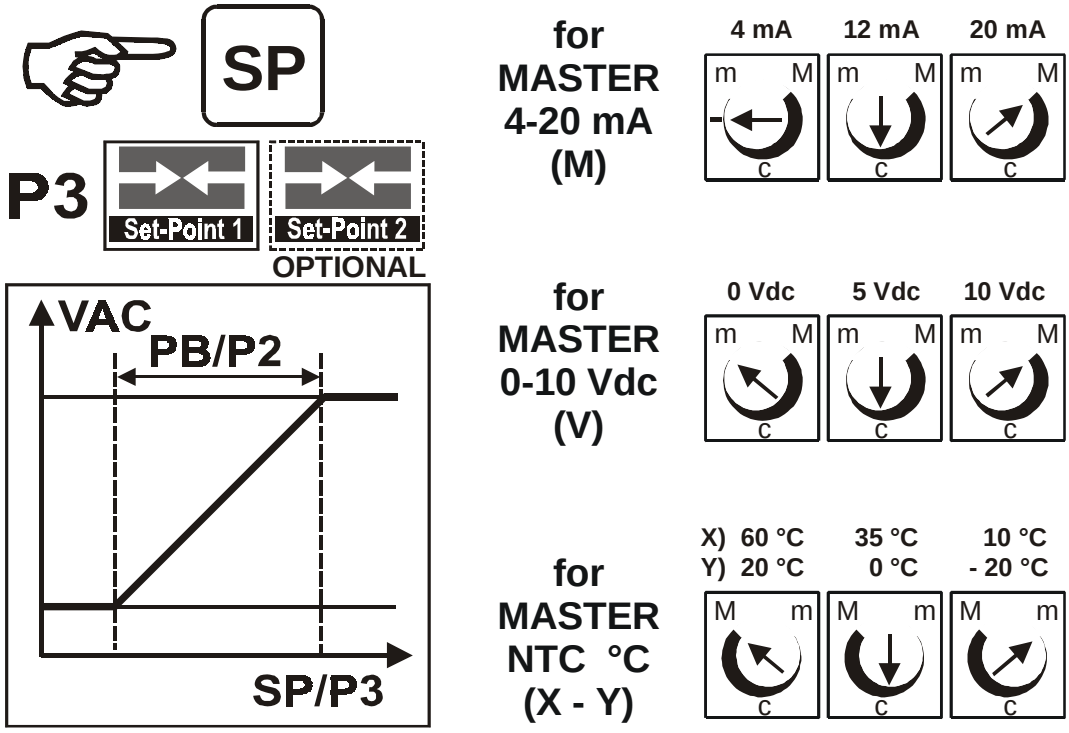


fig. 34

During the calibration procedure, it is advisable to start from position 'c' so as to be positioned halfway through the work field and the connected transducer or sensor scale.

4.5.1 Centesimal SET-POINT option (mod. M, V, X, Y) P3 - FHASE 2

In the MASTER configuration, the **RGF300** can be chosen with the **RGFPB1064 OPTION**.
This plug support the **SIMPLY Set-point** (**P3**), with double digital commutators for **DUAL** Set-Point (**S3** switch) in **99** setting positions.
So it's possible to set two (**2**) working Set-point (ex.: Night / Day – Winter / Summer, etc.) with **S3** switch (led **SP1 / SP2** switch-on)

P3
CENTESIMAL & DUAL SET POINT

- mA (Vdc)
- °C

It is possible to activate the **SET-POINT** (the automatic regulation start point) by activating the **P3** centesimal switch (100 positions).

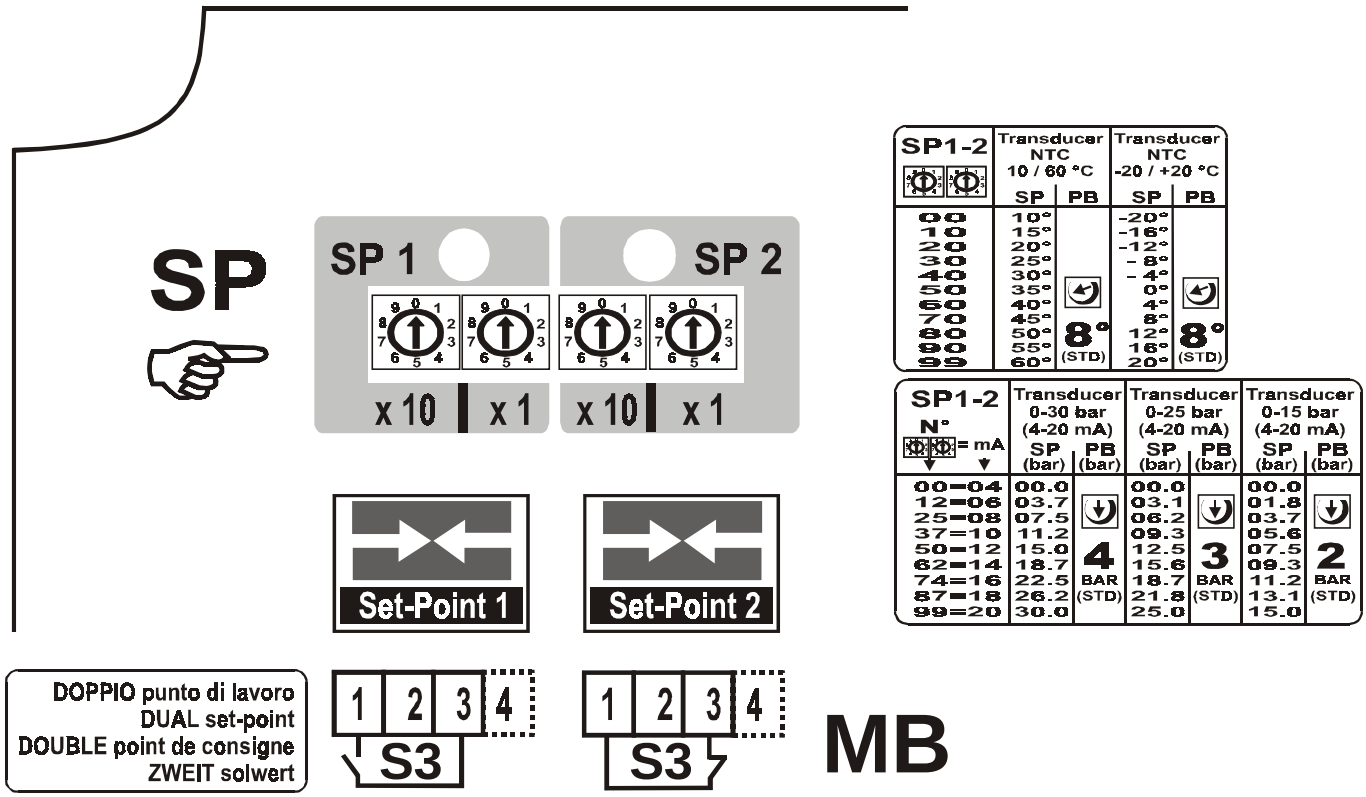
In the standard configuration, the Set-Point coincides with the maximum value of supply (100% or value of P4 max. output).

The regulation scales are as follows in '**Master**' versions:

- model **M** : from **4 mA** **to** **20 mA**
- model **V** : from **0 Vdc** **to** **10 Vdc**
- model **X** : from **10 °C** **to** **60 °C**
- model **Y** : from **-20 °C** **to** **20 °C**

The direction of regulation goes from '**00**' (low values) to '**99**' (high values).
In **SLAVE** versions **(M** and **V)**, this trimmer **is not operative** (STANDING) , even if present.
Note:
- for **M** versions, the regulation refers to the current control signal (**mA**)
- for **V** versions, the regulation refers to the voltage control signal (**Vdc**).
- for **X** and **Y** versions, the trimmer regulation refers directly to the temperature in **ºC**.

It is therefore necessary to change the "**range**" of the sensor being used to work out the corresponding measured quantity / control signal.



SP1-2	Transducer NTC 10 / 60 °C		Transducer NTC -20 / +20 °C	
	SP	PB	SP	PB
00	10°		-20°	
10	15°		-16°	
20	20°		-12°	
30	25°		- 8°	
40	30°		- 4°	
50	35°		0°	
60	40°		4°	
70	45°		8°	
80	50°	8°	12°	8°
90	55°	(STD)	16°	(STD)
99	60°		20°	

SP1-2 N° = mA	Transducer 0-30 bar (4-20 mA)		Transducer 0-25 bar (4-20 mA)		Transducer 0-15 bar (4-20 mA)	
	SP (bar)	PB (bar)	SP (bar)	PB (bar)	SP (bar)	PB (bar)
00=04	00.0		00.0		00.0	
12=06	03.7		03.1		01.8	
25=08	07.5		06.2		03.7	
37=10	11.2		09.3		05.6	
50=12	15.0	4	12.5	3	07.5	2
62=14	18.7	BAR	15.6	BAR	09.3	BAR
74=16	22.5	(STD)	18.7	(STD)	11.2	(STD)
87=18	26.2		21.8		13.1	
99=20	30.0		25.0		15.0	

fig. 36

4.6 SOFT-START regulation (P1 trimmer)

P1 **Soft-Start** **m = 2”** **M = 10”**

Adjusts the rapidity with which the fan speed varies ('**slow start**' and '**slow stop**'); in practice it makes the system 'slow' or 'fast' depending on the change in the automatic control signal.
In the '**M**' position (trimmer completely turned clockwise), the variation speed is slowed to the maximum (system slow to vary).
In the '**m**' position (minimum), speed variation is almost instantaneous ('fast' system).
The cutting regulators is provided with a minimum **Soft-Start** time equal to circa **2** seconds (**P1=m**) to avoid possible hunting that might be caused by an excessively slow system.

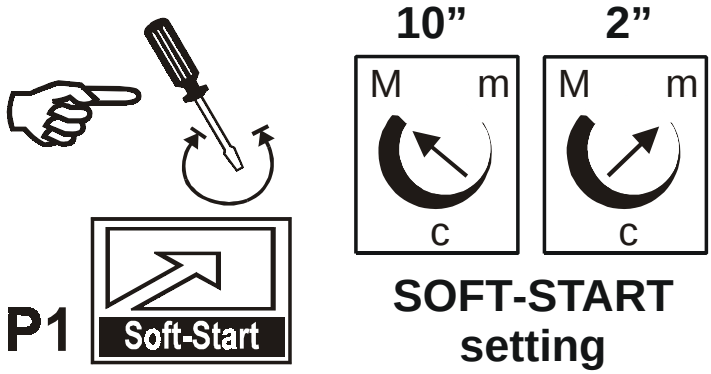


fig. 37

4.7 MANUAL regulation (P7 trimmer)

P7 **MANUAL** **m = 0% (o P6)** **M = 100%**

Adjusts the operating speed in **MANUAL** mode:
it allows a constant output voltage value to be set from between 100% and the **CUT-OFF** (**P6**), value using trimmer **P7**.
Once **S1** is closed with a ‘ **0 V** ’ potential contact, turn **P7** anticlockwise starting from position **M** until the desired voltage value is reached.
The standard preset position for **P7** is ‘**M**’.

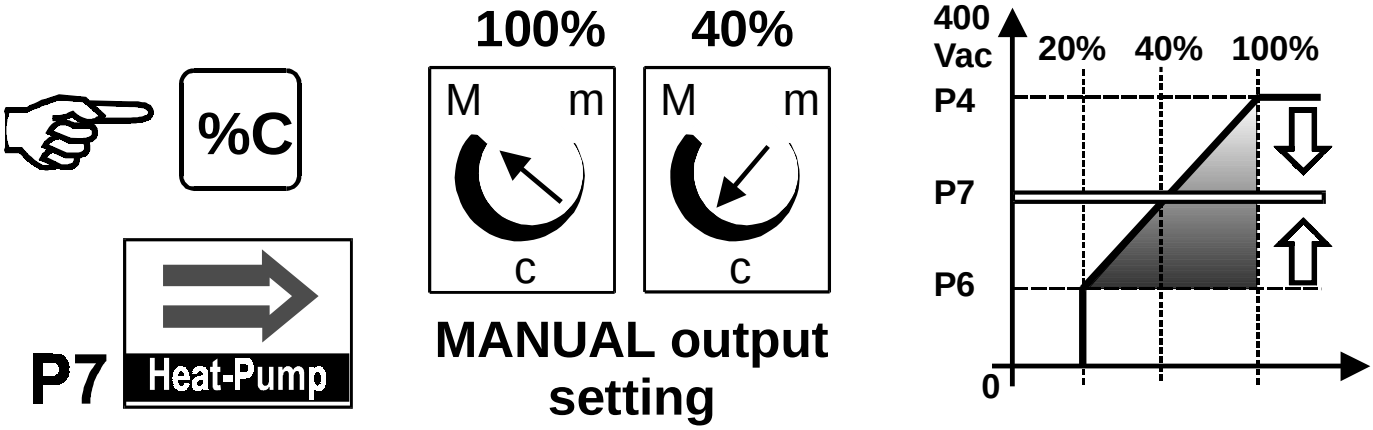
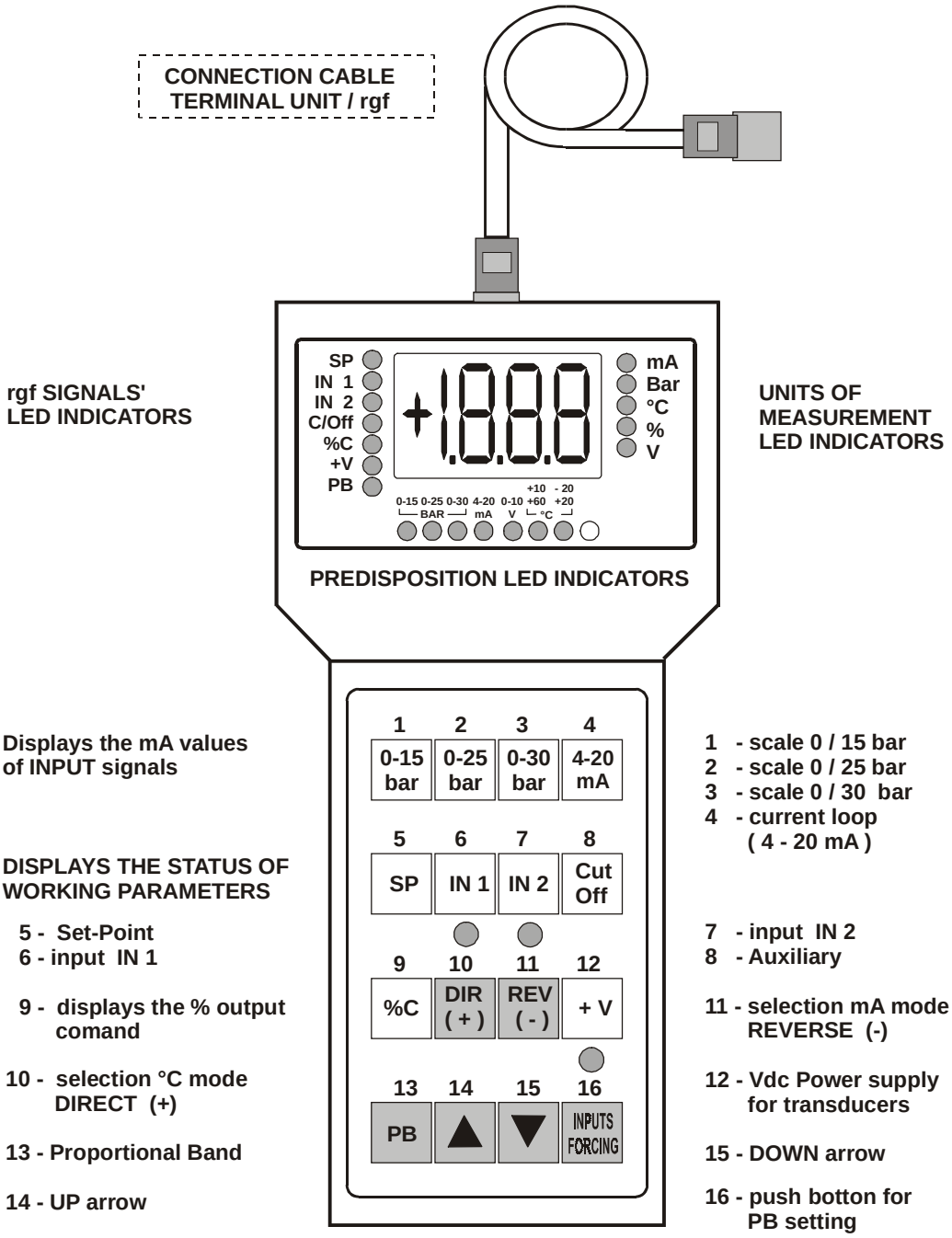


fig. 38

WARNING !
The position of trimmers marked with a spot of red paint (factory calibration) must not be altered

5.0 HELPI 10: PORTABLE DISPLAY UNIT

All calibration operations described can easily be carried out with the portable module called **HELPI10** for display of work parameters.
All three phase regulators in the **rgf300** series are fitted with the **CN2** connector located between the **MA** and **MB** terminal boards. After connecting the **HELPI10** module, the settings made with the regulator work parameter trimmers can be chosen and displayed, even if the **rgf300** is being supplied on the workbench.
The portable **HELPI10** unit is shown in **fig. 39** with function keys described.



(*) 10/11/13/14/15/16 - push bottons for Proportional Band setting (PB)

fig. 39

SUMMARY TABLES FOR USE OF THE HELPI10 DISPLAY MODULE.

Technical characteristics

Supply voltage	22 V (18....36 V)	From the connected appliance	
Input Layouts	4 - 4 mA	Can be changed via the keyboard to:	**0 - 15 bar**
			0 - 25 bar
			0 - 30 bar
	0 - 10V		
	NTC +10...+60°C		
	NTC -20...+20°C		
Signals measured	Main Set-point	Units of measurement	**mA , V , bar , °C**
	Transducer input 1	"	**mA , V , bar , °C**
	Transducer input 2	"	**mA , V , bar , °C**
	% output control signal	"	**% (0.....100)**
	Transducer supply voltage	"	**V**
	Proportional band	"	**mA , V , bar , °C**
Dimensions	**225 x 105 x 40 mm.**		
Weight	**0.5 kg**		

Screen

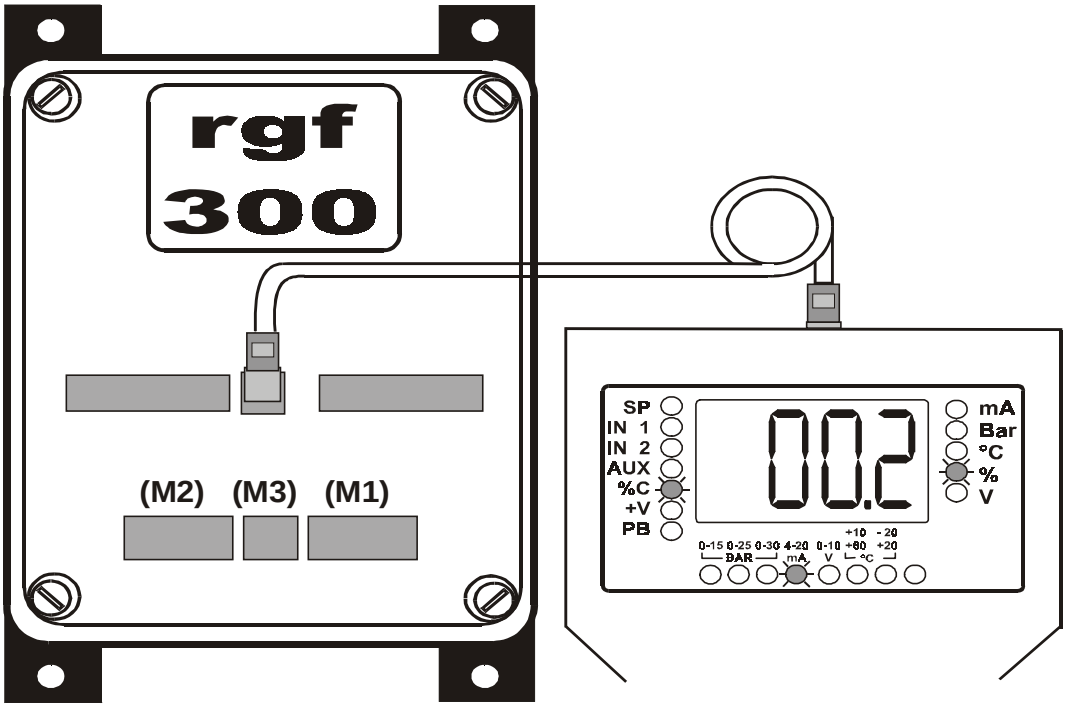
NUMERIC DISPLAY	LCD 3 ½ digit	
LED unit Selected input	position	left of the display
	no.	7
	colour	green
	function	indicates which signal is being displayed at any moment
Led unit Regulator set-up	position	below the display
	no.	8
	colour	red
	function	indicate the set-up on the connected regulator, including units of measurement and scale limits, for the following signals: **SP , IN1, IN2**. Also indicates if the scale factor has been modifed from mA to bar
Led unit Units of measurement	position	right of the display
	no.	5
	colour	green
	function	indicate the units of measurement of the value on the display

Led

Caption	Function
DIR (+)	Direct operation selected for calibration of the proportional band
REV(-)	Inverse operation selected for calibration of the proportional band
Inputs Forcing	Forced transducer inputs for calibration of the proportional band

COMMISIONING PROCEDURE :

Function keys > Regulation (Trimmer) > Displays



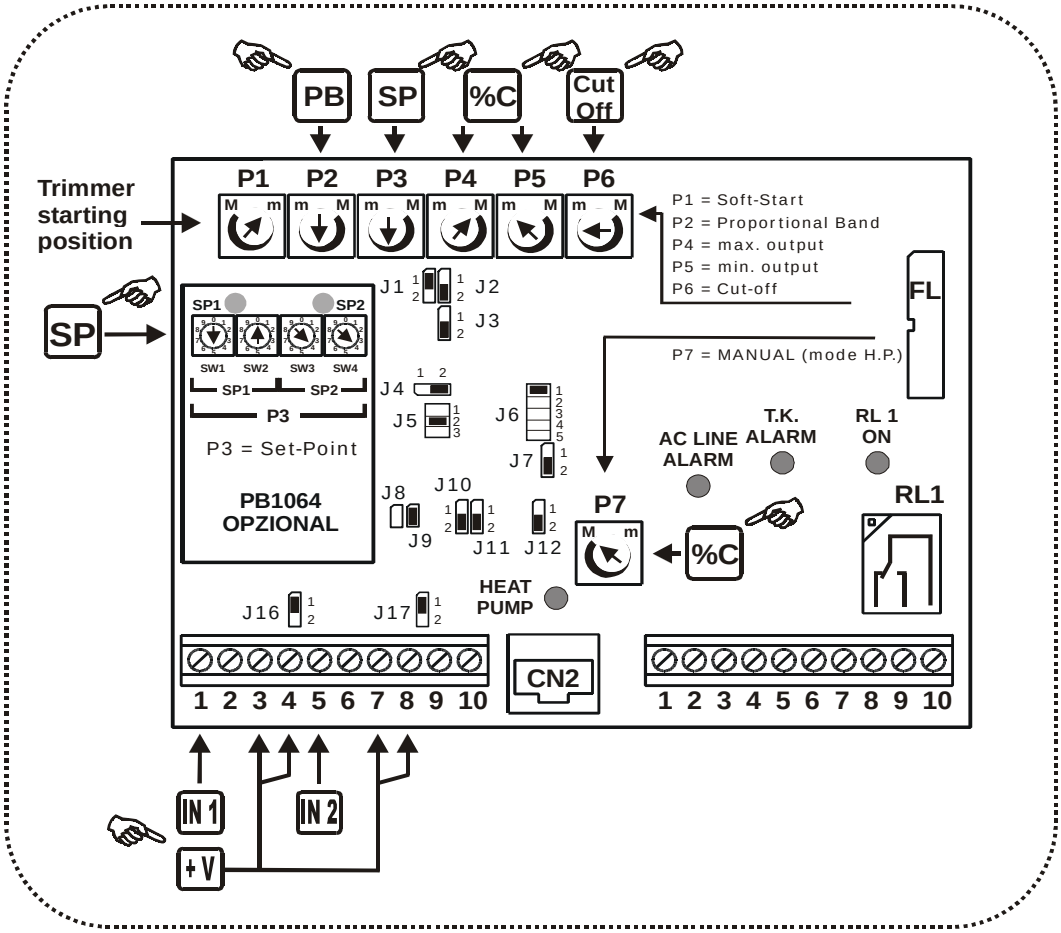


fig. 40

How to use the HELPI10 display module

•	Connect the **HELPI10** unit to the regulator to calibrate using the supplied cable; this can be done with the regulator powered up and operating **but without transducers or sensors connected**	
•	Check the **Leds** corresponding to the input set-up of the regulator are lit up correctly.	
•	If desired, for **4-20 mA** inputs, choose the scale in **bar** corresponding to the pressure transducer used. There are three choices: Transducers with range **0 - 15 bar** — press key **1** : 0 - 15 bar Transducers with range **0 - 25 bar** — press key **2** : 0 - 25 bar Transducers with range **0 - 30 bar** — press key **3** : 0 - 30 bar	
•	**Set-point**	Press key **5** "**SP**": the **"SP"** Led of the selected input and the Led of the unit of measurement (**mA, bar, °C, V**) corresponding to the regulator input set-up will light up. The current value of the **Set-point** will be displayed. To alter it, adjust the **P3** adjustment trimmer.
•	**Input 1**	Press key **6** "**IN 1**": the **"In 1"** Led of transducer input 1 and the Led of the unit of measurement (**mA, bar, °C, V**) corresponding to the regulator input set-up will light up. The current value of the **N 1** transducer input will be displayed.
•	**Input 2**	Press key **7** "**IN 2**": the **"In 2"** Led of transducer input 2 and the Led of the unit of measurement (**mA, bar, °C, V**) corresponding to the regulator input set-up will light up. The current value of the **N 2** transducer input will be displayed.
•	**Cut-Off**	**(N.B : Only for regulators with PB1018/4 control card)** Press key **8** "**Cut-Off**": the **"%C"** Led of the selected input and the Led of the unit of measurement"%"will light up**.** To check the regulator for correct cutting and the fans for correct rotation, adjust the corresponding trimmer P6, and see the current value on the display
•	**Cutting percentage**	Press key **9** "**%C**" : the **"%C"** Led of the selected input and the Led of the unit of measurement"%"will light up. The current value of the cutting percentage of voltage supplied by the regulator will be displayed (**P4, P5, P7** trimmer set-up).
•	**Transducer power supply**	Press key **12** "**+V** " : the **"+V"** Led of the selected input and the Led of the unit of measurement "**V** " will light up. The value of the supply voltage for transducers connected to the service will be displayed at circa **+22 V** rated (refer to the user manual of the connected regulator for details of the connection to the terminal board) .
•	**Proportional Band** (*) calibration	Press key **13** "**PB**": the **"PB"** Led of the selected input and the Led of the unit of measurement (**mA, bar, °C, V**) corresponding to the regulator input set-up will be displayed. The last value of the Proportional Band (**PB**) set will be displayed, differing for each type of input signal (**mA, Vdc, bar, °C**); modifiable using arrow keys **14** and **15** (see the limits shown on **fig. 32**). To **increase** : press key **14** "**UP**" (up arrow) . … **decrease** : press key **15** "**DOWN**" (down arrow). **(*) without connecting the sensors to inputs IN1 and IN2 :** • Press key **13** • Set the desired PB value, using keys **14** & **15** • Choose the operating mode of the regulator by pressing either **DIR** or **REV** . • Press key **16** " **Inputs Forcing**": the corresponding yellow Led will light up. • Adjust the regulation trimmer of the **P2** band to read the **"50.0 (%)".** • Press key **16** again: the yellow Led will go out and the regulator will now work with **PB** legible from key **13.**
N.B. : the value of **PB** in **mA, bar, Vdc, °C** read on the **HELPI** unit is always the last one set and different for the type of incoming signal (**mA, Vdc, bar, °C**)		

For more information, consult the user manual for **HELPI 10 display module**.

6.0 rgf 300 EASY REFERENCE COMMISSIONING GUIDE

Having connected the supply and load to the regulator, the control system commissioning operation must be divided into two phases in order to separate the **definition** of the regulator **work voltage limits** (**P4-P5-P6**) from the **surround control values (P3-P2** with mA - Vdc - °C) in automatic regulation:

QUESTION	ANSWER	HOW TO PROCEED
Should the fan reach **100**% speed in automatic regulation? (**P4**)	• **NO** • **YES**	• With **P5** in position **M**, turn **P4** clockwise slowly starting from '**M**' until the desired max. voltage is reached. • Turn **P4** to position '**M**'
Should the fan constantly rotate at a fixed speed regardless of the automatic regulation signal? (**P5**)	• **YES** • **NO**	• Starting from '**m**', turn **P5** slowly anticlockwise until reaching the desired voltage • Turn **P5** to position '**m**'
The fan starts rotating at **100 VAC**. How can you find this **CUT-OFF** (rotation start) value? (**P6**)	Starting from '**m',** slowly turn **P5** anticlockwise until reaching the voltage value that turns the fan slowly (e.g.: **100VAC**)	Having found the correct value with **P5**, starting from '**m**', turn **P6** slowly anticlockwise until the supply **STOP** threshold (**Led RL1=OFF** with **J14=3**) so as to overlay it on the **P5** value.

Once the **P4, P5** and **P6** values have been defined and therefore become fixed reference parameters, define the work field values (**P2** Proportional Band) and work point value (**P3** Set-point) in the:

"MASTER" CONFIGURATION with control in mA / Vdc / °C

P3, point where the system reaches maximum supply to the load, starting from **MIN.OUT** or **CUT-OFF**

P2, point where the system reaches the **MIN.OUT** control value for the fans

How can you determine the proportional band? **(P2)**	**Use the P2 trimmer.** First, check the trimmer's work parameters (**fig. 32**).	Starting from position '**m**', turn **P2** anticlockwise until the position considered as the optimum regulation is reached.
How can you determine the Set-Point? **(P3)**	**Use the P3 trimmer.** First, check the scale zone in which to operate (**fig. 34**).	Starting from position '**c**', turn **P3** clockwise or anticlockwise until the position considered as the optimum regulation is reached.

Once **P2** and **P3** have been positioned, check the modulation system and slowly correct by using:

P3 (+/-) if the Set-point is not working at the required pressure or temperature, and with
P2 (+/-) if the fan voltage variation is too fast or too slow.

"SLAVE" CONFIGURATION with control in mA / Vdc

With this configuration, once the **P4, P5** and **P6** reference parameters have been defined, the regulator carries out speed changes on the basis of the control values which are transmitted by the external controller, **without** needing further calibration.

In the case where you wish to change from **MASTER** to **SLAVE** configuration and therefore reprogram the type of regulator control, you should check the layout of the configuration jumpers shown and adjust the value of **P2** which determines **100%** of the fan control.

QUESTION	ANSWER	HOW TO PROCEED
What should you do to change from the **MASTER** to **SLAVE** configuration? only from **MASTER M** and **V** to: - **SLAVE M** for 0-20mA - **SLAVE V** for 0-10 Vdc	First, check the jumper layout (**fig. 19 > 21 (for M) & fig. 20 > 22 for V**). Then calibrate the scale limit value (100% of the supply to the fan) when the control value is at **10Vdc** or **20mA**	Generate the maximum control value (**20mA** or **10Vdc**) and, starting from position '**m**', turn **P2** clockwise until 400 VAC can be read on the output terminals.

- **Note : for versions X and Y, with NTC sensor, no changes can be made in regard to:**
  - configuration (from NTC to mA or Vdc control)
  - temperature scale (from version X to version Y and viceversa).

In this case too, all calibration operations described can be easily carried out using the **HELPI** portable work parameter display module that allows the operator to see and set values with the calibration trimmers even if the rgf300 is being supplied on the workbench

7.0 TROUBLE SHOOTING

Some of the problems which may occur during or after unit commissioning are listed below with their possible solutions.

Problem	Cause	Solution
Unit supplied but load does not activate.	**C1**. Absence of one or two phases (**Led AC LINE** on). **C2**. The load is not connected. **C3**. No control signal. **C4**. Incorrect operating mode (**direct, reverse**) and **Set - points** not adequate for signal control. **C5**. Maximum voltage supplied to lower load at minimum starting voltage. **C6**. Remote **STOP** (**ON-OFF**) (**MB 4, 5** contacts closed).	**S1**. Check supply connections and input phases. **S2**. Check there are no electrical interruptions between regulator and load. **S3**. Check sensors for correct operation (return voltage) and connections to terminal board **MA**. **S4**. Check **P3** trimmer calibration and positions of jumpers **J8/J9**, **J2/J3, J10/J11/J12.** **S5**. Check **P4** trimmer calibration. **S6**. Check **STOPS 4, 5** control contact on **MB** terminal board.
Tension can be read on outlet terminal heads to load (circa **370 VAC**) but motor does not start.	**C1**. Load not connected to regulator terminals.	**S1**. Check electromagnetic switch or motor / regulator connection sectioner. **S2**. Check the motor heat protection.
Cutting regulators supplies voltage to the load but load does not activate.	**C1**. Minimum voltage supplied to load is lower than needed for starting.	**S1**. Check **P6** trimmer calibration.
Protection fuses burn out.	**C1**. Regulator undersized for load used. **C2**. Interference on supply lines. **C3**. **By-pass** configuration with short circuited phases.	**S1**. Check powers involved as well as starting and operating currents. **S2**. Check the supply line and if necessary install mains or 'surge' filters upstream of the cutting regulators. **S3**. Check input and output phase correspondence.
After correctly operating for a certain time, cutting regulators supplies the maximum voltage load regardless of control signal.	**C1**. Lack of ventilation and/or high working temperature in the unit. **C2**. Detection transducer faulty or short-circuited.	**S1**. Check the unit is mounted vertically; check the room temperature where the unit is installed. **S2**. Check input control voltage (**MA** terminal board).
Unit regulates load in **ON - OFF** operation.	**C1**. Proportional band too "narrow" with respect to system response. **C2**. **CUT-OFF** too high (**80%**).	**S1**. Increase the proportional band value with trimmer **P2**. **S2**. Decrease value of **P6.**
Unit has suspended regulation and Led **TK ALARM** is on.	**C1**. External safety device has intervened (contact **MB 6,7**).	**S1**. Check unit reset type (see position of jumper **J13**). **S2** .Check activation of the safety device and the cause of the intervention.
Unit has suspended regulation and Led **AC LINE ALARM** is on.	**C1**. A fuse has burnt out or one of supply phases is absent.	**S1**. Replace supply line fuse and check beginning of line upstream.
Output voltage constant even with control signal activated and **MANUAL (Heat-Pump mode)** Led is on.	**C1**. The **MAN** contact (heat-pump) is closed.	**S1**. Select correct operating mode (**NO** contact) by activating contacts **2,3** of terminal board **MB**.

Table 7

8.0 LIABILITY AND RESIDUAL RISKS

Eliwell & Controlli s.r.l. shall not be liable for any damages deriving from:
- installation/use other than that prescribed and, in particular, that which does not comply with safety standards anticipated by regulations and/or those given herein;
- use on boards which do not guarantee adequate protection against electric shock, water or dust under the conditions of assembly applied;
- use on boards which allow access to dangerous parts without the use of tools;
- tampering with and/or alteration of the products;
- installation/use on boards not complying with the standards and provisions of current legislation.

9.0 DISCLAIMER

This manual and its contents remain the sole property of Eliwell & Controlli s.r.l., and shall not be reproduced or distributed without authorization. Although great care has been exercised in the preparation of this document, Eliwell & Controlli s.r.l., its employees or its vendors, cannot accept any liability whatsoever connected with its use. Eliwell & Controlli s.r.l. reserves the right to make any changes or improvements without prior notice.

TECHNICAL ASSISTANCE SHEET

1. All **rgf** equipment is guaranteed for **36** months from the date of testing.
2. The guarantee is rendered invalid under these circumstance:

- evidence of tampering with the mechanics or electrics
- improper use
- incorrect installation
- external electrical causes

Please keep this sheet near the 'rgf' regulator. To improve the assistance service and speed fault diagnosis, please fill this sheet in and send it to the Assistance centre together with the regulator in the event of a breakdown.

Customer:	**Regulator model:**	
Serial no.:	**Date of installation:**	**Date of breakdown:**

Description of the fault

☐ Noisy motor	☐ Burnt out motor	**Burnt fuse**
☐ Unbalanced phases	☐ Protection interrupt	☐ phase **R** ☐ phase **S** ☐ phase **T**
☐ Blocked motor	☐ Differential interrupt	

☐ **Description:**

Controls and contacts check card

☐ Soft-Start	P1	☐ Max. Out. Lim.	P4	☐ Manual contact	S1
☐ Prop.Band	P2	☐ Min. Out. Lim.	P5	☐ Stop contact	S2
☐ Set-point	P3	☐ Cut-off	P6	☐ SP1/SP2 contact	S3
		☐ Manual (HP)	P7	☐ Heat contact	TK
☐ INPUT 4/20 mA				☐ Transd. fd. 24 Vdc / 40 mA	
☐ INPUT 0/10 Vdc		☐ Output 1		☐ Potent. fd. 10 Vdc / 5 mA	
☐ INPUT NTC		☐ Output 2		☐ RL1 ☐ B 10/9 ☐ B 10/8	

Details of the connected load

Manufacturer:	Type ☐ fans ☐ electric resistors
Electrical data ☐ VAC ☐ Amp ☐ Start amp. ☐ Code	

	Motor		**Electrical data**		
Electrical data	☐ star	☐ delta	Phase R S	V	Amp
Traction	☐ direct	☐ belt driven	Phase S T	V	Amp
Mechanics	☐ helical	☐ centrifugal	phase T R	V	Amp

Operator name:	Company stamp:

Rgf300 INSTALLATION FEATURES

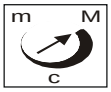
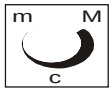
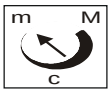
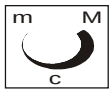
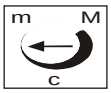
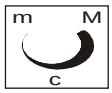
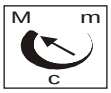
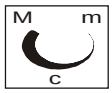
rgf FEATURES	
Serial N°	
Model	

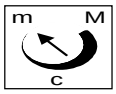
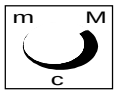
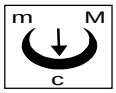
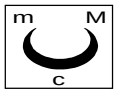
FAN FEATURES			
N°	Model	Load (Amp)	Power Supply

PROBE FEATURES

TYPE	N°	MODEL	RANGE	CONNECTION
Pressure Transducer				
NTC probe				
Transducer . . .				

WORKING PARAMETERS

TRIMMER		% OUTPUT	VAC OUTPUT	VAC SUPPLY	FACTORY SETTING	OPERATOR
P4	MAX. OUT					
P5	MIN. OUT					
P6	CUT-OFF					
P7	MANUAL					

TRIMMER		bar	°C	mA	Vdc	FACTORY SETTING	OPERATOR
P2	PROP. BAND						
P3	SET-POINT 1						
P3	SET-POINT 1					SP1 N° :	
	SET-POINT 2					SP2 N° :	

AUXILIARI ON-OFF CONTACTS	S1		S2		S3		RL1	
	☐YES	☐NO	☐YES	☐NO	☐YES	☐NO	☐N.C.	☐N.O.

Date :	Operator Name :	Company :

Eliwell & Controlli s.r.l.
via dell'Industria, 15 Zona Industriale Paludi
32010 Pieve d'Alpago (BL) ITALY
Telephone +39 0437 986111
Facsimile +39 0437 989066
Internet http:/www.eliwell.it

RGF 300
rel. 11/03 eng
cod. 8MA10033