

Dynamic-CONTROL-Technology

PID 5 **td** Derivative time action
i Integral time action
P Proportional action

AIR-Energy Software

RGM 3~

Lighting LEDs

PwS Auxiliary supply O.K.	01 REVERSE mode=ON	Phase loss
CPU All O.K. if blinking	02 Set-Point 2 = ON	TK fan protection
FAIL Alarm ON - RL1 > NC	03 Night RPM-dB limit=ON	C Pw card over 50°C
TX DATA transmission	04 Remote STOP=OFF	C Contr card over 80°C
	05 DATA reception	Contr Over Alarm current
		Contr Over Amp Peak
		Input Under range
		Input Over range

Alarm code > Err

Available Regulations for PID or Proportional MODES

NTC INPUT			4-20mA INPUT			0-5Vdc INPUT		
Mode	code	scale	Mode	code	scale	Mode	code	scale
MASTER	rIE 01	-20 / 90°C	MASTER	rPr420	4-20mA	MASTER	rUu 05	0-5Vdc
	rIE 02	10 / 90°C	rPr015	0-15bar		rPu030	0-30bar	
			rPr025	0-25bar		rPu045	0-45bar	
			rPr030	0-30bar				
			rPr045	0-45bar				

NTC 10kohm@25°C

Factory default selection			0-10Vdc INPUT		
Mode	code	scale	Mode	code	scale
SLAVE	rS 420	4-20mA	MASTER	rUu010	0-10Vdc
			SLAVE	rS 010	0-10Vdc

3 Phase FANs Speed Control

Global
3 YEAR
Warranty

Specialized Vac Stepless Controllers

for

**Ventilated Heat Exchangers
 Dry Coolers & Air Cooled Condensers**

S.EL.PRO.®
 sistemi elettronici professionali

FAN speed Control Solutions

Description of symbols used in the present manual



! Attention !



Information



Compliance with: CE mark –Electromagnetic Emissions – Low Voltage Directives



**PRODUCT End of Life – WEEE directive EU 2002/96/EC
(Waste Electrical and Electronic Equipment Directive)**



! WARNING !



Safety warnings

- Follow the instructions in this manual exactly and observe all safety measures in force. Always keep the present documentation close to the control device.
- The purchaser must previously ascertain the suitability of the product for the use it is intended for and assume all consequent risks and responsibility.
- This product has been designed to be used only as an operational control device. In the event delicate or great value products should be held within specific working limits, it is recommended to install a separated control device, equipped with alarm contacts.
- The commissioning, start-up and operation of the present device must be performed by qualified technicians with knowledge of the technical regulations in force, in compliance with all the safety standards and able to understand the indications of danger.
- 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 RGM300 voltage regulator or the fan connected to it may cause damage to objects or people.
- Before supplying power to the unit, make sure that the regulator is correctly connected to the power supply and to earth.
- The information provided in the present manual consent to install and control correctly the fan speed regulator **RGM300**.
- **Do NOT tamper with or disassemble the regulator 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; Earth 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 external protection cover.
- **DO NOT** touch any electrical parts of the circuit when the power supply is connected under any circumstances.
- Before supplying power to the unit, make sure that the regulator is correctly connected to the power supply and to earth;
- 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 'M3' S2 = ON/OFF.
- The S2 = ON/OFF contact on the terminal card M3 does not cut the mains supply and therefore cannot be used as a safety switch.
- Install the regulator out of direct sunlight, in order to protect the case from overheating.
- The appliance can operate at environmental temperatures up to 50°C. Do **not** install it where this temperature may exceed, otherwise the integrity of the regulator will be compromised, since the controller may make the user appliance operate at full load (100%) with all consequent effects.
- The equipment must be placed vertically, in order to encourage heat dissipation and to ensure sufficient air circulation in a free space measuring at least **150 mm** above and below the regulator. If several regulators are to be grouped together on a single electric board, please provide forced air circulation with a fan or with a sufficiently powerful cooling unit.
- 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.**

Terms of use

The **RGM 300** series devices are designed to vary the three-phase AC voltage thanks to the phase cutting principle, in order to regulate the rotational speed of three-phase asynchronous high-slip motors, to be used with axial and centrifugal fans in Air-Conditioning, Refrigeration, Ventilation and Air Treatment Systems.

Any different use of the equipment is strictly FORBIDDEN.

Manufacturer Declaration

This series is manufactured for the employment into the industrial environments and responds the following communitarian directives:

- Machine Directive **2006/42/EC** and following amendments
- Low Voltage Directive (LVD) **2006/95/EC and 93/68 EC**
- EMC Directive **2004/108/EC** and following amendments

(*) **ELECTRONIC FANS REGULATION - FULL ENVIRONMENTAL RESPECT**

Thanks to the electronic solutions used, the device responds totally to the emission limits required from the European Directives for Residential, Commercial and Light Industrial environments (EMC and PDS applications), and can therefore be installed without particular precautions (ex.: shielded cables). The equipment does NOT contain filters for the suppression of harmonic distortions.



It is not allowed to commission our equipment when installed in machines that do not comply with the legislation in force.

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1.0 Presentation

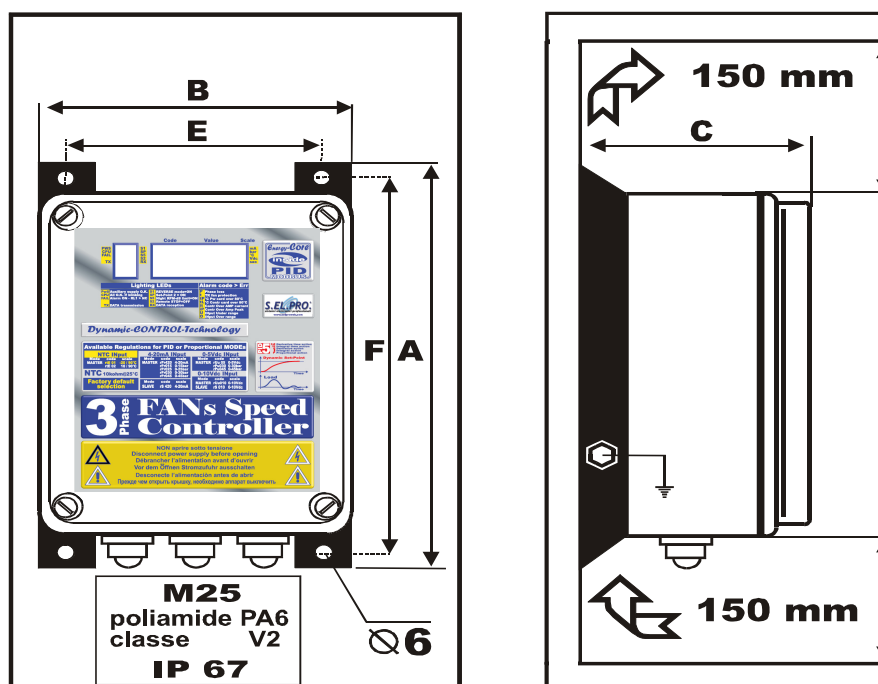
1.1 RGM300: Technical Characteristics

POWER SUPPLY	Voltage	420VAC +/- 10 % Three-phase - (on request 230VAC / 500 VAC)			
	Frequency	50 / 60 Hz automatic selection			
	Overvoltage Protection	For Installation Category II (4 KV)			
OPERATING PRINCIPLE	Electronic three-phase voltage regulators for the phase-cutting regulation (through SCR, total control on the three phases) of the active voltage applied to the load; compensation for inductive loads and motors.				
CURRENT	Rated	RGM 312	12 A up to 50°C environment; if over, decrease 0,6 A/°C		
		RGM 318	18 A up to 50°C environment; if over, decrease 0,6 A/°C		
		RGM 320	20 A up to 50°C environment; if over, decrease 1,0 A/°C		
		RGM 326	26 A up to 50°C environment; if over, decrease 1,0 A/°C		
		RGM 332	32 A up to 50°C environment; if over, decrease 1,5 A/°C		
		RGM 340	40 A up to 50°C environment; if over, decrease 2,0 A/°C		
		RGM 360	60 A up to 50°C environment; if over, decrease 2,0 A/°C		
	RGM 390	90 A up to 50°C environment; if over, decrease 2,5 A/°C			
Overload	200% of the rated current (max. 10" every 3')				
POWER	Control circuits	10VA	Control circuits		
	Thermally dissipated	RGM 312	48 W @ 12A	RGM 332	128 W @ 32A
		RGM 318	72 W @ 18A	RGM 340	160 W @ 40A
		RGM 320	80 W @ 20A	RGM 360	240 W @ 60A
	RGM 326	104 W @ 26A	RGM 390	360 W @ 90A	
OPERATING CHARACTERISTICS	MASTER CONTROLLERS rtE / rPr / rUu / rPu :	The output voltage varies in order to maintain at the Set-Point the prevailing value measured by one of the two transducers (the highest or the lowest value) connected to the inputs. This action can be: DIRECT: the output increases as the input increases, REVERSE: the output decreases as the input increases. Default: the VAC output increases as the controlled variable increases.			
	SLAVE CONTROLLERS rS	The output voltage varies according to the value of the remote control signal DIRECT: the output increases as the input increases, REVERSE: the output decreases as the input increases. Default: the VAC output increases as the controlled variable increases			
INPUT SIGNALS & CONTACTS	Analog control signals	The controller can be preset through the keypad on board. Any combination of the following operating modes is available:			
		NTC (*)	10 kohm	Config.	rtE-01 (*)
		0 - 10 Vdc	Ri = 10 kOhm	Config.	rS-010 - rUu010
		4 - 20 mA	Ri = 100 Ohm	Config.	rS-420
		4 - 20 mA	Ri = 100 Ohm	Config.	rPr420 rPr015-rPr025-rPr030-rPr045
	0 - 5 Vdc	Ri = 10 kOhm	Config.	rUu-05 - rPu030 - rPu045	
	(*) DEFAULT CONFIGURATION				
	Direct/ Reverse	S1	S1 = ON	Reverse Mode	S1 = OFF
Set-Point 1/ Set-Point 2	SP	SP = ON	Set-Point 2 (S2)	SP = OFF	Set-Point 1 (S1)
MAX Night RPM	S5	S5 = ON	Lh Night rpm% Limit active	S5 = OFF	hi MAX RPM% Limit active
Stop / Start	S2	S2 = ON	STOP regulation RGM-OFF	S2 = OFF	Regulation OK (RGM-RUN)
Thermal Protection for N° 1 fan	TK	TK = ON	Regulation OK (RGM-RUN)	TK = OFF	STOP regulation RGM-OFF
OUTPUT SIGNALS	Alarm relay RL1	Relay contact NO/NC , for alarm signal (FAIL) = Led L2 ON			
	Transducers Power Supply	Two outputs +22V -10/+20% 40mA non stabilized, protected from short-circuit			
	Transducers Power Supply	Two outputs + 5 V/10mA stabilized, protected from short-circuit			
	Potentiometer Power Supply	Two outputs +10V/5mA stabilized with protection, for manual control			
ALARM SIGNALS	n. 01 6 digit Display	It shows operating/regulation parameters & alarm codes			
	n. 11 Led	They indicate the current situation and the operating mode			
	n. 05 Led	They indicate the measurement unit used showed by the display			

PROTECTIONS	Mains monitoring	It checks the simultaneous presence of all the three mains phases; in case of lack of one phase, or insufficient power supply, the device is stopped and the situation is displayed by: Led FAIL=ON and ALARM=OFF + relay RL1=OFF
	Mains filter EMC (**)	Suitable for the installation in PDS systems (Power Drive System = Controller with connected fan/s), for Residential, Commercial and Light Industry environment (** ATTENTION! : In presence of a protection with DIFFERENTIAL system, use switches with leakage current to ground ≥ 60 mA)
	Overvoltage protection	Complying with EN 61000-4-5: Overvoltage Category II (4 KV)
CASE	Materials	GW-Plast 120°C (max. temperature 120°C) and aluminium
	Locking screws	TPN series with max. tightness 2,5 Nm. (according to CEI 23-58)
	Protection degree	IP 55
	Environmental pollution	High pollution
	Fire resistance	D Category
INSULATION	Case	Class I (use of protective earthing conductor)
	Control circuits	4000Vac between control input and mains voltage components
WORK ENVIRONMENT	Working temperature	-20 T 50 (from -20°C to $+50^{\circ}\text{C}$) for temperatures $< -10^{\circ}\text{C}$, use S2
	Storage temperature	-30 T 85 (from -30°C to $+85^{\circ}\text{C}$)
	HUMIDITY	RH < 85% non condensing
	Vibrations	Lower than 1G (9.8 m/s^2)
INSTALLATION	Wall mounting ONLY in vertical position, with N° 4 holes \varnothing 6 mm.	

1.2 Mechanical Dimensions

Model	Nominal Current RMS Ampere - kVA		DIMENSIONS (mm)						WEIGHT Kg
			A	B	C	E	F		
RGM 312	12	8,0	285	201	130	153	255	3,8	
RGM 318	18	12,0	285	201	160	173	255	4,5	
RGM 320	20	13,0	350	235	181	185	320	6,5	
RGM 326	26	17,0	350	235	204	185	320	7,5	
RGM 332	32	21,0	350	235	204	185	320	9,0	
RGM 340	40	27,0	415	315	178	273	385	11,0	
RGM 360	60	41,0	460	315	228	260	410	17,0	
RGM 390	90	61,0	590	408	290	378	530	25,0	





! WARNING !



Before installing the RGM300 regulator, you are invited to read this manual, which describes the necessary procedures for correct installation and commissioning of the controller RGM300

The digital **RGM300** series, dedicated to applications for Air-cooled Heat Exchangers, consist of:

- Configurable controller in n. 14 of available MASTER or SLAVE modes, simply by recalling from a keypad one of the already preset default configurations, with the possibility to modify the values of default parameters
- Two (2) inputs, for the connection and the management of one or two sensors through mA – Vdc – kohm (NTC probes) signals
- Two complete and independent ranges of settings, one for each SET of regulation parameters (SP1 & SP2), selectable through the “**SP**” input
- For each SET of regulation parameters (including double setting of: Set-Point – Proportional Band - Cut-Off/Minimum RMP% limit - Maximum RPM% limit - Starter, with acceleration/deceleration time of the regulation control), the following regulation contacts are also available:

- i** - **S1: REVERSE** operating mode, active by closing the contact
 - **SP:** contact for **SP2**, active by closing the contact
 - **S5: Maximum RPM% Night limit** (one limit for both Set-Point), active by closing the contact
 - **S2:** contact for remote **OFF**, active by closing the contact
 - **T.K.:** NO/NC contact for the connection of the thermal motor protection
 - **RL1:** GENERAL relay, with programmable activation modes (**C6** parameter) for ALARMS or ADIABATIC command (ON-OFF)
- And the following regulation controls too:

- **COS φ:** adjustment of the phase-shift (COS-PHI) due to the motor (**C5** parameter)
 - **NOISE-JUMP: selection of up to 3 RPM% jump-zones**, in order to avoid keeping the control values in correspondence with high acoustic disturbance (extra dB) zones, to be defined for both Set-Points (**S1** & **S2**) through the Min RPM% limit (**JL 1/2/3**) and Max RPM% limit (**Jh 1/2/3**)
 - **ALARM M&M:** setting of operating POINTS with Minimum-SET (**So**) & Maximum-SET (**Sh**), which allow to set alarm values for both MINIMUM RPM% and MAXIMUM RPM% limitation, so that the fan speed can be driven:
 - down to **ZERO%** (with control signal exceeding **So** value) – CUTOff function
 - up to **MAX RPM%** (with control signal exceeding **Sh** value) – OVERspeed function(when the values of **MIN & MAX RPM%** limits are selected, the system may not be completely stable); it is also possible to define separately the respective hysteresis values, through: **io** (for **So**) & **ih** (for **Sh**)
- **Analog output (M2: 9/10), which can be programmed (C7) and used in order to control:**

- i** - Up to ten Slave **DRIVER POWER UNITS (rS)**, with control signal **0-10Vdc** or **10-0Vdc** (with **S1=ON**)
- Up to ten external **Water-Power UR% UNITS** with **1-10Vdc** input for the management of the ADIABATIC system (with up to 4 steps/magnet valves controls, pump and drainage); all the units are controlled by the same input signal/sensor, and their operating range is defined by setting the Set-Point USP (+/-shifting from the main Set-Point for fans control) and the Proportional Band UPb
- Up to ten external units with **1-10Vdc** input, controlled by the same input signal/sensor but with Set-Point USP (+/-shifting from the main Set-Point for fans control) and Proportional Band UPb (ex. Shutters)
- Up to ten external units with **1-10Vdc** input, controlled by the same input signal/sensor but in **REVERSE** mode, with Set-Point USP (+/-shifting from the main Set-Point for fans control) and Proportional Band UPb

Once the desired regulation mode and the Set-Point value have been selected, the controller is ready to operate and control the fan speed, so as to maintain the system constantly stable within the preset operating range.

1.3 Operating modes

Phase cutting regulation, totally controlled over the three phases, in order to vary the active voltage applied to the load, no neutral connection required.

Through a keypad it is possible to program the device in one of the following modes:

- **MASTER CONTROLLER (rtE/rPr):** the VAC output varies according to the Vdc-mA-kohm input signal, and increases/decreases as the controlled parameter increases; the regulation depends on the signal with the highest (default) or the lowest (**C1** parameter) value, measured through two sensors (inputs IN1 and IN2)
- **SLAVE POWER UNIT (rS):** the VAC output varies according to the Vdc-mA signal received at the input IN1, and increases/decreases as the control signal increases.

The number of regulation signals/sensors/transducers can be increased by connecting the control unit to the Universal Input Expansion Module **RGFMEI-4**, which allows to connect up to 4 mA – Vdc – NTC sensors/signals to each controller input; it is always possible to select the signal with Highest/Lowest value as a reference point for the regulation; the controller allows the cascade connection of up to 6 RGFMEI-4 units.

Expansion Modules **MEI-4** have been designed to be connected to diverse regulation and control devices, such as inverters or PLC, which accept a **0-10Vdc** or **0-20mA control** signal.

1.4 EC Directives & Technical Standards

Like all of our products, the **RGM300** series has obtained the **CE** mark in compliance with the EMC (Electromagnetic Compatibility) directive **2004/108/EC**.

The essential requirements of the directive are satisfied by the conformity to the “**generic standards**” for industrial environments.



Directive	Standard code	Description
2006/42/EC	EN 60204-1	Safety of machinery. Electrical equipment of machines.
2006/95/EC	EN 60204-1	Safety of machinery. Electrical equipment of machines.
	EN 50178	Electronic equipment for use in power installations.
2004/108/EC	EN 61800-3	Adjustable speed electrical power drive systems. Part 3: EMC product standard including specific test methods.

All products have been tested in accordance with the procedures and test conditions laid down in the standards specified in the product technical file.

Since these products are destined to be used not only as “**stand alone**” systems, but also as components of other machines or plants, all compatibility tests to the standards have been performed under typical conditions of use.

In particular, the tests have been performed in a system consisting of a voltage controller **RGM300**, a control cable and relative commands, a supply cable, a motor cable and a group of fans with an equivalent power to the value of the nominal current of the controller.

With reference to EMC Compatibility, according to the Marking



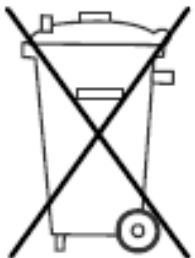
with CDM System



with PDS System



All SELPRO controllers are suitable for the installation in PDS systems (Power Drive System = Controller with connected fan/s), which guarantee the EMC compliance of the System “Controller + Fan/s”.
The final specifications of the system or plant, in compliance with the EMC directive, are in any case the responsibility of the installer, who must put the system into operation carefully, according to the rules in force and following the information provided by the present manual.



PRODUCT end of life EU 2002/96/EC

The device must be disposed of separately, according to the local authority advice.

2.0 Electrical connection

2.1 Connection of Power Supply and Load

Connect the power supply and the load as shown in the figure below, being careful to employ conductors with a cross section suitable to the connected load.

The power cables (power supply and load), must be installed separately from the control cables (analog inputs and ON-OFF input/outputs), keeping the maximum possible distance between the power and signal conductors.

Do not place power cables with signal cables in the same raceway. In case the cables cross one another, ensure it is at 90°.

! SURGE ARRESTER: electric protection placed between the regulator supply and the earth, meant to protect the device from transient overvoltage.

! WARNING: disconnect the faston contact from the PE earth reference, before making the “ELECTRIC STRENGTH TEST”.

! WARNING: In presence of a protection with DIFFERENTIAL SYSTEM, use switches with leakage current to earth ≥ 60 mA)

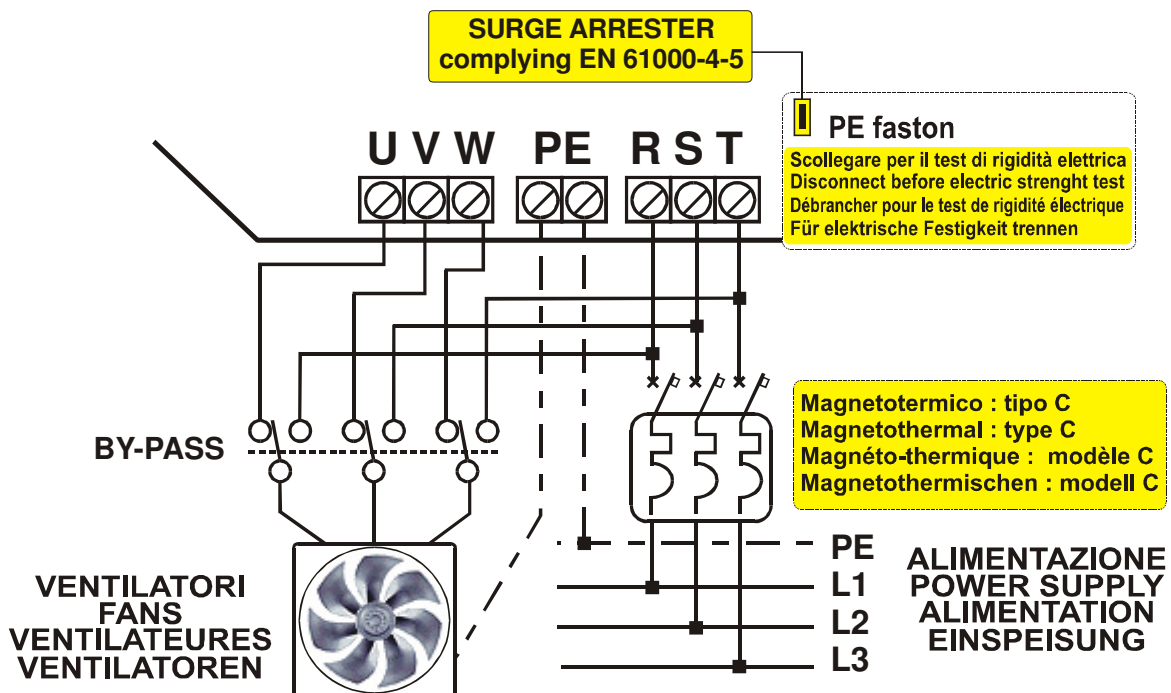
The RGM300 regulators allow the connection of three-phase loads *without requiring the connection of the neutral*.

This simplifies installation and facilitates the STAR or DELTA load configuration.

It is advisable to provide a Bypass Switch to allow the load activation, even when the cutting regulator is faulty (emergency by-pass).

When connecting the Bypass, the following precautions should be taken into consideration:

- ✓ The connection through the Bypass Switch must keep the phase correspondance unaltered so as to avoid destructive short-circuits and maintain the sense of rotation of the motor.
- ✓ Before supplying the load with maximum voltage, the supply should be disconnected from the Regulator. Therefore:
 - It is advisable to use a three-position manual switch as a commutation device
 - If automatic commutation is performed by means of contactors, make sure there is some delay (at least 2 seconds) between regulator disconnection and load activation



For connection, use silicone (FG7) or PVC insulated cables, and remember that the silicone insulation, which does not allow the cable to cool optimally, tolerates higher temperatures

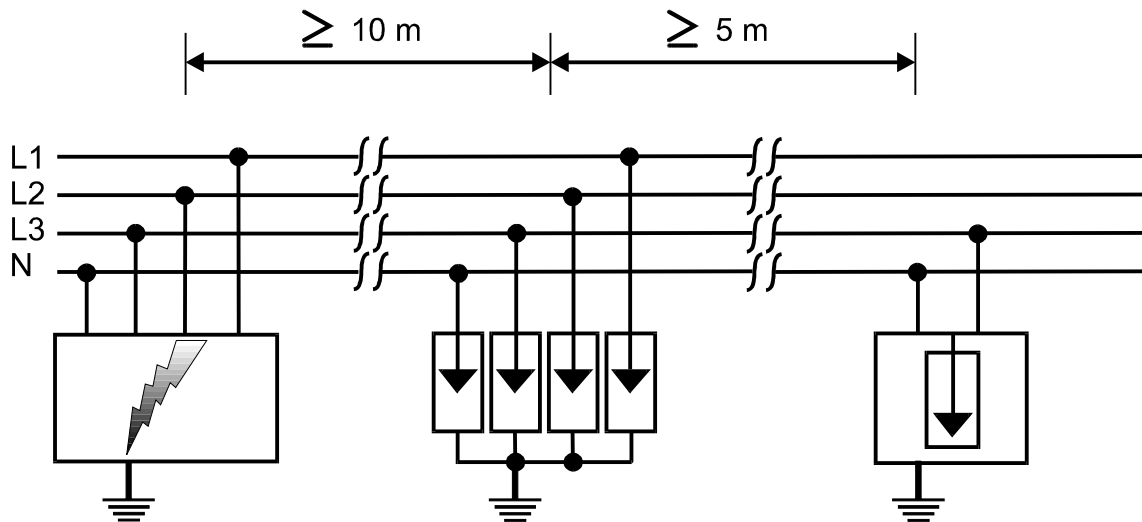
Model	Flexible cable rated section	
	Signal	Power
RGM 308/312	1.5 mm ² (13 AWG)	2.5 mm ² (13 AWG)
RGM 318/320	1.5 mm ² (13 AWG)	6.0 mm ² (9 AWG)
RGM 326	1.5 mm ² (13 AWG)	10.0 mm ² (7 AWG)
RGM 340	1.5 mm ² (13 AWG)	10.0 mm ² (7 AWG)
RGM 360	1.5 mm ² (13 AWG)	16.0 mm ² (7 AWG)
RGM 390	1.5 mm ² (13 AWG)	25.0 mm ² (7 AWG)

For the connection of an overvoltage protector to the mains network (L1, L2, L3, N), the cross section of the conductor must be of the same size as the cross section of the existing conductor.

Otherwise, in case the cable has a smaller rated section, it is necessary to provide a surge protection by means of a 100A fuse, gL type.

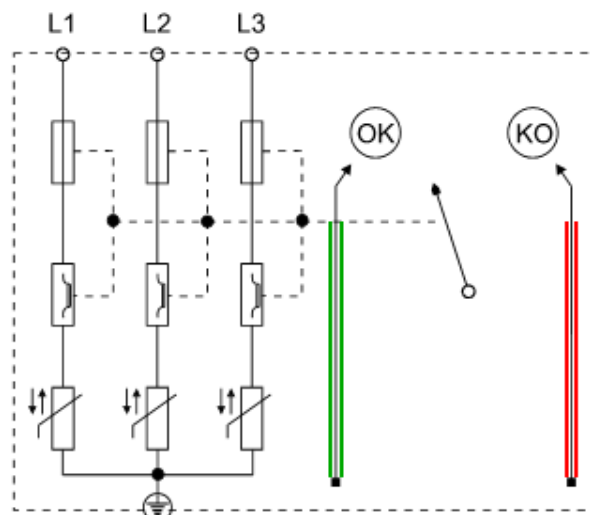
For the connection of the overvoltage protector to the ground, the rated cross section of the conductor must measure the 50% of the main equipotential bonding conductor cross section; in any case it doesn't have to be smaller than 6 mm, nor larger than 25 mm.

The connector between overvoltage protector and earth must be installed so as to be as shorter as possible..



The figure below shows the circuit diagram of a three phase surge filter, for the connection of a controller RGM300 to the supply line.

The filter has a small window, situated on the interchangeable cartridge, which shows the status of the overvoltage protector (OK = green - KO = red).



2.2 Electric motors

The regulator **RGM300** allows the connection of three-phase asynchronous motors, in applications whose motor torque-speed characteristic IS quadratic. Thus it is especially suitable with axial fans, while centrifugal fans can be connected only if purposely specialized for the phase-cutting regulation.

The correct electrical connection and the supply voltage are reported on the motor data plate; the direction of rotation of the motor can be changed by swapping two of the three supply cables.

It is important to keep the power supply cable as short as possible, so as to minimize interferences and leakage (**10 / 15 mt**); otherwise it is recommended to install an auxiliary three-phase filter on the controller's output.

The figure below shows the DELTA (High speed) & STAR (Low speed) connections respectively.

DELTA for High speed connection (100% RPM)	STAR for Low speed connection (70% RPM)
---	--



Problems may increase in the vicinity of the connection terminals, where the variations in the conductor temperatures can cause loosening of the clamping screws, thus leading the terminal to overheat due to increased electrical resistance.



The temperature of the PVC cables should not exceed 70°C, while the silicone insulated cables withstand temperatures of 90°C.



The **RGM300** regulator can control several motors connected in parallel, assuming that the absorption of their total current does not exceed the rated current indicated on the **RGM300** data plate.

The speeds of the motors vary at the same time; variances 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 motor speeds have to be different, motors with different rated speeds must be used. Bear in mind that motors with very different characteristics create heterogeneous electrical situations, which may show problems on start up and at low speeds because of different resistances of the stators which require different voltages on start up and at low speeds.

2.2.1 Magnetothermal protection

The **RGM300** 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:

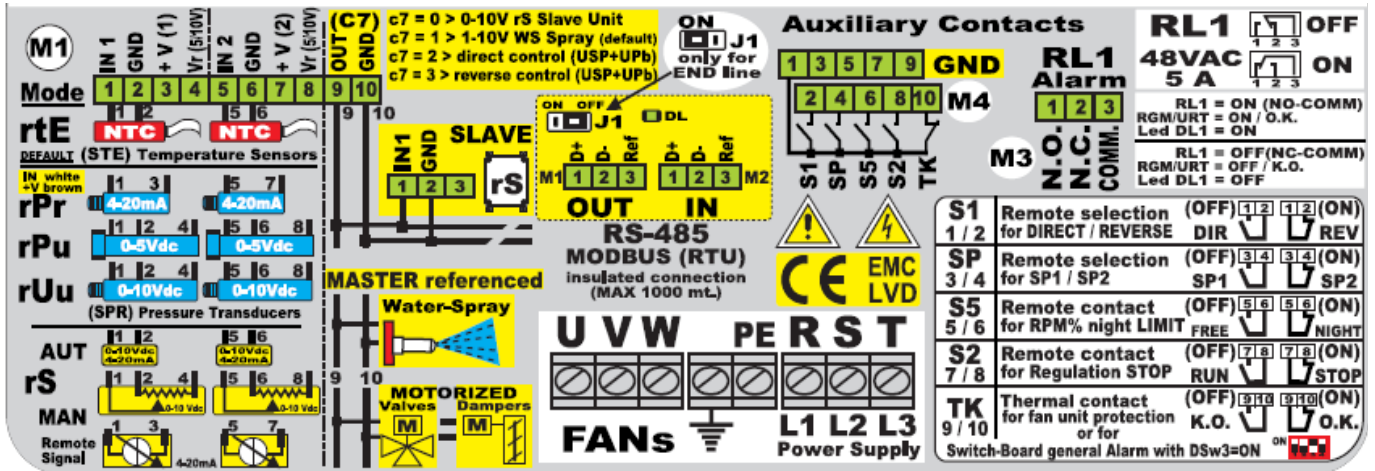
Codice	Magneto termico	Fusibili di protezione moduli SCR (*)			
		Dimensioni	V~	AMP	Catalogo
RGM 312	20 A	10 x 38	690 V	16	FR10GB69V16
RGM 318	32 A			25	FR10GB69V25
RGM 320	32 A	14 x 51		25	FR14GC69V25
RGM 328	40 A			32	FR14GC69V32
RGM 332	50 A	22 x 58		40	FR22UD69V40
RGM 340	60 A	NH Size 000		50	NH000GS69V50PV
RGM 360	80 A	NH Size 000		80	NH000GS69V80PV
RGM 390	120 A	NH Size 00		125	NH00GS69V125PV



(*) to protect SCR-Power-Semiconductor of the RGM controller, use **MERSEN** specialized fuse for electronic power applications.

2.3 CONTROL SIGNALS & AUXILIARY CONTACTS Connections

The figure below shows the label placed inside the regulator, which reproduces the electrical connections of control sensors/signals and of the available auxiliary contacts.



2.4 CONTROL SENSORS & SEGNSALS (M1)

According to the type of control sensors (in Master mode) or control signals (in Slave mode) connected to the terminal block M1 of the RGM300 device, a configuration code is determined, indicated in the paragraphs of below; to set the correct configuration code by using the keyboard.

Control signals for **MASTER** mode:

- 4-20 mA
- 0.5 – 4.5 Vdc
- 0-10 Vdc
- Kohm (NTC sensor 10 kohm@25°C)

Control scale for **MASTER** mode:

- 4-20 mA sensor
 - o 0-15bar / 0-25bar / 0-30bar / 0-45bar
- 0.5 – 4.5 Vdc sensor
 - o 0-30bar
- NTC sensor (10 kohm@25°C)
 - o -20/90°C
 - o 10/90°C

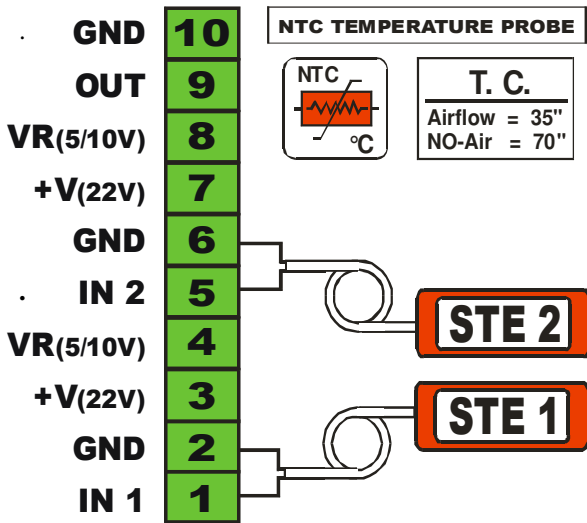
Control signals for **SLAVE** mode:

- 4-20 mA
- 0-10 Vdc

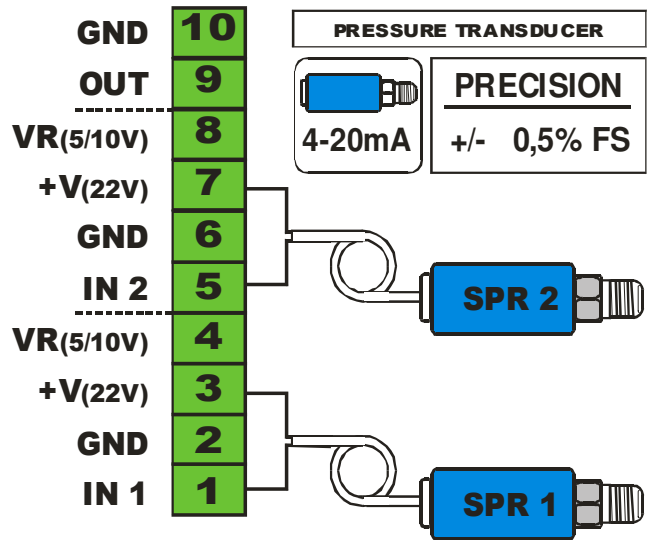
INPUTS	1 & 5	Analog Inputs	Inputs for IN 1 & IN 2 connections (selection for the higher in value)	
	2 – 6 - 10	Gnd reference	Ground connections for inputs signals & Vdc transducers	
	3 & 7	Transducers Power Supply	2 outputs 22V 10/+20% 40mA NOT stabilized, protect from short circuit towards IN1 , IN2 , GND	
	4 & 8	Power Supply for Transducers & Potentiometer	N. 2 outputs +10,0V/+5,0V (automatic commutation according to the configuration), 10mA, stabilized and protected from short-circuit towards IN1 , IN2 , GND	
Power Supply & Control OUTPUT Mode	9	Programmable Vdc Control Output (Max 20mA)	C7 = 0 0-10Vdc	Control Output, 0-10Vdc (direct)
			(*) C7 = 1 1-10Vdc	Control Output 1-10Vdc for the regulation of the WET-Power UR% unit with selectable Set-Point (USP) and Proportional Band (UPb)
			C7 = 2 0-10 Vdc	Control Output for direct remote control
			C7 = 3 10-0 Vdc	Control Output for reverse remote control

(*) Factory Default

2.4.1 Transducer/s NTC 10 kohm @ 25°C
Selection for MASTER rtE-01 & rtE-02
(range 01: -20T90 range 02: 10T90 °C)
See below the connection of two NTC probes



2.4.2 Transducer/s 4-20 mA
Selection for MASTER rPr
(range 4-20mA & 0/15, 25, 30, 45 bar)
See below the connection of two 4-20 mA transducers

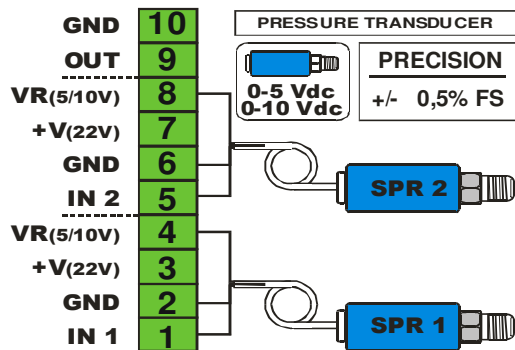


ATTENTION :

- The controller Factory configuration is : rtE-01 for NTC probe
- in standard configuration, the Set-point corresponds with the fan MAX. speed (C4=hi)
- the regulator selects automatically the signal with the higher value (C1 = hi)

2.4.3 Voltage transducers 0-5Vdc (ratiometric) - MASTER rUu (range 0-5Vdc)
Voltage transducers 0-5Vdc (ratiometric) - MASTER rPu (range 0/30 bar)
Voltage transducers 0-10Vdc – MASTER rUu (range 0-10Vdc)

See below the connection of two Vdc transducers

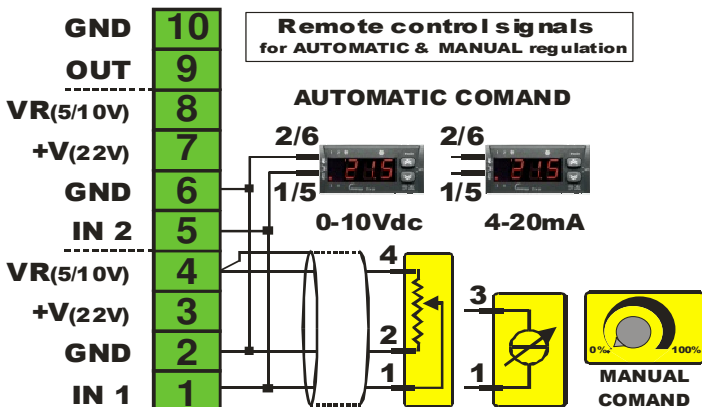


ATTENTION :

- The controller selects automatically the Vdc supply for the transducer (5Vdc or 10Vdc stabilized)
- in standard configuration, the Set-point corresponds with the fan MAX. speed (C4=hi)
- the regulator selects automatically the signal with the higher value (C1 = hi)

2.4.4 Remote 0-10 Vdc and 4-20 mA control signals

See below the connection of the 0-10 Vdc and 4-20 mA remote control signals for Automatic & Manual regulation



ATTENTION :

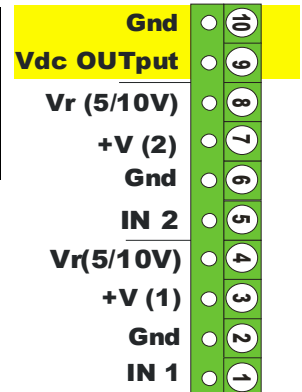
- The controller is configured to receive N° 2 remote control signal: 0-10Vdc or 4-20mA
- the regulator selects automatically the signal with the higher value (C1 = hi)
- in the configurations rS010 (Vdc) and rS420 (mA) it is possible to connect to the controller also manual control devices

2.4.5 Output Vdc control signal to remote SYSTEMS

Into the control signals (IN1 & IN2) terminal block, it's available the Vdc output (0-10Vdc), programmable by the C7 parameter selection (see table)

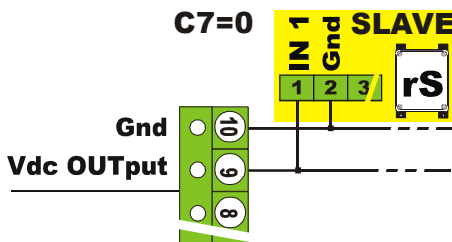
C7	0	0-10 Vdc	SLAVE command for extra power unit (rS configurated)
	1^(*)	1-10 Vdc	MASTER command for SELPRO Water-Spray Step & Stepless Systems
	2	0-10 Vdc	MASTER command for Direct regulation of motorized systems
	3	10-0 Vdc	MASTER command for Reverse regulation of motorized systems

(*)Default



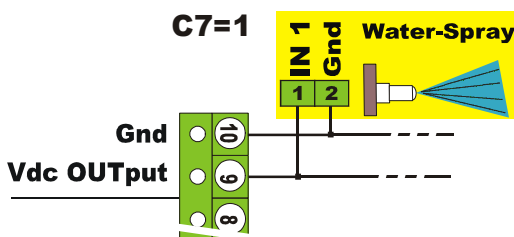
Here the regulation function by C7 parameter available selections.

a) Remote control for EXTRA-Power SLAVE unit



For application with SLAVE extra power unit, working with the MASTER controller. In this configuration (C7=0) the controller give to the Slave unit the working command (Co) to synchronize the fans working.

b) Remote control signal for Adiabatic Systems, with selectable working field (USP & UPb)



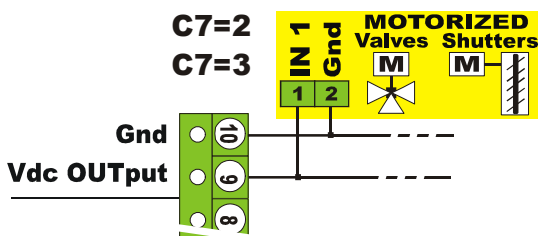
For application with Adiabatic Systems for Water Cooling, to have a controlled extra power for the ventilated heat exchanger. With C7=1, we have the software for the direct control of the adiabatic system, working with dedicated USP (Set-Point) and UPb (Proportional Band) parameters. The USP and UPb setting it's with (+) and (-) from SP, the fans set-point.

N.B.:

It's possible to use RL1 relay, for a direct drive of an adiabatic system (through ON-OFF command), always connected to USp & UPb parameters (see at 4.2), only by setting C6=3.

In this way we can Start and Stop the water cooling action of an external adiabatic system

c) Remote control for Motorized Auxiliary systems, with selectable working field (USP & UPb)



For application with Shutter or Valves working with fan regulation. With C7=2, we have the software for the direct control of the auxiliary system (valves or shutters), working with dedicated USP (Set-Point) and UPb (Proportional Band) parameters. The USp and UPb setting it's with (+) and (-) from SP, the fans set-point.

With C7=3, we have the same work, but for Reverse control mode.

2.5 AUXILIARY CONTACTS & SIGNALS (M4)

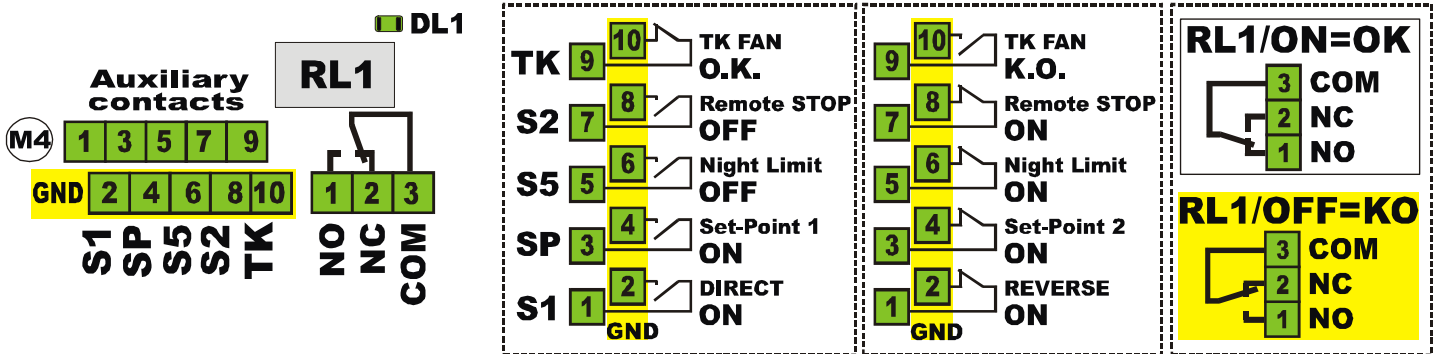
All the contacts of the auxiliary signals and inputs are located on the device M4 terminal block.



The S2 contact (terminals 7 and 8) does not disconnect the mains power supply: do not use it as a safety switch.

LOGIC SIGNALS & ISOLATED ON-OFF INPUTS	1 - 2	S1	DIR/REV Mode
	3 - 4	SP	Double Set-Point
	5 - 6	S5	Night RPM% Limit
	7 - 8	S2	Remote Start - Stop
	9 - 10	TK	Thermal Protection
RL1 = ON	1 - 3	NO	RGM = O.K.

S1=OFF	Direct Mode	S1=ON	Reverse Mode
	Led S1 = OFF		Led S1 = ON
SP=OFF	Set-Point1	SP=ON	Set-Point2
	Led SP2 = OFF		Led SP2 = ON
S5=OFF	Limit EXCLUDED	S5=ON	Limit ACTIVE
	Led S5 = OFF		Led S5 = ON
S2=OFF	Start	S2=ON	Stop
	Led S2 = ON		Led S2 = OFF
TK=ON	Start enable	TK=OFF	Alarm + Stop
	Led RL1 = ON		Led L2 = ON
RL1 = OFF	2 - 3	NC	RGM = ALARM



2.6 Auxiliary relay (M3) for ALARM or ADIABATIC on-off command

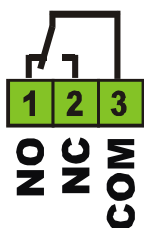
A relay is located on the board, and its operation is programmable for various Alarm levels or for the On-Off commando of an Adiabatic System (ready for Start & Stop).

In factory mode, when starting up the device, the relay switches for Alarm : from the rest position (NC, contacts 3 and 2) to the active position (NO, contacts 3 and 1).

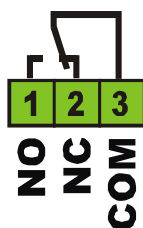
To change the relay work, select from C6 parameter the right mode

C6 = 0/1/2 Relay for ALARM mode

Normally set open

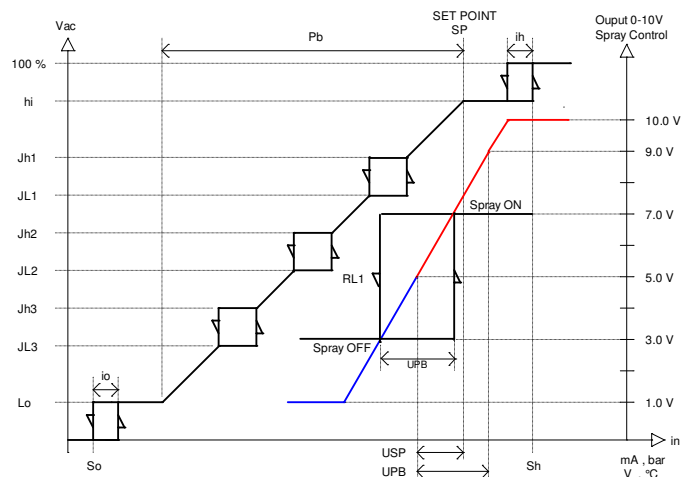


Normally set closed



The various alarm levels can be activated by C6 settings

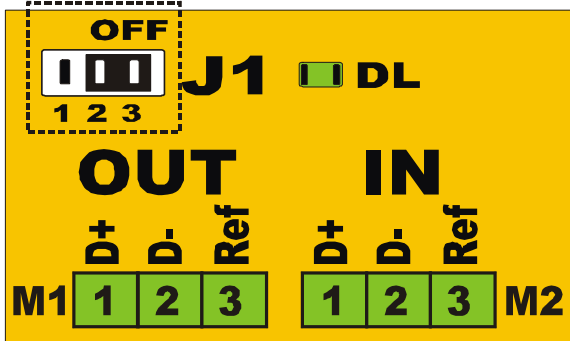
C6 = 3 Relay for ON-OFF spray command (see 6.2)



2.7 RS-485 MODBUS connection (PLUG PB1073C)

On the RGM300 control card, it's available the connection for the MODBUS (RTU) plug.

The two terminal M1 & M2 are for the connection (SLAVE input from PC-Host) for the serial line RS-485 (RTU), 1.000 mt. insulated line.



M1 & M2 terminal		Description
1	D+	In/Out Serial RS485 Dritta
2	D-	In/Out Serial RS485 Negata
3	REF	Gnd insulated reference

The connection terminal 1 / 2 / 3 of M1 and M2 are electrically connected

Seriale COM 0		
OFF	Posiz.	Terminazione (120 ohm)
ON	2/3	Linea passante
ON	1/2	Terminale di Linea

N.B. Il Jumper J1 deve essere posizionato in ON al termine del collegamento della linea seriale

RS-485 MODBUS (RTU std.)

For the connection of the Modbus serial line RS-485, apply cable for external ambient application, like: ITC BELDEN 15S7D Seriale cable for LAN net.



Specifiche costruttive ed elettriche

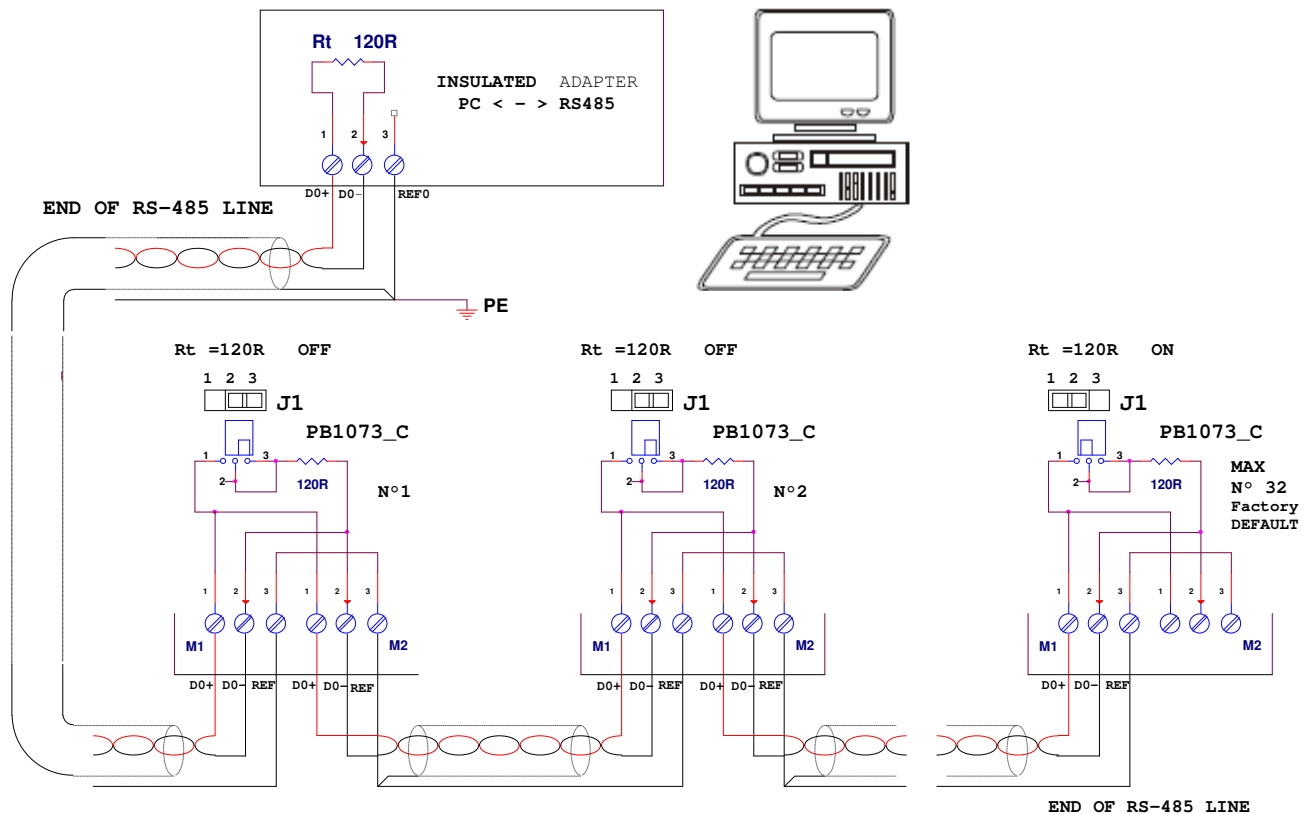
Conduttore 1 :	CuSn 7x0,25mm
Conduttore 1 (Resistenza):	50 Ohm/Km
Conduttore 2:	CuSn 7x0,25mm
Conduttore 2 (Resistenza):	50 Ohm/Km
Isolamento:	PEE 2,35mm
Codifica colori:	Bianco/Arancio Blu
Lamina 1:	AL/Pet 100 %
Calza 1:	CuSn 65 %
Guaina Interna:	PVC antifiama Grigio olioresistente
Guaina Interna (Diametro):	7,6 ± 0,1 mm
Guaina Esterna:	PE Resistente ai raggi UV Nero
Guaina Esterna (Diametro):	9,0 ± 0,1 mm
Impedenza caratteristica:	120 ± 15 Ohm
Capacità mutua o del cavo coassiale:	MUTUA 36 pF/m
Velocità di propagazione:	78 %
Efficienza di schermatura (100-900 MHz):	> 85 dB
Filo di continuità:	CuSn 7x0,20mm
Tensione nominale:	300 V
Temperatura di impiego:	-20 / +80 °C
Isolamento guaina:	C-4 (U0=400V)
Tensione di prova:	4,5 KVac
Raggio minimo curvatura (int/est):	40/90 mm
Peso:	8,4 Kg/100m
Note:	Idoneo alla posa esterna, interrata ed in ambienti umidi.

2.7.1 CONNECTION SCHEME FOR SERIAL LINE RS-485

Connect the cable to the terminal blocks, as indicated on the down schema:

M1	1	D0 +	2	D0 -	3	REF	Insulated input for 1.000 mt. cable
M2	1	D0 +	2	D0 -	3	REF	Insulated output (if end-line, put J1 = ON)

----- MASTER -----



Each station shall have a univocal reserved address; the address is input during installation through a keyboard and display for each device.

Right after inputting the address, each machine shall be visibly marked with the assigned address number in order to avoid any confusion when the system is used.

By default the address is input at the highest number (247)

N.B. : Verify the correct connection of the Modbus RS-485 line ;

All the terminal "D+", "D-" and "REF" must be connected with the same conductor cable.

La schermatura del cavo va collegata a Terra ed a REF, dal solo lato "PC <-> RS485".

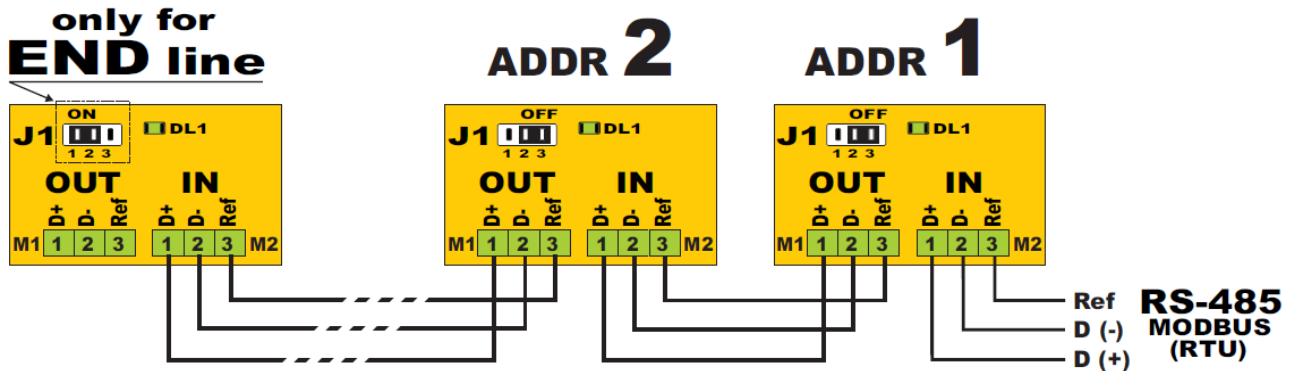
- Il cavo della linea dati (la rete Modbus), va connesso da un regolatore al successivo, partendo dall'unità Master per finire all'ultimo dispositivo servito; NON è ammesso altro metodo di cablaggio.
- I collegamenti devono essere realizzati con cavo adatto ad ambiente esterno, e non superare la lunghezza massima di **1.000 mt.**
- Assicurarsi di NON mescolare il cavo della rete Modbus con gli altri cavi dell'impianto, soprattutto quelli a tensione di rete V~.
- Gli estremi della linea (Master ed ultimo dispositivo servito) vanno terminati con una resistenza da **120ohm**. Attivare la terminazione **120ohm** su adattatore **RS-485 <-> PC Host**; sull'ultimo apparecchio della linea, posizionare **J1** su **ON (2-1)**; su tutte le unità intermedie lasciare **J1** su **OFF (2-3)**.
- Collegare a Terra il cavo che collega tutti i morsetti "REF" unicamente in prossimità della stazione Master, in modo che tutte le stazioni si trovino allo stesso potenziale, quello del **PC Host**.
- Collegare a Terra lo schermo del cavo in partenza dall'adattatore **RS-485<->PC Host**, solo in prossimità dell'adattatore stesso; lo schermo va collegato unicamente lato PC Host, come da schema riportato in figura.
- Il cavo risulterà diviso in spezzoni, uno per ogni tratta; collegare lo schermo della prima tratta solo dal lato adattatore **RS-485<-> PC Host**, e collegare lo schermo della seconda tratta solo dal lato Slave N°1, e così via.

La linea che collega tutti morsetti REF deve essere collegato a Terra in un punto solo, preferibilmente presso il PC che funge da stazione Master.

In questo stesso punto si collega al morsetto REF anche lo schermo del cavo.

Per il buon funzionamento è richiesto l'uso di una resistenza di terminazione del valore di **120R** posta ai due estremi fisici della linea: all'inizio ed alla fine.

In tutte le unità di regolazione, la terminazione iniziale è già presente ed attivabile con l'apposito Jumper **J1**.



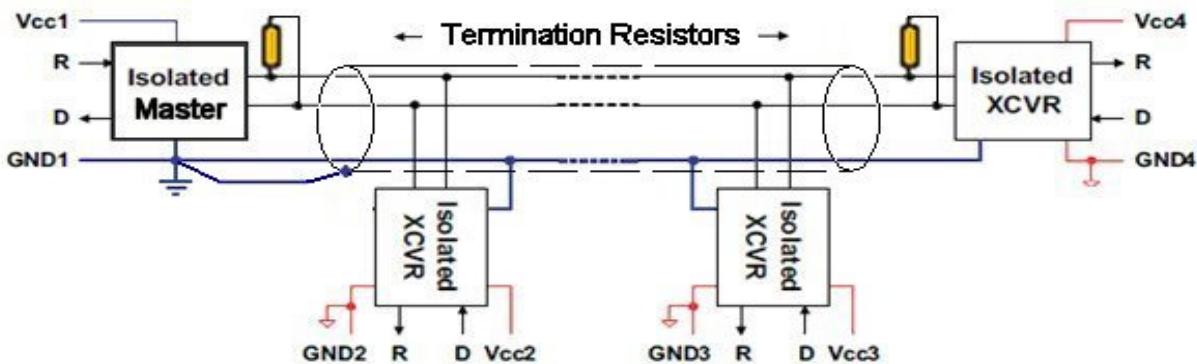
The latest generation of controllers can be equipped with the RS-485 isolated serial interface.

The RS485 isolated interface has three terminal boards called: D+ / D- / REF.

Links between all units part of the communication installation are made through parallel connection: all D+ terminals shall be connected like the D- and REF terminals as well.

The line which connects all REF terminals shall be grounded in one point only, preferably at the PC which shall act as master station

In this same point the screen of the cable is connected to the REF terminal.



The use of a termination resistance equal to a value of 120R placed at the two physical ends of the line is required for proper functioning.

The speed of communication 4,800, 9,600, 19200, 38400 bit/s adopted allow for extremely satisfying performance levels, even while remaining below the limitations prescribed by standard RS485. This ensures the line wiring can be made using a twisted and shielded average quality duplex cable: as long as the total range of the line does not exceed 200nF

The total length of the line can reach at least 1000 meters.

2.7.2 CLIMA-Sinergy : supervising and monitoring software

Il programma “**SELPRO CLIMA-Sinergy**” è un applicativo per sistemi operativi Windows che realizza la gestione di connessione e colloquio con tutti i regolatori **Selpro** che supportano la funzionalità di connessione, tramite protocollo **MODBUS (RTU)**, via seriale **RS232-485**.

Il Software prevede l'utilizzo di una connessione seriale che connette il **PC** ad uno o più moduli hardware (standard max 32); ogni modulo risponde ad un particolare **ID** (indirizzo modbus – max 247).

Nelle seguenti tabelle le informazioni riguardanti i principali registri (Input & Holding registers), disponibili sulle unità RGM300.

Available Input Register

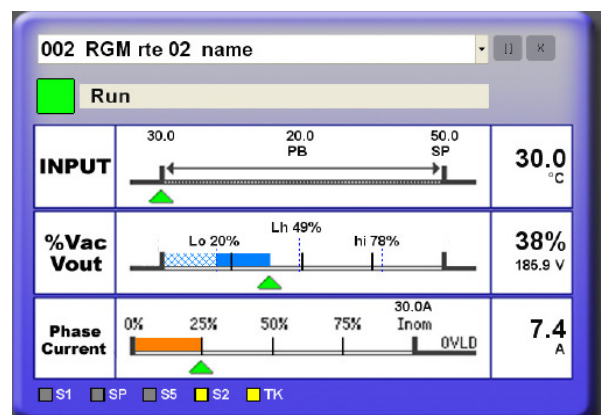
N° Register	symbol	Description
100	-	Equipment model / Input configuration
101	Hw/SW	Type of control Board / Model S/W : XX
102	c0	Working Modes
103	c1	Input Selection
104	c2	Input Type
105	c3	Display Conversion Type
106	c4	Set Point Position
107	c5	Cos Phi Value
108	c6	Alarm relay (RL1) use
109	c7	Analog Out 0-10V Use
110	Add.	Device address on Modbus RTU
111	SPE.	Communication Baud rate
112	tyP.	Communication Parameters
113	Ps	Nominal current of the equipment (in Ampères RMS)
114	tL	logic Board Temperature, in °C
115	tP	power Board Temperature, in °C
116	out	Analog Output 0-10V value
117	cur	Output current RMS value
118	Co	Output value (in % of Vac sup.)
119	in	Input signal in use (or ruling)
120	SP	Set-Point value in use
121	i1	Input 1 value
122	i2	Input 2 value
123	-	State of Relevant Logic Signals
124	-	State of alarm relay (RL1)
125	-	Running state
126	Err	Error code

“**symbol**” : initials displayed on the screen of board PB1073 in correspondence to the register; if the symbol is “ - “ that register is displayed on screen

For the PC remote control, it's available the CLIMA-Sinergy Supervising & Monitoring software, through MODBUS Communication System (RS-485)

It allows remote administration (reading, monitoring and modification) of the working parameters of the controlled Ventilation System, and permits to monitor and acquire working data from connected units, also with GPRS-GSM option.

Are also available bridge systems for different working protocol, like: BACnet, LonWork, ...

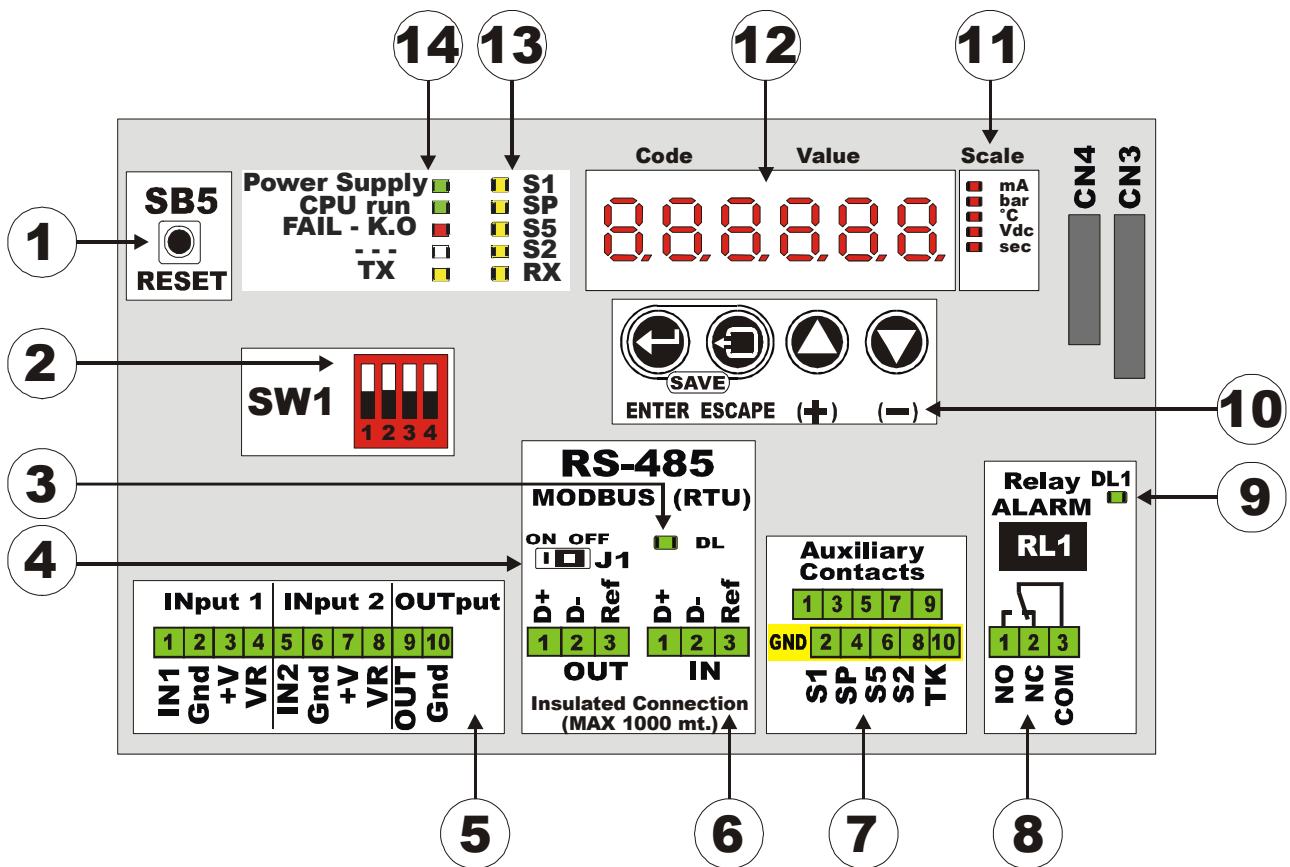


Available Holding Register

This section contains information on data **with the possibility both of reading and writing** numeric and non numeric numbers contained in the “Holding Register”; each register is composed by only one word (16 bit).

N° Register	Symbol	Description	
200	CMD	Command from master modbus (cleared after execution)	
201	VAL	Value in writing relative to the previous command code	
202	Lh	Limitation of MAX RPM% general nighttime	
203	Jh1	RPM% upper limit for jump n°1 of VAC output voltage	
204	JL1	RPM% lower limit for jump n°1 of VAC output voltage	
205	Jh2	RPM% upper limit for jump n°2 of VAC output voltage	
206	JL2	RPM% lower limit for jump n°2 of VAC output voltage	
207	Jh3	RPM% upper limit for jump n°3 of VAC output voltage	
208	JL3	RPM% lower limit for jump n°3 of VAC output voltage	
209	P.	PID Proportional Band (in units of inputs)	
210	I.	PID integral component value	
211	d.	PID Derivative Component value	
212	ti.	PID Integration time	
213	td.	PID Derivation time	
214	S1	Set-point Value	GROUP N°1
215	Pb	Proportional band	
216	hi	RPM% maximum limit	
217	Lo	RPM% minimum limit	
218	dE	Soft-Start Time of acceleration/deceleration	
219	Sh	Input value to force maximum output voltage	
220	ih	Hysteresis on the Sh value	
221	So	Input value to force output voltage zero	
222	io	Hysteresis on the So value	
223	US	Set Point UR% for Spray Unit	
224	Upb	Proportional band UR% for Spray Unit	
225	S2	Set-point Value	GROUP N°2
226	P.b.	Proportional band	
227	h.i.	RPM% Maximum limit	
228	L.o.	RPM% minimum limit	
229	d.E.	Soft-Start , Time of acceleration/deceleration	
230	S.h.	Input value to force maximum output voltage	
231	i.h.	Hysteresis on the S.h. value	
232	S.o.	Input value to force output voltage zero	
233	i.o.	Hysteresis on the S.o. value	
234	U.S.	Set Point UR% for Spray Unit	
235	U.p.b.	Proportional band UR% for Spray Unit	

2.8 RGM300: CONTROL CARD



See above: all the components in the PB1073 control card of the controller RGM300.

1	SB5 RESET Button	8	M3 - RL1 Connection for NO-NC contacts
2	SW1 Switch to enable modification of operating parameter	9	Led for relay RL1 state
3 (*)	Led for RS-485 line OK	10	Keypad for programming the operating parameters
4 (*)	Jumper to end the modbus connections line (set J1=ON)	11	Led for displayed measurement units
5	M1 - Connection of control sensors and signals	12	Display for the operating parameters
6	CN6 Optional connection of RS-485 / Modbus (RTU)	13	Led signals for Auxiliary Contacts ON
7	M4 Connection of auxiliary contacts	14	Led for the regulation state


(*) Optional plug for insulated (max. 1.000 meters) RS-485 ModBus (RTU) connection

3.0 Visualizations and Messages

After switching on the regulator or pushing the reset button, the display shows the following messages in quick succession:

3Ph nn	Type : three-phases regulator (3Ph), & the current size “ nn ”
rel. X.x	Last “release” of the firmware
rtE-01	the presently active configuration
in	Input value: display start position, showing also after the reset button pushing

Subsequently the display shows always the value of the active signal (**in**) connected to one of the inputs (**IN**) of the regulator.

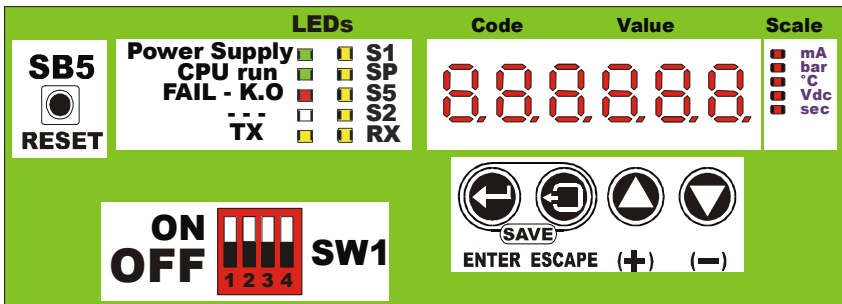
By pressing the buttons **+** & **-** it is possible to scroll through all parameters reported in the table below, divided in three groups: **ON**  **OFF**

V : display only

L : FREE modification


K : modification only by authorized personnel, through the Dip-Switch **SW1=1** to **ON**

Control card




Start condition

SW1

ON  OFF **L**

To enter to all the parameters

SW1

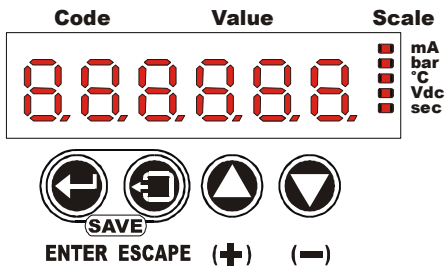
ON  OFF **K**

Above the control card components to see & to set all the regulations parameters

SB5	RESET button		
LEDs	Show the controller status and the auxiliary contacts		
Code	Selected parameters code		
Value	Selected parameter value		
Scale	Input signals working scale		
SW1	DIP-Switch for available functions selection		
ENTER	To select	SAVE	To save all the new values, only by pushing together
ESCAPE	To delete		
(+)	To select the code and to increase the selected value		
(-)	To decrease the selected value		

3.1 Codes shown through Keypad & Display:

The following table shows the codes of the regulation parameters, which the user can always modify when switching on the regulator



VISUALIZATIONS AND MESSAGES

i

V: display only

L: always changeable

SW1 all "OFF"

SW1



K: changeable by expert

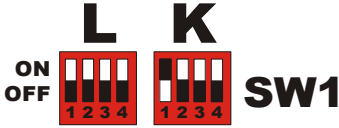

SW1 with 1 to "ON"

SW1





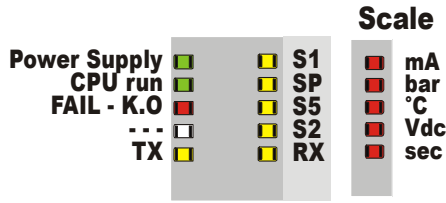



F: factory configuration

Code	Description	
rtE-01	Configuration in use: if the DEFAULT parameters K are modified, a point is displayed after every character (rtE-01 factory standard)	V
tYP		
SPE		
Add		
3Ph		
tL	Instantaneous temperature in °C of the control card	
tP	Instantaneous temperature in °C of the power card (just new power cards)	
out	Output current in A (powers with current transducer)	
Co	Value in % of the control output, visible also on the Service DIGIT	
in	Value of the active signal selected between the inputs IN1 or IN2	
SP	Active Set-point (S1 for SP1 and S2 for SP2)	
i 1	Value of the active signal at input IN 1	
i 2	Value of the active signal at input IN 2	
S1	Set point N.1 (SP1)	L
S2	Set-point N.2 (SP2)	
Lh	Max RPM% Night Limit for SP1 and SP2	
Jh1	RPM% upper limit of the VAC output for jump N.1	
JL1	RPM% lower limit of the VAC output for jump N.1	
Jh2	RPM% upper limit of the VAC output for jump N.2	
JL2	RPM% lower limit of the VAC output for jump N.2	
Jh3	RPM% upper limit of the VAC output for jump N.3	
JL3	RPM% lower limit of the VAC output for jump N.3	
Pb	Proportional Band Set-Point SP1	K
hi	Maximum RPM% limit	
Lo	Minimum RPM% limit	
dE	Soft-Start – acceleration/deceleration time	
Sh	Set-Point value for MAX limit = OFF and VAC = 100%	
ih	Hysteresis of the value Sh	
So	Set-Point value for MIN limit = OFF and VAC = 0%	
io	Hysteresis of the value So	
US(P)	Set Point UR% for external Spray Unit (if negative, "P" is absent)	
UP(b)	Proportional Band UR% for external Spray Unit (if negative, "b" is absent)	
P.b.	Proportional Band Set-Point SP2	
h.i.	Maximum RPM% limit	
L.o.	Minimum RPM% limit	
d.E.	Soft-Start – acceleration/deceleration time	
S.o.	Set-Point value for MIN limit = OFF and VAC = 0%	
i.o.	Hysteresis of the value So	
S.h.	Set-Point value for MAX limit = OFF and VAC = 100%	
i.h.	Hysteresis of the value Sh	
U.S.(P.)	Set Point UR% for external Spray Unit (if negative, "P" is absent)	
U.P.(b.)	Proportional Band UR% for external Spray Unit (if negative, "b" is absent)	

<p>K: SW1 with 1 on "ON" F: factory configuration</p> 		c0	Available operating mode: - SLAVE rS by codes selections, for 1 or 2 inputs signals - MASTER rtE / rPr by codes selections, for 1 or 2 sensors	K
		c1	Selection Mode of the prevailing input: selection of the input with the HIGHEST or the LOWEST value	
		c2	Input type : in Current 4-20 mA , in Voltage 0-5V or 0-10V , in kohm for STE probe	
		c3	Linear conversion, from mA to bar : Input 4-20 mA with conversion to ranges 0-15bar/25bar/30bar/45bar	
		c4	Set-Point presence and position on the operating characteristic	
		c5	Setting of cos-phi motor/s (from 0 to 15)	
		c6	Management of relay RL1 (closed in absence of alarms – led ALARM = ON)	
		c7	Analog control output 1-10Vdc , 0-10Vdc or 10-0Vdc for: External WS Spray Unit – rS SLAVE power unit - EC fans	
.....	Name of the configuration in use (if the DEFAULT parameters K are modified, a point is displayed after every character)	F		

ALARM MESSAGES (*)

<div style="text-align: center;"> <table border="1" style="margin: auto;"> <thead> <tr> <th>Code</th> <th>Value</th> <th>Scale</th> </tr> </thead> <tbody> <tr> <td>8.8.8.8.8.8</td> <td></td> <td>mA bar °C Vdc sec</td> </tr> </tbody> </table>  </div> <p>(*)The alarms are displayed according to the priority indicated in the table above; the presence of an alarm with higher priority prevents from displaying alarms with lower priority.</p> <p>(**) In order to reset the alarm showed on the DISPLAY, press "ESCAPE": the DISPLAY will show for an instant the message CANCER", so as to confirm that the alarm has been erased.</p> <p>If the ALARM does not disappear, call the SAT (Technical Assistance Service, 0039.0306821611)</p> <div style="text-align: center;">  <table border="1" style="margin: auto;"> <thead> <tr> <th>Code</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>cAnCeR</td> <td></td> </tr> </tbody> </table> </div>	Code	Value	Scale	8.8.8.8.8.8		mA bar °C Vdc sec	Code	Value	cAnCeR		<table border="1"> <tr> <td>Err P</td> <td>Absence of one supply phase</td> </tr> <tr> <td>Err t</td> <td>Activation of the external thermal protection (of the fans)</td> </tr> <tr> <td>Err tP</td> <td>Stop caused by overheating of the power card – temperature > 80°C (just new power cards)</td> </tr> <tr> <td>Err tL</td> <td>Stop caused by overheating of the control card – temperature > 80°C</td> </tr> <tr> <td>Err it</td> <td>Stop caused by activation of the protection from maximum thermal current (just powers with current transducer)</td> </tr> <tr> <td>Err iP</td> <td>Stop caused by activation of the protection from maximum peak current (just powers with current transducer)</td> </tr> <tr> <td rowspan="7" style="text-align: center; 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<p>Led signals (ON)</p> 	Power	green	Power supply OK				
	Cpu Run	green	The microcontroller is active (LED blinking intermittently)				
	Fail	red	Regulation K.O. – Presence of an alarm (see message)				
	-	green	Not in use				
	TX	green	Serial Line: data transmission				
	S1	yellow	Operation of the REVERSE mode				
	SP	yellow	Regulation with Set-Point 2				
	S5	yellow	Activation of RPM% night limit				
	S2	yellow	Start enable (input S2 = OFF)				
	RX	green	Serial Line: data transmission				
DL1	green	Indicates the state of the ALARM relay					
 DL1 	48 Vac 5 Amp		<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">DL1=ON</td> <td style="text-align: center;">DL1=OFF</td> </tr> <tr> <td style="text-align: center;">1-3=OFF / 2-3=ON</td> <td style="text-align: center;">1-3=ON / 2-3=OFF</td> </tr> </table>	DL1=ON	DL1=OFF	1-3=OFF / 2-3=ON	1-3=ON / 2-3=OFF
DL1=ON	DL1=OFF						
1-3=OFF / 2-3=ON	1-3=ON / 2-3=OFF						

4.0 Settings through keypad

4.1 Predefined Default Configurations

After switching on the regulator, it is possible to choose the desired operating mode among the n.11 factory preset DEFAULT configurations. When it is selected right after the activation of the regulator, such operation erases any previous modification to the regulation parameters and always restores all the default values of the selected code (default parameters table).

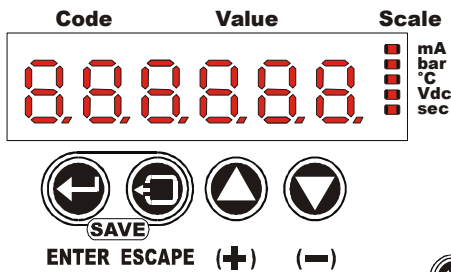
i N.B.: In case of first installation, the display will present the DEFAULT (rtE-01) configuration or the most recently selected one.

Config.	N° Input	Analog Input	Operating Mode	Transducer Model	Display message	
rtE-01	2	NTC 10K@25°C	MASTER Controller	STE	-20 / 90 °C	
rtE-02		NTC 10K@25°C		STE	10 / 90 °C	
rPr420		4-20mA Ri= 100 ohm		-	-	4-20 mA
rPr015					SPR 0-15 bar	0-15 bar
rPr025					SPR 0-25 bar	0-25 bar
rPr030					SPR 0-30 bar	0-30 bar
rPr045					SPR 0-45 bar	0-45 bar
rUu-05		0-5Vdc Ri= 10Kohm		-	-	0,5 – 4,5 Vdc
rPu030					-	0-30 bar
rPu045					-	0-45 bar
rUu010					0-10Vdc Ri= 10Kohm	-
rS 420	1	4-20mA Ri = 100 ohm	SLAVE	-	4-20 mA	
rS 010	1	0-10Vdc Ri= 10Kohm	Power Unit	-	0-10 Vdc	

i In order to enter this mode: switch on the regulator (from OFF to ON) or press SB5 (reset button)

4.2 Set-up PROCEDURE for Default configurations

i In order to enter this mode:
- switch on the regulator
- press the "RESET" SB5



Once the configuration procedure is finished, the display shows a message referring to the last version of the regulation software (ex.: 3Ph 3.0 = 3Phase controller rel. 3.0)

PROCEDURE

1. Press simultaneously the buttons "ENTER" and "(-)"
2. Switch on the regulator (from OFF to ON) or press the button "RESET"
3. Wait the conclusion of the RUN-TEST, until read "SETUP" on the display
4. Release simultaneously "ENTER" and "(-)": the regulator finds its configuration and the display shows the DEFAULT configuration code (rtE-01) or the last selected configuration
5. Press the buttons "+/-" to scroll through all available configuration "Codes" on the display
6. Once the configuration is reached, press "ENTER": the display does NOT blink anymore

7 i



Press simultaneously the buttons ENTER + ESCAPE in order to confirm your choice: the display shows the message "Update" > 3Ph ... > in (input signal value)

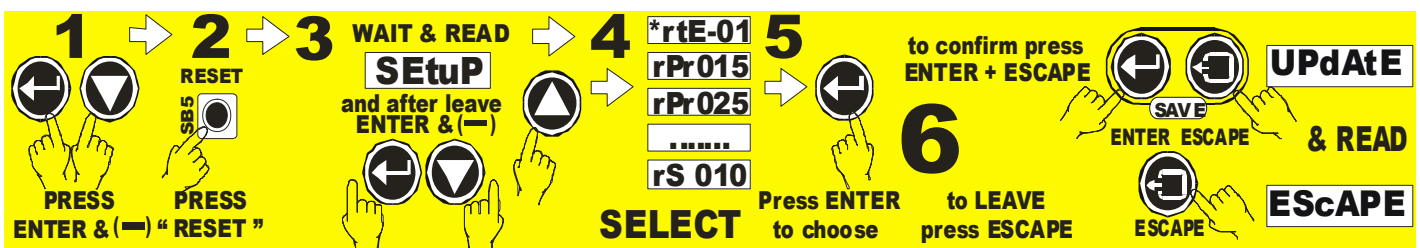
The selected configuration is saved and used immediately; the regulator starts running with the new parameters, while the display shows the in value of the input signal



Press the button ESCAPE in order to quit without modifying the configuration: the display shows the message ESCAPE > and then > in (input signal value)

4.3 Set-up sequence for the choice of the configuration

(*3) Warning: after switching on the regulator, wait for the conclusion of the RUN-TEST (all LEDS switch off)



Once the procedure is finished, the regulator starts running while the display shows the "in" value of the active input

5.0 How to modify the regulation parameters

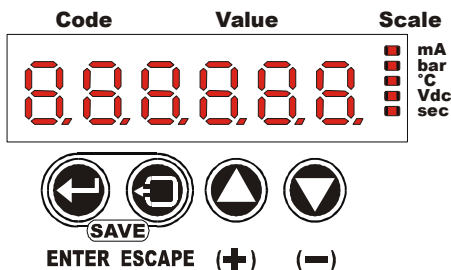
5.1 Parameters “L” (free setting) - SW1 in Off position

Code	Display Value		UM	Default	Configuration	Model of transducer or generated signal	Description	
	min	MAX						
S1	-10,0	+90,0	°C	45,0	rtE-01	STE -10/+90°C	Set point 1 (SP1)	
	4,0	20,1	mA	14,0	rPr420	4-20 mA		
	0	15,0	bar	10,6	rPr015	SPR 0-15 bar		
	0	25,0	bar	17,0	rPr025	SPR 0-25 bar		
	0	30,0	bar	17,0	rPr030	SPR 0-30 bar		
	0	45,0	bar	25,0	rPr045	SPR 0-45 bar		
	0	5,0	Vdc	2,9	rUu-05	0-5 Vdc		
	0	30,0	bar	17,0	rPu030	SPU 0-30 bar		
	0	45,0	bar	25,0	rPu045	SPU 0-45 bar		
S2	-10,0	+90,0	°C	45,0	rtE-01	STE -10/+90°C	Set point 2 (SP2)	
	4,0	20,1	mA	14,0	rPr420	4-20 mA		
	0	15,0	bar	10,6	rPr015	SPR 0-15 bar		
	0	25,0	bar	17,0	rPr025	SPR 0-25 bar		
	0	30,0	bar	17,0	rPr030	SPR 0-30 bar		
	0	45,0	bar	25,0	rPr045	SPR 0-45 bar		
	0	5,0	Vdc	2,9	rUu-05	0-5 Vdc		
	0	30,0	bar	17,0	rPu030	SPU 0-30 bar		
	0	45,0	bar	25,0	rPu045	SPU 0-45 bar		
Lh	0%	100%	off	100%	All configurations	All the probes	Max Night RPM% Limit	
Jh	0%	100%	off	100%	All configurations	All the probes		Upper RPM% Limit for jump 1 – jump 2 – jump 3
Jl	0%	100%	off	100%	All configurations	All the probes		Lower RPM% Limit for jump 1 – jump 2 – jump 3

5.2 Set-up procedure L parameters: S1 – S2 – Lh

In order to enter this mode:

- press the buttons Enter + Escape



Once the configuration procedure is finished, the display shows a message referring to the last version of the regulation software

(ex.: 3Ph 3.0 = 3Phase controller rel. 3.0)

PROCEDURE

1. Press simultaneously the buttons **ENTER + ESCAPE**: the display shows the message **ProGrA** and soon after the codes: **S1** (for **MASTER** mode) and **Lh** (for **SLAVE** mode)
2. Press the buttons “+” and “-” to scroll through the modifiable base level parameters
3. Once reached the desired parameter, press “**ENTER**”: the display starts blinking
4. By pressing the buttons “+” and “-”, reach the desired value (by pressing simultaneously also the button “**ENTER**”, the setting is accelerated)
5. Once the value is reached, press “**ENTER**”: the display does NOT blink anymore; to modify a further parameter, repeat from point 2

6. i



Press simultaneously the buttons **ENTER + ESCAPE** in order to confirm your choice: the display shows the message “Update” > SELPrO > 3Ph 3.0 > in (input signal value)

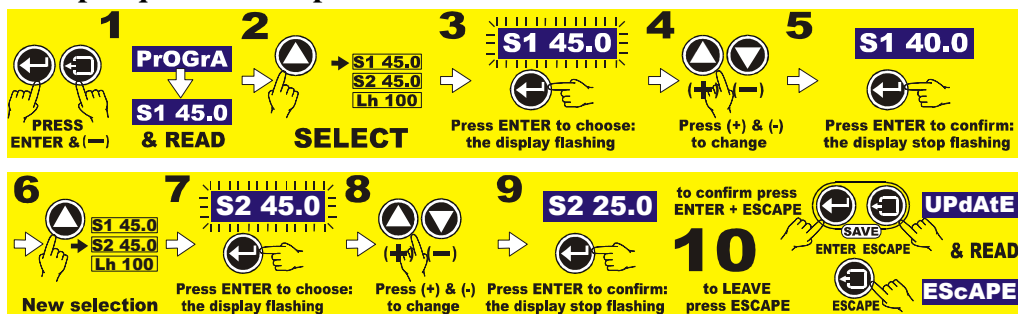


The selected configuration is saved and used immediately; the regulator starts running with the new parameters, while the display shows the **in** value of the input signal



Press the button **ESCAPE** in order to quit without modifying the configuration: the display shows the message **ESCAPE** > and then > in (input signal value)

5.3 Set-up sequence for L parameters: S1 –S2 –Lh

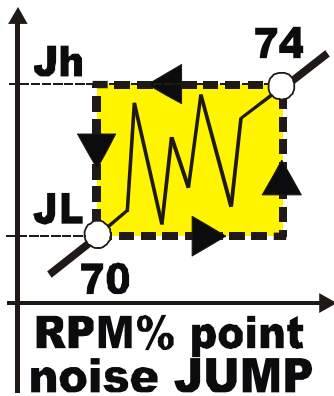
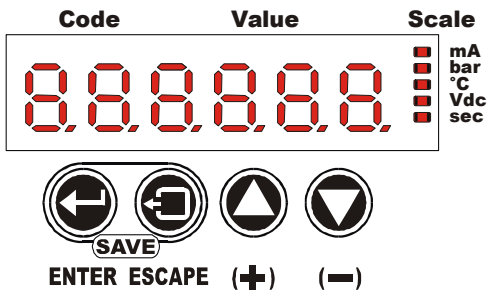


Once the procedure is finished, the regulator starts running with the new parameters, while the display shows the “in” value of the active input

5.4 Set-up procedure L parameters: Jh & JL (1-2-3) Noise-JUMP (extra-dB zones)

To eliminate any acoustic peaks ZONES (extra dB), proceed as follows:

i In order to enter this mode:
- press the buttons Enter + Escape



PROCEDURE

1. Shift the pin 1 of the Dip-Switch SW1 to the ON position and press simultaneously ENTER + ESCAPE: the display shows the message **ConF**; scroll down with (-) and select the **ParA** menu (the codes start from: **S1** (for MASTER mode) and **Lh** (for SLAVE mode))
2. Press the button "+" to scroll through the codes until reaching the code **Jh1** and press ENTER: the display starts blinking, the controller stops the automatic regulation and supplies the fan/s up to 100% Vac (default **Jh1 = 100 %**)
3. Press the buttons "+/-" to scroll through all the possible regulations; once the acoustic peak is reached, select a position slightly above it (1 or 2 % points higher)
4. Press ENTER to confirm the selected value: the display does NOT blink anymore.
5. Press the button "+" until finding **JL1** and press ENTER: the display starts blinking, the controller stops the automatic regulation and supplies the fan/s up to 100% Vac (default **Jh1 = 100 %**)
6. Press the button "-" in order to select a position slightly under the value selected for **Jh1** (3 or 4 % points below it)
7. Press ENTER to confirm the settings: the display does NOT blink anymore

Now repeat the above described procedure in order to select a further "jump-zone" for the parameters: **Jh2/JL2** and **Jh3/JL3**



To speed the selection, to hold pressed

8. **i**

Press simultaneously the buttons **ENTER + ESCAPE** in order to confirm your choice: the display shows the message "Update" > SELPro > 3Ph 3.0 > in (input signal value) The selected configuration is saved and used immediately; the regulator starts running with the new parameters, while the display shows the **in** value of the input signal

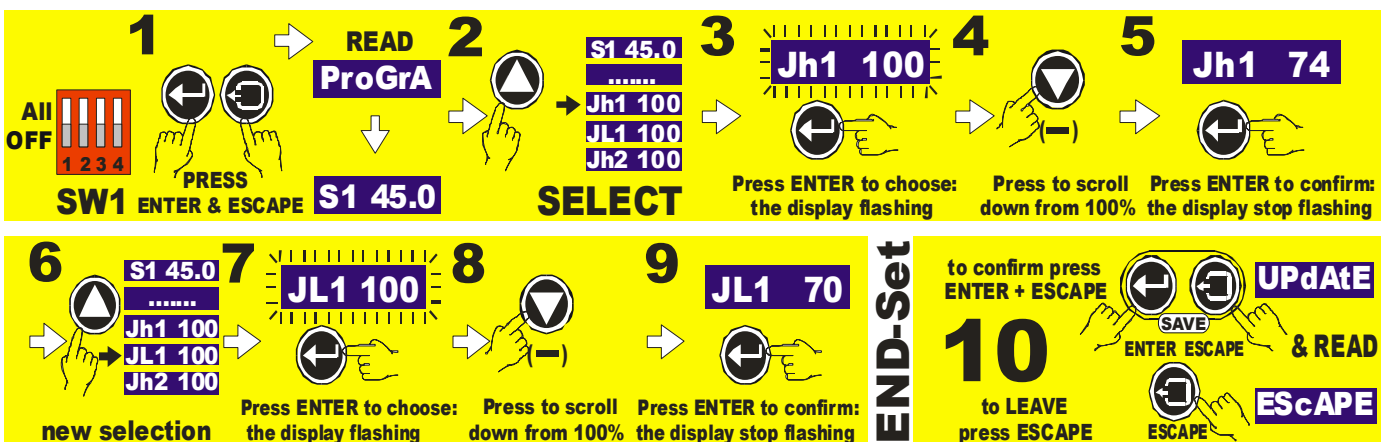


Press the button **ESCAPE** in order to quit without modifying the original configuration: the display shows the message **ESCAPE** > and then > in (input signal value)

Once the configuration procedure is finished, the display shows a message referring to the last version of the regulation software

(ex.: 3Ph 3.0 = 3Phase controller rel. 3.0)

5.5 Set-up sequence for L parameters: Jh & JL (1-2-3)



Once the procedure is finished, the regulator starts running with the new parameters, while the display shows the "in" value of the active input

5.6 Set-up procedure K parameters: menu PArA & conf



Any modification to the default parameters must be performed only by QUALIFIED and EXPERT PERSONNEL



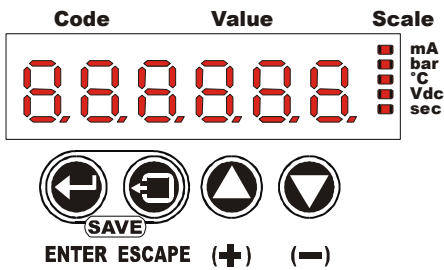
i In order to modify the DEFAULT parameters, it is necessary to shift the pin “1” of the Dip-Switch SW 1 to the “ON” position. This mode allows to access both regulation parameter menu:

Programming Menu
Configuration Menu

indicated with the code **.PArA.**
indicated with the code **.conf.**



5.7 Set-up procedure Menu ParA and conf



PROCEDURE

- Shift the pin 1 of the Dip-Switch SW1 to the ON position
- Press simultaneously the buttons ENTER + ESCAPE: the display shows the message **conf**
- Press the buttons “+/-” to choose the desired Menu (**ParA** or **Conf**) and press ENTER: the display shows the message **ProGrA** and soon after the following code:
 - By choosing **ParA** > **S1** (if modes **rTE** – **rPr** are active), **Lh** (if mode **rS** is active)
 - By choosing **conf** > **c0**
- Press the buttons “+” and “-” to scroll until the code to be modified
- Press the button “ENTER”: the display starts blinking
- Press the buttons “+” and “-” to scroll until the desired value and press “ENTER” to confirm your choice: the display does NOT blink anymore (by pressing simultaneously also the button “ENTER”, the setting is accelerated)

Once the configuration procedure is finished, the display shows a message referring to the last version of the regulation software

(ex.: 3Ph 3.0 = 3Phase controller rel. 3.0)

In order to modify a further parameter, repeat the above described procedure starting from point 4;



To speed the selection, to hold pressed

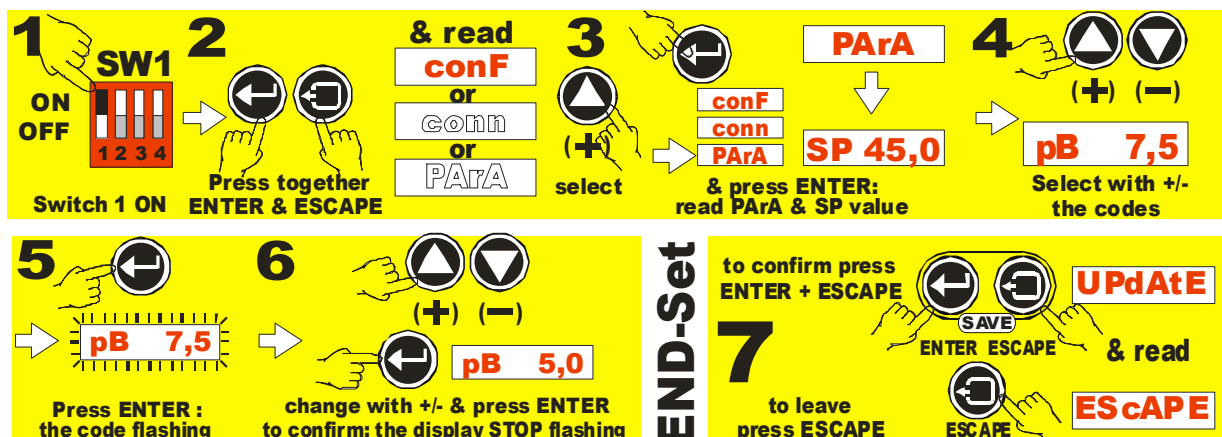


i 7. Press simultaneously the buttons ENTER + ESCAPE in order to confirm your choice: the display shows the message “Update”>3Ph nn > in (input signal value)



Press the button ESCAPE in order to quit without modifying the original configuration: the display shows the message ESCAPE > and then > in (input signal value)

5.8 Set-up sequence for programming parameters PArA



Once the procedure is finished, the regulator starts running with the new parameters, while the display shows the “in” value of the active input

5.9 Menu “PArA”

The following table shows the operating parameters relating to the two Set-Points.

The symbols used for the parameters of Set-Point 2 are the same as that used for Set-Point1, but with the addition of a full stop after every character (e.g.: Set-Point1 = USP; Set-Point2 = U.S.P.).

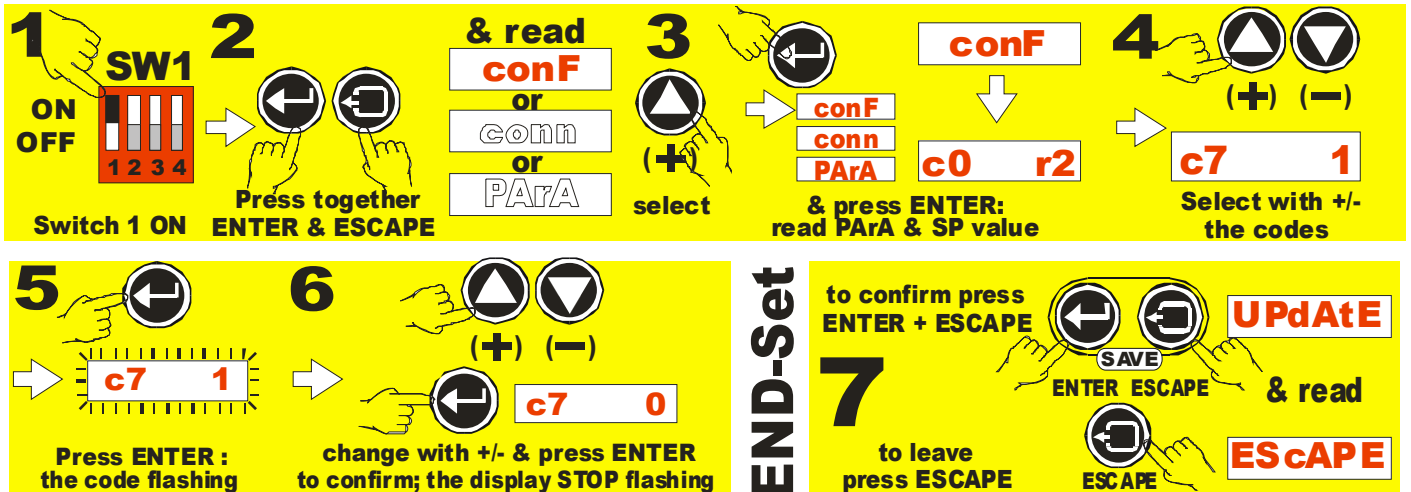
Code	Display			Default	Configuration	Probe	Description
	Value		UM				
	min	MAX					
USP (U.S.P.)	0	20.1	mA	15,0	rS-020	-	Set Point UR% External Spray Unit
	0	10	Vdc	7,5	rS-010	-	
	-54,9	+55	°C	-1,6	rtE-01	STE -10/+90°C	
	-8	+8	mA	-0,6	rPr420	4-20 mA	
	-7,5	+7,4	bar	-0,4	rPr015	SPR 0-15 bar	
	-12,5	+12,4	bar	-0,8	rPr025	SPR 0-25 bar	
	-15	+14.9	bar	-0,8	rPr030	SPR 0-30 bar	
	-22,5	+22,4	bar	-1,0	rPr045	SPR 0-45 bar	
	-2,5	+2,4	Vdc	-0,2	rUu-05	0-5 Vdc	
	-15	+15	bar	-1,0	rPu030	SPu 0-30 bar	
-22,5	+22,4	bar	-1,0	rPu045	SPu 0-45 bar		
-5.1	+4.9	Vdc	-0,5	rUu010	0-10 Vdc		
UPb (U.P.b.)	0,5	20	mA	4,2	rS-020	-	Proportional Band UR% External Spray Unit
	0,2	10	Vdc	2,1	rS-010	-	
	2,0	55,0	°C	2,4	rtE-01	STE -10/+90°C	
	0,5	15,0	mA	1,0	rPr420	4-20 mA	
	0,5	15,0	bar	0,7	rPr015	SPR 0-15 bar	
	1,0	25,0	bar	1,2	rPr025	SPR 0-25 bar	
	1,0	30,0	bar	1,2	rPr030	SPR 0-30 bar	
	1,0	45,0	bar	1,5	rPr045	SPR 0-45 bar	
	0,1	5,0	Vdc	0,4	rUu-05	0-5 Vdc	
	1,0	30,0	bar	1,5	rPu030	SPu 0-30 bar	
1,0	45,0	bar	1,5	rPu045	SPu 0-45 bar		
0,2	10,0	Vdc	0,8	rUu010	0-10 Vdc		
Sh (S.h.)	-20,0	+90,0	°C	90,0	rtE-01	STE -10/+90°C	Input value (IN 1 / IN 2) to force MAX limit to 100% Vac output BY-PASS of the MAX VAC limit
	4	20	mA	20,0	rPr420	4-20 mA	
	0	15	bar	15,0	rPr015	SPR 0-15 bar	
	0	25	bar	25,0	rPr025	SPR 0-25 bar	
	0	30	bar	30,0	rPr030	SPR 0-30 bar	
	1,0	45,0	bar	45	rPr045	SPR 0-45 bar	
	0	5	Vdc	5,0	rUu-05	0-5 Vdc	
	0	30	bar	30,0	rPu030	SPu 0-30 bar	
	1,0	45,0	bar	45	rPu045	SPu 0-45 bar	
0	10.1	Vdc	10,0	rUu010	0-10 Vdc		
ih (i.h.)	1	30	°C	1	rtE-01	STE -10/+90°C	Hysteresis of Sh value
	0,1	5,0	mA	0,1	rPr420	4-20 mA	
	0,1	5,0	bar	0,1	rPr015	SPR 0-15 bar	
	0,1	8,0	bar	0,1	rPr025	SPR 0-25 bar	
	0,1	8,0	bar	0,1	rPr030	SPR 0-30 bar	
	0,1	15,0	bar	0,1	rPr045	SPR 0-45 bar	
	0,1	2,5	Vdc	0,1	rUu-05	0-5 Vdc	
	0,1	15,0	bar	0,1	rPu030	SPu 0-30 bar	
	0,1	15,0	bar	0,1	rPu045	SPu 0-45 bar	
	0,1	5,0	Vdc	0,1	rUu010	0-10 Vdc	

Table - MENU “PArA”

Code	Display			Default	Configuration	Probe	Description
	Value		UM				
	min	MAX					
So (S.o.)	0	20.1	mA	0	rS-020	-	Input value (IN 1 / IN 2) to force MIN limit to 0% (OFF) VAC output BY-PASS of the MIN VAC limit (Cut-Off)
	0	10.1	Vdc	0	rS-010	-	
	-20,0	+90,0	°C	-20,0	rtE-01	STE -10/+90°C	
	4	20	mA	4	rPr420	4-20 mA	
	0	15	bar	0	rPr015	SPR 0-15 bar	
	0	25	bar	0	rPr025	SPR 0-25 bar	
	0	30	bar	0	rPr030	SPR 0-30 bar	
	0	45	bar	0	rPr045	SPR 0-45 bar	
	0	5	Vdc	0	rUu-05	0-5 Vdc	
	0	30	bar	0	rPu030	SPU 0-30 bar	
	0	45	bar	0	rPu045	SPU 0-45 bar	
0	10.1	Vdc	0	rUu010	0-10 Vdc		
io (i.o.)	0,2	10	mA	0,2	rS-020	-	Hysteresis of So value
	0,1	5,0	Vdc	0,1	rS-010	-	
	1	30	°C	1	rtE-01	STE -10/+90°C	
	0,1	5,0	mA	0,1	rPr420	4-20 mA	
	0,1	5,0	bar	0,1	rPr015	SPR 0-15 bar	
	0,1	8,0	bar	0,1	rPr025	SPR 0-25 bar	
	0,1	8,0	bar	0,1	rPr030	SPR 0-30 bar	
	0,1	15,0	bar	0,1	rPr045	SPR 0-45 bar	
	0,1	2,5	Vdc	0,1	rUu-05	0-5 Vdc	
	0,1	15,0	bar	0,1	rPu030	SPU 0-30 bar	
	0,1	15,0	bar	0,1	rPu045	SPU 0-45 bar	
0,1	5,0	Vdc	0,1	rUu010	0-10 Vdc		
hi (h.i.)	0%	100%	off	100	All configurations	All the probes	MAX OUT RPM% VAC limit
Lo. (L.o.)	0%	100%	off	00	All configurations	All the probes	MIN OUT RPM% VAC limit
dE (d.E.)	0,1"	60,0"	sec	2,0	All configurations	All the probes	STARTER Accel./Decel. Time
Pb (P.b.)	2,0	55,0	°C	7,5	rtE-01	STE -10/+90°C	Proportional Band
	0,2	16,0	mA	2,6	rPr420	4-20 mA	
	0,5	15,0	bar	2,4	rPr015	SPR 0-15 bar	
	1,0	25,0	bar	3,5	rPr025	SPR 0-25 bar	
	1,0	30,0	bar	3,5	rPr030	SPR 0-30 bar	
	1,0	45,0	bar	5,2	rPr045	SPR 0-45 bar	
	0,1	5,0	Vdc	0,8	rUu-05	0-5 Vdc	
	1,0	30,0	bar	3,5	rPu030	SPU 0-30 bar	
	1,0	45,0	bar	5,2	rPu045	SPU 0-45 bar	
	0,2	10,0	Vdc	1,6	rUu010	0-10 Vdc	

Table - MENU "PARA"

5.10 Set-up sequence for configuration parameters “ConF”



Once the procedure is finished, the regulator starts running with the new parameters, while the display shows the “in” value of the active input

5.11 MENU “ConF”

The following table shows the **configuration parameters** relating to the operating modes of the controller. With the software mode selection, all the “conF” parameters are automatically charged

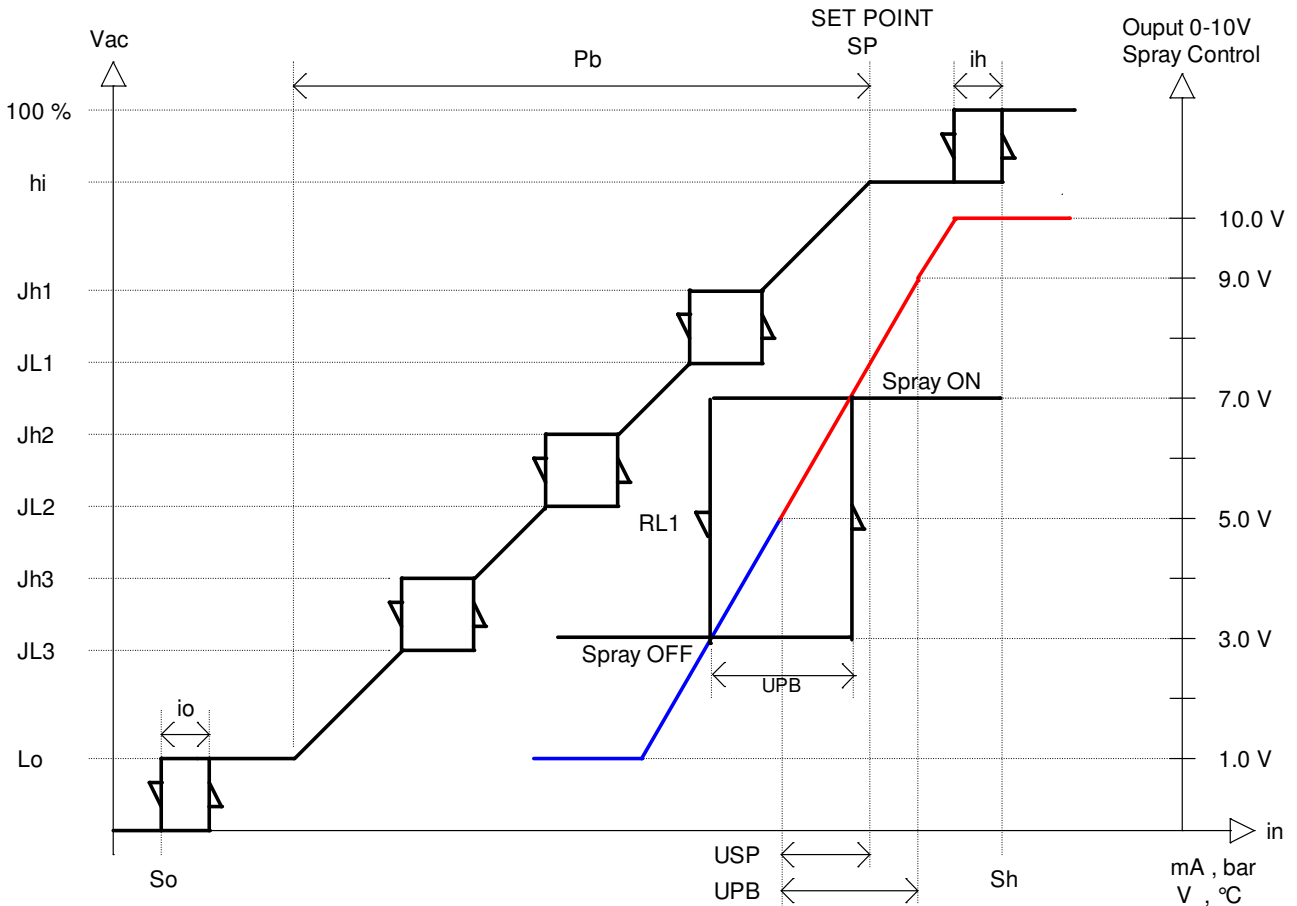
Display			Default	Description	
Code	Value	UM			
c0	GP	off	r2	Operation	Slave Regulator: using input IN1
	r1	off			Master Regulator: using input IN1
	r2	off			Master Regulator: using both inputs IN1 and IN2
c1	oFF	off	hi	Input selection	Always using the probe connected to IN1
	Lo	off			Using the probe with the LOWEST value
	hi	off			Using the probe with the GREATEST value
c2	020	mA	°C	Input type	Current signal 4-20mA for MASTER mode
	420	mA			Current signal 4-20mA for SLAVE mode
	05	V			Voltage signal 0-5Vdc for MASTER mode
	010	V			Voltage signal 0-10Vdc for MASTER or SLAVE mode
	ntc	°C			Kohm signal 10K @25°C for MASTER mode
c3	oFF	off	oFF	Linear conversion	No conversion
	015	bar			Conversion 4mA > 0 bar / 20 mA A 15 bar for transducer 0-15 bar
	025	bar			Conversion 4mA > 0 bar / 20 mA A 25 bar for transducer 0-25 bar
	030	bar			Conversion 4mA > 0 bar / 20 mA A 30 bar for transducer 0-30 bar
	045	bar			Conversion 4mA > 0 bar / 20 mA A 45 bar for transducer 0-45 bar
	030	bar			Conversion 0,5 V > 0 bar / 4,5 V > 30 bar for transducer 0-30 bar
	045	bar			Conversion 0,5 V > 0 bar / 4,5 V > 45 bar for transducer 0-45 bar
c4	oFF	off	hi	Set-point position	Power Unit Mode (OFF-Set-Point)
	Lo	off			Set-point at the MINIMUM of the regulation characteristic
	hi	off			Set-point al MAXIMUM of the regulation characteristic
c5	0-15	off	8	Cos-phi adjustment	Power factor (Cos-phi) adjustment
c6	0	off	0	RL1 relay management	RL1 = OFF > RGM = K.O.
	1	off			RL1 = OFF > RGM = K.O. + S2=ON
	2	off			RL1 = OFF > RGM = K.O. + S2=ON + U/V/W = 0Vac
c7	0	off	1	Analog control output 0-10V	For the control of further 0-10Vdc or 10-0Vdc SLAVE units
					For the 1-10V Master control of the external Spray unit (WS-Spray)
					For the 0-10V Master control of a motorized valves, dumpers, etc.
					For the 10-0V Master control of a motorized valves, dumpers, etc.

Table - MENU “ConF”

6.0 Function diagrams

6.1 MASTER Regulator - Function Diagrams

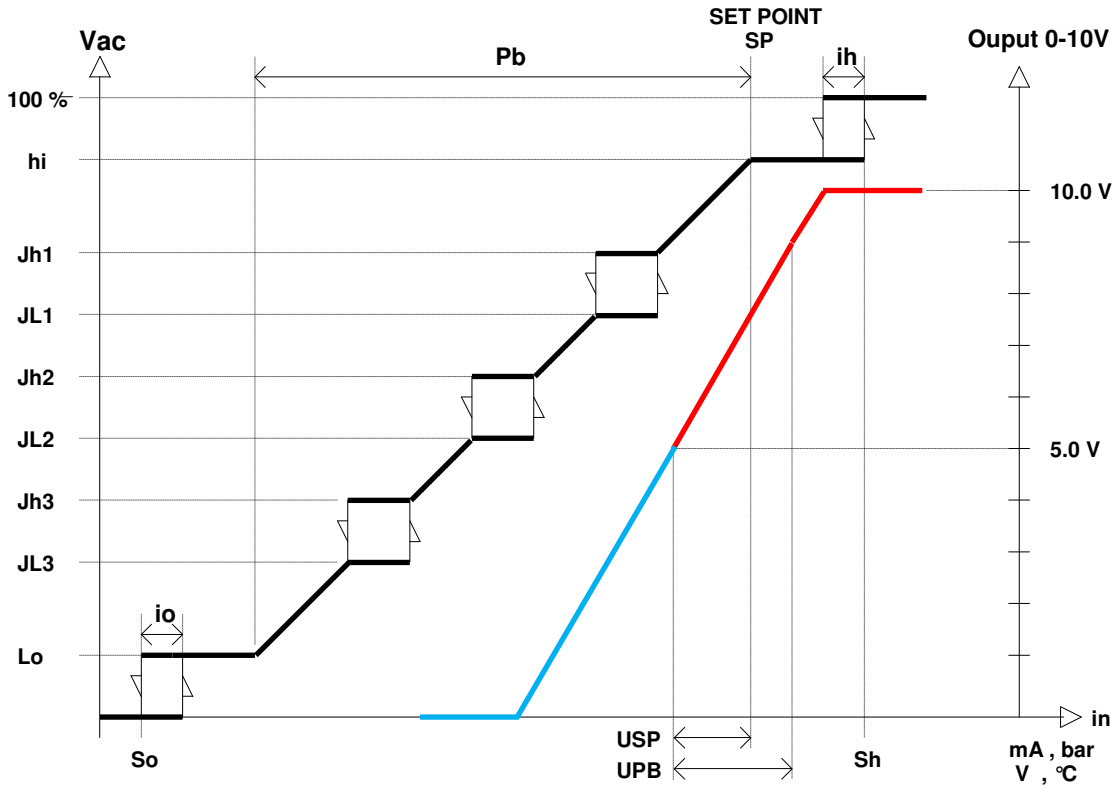
Control	Proportional	Set-Point	MAX RPM%
Characteristic	Direct	Analog Output	Spray Unit Control (C6=3)



SP	Set-point in use (mA-Vdc-°C-bar)
in	Signal value at the selected input
Lh	Maximum night RPM% limit
Jh 1, 2, 3	Upper limit of the AC voltage “jump-zone” (for N.3 zones)
JL1, 2, 3	Lower limit of the AC voltage “jump-zone” (for N.3 zones)
USP	Activation of the external Spray Unit: Set Point UR%
UPb	Activation of the external Spray Unit: Proportional Band UR%
Sh	Input signal value (mA-Vdc-°C) forcing the output up to 100%
ih	Hysteresis of the input signal value Sh (mA-Vdc-°C)
So	Input signal value (mA-Vdc-°C) forcing the output down to 0%
io	Hysteresis of the input signal value So (mA-Vdc-°C)
hi	Maximum RPM % limit
Lo	Minimum RPM % limit
Pb	Proportional Band in use (mA-Vdc-°C-bar)

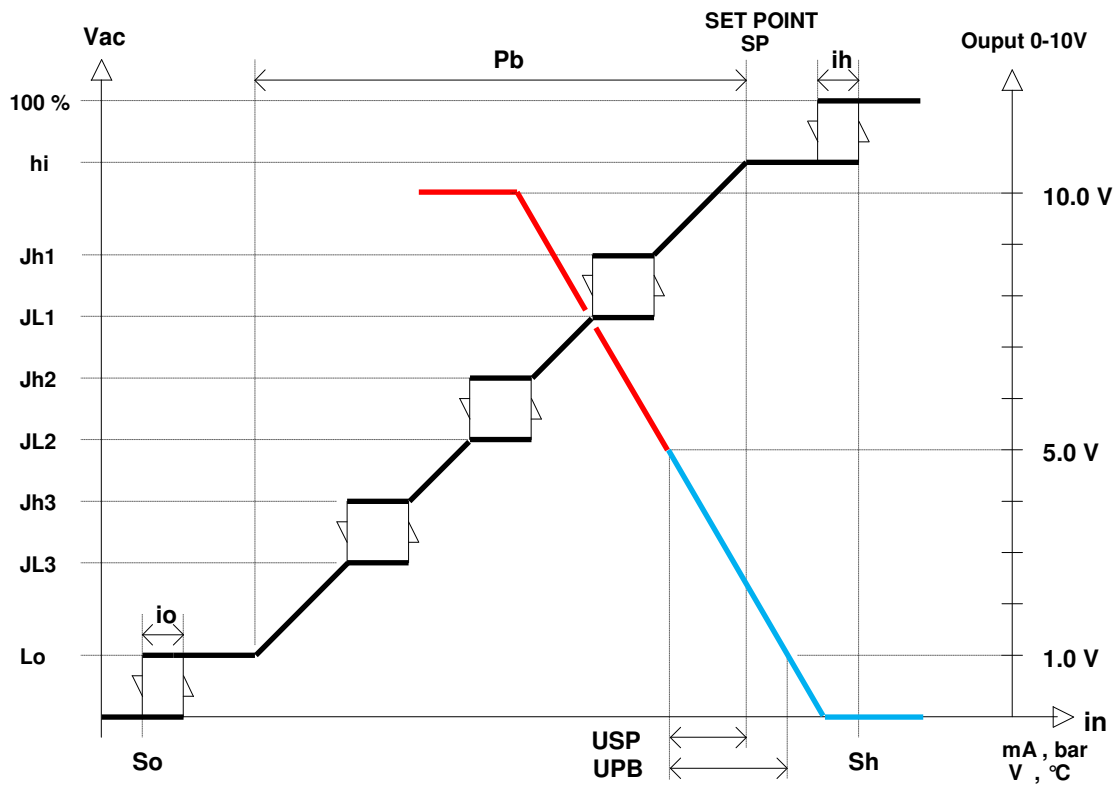
Control	Proportional
Characteristic	Direct

Set-Point	MAX RPM%
Analog Output	0-10V (Direct)



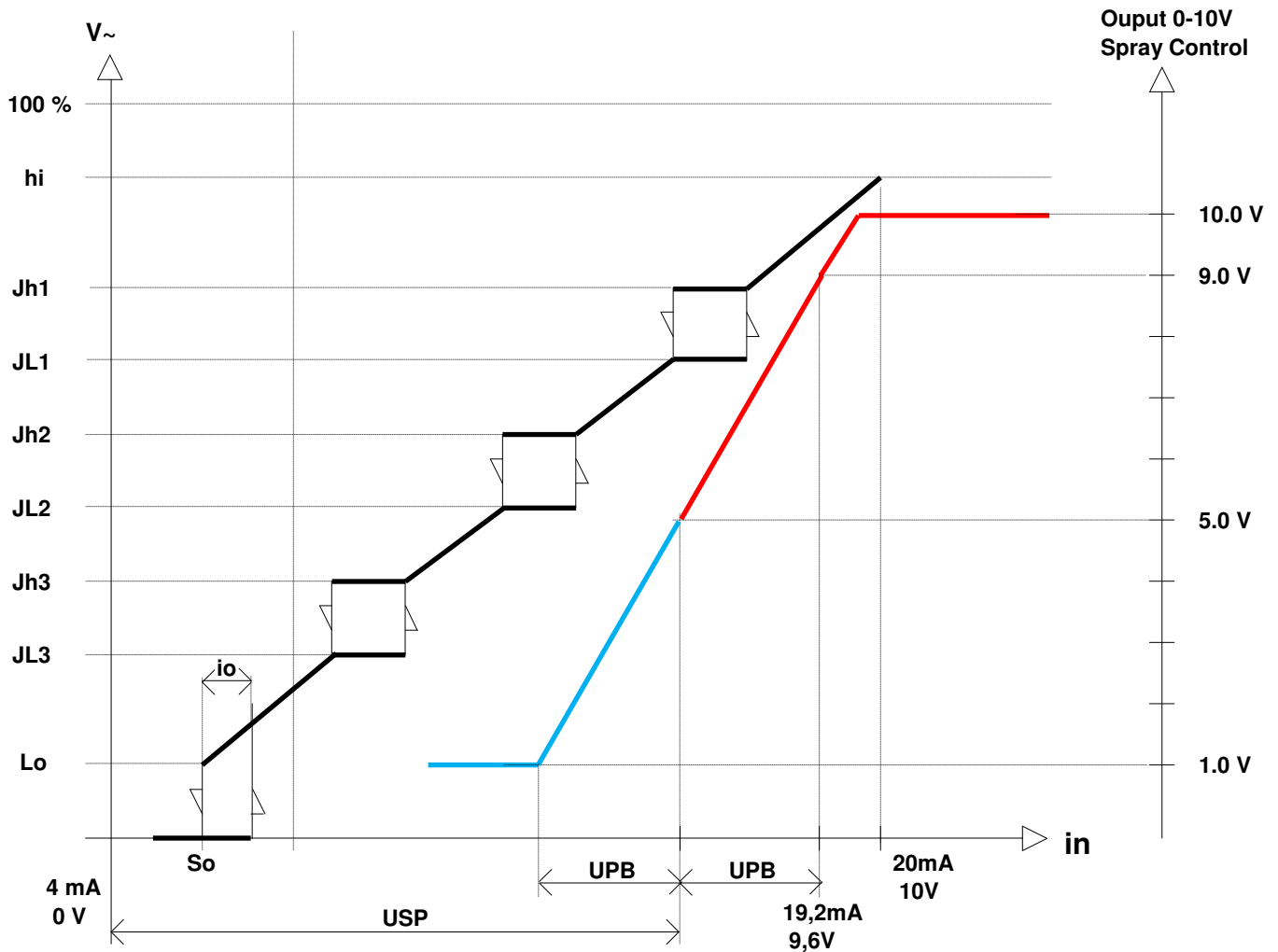
Control	Proportional
Characteristic	Direct

Set-Point	al RPM%
Analog Output	10-0V (Reverse)



6.2 SLAVE Power Unit - Function Diagrams

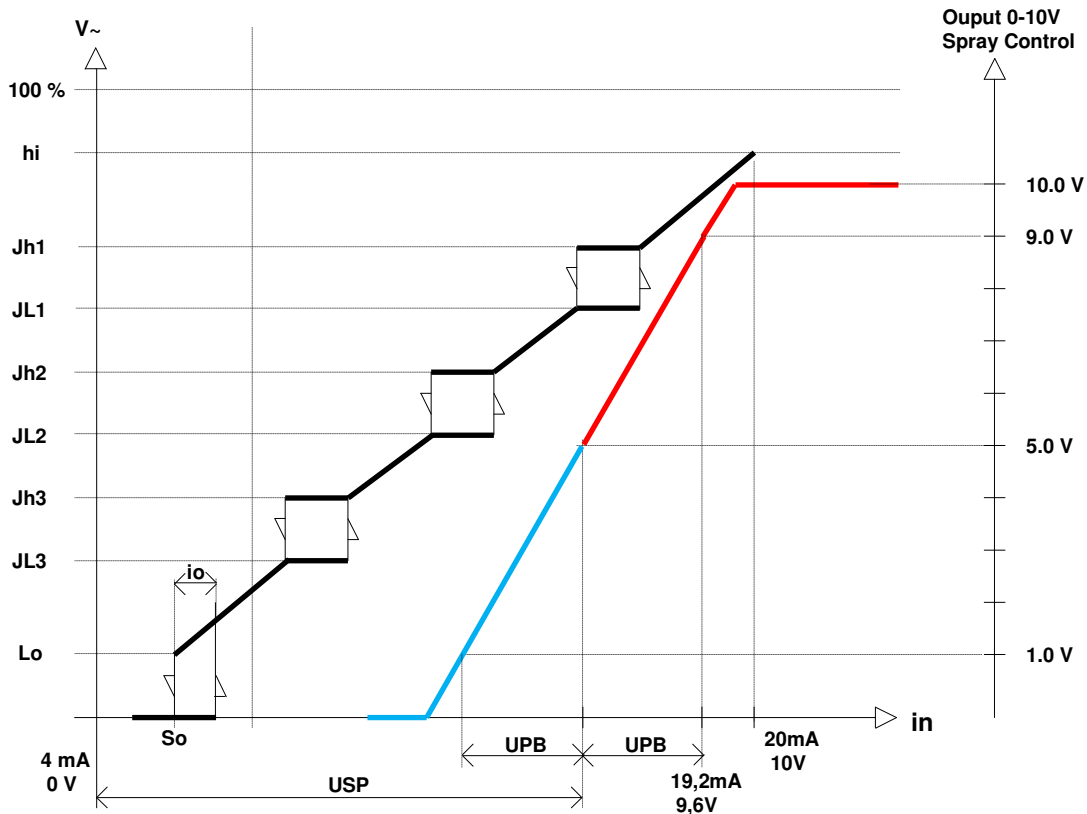
Control	Proportional	Limit	MAX RPM%
Characteristic	Direct	Analog Output	active UR% control



in	Signal value at the selected input (Vdc-mA)
i1	Value of the input signal n°1 (Vdc-mA)
Lh	Maximum night RPM% limit
Jh 1, 2, 3	Upper limit of the AC voltage “jump-zone” (for N.3 zones)
JL1, 2, 3	Lower limit of the AC voltage “jump-zone” (for N.3 zones)
USP	Activation of the external Spray Unit: Set Point UR%
UPb	Activation of the external Spray Unit: Proportional Band UR%
So	Input signal value forcing the output down to 0%
io	Hysteresis of the input signal value So
hi	Maximum RPM % limit
Lo	Minimum RPM % limit

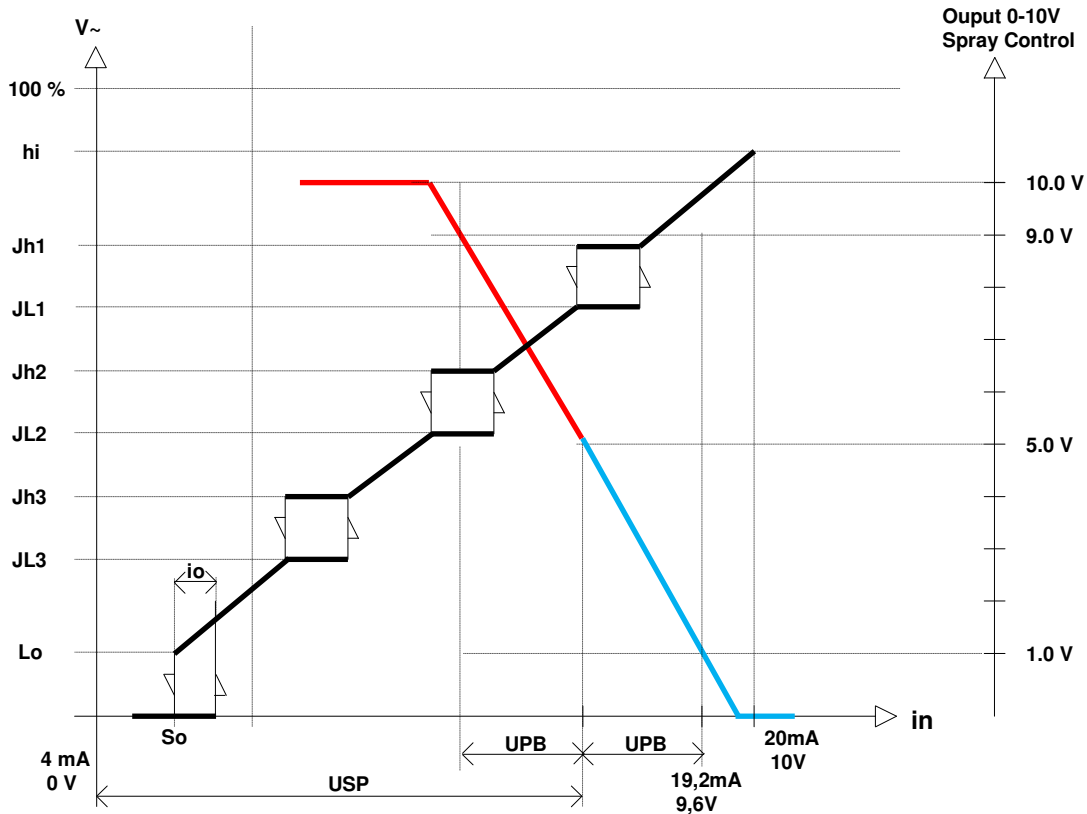
Control	Proportional
Characteristic	Direct

Limit	MAX RPM%
Analog Output	0-10V Direct







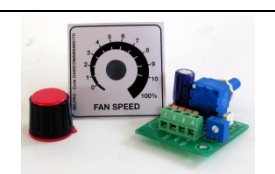
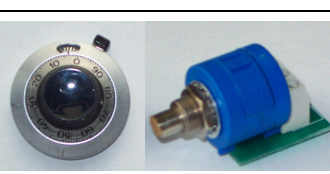
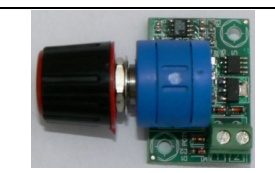
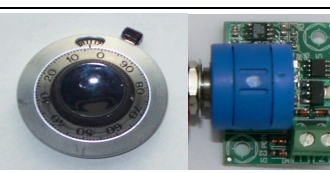
Control	Proportional
Characteristic	Direct

Limit	MAX RPM%
Analog Output	0-10V Reverse



7.0 Accessories

7.1 – Manual Remote Control Units

	<p>◆ Series of potentiometers for manual remote control</p> <ul style="list-style-type: none"> - Potentiometer for external remote control - Manual speed setting with 0-10 Vdc - Available 1 & 10 turn versions, with standard knob Ø 22 and silk screen label - Available 10 turn version, with knob Ø 30 with 100 Set-points - Mounting in switch cabinet doors, shaft length 15 mm, Ø 6.3 mm - Complete with front plate 50 x 50 mm 	
 <p>ZC RGF PB1034 00000</p>	<p>Linear potentiometer for 0-10 Vdc remote manual control</p> <p>1 turn – 10kohm – 1 W – in Cermet</p> <p>Front plate with silk screen label 50 x 50 mm and knob diameter Ø 22</p>	
 <p>ZC RGF PB1050 10000 with Ø 22 knob</p>	<p>Linear potentiometer for 0-10 Vdc remote manual control</p> <p>10 turns – 10kohm – 3 W – wire</p> <p>Front plate with silk screen label 50 x 50 mm</p>	 <p>ZC RGF PB1050 20000 with 100-points, Ø 30 knob</p>
 <p>ZC RGF PB1035 10000 with Ø 22 knob</p>	<p>AC voltage converter for manual control:</p> <p>Input 24Vdc >>> Output 0-10Vdc with adjustable MAX Vdc-Out LIMIT, for the regulation of:</p> <ul style="list-style-type: none"> - Fan motors - Geared motors for shutters - Geared motors for motorized valves <p>Front plate with silk screen label 50 x 50 mm</p>	 <p>ZC RGF PB1035 20000 with 100-points, Ø 30 knob</p>
 <p>ZC RGF PB1040 10000 with Ø 22 knob</p>	<p>AC voltage converter for manual control:</p> <p>Input 24Vdc >>> Output 4-20mA for the regulation of:</p> <ul style="list-style-type: none"> - Fan motors - Geared motors for shutters - Geared motors for motorized valves <p>Front plate with silk screen label 50 x 50 mm</p>	 <p>ZC RGF PB1040 20000 with 100-points, Ø 30 knob</p>

7.2 SPR-Pressure Transducer for 4-20 mA & 0-5 V

Description	Trasduttore	
	Control signal	4 ... 20 mA
Power supply	8 ... 28 V	5 V +/- 0,25V
Range (bar)	0 ... 15/25/30/45	0 ... 30/45
Linearity	< 0,5 % FS max	
Temperature compensation	0° ... 50°C	
Electrical connection	2 fili	3 fili
Connection	Male or Female	
Mechanical connection	7/ 16" - 20 UNF	
Protection	IP 65	



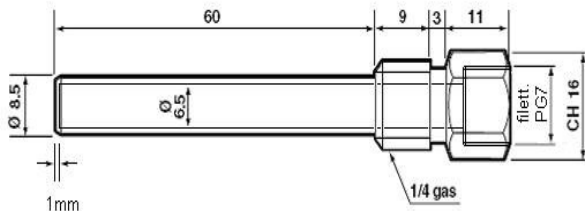
7.3 STE-Temperature probe NTC (10 kohm@25°C)

Sensor	NTC probe with resinated terminal
Connection	Silicon (light blue) 3.0 mt cable
Terminal	INOX AISI 304 6 x 40 mm.
Work range (°C)	-50 T 110



7.3.1 STP housing for NTC

Housing	Protection box for NTC probe
Screw	1 / 4" GAS
Component	INOX AISI 304 da 8,5 x 75 mm.



7.4. RGF-MEI(4) / UNIVERSAL input Expansion Module

Electronic "All-Round" unit for the connection of 4 additional control and regulation inputs, for all applications with:
Control inputs: **4-20mA, NTC(10k), 0-5Vdc, 0-10Vdc, 0-20mA**
Regulation output: **0-10 Vdc / 0-20 mA**

Selectable MASTER-SLAVE function for:

- NTC Temperature, Pressure, Remote signals, etc.
- Automatic selection between the MAX/MIN values
- OUTPUT connection to other MEI units (max 3)
- LEDs for the visualization of active inputs
- Power supply protection with fuse
- Power supply "surge" protection
- INPUT total protection against short-circuit
- Protection filters against input signal surge



7.5 Noise (Extra-dB) Suppression Filter for Phase-Cutting Regulators

By applying the NTF filter between the regulator and the fan motor, it is possible to reduce the extra-dB noise generated by the electronic regulation.

The NTF noise filter can be used only with fans controlled by SCR (phase-cutting) AC voltage controllers.

The noise filter consists of a choke and condensers (one for each phase) for reactive-current compensation.

The choke is directly connected to the controller output.

The filter **MUST NOT** be OPERATED nor SUPPLIED in absence of a connected fan.

- Protection with: **IP 55 Box**

- Power Supply:

3~ 230/420/500Vac +/-10% – 50/60 Hz (standard)

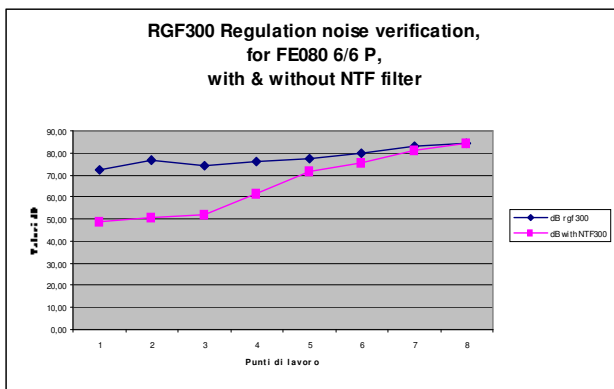
The size of the condensers combined with the filter (MAX 2 condensers per filter) depends on the power (Ampere) of the connected fans.



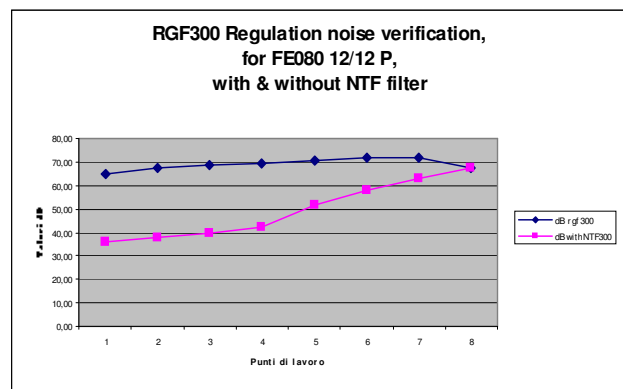
The following tables show the typical noise transfer functions (extra dB value) for the RGF300 (Three-phase cutting regulator) with and without NTF filter.

The values refer to the regulation with NTF noise filter (in red) and without NTF noise filter (in blue).

FE080-SDA.6N.2NV 6/6 P



FE080-NDA.6K.2NV 12/12 P

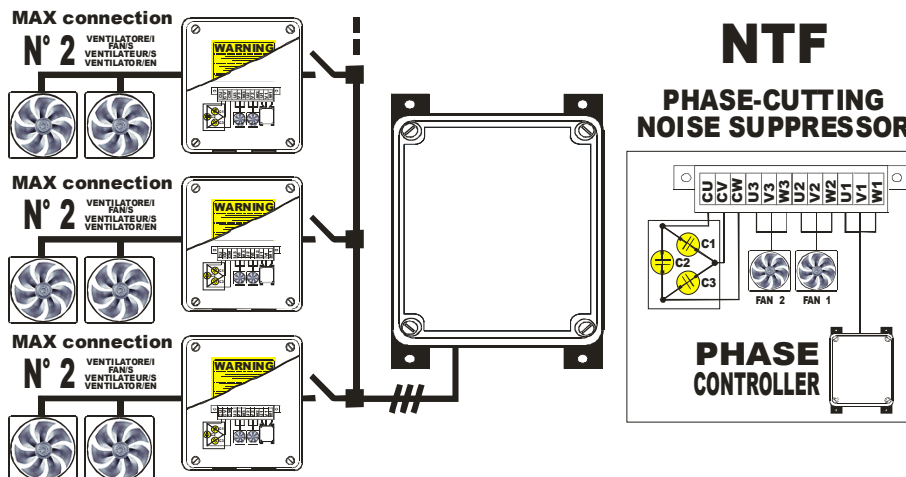


Connect only 1 or 2 (MAX!) fans to the NTF filter;

The given μF value refers to the 3 condensers connected to the three phase lines (1 for each phase)

! WARNING !

Do NOT use the NTF filter in absence of a connected fan: by doing so, the SCRs thyristor of the RGM300 regulator will be damaged



7.6 HWF300 - Filter for the suppression of Harmonic Distortions (IEC 61000-3-2 & 61000-3-12)

By applying the HWF300 active filter, between the regulator and the supply line, the harmonic distortions generated by the electronic regulation with SCR can be reduced by 100%.

The filter is directly connected to the Vac input of the controller and must be properly installed in order to ensure the declared performance.

- Protection degree: **IP 20** standard
IP 55 (on request)
- Power supply:
3~ 400Vac +/-10% – 50 Hz
3~ 460Vac +/-10% – 60 Hz

The size of the filter combined with the controller depends on the power (Ampere) of the connected fans.



On working the regulator RGM300 can create a max. of 30% of the noises produced by the inverter; the report is 1 to 3. Moreover the VAC controller don't produce noises at 0% & 100% of the VAC output. The indicated working point refers to the peak noise level caused by the phase-cutting regulators.

The HWF-320 (20 A) active filter is for all the applications until 60A.

8.0 RGM 300 - Electrical TESTS

Electrical connection for the following tests:

A) Voltage check (electric strength test), according to CEI EN 60204-1

The electrical equipment must support a test voltage applied for at least 1'' (seconds) to all circuit conductors, except for equipotential protection circuits and PELV (Protective Extra-Low Voltage) circuits.

The test voltage must:

1. be the double of the rated supply voltage of the equipment, or be at least of **1000 Vdc** (it is recommended to choose the higher value between the two options);
2. have a frequency of 50Hz, and
3. be equipped with a transformer with minimum rated current of 500VA

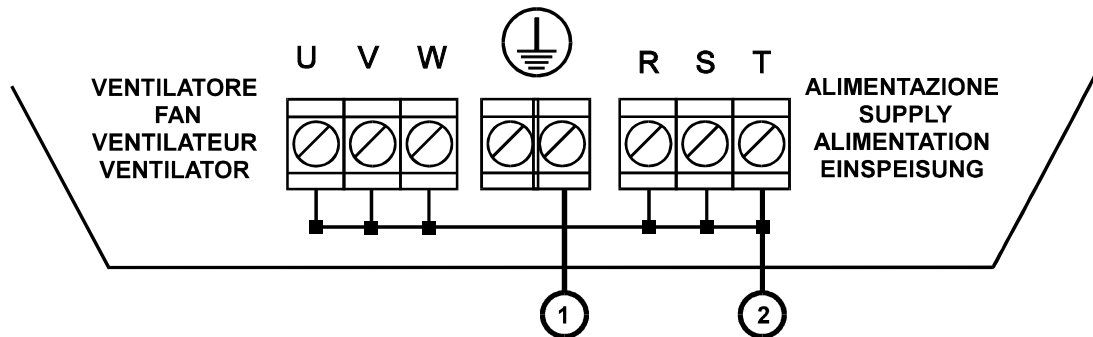
The components which cannot support these voltages must be disconnected during the test.

The test voltage must be applied between the points **1** and **2** as shown in **figure**.

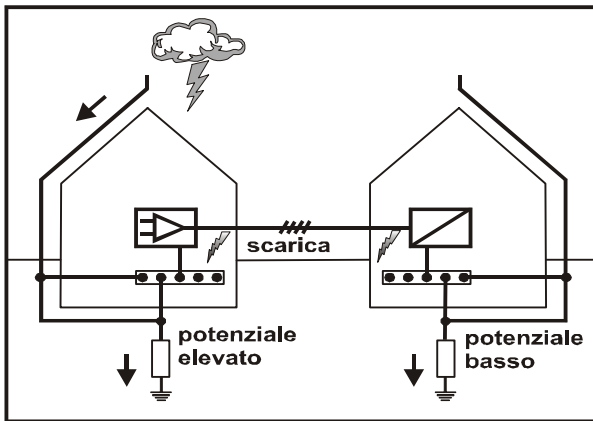
B) Insulation resistance test, according to CEI EN 60204-1

The insulation resistance, measured at **500 Vdc** between the power and the equipotential bonding conductors, must NOT be lower than 1 Mohm.

The test must be performed between the points **1** and **2** as shown in **figure**.

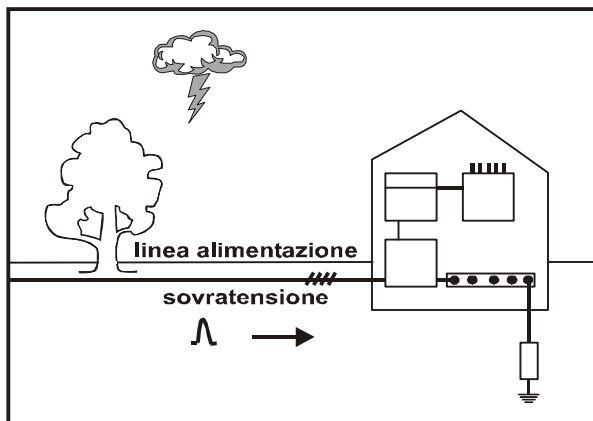


Identification of the sources of OVERVOLTAGE hazards



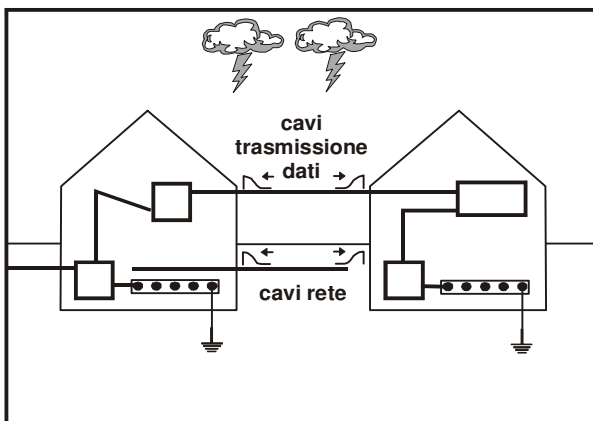
DIRECT ATMOSPHERIC DISCHARGE

When a lightning strikes directly a building equipped with a common protection system, the components connected to the system (supplementary system) reach a significant electric potential. This event determines such potential differences between the components connected to earth and the active components, that the insulation protection is not strong enough to stand it. As a result, the discharge causes irreparable damages to the electric equipment.



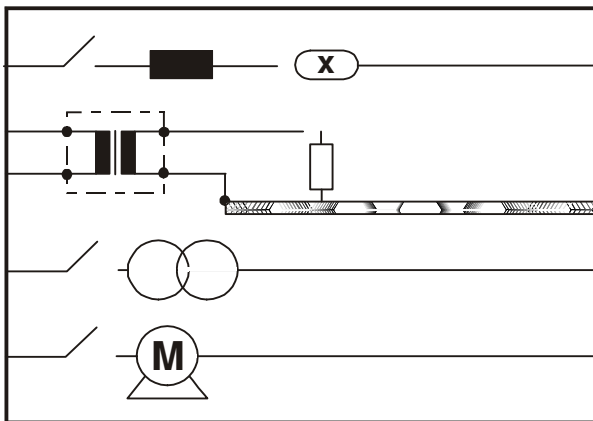
INDIRECT ATMOSPHERIC DISCHARGE

When a lightning strikes directly an electricity supplier, even if remarkably distant from the building, or when it reaches a mains supply cable or the earthing system by flowing through the roots of a tree, the generate overvoltage also in this case may cause severe damages to the electric equipment.



CLOUD TO CLOUD DISCHARGE

When the discharge does not take place between a cloud and the earth's surface, but within two different clouds (intercloud or cloud-to-cloud discharge), the generated overvoltage may even indirectly cause severe damages to the electric equipment.



OVERVOLTAGES DUE TO ON / OFF SWITCHING

Also the operation of power drives in electricity supply networks and in low voltage networks may cause overvoltage. Overvoltage may arise, for instance, by switching off high voltage lines by no-load operation, or by switching on and off transformers, condensers, heavy inductive loads, etc.

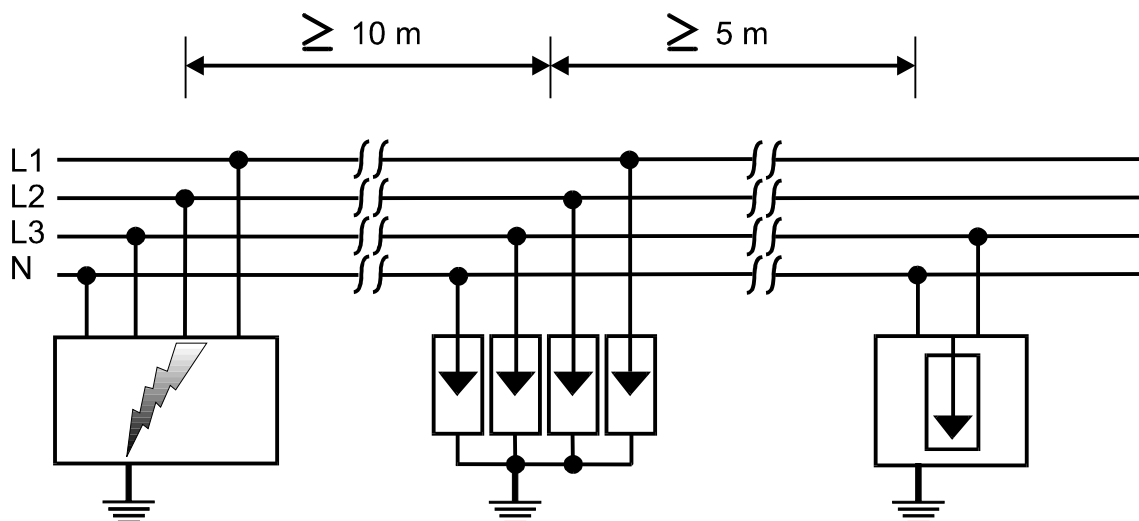
Connecting Conductors and their Cross Section

For the connection of an overvoltage protector to the mains network (L1, L2, L3, N), the cross section of the conductor must be of the same size as the cross section of the existing conductor.

Otherwise, in case the cable has a smaller rated section, it is necessary to provide a surge protection by means of a 100A fuse, gL type.

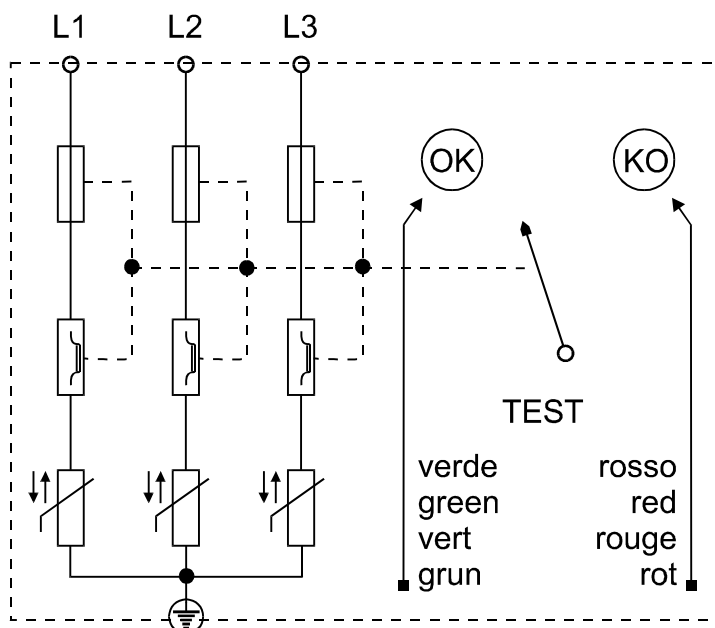
For the connection of the overvoltage protector to the ground, the rated cross section of the conductor must measure the 50% of the main equipotential bonding conductor cross section; in any case it doesn't have to be smaller than 6 mm, nor larger than 25 mm.

The connector between overvoltage protector and earth must be installed so as to be as shorter as possible.



The figure below shows the circuit diagram of a three phase surge filter, for the connection of a controller RGM300 to the supply line.

The filter has a small window, situated on the interchangeable cartridge, which shows the status of the overvoltage protector (OK = green - KO = red).



Product Request

Company name			
Address			
Reference to			
E-mail		Tel / Fax	

Technical data

Mode	Regulation	Application Request		Input/S Working Mode		
				Transducer Signal/S Type	N°	Inputs Work
<input type="checkbox"/> Master <input type="checkbox"/> Slave <input type="checkbox"/> Proportional <input type="checkbox"/> P.I.D. Plus	<input type="checkbox"/> Automatic <input type="checkbox"/> Manual	<input type="checkbox"/> Condenser <input type="checkbox"/> Dry-Cooler <input type="checkbox"/> Evaporator	Option : <input type="checkbox"/> Modbus <input type="checkbox"/> Clima Synergy	<input type="checkbox"/> 0-1 V <input type="checkbox"/> 0-5vdc <input type="checkbox"/> 0-10vdc <input type="checkbox"/> 4-20ma <input type="checkbox"/> 0-20ma <input type="checkbox"/> Ntc <input type="checkbox"/> Pwm (Max 30v) <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> Highest In Value > Drive <input type="checkbox"/> Lowest In Value > Drive <input type="checkbox"/> Medium <input type="checkbox"/> Differential

Regulator Type	<input type="checkbox"/> Digital Micro-Processor <input type="checkbox"/> Analog	<input type="checkbox"/> Multifunction All-In-One	<input type="checkbox"/> Specialized
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Power Mode	<input type="checkbox"/> Steplless	<input type="checkbox"/> Step - Step N° <input type="text"/>	Note : <input type="text"/>
	<input type="checkbox"/> Inverter (Hz) <input type="checkbox"/> Phase-Cut (Vac)	<input type="checkbox"/> Transformer <input type="checkbox"/> Vac On-Off	

Compliance	<input type="checkbox"/> CE <input type="checkbox"/> EMC (<input type="checkbox"/> PDS <input type="checkbox"/> CDM) <input type="checkbox"/> LHC (Limit Harmonic Current)					<input type="checkbox"/> UL <input type="checkbox"/> ETL <input type="text"/>
	<input type="checkbox"/> HARMONIC <input type="checkbox"/> BURST <input type="checkbox"/> SURGE <input type="checkbox"/> CONDUCTED RF <input type="checkbox"/> RADIATED RF	<input type="checkbox"/> Rhos Note : <input type="text"/>				

Target Price	<input type="text"/> ,00 €	Quantity	<input type="text"/>	Delivery	<input type="text"/>
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Power Supply	<input type="checkbox"/> Single Phase <input type="checkbox"/> Threephase <input type="checkbox"/> Threephase + Neutral <input type="checkbox"/> Three-single phases	Automatic Selection <input type="checkbox"/> 50/60Hz
	<input type="checkbox"/> 230 Vac <input type="checkbox"/> <input type="text"/> Vac Vac Range <input type="checkbox"/> 50Hz	
	<input type="checkbox"/> 400 Vac <input type="checkbox"/> <input type="text"/> Vac <input type="checkbox"/> + % <input type="checkbox"/> - % <input type="checkbox"/> 60 Hz	

Input /s	<input type="checkbox"/> mA <input type="text"/> <input type="checkbox"/> Vdc <input type="text"/> <input type="checkbox"/> 10 kohm @ 25 °c (NTC) <input type="checkbox"/> other <input type="text"/>
	N° <input type="text"/> N° <input type="text"/> N° <input type="text"/> N° <input type="text"/>

Auxiliary Contacts & Inputs	<input type="checkbox"/> Remote On-Off <input type="checkbox"/> Alarm Relay <input type="checkbox"/> Night Rpm% Db-Limit <input type="checkbox"/> Direct-Reverse
	<input type="checkbox"/> 2 nd Set-Point <input type="checkbox"/> Autoc - Manual <input type="checkbox"/> NTC Field-Forward <input type="checkbox"/> MODBUS (RTU)
	<input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/> <input type="checkbox"/> <input type="text"/>

Regulation mode	Sensor n° 1 (Master)	Set-point from <input type="text"/> to <input type="text"/>	<input type="checkbox"/> bar <input type="checkbox"/> °c <input type="checkbox"/> mA <input type="checkbox"/> Vdc
	Sensor n° 2 (Master)	Set-point from <input type="text"/> to <input type="text"/>	<input type="checkbox"/> bar <input type="checkbox"/> °c <input type="checkbox"/> mA <input type="checkbox"/> Vdc
	Remote (Slave)	Input from <input type="text"/> to <input type="text"/>	<input type="checkbox"/> bar <input type="checkbox"/> °c <input type="checkbox"/> mA <input type="checkbox"/> Vdc

Other outputs	<input type="text"/>
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Protection	Box type : <input type="text"/>	Ip : <input type="text"/>	Dimensions : <input type="text"/> x <input type="text"/> x <input type="text"/>	°C working ambient : <input type="text"/>
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Fan technical data		Customer name		Code	
Type	Transmission	Supply (Vac)	Load (amp)	Power (watt)	Frequency (Hz)
<input type="checkbox"/> axial	<input type="checkbox"/> direct	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/> centrifugal	<input type="checkbox"/> with belt	Rpm <input type="text"/>	Pole N° <input type="text"/>	Insulation class <input type="text"/>	N° of fans <input type="text"/>

Available regulation with :	INVERTER	<input type="checkbox"/> yes <input type="checkbox"/> no	PHASE CUTTING ?	<input type="checkbox"/> yes <input type="checkbox"/> no	Auto-TRANSFORMER	<input type="checkbox"/> yes <input type="checkbox"/> no
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Soluzioni per la regolazione dei ventilatori

Fan speed control solutions

Soluciones para la regulación de ventiladores

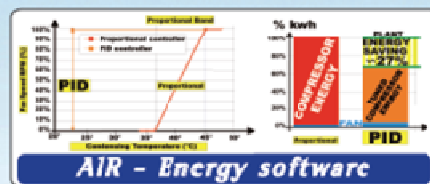
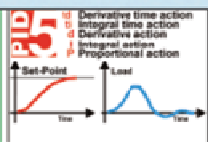
Des solutions pour la régulation des ventilateurs

Lösungen für die Regelung der Lüfter.

Решения для регулировки вентиляторов

the Energy Saver Systems

Dynamic-CONTROL-Technology



AIR - Energy software



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