

## INSTRUCTIONS MANUAL

# Cod. 100

## SINGLE-PHASE UNIVERSAL VOLTAGE REGULATOR



**Rowan Elettronica**

*Motors, drives, accessories and services for automation*

Via Ugo Foscolo, 20 - CALDOGNO - VICENZA - ITALIA  
Tel.: 0444 - 905566 (4 linee r.a.) Fax: 0444 - 905593  
Web: [www.rowan.it](http://www.rowan.it) - E-mail: [info@rowan.it](mailto:info@rowan.it)



# INDEX

Technical description.....	page 3
Standards Conformity/ Operation criteria and possible functions/ Powers Table.....	page 4
Description of microswitches - trimmers - leds connection board.....	page 5
Connection Drawings/connection examples.....	page 6
Series 100 cards coupling with single-phase ROWAN motors.....	page 7
Starting Instructions.....	page 8-9
Circuit serigraphy.....	page 10
Blocks Diagram.....	page 11
Overall Dimensions.....	page 12

## **Warning!**

- **Any use of this apparatus different from which is described in this manual is absolutely forbidden.**
- ROWAN ELETTRONICA s.r.l. declines any responsibility for any errors that may be contained in this manual, caused by stamping error and/or copying/translation. ROWAN ELETTRONICA also reserves the right to change without prior warning any variation which is considered necessary for an improved operation of the product.
- all the data and characteristics given in this manual have a tolerance of  $\pm 10\%$ , if not indicated differently.
- The product guarantee is ex-factory and is valid for 12 months from the date of leaving the ROWAN ELETTRONICA s.r.l. warehouse.
- The electronic equipment may cause situations of danger for the safety of people and objects; the user is responsible for the installation of the apparatus and the conformity of such installation to the regulations in force.
- The application diagrams given in this manual are only indications and must be epitomized by the client according to their needs.
- **The apparatus must only be installed by qualified personnel**, after reading and understanding of this manual, which must be always available for consultation on the apparatus. The supplier should be contacted, for the clarification of any doubts.

# SINGLE-PHASE UNIVERSAL VOLTAGE REGULATOR TYPE 100

## TECHNICAL DESCRIPTION

- 230/400Vac  $\pm 15\%$  50/60 Hz supply.
- Min power 1,25 KVA at 230VAC - max power 74kVA at 400VAC (see power table).
- Standard regulation range of the output voltage from 0 to 95% as regards the input voltage.
- Mixed sort of loads: resistive, inductive - capacitive.
- 4,5 VA max power absorbed by card.
- Working temperature  $-5^{\circ}$   $+40^{\circ}$  C.
- Storing temperature  $-25^{\circ}$ C  $+70^{\circ}$ C.
- Voltage regulation input by means of pot. 10 K $\Omega$  or analog voltage 0/+10 VDC (input resistance 100 k $\Omega$ ).
- Static stop control output selected by usable contact or excitation relay 24 VDC.
- Potentiometer output 470 K $\Omega$  for external ramp control.
- Driving inputs and outputs completely decoupled by high voltage.
- Internal regulations:
  - 1) Min and max regulation range of the voltage set by external potentiometer or analog voltage.
  - 2) Voltage increase/decrease ramp.
- Programming by means of microswitches of:
  - 1) Two kinds of ramp 0,005 - 0,5 sec or 0,2 - 28 sec.
  - 2) Ramp regulation internal/external potentiometer.
- Clutch control board.
- Screw power board.
- Printed circuit with possibility of being inserted on rack, "Europa" type.
- Standard open model on a plate support and with plexiglass lid.
- Model 100, with protection, available on request.

### Internal regulation

- 1) minimum and maximum regulation of the voltage set by external potentiometer or analogic voltage.
- 2) voltage ascent/descent ramp regulation.

### Selection by micro of:

- 1) two ramps regulation fields: 0,005  $\div$  0,5 sec. or 0,2  $\div$  28 sec.
- 2) ramp regulation internal or external potentiometer.

## STANDARDS CONFORMITY

Series Cod.100 voltage regulators conforms to B.T. Regulation 73/23/CEE with reference to the General Norm CEI EN 60204-1.

As regards Electromagnetic compatibility, regulators Series Cod.100 conform to EMC Regulation 89/336/CEE only when connected to the supply net by an adequate anti EMI filter (ElectroMagnetic Interference) supplied by Rowan Elettronica and installed as described on page 9; reference EMC rules are:

- Product Norm CEI EN 61800-3 (Variable speed Electrical drives) in case Cod.100 series cards activate electrical motors;
- General Norms EN 50081-2 and EN 50082-2 for Industrial environment for other applications.

## OPERATION CRITERIA AND POSSIBLE FUNCTIONS

Cod. 100 series card is a universal single-phase line voltage regulator with controlled diodes (SCR). The operation criteria uses a phase firing controller system which is the regulation of the firing angle of two controlled diodes connected in opposed phases in order to give to the load a regulated voltage ranging from 0 to 95% of the line voltage.

The SCR firing angle is perfectly linear and proportional to the variation of external potentiometer or of analog voltage 0 - 10 VDC, on terminals 1 - 3; this allows an easy adjustment of the output regulated voltage by means of programmable logics or PC - AT system or others with a perfect galvanic insulation from high voltage.

These cards have several uses, for example:

- 1) Torque control for single-phase ROWAN motor for small windings (Alquist system) or where it is necessary to make our motors work as dynamic brake/clutch in continuous duty.
- 2) Ventilation manual control with standard motors max 0,75KW each.
- 3) Standard motor control for electric tools, drills, shakers, tapping machines etc..
- 4) Lightning control for power lamps.
- 5) Temperature control on heat-weld resistances or goldsmith's craft ovens.
- 6) Transformer control on output variable voltage feeder units.
- 7) Combined to open-loop processing systems for the automatic regulations of temperature, voltage, current etc.
- 8) Each time you need to regulate the voltage to a single-phase device suitable to be under-supplied.

**Note:** the electronic regulation at phase partialization causes harmonics giving a phase-shifting on the supply line; the user shall evaluate the eventual necessity of a proportional re-phasing.

## POWER TABLE

CODE	Rated P 230Vac (KVA)	Rated P 400Vac (KVA)	In (A)	gL rapid fuses (A)	WEIGHT (Kg)	FAN 230Vac
<b>100 - 100/0</b>	<b>1,25</b>	<b>/</b>	<b>5,5</b>	<b>10</b>	<b>0,55</b>	<b>/</b>
<b>100/1</b>	<b>2,3</b>	<b>4</b>	<b>10</b>	<b>20</b>	<b>0,65</b>	<b>/</b>
<b>100/2</b>	<b>4</b>	<b>7,2</b>	<b>18</b>	<b>32</b>	<b>0,8</b>	<b>/</b>
<b>100.A/4</b>	<b>12,5</b>	<b>22</b>	<b>55</b>	<b>80</b>	<b>1,4</b>	<b>/</b>
<b>100/5</b>	<b>15</b>	<b>26</b>	<b>65</b>	<b>80</b>	<b>3,8</b>	<b>/</b>
<b>100/6</b>	<b>23</b>	<b>40</b>	<b>100</b>	<b>125</b>	<b>4,0</b>	<b>1</b>
<b>100/7</b>	<b>42</b>	<b>74</b>	<b>185</b>	<b>200</b>	<b>4,2</b>	<b>1</b>

When using models without fan, we suggest to install them into ventilated cabinet

## CONNECTION BOARD DESCRIPTION

- 1 = Common negative.
- 2 = Supply voltage for external potentiometer adjustment 10 VDC max 3 MA.
- 3 = Reference voltage input.
- 1- 4 = Static stop external control.
- 5- 6 = Ramp regulation external potentiometer output max 470 K Q
- 7- 4 = Input for static stop relay supply uncoupled from internal relay (on request).
- 8 - 9 Regulated output (load).
- 10-11=Supply line: 220VAC - 380VAC 50/60Hz conform to the internal adjustment ( terminals 9-10 for 100/3/4/5/6/7models).

## MICROSWITCHES DESCRIPTION

- Si open = External ramp regulation.
- Si closed= Internal ramp regulation.
- S2 open = Ramp mm 0,005 sec - max 0,5 sec.
- S2 closed = Ramp mm 0,2 sec - max 28 sec.
- S3 open = Voltage regulation range 0 ÷ 95%.
- S3 closed = Voltage regulation range 0 ÷ 74% (in case of Alquist functioning for single-phase ROWAN motors).

## INTERNAL TRIMMERS DESCRIPTION

- P1 = Min. setting for field regulation.
- P2 = Ramp regulation (it depends on S2).
- P3 = Max setting for field regulation.

## CONTROL LEDS DESCRIPTION

- L1 =  $\pm 12$  V supply is on.
- L2 = It indicates the presence of output regulated voltage. -
- L3 = Static stop relay excitation(optional).

## PRESET AND STANDARD ADJUSTMENT

Series 100 cards, after ROWAN laboratory testing, are pre-set and adjusted as follows:

- 1) Regulation range 0% ÷ 95% (S3 open).
- 2) Short ramp S2 open.
- 3) Acc/dec ramp internal regulation (S1 closed), adjusted with ramp max 0,5 sec.
- 4) Static stop without internal relay (NOT UNCOUPLED).

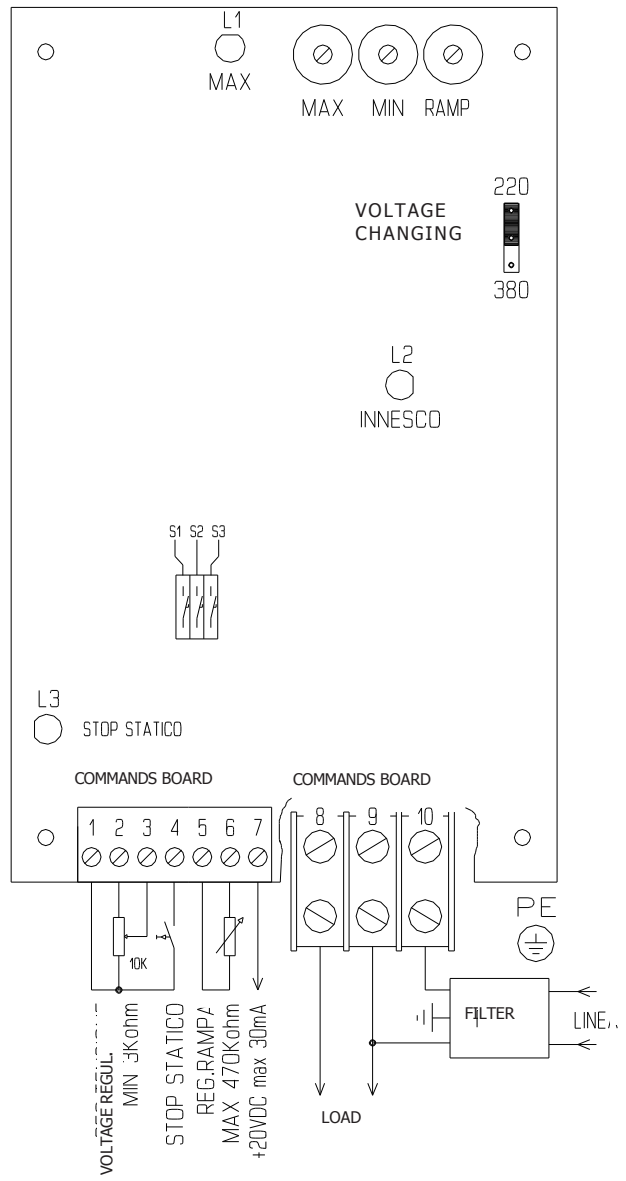
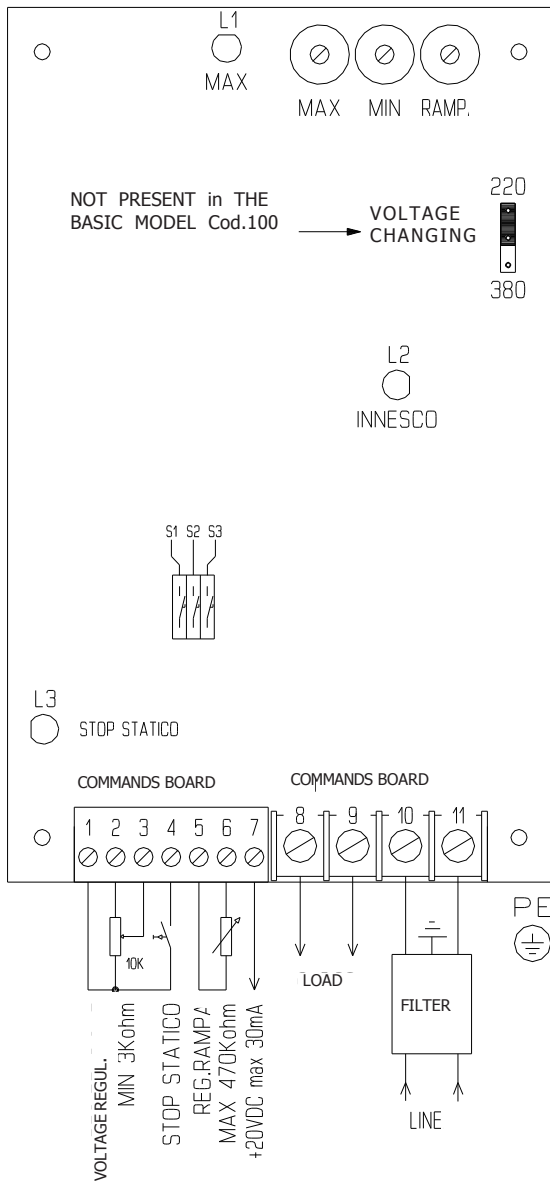
# CONNECTION DRAWINGS AND MICROSWITCHES - TRIMMERS - INDICATORS LAYOUT

BASIC MODEL

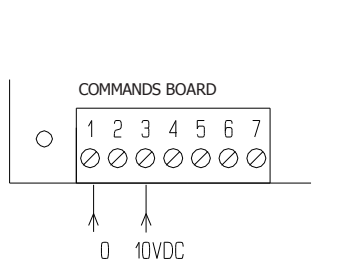
COD.100 E 100/1 /2

MODELS

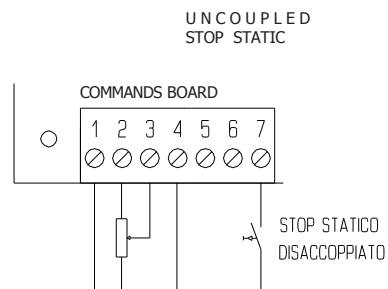
100/3 /4 /5 /6 /7



## COMMANDS BOARD CONNECTION EXAMPLES



VOLTAGE REGULATOR with COMMAND BY ANALOGIC SIGNAL 0/10VDC



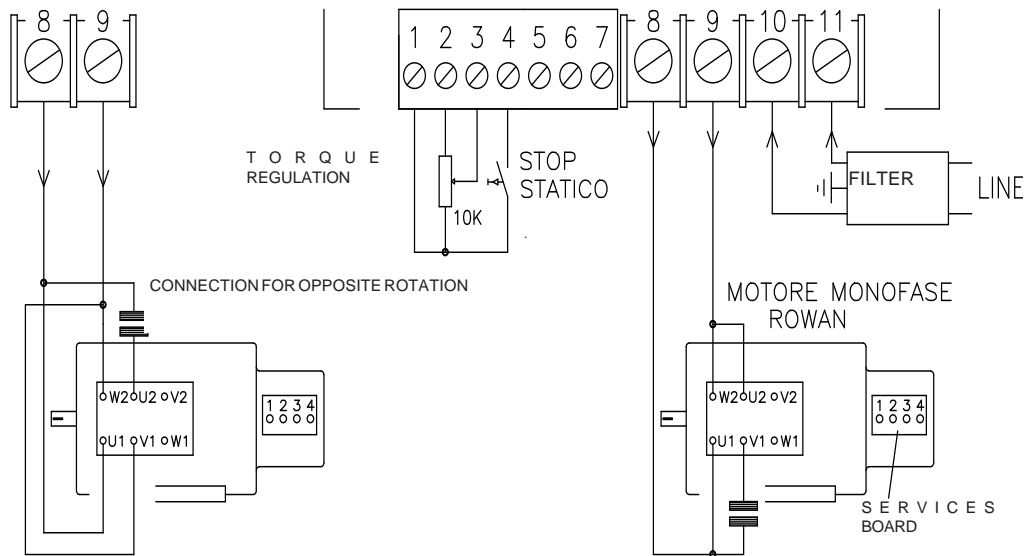
VOLTAGE REGULATOR BY POTENTIOMETER and STOP STATICO COMMAND in CASE OF UNCOUPLED RELAY VERSION

## SERIES 100 VOLTAGE REGULATOR COUPLING WITH SINGLE-PHASE ROWAN MOTORS IN ALQUIST FUNCTIONING OR AS DYNAMIC BRAKE-CLUTCH

Single-phase ROWAN motor is highly sliding and provides almost the same performances of the alquist motor, in fact under the same voltage on the stator windings its torque increases along with the sliding increase up to three times the starting torque. As it supplies a sufficient area with constant power it is irreplaceable in winding functions where the relation between the max ~ and the mm ~ of the coil does not exceed 1/3. This allows the preservation of a constant tension on the material to be wound without any external adjustment if the mechanic system shows a high efficiency (the use of gear down is compulsory). In this case card series 100 supplies the adjustable voltage on the RCWAN motor allowing the setting of the desired tension. The max output voltage must be lower than the line voltage so that the motor absorption results under the rated value even with blocked rotor; for this operation it is necessary to close microswitch S3 which reduces the voltage regulation range (mm 0% - max 74%).

Single-phase ROWAN motor that goes with card series 100, planned for this kind of functioning, can be used in every case where it is necessary an adjustable torque dynamic clutch as in tapping machines or in case of positive stops with energized motor.

### CONNECTION DIAGRAM for TORQUE CONTROL of SINGLE PHASE ROWAN MOTORS



#### MOTOR SERVICES BOARD

- 1 - 2 FAN: it is necessary to bring the supply voltage 220VAC to these connectors for the separate motor's ventilation.
- 3 - 4 THERMIC PROBE: it is a N.C. contact that opens when the wiring motor temperature gets over 150°C, safety limit corresponding to H class (180°C). It is used as emergency for the running telebreaking removing (the maximum loading of the contact is 1A-230VAC).

## STARTING INSTRUCTIONS

Standard cod. 100 card is planned to work only with 220 VAC voltage.

Standard cod. 100/i /2/3/4 cards are planned to work with two voltages 220/380, therefore, first of all, it is necessary to select the desired voltage by inserting a jumper between terminals 0 - 220 - 380:

Jumper between 0 - 220 supply 220.

Jumper between 0 - 380 supply 380.

CONNECT: the line with terminals 10 - 11, the load with terminals 8 - 9, the regulation potentiometer with terminals 1 - 2 - 3 with a potentiometer extreme connected with terminal 2 where there is the reference voltage +10 VDC. The other extreme with terminal 1, which is the circuit negative, and then the slider with terminal 3.

When the potentiometer cursor is at negative the output 8 - 9 is at 0 VAC. When the slider is at +10 VDC, 8-9 output is at 95% of the supply voltage. Whenever it is necessary to drive the output voltage with an analog signal  $0 \div +10$  VDC, connect the signal negative with terminal 1 and the positive with terminal 3. With input signal 0 VDC the output voltage is 0 VAC, with input signal 10 VDC the output voltage is 95% VAC. During the first testing, before energizing, set the potentiometer or the DC signal so as the output is at 0 VAC. Energize, when led L1 lights up,  $\pm 12$  card supply is on. By regulating the potentiometer or increasing the DC signal led L2 should start lighting up to show the progressive increase of the output alternating voltage up to 95% of the line voltage, the adjustment follows anyway the acc/dec ramp which can be regulated internally by means of trimmer P2. It is possible to obtain a ramp external regulation excluding trimmer P2 by opening microswitch S1 and connecting a potentiometer max 470 Kohm with terminals 5 - 6.

It is possible to select two ranges for the ramp regulation by operating on microswitch S2:

S2 open acc/dec ramp time mm 0,005 sec - max 0,5 sec. S2 closed acc/dec ramp time mm 0,2 sec - max 28 sec.

The regulator standard adjustment, as stated before, goes from a mm of 0% to a max 95.%; if it is necessary to limit the regulation range within different values, it is possible to operate for the mm on trimmer P1 and for the max, on trimmer P3.

In case of intermittent operation with short duty cycles, avoid the continuous control of the supply contactors, which can cause fatigue flashing over or hits, by controlling statically the regulator: by closing a usable contact between terminals 4 - 1 the output voltage will set at 0 with the adjustment ramp (with a min. regulated at 0). By opening the contact the output voltage will set at the max with the same ramp.

On request, there is the possibility of decoupling this contact from card regulation signal, putting on the card itself a 24 VDC relay 1 switch with dual-line socket; by supplying with a 24 VDC Voltage, for example from programmable logic, from terminals 1 negative and 4 positive the relay will be excited and it will perform a static stop, as stated before. If certain jumpers are introduced in the card, it is possible to invert the control with static stop when the relay is deenergized. The supply voltage for this relay can be taken from terminal 7 of the card. The static stop with relay is not standard but it is available on request; this operation is anyway indispensable when the stop contact connections are very long and the decoupling by means of relay avoids hits on the regulation input. The optimum value of the regulation potentiometers is 10Kohm, anyway the card work also with higher value potentiometers; in fact, if it is necessary to pre-set more potentiometers, it is possible to set them in parallel between terminals 1-2 switching each time the slider of the requested one on input 3. It is important, anyway, that the total resistance between terminals 1 - 2, with all the potentiometers in parallel, is not under 3 Kohm.

Series 100 cards are not provided with any kind of amperemeter protection, it is therefore necessary to externally provide with time delay fuses and adequate thermal relay. A special care is required when connecting the regulation inputs (voltage reg. potentiometer - DC 10 V signal - ramp external potentiometer for static stop without relay) to avoid voltage transients or hits; use sheathed cable with earth braid avoiding, if possible, to put it near the power connections or big transformers.

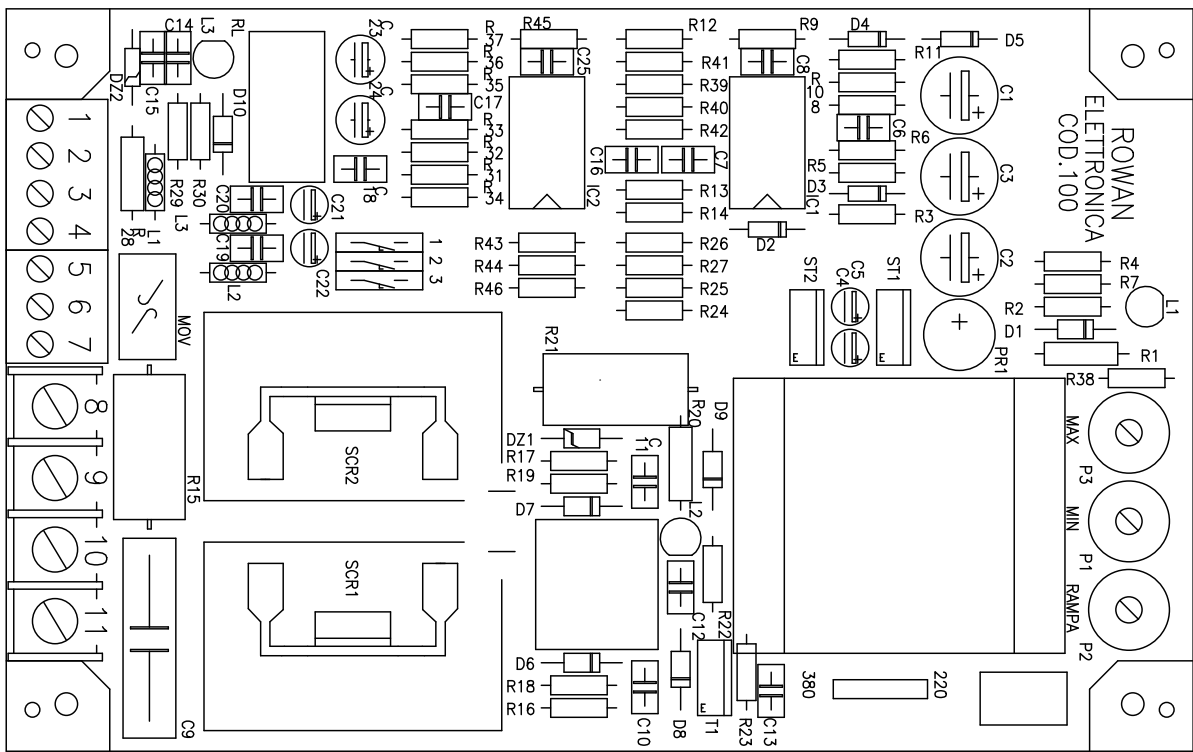


The card works correctly with environment temperatures between -10° and +50° C; higher or lower temperatures can provoke working anomalies or breakdowns; it is therefore necessary to place the card far from heat sources and ventilate the boards if the temperature is very high. For 100/4,/5,/6 and /7 model it is necessary to provide forced ventilation.

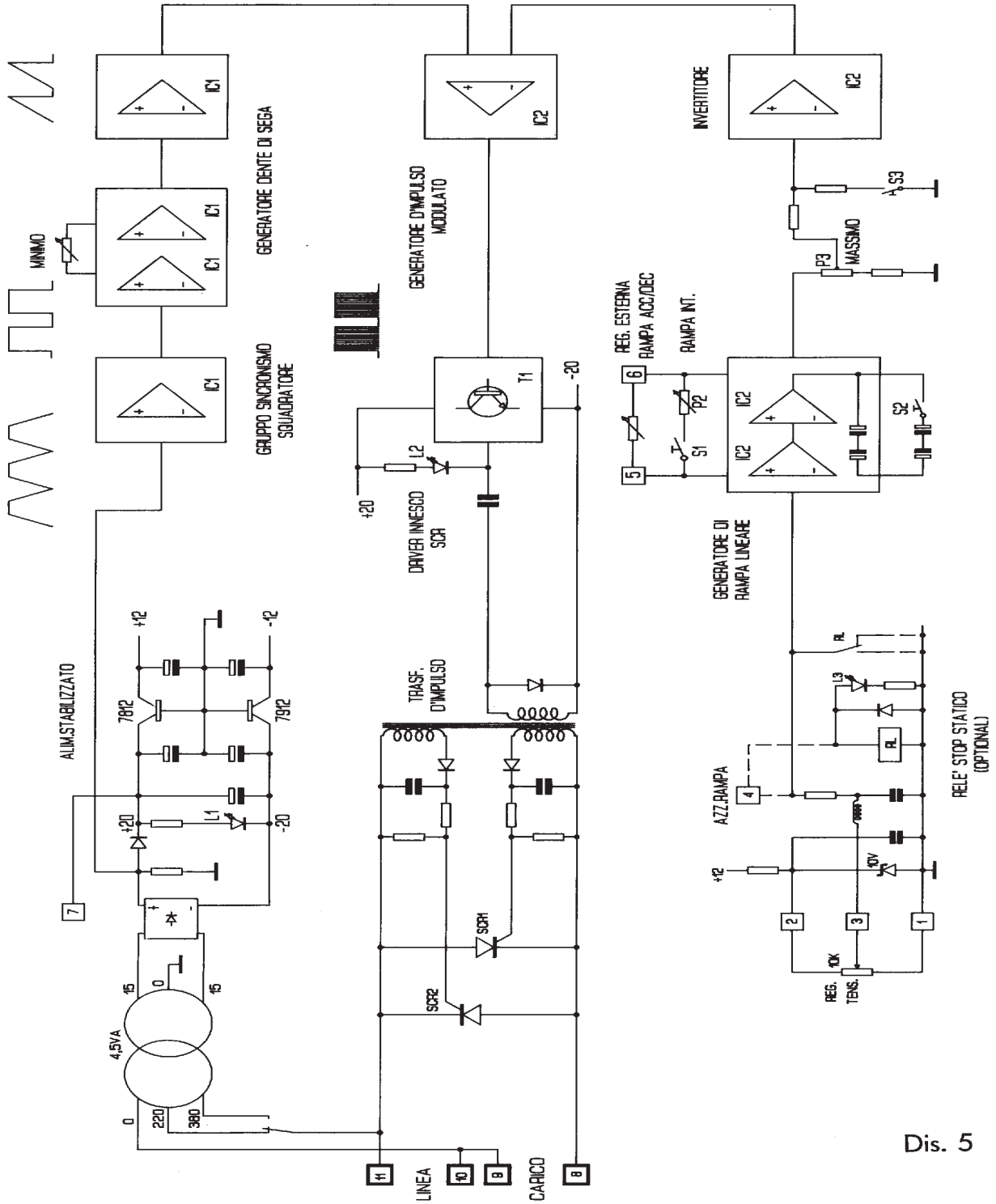
## INSTRUCTIONS TO FOLLOW REGARDING ELECTROMAGNETIC COMPATIBILITY NORMS (E.M.C.)

Series 100 drives have to be supplied by anti E.M.I. filter as described by the connection diagrams on page 6; in case of several C100 cards installed into the same cabinet we can use a unique filter which value is the sum of the line currents. Besides it is necessary using a screened cable for the command connection (potentiometer, tachogenerator) especially when stretches are very long and close to power cables; The cable grip must be connected to earth by one side only and not to the negative of the circuit; besides the drive negative has not to be connected to earth; avoid the nearness with power cables or big transformers and avoid creating earth rings.

## CIRCUIT SERIGRAPHY

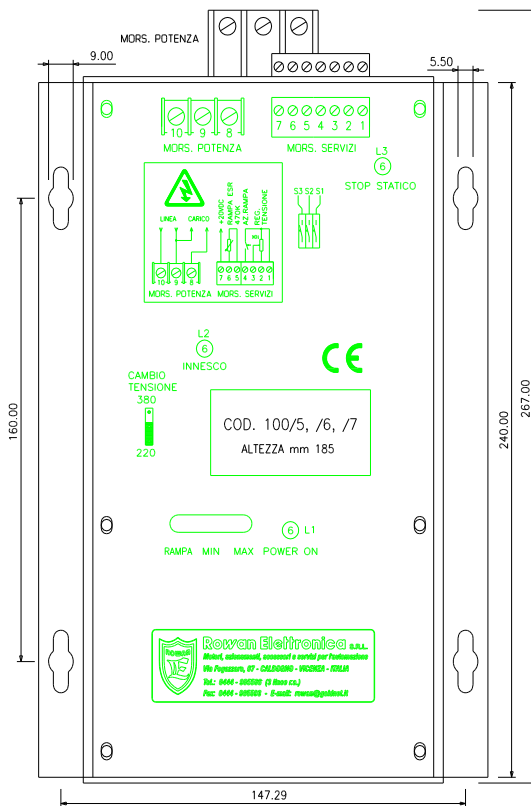
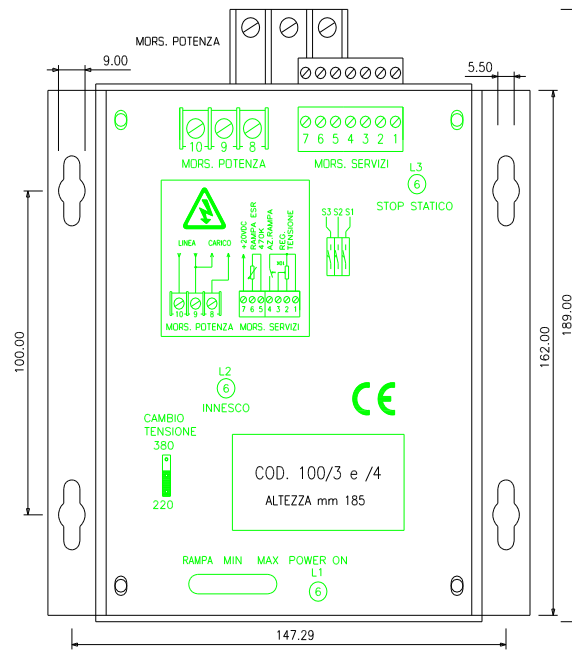
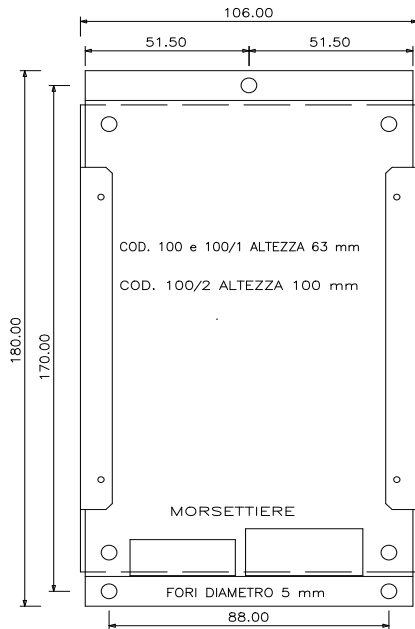


# BLOCKS DIAGRAM

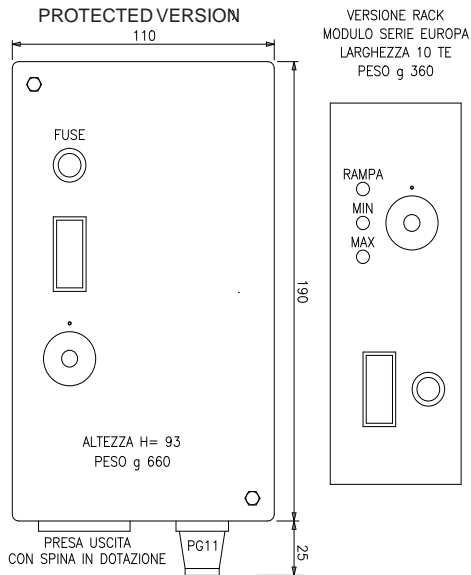


Dis. 5

# OVERALL DIMENSIONS



VERSIONS WITH FAN ARE 75 mm LONGER



CONFORMITY



**Rowan Elettronica**

*Motors, drives, accessories and services for automation*

Via Ugo Foscolo, 20 - CALDOGNO - VI - ITALY

Tel.: 0039 0444 - 905566 - Fax: 0039 0444 - 905593

Web: [www.rowan.it](http://www.rowan.it) - E-mail: [info@rowan.it](mailto:info@rowan.it)



UNI EN ISO 9001:2000