

CODE 119/92
DRIVE FOR SINGLE PHASE ROWAN MOTORS

TECHNICAL CHARACTERISTICS

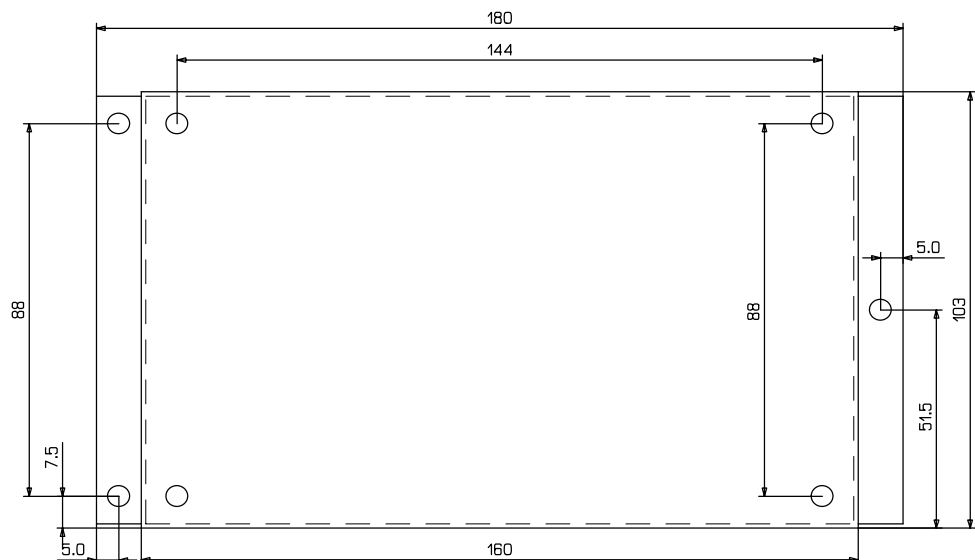
- Range of drives for ROWAN single-phase motors up to a maximum power of 2 Hp.
- Standard power supply 220 VAC $\pm 10\%$ 50/60 Hz.
- Operating temperature -15°C to $+60^{\circ}\text{C}$.
- Immunity to power mains noise in conformity to IEC standard 801.4 class 3.
- Set-up for 2-4-6 pole single-phase motor speed control, motors equipped with tachometer generator type 10 VDC at 1400 rpm (20 V at 2800 rpm).
- Input/output signals galvanically insulated from high voltage and connectable to PLCs, programmable logic boards, interface boards, etc.
- Input for tachometer generator with precision rectifier for operation in both rotation directions.
- Control of motor speed by potentiometer (2 or 3 wires connection) or 0/+10 VDC signal.
- Limitation of motor torque fully adjustable by trimmer, or adjustable externally by potentiometer or 0/+10 VDC signal.
- Input for pure contact (or open collector NPN transistor) for static run/stop control (12 VDC 2 mA).
- Internal regulations by trimmer for:
 - > acceleration/deceleration ramp
 - > max. speed
 - > min. speed
 - > max. torque
 - > min. torque
 - > stability (anti-oscillation trimmer)
- Signalling by led illumination of the following functions:
 - > power on
 - > tachometer generator presence
 - > motor run
- Driving circuit protection with 0.5 A fuse (power protection to be performed externally).
- Cage-clamp terminal strip (in type 119/92 2 Hp power terminal strips are screw-clamp type).
- Standard open version with metal support and poly-carbonate cover, protection level IP 00.

OVERALL DIMENSIONS in mm

Height:

Code 119/92 = 80 mm

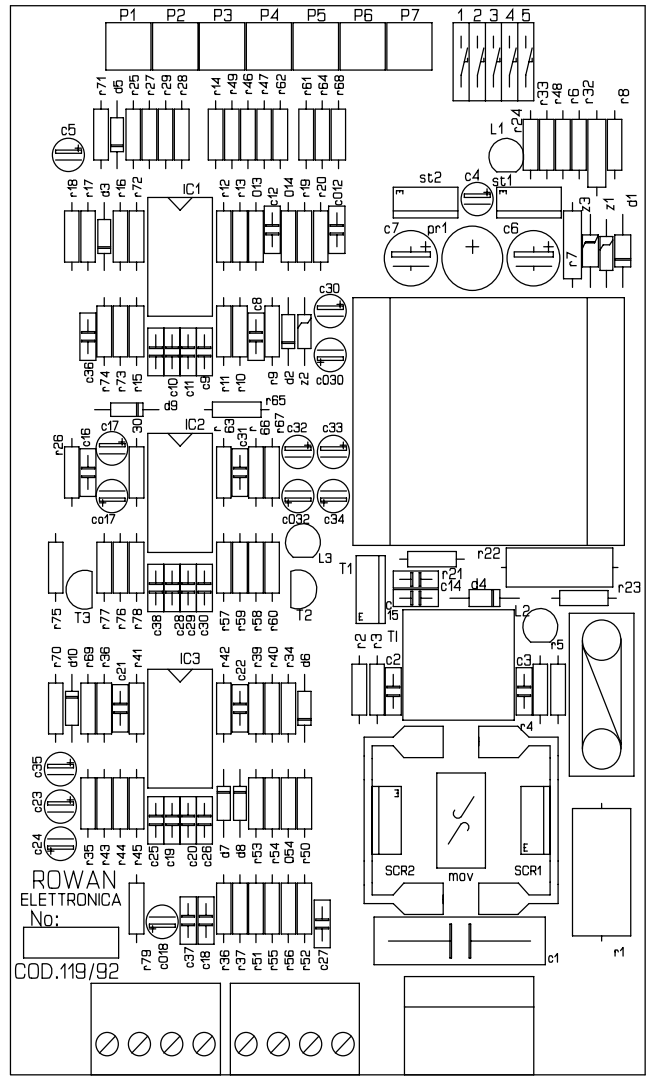
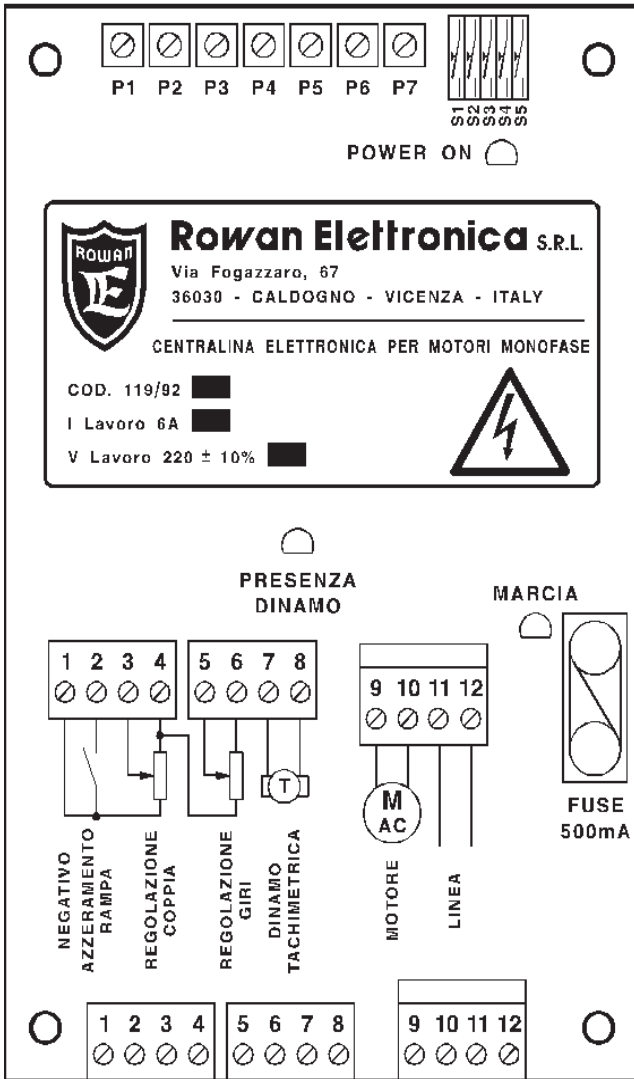
Code 119/92 - 2HP = 100 mm



OPERATING PRINCIPLE

Board 119/92 is a tachometer feedback single-phase voltage regulator using controlled diodes (SCR) driven by phase-limiting system. The voltage that powers the motor is the result of an analog process which maintains the revolutions constant through the differential control between the reference value as an actual speed value, picked up by the tachometer generator, and the one set by the potentiometer or external analog voltage. The result obtained by the combination of this system with the Rowan single-phase motor is an extremely silent and uniform variable speed system (characteristic PWM whistle absent), from zero to the maximum number of revolutions of the motor. The fact that controlled diodes were adopted for the power portion enhances reliability in the case of overvoltages or overcurrents. It is also possible to regulate the acceleration/deceleration ramp according to the requirements of the device driven by the Rowan single-phase motor; the controlled deceleration ramp works only if the motor is used in applications such as the handling of braking loads or irreversible loads; in the case of inertial loads, switch to code 260 actuation which is equipped with dynamic braking. Board type code 119/92 allows the construction of a combined speed/torque control of the Rowan single-phase motor; torque regulation can be carried out by simply limiting the motor maximum voltage using trimmer P1 on the board, or externally through a potentiometer or 0/+10 VDC signal; for more accurate control of motor torque, interface board 119/92 with other closed-loop current type boards 199/92 or 268.

SILKSCREEN OF TERMINAL STRIPS, TRIMMERS, MICRO-SWITCHES, LEDS - CIRCUIT SILKSCREEN



DESCRIPTION OF CONNECTIONS TERMINAL BOARD

1 - 6 - 7 ZERO VOLT for input/output signals.

1 - 2 A.R. contact connection (static run consent) or NPN open collector transistor; when open, assents acceleration ramp motor rotation up to maximum set speed and causes RUN led illumination. Closed, it removes voltage from the motor and set acc./dec. ramp to zero.

1 - 3 torque limitation 0 / +10VDC signal input:
0VDC = minimum torque / +10VDC maximum torque

1 - 4 +10VDC 3mA reference voltage output for speed and torque (max. 3kohm load) regulation external potentiometers.

1 - 5 speed regulation 0 / +10VDC signal input:
0VDC = zero turns / +10VDC = max speed

1 = extreme
3 = cursor
4 = extreme
} torque limitation external potentiometer connection
(active with S1 open) R = 10kohm

4 = extreme
5 = cursor
6 = extreme
} speed regulation external potentiometer connection
(active with S3 open) R = 10kohm

For connection of the 2 wire potentiometer (R = 10kohm) close microswitch S3 and use only terminals 5 - 6.

7 - 8 tachogenerator type 20VDC / 2800 rpm input

9 - 10 regulated output for powering starting and power windings of single phase Rowan motor (max 220VAC 8A for code 119/92 up to 1HP and max 220VAC 15A for code 119/92/2 - 2HP).

11 - 12 board power supply 220 VAC ±10% 50/60 Hz.

DESCRIPTION OF TRIMMERS

- P1 max torque limitation** if adjusted counter-clockwise, it limits max voltage to motor windings (active with microswitch S2 closed).
- P2 minimum torque** if adjusted clockwise, it increases min voltage to motor windings (active with microswitch S2 closed).
- P3 acceleration/deceleration ramp** min 20 mSec, max 8 Sec.
- P4 max speed** regulates motor max speed with speed regulation potentiometer at maximum and in any case with input on terminal 5 equal to +10VDC. Turned clockwise, it increases speed.
- P5 min speed** regulates motor min speed with speed regulation potentiometer at minimum and in any case with input on terminal 5 equal to 0VDC. Turned clockwise, it increases speed.
- P6 stability:** to be regulated clockwise to stabilise any oscillations in the control of speed if regulation of trimmer P7 was not sufficient (proportional / integral action).
- P7 stability:** to be regulated in a counter-clockwise direction to stabilise any oscillations in the control of speed (integral action).

DESCRIPTION OF MICROSWITCHES

- S1** open: activates external torque limitation from potentiometer or from 0 +10VDC signal connected to terminal 3
closed: activates board internal torque limitation from trimmer P1
- S2** open: cuts out torque limitation
closed: activates torque limitation
- S3** open: in case of 3 wire speed regulation potentiometer connection
closed: in case of 2 wire speed regulation potentiometer connection
- S4** open: in case of connection to 2 pole motor
closed: in case of connection to 4 pole (or 6 pole) motor. In case of 6 pole motor recalibrate maximum speed with P4 until the tachogenerator generates a maximum voltage of 5,7 VDC.
- S5** open: in case of maximum precision in controlling speed (minimum shift from loadless to loaded)
closed: enhances prompter response in speed change transients to the detriment of precision (greater shift from loadless to loaded)

DESCRIPTION OF DISPLAYS

- L1 POWER ON:** indicates power supply flowing through the board and driving circuit.
- L2 RUN:** when on indicates that motor rotation has been enabled with the opening of run consent contact (AR) at terminals 1 - 2. It illuminates in proportion to the voltage to motor windings.
- L3 TACHOMETER GENERATOR PRESENCE:** when on indicates that motor is rotating and that tachometer generator voltage is available at terminals 7 -8. Tachometer generator voltage is directly proportional to motor speed and assumes a value of approximately 20VDC at 2800 tpm.

CODE 119/92 DRIVES RANGE

It comprises 2 types of boards on identical support:

- **CODE 119/92** which is able to drive Rowan single phase motors up to 1HP (0,75 kW). Protection fuse: 10A.
- **CODE 119/92 - 2HP** which is able to drive Rowan single phase motors up to 2HP (1,5 kW). Protection fuse: 20A.

TABLE OF THE CHARACTERISTICS OF SINGLE-PHASE MOTORS AND POWER ABSORBED BY BRAKE AND COOLING FAN

The capacitor within parentheses increases starting torque by approx. 20% but cannot be used for continual service; its use is recommended only for intermittent movements.

The maximum current of Rowan single-phase motors is to be calculated to an approximate value by multiplying the rated value by 1.5. The same current can be used during the starting phase or in cycles that require the use for a period equivalent to a maximum of 20% of the entire work cycle.

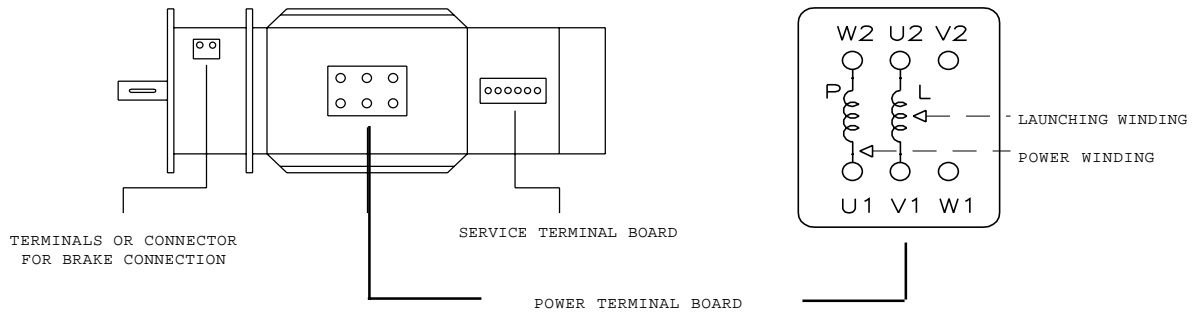
MEC SIZE	HP	KW	RATED CURRENT A	LAUNCH COND. mF	VENTIL. POWER W	BRAKE POWER W
63	0,15	0,11	1,2	12(16)	16	20
71	0,25	0,18	1,6	20(25)	16	20
80	0,5	0,35	3,7	25(31)	16	25
90	1	0,70	6	40(50)	19	30
100	2	1,50	9,5	50(60)	40	30

STANDARD SET-UP

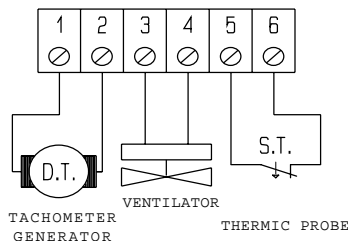
119/92 drives come out of Rowan labs ready tested and set-up for:

- 4-pole motors with speed regulation by 3-wire potentiometer (min. 0 rpm - max. 1300 rpm);
- torque limitation not active;
- acc/dec ramp: 2 Sec.;
- microswitch S4 closed (all other microswitches open).

INSTRUCTIONS FOR THE CONNECTION OF SINGLE PHASE ROWAN MOTORS



MOTOR SERVICE BOARD CONNECTION



1-2 TACHOMETER GENERATOR: from these terminals it is possible to have the voltage of the tachometer generator that is spliced to the motor shaft. It supplies a direct voltage of 20VDC at 2800RPM that is directly proportional to motor speed; for this reason, besides being connected to the drive for speed control, it can be used for analog revolution counters, display counters or other servomechanisms, provided that the overall loading does not exceed 3K (max 10 mA). **It is always necessary, to avoid interferences, to connect the tachometer generator with screened cable, above all if cables are long and run close to power cabling.**

3-4 VENTILATOR: it is necessary to supply these terminals with 220VAC for the separated ventilation of motor; make sure that this voltage is present also when the motor is not running, in order to guarantee the max cooling efficiency. As for the power absorbed by cooling fans, see table on page 3.

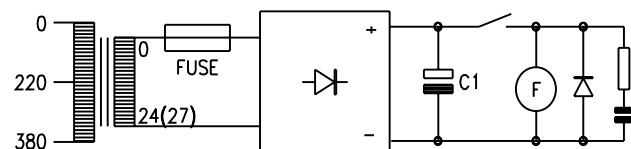
5-6 THERMIC PROBE: it is a N.C. contact which opens when the temperature of motor windings exceeds 150°C, safety limit corresponding to H class (180°C). It is used as emergency for the switching off of RUN remote control switch. The max capacity of this contact is 1A - 230VAC. (Rowan motor MEC 63 0, 15 HP is not equipped with Thermic Probe; for this reason terminals 5-6 are not present in its service terminal board).

BRAKE CONNECTION

On request, ROWAN motors can be provided with electromagnetic brake. In this case the motor must be constructed expressly with lengthened motor shaft and the brake is mounted on the front part, supported by a bell which reproduces the normal flanging conditions.

There are 2 different types of brakes:

- **DIRECT BRAKE:** in this case it is necessary to supply the brake to block the motor shaft. This kind of brake is suitable for precision stops. Its efficiency can be increased by using ROWAN card cod. 210, which oversupplies it at the stop improving its precision.
- **SAFETY SPRING BRAKE:** in this case it is necessary to remove supply from the brake to block the motor shaft. It is used as safety brake in case of lack of main power supply, with suspended loads as overhead travelling cranes, cranes etc.



Both brakes operate with direct voltage 24VDC, and are supplied through the single terminal or connector placed on the front brake-bearing bell. It is always advisable to connect a diode or a R/C in parallel with the brake, above all when near to equipments that are particularly sensitive to disturbances. As for the power absorbed by brakes see table on page 3.

In case a transformer with secondary 24VDC is used, it is necessary to insert a levelling condenser C1 dimensioned for the power of the brake; when the condenser is not present, a transformer with secondary 27 VAC must be used.

INSTRUCTIONS FOR OPERATION

Before powering, set up the microswitches on the board to suit the desired type of operation:

- 2 or 3 wire speed regulation potentiometer
- inclusion of internal/external torque limitation (see microswitch description)
- 2, 4 or 6-pole motor

In the case of a 6-pole single-phase motor recalibrate the maximum speed with trimmer P4 until the tachometer dynamo generates approx. 5.7 VDC with the speed regulation potentiometer or DC signal at maximum value.

- Before powering, adjust the potentiometer or DC signal for zero speed; at power up the motor must be stationary. Illumination of led L1 (power on) indicates that power supply is flowing through the driving circuits. Turn potentiometer or increase DC signal: motor speed should increase or decrease according to the set acceleration/deceleration ramp, while leds L2 (run) and L3 (tachometer gen. presence) must light up accordingly; progressive illumination of led L2 indicates the presence of voltage in the motor windings, whereas light-up of L3 indicates that the motor is rotating.

}

- If the motor suddenly races to maximum speed without following potentiometer regulation, and pilot lamp L3 does not illuminate, it means that tachometer dynamo voltage is not reaching terminals 7 and 8; when this happens reinspect the connections.

- Check attainment of maximum speed and, if necessary, fine adjust the maximum value with trimmer P4; be sure not to exceed the maximum speed as this would cause the motor to overheat even when loadless; when this happens regulate P4 until motor consumption equals the value measured at an intermediate speed. In any case check that motor consumption (measured at power supply line) conforms with the rated value. If during motor operation oscillations take place due to a particular type of load or due to mechanical transmission, these may be suppressed by regulating trimmer P7 clockwise; if regulation of P7 were not enough, also regulate trimmer P6 counter-clockwise. To prompt and smoothen motor response you may close microswitch S5.

Board 119/92 is provided with a 0,5A protection fuse only for driving circuit; provide external power protection through a 10 A fuse for board 119/92 and 20 A fuse for board 119/92-2HP. Use a shielded cable for control connections (potentiometer, tachometer generator) especially if they are long stretches or run close to power cables; connect cable braiding to ground and not to the circuit negative, and only at one cable terminal; the board negative must also not be connected to ground; at any rate, do your best to avoid routing near power cables or large transformers.

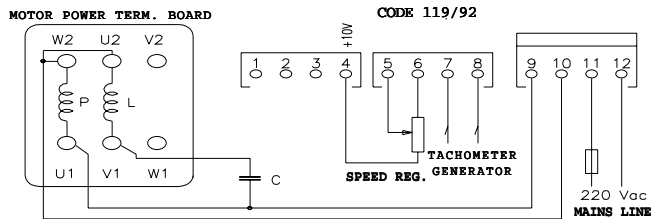
Use relays with contacts for low current for the switching of DC signals on the control terminal panel, and avoid the use of electromagnetic switch auxiliary contacts for these types of operations.

Boards of the 119/92 series operate efficiently with panel temperatures ranging from -15°C to +60°C; temperatures outside this range may give rise to faulty operation, speed control drifts and, if temperatures are particularly high, breakdown. Thus place the boards far from heat sources and provide adequate ventilation to the panel if the environment is subject to high temperatures.

INSTRUCTIONS FOR CONNECTION

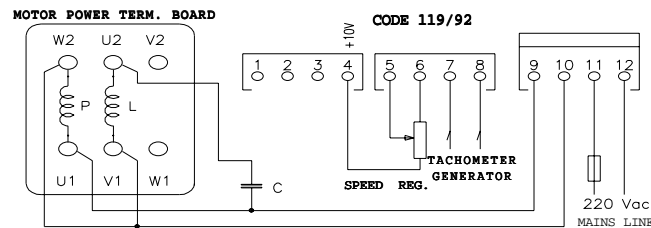
Application Diagram No. 1

RIGHT
ROTATION
SENSE

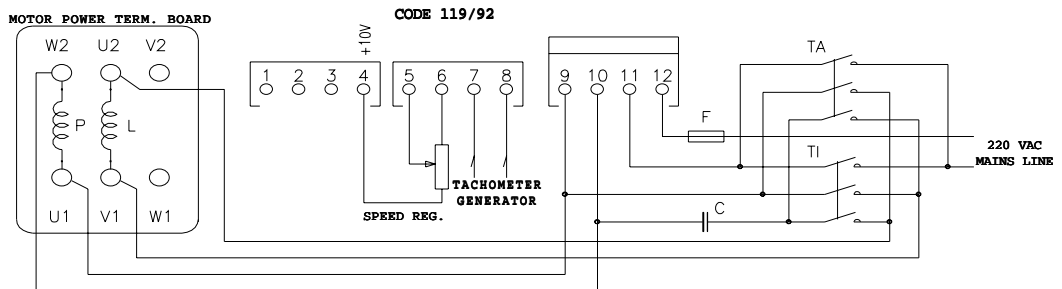


This is the basic schematic diagram for board 119/92 connection; the two individual diagrams show how to manually invert the rotation sense of the motor by operating on power connections (tachometer dynamo polarity does not need to be inverted); speed regulation is by potentiometer connected with 3 wires which ensures linear regulation of speed with respect to potentiometer rotation, whereas torque adjustment is excluded. In this case (if the motor is a 4-pole one) only microswitch S4 is to be closed.

LEFT
ROTATION
SENSE



Application Diagram No. 2



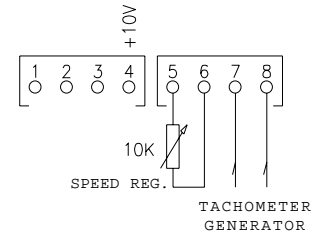
In this case board 119/92 drives the single-phase motor in both rotation senses; rotation sense is changed by inverting the starting winding with respect to power winding.

Set up board 119/92 as shown in schematic diagram No. 1.

EXAMPLES OF CONTROL TERMINAL BOARD CONNECTIONS

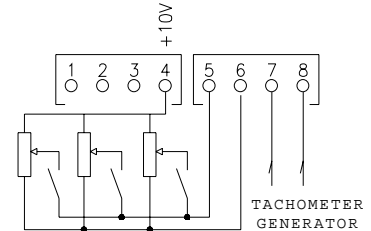
Connection of 2-wire speed regulating potentiometer:

Should you need to use the 2-wire speed regulating potentiometer (as for instance when replacing Rowan boards of previous manufacture such as those coded 119 or 121) close microswitch S1 and connect a 10 KOhm potentiometer; speed regulation with 2-wire potentiometer is not very linear with respect to its rotation.



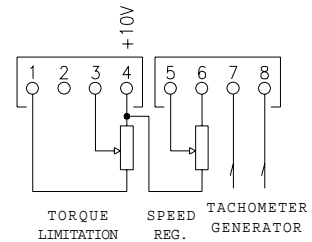
Selection of different speeds with two or more potentiometers in parallel:

Two or more potentiometers can be connected in parallel making sure that the overall resistance between terminals 4 and 6 is not lower than 3 KOhm.



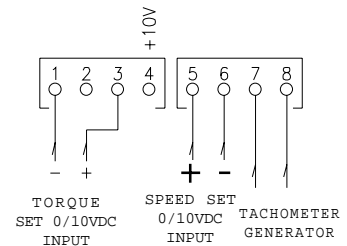
Motor torque limitation through external potentiometer:

When using an external potentiometer, close microswitch S2. It is possible to limit the regulation range of the potentiometer by using trimmer P1 (max.) and P2 (min.). If maximum torque internal limitation were enough, the external potentiometer can be omitted: in this case close microswitch S1 and limit torque by regulating trimmer P1. The maximum load on terminal 4 must not be over 5 mA (Load resistance must not be lower than 3 KOhm).



Speed/torque control from analog signal 0/+10VDC:

In code 119/92 boards, speed and torque regulations, in addition to the conventional manual potentiometer, can be performed by applying a 0/+10 VDC signal; depending on requirements, this signal can be picked up by Rowan interface boards or by other commercial equipment as PLCs, LOGIC BOARDS, COMPUTERS, etc.; the connection can be carried out directly because the board inputs are galvanically insulated from high voltage. Input impedance is 100 KOhm. Close microswitch S2.



Static run:

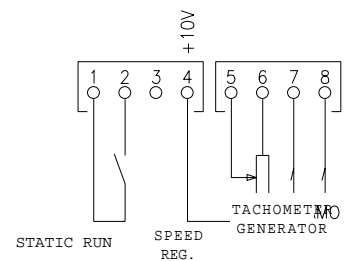
When the single-phase motor is used in only one direction, and frequent run and stop operations have to be performed, it is convenient to keep the power supply electromagnet switch excited and to enable static motor rotation by opening contact AR connectable to terminals 1-2.

- By opening contact AR, the motor follows the acceleration ramp up to the maximum speed set and with a ramp time that is adjustable by trimmer P3.
- Closure of contact AR immediately removes voltage, zero-sets the ramp and switches off RUN led L2.

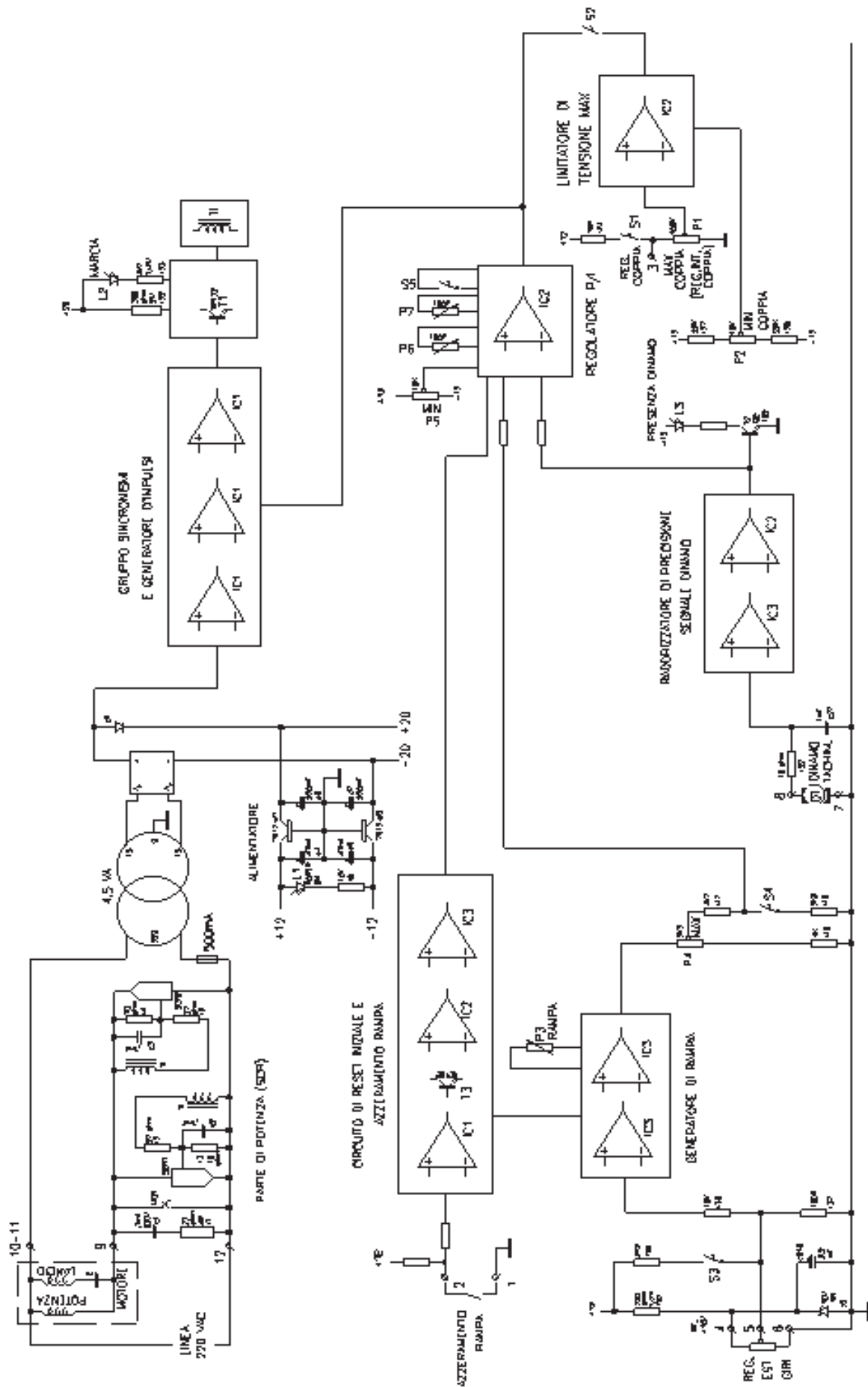
If motor run/stop were necessary with acceleration and deceleration ramps without immediately removing voltage from the motor in its stopping phase, perform the following operations:

- disconnect terminal clamp 5 from the voltage reference to cause the motor to decelerate to zero revs (or at a minimum speed calibrated with P5);
- connect terminal clamp 5 to the voltage reference to cause the motor to accelerate to the maximum speed set.

Speed variations are conditioned by the acceleration/deceleration ramp set with trimmer P3; the controlled deceleration ramp operates with motors applied to braking loads or irreversible systems, but it is inefficient with inertial type loads.



BLOCK DIAGRAM



INSTRUCTIONS FOR THE MAINTENANCE OF ROWAN MOTORS

Motors "ROWAN" are expressly manufactured to be driven by electronic cards with tachometer feedback and are particularly suitable, because of their intrinsic characteristics, for functioning with repeated starts and dynamic brakings. As they have no brushes, they require little maintenance. The maintenance mainly concerns the bearings and the replacement of the tachometer generator, which may anyway occur after at least 5000 hours' work.

Replacement of bearings or tachometer generator

Whenever it is necessary to disassemble the motor for bearing replacement, proceed as follows:

- 1- remove the screws from the rear ventilator-protecting shield or from the cochlea ventilator. Remove the ventilator after disconnecting its wires from the service terminal board;
- 2- remove the tachometer generator;
- 3- take out the rigid stays and remove the rear shield;
- 4- take out the front shield together with the rotor connected to it;
- 5- whenever it is necessary to remove the front bearing, take the screws of the anti-dust protection off and remove the Seger ring (if present) on the shaft;
- 6- take out the shaft from the bearing;
- 7- remove the Seger ring (if present) which keeps the bearing close to the shield;
- 8- take the bearing off and replace it with one of the same kind - of the type Z C3 greased with high temperature grease;
- 9- the rear bearing must be of the type 2RS C3.

If necessary, replace the tachometer generator while re-assembling the motor.

Air gap adjustment of spring- or direct brakes

If a **spring brake** is installed on the front part and it is necessary to adjust the air gap, proceed as follows:

- 1- remove the bolts that fasten the brake-bearing bell to the motor;
- 2- take out the bell and the brake from the shaft;
- 3- remove the screws that fasten the brake to the bell;
- 4- take out the brake wires from the terminal board;
- 5- take out the brake itself from the bell.

At this point it is possible to perform the regulation by adjusting the 3 bolts till you obtain an air gap between 0,2 and 0,3 mm.

If the brake is provided with an anti-dust ring, remove it to reach the 3 regulation bolts. The spring brake is usually furnished set for max braking torque, which can be reduced by unscrewing the proper ring up to a maximum of 40%; be careful not to unscrew it too much and cause it to go out of its seat.

In case a **direct brake** is installed, it is not necessary to disassemble it, but it is enough to control the air gap (max 0,3 mm) with a thickness-meter through the side openings and, if necessary, to correct it by loosening the fixing screw on the brake-bearing hub.

ROWAN motors need continuous ventilation and it is therefore necessary that all internal and external air passages are free of obstructions and it is necessary to ensure sufficient air changing. In case they are used in particularly severe conditions, ROWAN motors, normally IP 43, can be equipped with anti-dust filter up to a protection degree IP 53; in this case it is necessary to check the filter cleanliness and the ventilation efficiency more frequently.

It is possible to reach higher protection degrees up to IP 54 with particular protecting arrangements performed by the customer during installation or up to IP 55 by supplying a completely closed motor diminished of 50% as for the power.

The motor (except 0,15hp mec 63 motor) is provided with a thermic probe inserted in the windings that is adjusted for intervention at 150°C (the windings of ROWAN motors are of H class with working limit temperature of 180°C).

This thermic probe supplies a normally closed contact which opens at 150°C and must be used to remove the power from the motor (by means of the remote control switch) in case of over-temperature. The probe max load is 1A - 230 VAC.

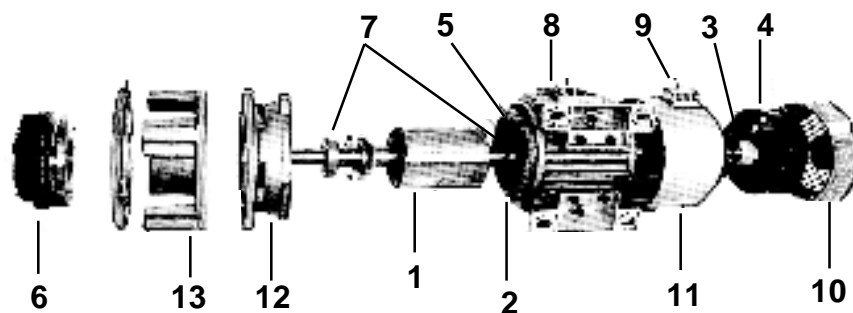
In case of over-temperature intervention of the probe, it is necessary to verify the following:

- the functioning of the cooling fan;
- the correct passage of the air flow;
- the absorption of the motor; if it is beyond the rated values, it may be caused by an excessive loading or worn-out bearings;

The statoric winding is of the kind used for asynchronous three-phase or single-phase motors; it is manufactured with particular care with H class insulation; it can be made, in case of necessity, by any winding builder, provided that he respects the winding data which can be supplied by our technical office.

ROWAN MOTOR

- | | |
|--|--|
| 1 Massive rotor for high-sliding | 8 Motor windings connection board |
| 2 Winding | 9 Service terminal board (tach.generator-ventilator-thermic probe) |
| 3 Tachometer generator
(type 20VDC 2800rpm) | 10 Ventilator-protecting shield |
| 4 Ventilator | 11 Rear shield |
| 5 Safety thermic probe | 12 Front shield |
| 6 Brake | 13 Brake bearing-bell |
| 7 Bearings | |



ROWAN motors work properly with temperatures ranging from -15° to $+60^{\circ}$; higher ambient temperatures could provoke working anomalies and, if excessive, breakdowns. It is therefore necessary to locate them far from heat sources and provide a minimum air changing.

INSTRUCTIONS FOR THE REPLACEMENT OF PREVIOUS PRODUCTION BOARDS WITH BOARD TYPE CODE 119/92

The board code 119/92 replaces the previous drives for the Rowan single phase motors type code 119 and code 120/121. Remember that in any case the code 119/92-2HP board is necessary for the single phase motor 2HP Mec 100.

Replacement of code 119 board with code 119/92 type board:

With regard to power connections:

the wires previously connected to terminals 7 and 8 are to be shifted to terminals 11 and 12 of the code 119/92 board, whereas the wires connected to terminals 5 and 6 are to be shifted to terminals 9 and 10.

With regard to control connections:

the dynamo wires that were previously connected to terminals 3 and 4 are to be connected to terminals 7 and 8 of the code 119/92 board, whereas potentiometer wires as follows: P- (0V) connected to terminal 2 is to be shifted to terminal 6, and P+ connected to terminal 1 is to be shifted to terminal 5 of the code 119/92 board. For functioning as old card cod. 119, microswitch S3 must be closed.

With new card cod. 119/92, speed regulation with 2 wire potentiometer is not linear but according to an exponential curve which presents strong variations at slow speed and small variations at high speed. If one wishes to avoid this behaviour and obtain a variation directly proportional to potentiometer variation, it is necessary to connect speed potentiometer with 3 wires as indicated in connection diagram of card code 119/92 and open microswitch S3.

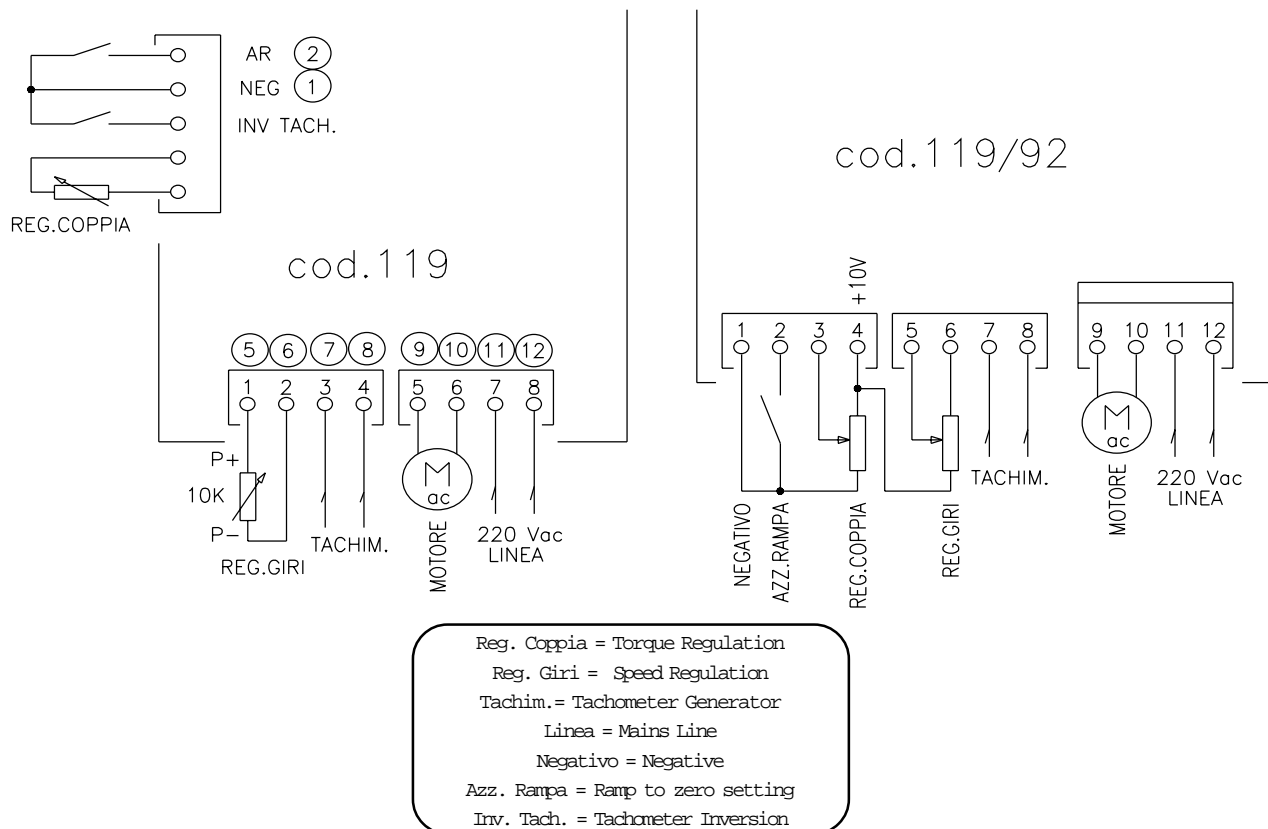
With regard to control wires connected to the lateral terminal strip of code 119 board:

- the wire connected to terminal **NEG** is to be shifted to terminal 1 of the code 119/92 board
- the wire connected to terminal **AR** is to be shifted to terminal 2 of the code 119/92 board
- the wire connected to terminal **INV.TACH.** is to be omitted (not necessary for the 119/92 board)
- the resistor connected to terminal **REG. COPPIA** must be eliminated.

Close microswitch S1 (for the other microswitches refer to the section containing the description of the microswitches).

If a potentiometer is connected to torque regulation terminals, reconnect it to code 119/92 board with 3 wires to terminals **1 3 4** as from electrical drawing; in this case microswitch **S2** must be closed.

The circled numbers in the electrical drawing designate the terminals in the code 119/92 board.



Replacing board 120/121 with board 119/92

For the power connections proceed as follows:

the wires that were connected to the terminals 1 and 2 are to be shifted to terminals 11 and 12 of board 119/92, whereas the wires connected to terminals 3 4 5 6 7 8 related to the capacitor and power and launching windings are to be reconnected together as shown in the schematic.

For the control connections proceed as follows:

the dynamo wires that were connected to terminals 9 and 10 are to be connected to terminals 7 and 8 of board 119/92, whereas the potentiometer wires as follows: P-(OV), connected to terminal 11, must be shifted to terminal 6, whereas P+, connected to terminal 12, must be shifted to terminal 5 of board 119/92.

For control wires connected to lateral terminal strip M2 of board 120/121 proceed as follows:

shift the wire connected to terminal NEG to terminal 1 of board 119/92;

shift the wire connected to terminal AR to terminal 2 of board 119/92;

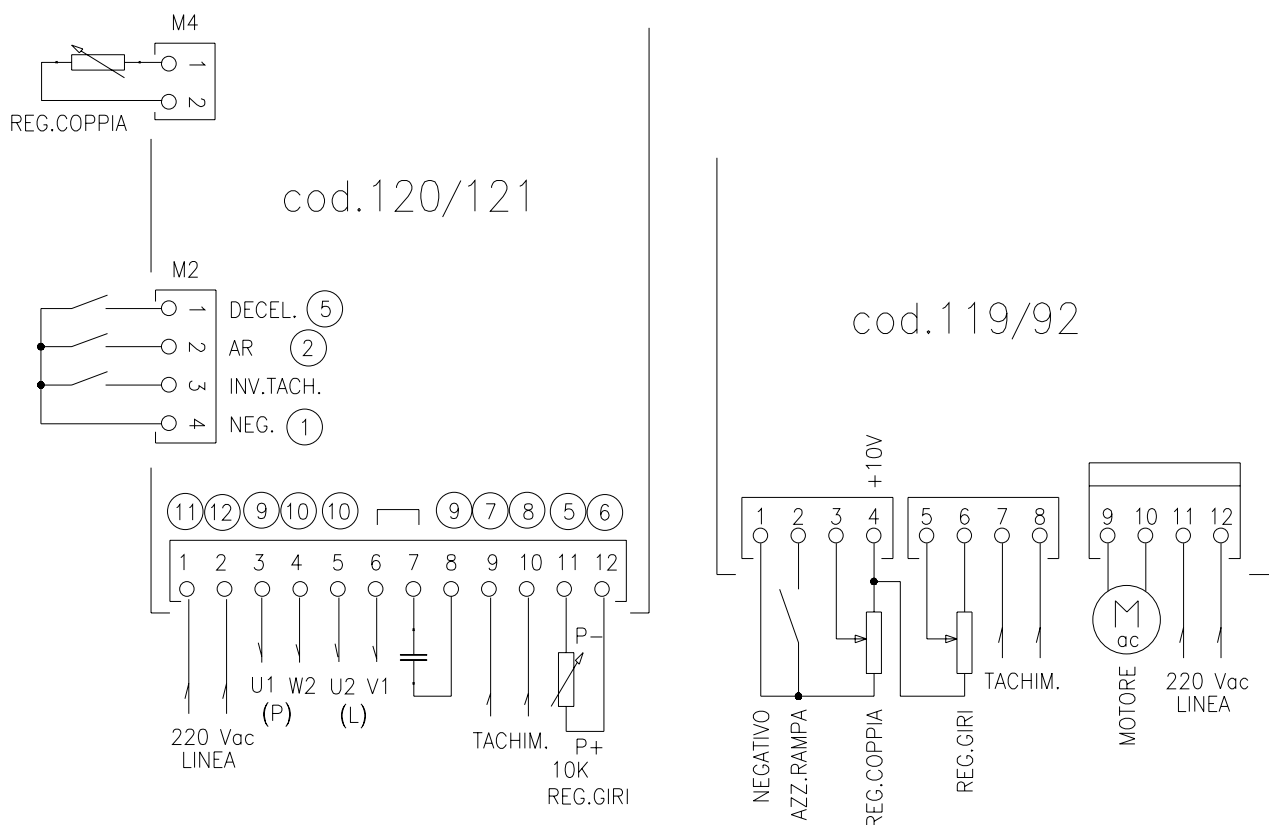
exclude the wire connected to terminal INV. TACH. since it is unnecessary for board 119/92;

connect wire connected to terminal DECEL to terminal 5 of board 119/92.

Close microswitch S1 (for other microswitches refer to the paragraph describing the microswitches).

If a potentiometer is connected to terminal board M4 for torque limitation, you should reconnect it to terminals 1 3 4 of code 119/92 board with 3 wires as illustrated in the schematic diagram; in this case close microswitch S2.

The circled numbers in the schematic refer to the terminals on board 119/92.



Reg. Coppia = Torque Regulation
 Reg. Giri = Speed Regulation
 Tachim. = Tachometer Generator
 Linea = Mains Line
 Negativo = Negative
 Azz. Rampa = Ramp to zero setting
 Inv. Tach. = Tachometer Inversion
 Decel = Deceleration

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INSTRUCTION MANUAL

CODE 119/92

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