



## VALBIA ELECTRIC ACTUATOR WITH POSITIONER S86 VB015M INSTALLATION AND MAINTENANCE INSTRUCTIONS MANUAL

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### 1.0 Warnings

- Please read the following instructions before making any installation of the actuator. The damages caused from the non-observance of these instructions are not covered in the warranty.
- This documentation must be kept in dry place and available for use.
- The actuator is an electronic device and during its working operations some parts are live components. The installation and maintenance of electric actuator must be made only by qualified personnel, in accordance with current electrical engineering and safety standards and all other applicable directives.
- Valbia S.r.l. reserves the right to change the data and the characteristics of this manual at any time and with no notice in the scope of a constant updating and technological improvement.
- The symbol  indicates that the instruction that follows is relevant for safety and if not observed it could pose a danger for the user or damages the actuator.

 **WARNING:** the mechanical and electronic parts, according to which the device is designed, are not eligible for modifications.

### 2.0 Transportation and storage

Valbia electric actuators are supplied in paperboard boxes which are of solid construction for a normal transport. Handle with care and keep the cover until the moment of the installation of the actuator. The storage of the actuators requires a covered, dry and ventilated environment, protected from temperature changes. The device must be stored with the cover mounted. Prior to installation, visual inspection is recommended to detect any anomalies caused by transport or storage.

### 3.0 Applications


VALBIA electric actuators have been designed and tested to ball and butterfly valves and dampers for the industrial sector. Actuators are available in standard version with rotation 0°-90°. On request we can supply actuators with rotation 0°-180° or 0°-270°. For applications other than that above are needed please contact VALBIA sales department.

### 4.0 Actuator Mounting

The mechanical assembling between the electric actuator and the item to be automated (for example: the valve) can be done by direct mounting or by a mounting kit. Both the cases you can verify the right alignment and the correct dimensions of the part to transmit the power to avoid axial stress which can damage valve and actuator.

All Valbia electric actuators are in conformity of norm EN ISO 5211 (DIN 3337).

In order to have a right automation of the valve, is necessary to use a Valbia electric actuators whose range has a torque of at least 25% over the valve maximum torque. Verify the actuator duty rating suitability with the application.

 **WARNING:** do not raise up or moved the motorized valve by using the electric actuator as point of grip or hold.

## 5.0 Specifications and technical information

TECHNICAL INFORMATION	DATA	
Object of device	Electric Actuator	
Enclosure material	Aluminum alloy	
Coating	Standard polyester powder coating	
Enclosure rating	IP68	
Duty cycle	75%	
Duty cycle 12V	50%	
Ambient temperature range	-20°C ÷ +55°C	-4°F ÷ +131°F
Maximum operating altitude	2000 meters	
Relative umidity	95%	
Auxiliary limit switches	1 A @ 250Vac - 1 A @ 30 Vdc (resistive load)	
Fault auxiliary contact	1 A @ 120Vac - 1 A @ 24 Vdc (resistive load)	
Power terminal block type	Plug in connector	
Auxiliary terminal block type	Fixed connector	
Section of terminal block's conductors	14 ÷ 22 AWG	2.08 ÷ 0.32 mm <sup>2</sup>
Minimum conductors' temperature	+85°C	+185°F
Protection class against electric shock	Class I	
Restriction of continue operation time (timeout)	Standard	
Power supply voltage tolerance	± 10%	
Multiple parallel actuators wiring	Standard (*)	
Cables entries	2 x M20 x 1.5	2 x ½" NPT
Standard stroke	90° ± 5°	
Position indicator	Dome indicator	
Manual override	Standard	
Positioning tolerance	<1% (referred to the maximum run of the potentiometer)	
Dead band	1.44% of analogue control signal (±0.23mA / ±0.14V)	

Tab. 1 General features of the electric actuator

(\*) It is important to verify that the application and its components are properly sized with the actuator characteristics and requirements.

GENERAL FEATURES OF THE ELECTRIC ACTUATOR FOR UL STANDARD		
UL listed fienu number	NMTR.E303174	
Enclosure Type	Type 4x (*)	
Connection conductor/wires	Listed flexible cord (ZJCZ) minimum SW or SJW 6÷12mm diameter	
Green terminal block screws maximum tightening capacity of model 100-240 Vac	0.56Nm	5LbIn
Black terminal block screws maximum tightening capacity of model 100-240 Vac	0.50 Nm	4.50 LbIn
100-240 Vac 0.50 Nm 4.50 LbIn Terminal block screws maximum tightening capacity of model 12-24 Vac/dc	0.50 Nm	4.50 LbIn
Enclosure screws maximum tightening capacity	11.30 Nm	100 LbIn
External pollution degree	3	
Internal pollution degree	2	
Overvoltage category	2	

Tab. 2 General features of the electric actuator for UL standard

Product in conformity with the European Community norms  
 LOW VOLTAGE 2014/35/UE (LVD)  
 ELECTROMAGNETIC COMPATIBILITY 2014/30/UE (EMC)  
 MACHINERY 2006/42/CE  
 ROHS 2011/65/UE  
 REGULATION N° 1907/2006 (REACH)  
 RINA TYPE APPROVAL certificate n° ELE302119CS  
 Use copper (CU) conductor

(\*) in order to guarantee the declared "Type", the following models of electric connectors should be used: HSK-M (1.609.1200.70) or HSK-K (1.209.1202.70) produced by Hummel AG (E103997). On request the cable glands can be supplied by Valbia.

## 5.1 Technical features

Technical characteristics of Valbia electric actuators as below:

- Heater: all actuators are standard equipped with heater to avoid condensation into the actuator (paragraph 6.3).
- a safety system detects when the actuator supplies a torque higher than expected (torque limiter): in this case the safety system blocks the actuator. The torque limiter intervention is indicated by a red color LED (paragraph 6.4) and by the opening of the remote signal an auxiliary contact (paragraph 6.2).
- a safety system intervenes to shut off the actuator in case the motor works past over the allowable operation time value (the time value depends on the actuator models). The maximum working time fault is indicated by a red color LED (paragraph 6.4) by the opening of the auxiliary contact of the remote signal (paragraph 6.2).
- duty rating: the electric actuator was designed to work with a nominal duty rating of 75%, referred to the working time, the maximum temperature and to the nominal load. This parameter defines the rest time after an operation. The use of the actuator with a higher duty rating or with a temperature above 55°C (131°F) can cause the improper torque limiter intervention or the failure of electronic components.
- “Captive” cover screws are permanently attached to the cover and simplify installation in awkward conditions.

## 5.2 Power requirements and current draw information

MODEL	VB015M	
Nominal torque [Nm]	15	
Nominal torque [LbIn]	133	
Nominal voltage (version H) [V]	100 ÷ 240Vac	
Absorbed current (version H) [A]	0.22-0.12	
Absorbed power (version H) [VA]	22-28.8	
Nominal voltage (version L) [V]	12Vac/dc	24Vac/dc
Absorbed current (version L) [A]	1.9 - 1.1	0.8 - 0.5
Absorbed power (version L) [VA]	23 - 13.5	20 - 12
Frequency [Hz]	50/60	
Rotation time 0° - 90° [sec]	9	

Tab. 3 Electrical rating of the actuator

## 6.0 Installation instruction

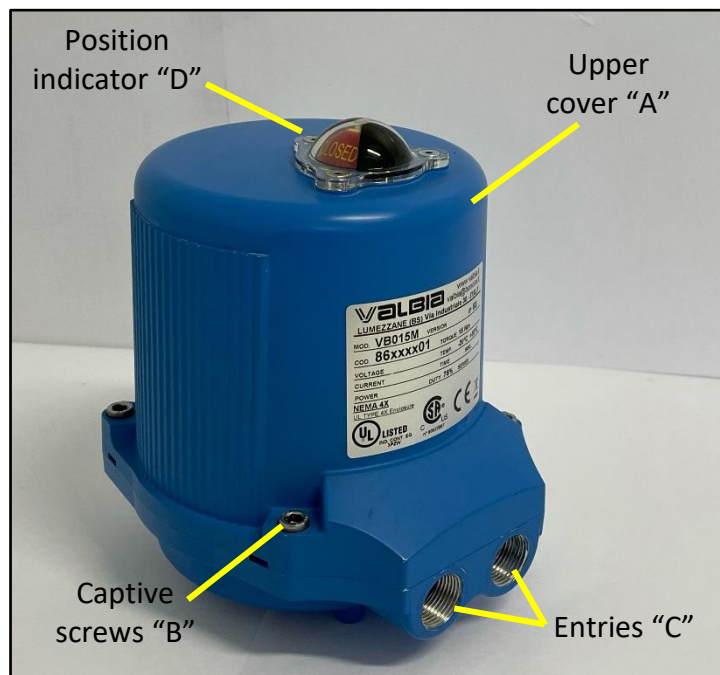


Fig.1 External view of the actuator

**⚠ WARNING:** the actuators should be properly grounded and wired in accordance with local electrical code.

**⚠ WARNING:** before performing any maintenance on the actuator, always make sure to shut off the power supply first.

**⚠ WARNING:** make sure that the power supply is set between the values indicated as indicated on the label on the side of the actuator.

**⚠ WARNING:** Valbia electric actuators may be mounted in many positions, however, we do not suggest using it with the cable glands positioned upright, since it cannot guarantee a perfect wiring tightness. We also recommend to avoid using it with the indicator facing down. If the actuator assembly and the respective electrical connection are provided in different moments, make sure that the cable entries are hermetically sealed.

**⚠ WARNING:** please ensure suitably rated cable glands and protection plug are used, according to IP protection rating. Properly seal the electrical connectors to prevent any liquid and dust infiltration. Warranty is voided if this warning is not respected. The cables must be of the appropriate size to the type of electrical connector selected. Verify the correct tightening of the electrical connectors.

**⚠ WARNING:** if the device is used not respecting the manufacturer specifications, the provided protection may be impaired. For the wiring, it is necessary to open the upper cover "A" in order to locate the terminal block on the power supply board.

**⚠ WARNING:** before opening the upper cover shut down the power supply voltage. To remove the upper cover "A" untighten the screws "B" and make sure to avoid collisions with the internal electrical parts. Insert the power supply cables inside the lower enclosure entries "C", tighten by the user. The terminal block "F" is composed by two parts, one of which removable. To simplify the procedure, it is possible to remove the removable part, wiring it and insert it once the wiring is done. Proceed to the cable connections in the appropriate terminal block "F" following the wiring diagram (paragraph 6.1).

**⚠ WARNING:** please pay attention during the wiring and setting phases of the electromechanical limit switches, in order to avoid fluids or other substance from getting on or around any electronic components. Moreover, before assembling the upper cover please make sure that the O-ring is seated in the proper groove and there are no impediments that could compromised the enclosure sealing.

## 6.1 Electrical connection

The wiring diagram, which should be followed for proper wiring of the actuators, is shown in paragraph 10.0 and it can be found also on the label inside the upper cover. Please follow the maximum allowed electrical rating values. The terminal block "F" is shown in Fig. 2. The cables through the connector must be of the proper size.

- The signal cable of "positive supply" (+24Vdc) or "phase" (24Vac / 100-240Vac) can be connected to pin "1" or pin "3" of terminal block "F".
- the signal cable "common" (0V) or "neutral" must be connected to pin "2" of terminal-block "F".
- the grounding cable must be connected to the properly signaled terminal.

**⚠ WARNING:** the ground wiring system is mandatory (Fig.2).

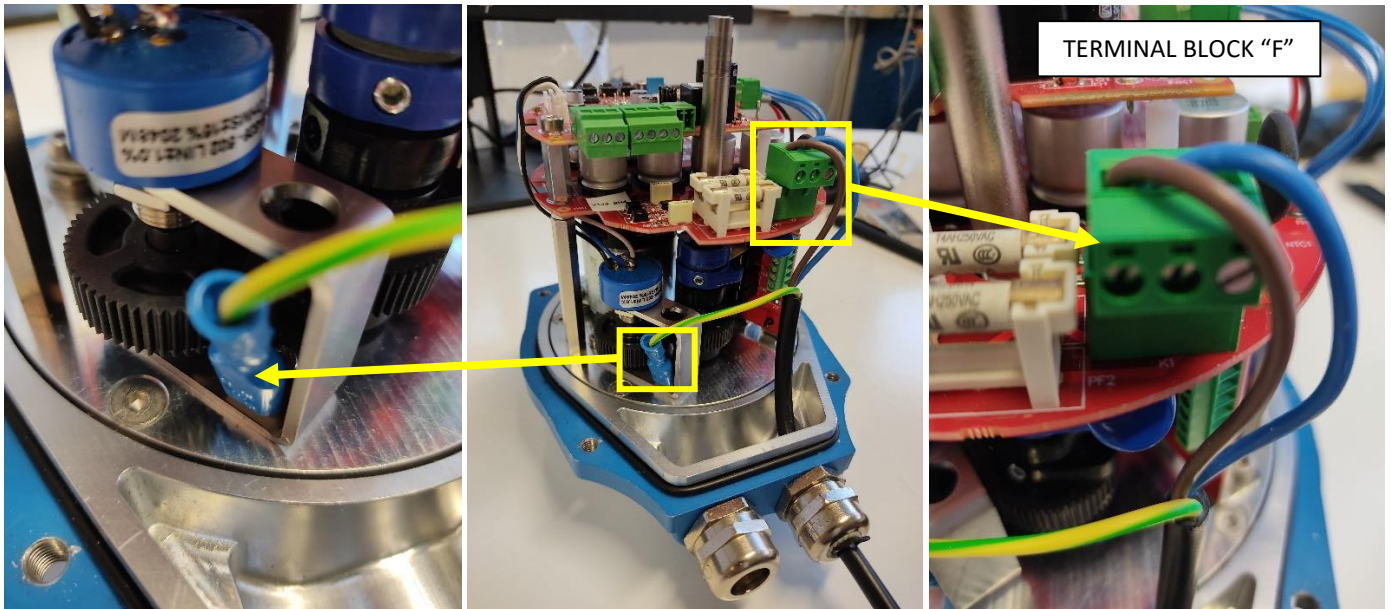


Fig.2 power supply board, focus on terminal block "F"

**⚠ WARNING:** to guarantee the proper operation of the device and to avoid damage to the components it is recommended that the ground/neutral signal of the power supply (negative terminal, connected to pin "2" of terminal block "F") is isolated from the ground of the control signal (negative terminal connected to pin "M" of the terminal block "CMD IN") or the ground of the signal output (connected to the pin "Q" of the terminal block "CMD OUT").

## 6.2 Auxiliary switches wirings

The "G" terminal block is connected to two auxiliary and independent limit switches (SPDT free contacts), FCU1 and FCU2, which indicate the position of the actuator to the final user.

Connect to the terminal block "G" between the following terminals:

- "B" and "C" to obtain the signal of closing position.
- "E" and "H" to obtain the signal of opening position.

The opening or closing signal comes when the blue cams push the auxiliary electromechanical limit switch on the logic board. The cams adjustment procedure is described on paragraph 6.5.

**⚠ WARNING:** during the installation it is recommended to verify the alignment of the auxiliary limit switches by using a multimeter/tester.

The terminal block "R" is connected to a free contact NO which closes in case of powered actuator and no detected anomaly. In case of anomalies or not powered actuator, the contact is open.

Terminal block "R" is composed by two parts, one of which removable for easier wiring. To simplify the procedure, it is possible to remove the removable part, wiring it and insert it once the wiring is done.

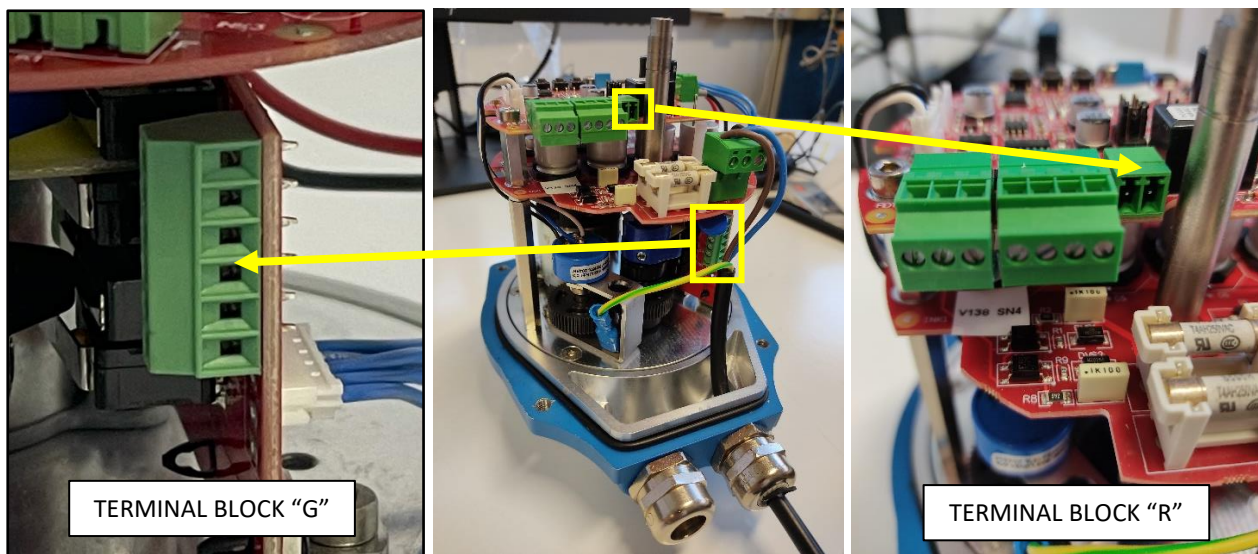


Fig.3 Control/logic board, focus on terminal blocks "G" and "R"

## 6.3 Heater

All the actuators are equipped with "RIS" heating resistor which works only if the actuator is connected to the power supply, when the motor is not rotating and the temperature inside the actuator goes down to 25°C / 77°F. It protects the actuator from the formation of condensation due to temperature changes. The resistor is part of the electronics, it does not require additional wiring and it is disabled when the internal temperature exceed 25°C / 77°F.

**⚠ WARNING:** to guarantee the normal operation of the resistor, it is necessary to keep the actuator connected to the power supply even in the open/close positions.

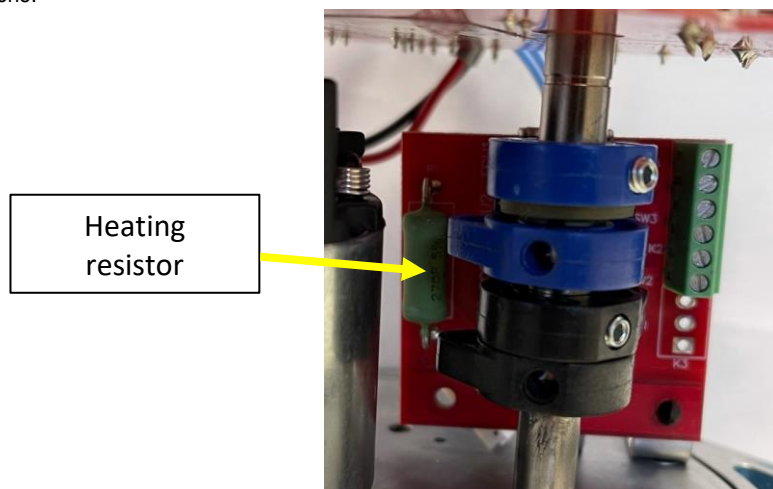


Fig.4 Heating resistor

## 6.4 Signal lamp unit

On the power supply board there is a green LED indicating that the power is on. On the logic board there is a multicolor LED which indicates the following actuator modes.

STANDARD COMMAND MODE 4-20mA / 0-10V				
WORKING STATE	DESCRIPTION	LED COLOR	FLASHING DURATION (sec)	PAUSE BETWEEN FLASHES (sec)
Stand-by	Actuator in position	green	0.1	0.9
Work	Actuator in rotation	green	0.6	0.4
Turning off stand-by	Shut off power supply	yellow	0.1	0.9
Turning off work	Shut off power supply	yellow	0.6	0.4

REVERSE COMMAND MODE 4-20mA / 0-10V				
WORKING STATE	DESCRIPTION	LED COLOR	FLASHING DURATION (sec)	PAUSE BETWEEN FLASHES (sec)
Stand-by	Actuator in position	green	0.1	0.4
Work	Actuator in rotation	green	0.3	0.2
Turning off stand-by	Shut off power supply	yellow	0.1	0.4
Turning off work	Shut off power supply	yellow	0.3	0.2

Every anomaly has a different number of flashes of the RED led on the logic board:

ANOMALY	EFFECT	NUMBER OF FLASHES	FLASHING DURATION (sec)	PAUSE BETWEEN FLASHES (sec)	PAUSE BETWEEN FLASHING CYCLES (sec)
Torque limiter alert	Actuator block	1	0.1	0.3	1
Below minimum threshold voltage alert	Re-enable	3			
Time-out operation intervention alert	Actuator block	4			
Fault driver alert	Actuator block	5			
Actuator in MAN mode	Resettable	6			

**⚠ WARNING:** to reset the anomalies it is recommended to shut off the power supply for more than 10 seconds to ensure the full discharge of the capacitors of the electronic boards.

## 6.5 Setting actuator stop positions

### Control analog inputs (Tab.4)

The board has two separate analog inputs of control for the positioning of the actuator (terminal block "CMD IN", Fig.5). The two inputs allow to apply a voltage control, by providing a signal from 0 to 10 V, or a current control, by providing a signal from 4 to 20 mA.

The electric actuator with positioner can work in two operating modes:

1. "Standard" mode: 4 mA (closed) ÷ 20 mA (open) or 0V (closed) ÷ 10V (open);
2. "Reverse" mode: 20 mA (closed) ÷ 4 mA (open) or 10V (closed) ÷ 0V (open).

The "Standard" mode is the default condition.

This setting between the operating modes is done using the buttons on the control PCB card:

- to enter the programming mode hold down the "M" button for 5 seconds;
- to change modes, simultaneously press the OPEN and CLOSE buttons for more than 2 seconds.
- the lamp of yellow LED indicates that the switching is on;
- to exit the programming mode hold down the "M" button for 5 seconds;

The yellow LED flashing displays which working mode is activated:

- slow flashing (light on every 0.5sec): "Standard" mode is activated;
- fast flashing (light on every 0.1sec): "Reverse" mode is activated;

It is not necessary to set any preset to choose which input to use: just connect the signal to the appropriate input, leaving the other unplugged. The selection is automatic. It is not possible to apply the voltage signal and the current signal simultaneously.

**ONLY ON REQUEST:** An useful feature of the board is the availability of an output on which the 10V fixed voltage is present. This output is available for the user, it can be used to connect the end of a potentiometer with which to move the valve (terminal block diagram "CMD IN", Fig.5). To use the 10V output to control the valve via a potentiometer, this must have a value between 1 kΩ and 4.7 kΩ (the recommended value is 1 kΩ).

### Signal outputs (Tab.4)

There are two analog signal outputs for full range position feedback. The signal output is at the lowest when the actuator is in closed position and is maximum when the actuator is in opened position, regardless of the activated mode (Standard/Reverse). The correspondence between the positions of the valve and the signal of output is proportional. Two signals are available on the two outputs: one voltage signal from 0 to 10 V, another current signal from 4 to 20mA. Both of the outputs can be used simultaneously. The input in voltage should not be loaded with a resistance lower than 1 kΩ and, for proper current output, make sure the resistance is not higher than 500 Ω.

### Procedures to programming

The open and closed positions can be set using the three buttons on the electronic board (Fig.5):

Button M (memory) - Button CLOSE (closing) - Button OPEN (opening)

The open and closed positions may be programmed in any position desired; however the minimum angle between positions must be greater than 45°. The maximum angle must not exceed 320°.

1. To enter programming mode, press the M button for 5 seconds. The yellow LED turns on and the analog input signal is deactivated. If no key is pressed for 30 seconds, the board exits programming mode (the green LED flashes) and the actuator follows the value of the analog input.
2. Use the OPEN and CLOSE buttons to move the actuator to the desired CLOSED position. Please keep in mind the 45° minimum angle.
3. Simultaneously hold the CLOSE and M buttons for more than two seconds (to avoid movement press the "M" button slightly before the "CLOSE" button). The yellow LED flashes three time indicating that the lock position has been stored.

**⚠ WARNING:** if the opening position is too close (or over) to the new closing position not respecting the minimum stroke of 45°, the new closing position is not stored (red LED flashes three time).

4. Use the OPEN and CLOSE buttons to move the actuator to the desired OPEN position. Please keep in mind the 320° maximum angle.

5. Simultaneously hold the OPEN and M buttons for more than two seconds (to avoid movement press the "M" button slightly before the "OPEN" button). The yellow LED flashes three times indicating that the lock position has been stored.

**⚠ WARNING:** if the closing position is too close (or over) to the new opening position not respecting the minimum stroke of 45°, the new opening position is not stored. (red LED flashes three time).

6. To exit the programming mode, hold down the "M" button for 5 seconds (if you press no buttons for 30 seconds the actuator will exit the programming mode and return to the current analog signal position).

**⚠ WARNING:** a special condition must also be taken into account. If you try to program an unsuitable position, such as a close position close to the maximum stroke limit (less than 45° from the virtual opening limit switch), it will not be possible to store that position. This is indicated by the fact that while the memory button are pressed, the yellow LED will not flash.

### Connections

The "CMD IN" terminal for analog input and the "CMD OUT" terminal for analog feedback are described in Tab.4.

CONNETTORE	PIN	NOME SEGNALE	DESCRIZIONE
CMD IN	L	IN 4-20 mA +	Analog input of control in current, from 4 to 20 mA
	M	IN-	Negative reference for both the analog inputs
	O	IN 0-10V +	Analog input of control in, from 0 to 10 V
	P	10V_AUX	Fixed voltage at 10V (for external potentiometer) (only on request)
CMD OUT	Q	OUT -	Negative reference for both the analog outputs
	S	OUT 0-10V +	Actuator position (voltage feedback, from 0 to 10V)
	T	OUT 4-20 mA +	Actuator position (current feedback, from 4 to 20 mA)

Tab. 4: "CMD IN" and "CMD OUT" connections

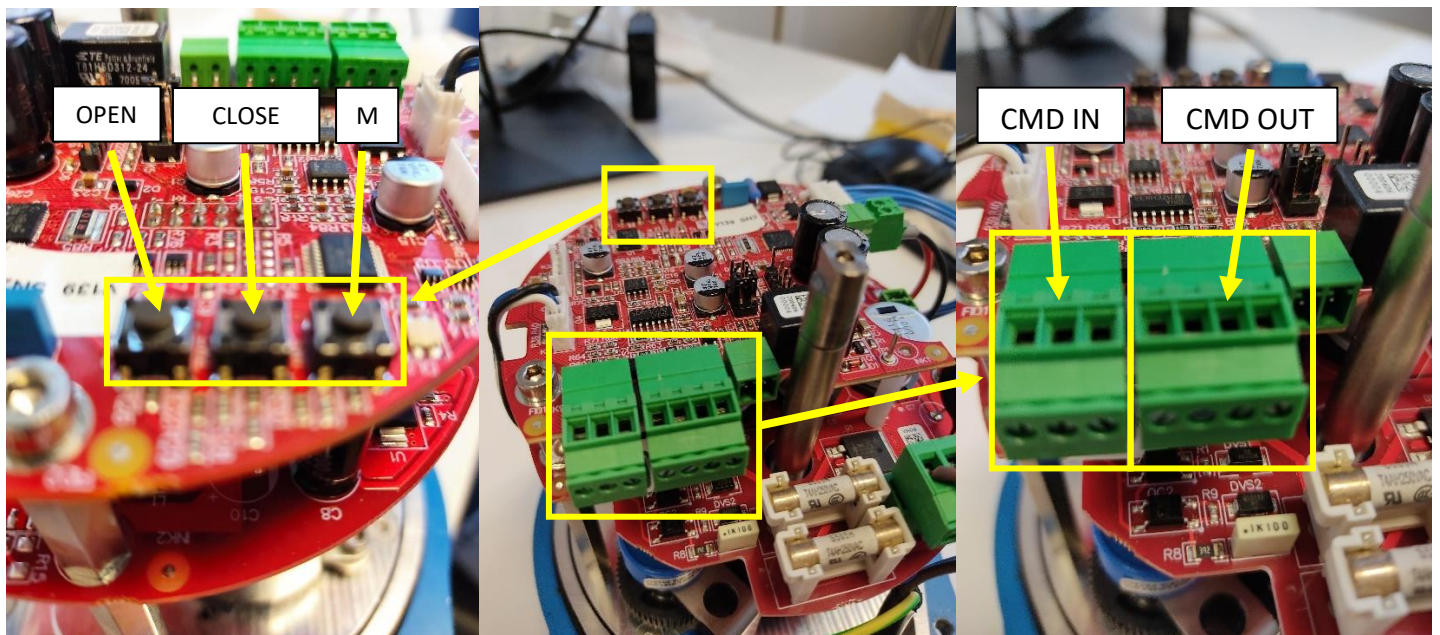


Fig.5 Buttons for the manual planning and terminal block "CMD IN" and "CMD OUT"

## 6.6 Actuator cover assembly

- After making proper connection, please proceed to the assembling of cover "A" (Fig.1), by paying close attention not to hit any electronic parts;
- secure the cable tightening by screwing the electrical connector;
- complete the closure of cover "A" by tightening the captive screws "B";

In case of difficulties in assembling the upper cover, it is recommended to:

- untighten the three dome indicator screws "D" and remove the dome transparent cover;
- remove the open/closed plastic insert;
- mount the upper cover "A" making sure the shaft is properly positioned in the hole;
- reposition the indicator "D" in the proper position on the shaft, place the transparent dome and tighten the three screws.

## 7.0 Manual override

The actuator is supplied with a 10mm (0.39In) square "Q" manual override located on the bottom cover (Fig.6). There are no selectors to switch from automatic to manual mode and vice versa. To manually move the actuator, it is enough to remove the supply voltage and to rotate the square by means of a special tool. The direction of rotation of the square is clockwise for the opening and counterclockwise for the closing.

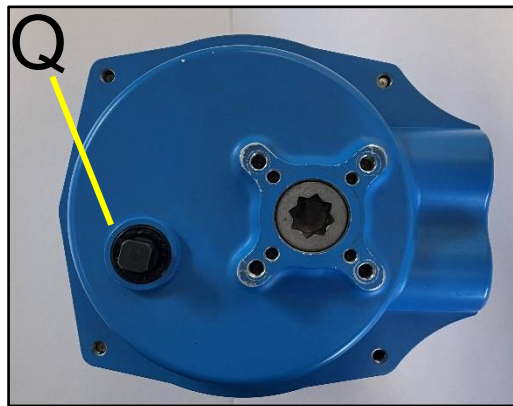


Fig.6 Square for manual override

**⚠ WARNING:** the usage of manual override when the actuator is powered can damage the device.

**⚠ WARNING:** during the operation of the actuator, the square "Q" is always rotating.

**⚠ WARNING:** if the actuator exceeds the stroke range by the manual override, to restore it is necessary to power the actuator and command in any direction until it returns to any limit switch position.

## 8.0 FAIL-SAFE OPERATION WITH BATTERY BACKUP (OPTIONAL)

The versions with battery of Valbia electric actuator use battery packs with series of cells in NiMh technology and nominal voltage on terminals at 24Vdc. For the actuators with battery back-up, VALBIA can set up the actuator to automatically carry out one of the following actions in the event of power outage:

- Opening: the in-progress/current operation is interrupted.
- Closing: the in-progress/current operation is interrupted.
- Completes the in-progress operation: the motor continues the in progress action until it reaches the set point position commanded by the analogue input. Battery operation is enabled after a delay of about 1 sec, it is instantaneous only if the emergency operation is consistent with the operation in progress (for example, when the actuator is closing, the supply voltage is lost and the battery set to NC intervenes).

The action in progress with the battery power supply is interrupted by a possible mains voltage recovery.

A yellow light (LED) mounted on the power supply board indicates that the board is charging the battery in TRICKLE mode. When the battery is fully charged the LED light turn off. The LED signal is reliable if the battery back-up has not been damaged.

The battery is a component that guarantees a limited number of charge / discharge cycles (over 500), therefore its life is inversely proportional to the number of interventions.

**⚠ WARNING:** to guarantee the emergency battery intervention, it is necessary that the actuator remains powered for more than 3 hours.

**⚠ WARNING:** for the version with battery it is recommended to power the actuator within 3 months from the purchase date.

The actuator can also be used in "solenoid" mode (wiring with two wires). To use this mode it is mandatory to follow the warnings above.

## 9.0 Maintenance

The electric actuator does not need any kind of maintenance. The internal lubrication of the gears is enough for the device life. For enclosure cleaning, use a light non-aggressive detergent. In case of damages or operation issues, we suggest sending the actuators back to Valbia for inspection. Valbia S.r.l. declines responsibility and warranty on our actuators repaired from any third party.



## 10.0 Wiring diagram

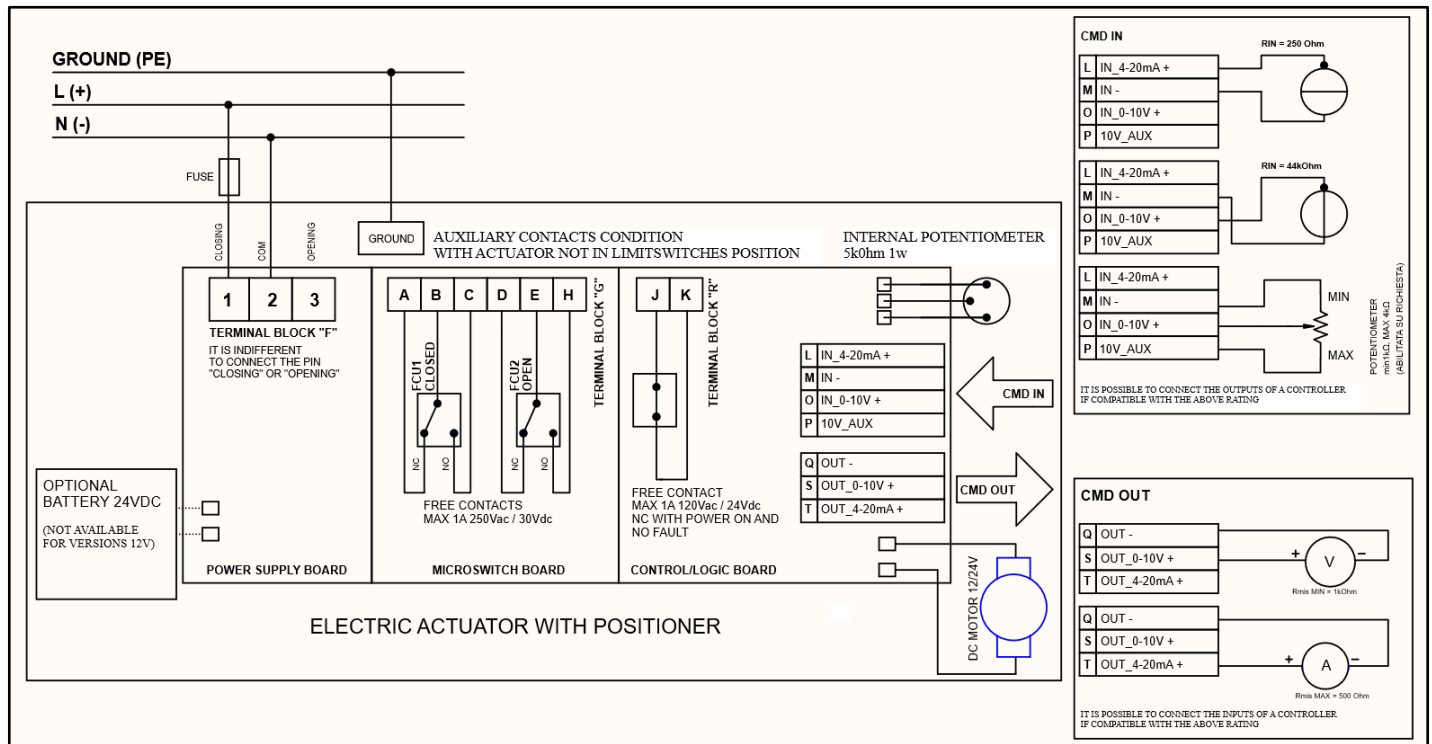


Fig.7 Wiring diagram

## 11.0 Disposal of the electrical actuators at the end of their life cycle

According to the provisions of the European directives 2011/65/UE and 2012/19/UE, concerning the restriction of the use of hazardous substances in electrical and electronic equipment as well as waste management, all the VALBIA electric actuators are designed in order to be completely disassembled when they arrive at the end of their life cycle, separating the different materials for the proper disposal and/or recovery.



The device must not be disposed as a mixed urban waste, it must be recycled through the proper collection system for disposal and for its subsequent correct recycling. The collection system of the equipment at the end of its life is guaranteed on the national territory through the national consortia for the eco-sustainable management of WEEE. For all the information contact VALBIA S.r.l.

At the end of the life cycle of the device, for its removal, a series of precaution must be followed:

- the structure and the various components, if not usable, must be demolished and divided up according to the type of product. All this helps collection, disposal and recycling centers and minimizes the environmental impact that this operation requires.
- appropriate separate waste collection for subsequent sending of the disused equipment for recycling, treatment and compatible environmental disposal contributes to preventing possible negative effects on the environment and favors recycling of the materials of which the equipment is composed.
- the illegal disposal of the product by the user involves the application of the penalties provided by the current regulations regarding such subject.

The product at the end of its life, if properly disposed, is not potentially dangerous for human health and the environment, on the contrary, if improperly abandoned, it could have a negative impact on the ecosystem.