

# **ELECTRIC ROTARY GEAR MOTOR SERIES AB1**

## **INSTALLATION AND OPERATING INSTRUCTIONS**

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## 1. GENERAL FEATURES

Electric rotary gear motors of series AB1 have been newly conceived and specially designed to be installed on residential and industrial combustion systems.

They are particularly suitable for control and regulation of modulating disc valves, butterfly valves, dampers and other fluid regulation systems requiring control of position angle within 90° or 180°.

Electric rotary gear motors are unipolar and bidirectional with high static and they maintain torque for 3-position-control.



### WARNING

Installation, wiring, adjustment and maintenance of gear motors must be carried out exclusively by skilled and authorized service technicians.

Non-proper installation, adjustment, modifications, use and maintenance may cause injuries to the staff or material damages.

It is therefore necessary to respect strictly the following instructions and local prescriptions for the installation of electric devices.

## 2. TECHNICAL DATA

Body and cover	die-cast aluminium
Nominal torque	5 Nm
Maintaining torque	2,5 ÷ 3 Nm
Rotation time	7,5 ÷ 60 seconds for 90° at 50 Hz
Output shaft	10 mm diameter
Adjustable rotation angle	20° ÷ 180° [standard 90°]
Installation	in any position
Fastening bore	DIN ISO 5211 – F05 and F07
Ambient temperature	- 10° ÷ + 60° C
Weight	1,7 Kg
Standard supply voltage	230 Vac / 50 - 60 Hz 110 Vac / 50 - 60 Hz 24 Vac / 50 - 60 Hz
Nominal load	4 VA
Rating of electric contacts of Endswitches and auxiliary switches	5 [1] A/250 V c.a.
Enclosure	IP 54 and IP 65 according to IEC 529
Duty cycle	continuous 100%
Available potentiometers	150, 1000, 2500 Ohm
Cable entry	2 x Pg 13.5

### 3. INSTALLATION

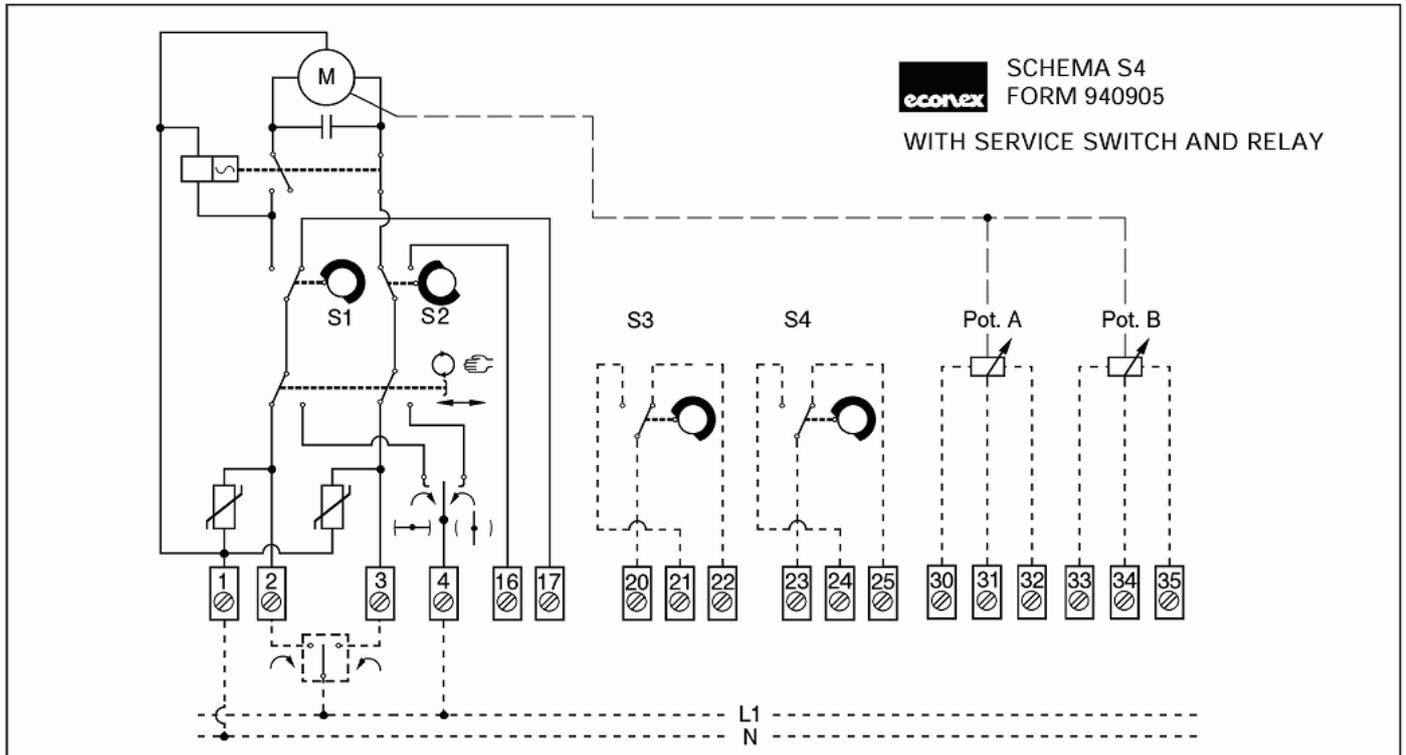
- 3.1** Make sure that all operating data indicated on gear motor plate correspond to the ones of the systems.
- 3.2** When installing the gear motor make sure that there is sufficient clearance above the gear cover and that it is easily accessible in order to perform wiring and endswitches' adjustment.
- 3.3** If not otherwise specified, AB1 rotary gear motor is always supplied by the factory with standard endswitches adjustment suitable for 90° rotation angle.
- 3.4** From a frontal view the motor shaft
- rotates clockwise      ↻      [closes]      supplying terminals 1 -2
  - rotates counter clockwise      ↺      [opens]      supplying terminals 1 -3
- 3.5** AB1 gear motor must be free to be stopped by its electric endswitches; the installation of mechanical locks or the presence of other obstacles could damage it.
- 3.6** AB1 gear motor can be installed in any environment included in the range of electrical protection IP 54 except where acid fumes or other deteriorating vapours might attack its metal parts or where gas leaks or explosive vapours are present in the atmosphere. In environments with high salt percentage, fastening screws should be zinc or cadmium plated and should not be made of brass or stainless steel.

## 4. WIRING

- 4.1 After having installed AB1 gear motor and before fastening it mechanically to the device it has to operate, proceed with wiring and earthing.
- 4.2 Wiring diagrams are reported in the attached technical bulletin and on the plate inside the cover.
- 4.3 **WARNING!**  
Before servicing make sure, that power supply is disconnected by means of the two-pole-switch [phase and neutral]; in case of non-observance, damages to people and equipments may occur.
- 4.4 In order to accede to the internal wiring terminal board, remove the cover by loosening the 4 fastening screws.
- 4.5 Two threaded holes for the fitting of the conduit plugs PG 13.5 are present on the frame of the AB1 gear motor.
- 4.6 All wires must comply with local prescriptions and, in any case, their section must be ranging between 1 and 1.5 mm<sup>2</sup>. Connection piping recommended H07V-U...G1.5 mm<sup>2</sup>.
- 4.7 Connection wiring diagrams show AB1 gear motor at end position closed [0°].
- 4.8 Auxiliary microswitches are single-pole double through and voltage-free.
- 4.9 The rating of auxiliary microswitches is 5[1]A/250V a.c.
- 4.10 If a potentiometer is installed, its resistance value is indicated on the nameplate.
- 4.11 Make sure that power supply and system frequency correspond to the values indicated on the gear motor plate.
- 4.12 Low-tension signalling cable [tension lower than 48V] must be laid separately from the higher-tension conduits [tension higher than 48V]. In case they are laid in a single channel, screened cables must be used.



## 5.2 With manual/automatic control station



### TERMINAL BOARD

Terminal 	earthing
Terminal 1	N = neutral
Terminal 2	by tension the gear motor shaft rotates clockwise  [closes]
Terminal 3	by tension the gear motor shaft rotates counter clockwise  [opens]
Terminal 4	for manual electric control
Terminal 16	answer signal when the gear motor reaches the position "open"
Terminal 17	answer signal when the gear motor reaches the position "closed"

## 5.3 Auxiliary microswitches

### TERMINAL BOARD

Terminal 20	common contact of the auxiliary microswitch S3
Terminal 21	normally open contact of the auxiliary microswitch S3
Terminal 22	normally closed contact of the auxiliary microswitch S3
Terminal 23	common contact of the auxiliary microswitch S4
Terminal 24	normally open contact of the auxiliary microswitch S4
Terminal 25	normally closed contact of the auxiliary microswitch S4

## 5.4 Potentiometer/s for answer signal of Pot. A <sup>and</sup> /or B position

### TERMINAL BOARD

Terminal 30	max. value
Terminal 31	slider
Terminal 32	min. value
Terminal 33	max. value
Terminal 34	slider
Terminal 35	min. value

## 6. AUXILIARY MICROSWITCHES

On request, AB1 gear motor can be supplied with 2 auxiliary microswitches, which can be adjusted in any position.

Microswitches are voltage-free.

Contact rating is about 5 A/250 with Ohm load and about 1 A/250 with inductive load.

For adjusting the cams of auxiliary microswitches, proceed as for cams of endswitches as indicated in paragraph 9.1 chapter 9 "SETTINGS".

## 7. FEEDBACK POTENTIOMETER/S

On request, the AB1 gear motor can be supplied with 1 or 2 independent potentiometers [pot. A <sup>and</sup>/or pot. B] for answer signal of the position of the gear motor.

Resistance value of the potentiometer is indicated on the identification plate.

If resistance value does not correspond to the one wished, proceed as indicated in paragraph 9.2 of chapter 9 "ADJUSTMENTS".

Power consumption is 2 W.

## 8. CONTROL STATION

**8.1** The control station allows the manual electric control of the gear motor.

**8.2** Phase L1 must be connected to Terminal no. 4.

**8.3** The switch AUTO/MAN is supplied on position AUTO .

**8.4** Position the switch AUTO/MAN on manual position indicated by a stylized hand .

**8.5** Switch-ON / Switch-OFF as follows:

**8.5.1** By pushing the switch towards the symbol ▼ the gear motor rotates counter-clockwise  [cam S2 regulates the wished end position "OPEN"].

**8.5.2** By pushing the switch towards the symbol ▲ the gear motor rotates clockwise  [cam S1 regulates the wished end position "CLOSED"].

**8.5.3** By positioning the switch in the middle, the motor does not run.

**8.5.4** IMPORTANT: once the operations for the manual electric control of the gear motor are over, reset the switch AUTO/MAN /C] on position AUTO .

## 9. ADJUSTMENTS

### 9.1 Endswitches

As already reported in chapter 4 paragraph 4.3 the AB1 electric rotary gear motor is supplied by the factory with adjustment foreseen for a 90° rotation angle. If higher or lower than 90° rotation angles are requested, proceed as follows:

- 9.1.1 Disconnect the operating lever system of the gear motor shaft and remove the cover.
- 9.1.2 For "CLOSED" position adjustment it is necessary to operate on cam "S1". For "OPEN" position adjustment, it is necessary to operate on cam "S2".
- 9.1.3 For cam adjustment, use the proper "half-moon" key, supplied with the AB1 gear motor equipment and installed inside.
- 9.1.4 Use the key from the right side, introducing the pin into one of the holes on the sides of the blue cam of the cam involved and lever it to desired position.
- 9.1.5 If the blue cam is in a behind position, use at first the lever on its curved side to move the blue cam to a more suitable position to perform adjustment.



Picture 1

- 9.1.6 Cam adjustment is possible in both directions and along the whole rotation angle of the cam shaft.
- 9.1.7 Remove the key before servicing.
- 9.1.8 Run the AB1 gear motor for a few cycles making sure that the right cam adjustment has been achieved.

- 9.1.9 Once all adjustments have been carried out return the key inside the AB1 gear motor and reinstall the cover by fastening the 4 screws.
- 9.1.10 Reinstall the control lever system of the AB1 gear motor and test functioning of the whole system.

## 9.2 Potentiometer/s

- 9.2.1 The potentiometer shaft is frictioned and is accessible from the upper side inside the gear motor.
- 9.2.2 Disconnect the cables connected with the regulation system from the respective terminals n. 30, 31 and 32 [Pot. A] and, if necessary, n. 33, 34 and 35 [Pot. B].
- 9.2.3 By means of a suitable screwdriver with 5 mm cut rotate the potentiometer shaft and measure the resistance value of 0 Ohm between terminals n. 31 and 32 and, if necessary, also between terminals n. 34 and 35 when the gear motor is closed [picture 2].



Picture 2

By rotating the potentiometer:

- clockwise  $\curvearrowright$  the resistance value increases
- counter clockwise  $\curvearrowleft$  the resistance value decreases

- 9.2.5 The gearbox between the gear motor shaft and the potentiometer shaft is foreseen for a 90° rotation angle. Hence should the gear motor opening be reduced with a rotation angle lower than 90°, the variation of the potentiometer resistance value will be proportionally reduced. If, on the contrary, the rotation angle has been wrongly adjusted over 90° there will be no increase in the resistance value beyond the plate maximum value.

## 10. OPERATING

After installation and adjustment of the control lever system check that switch and wiring of the circuit are correct.

Check that the AB1 rotary gear motor duly controls the device it is meant for.

Check that the AB1 rotary gear motor runs in accordance with the given manual input.

Check that the AB1 gear motor, the lever system and the controlled device are mechanically connected in a correct and safe way.

Check that the levers' movements occur smoothly without jamming or blocking due to other objects.

## 11. MAINTENANCE

The AB1 rotary gear motor does not require any particular current maintenance.

The AB1 gear motor does not require any lubrication because the gear mechanism is immersed in a grease bath.

Do not disassemble any internal part of the AB1 gear motor. In case of non-functioning, after having performed all possible checks on field, it must be returned to the factory for any possible repair.

It is not advisable to perform any repair on field.

Any replacement must be carried out by qualified technicians only.

## 12. REPLACEMENT

In case replacement of the AB1 gear motor is necessary, proceed as follows:

- disconnect power supply from the gear motor.
- remove the gear motor's cover.
- disconnect electric wiring taking note of the cables' numeration.
- remove all levers between the AB1 gear motor and the controlled device.
- install the new AB1 gear motor proceeding as per the instructions given in the foregoing chapters