# USER'S AND MAINTENANCE MANUAL ON-OFF ELECTRIC ACTUATOR "EA" TYPE





OMAL S.p.A.

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#### Note

Please keep this manual in a safe and accessible place.

Always use Individual Protection Devices in compliance with current regulations.

Let only expert and specifically trained staff install and service your system.

Before connecting, please make sure the ground wiring system works properly.

The electric system has to be made in such a way to allow every actuator to have a suitable protection and a disconnecting switch with a key.

Use original spare parts ONLY.

If necessary, spare labels can be provided.

All data and features in this manual may be changed at any time and with no notice for the implementation of technical improvements. Therefore they can not be considered as binding for the delivery.

# 1) WARNINGS

#### **1.1 APPLICATION**

OMAL electric actuators have been specifically designed, manufactured and tested to operate industrial butterfly or ball valves or any other industrial quarter-turn type valve. Different applications may result in damages to the actuators as well as people, animals and things. Always ask the manufacturer before using an actuator for an application that differs from the ones it has been specifically designed for. Follow all installation, use and maintenance instructions when using OMAL electric actuators.

#### **1.2 A BRIEF DESCRIPTION**

An OMAL quarter-turn electric actuator model EA is operated by an electromotor whose two different gear reducers generate the output torque necessary to operate industrial valves. As the kinematic structure creates an absolutely irreversible system, the position reached will be kept even when the motor is not supplied and regardless of the reacting torque of the output shaft. The system is limited mechanically at  $-12^{\circ} + 102^{\circ}$  (no regulation can be made by the user) and by electromechanical contacts at  $-5^{\circ} + 95^{\circ}$ . The contact cams can be regulated by the user all along the stroke down to a minimum rotation angle of 20°. The actuator is provided with an emergency manual lever to be used ONLY and EXCLUSIVELY after disconnecting the actuator.

# **1.3 DIRECTION OF ROTATION**

OMAL electric actuators have been designed to close valves with a clockwise rotation and open them with an anticlockwise rotation. However the user can change that and the visual position indicator can be modified to show the exact position of the actuator and the valve attached to it (see section 6).

#### **1.4 CONNECTION**

Power connections use IP67 multipolar connectors. Connectors have to be properly wired in compliance with all safety measures for low-voltage appliances. Use only cables whose sizes are suitable for the current and voltage in question. While opening the actuator cap to regulate the electromechanical limit switches make sure no water and/ or any other fluid get into it. Make sure not to damage the cap seals to prevent fluids from getting into the working actuator. Make sure the voltage meets the values specified in the actuator label. The 24V supplied models must be connected either by a safety transformer or by a Class II insulating power supply. Let only qualified, specifically trained and properly equipped personnel wire and regulate your actuator.

#### **1.5 MAINTENANCE**

Actuators in the EA series do not require further lubrication and are virtually maintenance free. However, if needed, send your actuator back to OMAL S.p.A. where our service department will test it, fix it (if neccessary) and send it back to you straight away. If you can not send the actuator back, identify the spare parts you need and place an order with our sales department. Please specify your actuator model and serial number and you will get the correct spare parts for your specific actuator. OMAL S.p.A. will not be held responsible for actuators repaired by third parties.

#### **1.6 GENERAL INFORMATION**

Always make sure that the actuator torque is high enough to operate the valve in question. It is common engineering knowledge that the actuator torque needs to be at least 25% higher than the valve working torque. These electric actuators have not been designed and manufactured in compliance with ATEX 94-9/EC directive. Therefore they can not been installed in potentially explosive environment and used in applications where potentially explosive atmosphere can be generated.

OMAL S.p.A will not be held responsible for accidents resulting from the user's non-compliance with one or more sections in this manual and/or improper or wrong use of the product.

# 2) SHIPPING AND STORAGE

Every actuator comes in a container suitable for shipping. Don't remove the actuator from its container until you are ready to use it. Ship and handle every container very carefully and don't stack more than five. Prevent water and dust from getting into the container. Store in a dry and well ventilated place. Make sure that maximum and minimum transit and storage temperatures fall within the range specified in the product technical data sheet. When you get the actuator, make sure its container is in perfect condition. Don't install any actuator that might have been damaged in transit or storage. If the actuator is supplied with a valve, provide the valve and NOT the actuator with lifting eyelets. Never use the actuator to hold on a valve and move it.

# **3) TECHNICAL FEATURES**

Nominal working angle: 90°, adjustable between 20° and 95° Type of regulation: continuous by means of self-stopping cams and electromechanical limt-switches Nominal working torque: from 35 to 240 Nm Cycle time (0°-90°): see diagram Service: S3 ED 50% in compliance with IEC 60034 Applicable regulations: Low Voltage Directive 2006/95/EC; Electromagnetic Compatibility Directive 2004/108/EC Enclosure: IP65 in compliance with EN 60529 Working temperature: -25° +60°C Storage temperature: -40° +90°C Motor in-built auto-reset thermostatic protection Motor with Class F insulation (155°C) Rotor supported by ball bearings Connection for emergengy manual lever (hexagonal wrench in equipment) Flashing external visual position indicator with graduated top Space heater (standard) IP65 connectors also available with pre-wired cable No. 2 SPDT auxiliary electromechanical limit switches with gold contacts and cams adjustable all along the stroke (Max. 24V AC/DC; Max. 1 A - min. 1mA) Maximum working noise: < 70dB Supply voltage: 230 Vac 50/60 Hz ±10% monophase; 115 Vac 50/60 Hz ±10% monophase; 24V ac/dc ±10%; 24V dc ±5%









alimentazione

main power





MODEL	EA0035	EA0070	EA0130	EA0240	
А	136,9	136,9	157,6	157,6	
В	109	109	129,7	129,7	
С	132,1	136,1	160	163,5	
D	190	190	221,6	221,6	
E	74	74	90,5	90,5	
G	84	84	93	93	
F	03-05-07	03-05-07	03-05-07	03-05-07	
0	14	14	17	22	

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Fig. 2

# 4) ASSEMBLING ON VALVES

APPROACH : Actuator (fig 7) -CLOSE





ACTUATOR MODEL	Coupling	Dimension A min. value	Dimension A max. value
35 Nm	14 mm	12 mm	15 mm
70 Nm	14 mm	12 mm	15 mm
130 Nm	17 mm	15 mm	18 mm
240 Nm	22 mm	20 mm	23 mm

#### 5) MANUAL OPERATON

The actuator can be rotated manually by means of a manual lever in case of emergency or for regulating purposes. NOTE: always disconnect the actuator before using the manual lever

- 1. unclip the lever (A)
- 2. insert the lever in the hexagonal seat (B)
- 3. rotate clockwise to get the actuator closing rotation
- 4. rotate anticlockwise to get the actuator opening rotation5. clip the lever back

NOTE: always remove the lever from the hexagonal seat (B) before reconnecting the actuator



#### **DIRECTION OF ROTATION**

The pictures show a standard electric actuator: the position is that of a closed valve. To get the electric opening rotation, supply connecting terminal no. 1 (see elecric diagram on page .....). To get the manual opening rotation, insert the lever in the hexagonal seat and rotate it anticlockwise. The valve shaft will turn anticlockwise (see arrows).



# 6) SETTING THE POSITION INDICATOR

The position indicator normally allows for a valve that opens with an anticlockwise rotation and closes with a clockwise rotation. The turret shows  $0\infty$  and a completely black window when the valve is closed. It shows  $90\infty$  and a completely yellow window when the valve is open. The pictures show how the position indicator is assembled in House. However its component positions can be changed depending on each customer's specific needs.

#### NOTE: always disconnect the actuator before proceeding

#### Changing the turret (C) position

- 1) Unscrew the protective cap (A) fixing screws (B)
- 2) Unscrew the turret fixing screws (D).
- 3) Remove the turret (C) and rotate it to the desired position
- 4) Screw the turret and the cap back tight to avoid any possible infiltration

#### Changing the graduated disc (E) position

- 1) Unscrew the cap (A) fixing screws (B)
- 2) Loosen the disc fixing screw (F)
- 3) Rotate the graduated disc (E) to the desired position
- 4) Screw the fixing screw back tight (F)
- 5) Screw the cap back tight to avoid any possible infiltration

# Changing the graduated cylinder (G) position

- 1) unscrew the cap (A) fixing screws (B)
- 2) remove the rotating cylinder (G) from its seat and rotate it to the desired position (90∞ increments).
- 3) Screw the cap back tight to avoid any possible infiltration

#### Position of the disc after stroke regulation

After regulating the actuator stroke, make sure that the position indicator shows the actual position of the valve





Fig. 9

# 7) REGULATING THE ACTUATOR ELECTRIC STROKE

Each actuator must be regulated with a specific valve in order to guarantee its perfect opening and closing. The extent of the regulation depends on the type of valve and on how precisely actuator and valve are connected (the bigger the play the higher the extent of regulation required)

# WARNING: ALWAYS DISCONNECT THE ACTUATOR BEFORE PROCEEDING AS FOLLOWS:

# Regulation procedure (fig. 13 and 14 pag. 6)

After removing the cap (see section 6), limit switch and auxiliary limit switch cams will become accessible.

1) disconnect the actuator

- 2) insert the manual lever (see section 5)
- 3) rotate the manual lever (see section 5) until the actuator is in the closed-valve position

4) loosen screw I as much as possible. Using a 4-mm screwdriver, rotate the limit switch cams

(NOTE: limit switch and auxiliary limit switch cams move independently from one another and do not interact with one another even when I is loose. However if you rotate the actuator when I is loose, the cams might not keep their positions).

5) rotate cam C until limit switch B switches (even if the switching can be heard with no or little noise, always use an electric continuity gauge to check the limit switch contacts)

6) screw I back tight

7) by means of the emergency manual lever operate the actuator from the closed-valve position. Make sure that the limit switch B switches in the desired position

8) Rotate the actuator to the open-valve position using the emergency manual lever

9) loosen screw I as much as possible. Using a screw driver, rotate the limit switch cams.

10) rotate cam D until limit switch E switches (even if the switching can be heard with no or little noise, always use an electric continuity gauge to check the limit switch contacts)

11) screw I back tight

12) by means of the emergency manual lever operate the actuator from the open-valve position. Make sure that limit switch E switches in the desired position

13) The same procedure must be followed for auxiliary limit switches A and F and the corresponding cams L-G, if you want to use this function

14) Clip the emergency manual lever back

15) Put the visual position indicator back

16) Put the actuator cap back making sure that the seal is in perfect condition and well set and that all fixing screws are tight

17) Reconnect the actuator

18) Eletrically Operating the actuator make sure that the strokes meet what is required by the application

19) If necessary, re-regulate

After the regulations close the caps accurately in order to guarantee the tightness to the infiltrations.

- A) Auxiliary limit switch: closing
- B) Electric Limit switch: closing
- C) Limit switch cam: closing
- D) Limit switch cam: opening
- E) Electric Limit switch: opening
- F) Auxiliary limit switch: opening
- G) Auxiliary limit-switch cam: opening
- H) Visual position indicator turret
- I) Cam fixing-loosening screw
- L) Auxiliary limit-switch cam: closing





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# 7.5 REGOLATION ON BUTTERFLY VALVES

When an actuator assembled on a butterfly valve is properly regulated, both actuator and valve will work flawlessly for a long time. If the locking disc is roughly regulated, the seal might be under excessive stress and wear prematurely. Tightnees is guaranteed when the disc meets the seal between 3° and 5° before 0°.

Having a true irreversible actuator allows to position the closed-valve limit switch very close to the point of minimum seal compression necessary to mantain the tightness.

In the previous chapter we have described how to regulate the actuator electric stroke.

In the regulation procedure, step 3 describes how the valve is closed by means of the emergency manual lever. With a butterfly valve there will be an enormous increase in the resisting torque when the disc meets the seal. Like we said before this point is genarally between  $3^{\circ}$  and  $5^{\circ}$  before  $0^{\circ}$ .

Regulate the limit switch cam carefully so that the motor will stop within one grade from the point that has been manually detected. That will stop the disc from penetrating too deep into the the elastomeric seal, will reduce the valve operating torque and make the seal last longer. Furthermore when seals are worn out this regulation allows for a regulation margin to get tightness back.

# 7.6 BALL VALVE REGULATION

Installing electric actuators on ball valves is easier than on butterfly valves. Small mistakes in the regulation of 0° and 90° on ball valves will not affect their performance. The regulation of 0° and 90° when electric actuators are being tested is generally more than enough to guarantee the perfect and immediate performance of the valves.

# NOTE

If a valve is operated outside a pipe, make sure not to put your hands or any other part of your body inside the valve as there is enough speed and energy to amputate limbs or hurt a careless operator. Don't put any object inside the valve and don't try to stop its rotation introducing any tool; both valve and actuator could be permanently damaged.

#### 8) CONNECTION

Connecting OMAL electric actuators of the EA series is facilitated by two different IP65 multipolar connectors. The person in charge of the connection shall choose a cable in a size suitable for the current absorbed by the actuator and in a material suitable for the working temperatures developed by the application. Proper wiring of the connecting cables and careful locking of the connector cable-press will guarantee an IP65 protection level and, therefore, the perfect performance of the actuator in time. The connector cable-presses have been designed for multipolar covered cables with an 8- to 10-mm outside diameter.



The wiring diagram will be the same for all voltages

#### **POWER CONNECTOR (4 POLES)**

pole 4: ground cable

Pole 2: neutral for ac supply or negative pole for dc supply Poles 1 and 3: other ac phase or positive pole for dc supply depending on what kind of rotation you want to get (actuator opening or closing rotation)

#### **SIGNAL CONNECTOR (7 POLES)**

Pole 1: common pole of the two auxiliary limit switches Pole 2: NA contact of the limit switch indicating an open valve Pole 3: NC contact of the limit switch indicating an open valve Pole 4: NA contact of the limit switch indicating a closed valve Pole 5: NC contact of the limit switch indicating a closed valve Pole 6 and 7: space heater

#### 9) SPACE HEATER

It comes standard with OMAL mod. EA actuators

The use of this resistance is optional and depends on the climatic conditions in the area where the electric actuator works. This resistance prevents the so-called idew effecti from happening which would cause air humidity to condensate inside the actuator wiring system. It is important to keep the space heater supplied whenever temperature is close to or lower than 0° C or whenever major changes in temperature may occur. THE SPACE HEATER MUST BE SUPPLIED WITH THE SAME VOLTAGE AS THE ELECTRIC ACTUATOR. ITS CON-

THE SPACE HEATER MUST BE SUPPLIED WITH THE SAME VOLTAGE AS THE ELECTRIC ACTUATOR. ITS CON-SUMPTION IS APPROX. 5 W.



femmina volante 4 poli lato morsetti



femmina volante 7 poli lato saldature



Fig. 19

A) DC motor group consisting of motor and motor cap seal

B) AC motor group consisting of motor stator and rotor, motor cap seal and compensating undulated washer

C) final transmission group consisting of wormscrew, no.2 screw bearings, pre-assembled ring gear and output shaft, no. 2 outputshaft sliding bushes

D) primary transmission group consisting of parallel-axis gears and wheel cap seal

E) complete electronic card

F) limit-switch cam group

G) mobile visual position indicator

H) top cap provided with fixed position indicator

I) top cap seal

- L) intermediate adaptor consisting of adaptor seal and flange
- M) intermediate plate
- N) wheel cap (with bushes)
- O) movable female connectors (4 poles and 7 poles)
- P) pre-wired male connectors (4 poles and 7 poles)
- Q) manual operation kit with lever and no. 2 lever clips



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# **C** $\in$ DECLARATION OF CONFORMITY

The undersigned OMAL SPA based in via Ponte Nuovo 11- Rodengo Saiano (BS) - ITALY

# DECLARES

that the following products :

# **ELECTRIC ACTUATOR EA TYPE**

are in conformity with the provisions of the following EC directives:

2006/95/EC Low Voltage

2004/108/EC Electromagnetic Compatibility

2006/42/EC Annex IIB - Machinery

Reference Norms:

EN 60730-1 :2000 EN 60730-2-8 :2002 EN 60529 :1997 EN 55014-1:2006 EN 55014-2:1997 EN 61000-3-2:2006 EN 61000-3-3:1995 EN 61326-1:2006 EN 12100:2010 EN 60204-1 :2006

Rodengo, 23/03/2011

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