

**BERNARD  
CONTROLS**

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# AQ SWITCH RANGE



*Start Up Guide  
Instructions de mise en service*

SUG\_17003 - Ind. A  
Art : 5100466

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## 1 SAFETY

This device complies with current applicable safety standards. Installation, maintenance and use of this unit require a skilled and trained staff.

Please carefully read this whole document before mounting and starting-up the actuator.

## 2 PACKAGING, STORAGE AND MAINTENANCE

### Packaging

AQ actuators are delivered in a cardboard box of a size equivalent to the actuator and sit in a cardboard wedge.

### Storage

Actuators should be stored under a shelter, in a clean and dry place and protected from wide temperature variations.



- Avoid placing the actuator directly on the floor.
- Check that plugs on cable entries are correctly tightened.
- Check that cover screws are correctly tightened to ensure weatherproof sealing of the cover.

AQ actuators include electrical components and lubricated gears. Even with a weatherproof enclosure, oxidation, seizing and other alterations may occur if actuators are not correctly stored.



Heating element should be connected to power supply especially if the storage place is wet (standard 230 VAC, except otherwise specified).

### What to check after storage

1. Visually check the electrical equipment.
2. Manually operate micro-switches, buttons, selectors, etc., to ensure their proper mechanical functioning.
3. Manually operate the actuator.

## What to check on installed non-commissioned actuators

If you expect a long period between actuator mounting and electrical wiring:

1. Visually check that cable entries and cover are tightly closed.
2. In case of outdoor installation, cover the unit with a plastic protective film.

## Actuators equipped with electronic components

Long term storage of electronic components which are not in service increases the risk of malfunction. This is not advisable.

If a long term storage is absolutely necessary, we strongly recommend a revision of the electronic boards in our factory before actuator usage.

## Maintenance

This actuator features lifetime lubrication. While the device is correctly mounted and sealed, no specific maintenance is required.

Test once a year the motor operation and make sure that the electrical compartment is free from condensation.

If it operates in a wet atmosphere, this actuator includes an anti-condensation heater to avoid condensation build-up.

### 3 ASSEMBLY

Actuator should be attached directly to the valve using proper bolts or via a proper interface.

After assembly, the actuator can operate in any position.

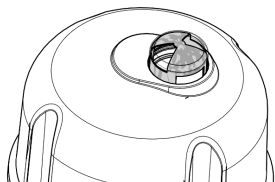
However:



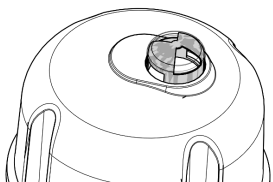
- do not lift the actuator by the handwheel to avoid damage on internal gearing
- cable glands must not be oriented upwards (loss of water tightness)

#### Changing closing direction indication

As a standard, AQ actuator is configured to close clockwise. If the actuator must close counter-clockwise, you can change orientation of the position indicator cap.



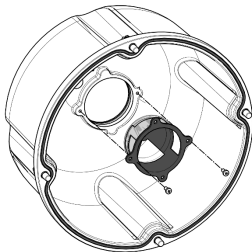
**Standard indicator orientation**  
for clockwise closing



**Reverse indicator orientation**  
for counter-clockwise closing

#### How to change cap orientation

1. Disassemble the cover then the cap.
2. Turn the cap 90°.
3. Reassemble the cap then the cover.



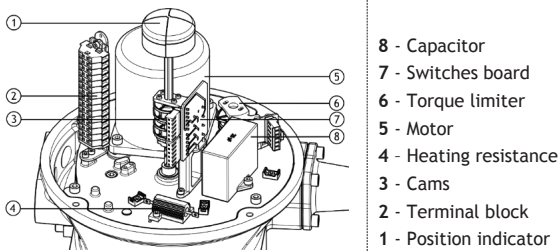
## 4 EMERGENCY HANDWHEEL OPERATION

AQ actuators feature a handwheel for emergency operation.

To avoid potentially harmful turning protruding parts during electrical operation, AQ handwheels feature a foldable handle: you can fold it during electrical operation and unfold it if you need to operate the actuator manually.

## 5 ELECTRICAL COMMISSIONING

### Connection and preliminary tests



Actuator and its components are wired to internal terminal blocks.

To proceed to the wiring, remove the cover and pass the cables through the M20 cable entries or 3/4" NPT cable entries (depending on order).

Please refer to the wiring diagram enclosed for terminal numbering. Both thermal protector and torque limit switches must be integrated into your control system in order to prevent potential damage to the actuator or valve.

## What to check after wiring

Once actuator wiring is completed, please check the following:

1. Make sure that power supply voltage matches information on the sticker on the side of the actuator.
2. Check that all connectors or cable glands are correctly tightened.
3. Manually drive the valve to a mid-travel position.
4. Electrically operate counter-clockwise rotation and check that the motor rotates in the right direction.
5. Manually press on the counter-clockwise travel limit switch then the motor should stop.
6. Repeat steps 4 and 5 for clockwise direction.



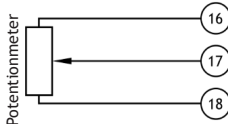
- If any fault is detected at this stage, please check again the whole wiring.

## Position feedback potentiometer (OPTION)

The potentiometer used for actuator position feedback is driven by the travel cam block system.

For clockwise closing:

- 0% position indicates a closed valve
- 100% position indicates an open valve.

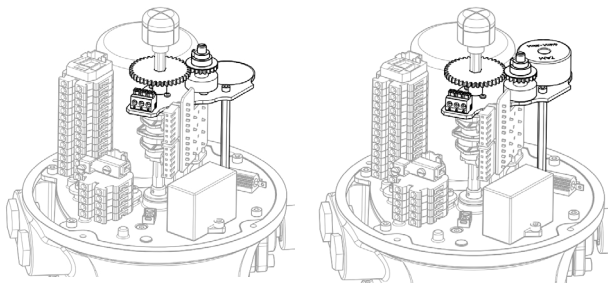


Resistance value is measured between 16 and 17 terminals.

## How to set the potentiometer circuit board

You can set the zero of the potentiometer with the **0% position screw**. Use a flat blade screwdriver to turn this screw.

1. Drive the actuator to the **CLOSED** position.
2. Untighten the positioner pinion blocking screw.
3. Adjust the potentiometer by turning its shaft so that the resistance value exceeds 0 Ohm and regularly increases then turn backwards to reach the closest value to 0 Ohm. Tighten back the positioner pinion blocking screw.
4. Drive the actuator to the **OPEN** position and write down the resistance value corresponding to the 100% position.
5. Come back to the **CLOSED** position and check that the resistance shows a repeatable near zero value for the 0% position.



*Position feedback potentiometer (Left) & TAM position transmitter (Right)*

### Signal inversion

To change the signal variation direction, invert potentiometer wires on the terminal block (e.g. for a connection on 16/17/18, invert 16 and 18).



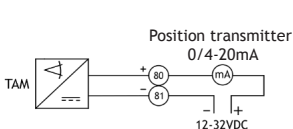
## TAM position transmitter (OPTION)

The TAM transmitter delivers a 4 to 20 mA signal linearly proportional to the angular position of the valve.

### Electrical connections

To connect TAM, refer to the wiring diagram supplied.

Filtered or stabilized power supply should be provided within the 12 to 32 VDC range. Maximum admissible resistance values are given in the following table:

	DC supply (volts)	Max. admissible resistance (ohms)
	12	150
	24	750
	32	1050

### Signal direction inversion

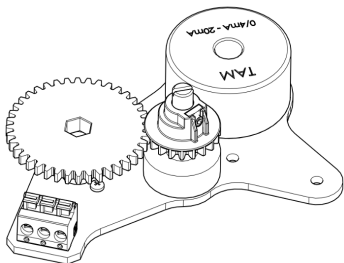
The TAM transmitter, when supplied with a clockwise closing actuator, provides a signal that rise from close position to open position.

If an opposite signal variation is required, simply move 2 jumpers on the board near the potentiometer:

- direct signal: jumpers on 1-3 and 2-4
- reversed signal: jumpers on 1-2 and 3-4

## How to set TAM

1. Connect a milli-amp meter on terminal block.
2. Always start by adjusting the 4mA.
3. Drive actuator to the position corresponding to the 4 mA (**CLOSED** position).
4. Untighten the potentiometer pinion blocking screw. Adjust the potentiometer shaft so that the output current reaches a minimum value.



5. Turn backwards until the current value regularly increases then turn backwards again and stop as soon as the minimum value determined here above is reached and tighten back the potentiometer pinion blocking screw.  
The potentiometer is then positioned at the very beginning of its track.
6. Then, use the TAM adjustment screw marked as **0/4mA** to adjust the current to a value as close to the 4 mA as possible.
7. Drive actuator to the position corresponding to the 20 mA (open position).
8. Turn the screw marked **20mA** in order to read exactly 20 mA on the milli-amp meter.
9. Come back to the closed position and check that, for the 0% position, the signal current shows a close to 4 mA and repeatable value.

## 5.4 Heating element

Each actuator includes a heating resistor.

As soon as the actuator is installed in the field, it is recommended to power the resistor to prevent condensation.



- Immediately put the cover back in place after start-up while ensuring its seal is clean. Never leave actuator electrical components without their protection cover.

In case of water intrusion:

- Dry electrical components before putting back the cover.
- Check electrical insulation.

## 6 TRAVEL LIMIT SETTINGS

The actuator is factory-set for a 90° travel.

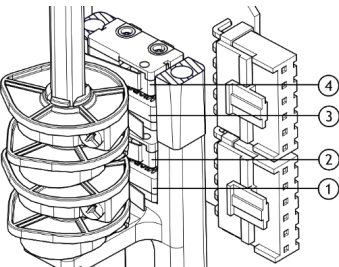
It features 2 devices to limit the travel:

- Cams trigger switches to switch off power at an end position or to signal a position
- Mechanical stops mechanically block rotation to protect the valve in case of over-travel. **They must not be used as travel limits.**

### Single cam setting

The cam rotates with the output shaft and triggers a switch by pushing on its lever.

Cams orientation are factory pre-set, yet you can still re-adjust them during the commissioning if necessary.



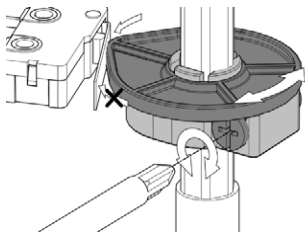
Rep.	Function	Status before installation
1	Clockwise travel limit	Pre-wired, cam pre-set
2	Counter-clockwise travel limit	Pre-wired, cam pre-set
3	Clockwise signaling	To wire, to set
4	Counter-clockwise signaling	To wire, to set

## How to adjust a single cam



Take care that cams get to the lever according to its inclination direction, otherwise you could damage the switch.

At the desired position of the actuator output:



- 1) Turn the setting screw of the corresponding cam with a flat blade or a Phillips screwdriver. cam disk is then turning.
- 2) Set the cam disk until you hear a click from the switch. It indicates the trigger of the switch.



If the actuator is supplied mounted on a valve, following settings should have been performed by the supplier.

## Cams and mechanical stops setting

On AQ switch actuators, both cams and mechanical stops can be set.

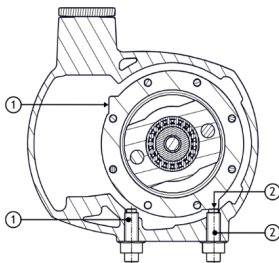
The actuator stops on open and closed position when the travel limit switch is tripped.

### Travel limit settings

The mechanical stops (1: counter-clockwise - 2: clockwise) avoid over-travel in case of handwheel operation.

They can be set on the actuator or on the gearbox if a gearbox is fitted on the actuator.

Fine adjustment of the stop screws position is possible within a limit of  $\pm 2^\circ$  maximum. These screws are located on the lower side of the actuator.



## How to adjust cams and mechanical stops for both directions



One turn of the adjustment screw = 4° angle variation at the actuator output.

### *Clockwise mechanical stop setting*

1. Untighten the nut corresponding to clockwise mechanical stop and turn the mechanical stop 2 turns back.
2. Drive the actuator to clockwise travel limit position.
3. Get the clockwise mechanical stop in contact with output sleeve then move it back of 1.5 turns.
4. Retighten nut to keep mechanical stop in position.

### *Clockwise travel limit switch cam setting*

5. Set the cam corresponding to clockwise travel limit switch.

### *Clockwise signaling switch cam setting (if wired)*

6. Drive slightly the output in the counter-clockwise direction using manual override.
7. Set the cam corresponding to clockwise signaling switch.

### *Counter-clockwise settings*

8. Untighten the nut corresponding to counter-clockwise mechanical stop and turn the mechanical stop 2 turns back.
9. Drive the actuator to the counter-clockwise travel limit position.
10. Redo settings steps 3 to 7 for counter-clockwise direction.

Perform complete electrical valve opening and closing operations. It is mandatory that the motor stops on the travel limit switch and not on the mechanical stop (check available extra travel to the stop with handwheel).

## 7 TORQUE LIMITING DEVICE (AQ25 / 30 / 50 only)

The actuator is protected by a torque limiting device in case of over-torque.

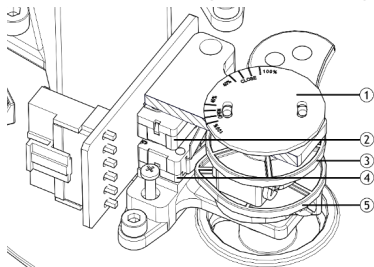


If the actuator stops in a position which is not the one desired, please check if actuator did not reach mechanical stops or that valve has no stiff point.

Actuators are set and tested in factory according to torque stated on orders. If no torque is specified, the actuator is supplied with limiter set to the maximum output torque. In both of these cases, you can adjust torque limiter if necessary.

### Torque limiter operation

Please check below torque limiter setting components.



- 5 - Clockwise direction cam
- 4 - Clockwise direction switch
- 3 - Counter-clockwise direction cam
- 2 - Counter-clockwise direction switch
- 1 - Torque scale disk

Torque limiter is triggered as (3) and (5) cams trigger their corresponding (2) and (4) switches when rotating.

Torque scale disk (1) allows to set torque limit for both directions. It has torque graduations from 40 to 100% of the maximum torque deliverable by the actuator.

To adjust torque, set the tip of cam to match the torque percentage desired on the disk.



Torque scale disk is factory-set and is a reference for cams setting. Do not modify its position or you will not be able to set the torque limiter accurately.

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