

**BERNARD®
CONTROLS**

Invest in Confidence



AT SWITCH RANGE



Start Up Guide

SUG_17010_EN - Ind. A
Art : 5100581

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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 assembling on valve and starting-up the actuator.

2 PACKAGING, STORAGE AND MAINTENANCE

2.1 Packaging

AT actuators packaging is comprised of a dual-layer carton strapped on a pallet. For certain non-EU countries or on request, the pallets are heat treated to standard NIMP 15 and IPPC-stamped.

This packaging is identical for shipping by road, air or sea, unless otherwise provided in the contract.

2.2 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 of cable entries are correctly tightened.
- Check that cover screws are correctly tightened to ensure weatherproof sealing of the cover

AT actuator includes electrical components and lubricated gear stages. Even with a weatherproof enclosure, oxidation, seizing and other alterations may occur if actuator is not correctly stored.



Heating resistor should be connected to power supply especially if the storage place is wet.

What to check after storage

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

What to check on pre-installed actuators

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

1. Visually check that cable entries and cover are tightly closed.

2.3 Maintenance

All AT actuators feature lifetime lubrication and therefore require no specific maintenance, if they were correctly commissioned and used in conditions foreseen by design.

3 ASSEMBLY

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

After assembly, the actuator can operate in any position.

However:



- The actuator must not be handled by handwheel, to avoid damage on gearing.
- Cable glands must not be oriented upwards (loss of water tightness)
- It is recommended not to position motor downwards.



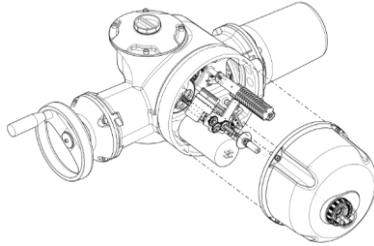
If the actuator is delivered mounted on the valve, basic settings should have been carried out by the valve supplier.
In this case, you do not need to set again travel limits and torque limiter.

4 ELECTRICAL COMMISSIONING

4.1 Opening / Closing electrical compartment

You need to open the electrical compartment in order to wire actuator.

If closing direction is not standard (clockwise), and it is not already done, configure the position indicator accordingly (see page 16).



How to open electrical compartment

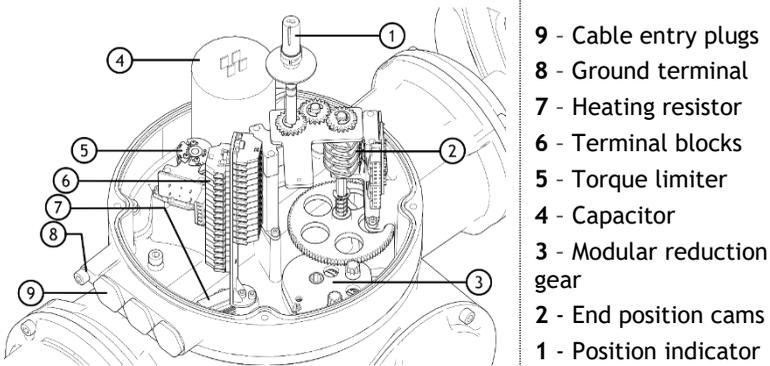
1. With 10mm angled socket wrench or flat blade screwdriver, untighten the 4 screws.
2. Remove the cover along position indicator (see page 8) axis.

How to close electrical compartment

1. Position the cover with the indicator window opposite the position indicator
2. Insert the cover on the position indicator until it reaches the housing.
3. With 10mm angled socket wrench or flat blade screwdriver, tighten the 4 screws on the housing.

4.2 Connection and preliminary tests

4.2.1 Components (with cover open)



Actuator and its components are wired to internal terminal blocks.

4.2.2 Installing cable glands

AT actuator is fitted with M20 cable glands.

How to install cable glands

For each cable entry used

1. Remove plug from the cable entry with 23mm (M20 entry) open-end wrench.
2. Separate sealing nut from its cable gland.
3. Screw and tighten cable gland in the cable entry.
4. Thread the sealing nut on the cable and pass the cable through the cable gland.
5. When the wiring is finished, tighten the sealing nut on the cable gland.



Unused entries must be kept closed by their plug.

4.2.3 Wiring

Internal wiring

To proceed to the wiring, remove the cover and pass the cables through the cable glands, then connect wires on terminal blocks.

Please refer to the wiring diagram enclosed for terminal numbering.

Both heating resistor (7) and torque limit switches (5) must be integrated into your control system in order to prevent potential damage to the actuator or valve.

Ground terminals wiring

Attach a ground wire fitted with a 6mm ring terminal to the internal and external (8) ground terminals.

4.2.4 Wiring checking

You need to check your wiring once finished.

How to check your wiring

1. Make sure that power supply voltage matches information on the label on the side of the actuator.
2. Check that cable glands are correctly tightened.
3. Manually drive the valve (see page 20) 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 all wiring.

4.3 Position feedback

4.3.1 Position feedback board

Two components can be used for position feedback:

- a potentiometer
- a « TAM », a component recopying position from a 4-20 mA signal

They can be combined to work as **Position transmitter** (potentiometer + TAM) or **Positioner** (potentiometer).

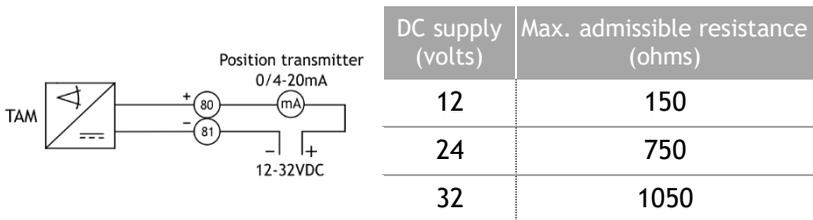
4.3.2 Position transmitter (OPTION)

The position transmitter delivers a 4 to 20 mA signal linearly proportional to the percentage of opening 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 for the wiring are given in the following table:



Signal direction inversion

If the TAM transmitter is fitted on a counter-clockwise closing actuator, it provides a signal that rises from closed to open positions.

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

You always must start by setting the 0/4mA setting.

1. Connect a milliamperemeter with or without load to read the output current.
2. Drive actuator to the position corresponding to the 0/4 mA. As a standard, it is the position at the end of operation in clockwise direction, which is CLOSED position.
3. While holding the pinion located just under the plate marked «0% position», adjust the potentiometer turning its screw so that you reach the range where the current is at its minimal value.
4. Turn the screw backwards to find the range where the current starts to regularly increase.
5. Turn again the screw backwards and stop as soon as the minimum value determined at pt. 3 is reached. The potentiometer is then positioned at the beginning of its track.
6. Precisely adjust the 0/4mA using the TAM screw marked “0/4mA”.
7. Drive the actuator to the position corresponding to the 20 mA. As a standard, it is the position at the end of operation in counter-clockwise direction, which is OPEN position.
8. Turn the screw marked “20mA” in order to read exactly 20 mA on the milliamperemeter.
9. Come back to the closed position and check that for 0% position, the signal current shows a close to 0/4 mA and repeatable value.

4.4 Positioner (OPTION)

The potentiometer used for actuator signal feedback is driven by position indicator rod.

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 potentiometer

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. Hold the pinion located just under the plate marked with the **0% position** while turning the potentiometer screw.
3. Adjust the potentiometer so that the resistance value exceeds 0 Ohm and regularly increases then turn backwards to reach the closest value to 0 Ohm.
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.

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).

4.5 Heating resistor

Each actuator includes a heating resistor.

As soon as the actuator is installed in the field, it is recommended to supply 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.

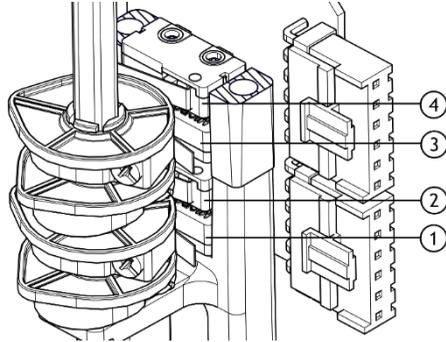
5 TRAVEL LIMIT SETTINGS

To limit the travel, AT actuator features a set of cams. They trigger switches to switch off power at end positions, or to signal a position.

5.1 Single cam setting

Cams rotate as the output shaft, and trigger switches by pushing on their levers.

Orientation of each cam is factory pre-set, yet you can still re-adjust them at the installation if necessary.



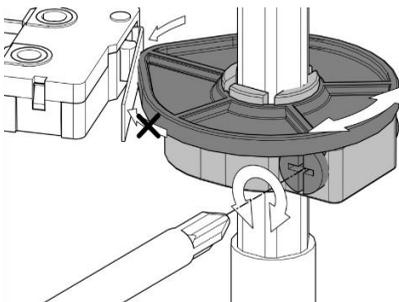
Rep.	Function	Status before installation
1	Clockwise travel limit	Pre-wired, cam pre-set
2	Counter-clockwise travel limit	Pre-wired, cam pre-set
3	Clockwise signaling	Pre-wired, cam pre-set
4	Counter-clockwise signaling	Pre-wired, cam pre-set

How to adjust a single cam



Make sure that cams get to the switch 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 Philips screwdriver.

The 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.

5.2 Cams setting

The actuator stops on open or closed position when corresponding travel limit switch is tripped by its cam.

How to adjust cams for both directions

1. Drive the valve to the clockwise travel limit position.
As a standard, it is CLOSED position.
2. Set the cam corresponding to clockwise travel limit switch (1).
3. Drive the output slightly in the counter-clockwise direction using manual override.
4. Set the cam corresponding to clockwise signaling switch (2).
5. Drive the actuator to the counter-clockwise travel limit position.
6. Redo settings steps 2 to 4 for counter-clockwise direction.
7. Perform complete valve counter-clockwise and clockwise electrical operations.
The motor should stop when the corresponding cams are reached.

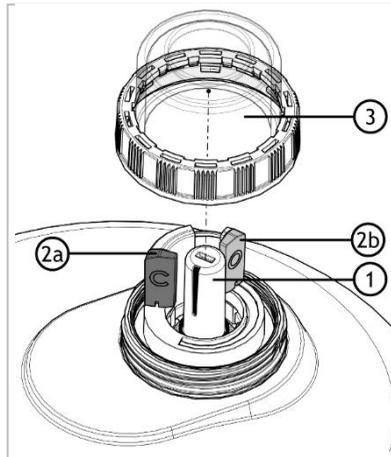
6 POSITION INDICATOR SETTINGS

6.1 Handling position indication

Position indication can indicate travels from 90° to 300°. Angle sector (gray arrow) is marked out by 2 markers hold on 2 rotating rings: (2a) red tagged “C” (CLOSED) and (2b) green marker tagged “O” (OPEN).

Position indicator (1) features a slit on his side to indicate the current position between CLOSED and OPEN positions.

It can be turned to be better viewed in operation using flat blade screwdriver shape on its top. The angle sector can follow and be set according to position indicator.



6.2 Opening / Closing position indicator



You do not have to remove the actuator cover to set the indicator.

To open indicator, unscrew black ring of the indicator transparent cap (3) and remove it.

To close indicator, put back the transparent cap (3) on indicator base and screw the black ring on the base.

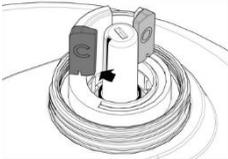


Make sure that the actuator cap is correctly reassembled on its base, otherwise actuator tightness is not guaranteed anymore.

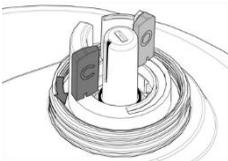
6.3 Setting indicator

To set position indicator

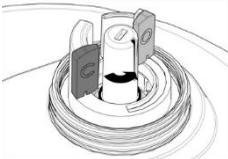
1. Open indicator as shown on page 16.
2. Operate the actuator electrically towards CLOSE position until it stops on end position switch.



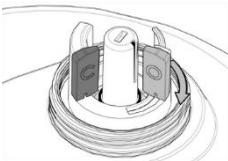
3. Set the position indicator position if necessary.
4. Set the "C" marker in front of the indicator slit.



5. Operate the actuator electrically towards OPEN position until it stops on end position switch.



6. Set the "O" marker in front of the indicator slit.



6.4 Changing closing direction indication

As a standard, AT actuator is configured to close clockwise. If the actuator must close counter-clockwise, you can modify opening and closing set orientation of the position indicator.

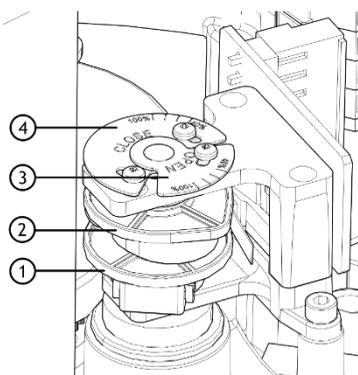
To change closing direction indication

1. Open the indicator.
2. Remove and switch the red marker tagged “C” (CLOSE) with the green marker tagged “O” (OPEN).
3. Close the indicator.

7 TORQUE LIMITING DEVICE

7.1.1 Torque limiter operation

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



- 4 - Closing direction torque scale
- 3 - Opening direction torque scale
- 2 - Counter-clockwise direction cam
- 1 - Clockwise direction cam

Torque limiter is triggered as (1) or (2) cams trigger their corresponding switches when rotating.

Torque limiter is fitted with 2 scale disks (3) and (4) to adjust torque limit for both directions. They have torque graduations from 40 to 100% of the maximum torque deliverable by the actuator.



Torque limiter provides a maintained contact.



If the actuator stops in a position which is not the one desired, please check that:

- Valve stem is clean and well lubricated
- Valve stem does not jam in the nut
- Valve stuffing box is not too tight

7.1.2 Torque limiter adjustment



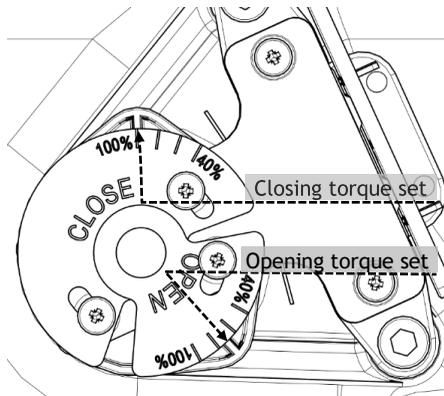
Torque scale sectors are factory-set and are a reference for cams setting. Do not modify their position or you will not be able to accurately adjust torque limiter anymore.

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, torque limiter can still be adjusted if necessary.

To adjust torque limits, set the tip of cams to match the desired percentage of maximum torque (see How to set a cam page 14):

1. For **closing torque limit**, set tip of cam (1) on the percentage desired on the CLOSE scale
2. For **opening torque limit**, set tip of cam (2) on the percentage desired on the OPEN scale



On the opposite figure, closing torque limit is 100%, opening torque limit is 70%.

8 EMERGENCY HANDWHEEL OPERATION

AT actuators feature a handwheel for emergency operation.

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

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