



# Quarter Turn Electric Actuators

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## SD RANGE

## A heavy duty range



**Q**uarter-turn actuators are used to operate ball, plug or butterfly valves, dampers, vents and any equipment with quarter-turn or part turn travel.

**BERNARD** has achieved an excellent reputation over the years in this market thanks to a range of actuators providing the following features :

- Compact construction with a high output torque
- Self-locking gear train maintains the position of the valve when the actuator is de-energized
- Very good resistance to vibrations
- Adjustable mechanical travel limit stops prevent overtravel
- Emergency handwheel and mechanical position indicator provided on all actuators as a standard
- Fixing flange according to ISO standard
- Removable drive socket for easy machining

BERNARD actuators have been operated in different fields such as power plants, industry and building automation, ship building and water treatment.

# For on-off or positioning operations

## ■ ON - OFF :

The ON-OFF version of the SD range actuators are designed to fully open or close on an average of 20 to 30 times per day.

## ■ CLASS III MODULATING :

With the Class III modulating actuators, it is possible to select between intermediate positions, average of 360 times per day, with a precision better than 2%.

For higher duty and precision modulating actuators, please refer to our modulating range catalog.

# Protection adapted to your environment



## ■ WATERPROOF DESIGNS :

As a standard, our SD actuators have a waterproof enclosure IP67 (NEMA 4) as per CEI 144 recommendations.

Higher levels of protection are available on request (please consult us).

## ■ CORROSION RESISTANT DESIGNS :

Our actuators can also be manufactured for operation in harsh environmental conditions such as :

- industrial corrosive atmosphere (chemical, alumina plants i.e)
- marine corrosive atmosphere (on-shore and off-shore)

## ■ EXPLOSION-PROOF DESIGNS :

Actuators are also available with an explosion-proof protection complying with the ATEX European Directive (for detailed specifications, refer to the Technical Guide AF\_XTEC101).

## Available versions :

Our explosion-proof actuators are available in 2 different designs :

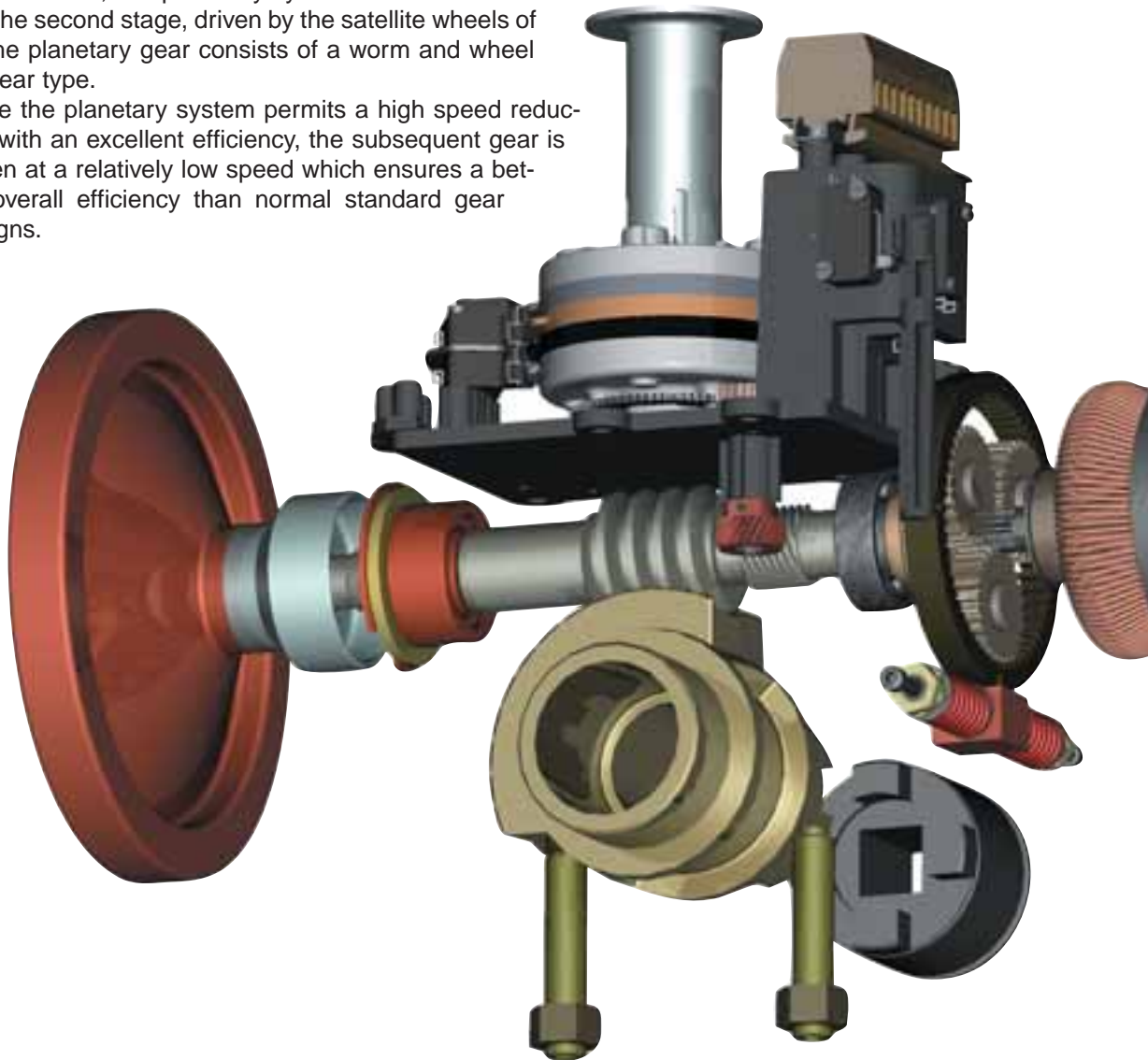
- EEx ed design for the explosion-proof versions of the OA, AS and BS actuators
- EEx d rating for the UX actuators (complete explosion-proof enclosure)

The EEx d version is recommended for the actuators equipped with an electronic control device such as a transmitter or Integral+ control. In fact, the circuit boards can be simply and directly fitted into the EEx d enclosure.

## Main features

### ■ TRANSMISSION GEARS

- The gear drive system is composed of 2 reduction stages :
  - The first stage, driven directly by a pinion on the motor drive shaft, is a planetary system.
  - The second stage, driven by the satellite wheels of the planetary gear consists of a worm and wheel gear type.
- Since the planetary system permits a high speed reduction with an excellent efficiency, the subsequent gear is driven at a relatively low speed which ensures a better overall efficiency than normal standard gear designs.



### ■ EMERGENCY HANDWHEEL

- In case of a loss of power supply or a faulty control system, the presence of a handwheel enables the operator to easily drive the valve to any required position manually.

### ■ MECHANICAL STOPS

- BERNARD actuators are equipped with mechanical stops to prevent overtravel, which may occur during manual operation.

### ■ POSITION INDICATOR

- A visual position indicator allows for a clear indication of the current valve position. In fact, this indicator is mechanically linked to the valve shaft.

### ■ TRAVEL LIMIT SWITCHES

- Thanks to the BERNARD camblock system, the adjustment of travel limit switches is simply accomplished with a standard screwdriver. No disassembly is required.
- Each single cam can be set independently from the others.
- The cams are automatically locked in their respective positions, once adjusted, and unaffected by vibrations.



### ■ ASYNCHRONOUS MOTORS

- The asynchronous motor technology offers the highest ratio of starting torque versus nominal torque. Thus, the actuator maximum torque capacity is available from the beginning of travel to unseat the valve.



### ■ MOTOR THERMAL PROTECTION

- A built-in motor thermal switch protects the motor from excessive overheating conditions.

### ■ TORQUE SENSORS

- The output torque for valve operation is permanently measured by the lever deflection of the planetary gear external crown. This crown gear is maintained in position by two calibrated linear springs which can be set independently for each rotational direction to a desired torque value.
- In the event the torque setting is reached, the crown lever compresses the spring to a point where a microswitch is tripped.
- As this unique system is mechanically friction-free, exceptional precision and repeatability are obtained, which is highly appreciated when the device has to "close on torque".

### ■ DETACHABLE DRIVE BUSH

- The output drive socket can be easily removed from the actuator, without the use of any special tool, for adaptation to the valve shaft.

### ■ LIFETIME LUBRICATION

- The gear design permits lifelong lubrication by grease, thus reducing periodic maintenance requirements considerably.

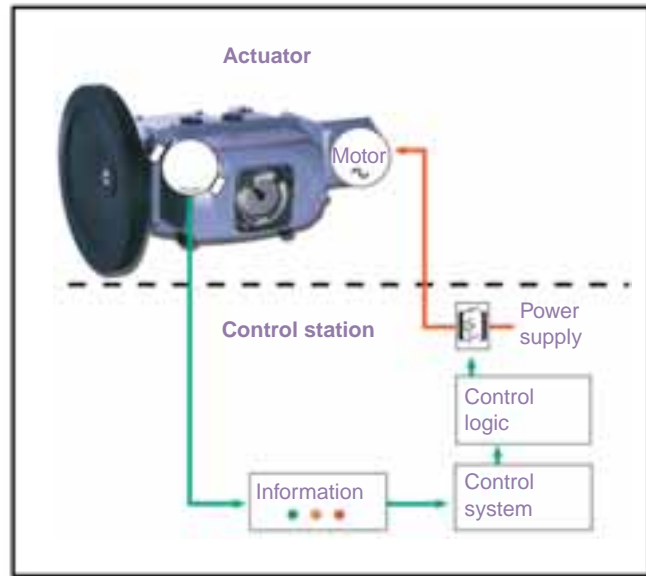


# Actuator controls made easy

Whether you decide to design your own external control system or to get a turnkey solution, with an analog or fieldbus technology, review our range of controls and find the most appropriate solution for your application.

## STANDARD VERSION

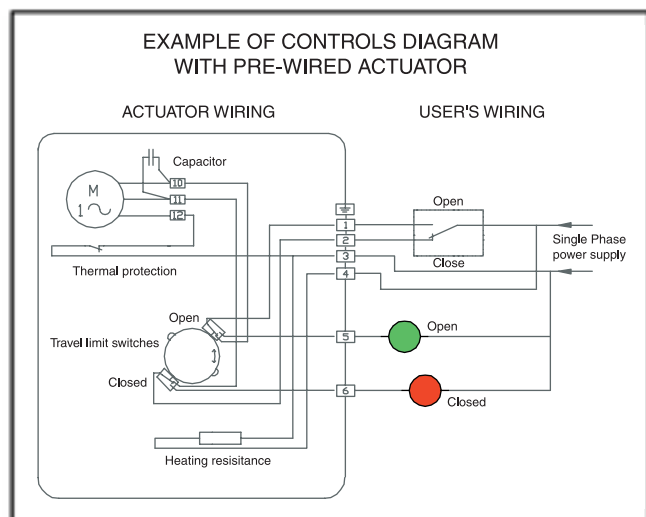
- Your control system receives all basic information from the actuator (travel limit switches, thermal protection, torque limit switches).
- Your control system will have to integrate the control logic, the power switches and the maintaining torque limiter signal.
- This solution is particularly well suited for straight forward processes and extreme environmental conditions (nuclear application, extreme temperature, high vibration level,...).



## PRE-WIRED VERSION (SINGLE PHASE OA ONLY)

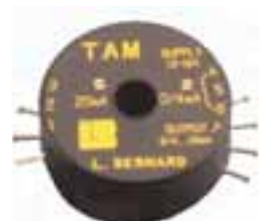
- Single phase OA actuators can be delivered with a ready-to-use internal pre-wiring.
- In this configuration, opening and closing commands can be performed by simple contact (\*) switches. In fact, end of travel and thermal protection switches are pre-wired to the motor at the factory.

(\*) Contacts used shall withstand the motor maximum power supply current.



## POSITION FEEDBACK POTENTIOMETER / TRANSMITTER

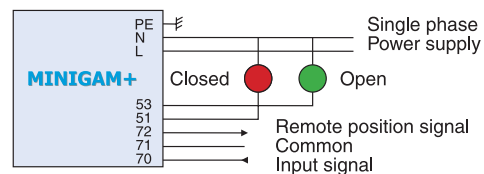
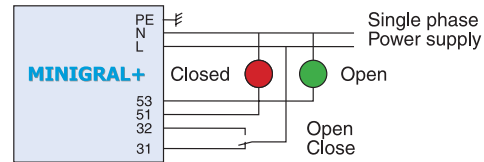
- If positioning of the motorised device has to be reported to the control room, two optional devices can be fitted to our actuators :
  - a 1 kOhm potentiometer
  - a 0/4 to 20mA transmitter (TAM)



## ■ MINIGRAL+ / MINIGAM+ CONTROLS

- These electronic boards are designed to control small BERNARD single phase actuators
- Thanks to the Minigral+ and Minigam+ controls solution, time and money are saved on the design and wiring of the control logic and power switches
- With their very compact design, the boards are directly mounted into the actuator body thus requiring no additional external box
- Available in two versions :
  - Minigral+ : on-off operation
  - Minigam+ : Class III modulating operation

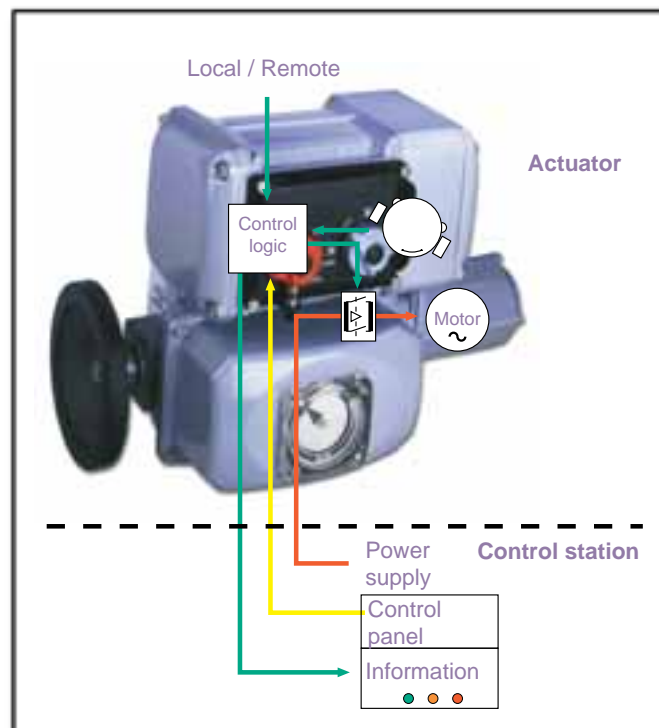
For details refer to MINIGAM+ / MINIGRAL+ catalog n°A112



## ■ INTEGRAL+ / POSIGAM+ CONTROLS

- More sophisticated than the Minigam+ and Minigral+ electronics, the Integral+ allows full control of both single and three phase actuators, and provides additional major advantages such as :
  - User configuration
  - Signalling and fault reporting
  - Device protection functions
  - Management of specific operation constraints (for example, close on torque and valve un-seat)
  - Emergency Shut Down command
- Local keypad controls available
- The Integral+ electronics offer some clear benefits :
  - real cost and time savings during the design and wiring phase
  - additional flexibility and ease during the start-up phase
- Available in two versions :
  - Integral+ : on-off operation
  - Posigam+ : Class III modulating operation

For details refer to INTEGRAL+ / POSIGAM+ catalog n°A115



## ■ FIELDBUS

- BERNARD actuators with INTEGRAL+ controls can be equipped with digital FIELDBUS communication systems :
  - PROFIBUS DP
  - DS100/DS200 fully redundant bus system
  - Other bus technologies : please consult us

## SD Range overview

### Model OA

Small direct quarter turn actuator for torques lower than 150 N.m  
(1,350 In.Lbs)



### Models AS18 to 80 & BS

Compact direct quarter turn actuators for the torque range 150 to 800 N.m  
(1,350 to 7.100 In.Lbs)



### Models AS100 to 400

Combination quarter turn actuators for torques exceeding 800 N.m  
(7,100 In.Lbs)





# Model - Torque selection table

Note : This table is given for information only. Additional and more detailed data can be found in our Technical handbooks ref. AF\_WTEC101 (weatherproof) and AF\_XTEC101 (explosion-proof) such as torques, 90° travel time, motor data, ...).

Max. Torque		Model	Available design		
N.m	Lb.ft		IP67	EEx e d	EEx d
35	25	OA3	X		
60	40	OA6	X	X	
100	70	OA8 / OAP	X	X	
150	110	OA15	X	X	
200	140	AS18 UX18	X	X	X
300	220	AS25 UX25	X	X	X
600	440	AS50 UX50	X	X	X
800	590	AS80 UX80	X	X	X
1,000	740	AS100	X		
1,200	890	BS100	X	X	
1,500	1,110	BS150	X	X	
2,500	1,840	AS200	X		
4,000	2,950	AS400	X		

## Other BERNARD actuator ranges



**ST range**  
Multi-turn intelligent actuators  
Catalog n° A114



**Modulating range**  
High duty & precision actuators  
Catalog n° A103



**FQ range**  
Failsafe spring-return actuators  
Catalog n° A105

# Technical specifications

## ■ GENERAL

Basic actuators include motor with thermal protection, gear case, emergency handwheel, connection box, travel limit switches, torque switches (except for OA) and output drive with removable socket.

## ■ TORQUE AND 90° TRAVELLING TIME

- Easy overview of torques on page 9 of this catalog. Detailed data in technical handbooks ref. AF\_WTEC 101 (weatherproof) and AF\_XTEC 101 (explosion-proof).

## ■ ENCLOSURES

- Aluminium die casting
- IP67 (IP68, please consult us)
- NEMA 4, 4X & 6 C.S.A. NTL certified

## ■ EX-PROOF VERSIONS

All our SD range explosion-proof actuators comply with the CE ATEX directive and are suitable for use in zones 1 and 2 (gaseous atmosphere), 21 and 22 (combustible dust).

Construction rating :

- Models OA, AS & BS : EEx ed II B T5  
Available on request : EEx ed II C T5 or T6
- Model UX : EEx d II B T4  
Available on request : EEx d II C T4, T5 or T6

For detailed Ex-proof quarter-turn actuators specifications, please refer to the SD Range Explosion-proof technical handbook AF\_XTEC101.

## ■ EXTERNAL CORROSION PROTECTION

- Paint system :
  - Zinc rich primer + epoxy intermediate coat
  - Optional polyurethane finish
  - Protection for highly corrosive conditions on request
- All cover fasteners captive and stainless

## ■ AMBIENT TEMPERATURE RANGE

IP67 standard : -20 ... +70°C / -4 ... +158°F  
 IP67 low temp. : -40 ... +70°C / -40 ... +158°F  
 IP67 high temp. : +0 ... +90°C / +32 ... +194°F

EEx versions : see technical handbook AF\_XTEC101.

## ■ MOTORS

- 3-Phase squirrel cage induction type TENV equipped with embedded thermal protection available in all standard voltages 50 or 60 Hz.
- 1-Phase squirrel cage induction type TENV motor available in all standard voltages 50 or 60Hz
- Motors are easily removable with front and rear totally enclosed lubricated ball bearings
- Motors rated to S4 service (intermittent duty with starting under load) according to IEC 34-1
- Duty rating :
  - 30% and up to 360 Starts / hour for ON-OFF service
  - 50% and up to 1200 starts / hour for modulating Class III

## ■ GEAR DESIGN

- Two reduction stages :
  - Planetary system with high speed reduction and excellent efficiency
  - Oversized worm & quadrant gear type
- The gears are mechanically irreversible

## ■ MANUAL EMERGENCY OPERATION

Actuators are fitted with a handwheel for manual emergency operation.

On models with torque higher than 800 Nm (1,400 in.lbs), a declutchable handwheel is used with electric operation priority.

## ■ VISUAL POSITION INDICATION

A dial type window provides continuous position indication even in the event of power supply loss.

## ■ POSITION AND TORQUE SENSORS

- Information sources :
  - **Position** : helical reduction gear on main worm
  - **Torque** (not available on OA models) : the actual actuator torque is measured by the dynamometric balance principle. Action is not maintained after the motor is stopped. Torque springs are calibrated at the manufacturing plant.
- Signalling and setting :
  - Both torque and position limits are indicated by SPDT switches, that can be set independently for each direction of rotation.

Adjustment is possible at any point of the setting range and does not require any special tooling.

- SPDT switches : 250VAC-16A / 24VDC-16A / 48VDC-2.5A maximum (resistive load).

- Options :

- Proportional position feedback signal can be delivered from a 1 kOhm potentiometer or a 0/4-20mA transmitter (TAM)
- Intermediate positions by extra switches

### ■ TERMINAL COMPARTMENT

- Screw-type terminals size 4 mm<sup>2</sup> for controls and power supply
- Internal earth grounding post (internal and external earth post for explosion-proof design)
- Double sealing : In Integral+ version the terminal compartment can be isolated from the control chamber

### ■ CONDUIT ENTRIES (STANDARD VERSION)

- Weatherproof : 2 x M 20 (max : 4 x M20)
- EEx e d : 3 x M 20 (max : 4 x M20)
- EEx d : 2 x 3/4"NPT (max : 3 x 3/4"NPT)

### ■ CONTROLS

- **STANDARD** : all control elements are directly connected to screw type terminals according to wiring diagram S50000.
- **MINIGRAL+** (option) : integrated controls of on-off small single phase actuators (for details refer to MINIGRAL+ catalog n°A112)
- **MINIGAM+** (option) : integrated controls of Class III modulating small single phase actuators (for details refer to MINIGAM+ catalog n°A112)
- **INTEGRAL+** (option) : advanced integrated controls of on-off single and three phase actuators (for details refer to INTEGRAL+ catalog n°A115)
- **POSIGAM+** (option) : advanced integrated controls of Class III modulating single and three phase actuators (for details refer to POSIGAM+ catalog n°A115)

Please refer to the SD Range Technical handbooks ref AF\_WTEC 101 (weatherproof) or AF\_XTEC 101 (explosion-proof) for detailed :

- Performance data
- Dimensional drawings
- Wiring diagrams

## Lever systems



*Note : This brochure is not intended to form the basis of a contract and the company reserves the right to amend the design and specifications without notice.*

# At Your Service Over The World

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