Invest in Confidence
SQ RANGES
Weatherproof
Quarter-turn Actuators
The complete solution
Contents

SQ Range Overview  >  4
SQ Range Controls  >  6
Reliability  >  8
Security  >  12
User-friendly controls  >  14
Hardwired controls  >  18
Fieldbus communication  >  20
Product Specifications  >  22
INTELLI+® Layout  >  27
INTELLI+® Configuration  >  28
Other Weatherproof Solutions  >  30
The BC PREMIUM label guarantees "The complete solution", with many options and possible configurations to fit at best very specific needs. Decades of return on experience from very demanding applications such as nuclear qualified valves actuation have shaped our technical orientations and our commitment to quality and safety.

The BC PREMIUM label reflects this long-lasting experience and in-depth expertise, working with the most demanding markets, where the ability to design customized solutions has always been decisive. It is the guarantee of quality and security for installations' actuation in the case of severe environment, demanding operational constraints and critical applications.
Overview

Quarter-turn actuators are used to operate ball, plug or butterfly valves, dampers, louvers and any equipment with quarter-turn travel.

Industrial grade actuators

BERNARD CONTROLS has achieved an excellent reputation over the years in the Power, Water & Industry markets thanks to a range of actuators providing the following features:

- Compact construction with a high output torque
- Self-locking gear train to maintain the position of the valve when the actuator is de-energized
- Very good resistance to vibrations
- Very simple settings - no specific tool required
- Adjustable mechanical travel limit stops to prevent overtravel
- Removable drive socket for easy machining
- Emergency handwheel and mechanical position indicator provided on all actuators as a standard

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

SQ Range description

- Adaptation to all quarter-turn valves:
  - Torque range from 30 to 10 000 Nm
  - Torque values from 10 000 to 600 000 Nm available with gearbox combinations
- Self-locking at all speeds
- IP67 as standard (IP68 as an option)

- EN15714-2 Duty classification:
  - On-Off : Class A
  - Inching/Positioning : Class B
  - Modulating: Class C
- Type of controls:
  - SWITCH, electromechanical
  - INTEGRATED (INTEGRAL+/POSICAM+)
  - INTELLI+, intelligent control
On-Off, Inching / Positioning and Modulating

EN15714-2 Standard defines a duty classification to operate the actuator, divided into 4 Classes: A - On-Off, B - Inching / Positioning, C - Modulating & D - Continuous modulating. BERNARD CONTROLS qualifies basic design requirements with key criteria, in order to propose electric actuation solutions according to end users’ process requirements:

- As for On-Off & Inching/Positioning, BC emphasizes endurance (number of cycles) as the key criterion to select an actuator, and offers Class A / B actuators complying with EN15714-2 & improved endurance Class A+ / B+ actuators with increased lifetime.

- Modulating applications require specific expertise that BERNARD CONTROLS has developed over time. BC proposes performance as the key criterion to select a modulating actuator. BC qualifies performance and adds key criteria, notably resolution, to address process requirements thanks to Class III / Class III+ / Class II / Class II+ and Class I actuators.

BC SQ Range is available for On-Off (Class A & A+), Inching/Positioning (Class B & B+) and Modulating (Class III) applications. Continuous modulating Class II actuators are also available in BC product offer. Please consult us.

Protection adapted to your environment

- WEATHERPROOF DESIGN:
  As a standard, our actuators have a weatherproof enclosure protection rated IP67 (NEMA 4 and 4X) as per CEI 144 recommendations. IP68 enclosure is available as an option.

- CORROSION RESISTANT DESIGN:
  BC actuators can also work in harsh environmental conditions such as industrial corrosive atmosphere (chemical, alumina plants) or marine corrosive atmosphere (on-shore / off-shore).

SQ4 to SQ15
- Small direct quarter-turn actuators for torques lower than 150 N.m

SQ20 to SQ80
- Compact direct quarter-turn actuators for the torque range from 150 to 800 N.m

SQ100 to SQ1000
- Combination quarter-turn actuators for torques exceeding 800 N.m
You can decide on local or remote control to meet the requirements of your particular system and the environment in which the actuators are to be used. BERNARD CONTROLS wide range of control systems enables you to choose the best solution for your needs.

➤ **SWITCH control**

The customer provides the control logic to handle all the data received from the actuator electric contacts. The reversing starters are housed in the customer’s own enclosure.

➤ **Integrated control**

The INTEGRAL+ control system is fully configurable and can perform all actuator control functions, including production of status reports, fault handling, protection systems and command processing. It offers local controls which can be disabled either locally or from a remote location. The reversing starters are incorporated in the control unit.

The POSIGAM+ control (Class III actuators) is based on the same electronics platform as the INTEGRAL+ but includes a positioner function. Proportional signals are used to control the actuator (setpoint) and to signal the valve actual position (feedback).

➤ **INTELLI+® control**

The INTELLI+® control allows the system to be set up and programmed without opening the unit. It includes an LCD screen plus tools for preventive maintenance. More information on INTELLI+® control on pages 14 to 17 and 27 to 29.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUTY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On - Off (Class A)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Inching/Positioning (Class B)</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Modulating (Class C)</td>
<td>● (POSIGAM+)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Pulse command</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Maintained command</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>ESD (Emergency ShutDown)</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Auxiliary</td>
<td>-</td>
<td>Local control inhibition (ESD)</td>
<td>2 commands 9 options</td>
</tr>
<tr>
<td>Timer</td>
<td>-</td>
<td>Option</td>
<td>●</td>
</tr>
<tr>
<td>Lockable selector knobs</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Digital display</td>
<td>-</td>
<td>-</td>
<td>●</td>
</tr>
<tr>
<td>Indicator lights</td>
<td>-</td>
<td>Options</td>
<td>●</td>
</tr>
<tr>
<td>Fuses</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Automatic phase monitoring (3-phase)</td>
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<td>Motor thermal cut-out</td>
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<td>●</td>
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</tr>
<tr>
<td>Torque limiter protection</td>
<td>●(*)</td>
<td>●(*)</td>
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</tr>
<tr>
<td><strong>REMOTE CONTROL</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Number of signal relays</td>
<td>4 limit switches</td>
<td>4 + 3 (option)</td>
<td>4 + 3 (option)</td>
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<tr>
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<td>12</td>
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<td>Analogue position feedback</td>
<td>Option</td>
<td>Option (Std on POSIGAM+)</td>
<td>Option</td>
</tr>
<tr>
<td>Configuration setting</td>
<td>Intrusive</td>
<td>Internal (with DIP switches) &amp; jumpers</td>
<td>External - Local command knob - Fieldbus - Pocket PC - Laptop</td>
</tr>
<tr>
<td>Torque/position setting method</td>
<td>Mechanical</td>
<td>Mechanical</td>
<td>Digital</td>
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<tr>
<td>Travel limit stop</td>
<td>●</td>
<td>On position - On torque (*)</td>
<td>On position - On torque</td>
</tr>
<tr>
<td>Full configuration upload</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>INTERNAL PROTECTION</strong></td>
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<tr>
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<td>●(*)</td>
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</tr>
<tr>
<td><strong>MONITORING</strong></td>
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<td>Self-diagnostics</td>
<td>-</td>
<td>-</td>
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<td>Torque/position curve</td>
<td>-</td>
<td>-</td>
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<td>Actuator operating log</td>
<td>-</td>
<td>-</td>
<td>●</td>
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<td>Partial stroke test</td>
<td>-</td>
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<tr>
<td><strong>FIELDBUS</strong></td>
<td></td>
<td></td>
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<td>Profibus DP (single or redundant)</td>
<td>-</td>
<td>Option</td>
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</tr>
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<td>Foundation fieldbus</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Modbus RTU</td>
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<td>-</td>
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<tr>
<td>HART</td>
<td>-</td>
<td>-</td>
<td>Option</td>
</tr>
</tbody>
</table>

*Except SQ4 to SQ15*
Reliability

Heavy duty mechanical design

➤ Trouble-free operation
  • Gearing is self-locking at all speeds.
  • Continuous gear drive between motor and valve.
  • Unaffected by vibration on main mechanical parts

➤ Motor thermal protection
  • A built-in motor thermal switch protects the motor from overheating.

➤ Lubrication
  • The gear design ensures lifetime lubrication by grease, thus reducing periodic maintenance requirements considerably.

➤ Powerful motors
  • Asynchronous motor with high starting torque to unseat the valve.
  • Excellent starting torque / nominal torque ratio.
  • On/Off & Inching/Positioning operation: S4 motor with 30% duty rating for peak service conditions of up to 360 starts per hour.
  • Modulating Class III: 50% duty rating for peak service conditions of up to 1,200 starts per hour.

➤ Position indicator
  • A visual position indicator allows a clear indication of the current valve position. In fact, this indicator is mechanically linked to the valve shaft.
Emergency handwheel

- **NON-ROTATING HANDWHEEL**
  In case of loss of power supply or a faulty control system, the presence of a handwheel enables the operator to easily manually drive the valve to any required position. This handwheel does not rotate on all our models.

- **HANDWHEEL WITHOUT CLUTCH RELEASE**
  Available on SQ20 to SQ80 models, this patented manual override system is made up of a differential gear drive which allows the handwheel to be operated without releasing a clutch beforehand, under all conditions, even when the valve is blocked by the torque limiter.

Torque sensors

- From SQ20 to SQ 1000, 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 are set independently at the factory 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 switch 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».

Travel limit switches

- Thanks to BERNARD CONTROLS patented cam block system, the adjustment of travel limit switches is simply accomplished with a standard screwdriver. No special tool 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.
Reliability

Enclosure adapted to field constraints

For SQ with integrated and INTELLI+® controls, BERNARD CONTROLS offers reliable solutions adapted to field constraints.

Separated control box (option)

The separated control box configuration can be specially useful when the actuator has to be mounted:

- in a difficult access (manhole, in a high position,...)
- on a highly vibrating device
- in an excessively high or low temperature area

The maximum distance between control and actuator is 50 meters.

Double-sealing protector

Two barriers fitted with O-rings insure an optimum protection against water ingress into the electronic compartment.

This protection remains effective even if the cover has not been closed properly or if the cable glands have not been tightened.

Protection is also ensured for the local control selectors thanks to internal reed switches which prevent moisture ingress.
Reliability

INTELLI+® accurate information

For SQ with INTELLI+, thanks to ABSOLUTE SENSORS, which constantly measure the position & torque of your valve, get precise and reliable information.

- Proven measurement principles
  - Torque is measured by a dynamometric balance (calibrated springs) offering a high level of precision, an excellent repeatability as well as a very low long-term drift. The short response time of the system allows an early detection of the valve seat reach thus reducing the over-torque applied to the valve. On the two smallest models (SQ6-SQ15), torque monitoring is based on motor intensity measurement.
  - The position sensor is mechanically linked to the main gear and delivers a proportional signal with no risk of loss of position with time.

- Actual valve information
  - Both position and torque are measured as close as possible of the output of the actuator (see picture below).
    This means that what is measured is really representative of the actual valve torque and position.
  - The valve position/torque curve is available at any time directly on the INTELLI+® graphical display.

- Absolute sensors
  - Thanks to absolute sensors, the position and torque information are not lost even after a loss of power supply. In fact, as soon as the power comes back, the INTELLI+® electronics has just to read the value given by the sensors and update the feedback signals to the control room. Therefore, this system does not require any battery back-up.
Motorised valve protection

BERNARD CONTROLS INTELLI+® controls offers key specifications for valve protection.

Phase monitoring
INTELLI+® includes an automatic phase correction device. In case of 3 phase power supply, whatever the power connection, the actuator always rotates in the correct direction. If one of the phases is not present, the actuator stops automatically and the fault relay drops.

Protection of change in direction
An automatic delay protects the actuator and valve from all rapid rotational direction changes while limiting the effects of the mechanical pieces in inertia.

Signaling continuity (option)
The actuator is totally autonomous and does not require a battery to operate. However, a signaling battery back-up optional board can be added for signaling purpose only. This battery is activated in case of loss of power supply and allows:
- to use the INTELLI+® display.
- to update remote signalling (valve position, alarms, ...)
- to refresh fieldbus information

Low battery condition is automatically detected by the INTELLI+® and a warning message is sent. A low battery condition does not have any consequence on actuator operation.

Note: a 24VDC external power supply input is also present on the INTELLI+® board to achieve the same functionality and more.

Fault monitoring relay
One changeover (SPDT) relay indicates that the actuator is unavailable. This fault monitoring relay reports 5 types of defaults as a standard. Additional defaults to be reported can be easily added by the user (see Configuration on page 28). The monitoring relay is always energized and drops out only in event of a fault.
Security

Plant installations protection

BERNARD CONTROLS INTELLI+® controls offers key specifications for installation protection.

▶ Emergency shutdown (ESD)

ESD (Emergency Shut Down) is a remote emergency control signal with priority over all other commands. Depending upon the valve operation, ESD can be configured as an Open, Close or Stop command. To increase the availability of the actuator in extreme conditions, ESD can be set to ignore a torque overload condition.

▶ SIL Certification (option)

Thanks to a fully dedicated control board and to an absolute position encoder with built-in self-test, BC INTELLI+® actuators are SIL 2 certified for the following safety integrated functions: Emergency Shut Down - Emergency Open - Emergency Stayput. These are also SIL3 capable for Emergency Shut Down and Emergency Open in 1oo2 configuration. Moreover, in case of emergency, the accuracy of signaling data is essential to make the good decision and activate the ESD functions. BERNARD CONTROLS offer SIL2 assessment on the following signaling functions: Valve open - Valve closed - 4/20mA analog position signal (optional function).

▶ Alarms indication

INTELLI+® continuously monitors the actuator performances. Up to 17 different types of faults and alarms can be reported (refer to Configuration on page 28 for a complete list of alarms). An exclamation mark in a triangle on the local display indicates an alarm. The actuator can still operate normally in case of an alarm, for example there is an alarm after ‘Too many starts’. The alarm will automatically reset when the fault no longer exists.

▶ Partial Stroke Test (PST)

Partial stroking is a key specification of BERNARD CONTROLS actuators which enable to check the availability of the connected MOVs. This test consists in the execution of a very short return travel. Starting position as well as partial stroke amplitude are programmable. This command can be either hardwired or sent by fieldbus. A warning is generated in event of problems occurring during this test.

▶ Protection by password

A password can be entered to protect access to parameters modification and actuator on valve setting.

▶ Timer

This function enables an increase in the operating time of the actuator, i.e. to avoid water-hammer effect in a pipe. Travel time can be programmed independently in both opening and closing directions. It is also possible to apply the timer function to a limited section of the stroke.
User-friendly controls

INTELLI+® intuitive interface

Graphical display

- Menu guided settings using clear messages. Language can be freely selected among: Chinese, English, French, German, Italian, Polish, Portuguese, Russian and Spanish
- The LCD display gives a clear status of the actuator and of the control system:
  - Position in percentage (for example 5% Open)
  - When the valve is fully closed, “closed” is displayed
  - When the valve is fully open, “open” is displayed
  - Actual torque expressed as % of actuator maximum torque
  - Alarm/fault flag

Display indications

<table>
<thead>
<tr>
<th>5% Open</th>
<th>Valve position in % of opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque 20%</td>
<td>Valve torque can also be displayed in % of actuator maximum torque.</td>
</tr>
</tbody>
</table>

- Local controls inhibited by the remote controller.
- ESD Emergency shutdown signal received.
- Infra red link is detected.
- Bluetooth link is detected
- This icon is displayed in case of alarm.
- When a positioner is built-in, the set point value is displayed in percentage. This indication is blinking in case of loss of control signal.
- This icon indicates that the fieldbus board is installed. The square displays the status of the communication: no communication, communication in progress or faulty module.
- In case of redundant fieldbus interface, two squares are displayed.
- The squares display the status of each communication line: no communication, a channel is acting as primary or backup, communication in progress or a faulty module.
Autonomous

- INTELLI+® user interface is intuitive.
- INTELLI+® operation does not rely on a battery.
- No tool is needed to have access to the menu in any case.

Local signaling

- 2 LEDs (red/green) indicate the position (close/open) at ends of travel, and direction of running (blinking).
- Red and green LED can be freely assigned to open or closed positions.

Local commands

- The red selector enables the operator to choose remote control, local control function and stop during operation. It can also inhibit all use of the actuator (OFF position). This selector switch can be locked in each position (padlock not supplied).
- The blue selector allows local operation of the actuator in either direction: OPEN or CLOSE.
- Local commands can be inhibited remotely.

User-friendly menu

- **OK** Selector to validate the choice (ok)
- **Selector to navigate up and down into the menu**

**LANGUAGE:** to change the language of the display (9 languages available)

**CHECK:** to read all the actuator parameters and configuration (activity, alarms, commands, torque, data sheet, position, positioner, signaling, timer, fieldbus)

**SET UP:** to set up the actuator on the valve (closing mode, close direction, position setting)

**CHANGE:** to modify the actuator configuration (activity, commands, torque, data sheet, position, positioner, signaling, timer, fieldbus)

**EXIT SETUP:** to exit the actuator setup
User-friendly controls
INTELLI+® non intrusive settings

Thanks to INTELLI+®, commissioning is simplified and can be performed in a non-intrusive way. Upon user’s request the actuator parameters can be preset at the factory. In this case, start-up simply consists in setting the actuator on the valve.

▶ Manual or automatic setting
During the actuator on valve setting procedure, the user is guided step by step by INTELLI+®:
- Choice of closing (on torque or on position),
- Choice of direction to close,
- Drive the actuator to the closed and the open position and validate the position.

For certain valves, as an example gate valves equipped with back seat, INTELLI+® can automatically perform this setting: the actuator detects the extreme positions (using the torque limiter), tests the inertia in order to optimize this setting.

▶ Infrared communication
INTELLI+® offers the possibility to communicate with a standard laptop through an infra-red link with INTELLIKIT or INTELLIPOCKET.
- INTELLIPOCKET is a real industrial pocket PC which eases the engineer’s job on site both for setting up and throughout product lifetime.
- INTELLIKIT is a communication kit necessary to communicate with INTELLI+®, made of the INTELLISOFT communication software developed by BERNARD CONTROLS and an infrared transmitter receiver connected to USB. All functions (use, settings/configuration, status, etc...) are available through the computer.

▶ Bluetooth communication (option)
As an alternative, BERNARD CONTROLS proposes the Bluetooth technology which uses radio signals to communicate between the PC with INTELLISOFT and the INTELLI+® controls.
- Accessibility: the user does not need to position himself in front of the actuator and can move its computer without loss of communication.
- Simplicity and security: the PC/PDA automatically detects all devices located at a maximum distance of 10m. Each actuator holds a unique identifier and the connection can be protected with a password.

▶ Parameters modification
If necessary, operating parameters can be modified with the local control buttons by following information on the display.
User-friendly controls

INTELLI+® preventative maintenance

Thanks to its absolute sensors and its microprocessor technology, INTELLI+® continuously monitors its components as well as the actuator status and measures some important valve parameters. INTELLI+® provides users with a great deal of information to help with system diagnosis and aid in scheduling their valves preventative maintenance. INTELLI+® helps maximise process availability by reducing maintenance downtime.

Actuator activity

Parameters are available on the display through the menu to check the activity of the actuator:
- **Number of starts**: total starts since the actuator manufacturing.
- **Partial counter can be selected**.
- **Running time**: total running time since the actuator manufacturing.
- **Starts last 12h**: number of starts in the last 12 hours (to check the modulating activity i.e.).
- **Handwheel action**: indicates if the handwheel was operated by manual operation since the last electrical command.

Data sheet

INTELLI+® stores in its memory the data sheet of the actuator: customer tag number, BERNARD CONTROLS serial number, duty rating, classification level, manufacturing date, etc.

Self-monitoring functions

INTELLI+® checks the operation of its components, particularly torque sensor, position sensor, microprocessor and EEPROM memory.
INTELLI+® constantly monitors its performance in order to detect any problem of over-travel, jammed motor, rotation direction, lost phase, motor thermal overload and many others.
Refer to Configuration page 28 for the complete list of alarms.

Valve torque curve

INTELLI+® memorizes the valve torque data during its last opening and closing operation. This information can be recalled on the actuator display. The curve displays the position from 0 to 100% and the torque from 0 to 100%. The data can be uploaded in the computer with INTELLISOFT/INTELLIPOCKET (optional) in order to be displayed with the INTELLISOFT software as a curve (torque vs. position) or data in a spreadsheet.
FOCUS ON
Hardwired controls

Wire by wire command
Remote control can be achieved using a 10 to 250 V external voltage supply or by dry contacts, which uses the actuators internal 24 VDC voltage supply. This control can be configured as a pulse or self-holding remote command. Inputs on the board are completely isolated by opto-isolators. It is also possible to control the actuator with a unique external contact, using one of the two functions «Priority to open» or «Priority to close».

Remote indications
Remote indication is done through 4 relays, with the possibility of 23 available information. Voltage free relays maintain their positions without battery backup. Normally open or normally closed contact can be chosen. An optional board with 3 single option relays allows reporting of 3 additional indications.

Position & torque transmitter
INTELLI+® can be equipped with an analogue position & torque feedback board. This module delivers a 0/4-20mA signal proportional to the percentage of the valve opening. A voltage signal (i.e. 0-10V) can also be obtained by connecting an external resistance. The board can be either supplied by an external (12 to 32 VDC) source of power or internally, by the INTELLI+® electronics. This module also delivers a 4 - 20mA signal proportional to the real torque of the valve.

Positioner
A positioner board can be installed into the INTELLI+® to allow the operator to drive the valve to intermediate positions (Inching/Positioning & Modulating duties). The positioner module has been designed to work with either current (i.e. 4-20mA) or voltage (i.e. 0-10V) analogue signals:

- One input signal: the set-point
- One output signal: the actual valve position feedback

The input and output signals are fully isolated from each other. The setting procedure is fully automatic and is performed in a non-intrusive way. The dead band can be adjusted by the user.
Bernard Controls actuators can be connected to most of the standard fieldbuses available on the market:
- PROFIBUS DP
- FOUNDATION FIeldBUS
- MODBUS RTU
- HART
- Other fieldbus on demand.

For more security, redundant fieldbus ensures continuous operation, even in case of a bus line disruption. Indeed, all elements of the bus line (bus controller, lines, actuators interfaces) are doubled.

**Open versus Proprietary systems:**

Two physical concepts of fieldbus are available from various providers.

- The «Proprietary» so-called system: This is a technology designed by a device manufacturer for his own needs. A «Proprietary» system always includes the actuators with the specific bus interface, but also the bus controller located at the line head-end. Only the products proposed by the bus controller manufacturer can be installed on the bus.

- «Open» systems: One using standard international fieldbuses so various manufacturers can supply compatible controllers and interfaces. This type of technology is proven, reliable and offers fast response time.

Bernard Controls chooses the «open» system for all its fieldbus solutions.
• Based on robust PLC technology and open fieldbus protocol

• Up to 120 actuators and 10km distance

• Fast response time. Standard scan time 1 to 3 s whatever the distance and number of actuators connected

• 1 to 3 lines starts

• Simple or redundant configurations

• Overall start up time reduced to the minimum
# Product specifications

## General specifications

<table>
<thead>
<tr>
<th>Torque range</th>
<th>• Direct mount: 40 to 800 N·m • With gearbox: up to 10,000 N·m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of operation</td>
<td>Adapted to process requirements: • On-Off: Class A actuators complying with EN15714-2 and improved endurance Class A+ actuators • Inching/Positioning: Class B actuators complying with EN15714-2 and improved endurance Class B+ actuators • Modulating: Class III actuators with higher duty performance and specification of additional performance criteria compared to EN15714-2 Class C basic design requirements</td>
</tr>
</tbody>
</table>

## Enclosure protection

<table>
<thead>
<tr>
<th>Casing</th>
<th>Actuator body in cast aluminium. Gearbox body in ductile cast iron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tightness</td>
<td>IP67 as standard - IP68 on option (2m/24h SQ4-SQ15 and 5m/72h SQ20 and higher). NEMA 4, 4X, 6 and 6P CSA C &amp; US</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>• Standard: -20 ... +70°C -4 ... +158°F • Low temp: -40 ... +70°C -40 ... +158°F • High temp: +0 ... +90°C +32 ... +194°F (switch control version only)</td>
</tr>
</tbody>
</table>

## Mechanical specifications

| Gear design | • Reduction stages: - Planetary system with high speed reduction and excellent efficiency (SQ20 and higher) - Largely sized worm & quadrant gear type • The gears are mechanically self-locking at all speeds |
| Handwheel | All actuators are fitted with a handwheel for manual emergency operation. • Automatic switch from motor to handwheel without declutching, (SQ20 to SQ80) • Handwheel gear ratio SQ6-SQ120: 9-21 / SQ250-SQ100: 30 and higher (turns for 90° travel) • Force to apply conform to EN 12570 standard |
| Output flange | Quarter-turn actuators flanges comply with ISO 5211. Flanges for valve special top works available on request |
| Output drive | Removable sockets |
| Vibration Resistance | 1g (9.8 m/s²) at 10-500 Hz (Contact our marketing dept. for higher vibration levels) |
| Lubrication | Actuators are lubricated for product lifetime and do not require any specific periodic maintenance |

## Electrical specifications

| Power supply | The actuators can operate on a wide variety of power supplies: • 3-phase, single-phase or DC • up to 690 V • 50 or 60 Hz |
| Motor technology | TENV type Totally Enclosed Fan Ventilated, motors (VAC). Class F insulation Integral thermal overload protection. Easy to remove with sealed ball bearings fitted at front and rear |
| Motor duty rating | S4 motor service (intermittent service on start-up) to IEC 34-1 • S4 - 30% for On/Off: Class A and Inching/Positioning: Class B duties - up to 360 starts per hour in peak • S4 - 50% for Modulating class III - up to 1,200 starts per hour in peak |

## Conformity to EC directives

| EC Directives | The actuators comply with: • The 2004/108/EC electromagnetic compatibility • The 2006/95/EC C Low Voltage • The following harmonized standards: - Generic emission standard-Industrial environment EN 61000-6-4 - Generic immunity standard - Industrial environment EN 61000-6-2 - Rotating electrical machines EN 60034-1 - Degrees of protection provided by enclosures (IP code) EN 60529 |
## GENERAL

<table>
<thead>
<tr>
<th>Description</th>
<th>Basic actuators include motor with thermal protection, gear case, emergency handwheel, connection box, travel limit switches, torque switches (except for SQ4 to SQ15) and output drive with removable socket.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual position indication</td>
<td>A dial type window provides continuous position indication even in the event of power supply loss.</td>
</tr>
</tbody>
</table>

### External corrosion protection
- **Paint system:** Polyurethane paint Ral5002 complying with ISO 12944 (C3)
- Protection for highly corrosive conditions as an option
- All cover fasteners captive and stainless.

## TRAVEL & TORQUE LIMITATION

<table>
<thead>
<tr>
<th>Travel limit systems</th>
<th>4 contacts as standard (2 in opening and 2 in closing direction); SPDT; 250VAC-16A / 48VDC-2,5A max. (resistive load)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional auxiliary SPDT contacts</td>
<td>(Models SQ4 - SQ15: N.A.; Models SQ20 and higher: 2 (total = 6))</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Torque limiting systems</th>
<th>Torque: dynamometer measuring torque transmitted (not available for SQ4 to SQ15 models).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The torque limit switch gives a short duration contact.</td>
</tr>
<tr>
<td></td>
<td>The torque limiting system is calibrated at the factory to the torque setting selected by the customer.</td>
</tr>
<tr>
<td></td>
<td>2 contacts as standard; SPDT; 250VAC-16A / 48VDC-2,5A max. (resistive load)</td>
</tr>
</tbody>
</table>

## ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Remote position signal (option)</th>
<th>1000 Ohm potentiometer, 0.3W - wiper current = max. 1 mA.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>«TAM» position transmitter: 4-20mA (12, 24 or 32V power supply for maximum permissible load of 150, 750 or 1,050 Ohms).</td>
</tr>
<tr>
<td></td>
<td>Others on request.</td>
</tr>
</tbody>
</table>

### Terminal compartment
- Screw-type terminals size 4 mm² for controls and power supply.
- Internal earth grounding post.

### Cable entries
- Standard: 2xM20 sealed by caps. Optional configurations: 3M20 (SQ4-SQ15) and 1xM25 + 2xM20 (SQ20 and higher models)
- Other configurations available on request (number of entries maxi =4xM20, adaptors...)
### SQ INTEGRAL+/POSIGAM+ specifications

| Description | • **INTEGRAL+ for On-Off duty includes**: Terminal compartment, Power contactors, Logic control, Configuration panel, Signaling relays and Local control selectors  
| • **POSIGAM+ for Inching/Positioning and Modulating includes**: All INTEGRAL+ features plus Positionner board, Precision feedback potentiometer - sensor linearity < 0.5%  
| External corrosion protection | • Paint system:  
| | • Polyurethane paint Ral5002 complying with ISO 12944 (C3)  
| | • Protection for highly corrosive conditions as an option  
| | • All cover fasteners captive and stainless.  
| Controls location | As standard, the INTEGRAL+/POSIGAM+ controls are integrated to the actuator. On option, controls can be mounted in a separated box (max distance between actuator and controls = 50m).  
| Double-sealing protection | Protection of the electronics: the control compartment of the actuator is fully isolated from the wiring compartment.  
| On-Off control | • Isolated by opto-couplers  
| | • Voltage: 10 to 250 V DC/AC  
| | • Current: 10 mA at 24V  
| | • Dry contacts (uses INTEGRAL+ auxiliary DC supply)  
| | • Minimum pulse duration: 100ms  
| | • Time of rotational direction change: 50ms or 200ms  
| Inching/Positioning & Modulating control | • Standard input signal: 4-20 mA - output signal: 4-20mA  
| | • Input signal: 0-20 mA - output signal: 0-20 mA  
| | • Input signal: 0-10 V - output signal: 0-20 mA  
| Signaling relays | • 4 relays: four information can be freely selected among a total of 16 available information (250 VAC-5A max.)  
| | • Contact configuration: normally open or normally closed  
| Default relay | SPDT contact: Normally energised  
| Electrical connection | Ring tongue terminals  
| Cable entries | Standard configuration: 3 x M20. Additional 4 x M16 in case of fieldbus.  
| | Optional configuration: 2 x M20 + 2 x M25. Other specific configurations on request (number of entries, adaptators...)  
| Fuse protection | Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer board. 2 automatic fuses for low internal voltages.  
| Fieldbus interface (option) | Profibus DP (simple or redundant)  
| | • PROFIBUS-DP slave - RS 485  
| | • Baudrate: autodetection  
| | • Total number of master and slave modules on the same line: 31 max. up to 99 with repeaters  
| | • PROFIBUS operability approved by PNO (Profibus Nutzer Organisation)  
| | • External power supply backup  
| | Other fieldbus on request  
| Options | • LED indication board (closed, open, power on)  
| | • Additional 3 signaling relays board  
| | • Timer board  
| | • Separated box  
| | • Additional position transmitter isolated from the other output signals  

/// 24
**SQ INTELLI+® specifications**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GENERAL</strong></td>
<td><strong>INTELLI+® controls</strong> is an intelligent integrated control technology which provides a user-friendly interface as well as non-intrusive settings and advanced features for monitoring and preventative maintenance. See configuration page 28. For On-Off, Inching/Positioning and Modulating duties. Remote/Off/Local sector is padlockable.</td>
</tr>
</tbody>
</table>
| External corrosion protection | • Paint system:  
  - Polyurethane paint Ral5002 complying with ISO 12944 (C3)  
  - Protection for highly corrosive conditions as an option  
  • All cover fasteners captive and stainless.                                                                                                                                                                                                                                                                                                    |
| **POSITION AND TORQUE SENSORS** | **Position**  
• Absolute sensor (without battery)  
  **Torque**  
• Torque measured by a dynamometric balance or motor intensity (SQ6 and SQ15)  
• Absolute sensor (without battery)  
• Setting range: From 40 to 100% of actuator maximum torque by steps of 1%  
• Reading range: From 10 to 100% of actuator range with a resolution of 1%                                                                                                                                                                                                                     |
| **CONTROLS**             | **Controls location**  
As standard, the INTELLI+® control is integrated to the actuator. On option, controls can be mounted in a separated box (max distance between actuator and controls = 50m).  
  **Double-sealing protection**  
Protection of the electronics: the control compartment of the actuator is fully isolated from the wiring compartment  
  **Power circuit**  
Integral motor reversing starters (electromechanical controls for On-Off Class A / Inching-Positioning Class B / Modulating Class C)  
  **Display**  
Back-lit graphics display with a choice of 9 different languages  
  **On-off remote Control**  
Command by:  
• voltage: 10 to 250 V DC/AC (current 10 mA at 24V)  
• dry contact (use INTELLI+ auxiliary 24 VDC supply)  
Command Signal Isolated by opto-couplers  
Minimum command pulse duration: 100ms  
Time of rotational direction change: 200ms (factory setting range 50 to 500 ms)  
  **Signaling relays**  
4 relays: each information can be freely selected among a total of 23 available information  
• Contact configuration: normally open or normally closed  
• Minimum current 10mA at SV  
• Maximum current 5A at 250V AC or 5A at 30VDC (inductive load)  
Additional 3 relay boards on option.  
  **Fault relay**  
• Normally closed & energized SPDT contact  
• Minimum current 10mA at SV  
• Maximum current 5A at 250V AC or 5A at 30V DC (inductive load)  
  **Proportional control Modulating Class III (option)**  
Input (setpoint) and output (feedback) signals are fully isolated from each other  
Signal configurations (selectable):  
• Input signal: 4-20 mA - output signal: 4-20mA  
• Input signal: 0-20 mA - output signal: 0-20mA  
• Input signal: 0-10 V - output signal: 0-20mA (0-10V with an external resistance)  
Analogue inputs:  
• In current: impedance of 160 Ohms  
• In voltage: impedance of 11 KOhms  
Analogue outputs:  
• In current: maximum acceptable load of 750 Ohms at 24 VDC supply  
• In voltage: minimum acceptable load of 50 KOhms (with a shunt resistance of 500 Ohms)  
  **Transmitter (option)**  
Proportional position (0/4-20 mA) and torque (4-20 mA) feedback board  
  **Signaling continuity (option)**  
Allows to use the display and update the open and closed position information (through the signaling relays or Profibus DP) in case of lack of power supply  
  **Auxiliary power supply**  
24VDC in standard. 48VDC in option. |
**SQ INTELLI+® specifications**

<table>
<thead>
<tr>
<th>SETTINGS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Settings</strong></td>
<td>Non-Intrusive. All actuator settings and parameters are stored in a non-volatile EEPROM memory. Protection by password.</td>
</tr>
<tr>
<td><strong>Local selectors</strong></td>
<td>The INTELLI+® can be fully set via its local display and selectors. Does not require any specific setting tool. Local / Remote selector is padlockable.</td>
</tr>
<tr>
<td><strong>INTELLIKIT (option)</strong></td>
<td>• INTELLISOFT CD-ROM for laptop PC. • Infrared module to connect to the laptop (USB) and clip on the actuator window. • USB cable (2 meters length max).</td>
</tr>
<tr>
<td><strong>INTELLIPOCKET (option)</strong></td>
<td>• Protection: IP65 (option: RTEx IIG G Ex ia IICT4). • Shock resistance: 1.2 m on concrete. • Communication: with INTELLI+: infrared link (40 cm maximum distance) or Bluetooth (up to 10 m) with PC, Bluetooth, RDR, Wi-Fi (802.11b) as a standard. • Optional USB station. • Operating system: Windows Mobile 2005. • 64 Mb RAM + 256 Mb storage card.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ELEC. SPECS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical connection</strong></td>
<td>Ring tongue terminals. Internal and external ground rod.</td>
</tr>
<tr>
<td><strong>Cable entries</strong></td>
<td>Standard configuration: 3 x M20. Additional 4 x M16 in case of fieldbus. Optional configuration: 2 x M20 + 2 x M25. Other specific configurations on request (number of entries, adaptors,...).</td>
</tr>
<tr>
<td><strong>Fuse protection</strong></td>
<td>Primary fuse (6.3 x 32 mm - 0.5 A) located on the transformer board. 2 automatic fuses for low voltages.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIELDBUS CONTROLS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Profinet DPV1 (option)</strong></td>
<td>• PROFIBUS-DPV1 - RS 485. • Baud rate: 9.6 kbit/s up to 1.5 Mbit/s (autodetection). • Communication protocol: PROFIBUS DPV1 slave-cyclic and acyclic. • Type of connection: single line (standard) or redundant line (option). • Cable specification: Profibus certified cable only. • Line connection without repeater: Actuators per line: 31 max. / Line length: 1.2 km max. (0.75 mi). • Line connection with repeaters: Number of repeaters per line: 9 max / 30 actuators and 1 km max. per segment / Number of actuators per line with repeater: 124 maximum / Line length with 9 repeaters: 10.2 km max. (6.2 mi). • Scan speed: 50 units in 1.2 km: 0.1 s (at a baud rate of 93.75 Kbit/s). • Power supply: internal and isolated via INTELLI+. Optional signalling battery or 24VDC external backup supply update the open and closed position information in case of loss of power supply. • Technical approval: operability approved by PNO (Profibus Nutzer Organisation).</td>
</tr>
<tr>
<td><strong>Modbus (option)</strong></td>
<td>• MODBUS RTU - RS 485. • Transmission medium: 1 shielded pair cable. • Functions: Half Duplex, asynchronous mode, multidrop. • Baud rate: 1.2 k/s to 115 Kbit/s. • Format: 8 data bits, 1 stop bit, no parity. • Communication protocol: Modbus (slave). • Modbus address: configurable by the actuator menu.</td>
</tr>
<tr>
<td><strong>Foundation Fieldbus (option)</strong></td>
<td>• H1 speed = 3.125 kBit/s. • Fully compliant with fieldbus standard IEC 61158. • Physical layer: IEC 61158-2, 2 wires communication. • Current consumption: 20 mA. • Operating voltage: 9 to 32 VDC. • Cable specification: Type A (for example: 3D76F Belden). • Line connection: Actuators per line without repeater: 31 max. / Line length without repeater: 1.9 km max. (1.2 mi). / Number of repeaters per line: 4 max. / Maximum number of actuators and line length depends on consumption available. • Technical approval: Foundation tested. Several DCS manufacturer operability checked.</td>
</tr>
</tbody>
</table>

* For further information on electrical data, dimensions and wirings, please consult our Technical Handbooks.
## INTELLI+® Configuration

**INTELLI+®** offers a lot of information, many of them can be configurable by the user as it is shown in the following table.

<table>
<thead>
<tr>
<th>INFORMATION</th>
<th>STANDARD</th>
<th>CONFIGURABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close direction</td>
<td>Clockwise</td>
<td>Counter-clockwise</td>
</tr>
<tr>
<td>Closing mode</td>
<td>On position</td>
<td>On torque</td>
</tr>
<tr>
<td>Setting of torque limit system</td>
<td>100%</td>
<td>Other values between 40 and 100%</td>
</tr>
<tr>
<td>Closing torque</td>
<td>100%</td>
<td>Other values between 40 and 100%</td>
</tr>
<tr>
<td>Opening torque setting</td>
<td>100%</td>
<td>Other values between 40 and 100%</td>
</tr>
<tr>
<td>Only if closing the valve on torque</td>
<td>100%</td>
<td>Other values between 40 and 100% or without any limitation</td>
</tr>
<tr>
<td>Valve seat torque</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Torque to unseat the valve</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Auxilary remote commands (2 chosen from 10)</td>
<td>Local command inhibit but local stop available (auxiliary command 1)</td>
<td>Local plus remote control or remote control only</td>
</tr>
<tr>
<td></td>
<td>In emergency closing (ESD) (auxiliary command 2)</td>
<td>Local or remote control</td>
</tr>
<tr>
<td>Fault tolerance degradation (ESD)</td>
<td>None</td>
<td>Local command inhibited</td>
</tr>
<tr>
<td>Auxiliary command activated by a contact</td>
<td>Normally open</td>
<td>Open/Close inhibited</td>
</tr>
<tr>
<td>Blue selector operating mode</td>
<td>By pulse (a pulse is enough to achieve an opening or closing command)</td>
<td>Auto / modulating / On-Off</td>
</tr>
<tr>
<td>Stop local, while remote command</td>
<td>Authorized</td>
<td>Emergency closing (ESD)</td>
</tr>
<tr>
<td>Faults reported on fault relay</td>
<td>Control circuit power lost (always included)</td>
<td>Emergency opening (ESD)</td>
</tr>
<tr>
<td></td>
<td>Fuse blown (always included)</td>
<td>Emergency stopping (ESD)</td>
</tr>
<tr>
<td></td>
<td>Thermal cutoff has tripped (always included)</td>
<td>Partial stroke</td>
</tr>
<tr>
<td></td>
<td>Lost phase (always included)</td>
<td>No thermal overload (weatherproof versions only)</td>
</tr>
<tr>
<td></td>
<td>Locked rotor (always included)</td>
<td>Full torque (100%)</td>
</tr>
<tr>
<td></td>
<td>Local / remote selector set to local</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Local / remote selector set to off</td>
<td></td>
</tr>
<tr>
<td>Local / remote selector set to local</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCAL COMMANDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault tolerance degradation (ESD)</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Auxiliary command activated by a contact</td>
<td>Normally open</td>
<td></td>
</tr>
<tr>
<td>Blue selector operating mode</td>
<td>By pulse (a pulse is enough to achieve an opening or closing command)</td>
<td>Maintained (actuator operates while the operator holds the button)</td>
</tr>
<tr>
<td>Stop local, while remote command</td>
<td>Authorized</td>
<td>Increments from 0 to 100% (actuator moves the valve to the position set in % of opening)</td>
</tr>
<tr>
<td>FAULT RELAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faults reported on fault relay</td>
<td>Control circuit power lost (always included)</td>
<td>Jammed valve</td>
</tr>
<tr>
<td></td>
<td>Fuse blown (always included)</td>
<td>Actuator receives an emergency command (ESD)</td>
</tr>
<tr>
<td></td>
<td>Thermal cutoff has tripped (always included)</td>
<td>The actuator receives an inhibit command</td>
</tr>
<tr>
<td></td>
<td>Lost phase (always included)</td>
<td>Overtravel</td>
</tr>
<tr>
<td></td>
<td>Locked rotor (always included)</td>
<td>4 - 20 mA signal lost (if positioner option installed)</td>
</tr>
<tr>
<td></td>
<td>Local / remote selector set to local</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Local / remote selector set to off</td>
<td></td>
</tr>
</tbody>
</table>

### Setup

**DATA SHEET**

**COMMANDS**

**OPENING/CLOSING PRIORITY**

**FAULT RELAY**
### INFORMATION

**Information reported on signaling relays**

- Valve open (for R1 and R3)
- Valve closed (for R2 and R4)

Each contact can be:

- Normally open (when something occurs, contact is closed)

**In case of communication loss**

- Remain in position
- Go to closed position
- Go to open position

### STANDARD

**Position remote indication**

- 4-20mA

**Torque remote indication**

- 4-20mA

**Signal variation direction**

- Signal increases in the open direction
- Signal decreases in the open direction

**Auxiliary command 1**

- Switch: automatic control (proportional command) / On-Off (standard Open / Close command)
- 4-20mA

**Type of signal**

- 4-20mA
- 0-20mA and 0-10V*
- 4-12mA
- 12-20mA

**Signal direction**

- Signal increases in the open direction
- Signal decreases in the open direction

**Dead band setting**

- 1%

**In case of 4-20mA signal loss**

- Other value between 0.2 and 5%
- Go to fully closed position
- Go to fully open position

*Voltage signal with an external resistance*

---

**CONFIGURABLE**

- Torque limiter action in the opening / closed direction
- Valve in intermediate position, between x% and y% of opening (for example: 10% to 50%)
- Selector in local/remote/off
- The actuator is moving (fixed signal)
- The actuator is moving (blinking signal)
- Moving in the open/closed direction (fixed signal)
- Moving in the open/closed direction (blinking signal)
- Emergency command (ESD)
- Stop mid-travel
- The actuator is normally powered
- The motor thermal cutoff has tripped
- Jammed valve
- In three-phase, a phase is missing
- 4-20 mA signal lost (if positioner option installed)
- The handwheel has been activated since the last electrical movement
- If fieldbus option is installed, this relay is assigned to an external command
- Battery low (if installed)
- Partial stroking in progress / in fault
- Normally closed

**In case of communication loss**

- Remain in position
- Go to closed position
- Go to open position

**Position remote indication**

- 4-20mA

**Torque remote indication**

- 4-20mA

**Signal variation direction**

- 0-20mA and 0-10V*
- 4-12 mA
- 12-20 mA

**Auxiliary command 1**

- Switch: automatic control (proportional command) / On-Off (standard Open / Close command)
- 4-20mA

**Type of signal**

- 4-20mA
- 0-20mA and 0-10V
- 4-12mA
- 12-20mA

**Signal direction**

- Signal increases in the open direction
- Signal decreases in the open direction

**Dead band setting**

- 1%

**In case of 4-20mA signal loss**

- Other value between 0.2 and 5%
- Go to fully closed position
- Go to fully open position

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*Voltage signal with an external resistance*
Other Weatherproof Solutions

Fail Safe FQ Actuators
- Failsafe with reliable spring-return technology
- Fast and shock-free valve travel during emergency operation
- Maintenance-free
- Available torque range from 40 to 500 Nm
- IP67 as standard

Continuous modulating
- Adaptation to all modulating valves
- Duty standard classification EN15714-2: Continuous Modulating (Class D)
- Up to high speed and very high resolution
- Torque range from 20 to 1000 Nm.

Foot & Lever
- Main application: dampers’ control
- Lever position can be set over 360°
Weatherproof Electric Actuator
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