Reliability
Security
User-friendly

BC PREMIUM

by

BERNARD CONTROLS

LABEL BC PREMIUM

BERNARD® CONTROLS

Invest in Confidence

Weatherproof Quarter-turn Actuators

SQ RANGE

Contents

LABEL

BC PREMIUM

→ Reliability
→ Security
→ User-friendly

The BC Premium label is the guarantee of high performance, reliable and innovative ***actuator solutions designed to sustain severe environmental and operational conditions****.*
Decades of return of experience from very demanding applications such as nuclear qualified valves actuation have shaped our technical orientations and our commitment to quality and safety.
Moreover, BC Premium labelled products offer user-friendliness and extremely low level of maintenance requirements.

SQ Range

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 265 to 88,500 lbs. in
  - Torque values from 188,500 to 5,310,000 lbs. in 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+/POSIGAM)
  - INTELLI+®, intelligent control

On-Off, Inching / Positioning and Modulating

UP TO DEMANDING OPERATIONAL CONSTRAINTS

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

UP TO DEMANDING ENVIRONMENTAL CONSTRAINTS

• 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 1325 lbs.in

SQ20 to SQ80

• Compact direct quarter-turn actuators for the torque range from 1325 to 8850 lbs.in

SQ100 to SQ1000

• Combination quarter-turn actuators for torques exceeding 8850 lbs.in

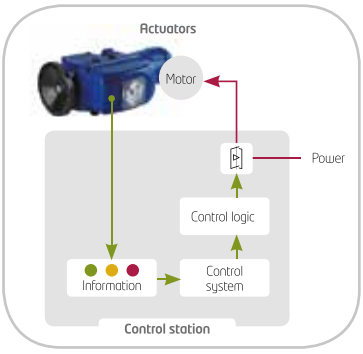
SQ Range

Controls

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.

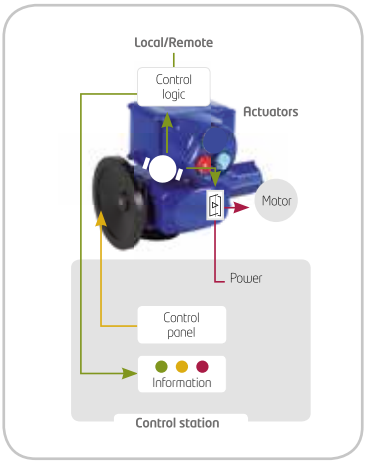


SWITCH control

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.

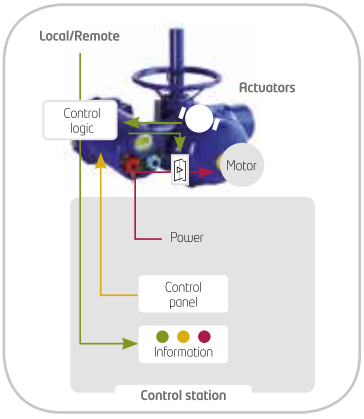
The POSIGAM+ control (Class III actuators) is based on the same electronics platform as the INTEGRAL+ but includes a positioner function. Proportional signals are used to control the actuator (setpoint) and to signal the valve actual position (feedback).



Integrated controls INTEGRAL+ / POSIGAM+

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.



INTELLI+® control

		SWITCH	INTEGRAL+	INTELLI+®
DUTY	On - Off (Class A)	●	●	●
	Inching/Positioning (Class B)	●	●	●
	Modulating (Class C)	●	● (POSIGAM+)	●
REMOTE CONTROL	Pulse command	●	●	●
	Maintained command	●	●	●
	ESD (Emergency ShutDown)	-	●	●
	Auxiliary	-	Local control inhibition (ESD)	2 commands 9 options
	Timer	-	Option	●
LOCAL COMMANDS	Lockable selector knobs	-	●	●
	Digital display	-	-	●
	Indicator lights	-	Options	●
INTERNAL PROTECTION	Fuses	-	●	●
	Automatic phase monitoring (3-phase)	-	●	●
	Motor thermal cut-out	●	●	●
	Torque limiter protection	● (*)	● (*)	● (*)
SIGNALING	Number of signal relays	4 limit switches	4 + 3 (option)	4 + 3 (option)
	Data items	-	16	23
	Number of fault relays	-	1	1
	Number of listed faults	-	8	12
	Analogue position feedback	Option	Option (Std on POSIGAM+)	Option
CONFIGURATION	Configuration setting	Intrusive	Internal (with DIP switches) & jumpers	External - Local command knob - Fieldbus - Pocket PC - Laptop
	Torque/position setting method	Mechanical	Mechanical	Digital
	Travel limit stop	●	On position - On torque (*)	On position - On torque
	Full configuration upload	-	-	Via: Fieldbus - Pocket PC Laptop
MONITORING	Self-diagnostics	-	-	●
	Torque/position curve	-	-	●
	Actuator operating log	-	-	●
	Partial stroke test	-	-	●
FIELDBUS	Profibus DP (single or redundant)	-	Option	Option
	Foundation fieldbus	-	-	Option
	Modbus RTU	-	-	Option
	HART	-	-	Option

** 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 geardrive 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 SQ1000, 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 independenly 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 camblock 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

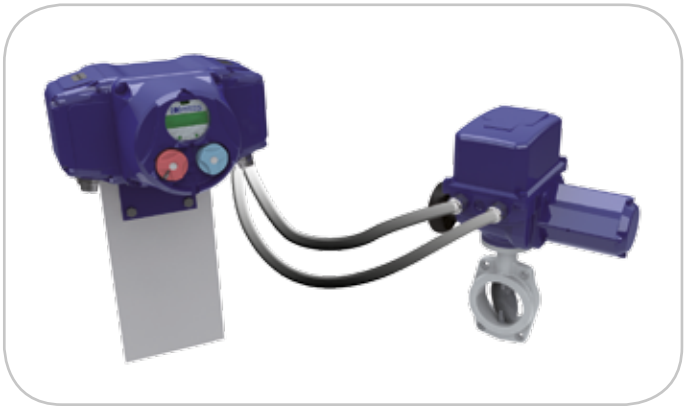
For SQ with integrated and INTELLI+® controls, BERNARD CONTROLS offers reliable solutions adapted to field constraints.

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.

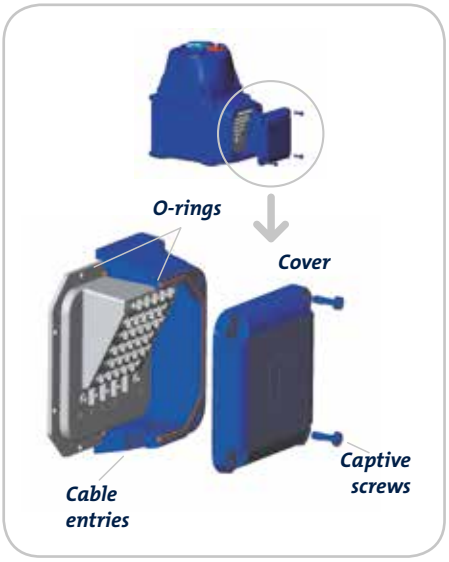


Double-sealing protector

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.



Double-sealing principle

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.

BERNARD CONTROLS' position & torque absolute sensors on SQ models

Security

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 occuring 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

5% Open **Torque 20%**	Valve position in % of opening Valve torque can also be displayed in % of actuator maximum torque.
	Local controls inhibited by the remote controller.
ESD	Emergency shutdown signal received.
	Infrared link is detected.
	Bluetooth link is detected
	This icon is displayed in case of alarm.
0%	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.
BUS□	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.
1□2□	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

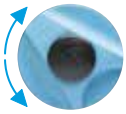
- 2 LEDs (red/green) indicate the position (close/open) at ends of travel, and direction of running (blinking).
- Red and green LED can be freely assigned to open or closed positions.

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

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.

Screen with INTELLISOFT

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.*
- *A 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.*

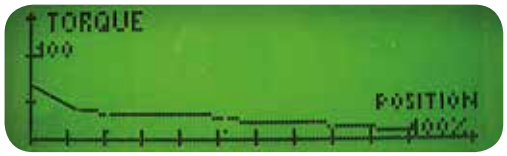
Data sheet

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 propotional to the real torque of the valve.

Positioner

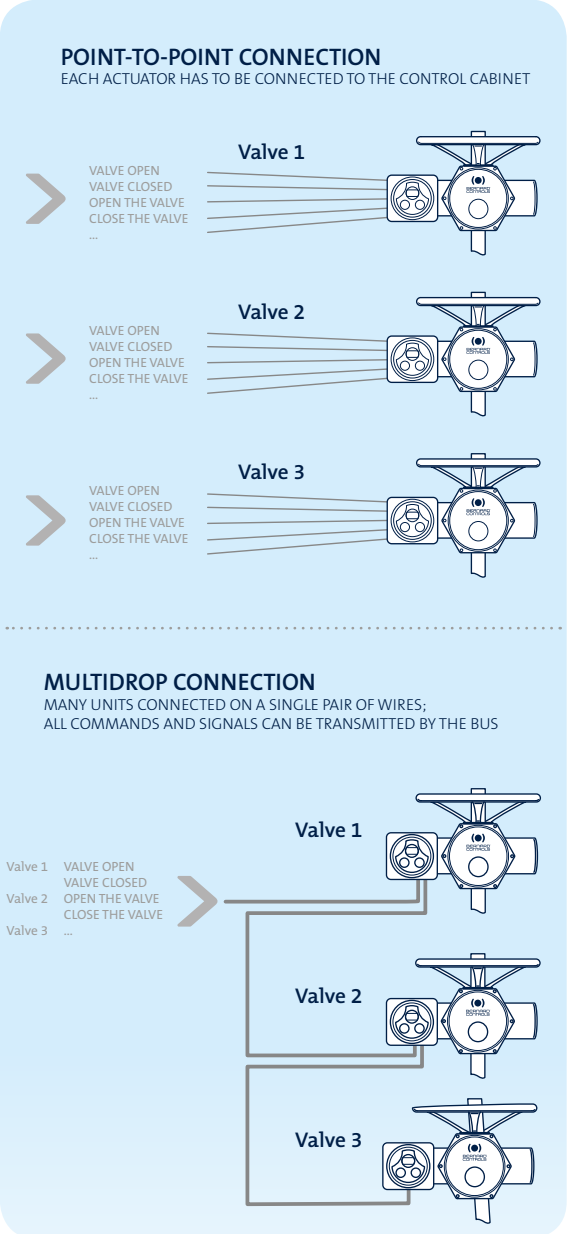
A positioner board can be installed into the INTELLI+® to allow the operator to drive the valve to intermediate positions (Inching/Positioning & Modulating duties).
The positioner module has been designed to work with either current (i.e. 4-20mA) or voltage (i.e. 0-10V) analogue signals

- *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.

FOCUS ON
Fieldbus communication
with INTELLI+® control

The fieldbus, present on a large number of installations, is used more and more to communicate information and commands with multiple actuators and devices wired in series on a single pair of wires.
Thus, the number of information available from each actuator can be multiplied while reducing the overall cost of wiring on the site.



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.

BERNARD CONTROLS Master Station

- Based on robust PLC technology and open fieldbus protocol
- Up to 120 actuators and 6.25 miles 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

SQ Range

General specifications

GENERAL	**Torque range**	• Direct mount : 354 lbs. in to 7,080 lbs. in • With gearbox : up to 88,500 lbs. in
	Type of operation	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
ENCLOSURE PROTECTION	**Casing**	Actuator body in cast aluminium. Gearbox body in ductile cast iron
	Tightness	IP67 as standard - IP68on option (2m/24h SQ4-SQ15 and 5m/72h SQ20 and higher). NEMA 4, 4X, 6 and 6P CSA C & US
	Ambient temperature	• 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)
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 SQ20-1000 1:1 / SQ6-SQ15 (9 to 21 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
ELEC. SPECS	**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	**Motor technology**	TENV type Totally Enclosed Non 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

SQ SWITCH specifications

GENERAL	**Description**	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.
	Visual position indication	A dial type window provides continuous position indication even in the event of power supply loss.
	External corrosion protection	• Paint system : - Cataphoresis + RAL5002 blue epoxy paint - Optional polyurethane finish - Protection for highly corrosive conditions on request • All cover fasteners captive and stainless.
TRAVEL & TORQUE LIMITATION	**Travel limit systems**	• 4 contacts as standard (2 in opening and 2 in closing direction) ; SPDT ; 250VAC-16A / 48VDC-2,5A max. (resistive load) • Optional auxiliary SPDT contacts. (Models SQ4 - SQ15: N.A. ; Models SQ20 and higher : 2 (total = 6))
	Torque limiting systems	• Torque: dynamometer measuring torque transmitted (not available for SQ4 to SQ15 models). • The torque limit switch gives a short duration contact. • The torque limiting system is calibrated at the factory to the torque setting selected by the customer. • 2 contacts as standard ; SPDT ; 250VAC-16A / 48VDC-2,5Amax. (resistive load)
ELECTRICAL SPECIFICATIONS	**Remote position signal (option)**	• 1000 Ohm potentiometer, 0.3W - wiper current = max. 1 mA. • «TAM» position transmitter: 4-20mA (12, 24 or 32V power supply for maximum permissible load of 150, 750 or 1,050 Ohms). • Others on request.
	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, adaptators...)

SQ INTEGRAL/POSIGAM specifications

GENERAL	**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 : - Cataphoresis + RAL5002 blue epoxy paint - Optional polyurethane finish - Protection for highly corrosive conditions and other colors on request • All cover fasteners captive and stainless.
CONTROLS	**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 = 150 Feet).
	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+ auxillary 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
ELEC. SPECS	**Electrical connection**	Ring tongue terminals
	Cable entries	Standard configuration : 3 x M20. Additional 4 x M16 in case of fieldbus Optional configuration : 2xM20 + 2xM25. 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 & OPTIONS	**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

SQ INTELLI+® specifications

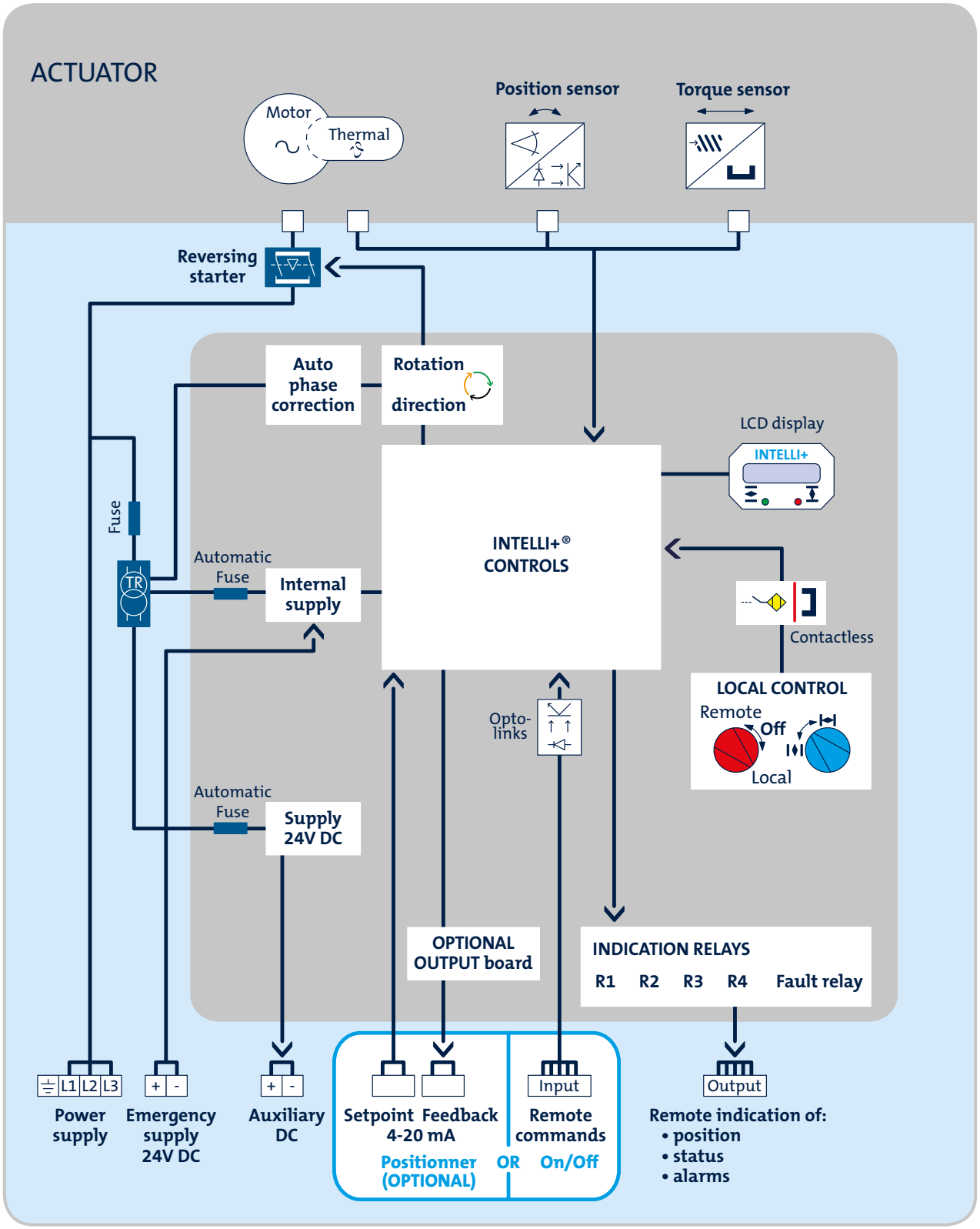
GENERAL	**Description**	**INTELLI+® controls** is an intelligent integrated control technology which provides a user-friendly interface as well as non-intrusive settings and advanced features for monitoring and preventative maintenance. See configuration page 28. For On-Off, Inching/Positioning and Modulating duties. Remote/Off/Local sector is padlockable.
	External corrosion protection	Standard paint system: Zinc rich primer, epoxy undercoat and RAL5002 blue protection polyurethane top coat Optional special anti-corrosion protection for marine, aggressive or abrasive atmospheres 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 5V • 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 5V • 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

SETTINGS	**Settings**	Non-Intrusive All actuator settings and parameters are stored in a non-volatile EEPROM memory. Protection by password.
	Local selectors	The INTELLI+® can be fully set via its local display and selectors Does not require any specific setting tool Local / Remote selector is padloackable
	INTELLIKIT (option)	• 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.)
	INTELLIPOCKET (option)	• Protection: IP65 (option: ATEX II2G EEx ia IICT4) • Shock resistance: 47.24 inches on concrete • Communication: - with Intelli+: infrared link (15.75 cm maximum distance) or bluetooth (up to 393.70 inches) - with PC: bluetooth, IRDA, Wifi (802.11b) as a standard • Optional USB station • Operating system : Windows Mobile 2005 • 64Mb RAM + 256Mb storage card
ELEC. SPECS	**Electrical connection**	Ring tongue terminals. Internal and external ground rod
	Cable entries	Standard configuration : 3 x M20. Additional 4 x M16 in case of fieldbus Optional configuration : 2xM20 + 2xM25. 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 voltages
FIELDBUS CONTROLS	**Profibus DPV1 (option)**	• 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 (30 units & 1.2 km): 0.1s (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)
	Modbus (option)	• MODBUS RTU - RS 485 • Transmission medium: 1 shielded pair cable • Functions: Half Duplex, asynchronous mode, multidrop • Baud rate: 1.2k to 115 Kbit/s • Format: 8 data bits, 1 stop bit, no parity • Communication protocol: Modbus (slave) • Modbus address: configurable by the actuator menu
	Foundation Fieldbus (option)	• H1 speed = 31.25kBit/s • Fully compliant with fieldbus standard IEC 61158 • Physical layer: IEC 61158-2, 2 wires communication • Current consumption: 20mA • Operating voltage: 9 to 32 VDC • Cable specification: Type A (for example: 3076F 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.
	Hart	Interface: HART, 4-20mA current, FSK modulation Transfer speed: 1.2 kbit/s Protocol: HART 7.4 Impedance: 250 Ohms Power consumption: Internal by Intelli+ transformer, External power supply for 4-20mA loop only Actuator configuration: Available through EDD file Connection line: Point-to-Point or Multi-drop Technical approval: approved by Hart Communication Foundation

* For further information on electrical data, dimensions and wirings, please consult our Technical Handbooks

INTELLI+® layout



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.

	INFORMATION	STANDARD	CONFIGURABLE
DATA SHEET		• Tag number (8 digits) • Actuator serial number (unchangeable) • Manufacturing date (unchangeable) • Password (000)	• Password (3 digits)
SET UP	**Close direction**	• Clockwise	• Counter-clockwise
	Closing mode	• On position	• On torque
	Setting of torque limit system		
	Closing torque	• 100%	• Other values between 40 and 100%
	Opening torque setting	• 100%	• Other values between 40 and 100%
	Only if closing the valve on torque		
	Valve seat torque	• 100%	• Other values between 40 and 100%
	Torque to unseat the valve	• 100%	• Other values between 40 and 100% or without any limitation
COMMANDS	**Auxiliary remote commands (2 chosen from 10)**	• Local command inhibit but local stop available (auxiliary command 1) • In emergency closing (ESD) (auxiliary command 2)	• Local plus remote control or remote control only • Local or remote control • Local command inhibited • Open/Close inhibited • Auto / modulating / On-Off • Emergency closing (ESD) • Emergency opening (ESD) • Emergency stopping (ESD) • Partial stroke
	Fault tolerance degradation (ESD)	• None	• No thermal overload (weatherproof versions only) • Full torque (100%)
	Auxiliary command activated by a contact	• Normally open	• Normally closed
LOCAL COMMANDS	**Blue selector operating mode**	• By pulse (a pulse is enough to achieve an opening or closing command)	• Maintained (actuator operates while the operator holds the button) • Increments from 0 to 100% (actuator moves the valve to the position set in % of opening)
	Stop local, while remote command	• Authorized	• Inhibited
OPENING/ CLOSING PRIORITY		• None	• Open priority • Close priority • Open and close priority
FAULT RELAY	**Faults reported on fault relay**	• Control circuit power lost (always included) • Fuse blown (always included) • Thermal cutoff has tripped (always included) • Lost phase (always included) • Locked rotor (always included) • Local / remote selector set to local • Local / remote selector set to off	• Jammed valve • Actuator receives an emergency command (ESD) • The actuator receives an inhibit command • Overtravel • 4 - 20 mA signal lost (if positioner option installed)

	INFORMATION	STANDARD	CONFIGURABLE
SIGNALLING RELAYS	**Information reported on signaling relays**	• Valve open (for R1 and R3) • Valve closed (for R2 and R4)	• 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/close direction (fixed signal) • Moving in the open/close 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
	Each contact can be:	• Normally open (when something occurs, contact is closed)	• Normally closed
FIELDBUS (option)	**In case of communication loss**	• Remain in position	• Go to closed position • Go to open position
ANALOG POSITION FEEDBACK BOARD (option)	**Position remote indication**	• 4-20mA	• 0-20mA and 0-10V* • 4-12 mA • 12-20 mA
	Torque remote indication	• 4-20mA	
	Signal variation direction	• Signal increases in the open direction	• Signal decreases in the open direction
ANALOGUE CONTROL: POSITIONER (option)	**Auxiliary command 1**	• Switch: automatic control (proportional command) / On-Off (standard Open / Close command)	
	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%	• Other value between 0.2 and 5%
	In case of 4-20mA signal loss	• Remain in position	• Go to fully closed position • Go to fully open position

** Voltage signal with an external resistance*

FOCUS ON

Other Weatherproof Solutions

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- Torque range from 177 to 88,500 lbs. in

Foot & Lever

- Main application: dampers' control
- Lever position can be set over 360°


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BELGIUM
BERNARD CONTROLS BENELUX
BRUXELLES
inquiry.belgium@bernardcontrols.com
inquiry.holland@bernardcontrols.com
Tel. +32 (0)2 343 41 22

CHINA
BERNARD CONTROLS CHINA
BEIJING
inquiry.china@bernardcontrols.com
Tel. +86 (0) 10 6789 2861

FRANCE
BERNARD CONTROLS FRANCE
GONESSE (PARIS)
inquiry.france@bernardcontrols.com
Tel. +33 1 34 07 71 00

GERMANY
BERNARD CONTROLS DEUFRA
TROISDORF
inquiry.germany@bernardcontrols.com
Tel. +49 22 41 98 340

ITALY
BERNARD CONTROLS ITALIA
MILANO
inquiry.italy@bernardcontrols.com
Tel. +39 02 931 85 233

KOREA
BERNARD CONTROLS KOREA
SEOUL
inquiry.korea@bernardcontrols.com
Tel. +82 2 553 69 57

MIDDLE-EAST
BERNARD CONTROLS MIDDLE-EAST
DUBAI - U.A.E.
inquiry.middleeast@bernardcontrols.com
Tel. +971 4 880 0660

CHENNAI - INDIA
inquiry.india@bernardcontrols.com
Tel. +0091 9566204444

RUSSIA
BERNARD CONTROLS RUSSIA
MOSCOW
inquiry.russia@bernardcontrols.com
Tel. +7 985 923 84 13

SINGAPORE
BERNARD CONTROLS SINGAPORE
SINGAPORE
inquiry.singapore@bernardcontrols.com
Tel. +65 65 654 227

SPAIN
BERNARD CONTROLS SPAIN
MADRID
inquiry.spain@bernardcontrols.com
Tel. +34 91 30 41 139

UNITED STATES
BERNARD CONTROLS Inc
HOUSTON
inquiry.usa@bernardcontrols.com
Tel. +1 281 578 66 66

Exhaustive list of agents and distributors on www.bernardcontrols.com

BERNARD® CONTROLS

Invest in Confidence

BERNARD CONTROLS
4 rue d'Arsonval - CS 70091
95505 Gonesse CEDEX France
Tel.: +33 (0)1 34 07 71 00
Fax: +33 (0)1 34 07 71 01
mail@bernardcontrols.com
www.bernardcontrols.com

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