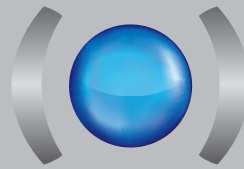


Reliability,  
Security,  
User Friendly.

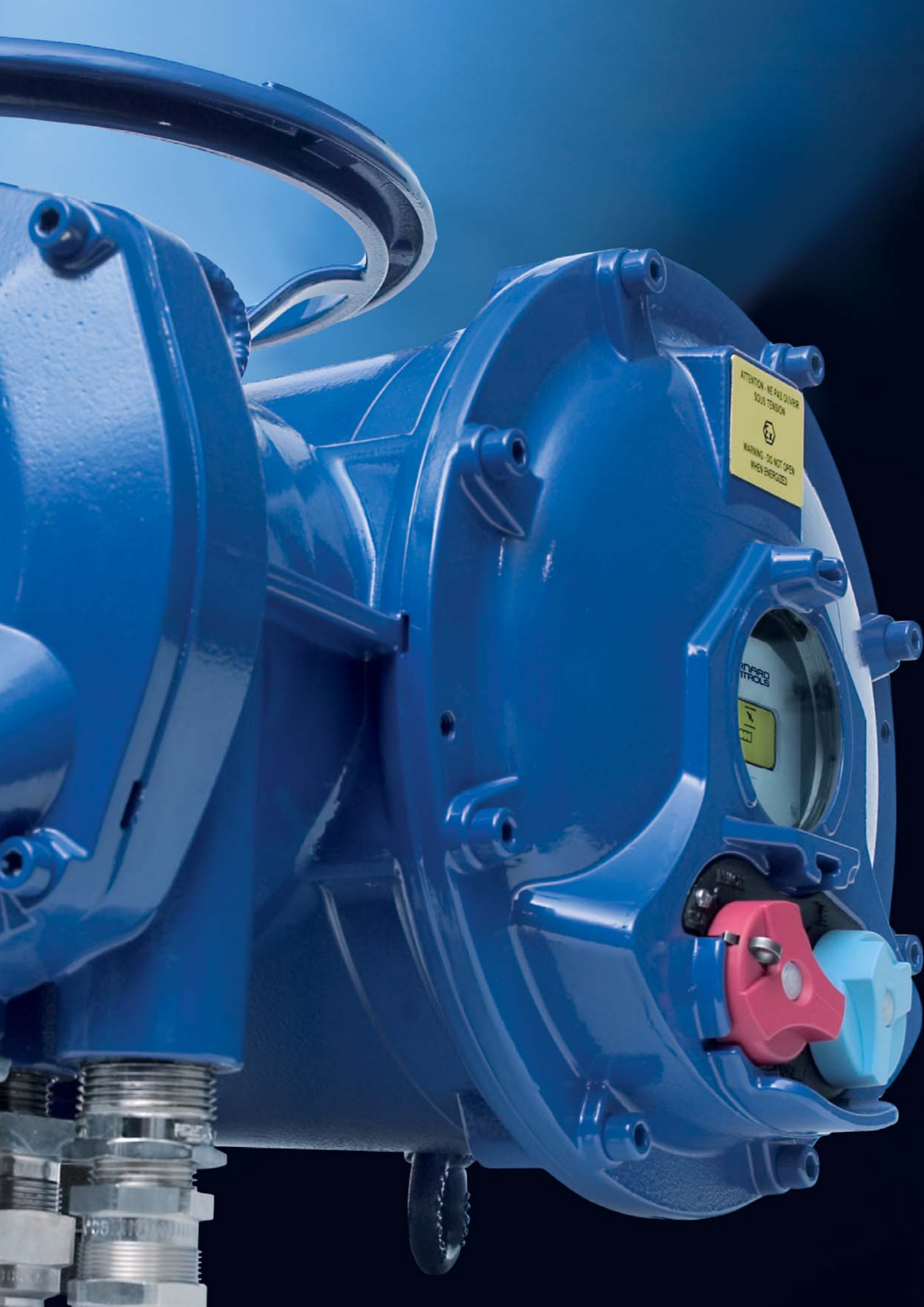


**BERNARD<sup>®</sup>  
CONTROLS**

//////////////////// Invest in Confidence //////////////////////



**EXPLOSION PROOF  
INTELLI+<sup>®</sup> ACTUATORS  
SQX & STX RANGES**



---  
LABEL



- Reliability
- Security
- User Friendly

*BERNARD CONTROLS introduces the BC Premium label. 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.*

## Contents

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# invest in experience

***BERNARD CONTROLS RELIES ON 75 YEARS  
OF CONTINUOUS EXPERIENCE AND KNOW-HOW  
TO OFFER TOTAL & DURABLE SOLUTIONS  
FOR INDUSTRIAL VALVES' AUTOMATION***

## Expertise and innovation

Expertise is our business specialty. Our credo follows from the technical requirements of our products' fields of application. Our products are qualified and approved by the largest prime contractors and industrial players in France and abroad. By improving our competencies and the efficiency of our processes, we enhance the quality of our products and services.

## Performance and Security

The nuclear market has shaped our expertise, our commitment to quality and to the control of your processes. By fulfilling these requirements, we undertake to make no compromise on security.

## Controls and Confidence

BERNARD CONTROLS is an international industrial technological company acknowledged for its know-how and expertise in the most demanding markets. The control of processes is our business and the cornerstone of your confidence.





Power Generation



Industries, HVAC & Marine



Water



Oil & Gas

## Installation and commissioning

Commissioning electric actuators requires specific expertise and care. This is specially true when the motorised valve is controlled by a complex system such as a fieldbus. That is the reason why our specialists are available to provide the adequate support to our customers for:

- adaptation on the valve
- installation
- set-up
- start-up

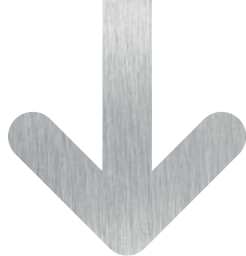
## Maintenance and repair

Everyday, our technicians are available to quickly go on site for:

- periodic actuator functional check-up
- preventative maintenance operations
- diagnosis and repair

## Training

Regular training sessions are organised for our customers and our distribution network. These sessions are held either in France, at our local service centre or at customer site. Actuator technology, setting, operating and maintenance are among the most popular topics covered.



# Range overview

## > Multiturn actuators

STX Range description

- Available torque range from 60 to 25 000 Nm
- Ex d/NEMA 7 explosion proof enclosure
- ATEX, IEC Ex , CSA/FM, CEPEL, GOST-EX Certified
- IP68 (10m / 96h) as standard
- Available for ON/OFF and Modulating Class III applications
- INTELLI+ controls as standard
- Electromechanical versions (switches) on request (refer to specific datasheet)



**BERNARD CONTROLS multiturn STX actuator**



**BERNARD CONTROLS STX actuator on a bevel gearbox**

## > Other Explosion proof solutions



- Quarter-turn failsafe
  - > Failsafe with reliable spring-return technology
  - > Fast and shock-free valve travel during emergency operation
  - > Maintenance-free
  - > EEx d/NEMA 7 explosion proof enclosure
  - > IP67 as standard



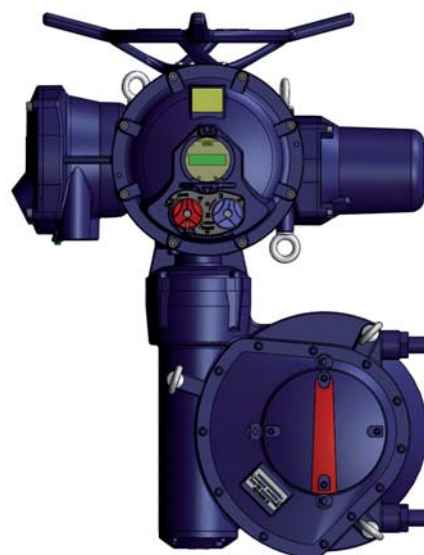
## ➤ Quarter-turn actuators

### SQX Range description

- Available torque range from 200 to 500 000 Nm
- EXd/NEMA 7 explosion proof enclosure
- ATEX, IEC Ex , CSA/FM, CEPEL, GOST-EX Certified
- IP68 (10m / 96h) as standard
- Available for ON/OFF and Class III applications
- INTELLI+ controls as standard
- Electromechanical versions (switches) on request (refer to specific datasheet)



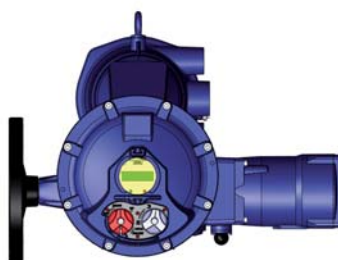
**BERNARD CONTROLS quarter-turn SQX actuator**



**BERNARD CONTROLS STX actuator on a worm gearbox**

### • EEx ed quarter-turn actuators

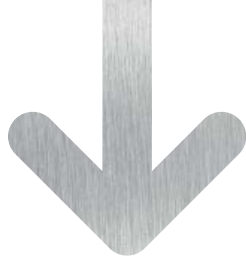
- Available torque range from 60 to 800 Nm
- EEx ed explosion proof enclosure
- IP67 as standard
- Available only in electromechanical version (switches)
- Compact and robust



### • Intensive Modulating Class II

- 100 % duty service
- Change of position every 2 to 3 seconds
- Quarter-turn, linear, multiturn and lever movements





# Reliable technology

## Heavy duty design

***BERNARD CONTROLS actuators offer a robust and reliable design based on more than 75 years of experience in demanding markets.***

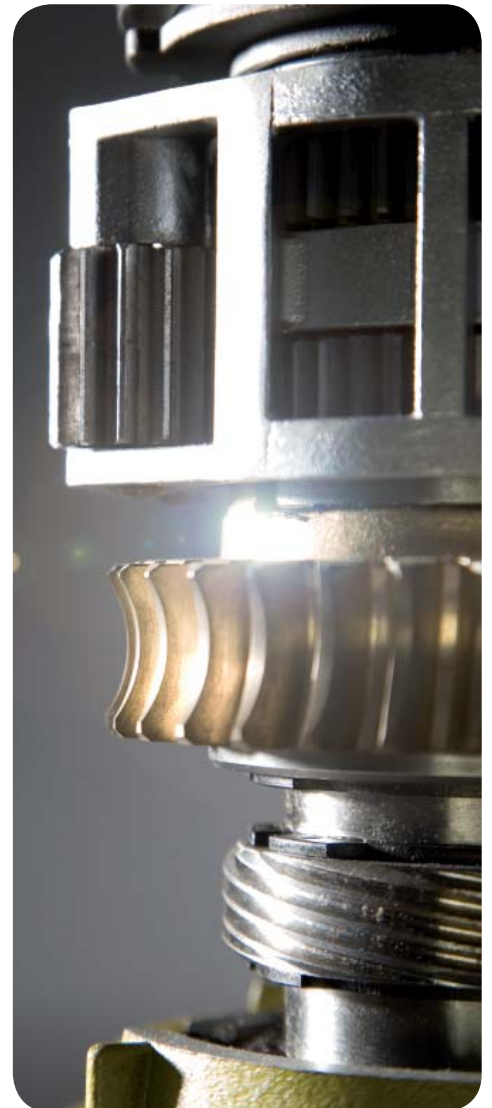
### > Trouble-free operation

- Gearing is self-locking at all speeds.
- Continuous gear drive between motor and valve.
- Main mechanical parts unaffected by vibration.
- No preventative maintenance required. Gearing is lubricated for lifetime.
- High efficiency gearing reduce wear.

### > Power to spare

Asynchronous motors used for Explosion proof series has the highest possible ratio between starting torque and nominal torque. With this hypothesis of design, actuators can operate in any difficult case and can also support repetitive starts.

- Asynchronous motor with high starting torque.
- Excellent starting torque / nominal torque ratio.
- On/Off operation: 30% motor duty rating. Up to 360 starts per hour at peak of operation.
- Modulating Class III: 50% motor duty rating. Up to 1 200 starts per hour at peak of operation.
- Easy to remove motors with sealed ball bearings fitted at front and rear.







## Accurate information

***Thanks to ABSOLUTE SENSORS , which constantly measure the position & torque of your valve, INTELLI+ 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.*
  - *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 (see page 18)*
- 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 are mechanically linked to the output shaft***

# Security at all levels

## 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
- > The setting can be done automatically or manually by choosing the closed or open positions.

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

- INTELLIPOCKET is a real industrial pocket PC which eases the engineer's job on site both for setting up and throughout product lifetime. Exists in Explosion proof version. INTELLI+ offers the possibility to communicate with a standard laptop through an infra-red link with INTELLIKIT or INTELLIPOCKET.

- 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.

# Actuator & 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.

## > Signalling continuity (option)

The actuator is totally autonomous and does not require a battery to operate. However, a signalling battery back-up optional board can be added for signalling 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 always present on the INTELLI+ board to achieve the same functionality and more. In case of hardwired control, 24VDC voltage can be supply trough the same multiwire cable as input/output signals.

## > Fire protection (option)

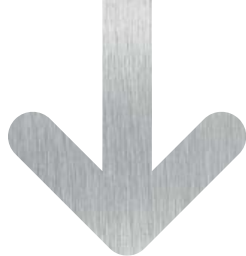
Fire could be a major cause of damage in Oil & Gas installation. For this reason, BERNARD CONTROLS can propose an option for Explosion proof actuators, two efficient systems: a fire jacket or an intumescent coating. These two systems allow the actuator to continue operating for 30 minutes in fire temperature over 1000°C.

## > Motor thermal protection

To prevent motor overheating, a thermal cutoff is embedded in the motor winding (in the case of a low maximum admissible surface temperature (ATEX T6 i.e), a surface thermal cutoff is added into the motor.

## > SIL 2 (option)

Safety Integrity Level (SIL) option is guaranteeing a very high level of confidence with diagnostic capabilities on the valve position measurement and ESD command chains. Through its innovative Intelli+ interface and according to IEC61508 & 61511 standards, Bernard Controls is the first to propose a SIL2 function guaranteeing also the valve position monitoring.



# Security at all levels

## Protect your installation

*Thanks to BERNARD CONTROLS actuators' smart functions, the user maximizes site protection.*

### > Partial stroking

Partial stroking is a key specification of BERNARD CONTROLS actuators which enables 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.

### > 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 34 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.

### > Fieldbus lightning protection

In case of lightning stroke on the fieldbus line, overvoltage spreads along the line.

If your actuators are not protected, some of the electronic components may breakdown and have to be replaced.

**The lightning protection included in our explosion proof actuators acts as a shield and discharges overvoltage.** Voltage goes back to standard level and the automation of your valves can resume.

### > 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.

### > 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 34). The monitoring relay is always energized and drops out only in event of a fault.

### > 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.

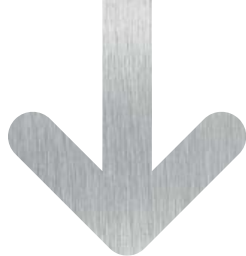
It is also possible to apply the timer function to a limited section of the stroke.

### > Protection by password

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







# User friendly & intuitive controls



## ➤ Graphical display

- Menu guided settings using clear messages. Language can be freely selected among: Chinese, English, French, German, Italian, 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

## ➤ Main 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 signalling

- 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.
- If necessary, operating parameters can be modified with the local control buttons by following information on the display.. Password can be entered to protect access.

## > 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 (8 languages available)

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

**EXIT SETUP:** to exit the actuator setup

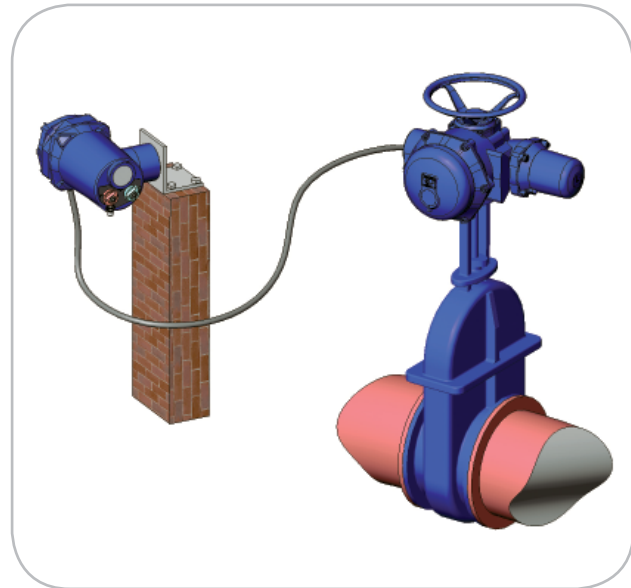
# Versatile enclosure

## ➤ Separated box

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.

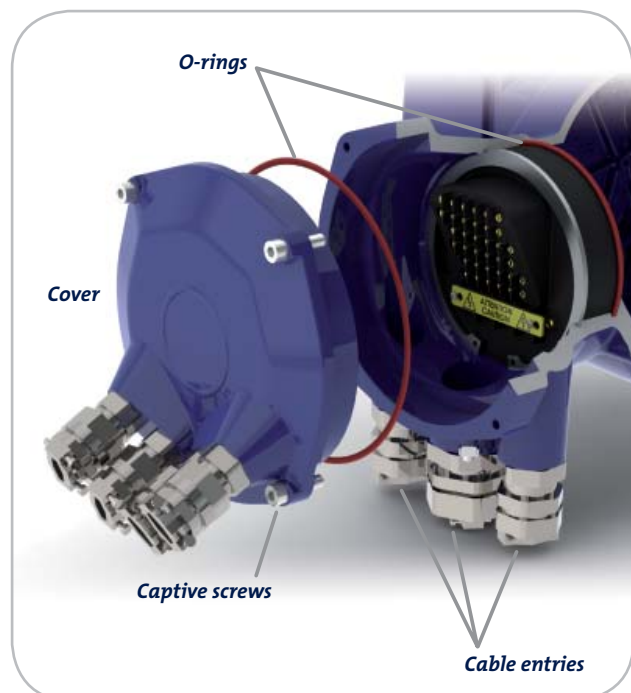


## ➤ Double-sealing protector

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.

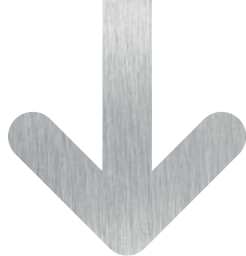
Protection is also ensured for the local control selectors thanks to internal reed switches which prevent moisture ingress.



*Double-sealing principle*







# Easy maintenance

## Diagnostic & 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 diagnostic 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.
- > A partial counter can be selected.
- > 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 memorised

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.

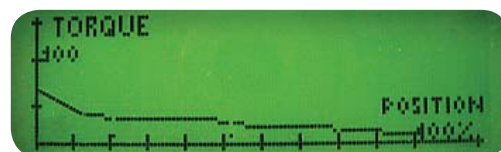
INTELLI+ constantly monitors its performance in order to detect any problem of over-travel, jammed motor, rotation direction, lost phase, motor thermal overload and many others.

Refer to Configuration page 34 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 INTELLIKIT on the INTELLIPOC-KET or by fieldbus (optional) in order to be displayed with the INTELLISOFT software as a curve (torque vs. position) or data in a spreadsheet.





## Easy site management

### > Declutch-free handwheel

- Patented manual override system.
- Differential geardrive allows the handwheel to be operated without releasing a clutch beforehand.
- The handwheel can therefore be operated under all conditions, even when a high torque is applied to the valve (i.e wedge gate valve closed tight).
- Electric command has priority over manual override.

### > Detachable thrust unit

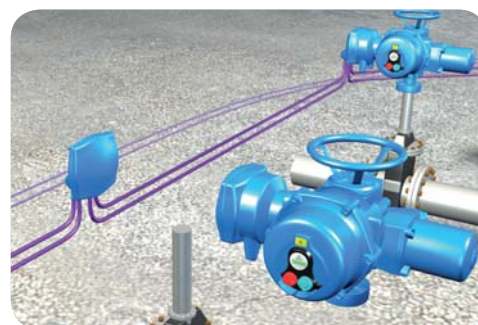
For rising stem valves applications, the STX actuators thrust unit is detachable. In fact, the A form is bolted on both actuator and valve flanges. This offers a lot of flexibility and safety at the installation phase as well as for maintenance operations.

For example, if the actuator has to be dismantled from the valve, the thrust unit can be left in place. This enables to lift up the heavy actuators without “unscrewing” them and also keeps the valve stem in position.

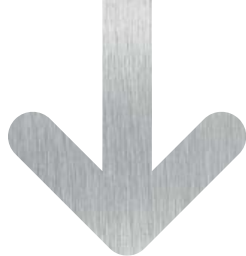
### > Bus continuity

Fieldbus is advantageous because it allows getting more information while reducing the overall wiring on site. However, when you break up the continuity of the line, for instance because of one actuator being retrieved from the field for maintenance, your whole installation is affected since the signal cannot circulate anymore.

BERNARD CONTROLS actuators can host a special Profibus connection board<sup>1</sup>, located in the cover of the wiring compartment. This cover can simply be removed from the actuator and closed tight by a special type plate. The resulting so-called “BU” type box ensures continuity of signal throughout the line even when the actuator is removed from the field. Maintenance is then facilitated since you can disconnect an actuator for repair or replacement, while maintaining signal transmission. The “BU” box is explosion proof.



<sup>1</sup> - Standard on Explosionproof actuators, on option for Waterproof actuators.



# Hardwired control

## > Wire by wire command

Remote control can be achieved using a 10 to 250 V external voltage supply or by dry contacts which use 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

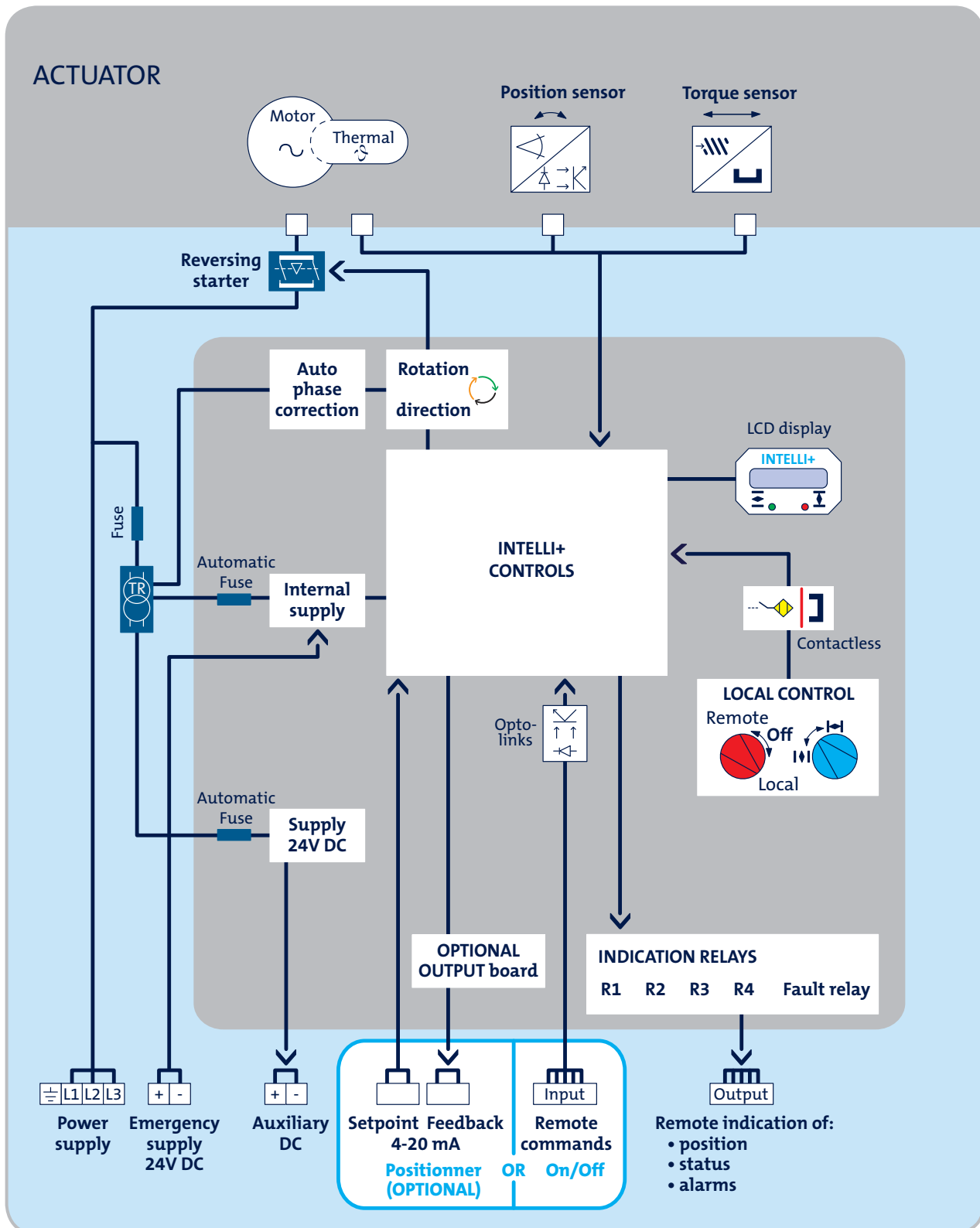
A positioner board can be installed into the INTELLI+ to allow the operator to drive the valve to intermediate positions (Class III modulating). The positioner module has been designed to work with either current (i.e. 4-20mA) or voltage (i.e. 0-10V) analogue signals:

- > *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.



# INTELLI+ layout



# Fieldbus communication

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.

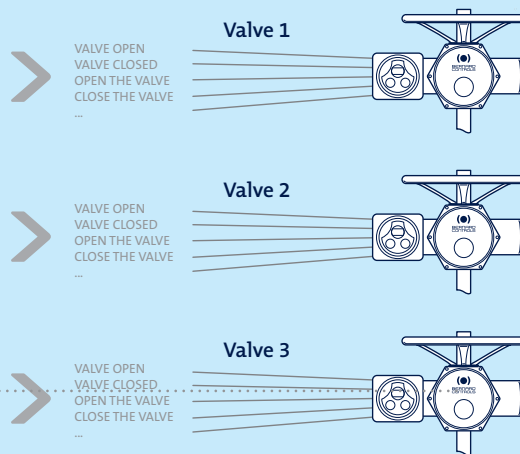
BERNARD CONTROLS actuators can be connected to most of the standard fieldbuses available on the market:

- PROFIBUS DP,
- FOUNDATION FIELDBUS,
- MODBUS RTU,
- 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.

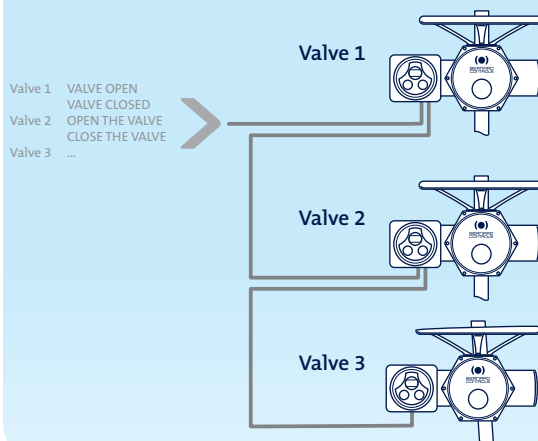
## POINT-TO-POINT CONNECTION

EACH ACTUATOR HAS TO BE CONNECTED TO THE CONTROL CABINET



## MULTIDROP CONNECTION

MANY UNITS CONNECTED ON A SINGLE PAIR OF WIRES;  
ALL COMMANDS AND SIGNALS CAN BE TRANSMITTED BY THE BUS



## Open versus Proprietary systems :

Two physical concepts of fieldbus are available from various providers.

### • The «Proprietary» so-called system :

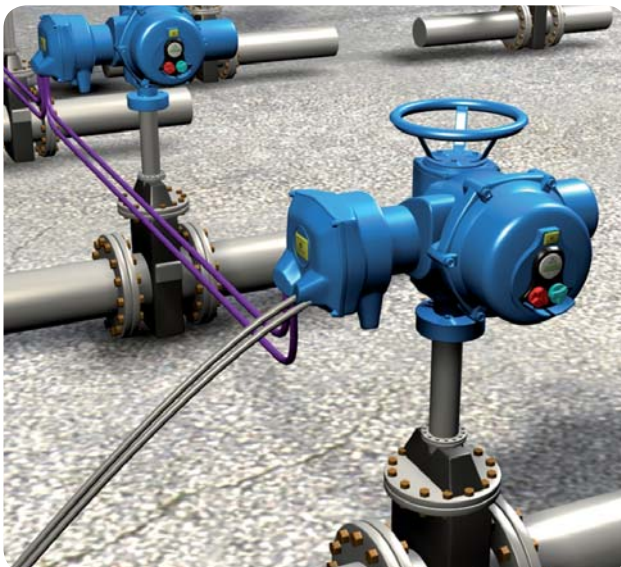
This is a technology designed by a device manufacturer for his own needs. A «Proprietary» system always includes the actuators with the specific bus interface, but also the bus controller located at the line head-end. Only the products proposed by the bus controller manufacturer can be installed on the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

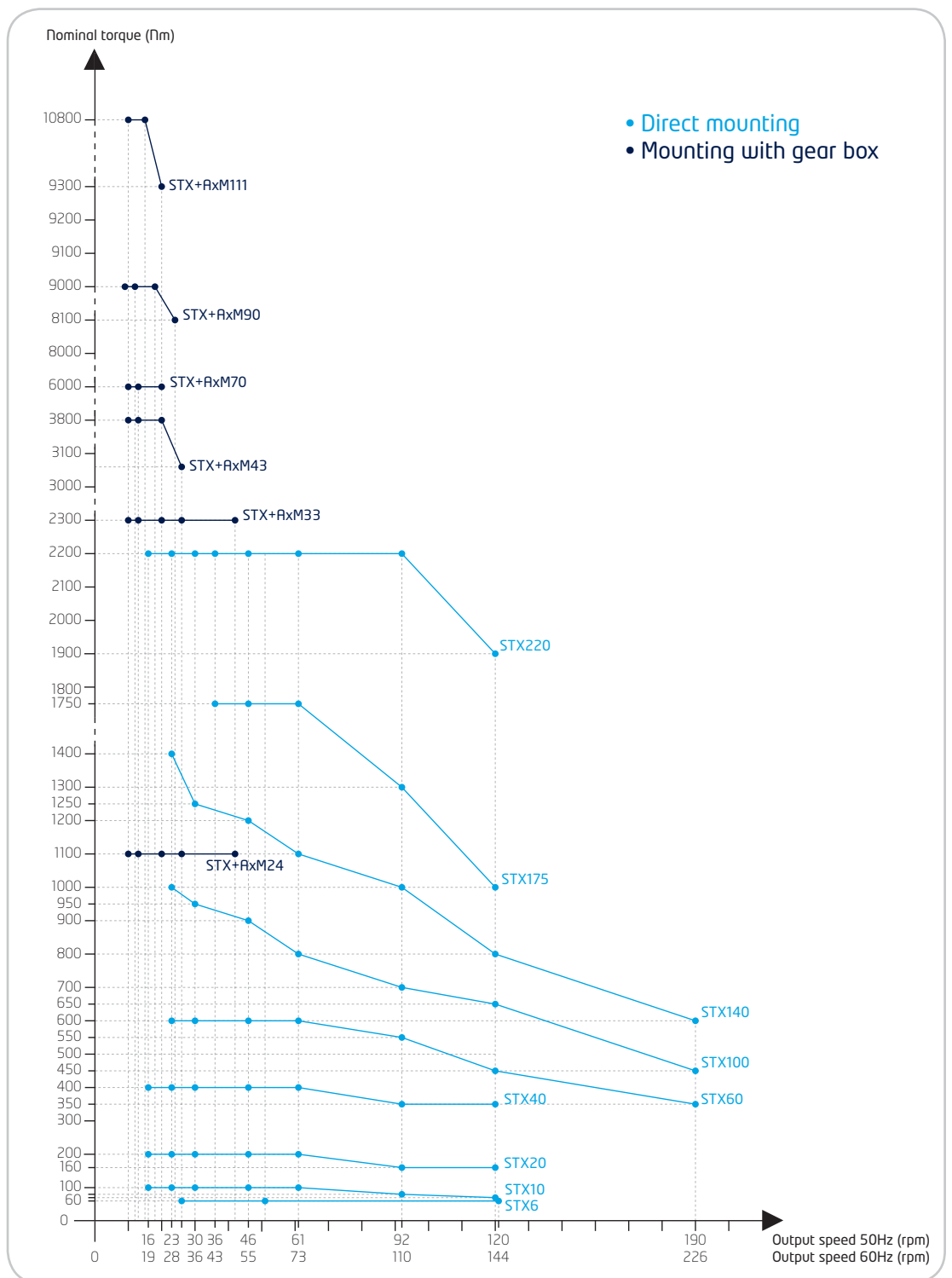


- Based on robust PLC technology and open fieldbus protocol
- Up to 120 actuators and 10km distance
- Fast response time. Standard scan time 1 to 3 s whatever the distance and number of actuators connected
- 1 to 3 lines starts
- Simple or redundant configurations
- Overall start up time reduced to the minimum



# STX Performance data

## Multiturn explosion proof actuators



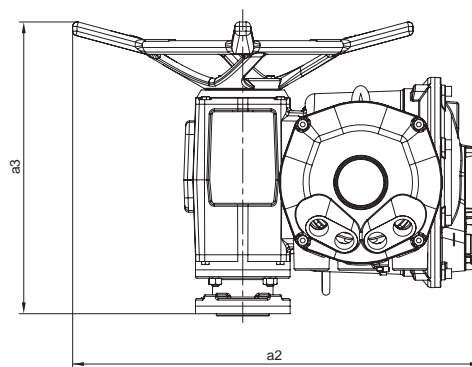
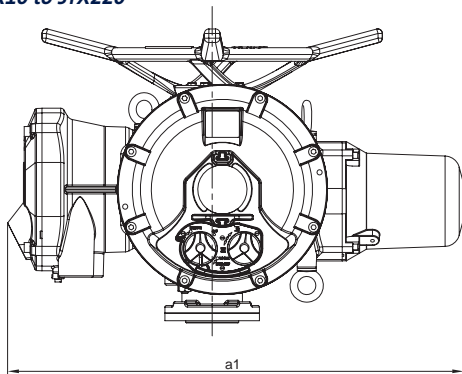




# STX Dimensions

## Multiturn explosion proof actuators

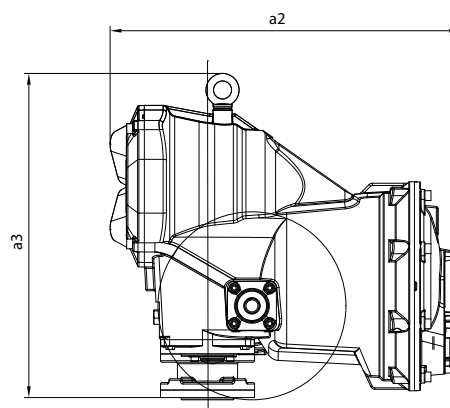
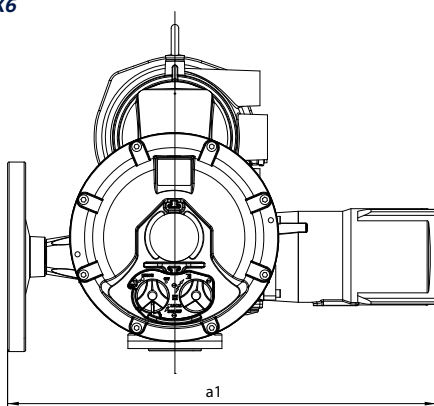
STX10 to STX220

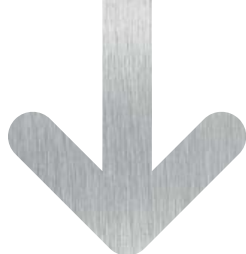


	Flange	Stem diameter (mm)			a1 max.	a2	a3 (A-B1 form)	a3 (B3 form)	Weight (kg)
		Type A (max.)	Type B1 (max.)	Type B3					
<b>STX6*</b>	F10	30	42	20	569	540	431	373	41
<b>STX10</b>	F10	38	42	20	603	540	386	328	48
<b>STX20</b>	F10	38	42	20	613	540	386	328	49
	F14	38	60	NA	613	540	405	NA	50
<b>STX40</b>	F14	48	60	30	726	621	438	361	80
<b>STX60</b>	F16	60,5	80	40	808	668	505	405	100
<b>STX100</b>	F16	60,5	80	40	711	668	505	405	102
	F25	60,5	100	NA	711	668	535	NA	105
<b>STX140</b>	F25	70	100	50	829	698	559	429	137
<b>STX175</b>	F25	85	100	50	1056	797	661	523	295
<b>STX220</b>	F30	90	120	60	1056	797	661	523	316

\* Stem lift limited to 130 mm. Please refer to detailed drawing for more details.

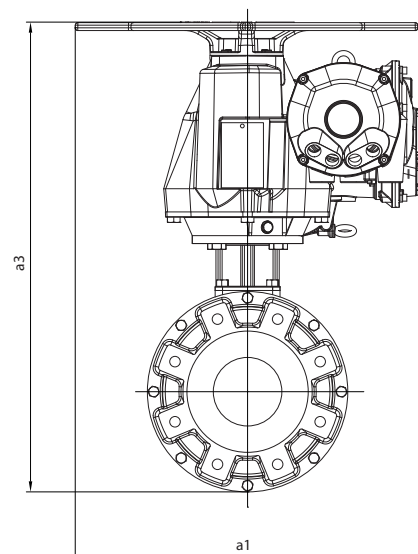
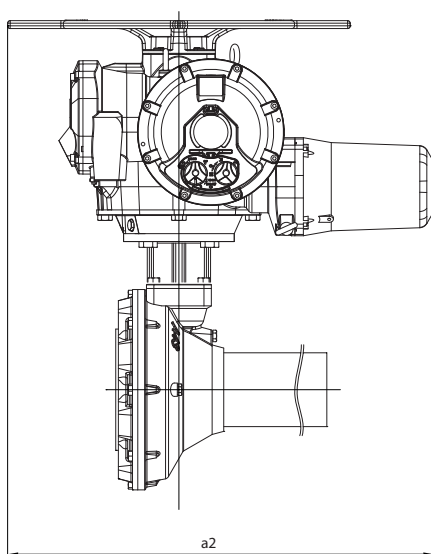
STX6





# STX Dimensions

## Multiturn explosion proof actuators



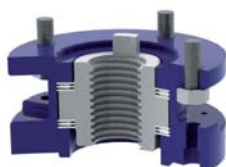
	Flange	Stem diameter (mm)		a1 max. (H if higher)	a2	a3	Approx. Weight (kg)
		Type A (max.)	Type B1 (max.)				
<b>STX40+AxM24</b>	F16	70	85	726	621	705	97
<b>STX60+AxM33</b>	F25	85	118	808	668	853	142
<b>STX100+AxM43</b>	F30	102	132	808	668	891	162
<b>STX140+AxM70</b>	F35	115	145	698	829	917	250
<b>STX175+AxM70</b>	F35	115	145	1000	1220	1013	420
<b>STX175+AxM90</b>	F35	122	190	1000	1220	1104	455
<b>STX220+AxM90</b>	F35	122	190	1000	1220	1104	476
<b>STX220+AxM111</b>	F40	140	210	1000	1220	1180	626



# Mounting flange

## Specifications

**Type A**  
STEM NUT



Thrust accepted



**Type B1**  
LARGE DIA.



Thrust not accepted



**Type B3**  
SMALL DIA.



Thrust not accepted



**Type C**  
CLAW COUPLING



Thrust not accepted



## > ISO 5210 requirements

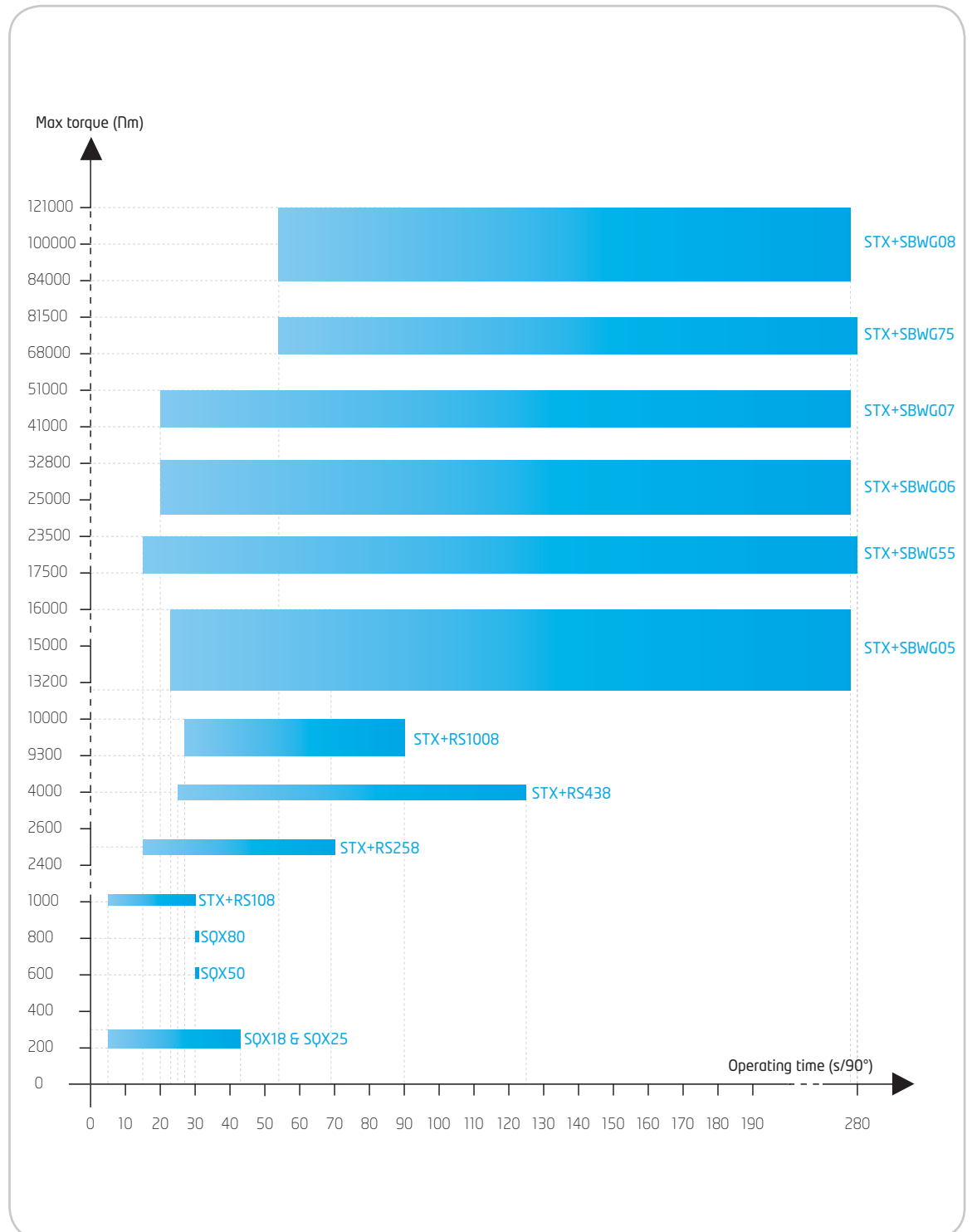
Flange	Max torque	Max. acceptable thrust (Type A)	Mounting bolts
<b>F10</b>	100 N.m	40 000 N	4 x M10 / d=102 mm
<b>F14</b>	400 N.m	100 000 N	4 x M16 / d=140 mm
<b>F16</b>	700 N.m	150 000 N	4 x M20 / d=165 mm
<b>F25</b>	1200 N.m	200 000 N	8 x M16 / d=254 mm
<b>F30</b>	2500 N.m	325 000 N	8 x M20 / d=298 mm





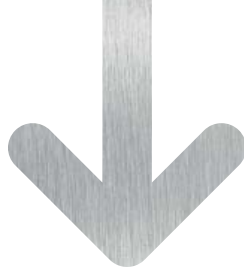
# SQX Performance data

## Quarter-turn explosion proof actuators



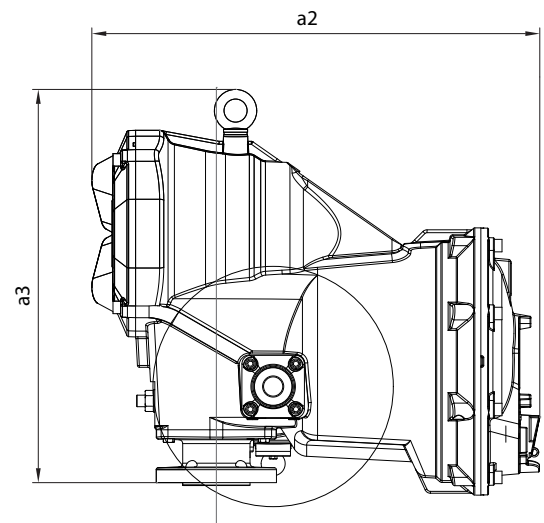
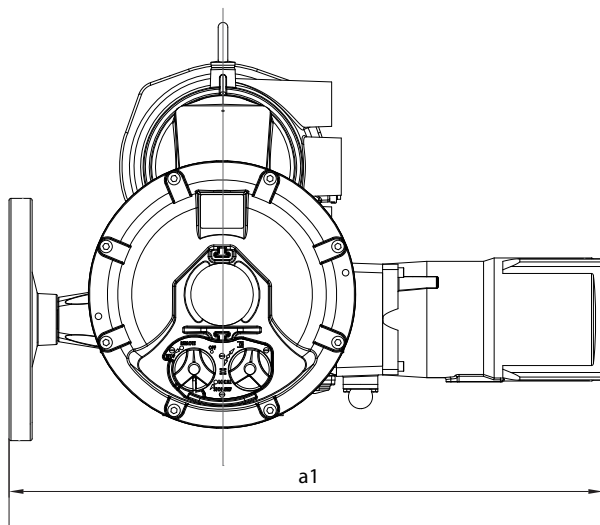
\* Many other possibilities up to 610.000 Nm. For more details, please contact us



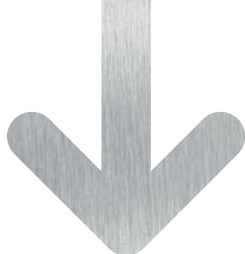


# SQX Dimensions

Quarter-turn explosion proof actuators

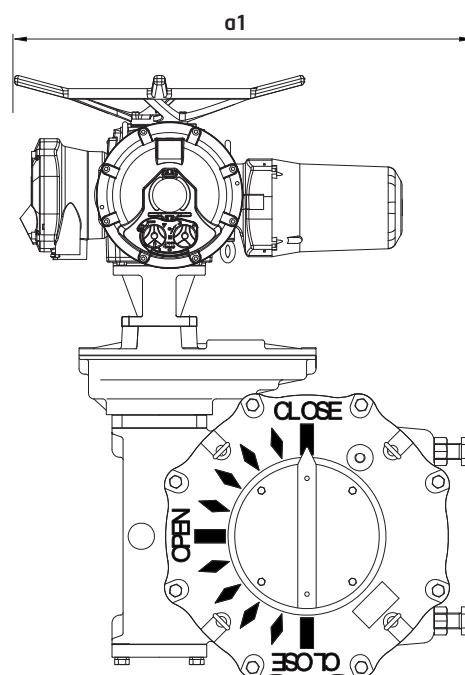
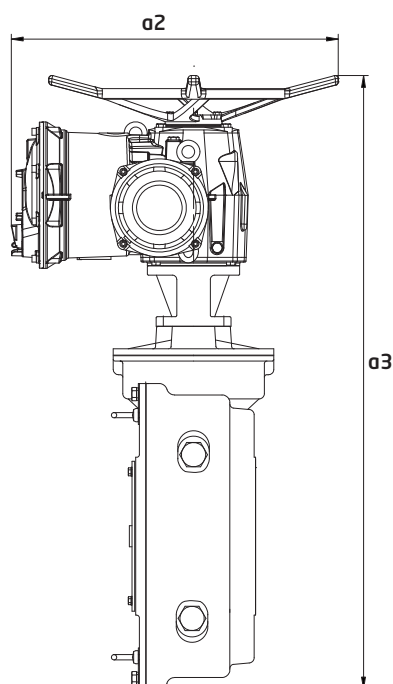


	Flange	Stem size (mm)		a1 max.	a2	a3	Approx. Weight (kg)
		Bore (max.)	Square (max.)				
<b>SQX 18</b>	F07/F10	32	32	568	466	409	33
<b>SQX 25</b>	F07/F10	32	32	616	466	409	35
<b>SQX 50</b>	F07/F10	32	32	617	466	409	36
<b>SQX 80</b>	F12	36	40	617	466	440	41



# SQX Dimensions

Quarter-turn explosion proof actuators



	Flange	Stem size (mm)		a1 max.	a2	a3	Approx. Weight (kg)
		Bore (max.)	Square (max.)				
<b>STX6+RS108</b>	F10/F12/F14	60	40	569	466	612	57
<b>STX6+RS258</b>	F14/F16	80	55	569	466	755	77
<b>STX6G+RS438</b>	F16	80	55	569	466	701	77
<b>STX6+RS1008G</b>	F25	100	70	569	466	829	105
<b>STX20+SBWG05/1SDM</b>	F25/F30	115	/	666	540	845	160
<b>STX20+SBWG55/1SDM</b>	F25/F30	125	/	613	540	890	183
<b>STX40+ SBWG06/1SBM</b>	F30/F35	140	/				
<b>STX40+SBWG07/1SBM</b>	(F35) F40	180	/	868	621	1165	372
<b>STX40+SBWG75/1SBM</b>	(F40) F48	210	/	958	621	1332	489
<b>STX60+SBWG08/1SBM</b>	(F40) F48	225	/	908	666	1367	648

\* Many other possibilities up to 610.000 Nm. For more details, please contact us



# Explosion proof actuators

## Technical Specifications

GENERAL SPECIFICATIONS	Torque range	Multiturn <ul style="list-style-type: none"><li>• direct mount : 60 to 2200 N.m</li><li>• with gearbox : up to 20,000 N.m</li></ul> Quarter-turn <ul style="list-style-type: none"><li>• direct mount : 200 to 800 N.m</li><li>• with gearbox : up to 500,000 N.m</li></ul>
	Type of service	ON/OFF - Modulating Class III. Class II: refer to specific documentation
ENCLOSURE - PROTECTION	Casing	Cast aluminium. Ductile cast iron for models STX175 / STX220
	Ingress Protection	IP68 10m / 96h G NEMA 6 (C.S.A C and US certified)
	Controls location	As standard, the INTELLI+ controls are integral to the actuator On option, the INTELLI+ can be mounted in a separated box (maximum distance between actuator and controls = 50m)
	Explosion proof ATEX	ATEX Directive 94/9/EC - CENELEC EN 60079-0, EN60079-1, EN61241-0, EN61241-1 standards As standard: Ex d II B T4 (option T5 or T6) and Ex t DA21 IP68 T=135°C (option T=100°C, T=85°C) On request: Ex d II C T4 (option T5 or T6)
	Explosion proof C.S.A. C and US	NEMA 7 - NEMA 9 certified C22-2, FM3600, FM3611 and FM3615 standards Class I Group C, D div 1&2 (option Group B)- Class II Group E, F, G div 1&2
	Explosion proof IEC Ex	IEC Ex - standard IEC 60079-0, IEC60079-1, IEC61241-0, IEC61241-1 standards As standard: Ex d II B T4 (option T5 or T6) and Ex t DA21 IP68 T=135°C (option T=100°C, T=85°C) On request: Ex d II C T4 (option T5 or T6)
	Ambiant temperature operating range	• IIB standard: -20 ... +70°C • IIB low temperature option: -50 ... +70°C • IIC option: -20 ... +60°C
	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
	Double sealing Protection	The control section of the actuator is totally isolated from the terminal compartment to protect electronic components Terminal compartment < 2 litres, no source of ignition
MOTOR	Motor technology	TENV type Totally Enclosed Non Ventilated, squirrel cage motors (VAC) Class F insulation class 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 <ul style="list-style-type: none"><li>• S4 - 30% for ON/OFF operation - up to 360 starts per hour</li><li>• S4 - 50% for Modulating class III - up to 1,200 starts per hour</li></ul>
MECHANICAL SPECIFICATIONS	Gearing	Self-locking at all speeds
	Manual override	Handwheel which does not rotate during motor operation. <ul style="list-style-type: none"><li>• Automatic switch between manual and electrical operation without clutch release lever. Priority to electric drive</li><li>• Manual control gear ratios: STX6 1:9 - STX10/STX20/STX40 1:2 - STX60/STX100 1:7- STX140 1:9 - STX175/STX220 1:31</li><li>• Maximum rim force to apply conform to EN 12570 standard</li></ul>
	Output flange	• Multiturn actuators flanges comply with ISO 5210 • Quarter-turn actuators flanges comply with ISO 5211 Flanges for valve special top works available on request
	Output drive	Removable sockets on SQX and STX models Direct machining in the output quadrant on larger quarter-turn gearboxes
	Vibration Resistance	1g (9.8 m/s <sup>2</sup> ) 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: <ul style="list-style-type: none"> <li>• 3-phase , single-phase or DC,</li> <li>• up to 690 V,</li> <li>• 50 or 60 Hz ...</li> </ul>
	Cable entries	Standard configuration: <ul style="list-style-type: none"> <li>• power &amp; signal : 1"1/2 NPT + 2x1"NPT</li> <li>• fieldbus : up to 4x3/4"NPT</li> </ul> Other configurations available on request: plugs, adaptors, ISO thread
	Electrical connection	Ring tongue terminals Internal and external ground rod
	Fuse protection	Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer board Two automatic fuses for low voltages
POSITION AND TORQUE SENSORS	Position	<ul style="list-style-type: none"> <li>• Movement read directly on the main shaft (direct mechanical link)</li> <li>• Absolute sensor (without battery)</li> <li>• Range: 1.5 to 900 turns. (Range above 900 turns available on request)</li> </ul>
	Torque	<ul style="list-style-type: none"> <li>• Torque measured by a dynamometric balance</li> <li>• Absolute sensor (without battery)</li> <li>• Setting range: 40 to 100% of actuator maximum torque by steps of 1%</li> <li>• Reading range: 10 to 100% of actuator range with a resolution of 1%</li> </ul>
CONTROLS	Power circuit	Integral motor reversing starters (electromagnetic contactors for On-Off / Modulating Class III)
	Display	Back-lit graphics display with a choice of 8 different languages
	On-off remote Control	Command by <ul style="list-style-type: none"> <li>• voltage: 10 to 250 V DC/AC (current: 10 mA at 24V)</li> <li>• dry contact (use INTELLI+ auxiliary 24 VDC supply)</li> </ul> Isolated by opto-couplers Minimum pulse duration: 100ms Time of rotational direction change: 200ms (factory setting range 50 to 500 ms)
	Signalling relays	4 relays: each information can be freely selected among a total of 23 available information <ul style="list-style-type: none"> <li>• Contact configuration : normally open or normally closed</li> <li>• Minimum current 10mA at 5V</li> <li>• Maximum current 5A at 250V AC or 5A at 30VDC (inductive load)</li> </ul> Additional 3 relay board on option
	Fault relay	<ul style="list-style-type: none"> <li>• Normally closed &amp; energized SPDT contact</li> <li>• Minimum current 10mA at 5V</li> <li>• Maximum current 5A at 250V AC or 5A at 30V DC (inductive load)</li> </ul>
	Proportional control Modulating Class III (option)	Input (setpoint) and output (feedback) signals are fully isolated from each other Signal configurations (selectable): <ul style="list-style-type: none"> <li>• Input signal: 4-20 mA - output signal: 4-20mA</li> <li>• Input signal: 0-20 mA - output signal: 0-20mA</li> <li>• Input signal: 0-10 V - output signal: 0-20mA (0-10V with an external resistance)</li> </ul> Analogue inputs: <ul style="list-style-type: none"> <li>• in current: impedance of 160 Ohms</li> <li>• in voltage: impedance of 11 KOhms</li> </ul> Analogue outputs: <ul style="list-style-type: none"> <li>• in current: maximum acceptable load of 750 Ohms at 24 VDC supply</li> <li>• In voltage: minimum acceptable load of 50 KOhms (with a shunt resistance of 500 Ohms)</li> </ul>
	Fieldbus Control	See table on next page
	Transmitter (option)	Proportional position (0/4-20 mA) and torque (4-20 mA) feedback board
	Signalling 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
	Fire protection (option)	30 minutes at 1,000°C Tested to UL1709 criteria
SETTINGS	Settings	Non-Intrusive. All actuator settings and parameters are stored in a non-volatile EEPROM memory. Protection by password. Can be done by local command, infrared link or bluetooth link (For a good safety level, bluetooth link is limited at 10m)
	Local selectors	The INTELLI+ can be fully set via its local display and selectors Does not require any specific setting tool
	INTELLIKIT (option)	<ul style="list-style-type: none"> <li>• INTELLISOFT CD-ROM for laptop PC</li> <li>• Infrared module to connect to the laptop (USB) and clip on the actuator window</li> </ul> From update 3.00, INTELLISOFT is also able to manage bluetooth link with advanced torque recordings
	INTELLI Pocket (option)	Industrial pocket PC (PDA) <ul style="list-style-type: none"> <li>• Protection: IP65 (option: ATEX II2G EEx ia IICT4)</li> <li>• Shock resistance: 1.2 m (on concrete)</li> <li>• Communication:               <ul style="list-style-type: none"> <li>- with INTELLI+ : Infrared link (40 cm maximum distance)</li> <li>- with PC: bluetooth, IRDA, Wifi (802.11b) as a standard</li> </ul> </li> <li>• Optional USB station.</li> <li>• Operating system: Windows Mobile 2005, 64Mb RAM + 256Mb storage card</li> </ul>



CONFORMITY TO EC DIRECTIVES	EC Directives	<p>The actuators comply with:</p> <ul style="list-style-type: none"> <li>• The 2004/108/EC electromagnetic compatibility</li> <li>• The 2006/95/EC C Low Voltage</li> <li>• The following harmonized standards: <ul style="list-style-type: none"> <li>- Generic emission standard-Industrial environment EN 61000-6-4</li> <li>- Generic immunity standard - Industrial environment EN 61000-6-2</li> <li>- Rotating electrical machines EN 60034-1,</li> <li>- Degrees of protection provided by enclosures (IP code) EN 60529</li> </ul> </li> </ul>
	Profibus DPV1 (option)	<ul style="list-style-type: none"> <li>• PROFIBUS-DPV1 - RS 485</li> <li>• Baud rate: 9.6 kbit/s up to 1.5 Mbit/s (autodetection)</li> <li>• Communication protocol: PROFIBUS DPV1 slave-cyclic &amp; acyclic</li> <li>• Type of connection: single line (standard) or redundant line (option)</li> <li>• Cable specification: Profibus certified cable only</li> <li>• Line connection without repeater <ul style="list-style-type: none"> <li>- Actuators per line: 31 max.</li> <li>- Line length: 1.2 km max. (0.75 mi)</li> </ul> </li> <li>• Line connection with repeaters <ul style="list-style-type: none"> <li>- Number of repeaters per line: 9 max</li> <li>- 30 actuators and 1 Km max. per segment .</li> <li>- Number of actuators per line with repeater: 124 maximum</li> <li>- Line length with 9 repeaters: 10.2 km max. (6.2 mi)</li> </ul> </li> <li>• Scan speed (30 units &amp; 1.2 km): 0.1s (at a baud rate of 93.75 Kbit/s)</li> <li>• 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</li> <li>• Technical approval: operability approved by PNO (Profibus Nutzer Organisation)</li> </ul>
	Modbus (option)	<ul style="list-style-type: none"> <li>• MODBUS RTU - RS 485</li> <li>• Transmission medium: 1 shielded pair cable</li> <li>• Functions: Half Duplex, asynchronous mode, multidrop</li> <li>• Baud rate: 1.2k to 115 Kbit/s</li> <li>• Format: 8 data bits, 1 stop bit, no parity</li> <li>• Communication protocol: Modbus (slave)</li> <li>• Modbus address: configurable by the actuator menu</li> </ul>
	Foundation Fieldbus (option)	<ul style="list-style-type: none"> <li>• H1 speed = 31.25kBit/s</li> <li>• Fully compliant with fieldbus standard IEC 61158</li> <li>• Physical layer: IEC 61158-2, 2 wires communication</li> <li>• Current consumption: 20mA</li> <li>• Operating voltage: 9 to 32 VDC</li> <li>• Cable specification: Type A (for example: 3076F Belden)</li> <li>• Line connection <ul style="list-style-type: none"> <li>- Actuators per line without repeater: 31 max.</li> <li>- Line length without repeater: 1.9 km max. (1.2 mi)</li> <li>- Number of repeaters per line: 4 max.</li> <li>- Maximum number of actuators and line length depends on consumption available</li> </ul> </li> <li>• Technical approval: Foundation tested. Several DCS manufacturer operability checked.</li> </ul>

Please refer to our Technical Handbooks for detailed information on electrical data, dimensions and wiring diagrams.  
AF401: Quarter-Turn Explosionproof  
AF402: Multiturn Explosionproof





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



	INFORMATION	STANDARD	CONFIGURABLE
SIGNALLING RELAYS	<b>Information reported on signalling relays</b>	<ul style="list-style-type: none"> <li>Valve open (for R1 and R3)</li> <li>Valve closed (for R2 and R4)</li> </ul>	<ul style="list-style-type: none"> <li>Torque limiter action in the opening / closed direction</li> <li>Valve in intermediate position, between x% and y% of opening (for example: 10% to 50%)</li> <li>Selector in local/remote/off</li> <li>The actuator is moving (fixed signal)</li> <li>The actuator is moving (blinking signal)</li> <li>Moving in the open/close direction (fixed signal)</li> <li>Moving in the open/close direction (blinking signal)</li> <li>Emergency command (ESD)</li> <li>Stop mid-travel</li> <li>The actuator is normally powered</li> <li>The motor thermal cutoff has tripped</li> <li>Jammed valve</li> <li>In three-phase, a phase is missing</li> <li>4-20 mA signal lost (if positioner option installed)</li> <li>The handwheel has been activated since the last electrical movement</li> <li>If fieldbus option is installed, this relay is assigned to an external command</li> <li>Battery low (if installed)</li> <li>Partial stroking in progress / in fault</li> </ul>
	Each contact can be:	<ul style="list-style-type: none"> <li>Normally open (when something occurs, contact is closed)</li> </ul>	<ul style="list-style-type: none"> <li>Normally closed</li> </ul>
FIELD BUS (option)	In case of communication loss	<ul style="list-style-type: none"> <li>Remain in position</li> </ul>	<ul style="list-style-type: none"> <li>Go to closed position</li> <li>Go to open position</li> </ul>
ANALOG POSITION FEEDBACK BOARD (option)	Position remote indication	<ul style="list-style-type: none"> <li>4-20mA</li> </ul>	<ul style="list-style-type: none"> <li>0-20mA and 0-10V*</li> <li>4-12 mA</li> <li>12-20 mA</li> </ul>
	Torque remote indication	<ul style="list-style-type: none"> <li>4-20mA</li> </ul>	
	Signal variation direction	<ul style="list-style-type: none"> <li>Signal increases in the open direction</li> </ul>	<ul style="list-style-type: none"> <li>Signal decreases in the open direction</li> </ul>
ANALOGUE CONTROL: POSITIONER (option)	Auxiliary command 1	<ul style="list-style-type: none"> <li>Switch: automatic control (proportional command) / On-Off (standard Open / Close command)</li> </ul>	
	Type of signal	<ul style="list-style-type: none"> <li>4-20mA</li> </ul>	<ul style="list-style-type: none"> <li>0-20mA and 0-10V</li> <li>4-12mA</li> <li>12-20mA</li> </ul>
	Signal direction	<ul style="list-style-type: none"> <li>Signal increases in the open direction</li> </ul>	<ul style="list-style-type: none"> <li>Signal decreases in the open direction</li> </ul>
	Dead band setting	<ul style="list-style-type: none"> <li>1%</li> </ul>	<ul style="list-style-type: none"> <li>Other value between 0.2 and 5%</li> </ul>
	In case of 4-20mA signal loss	<ul style="list-style-type: none"> <li>Remain in position</li> </ul>	<ul style="list-style-type: none"> <li>Go to fully closed position</li> <li>Go to fully open position</li> </ul>

\* Voltage signal with an external resistance

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