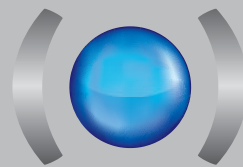




LABEL

The complete solution



**BERNARD[®]
CONTROLS**

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



Weatherproof Multi-turn Actuators

ST & ASM RANGES



Contents

Ranges Overview	>	4
Wide Choice of Controls	>	6
Reliability	>	8
Security	>	12
User-friendly controls	>	14
Hardwired controls	>	18
Fieldbus communication	>	20
Product Specifications	>	22
INTELLI+® Layout	>	31
INTELLI+® Configuration	>	32
Mounting Flange	>	34

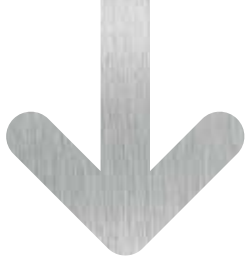
.....
LABEL



The complete solution

The BC PREMIUM label guarantees "The complete solution", with many options and possible configurations to fit at best very specific needs. Decades of return on experience from very demanding applications such as nuclear qualified valves actuation have shaped our technical orientations and our commitment to quality and safety.

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



Ranges overview

> ST Range

- Available torque range from 60 to 2200 N.m
- IP68 (5m/72h) / NEMA6 as standard
- Duty & Modulating Classification:
 - > On-Off : A/A+,
 - > Inching/Positioning : B/B+,
 - > Modulating : III (complying with EN15714-2 Class C)
- Type of control:
 - > Standard electromechanical, SWITCH
 - > Integrated, INTEGRAL+ / POSIGAM+
 - > Intelligent INTELLI+®
- Self-locking at all speed



ST actuator SWITCH version



ST actuator with INTELLI+® controls

> Other Weatherproof solutions

- Linear systems



- > Positioning & modulating applications
- > Up to 200mm travel
- > Up to 200 kN thrust
- > Optional yoke mounting



> ASM range

- Available torque range from 60 to 200 N.m
- IP67 (IP68 5m/72h as option) / NEMA6 as standard
- Duty & Modulating Classification:
 - > On-Off : A/A+,
 - > Inching/Positioning : B/B+,
 - > Modulating : III (complying with EN15714-2 Class C)
- Type of control:
 - > Standard electromechanical, SWITCH
 - > Integrated, INTEGRAL+ / POSIGAM+
 - > Intelligent INTELLI+®



ASM actuator SWITCH version

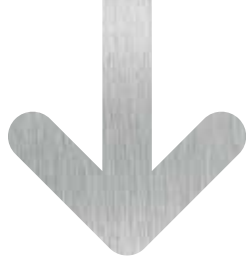


ASM actuator with INTELLI+® controls

• Continuous Modulating Actuators



- > Adaptation to all modulating valves: quarter-turn, multi-turn, linear
- > EN15714-2 duty classification: Continuous Modulating (Class D)
- > Up to high speed and very high resolution
- > Torque range from 20 to 1000 N.m.

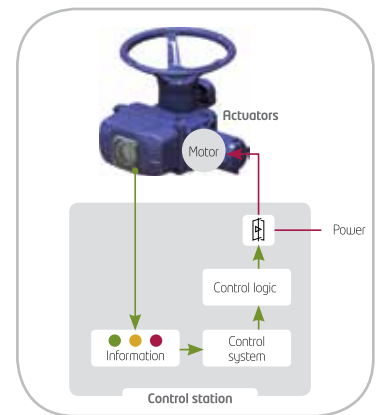


Wide Choice of Controls

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.

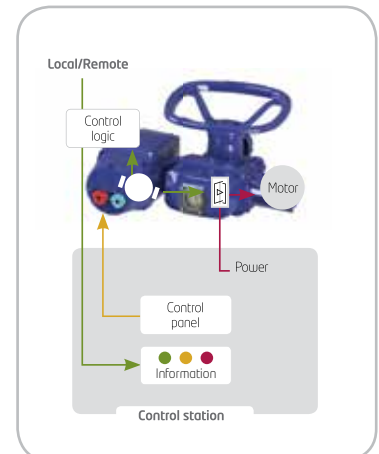


SWITCH control

> 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.

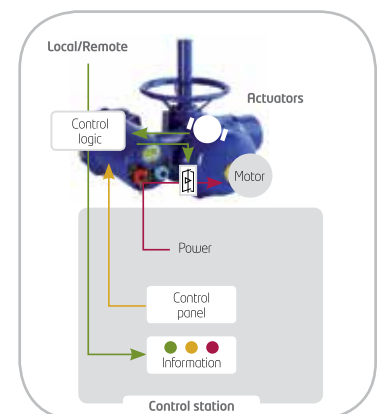
The POSIGAM+ control (Class III actuators) is based on the same electronics platform as the INTEGRAL+ but includes a positioner function. Proportional signals are used to control the actuator (setpoint) and to signal the valve actual position (feedback).



Integrated controls INTEGRAL+ / POSIGAM+

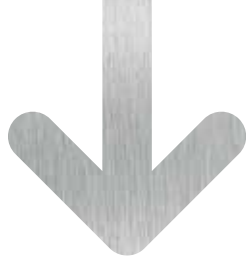
> INTELLI+® control

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 33 to 35.



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	-	INTEGRAL+: Local control inhibition POSIGAM+: Auto/On-Off	2 commands 9 options
LOCAL COMMANDS	Timer	-	Option	●
	Lockable selector knobs	-	●	●
	Digital display	-	-	●
INTERNAL PROTECTION	Indicator lights	-	Options	●
	Fuses	-	●	●
	Automatic phase monitoring (3-phase)	-	●	●
	Motor thermal cut-out	●	●	●
SIGNALING	Torque limiter protection	●	●	●
	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
CONFIGURATION	Analogue position feedback	Option	Option (Std on POSIGAM+)	Option
	Configuration setting	Intrusive	Internal (with DIP switches) & jumpers	Non-Intrusive - 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
MONITORING	Full configuration upload	-	-	Via: Fieldbus - Pocket PC Laptop
	Self-diagnostics	-	●	●
	Torque/position curve	-	-	●
	Actuator operating log	-	-	●
FIELDBUS	Partial stroke test	-	-	●
	Profibus DP (single or redundant)	-	Option	Option
	Foundation fieldbus	-	-	Option
	Modbus RTU	-	-	Option
	HART	-	-	Option



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.
- Motors easy to remove with sealed ball bearings fitted at front and rear.

> 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

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 (Except ST6 and ASM).

➤ Torque sensors

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

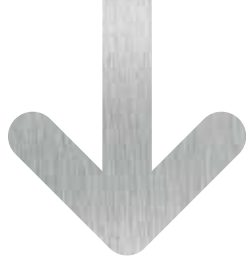


➤ Travel limit switches

- Thanks to BERNARD CONTROLS patented camblock system, the adjustment of travel limit switches is simply accomplished with a simple 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.



BC camblock system



Reliability

Enclosure adapted to field constraints

For ST & ASM 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

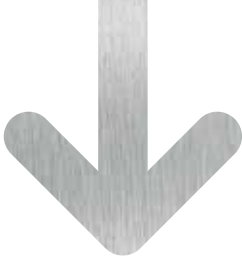
Two barriers fitted with O-rings insure an optimum protection against water ingress into the electronic compartment.

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

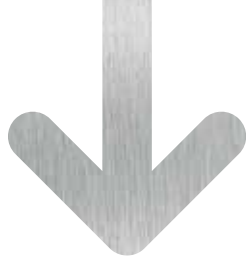
INTELLI+[®] accurate information

For ST & ASM 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.
 - › The position sensor is mechanically linked to the output shaft 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 are mechanically linked to the output shaft (ST 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:

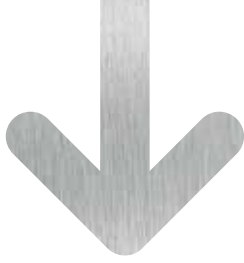
- > to use the INTELLI+® display,
- > to update remote signalling (valve position, alarms, ...)
- > to refresh fieldbus information

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 34). 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

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

> Alarms indication

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

> Partial Stroke Test (PST)

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

> Protection by password

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

> Timer

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

User-friendly controls








INTELLI+[®] intuitive interface

> Graphical display

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



> Display indications

- 5% Open** Valve position in % of opening
Torque 20% 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**  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.

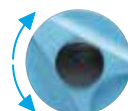
> Local commands

- 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

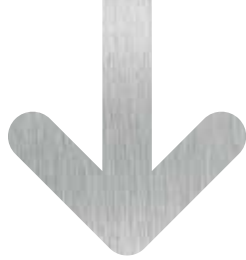
LANGUAGE: to change the language of the display (9 languages available)

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

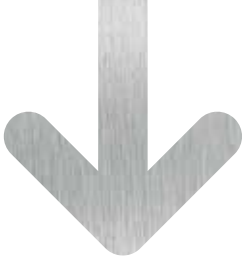
➤ Bluetooth communication (option)

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.



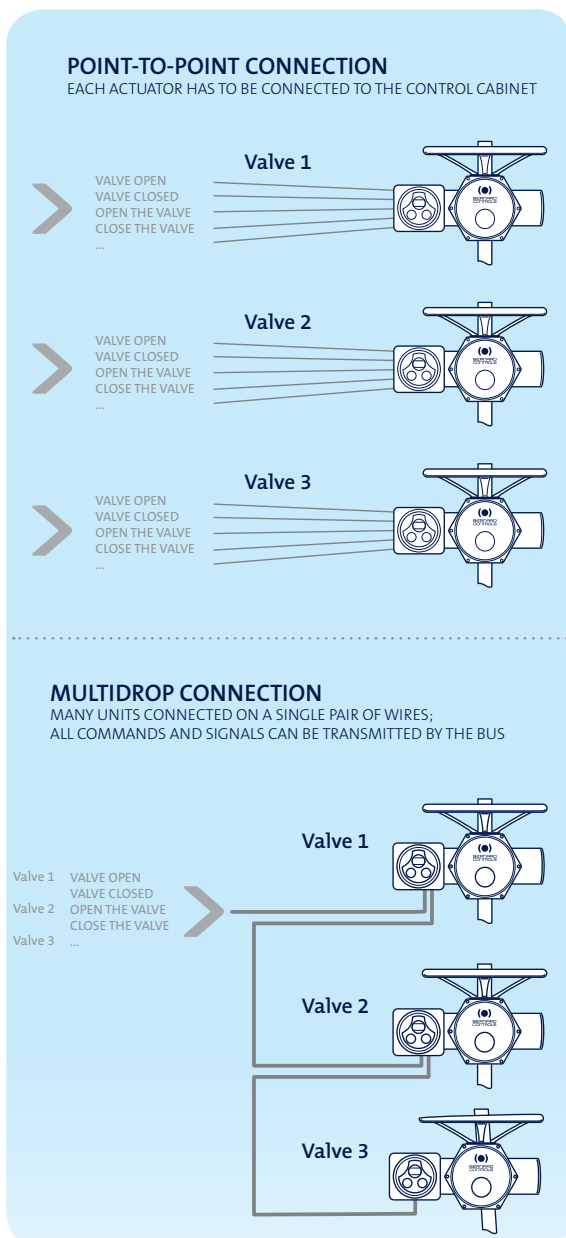
FOCUS ON Fieldbus communication

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 10km distance
- Fast response time. Standard scan time 1 to 3 s whatever the distance and number of actuators connected
- 1 to 3 lines starts
- Simple or redundant configurations
- Overall start up time reduced to the minimum



Product specifications

> ST SWITCH & INTEGRAL+/POSIGAM+ specifications

GENERAL	Description	ST actuators SWITCH version include motor with thermal protection, gear case, emergency handwheel, connection box, travel limit switches, torque switches and output drive. Wide range of number of turns: 2 to 1080 turns
	Torque range	ST6 = 60 Nm ST30 = 300 Nm ST14 = 140 Nm ST70 = 700 Nm ST175 = 1750 Nm ST220 = 2200Nm
	Type of service	Adapted to process requirements: <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Aluminium die casting Iron cast casing for ST175/ST220 Cover fastened by captive and stainless screws
	External Protection	<ul style="list-style-type: none"> Type : polyurethane coating in standard Protection: - Standard: C3 according to ISO 12944 - Option : highly corrosive conditions: C5M <ul style="list-style-type: none"> Color: RAL 5002 Blue Other possibilities on request
	Weatherproof	<ul style="list-style-type: none"> IP68 - 5m /72h
	Ambient temperature range ATEX and IEC Ex	<ul style="list-style-type: none"> Standard : -20 ... +70°C / -4 ... +158°F Low temp. option : -40 ... +70°C / -40 ... +158°F High temp. option : +0 ... +90°C / +32 ... +194°F (available only on SWITCH versions)
	Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (Contact our sales teams for higher vibration levels).
MOTOR	Motor technology	<ul style="list-style-type: none"> TENV design (Totally-enclosed, not ventilated) 3-phase or single-phase asynchronous motor, class F insulation with integral thermal overload protection. TENV DC motors with 2-wire connection available for some references
	Motor duty rating	<ul style="list-style-type: none"> On/Off operation (complying with EN15714-2 Class A) and Inching/Positioning (complying with EN15714-2 Class B): S4-30% motor duty rating. Up to 360 starts per hour at peak of operation. BC Modulating Class III (complying with EN15714-2 Class C) : S4-50% motor duty rating. Up to 1 200 starts per hour at peak of operation.
MECHANICAL SPECIFICATION	Gear design	<ul style="list-style-type: none"> Reduction by largely sized worm & wheel gear type The gears are mechanically self-locking
	Manual emergency operation	Handwheel which does not rotate during motor operation. <ul style="list-style-type: none"> Automatic switch between manual and electrical operation without clutch release lever (except ST6). Priority to electric drive. Manual control gear ratios: ST6:1:1, ST14/30:1/2, ST70:1/21, ST175/220: 1/31 Maximum rim force to apply conform to EN 12570
	Output flange	Actuator flanges comply with ISO 5210.
	Lubrication	The actuators are lubricated for the product lifetime and do not require any special maintenance.
ELECTRICAL SPECIFICATION	Power supply	Actuators can operate on a wide variety of power supplies: <ul style="list-style-type: none"> single-phase or 3-phase, DC, up to 690 V (depending on version), 50 or 60 Hz
	Terminal compartment	<ul style="list-style-type: none"> SWITCH : All control elements are directly connected to screw type terminals, size 4 mm² for controls and power supply, according to enclosed wiring diagram. INTEGRAL+ : Ring tongue terminals inside control box Internal and external earth ground rod.
	Fuse protection INTEGRAL+	INTEGRAL+ : 3 fuses : FU1 : transformer primary fuse 6,3 x 32mm - 0,5A - 500V; FU2 : transformer secondary fuse 5 x 20mm - 0,5A; FU3 : transformer tertiary fuse 5 x 20mm - 0,05A
	Conduit entries	SWITCH : <ul style="list-style-type: none"> 2 x M20 • 2 x M20 + 1 x M25 (as an option) INTEGRAL+ : <ul style="list-style-type: none"> 3 x M20 • 2 x M20 + 2 x M25 (as an option) or With INTEGRALBUS option 3 x M20 + 2 x M16 (or 4xM16 for bus redundant) ST175/ST220: <ul style="list-style-type: none"> 2 x 1" + 1 x 1"1/2 • + 2 x 3/4" for fieldbus (as an option) • (or 4x 3/4" for bus redundant)

POSITION & TORQUE SENSORS	Travel limit systems	<ul style="list-style-type: none"> • Limit switches actuated by adjustable camblock. • 4 SPDT switches as standard ; 250VAC-16A/ 48VDC-2.5A under resistive load
	Torque limiting system	<ul style="list-style-type: none"> • Torque: Direct measurement transmitted torque. • The torque limiting system is calibrated in factory to customer's choice. It remains adjustable. • 2 switches as standard (1 in opening and 1 in closing); SPDT ; 250VAC-16A/48VDC-2.5A under resistive load • Adjustable torque from 40 to 100% of max torque
CONTROLS	Control	INTEGRAL+: <ul style="list-style-type: none"> • Isolated by opto-couplers • Voltage: 10 to 250 V DC/AC • Current: 10 mA at 24V • Dry contacts (uses INTEGRAL+ auxiliary 24 VDC supply) • Minimum pulse duration: 100ms • Time of rotational direction's change: 50ms (default value) or 200ms
	Indication	A dial type window provides continuous position indication.
	Controls Location	INTEGRAL+: As standard, the INTEGRAL+ controls are integrated to the actuator. - as an option, controls can be mounted in a separated box. (Max distance between actuator and controls 50m).
	Double sealing protection	INTEGRAL+: Protection of the electronics: the control compartment of the actuator is fully isolated from the wiring compartment
	Power circuit	Motor reversing starters (electromechanical controls for On-Off Class A / Inching-Positioning Class B / Modulating Class III)
	Signal relay	INTEGRAL+: 4 relays: each information can be freely selected among a total of 10 available information <ul style="list-style-type: none"> • Contact configuration: normally open or normally closed • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30VDC (resistive load) Additional 3 relay boards as an option.
	Fault relay	INTEGRAL+: <ul style="list-style-type: none"> • SPDT latching relay, in fault position when not supplied. • Minimum current 10mA at 5V • Maximum current 5A at 250VAC or 5A at 30VDC (resistive load)
	Inching/Positioning & Modulating control (option)	POSIGAM+: Signal configurations (with integrated analogue output): <ul style="list-style-type: none"> • 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 Analogue Input: <ul style="list-style-type: none"> - in current: impedance of 260 Ohms - In voltage: impedance f 10 kOhms Analogue Output: <ul style="list-style-type: none"> - In current: maximum acceptable load of 350 Ohms, self-supply
	Transmitter (option)	SWITCH & INTEGRAL+ <ul style="list-style-type: none"> • «TAM» position transmitter: 4-20mA or 0-20mA • Power supply and maximum load acceptable: 12 V / 1500hms, 24 V / 750 Ohms, 32 V / 1050 Ohms • Isolated from Inching/positioning & Modulating control
SETTINGS	Settings	INTEGRAL+: Set with jumpers
	Local settings	Local/Off/Remote selector is padlockable
COMFORMITY TO EC DIRECTIVES	Compliance with EC Directives	ST actuators comply with: <ul style="list-style-type: none"> • directive 2004/108/EC Electromagnetic compatibility • directive 2006/95/EC Low voltage • the following harmonised standards: EN 61000-6-4: Generic emissions standard for industrial environments; EN 61000-6-2: Generic immunity standard for industrial environments; EN 60034-1: Rotating electrical machines; EN 60529: Degrees of protection provided by enclosures (IP ratings code)
FIELDBUS	Profibus DP (option)	Profibus DP (simple or redundant) <ul style="list-style-type: none"> • PROFIBUS-DP slave - RS 485 • Baud rate: 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 as an option
OPTIONS	Options Switch	<ul style="list-style-type: none"> • DPDT limit switches (250VAC-16A max / 48VDC- 4Amax) • Extra DPDT limit switches (250VAC-16A max / 48VDC-4Amax) • Single track potentiometer 1 kOhm (other values as an option). Max 0,3W
	Option Integral+/Posigam	<ul style="list-style-type: none"> • LED indication board (closed, open, power on) • Additional 3 signaling relays board • Timer board

> ST INTELLI+® specifications

GENERAL	Description	ST actuators offer a wide range of torques. INTELLI+® control offers many advanced solutions. An INTELLI+® controls with SIL2/SIL3 assessment is also available (see dedicated catalog for detailed specifications). Wide range of number of turns: 2 to 900 turns
	Torque range	ST6 = 60 Nm / ST30 = 300 Nm / ST14 = 140 Nm / ST70 = 700 Nm / ST175 = 1750 Nm / ST220 = 2200Nm
	Type of service	Adapted to process requirements: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Aluminium die casting • Iron cast casing for ST175/ST220 • Cover fastened by captive and stainless screws
	External Protection	<ul style="list-style-type: none"> • Type : polyurethane coating Protection: - Standard: C3 according to ISO 12944 - Option : highly corrosive conditions: C5M • Color: RAL 5002 Blue Other possibilities on request
	Weatherproof	• IP68 - 5m / 72h
	Ambient temperature range ATEX and IEC Ex	<ul style="list-style-type: none"> • Standard : -20 ... +70°C / -4 ... +158°F • Low temp. option : -40 ... +70°C / -40 ... +158°F
	Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (2g for INTELLI+® with SIL) (Contact our sales teams for higher vibration levels).
MOTOR	Motor technology	<ul style="list-style-type: none"> • TENV design (Totally-enclosed, not ventilated) 3-phase or single-phase asynchronous motor, class F insulation with integral thermal overload protection. • TENV DC motors with 2-wire connection available for some references
	Motor duty rating	<ul style="list-style-type: none"> • On/Off operation (complying with EN15714-2 Class A) and Inching/Positioning (complying with EN15714-2 Class B): S4-30% motor duty rating. Up to 360 starts per hour at peak of operation. • BC Modulating Class III (complying with EN15714- 2 Class C) : S4-50% motor duty rating. Up to 1 200 starts per hour at peak of operation.
MECHANICAL SPECIFICATION	Gear design	<ul style="list-style-type: none"> • Reduction by largely sized worm & wheel gear type • The gears are mechanically self-locking
	Manual emergency operation	<ul style="list-style-type: none"> Handwheel which does not rotate during motor operation. • Automatic switch between manual and electrical operation without clutch release lever (except ST6). Priority to electric drive. • Manual control gear ratios: ST6:1:1, ST14/30:1/2, ST70:1/21, ST175/220: 1/31 • Maximum rim force to apply conform to EN 12570
	Output flange	Actuator flanges comply with ISO 5210.
	Lubrication	The actuators are lubricated for the product lifetime and do not require any special maintenance.
ELECTRICAL SPECIFICATION	Power supply	<ul style="list-style-type: none"> Actuators can operate on a wide variety of power supplies: • single-phase or 3-phase, DC, • up to 690 V (depending on version), • 50 or 60 Hz
	Terminal compartment	<ul style="list-style-type: none"> • Ring tongue terminals • Internal and external ground rod
	Fuse protection	Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer board. 2 automatic fuses for low internal voltages.
	Conduit entries	<ul style="list-style-type: none"> • Cable glands supplied as an option • 3xM20 in standard • + 2xM16 for fieldbus (as an option) • (or 4xM16 for bus redundant)

POSITION & TORQUE SENSORS	Travel limit systems	<ul style="list-style-type: none"> • Position: movement reading on output shaft. • Position sensor : Absolute encoder
	Torque limiting system	<ul style="list-style-type: none"> • Torque: Direct measurement transmitted torque. • The torque limiting system is calibrated in factory to customer's choice. It remains adjustable via INTELLI+® (non intrusive setting)
CONTROLS	Control	Command by: <ul style="list-style-type: none"> • 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)
	Visual position indication	A LCD screen dial type window provides continuous position indication even in the event of power supply loss using 24VDC back-up supply or optional battery.
	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	Motor reversing starters (electromechanical controls for On-Off Class A / Inching-Positioning Class B / Modulating Class III)
	Auxiliary power supply	24VDC in standard. 48VDC as an option.
	Signal relay	4 relays: each information can be freely selected among a total of 23 available information <ul style="list-style-type: none"> • Contact configuration: normally open or normally closed • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30VDC (resistive load) Additional 3 relay boards as an option.
	Default relay	<ul style="list-style-type: none"> • SPDT monostable relay, in fault position when not supplied. • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30V DC (inductive load)
	Inching/Positioning & Modulating control (option)	Input (setpoint) and output (feedback) signals are fully isolated from each other Signal configurations (selectable): <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • in current: impedance of 160 Ohms • in voltage: impedance of 11 KOhms Analogue outputs: <ul style="list-style-type: none"> • 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 Analogue outputs: <ul style="list-style-type: none"> • 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)
	Signaling continuity (option)	Allows to use the display and update the open and closed position information (through the signaling relays or via fieldbus or via Transmitter option) in case of lack of power supply
SETTINGS	Settings	Non-Intrusive. All actuator settings and parameters are stored in a non-volatile EEPROM memory. Protection by password. Adjustable via Local control; Infrared link or Bluetooth (as an option; to keep an high level of security, Bluetooth range is limited to 10m).
	Local settings	The INTELLI+® can be fully set via its local display and selectors. Does not require any specific setting tool. Local / Off / Remote selector is padlockable
	INTELLIKIT (option)	<ul style="list-style-type: none"> • 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.)
	INTELLI POCKET (option)	<ul style="list-style-type: none"> • Protection: IP65 (option: ATEX II2G EEx ia IICT4) • Shock resistance: 1.2 m on concrete • Communication: with INTELLI+®: infrared link (40 cm maximum distance) or bluetooth (up to 10m) / with PC: bluetooth, iRDA, Wifi (802.11b) as a standard • Optional USB station • Operating system : Windows Mobile 2005 • 64Mb RAM + 256Mb storage card

> ST INTELLI+® specifications

COMFORMITY TO EC DIRECTIVES	Compliance with EC Directives	<p>ST actuators comply with:</p> <ul style="list-style-type: none"> • directive 2004/108/EC Electromagnetic compatibility • directive 2006/95/EC Low voltage • the following harmonised standards: EN 61000-6-4: Generic emissions standard for industrial environments; EN 61000-6-2: Generic immunity standard for industrial environments; EN 60034-1: Rotating electrical machines; EN 60529: Degrees of protection provided by enclosures (IP ratings code)
FIELDBUS	Profibus DPV1 (option)	<ul style="list-style-type: none"> • PROFIBUS-DPV1 - RS 485 • Baud rate: 9.6 kbit/s up to 1.5 Mbit/s (autodetection) • Communication protocol: PROFIBUS DPV1 slave-cyclic & acyclic • Type of connection: single line (standard) or redundant line (option) • Cable specification: Profibus certified cable only • Line connection without repeater <ul style="list-style-type: none"> - Actuators per line: 31 max. - Line length: 1.2 km max. (0.75 mi) • Line connection with repeaters <ul style="list-style-type: none"> - 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+®. 24VCC emergency power supply to refresh Open/Close position information in case of loss of electric supply • Technical approval: operability approved by PNO (Profibus Nutzer Organisation)
	Modbus (option)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> - 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 (option)	<ul style="list-style-type: none"> • 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
OPTION	Option INTELLI+®	<ul style="list-style-type: none"> • Heating resistance (6W max) • Position feed-back (current loop) • Torque feed-back (current loop) • Fieldbus interface • Signaling continuity • 3 additional signaling relays

➤ ASM SWITCH & INTEGRAL+/POSIGAM+ specifications

GENERAL	Description	The ASM range is mainly designed to work in combination with gearboxes. Wide range of number of turns: 2 to 270 turns
	Torque range	ASM-6: 60Nm, ASM10: 100Nm, ASM16: 160Nm, ASM20: 200Nm
	Type of service	Adapted to process requirements: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Aluminium die casting • Cover fastened by captive and stainless screws
	External Protection	<ul style="list-style-type: none"> • Type : polyurethane coating Protection: - Standard: C3 according to ISO 12944 - Option : highly corrosive conditions: C5M • Color: RAL 5002 Blue Other possibilities on request
	Weatherproof	<ul style="list-style-type: none"> • IP67 in standard • IP68 (5m/72h) as an option
	Ambient temperature range ATEX and IEC Ex	<ul style="list-style-type: none"> • Standard : -20 ... +70°C / -4 ... +158°F • Low temp. option : -40 ... +70°C / -40 ... +158°F • High temp. option : +0 ... +90°C / +32 ... +194°F (available only on SWITCH versions)
	Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (Contact our sales teams for higher vibration levels).
MOTOR	Motor technology	<ul style="list-style-type: none"> • TENV design (Totally-enclosed, not ventilated) 3-phase or single-phase asynchronous motor, class F insulation with integral thermal overload protection. • TENV DC motors with 2-wire connection available for some references
	Motor duty rating	<ul style="list-style-type: none"> • On/Off operation (complying with EN15714-2 Class A) and Inching/Positioning (complying with EN15714-2 Class B): S4-30% motor duty rating. Up to 360 starts per hour at peak of operation. • BC Modulating Class III (complying with EN15714- 2 Class C) : S4-50% motor duty rating. Up to 1 200 starts per hour at peak of operation.
MECHANICAL SPECIFICATION	Gear design	<ul style="list-style-type: none"> • Two reduction stages : <ul style="list-style-type: none"> - Planetary system with high speed reduction and excellent efficiency - Worm & wheel gear type • One additional planetary system on ASM16/ASM20 • The gears are mechanically self-locking when associated with worm and wheel gearboxes. • Self-locking system as an option for other mechanical devices.
	Manual emergency operation	Actuators are fitted with a handwheel for manual emergency operation. Decutch system with motor priority <ul style="list-style-type: none"> • Manual control gear ratios: ASM6-ASM10: 1:1, ASM16-ASM20 : 1:3 • Force to apply conform to EN 12570 standard
	Output flange	Actuator flanges comply with ISO 5210. ASM16/20 available only in B3 or B4 form.
	Lubrication	The actuators are lubricated for the product lifetime and do not require any special maintenance.
ELECTRICAL SPECIFICATION	Power supply	Actuators can operate on a wide variety of power supplies: <ul style="list-style-type: none"> • single-phase or 3-phase, DC, • up to 690 V (depending on version), • 50 or 60 Hz
	Terminal compartment	<ul style="list-style-type: none"> • SWITCH : All control elements are directly connected to screw type terminals according to enclosed wiring diagram. • INTEGRAL+ : Ring tongue terminals inside control box • Internal and external earth ground rod.
	Fuse protection	INTEGRAL+ : 3 fuses : FU1 : transformer primary fuse 6,3 x 32mm - 0,5A - 500V FU2 : transformer secondary fuse 5 x 20mm - 0,5A FU3 : transformer tertiary fuse 5 x 20mm - 0,05A
	Entrées de câbles Conduit entries	SWITCH : <ul style="list-style-type: none"> • 2 x M20 • 2 x M20 + 1 x M25 (as an option) INTEGRAL+ : <ul style="list-style-type: none"> • 3 x M20 • 2 x M20 + 2 x M25 (as an option) or With INTEGRALBUS option • 3 x M20 + 2 x M16 (or 4xM16 for bus redundant)

POSITION & TORQUE SENSORS	Travel limit systems	<ul style="list-style-type: none"> • Limit switches actuated by adjustable camblock. • 4 SPDT switches as standard (2 in opening and 2 in closing direction); 250VAC-16A/ 48VDC-2.5A under resistive load
	Torque limiting system	<ul style="list-style-type: none"> • Torque: dynamometer measurement transmitted torque (over 150Nm) • The torque limit switches give a short duration signal • The torque limiting system is calibrated at the factory to the torque setting selected by the customer. • 2 contacts as standard (1 in opening and 1 in closing); SPDT ; 250VAC-16Amax (resistive load) • Adjustable torque from 40 to 100% of max torque
CONTROL	Control	INTEGRAL+: <ul style="list-style-type: none"> • Isolated by opto-couplers • Voltage: 10 to 250 V DC/AC • Current: 10 mA at 24V • Dry contacts (uses INTEGRAL+ auxiliary 24 VDC supply) • Minimum pulse duration: 100ms • Time of rotational direction's change: 50ms (default value) or 200ms
	Visual position indication	A dial type window provides continuous position indication.
	Controls Location	INTEGRAL+: As standard, the INTEGRAL+ controls are integrated to the actuator. - as an option, controls can be mounted in a separated box. (Max distance between actuator and controls 50m).
	Double sealing protection	INTEGRAL+: Protection of the electronics: the control compartment of the actuator is fully isolated from the wiring compartment
	Power circuit	Motor reversing starters (electromechanical controls for On-Off Class A / Inching-Positioning Class B /Modulating Class III)
	Signal relay	INTEGRAL+: 4 relays: each information can be freely selected among a total of 16 available information <ul style="list-style-type: none"> • Contact configuration: normally open or normally closed • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30VDC (resistive load) Additional 3 relay boards as an option.
	Fault relay	INTEGRAL+: <ul style="list-style-type: none"> • SPDT monostable relay, in fault position when not supplied. • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30V DC (resistive load)
	Inching/Positioning & Modulating control (option)	POSIGAM+: Signal configurations (with integrated analogue output): <ul style="list-style-type: none"> • 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 Analogue Input: <ul style="list-style-type: none"> - in current: impedance of 260 Ohms - In voltage: impedance f 10 kOhms Analogue Output: <ul style="list-style-type: none"> - In current: maximum acceptable load of 3500hm, self-supply
Transmitter (option)	SWITCH & INTEGRAL+: <ul style="list-style-type: none"> • «TAM» position transmitter: 4-20mA or 0-20mA • Power supply and maximum load acceptable: 12 V / 1500hms, 24 V / 750 Ohms, 32 V / 1050 Ohms • Isolated from Inching/positioning & Modulating control 	
SET TINGS	Settings	INTEGRAL+: Set with jumpers
COMFORMITY TO EC DIRECTIVES	Compliance with EC Directives	ASM actuators comply with: <ul style="list-style-type: none"> • directive 2004/108/EC Electromagnetic compatibility • directive 2006/95/EC Low voltage • the following harmonised standards: EN 61000-6-4: Generic emissions standard for industrial environments; EN 61000-6-2: Generic immunity standard for industrial environments; EN 60034-1: Rotating electrical machines; EN 60529: Degrees of protection provided by enclosures (IP ratings code)
FIELDBUS	Profibus DP (option)	Profibus DP (simple or redundant) <ul style="list-style-type: none"> • 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 as an option
OPTIONS	Options Switch	<ul style="list-style-type: none"> • DPDT limit switches (250VAC-16A max / 48VDC- 4Amax) • Extra DPDT limit switches (250VAC-16A max / 48VDC-4Amax) • Single track potentiometer 1 kOhm (other values as an option). Max 0,3W
	Option Integral+/ Posigam	<ul style="list-style-type: none"> • LED indication board (closed, open, power on) • Additional 3 signaling relays board • Timer board

➤ ASM INTELLI+[®] specifications

General	Description	The ASM range is mainly designed to work in combination with gearboxes. ASM actuators offer a wide range of torques. INTELLI+ [®] control offers many advanced solutions. An INTELLI+ [®] controls with SIL2/SIL3 assessment is also available (see dedicated catalog for detailed specifications). Wide range of number of turns: 2 to 480 turns for ASM-6/ASM10 and 2 to 270 turns for ASM16/ASM20
	Torque range	ASM-6: 60Nm, ASM10: 100Nm, ASM16: 160Nm, ASM20: 200Nm
	Type of service	Adapted to process requirements: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Aluminium die casting • Cover fastened by captive and stainless screws
	External Protection	<ul style="list-style-type: none"> • Type : polyurethane coating Protection: - Standard: C3 according to ISO 12944 - Option : highly corrosive conditions: C5M • Color: RAL 5002 Blue • Other possibilities on request
	Weatherproof	<ul style="list-style-type: none"> • IP67 in standard • IP68 (5m/72h) as an option
	Ambient temperature range ATEX and IEC Ex	<ul style="list-style-type: none"> • Standard : -20 ... +70°C / -4 ... +158°F • Low temp. option : -40 ... +70°C / -40 ... +158°F
	Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (2g for INTELLI+ [®] with SIL) (Contact our sales teams for higher vibration levels).
MOTOR	Motor technology	<ul style="list-style-type: none"> • TENV design (Totally-enclosed, not ventilated) 3-phase or single-phase asynchronous motor, class F insulation with integral thermal overload protection. • TENV DC motors with 2-wire connection available for some references
	Motor duty rating	<ul style="list-style-type: none"> • On/Off operation (complying with EN15714-2 Class A) and Inching/Positioning (complying with EN15714-2 Class B): S4-30% motor duty rating. Up to 360 starts per hour at peak of operation. • BC Modulating Class III (complying with EN15714-2 Class C) : S4-50% motor duty rating. Up to 1 200 starts per hour at peak of operation.
MECHANICAL SPECIFICATION	Gear design	<ul style="list-style-type: none"> • Two reduction stages : <ul style="list-style-type: none"> - Planetary system with high speed reduction and excellent efficiency - Worm & wheel gear type • One additional planetary system on ASM16/ASM20 • The gears are mechanically self-locking when associated with worm and wheel gearboxes. • Self-locking system as an option for other mechanical devices.
	Manual emergency operation	Actuators are fitted with a handwheel for manual emergency operation. Decutch system with motor priority <ul style="list-style-type: none"> • Manual control gear ratios: ASM6-ASM10: 1:1, ASM16-ASM20 : 1:3 • Force to apply conform to EN 12570 standard
	Output flange	Actuator flanges comply with ISO 5210. ASM16/20 available only in B3 or B4 forms.
	Lubrication	The actuators are lubricated for the product lifetime and do not require any special maintenance.
ELECTRICAL SPECIFICATION	Power supply	Actuators can operate on a wide variety of power supplies: <ul style="list-style-type: none"> • single-phase or 3-phase, DC, • up to 690 V (depending on version), • 50 or 60 Hz
	Terminal compartment	<ul style="list-style-type: none"> • Ring tongue terminals • Internal ground rod
	Fuse protection	Primary fuse (6.3 x 32mm - 0.5 A) located on the transformer board. 2 automatic fuses for low internal voltages.
	Conduit entries	<ul style="list-style-type: none"> • Cable glands supplied as an option • 3xM20 in standard • + 2xM16 for fieldbus (as an option) • (or 4xM16 for bus redundant)

➤ ASM INTELLI+® specifications

POSITION & TORQUE SENSOR	Travel limit systems	<ul style="list-style-type: none"> • Position: movement reading on output shaft. • Position sensor : Absolute encoder
	Torque limiting system	<ul style="list-style-type: none"> • Torque: dynamometer measuring transmitted torque . • The torque limiting system is calibrated in factory to customer's choice. It remains adjustable via INTELLI+® (non intrusive setting)
CONTROL	Control	Command by: <ul style="list-style-type: none"> • 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)
	Visual position indication	A LCD screen dial type window provides continuous position indication even in the event of power supply loss using 24VDC back-up supply or optional battery.
	Controls Location	As standard, the INTELLI+® control is integrated to the actuator. As an 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	Motor reversing starters (electromechanical controls for On-Off Class A / Inching-Positioning Class B / Modulating Class C)
	Auxiliary power supply	24VDC in standard. 48VDC as an option.
	Signal relay	4 relays: each information can be freely selected among a total of 23 available information <ul style="list-style-type: none"> • Contact configuration: normally open or normally closed • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30VDC (resistive load) Additional 3 relay boards as an option.
	Default relay	<ul style="list-style-type: none"> • SPDT monostable relay, in fault position when not supplied. • Minimum current 10mA at 5V • Maximum current 5A at 250V AC or 5A at 30V DC (inductive load)
	Inching/Positioning & Modulating control (option)	Input (setpoint) and output (feedback) signals are fully isolated from each other Signal configurations (selectable): <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • in current: impedance of 160 Ohms • in voltage: impedance of 11 KOhms Analogue outputs: <ul style="list-style-type: none"> • 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 Analogue outputs: <ul style="list-style-type: none"> • 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)
Signaling continuity (option)	Allows to use the display and update the open and closed position information (through the signaling relays or via fieldbus or via Transmitter option) in case of lack of power supply	
SETTINGS	Settings	Non-Intrusive. All actuator settings and parameters are stored in a non-volatile EEPROM memory. Protection by password. Adjustable via Local control; Infrared link or Bluetooth (as an option; to keep an high level of security, Bluetooth range is limited to 10m).
	Local settings	The INTELLI+® can be fully set via its local display and selectors Does not require any specific setting tool Local / Remote selector is padlockable
	INTELLIKIT (option)	<ul style="list-style-type: none"> • 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.)
	INTELLI POCKET (option)	<ul style="list-style-type: none"> • Protection: IP65 (option: ATEX II2G EEx ia IICT4) • Shock resistance: 1.2 m on concrete • Communication: with INTELLI+®: infrared link (40 cm maximum distance) or bluetooth (up to 10m) / with PC: bluetooth, IRDA, Wifi (802.11b) as a standard • Optional USB station • Operating system : Windows Mobile 2005 • 64Mb RAM + 256Mb storage card

COMFORMITY TO EC DIRECTIVES	Compliance with EC Directives	<p>ASM actuators comply with:</p> <ul style="list-style-type: none"> • directive 2004/108/EC Electromagnetic compatibility • directive 2006/95/EC Low voltage • the following harmonised standards: EN 61000-6-4: Generic emissions standard for industrial environments; EN 61000-6-2: Generic immunity standard for industrial environments; EN 60034-1: Rotating electrical machines; EN 60529: Degrees of protection provided by enclosures (IP ratings code)
FIELDBUS	Profibus DPV1 (option)	<ul style="list-style-type: none"> • PROFIBUS-DPV1 - RS 485 • Baud rate: 9.6 kbit/s up to 1.5 Mbit/s (autodetection) • Communication protocol: PROFIBUS DPV1 slave-cyclic & acyclic • Type of connection: single line (standard) or redundant line (option) • Cable specification: Profibus certified cable only • Line connection without repeater <ul style="list-style-type: none"> - Actuators per line: 31 max. - Line length: 1.2 km max. (0.75 mi) • Line connection with repeaters <ul style="list-style-type: none"> - 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+®. 24VCC emergency power supply to refresh Open/Close position information in case of loss of electric supply • Technical approval: operability approved by PNO (Profibus Nutzer Organisation)
	Modbus (option)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> - 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 (option)	<ul style="list-style-type: none"> • 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
OPTIONS	Option INTELLI+®	<ul style="list-style-type: none"> • Heating resistance (6W max) • Position feed-back (current loop) • Torque feed-back (current loop) • Fieldbus interface • Signaling continuity • 3 additional signaling relays

Mounting flange specifications

	Flange	Max. stem diameter (mm)			
		Type A (max)	Type B1 (max)	Type B3	Type C (max)
ST6	F10	30	42	20	32
ST14	F10	38	42	20	40
ST30	F14	42	60	30	45
ST70	F16	54	80	40	56
ST175	F25	85	100	50	90
ST220	F30	90	120	60	90
ASM6	F10	30	42	20	32
ASM10	F10	30	42	20	32
ASM16	F14	∅/A	∅/A	30	∅/A
ASM20	F14	∅/A	∅/A	30	∅/A

Type A
STEM NUT



Thrust accepted

Type B1
LARGE DIA.



Thrust not accepted

Type B3
SMALL DIA.



Thrust not accepted

Type C
CLAW COUPLING



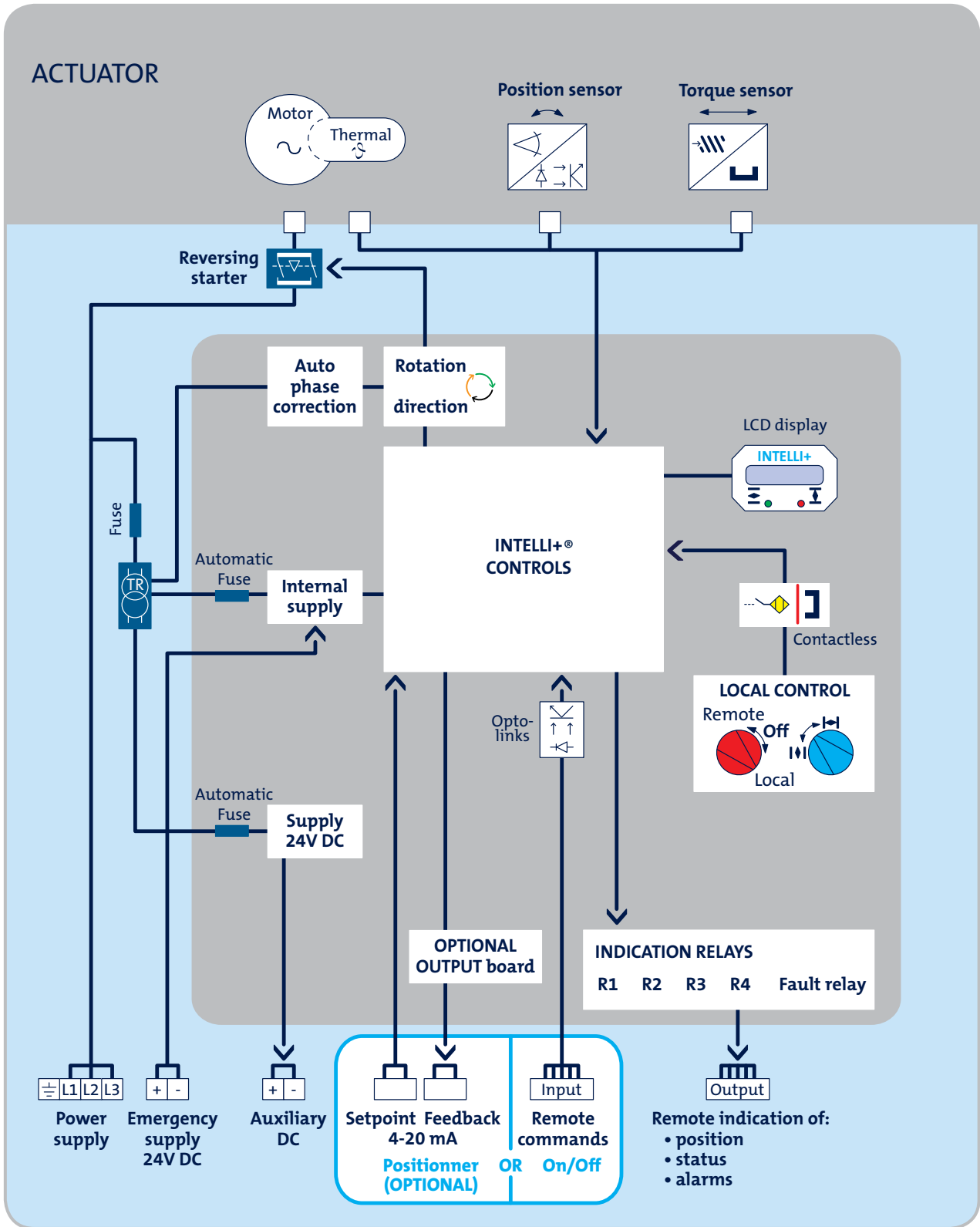
Thrust not accepted



ISO 5210 requirements

Flange	Max torque	Max. thrust with stem nut	Mounting bolts
F10	100 N.m	40 000 N	4 x M10 / d=102 mm
F14	400 N.m	100 000 N	4 x M16 / d=140 mm
F16	700 N.m	150 000 N	4 x M20 / d=165 mm
F25	1200 N.m	200 000 N	8 x M16 / d=254 mm
F30	2500 N.m	325 000 N	8 x M20 / d=298 mm

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		<ul style="list-style-type: none"> • Tag number (8 digits) • Actuator serial number (unchangeable) • Manufacturing date (unchangeable) • Password (000) 	<ul style="list-style-type: none"> • Password (3 digits)
SET UP	<p>Close direction</p> <p>Closing mode</p> <p>Setting of torque limit system</p> <p>Closing torque</p> <p>Opening torque setting</p> <p>Only if closing the valve on torque</p> <p>Valve seat torque</p> <p>Torque to unseat the valve</p>	<ul style="list-style-type: none"> • Clockwise • On position • 100% • 100% • 100% • 100% 	<ul style="list-style-type: none"> • Counter-clockwise • On torque • Other values between 40 and 100% • Other values between 40 and 100% • Other values between 40 and 100% • Other values between 40 and 100% or without any limitation
COMMANDS	<p>Auxiliary remote commands (2 chosen from 10)</p> <p>Fault tolerance degradation (ESD)</p> <p>Auxiliary command activated by a contact</p>	<ul style="list-style-type: none"> • Local command inhibit but local stop available (auxiliary command 1) • In emergency closing (ESD) (auxiliary command 2) • None • Normally open 	<ul style="list-style-type: none"> • 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 • No thermal overload (weatherproof versions only) • Full torque (100%) • Normally closed
LOCAL COMMANDS	<p>Blue selector operating mode</p> <p>Stop local, while remote command</p>	<ul style="list-style-type: none"> • By pulse (a pulse is enough to achieve an opening or closing command) • Authorized 	<ul style="list-style-type: none"> • 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) • Inhibited
OPENING/CLOSING PRIORITY		<ul style="list-style-type: none"> • None 	<ul style="list-style-type: none"> • Open priority • Close priority • Open and close priority
FAULT RELAY	<p>Faults reported on fault relay</p>	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> Valve open (for R1 and R3) Valve closed (for R2 and R4) 	<ul style="list-style-type: none"> 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 Normally closed
	Each contact can be:	<ul style="list-style-type: none"> Normally open (when something occurs, contact is closed) 	
FIELDBUS (option)	In case of communication loss	<ul style="list-style-type: none"> Remain in position 	<ul style="list-style-type: none"> Go to closed position Go to open position
ANALOG POSITION FEEDBACK BOARD (option)	Position remote indication	<ul style="list-style-type: none"> 4-20mA 	<ul style="list-style-type: none"> 0-20mA and 0-10V* 4-12 mA 12-20 mA
	Torque remote indication	<ul style="list-style-type: none"> 4-20mA 	
	Signal variation direction	<ul style="list-style-type: none"> Signal increases in the open direction 	<ul style="list-style-type: none"> Signal decreases in the open direction
ANALOGUE CONTROL: POSITIONER (option)	Auxiliary command 1	<ul style="list-style-type: none"> Switch: automatic control (proportional command) / On-Off (standard Open / Close command) 	
	Type of signal	<ul style="list-style-type: none"> 4-20mA 	<ul style="list-style-type: none"> 0-20mA and 0-10V 4-12mA 12-20mA
	Signal direction	<ul style="list-style-type: none"> Signal increases in the open direction 	<ul style="list-style-type: none"> Signal decreases in the open direction
	Dead band setting	<ul style="list-style-type: none"> 1% 	<ul style="list-style-type: none"> Other value between 0.2 and 5%
	In case of 4-20mA signal loss	<ul style="list-style-type: none"> Remain in position 	<ul style="list-style-type: none"> Go to fully closed position Go to fully open position

* Voltage signal with an external resistance

BERNARD CONTROLS GROUP

CORPORATE HEADQUARTERS

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

CONTACT BY OPERATING AREAS

> AMERICAS

NORTH AMERICA

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

SOUTH AMERICA

BERNARD CONTROLS LATIN AMERICA
inquiry.southamerica@bernardcontrols.com
Tel. +1 281 578 66 66

> ASIA

CHINA

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

KOREA

BERNARD CONTROLS KOREA
SEOUL
inquiry.korea@bernardcontrols.com
Tel. +82 2 553 6957

SINGAPORE

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

> EUROPE

BELGIUM

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

FRANCE

BERNARD CONTROLS FRANCE &
BERNARD CONTROLS NUCLEAR FRANCE
GONESSE (PARIS)
inquiry.france@bernardcontrols.com
Tel. +33 (0)1 34 07 71 00

GERMANY

BERNARD CONTROLS DEUFRA
TROI SDORF (KÖLN)
inquiry.germany@bernardcontrols.com
Tel. +49 2241 9834 0

ITALY

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

RUSSIA

BERNARD CONTROLS RUSSIA
inquiry.russia@bernardcontrols.com
Tel. +33 (0)1 34 07 71 00

SPAIN

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

> INDIA, MIDDLE EAST & AFRICA

AFRICA

BERNARD CONTROLS AFRICA
ABIDJAN - IVORY COAST
inquiry.africa@bernardcontrols.com
Tel. + 225 21 34 07 82

INDIA

BERNARD CONTROLS INDIA
inquiry.india@bernardcontrols.com
Tel. +971 4 880 0660

MIDDLE-EAST

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

