



MULTI-TURN ELECTRIC ACTUATORS



ST RANGE

B BERNARD

Contents

L. Bernard has drawn on fifty years of experience to design the new ST Range. These products offer customers the best combination of:

- reliability of all actuator components
- flexibility of user-oriented programmable electronic controls
- advanced interactive communication capabilities offered by fieldbus technology

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L. BERNARD,

the electric actuator specialist

With several decades of experience in actuator technology and unrivalled knowledge in the use of these systems in industry, L. Bernard is ideally placed to offer comprehensive solutions for valve automation applications.

Innovation & international presence

L. Bernard is an international company which specializes in the design and manufacture of electric actuators and employs an innovative development program to bring constant improvement to its product range.

The company's actuators incorporate the latest design concepts and specifications to ensure that they are both easy to use and meet the most demanding industrial standards and environmental requirements.

Over forty subsidiaries, offices and agencies help our customers with the design, installation, commissioning and maintenance of their systems.

Our flexible approach and efficient service allow us to develop and maintain a relationship of trust with our customers.

Certification

L. Bernard appreciates the importance on Quality at all stages of the production process, and has put in place and maintains a Quality Management System in accordance with ISO 9001-2000 (certification no.: QUAL/1997/8657b).

The quality of Bernard products has been approved and recognized by a number of international certifying bodies, including ABS, CSA, NEMA, ATEX, IEEE, LCIE, Germanischer Lloyd, GOST Russia, INERIS and others.



Services

Our certified technical centres ensure that quality technical support is on hand for all of our customers.

Installation and commissioning

The process of commissioning electric actuators calls for special expertise, particularly in cases where the motorized valve is controlled by a complex system like a fieldbus.

Our specialists can therefore provide assistance to our customers in the following operations:

- fitting the actuator to the valve
- installation
- set-up
- commissioning

Maintenance and repairs

Our technicians can visit your site at any time to:

- conduct periodic checks on the operation of actuators
- perform preventive maintenance
- troubleshoot problems and carry out repairs

Training

We arrange training sessions for our customers on a regular basis. The sessions can either be held at our head office in France or on site.

Subjects which are most in demand include actuator technology, settings, operation and maintenance.

Overview of ST range

ST actuators are designed to operate valves in ON/OFF service or in modulating Class III operation.

Trouble-free operation

- Gearing is self-locking at all speeds
- Continuous gear drive between motor and valve
- Thermal cut-out on motor
- Unaffected by vibration on main mechanical parts
- Requires no preventive maintenance. Gearing has life-long lubrication

Innovative sensors

- Direct torque and position measurement is on the output shaft making it unnecessary to process signals
- Position measurement using movement reading with direct mechanical link on the output shaft
- Torque measured by a dynamometer with calibrated springs are on the actuator output. The control system receives data on the actual torque transmitted to the valve instantly. The exceptionally short response time means that the system can be shut down rapidly, and the overtorque effect applied to the valve is reduced



- Easy adjustment for all control systems: program with INTELLI+ or simple cam adjustment (travel limit devices) and torque limiter using only a screwdriver on other versions
- With INTELLI+ control systems, absolute sensors are used to measure both position and torque data. This means that there is no possibility of the position being lost even if a power failure occurs. There is therefore no need to include a backup battery.

Power to spare

- Asynchronous motor with high starting torque
- Excellent starting torque / nominal torque ratio
- On/Off operation: 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



Handwheel without clutch release

- Patented manual override system
- Differential geardrive allows the handwheel to be operated without releasing a clutch beforehand (except for very low torque values on model ST6)
- The handwheel can therefore be operated under all conditions, even when the valve is blocked by the torque limiter

Weatherproof version with integral control system

- Watertight to IP68 & NEMA 6P: housings withstand pressure of 5 metres WC for 72 hours
- Controls available: INTEGRAL+ or INTELLI+ (see following pages for further details)
- Integrated SPDT switches and control logic
- Non-intrusive local control selector knobs
- Electronic components protected against water ingress: double-seal with two O-ring barriers between the electrical terminal compartment and the electronic components. The control knob spindles do not penetrate the enclosure.



ST actuator with INTEGRAL+ control

Explosion-proof version with INTELLI+

- Our actuators are certified for use in explosive atmospheres to ATEX, NEMA 7, IEC-EX, GGTN and other standards
- Multilingual graphical digital display unit
- Non-intrusive commissioning and adjustment without need to use special tools or open the actuator housing
- The actuator position and torque settings are logged and stored in the control unit's non-volatile memory to provide total immunity from power outages without the need for a backup battery
- The actuator's torque limit can be programmed for a particular operating range. The actual torque value transmitted to the valve is then monitored by continuous proportional measurement
- The valve torque curve can be displayed during opening and closing operations
- Longer operating times can be programmed to prevent hammerblow effect in the pipes
- Self-diagnostics and alarm display
- Actuator operations logged (number of starts, operating time and action during previous 12 hours)



Explosion-proof ST actuator with INTELLI+ control

- Compatibility with field bus system limits cabling costs and gives full access to all of the data & functions available in the INTELLI+
- Software for use on a laptop or pocket computer (option) for an even more user-friendly actuator and valve commissioning plus diagnostics

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. The BERNARD range of control systems lets you choose the solution which best suits your needs.

Standard version

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

INTEGRAL+ control

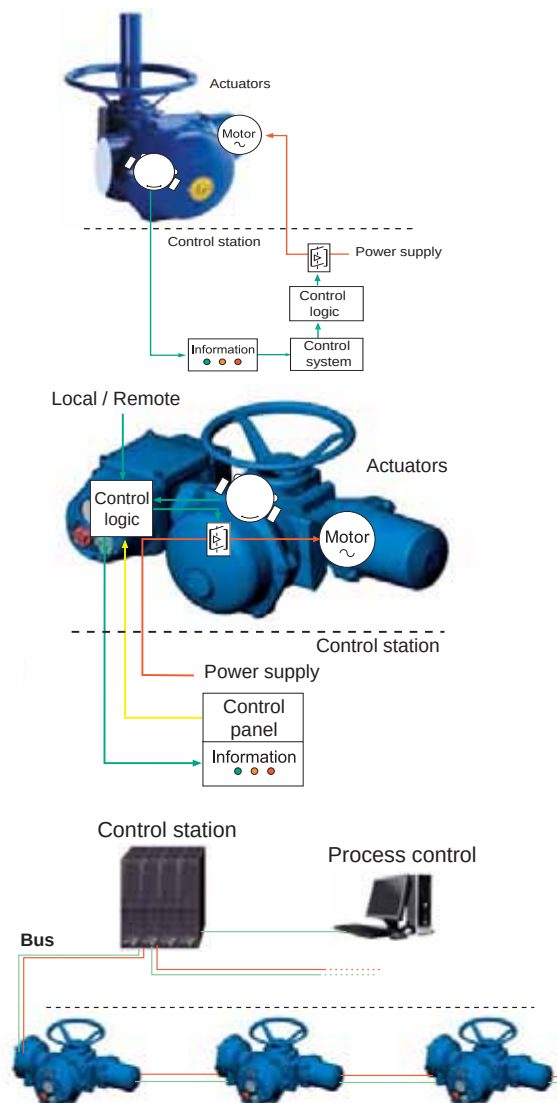
The INTEGRAL+ control system is fully configurable and can perform all actuator control functions, including production of status reports, fault handling, protection systems and command processing. Local controls can be disabled either locally or from a remote location. The reversing starters are incorporated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

INTELLI+ control

As well as the functions offered by INTEGRAL+, the INTELLI+ system also allows the system to be set up and programmed without opening the unit. It includes an LCD screen plus tools for preventive maintenance.

Fieldbus control

Fieldbus systems are compatible with L. Bernard integrated controls and allow you to control a large number of actuators or other devices and transmit/receive a great deal of data over a single two-wire serial link.



See the "Specifications" section of this brochure for further details.

Benefits of Integrated control systems

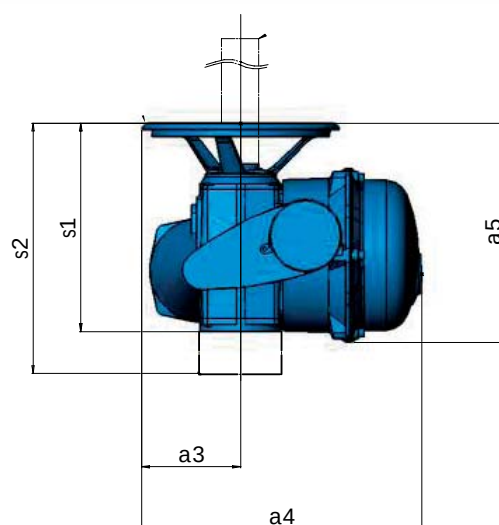
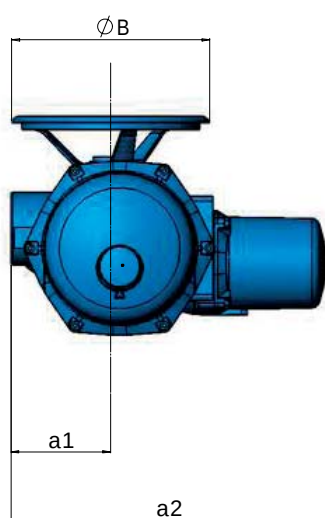
- **Simple:** ready-to-use turnkey solution.
- **Safe:** proven system incorporating many safety features.
- **Economical:** saves time and money at the design and installation stages.
- **Intelligent:** remote management of a large volume of data and optimized preventive maintenance using our digital solutions in conjunction with the fieldbus.

		INTEGRAL+	INTELLI+
MODULATING CLASS	ON/OFF	Integral+	Intelli+
	Modulating class III	Posigam+	Intelli+
REMOTE CONTROL	Pulse command	■	■
	Maintained signal	■	■
	ESD (Emergency ShutDown)	■	■
	Auxiliary	■ (Overrides local command)	2 commands 9 options
	Timer	Option	■
LOCAL COMMANDS	Lockable selector knobs	■	■
	Digital display	-	■
	Indicator lights	Option	■
INTERNAL PROTECTION	Fuses	■	■
	Automatic phase monitoring (3-phase)	■	■
	Motor thermal cut-out	■	■
	Torque limiter protection	■	■
SIGNALLING	Number of signal relays	4 + 3 (option)	4 + 3 (option)
	Data items	16	23
	Number of fault relays	1	1
	Number of listed faults	8	12
	Analogue position feedback	Option (Standard)	Option
CONFIGURATION	Configuration setting	Internal (with jumpers)	External Local command knob Fieldbus Pocket PC Laptop
	Torque/position setting method	Mechanical	Digital
	Travel limit stop	On position On torque	On position On torque
	Full configuration upload	-	Via fieldbus Via pocket PC Via laptop
MONITORING	Self-diagnostics	-	■
	Torque / position curve	-	■
	Actuator operating log	-	■
	Partial stroking	-	■
FIELDBUS	Profibus DP (single or redundant)	Option	Option
	Foundation fieldbus	-	Option
	Modbus RTU	-	Option

See INTEGRAL+ (A115) and INTELLI+ (A116) catalogues for further information on controls.

Specifications for standard weatherproof version

Overall dimensions



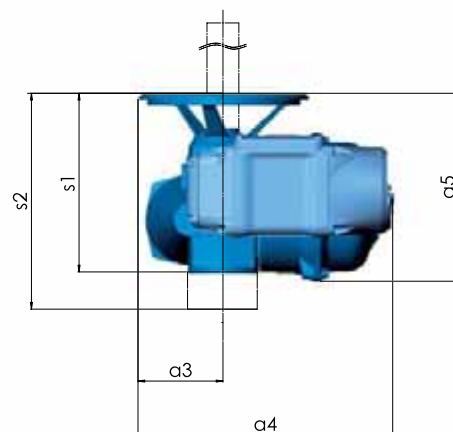
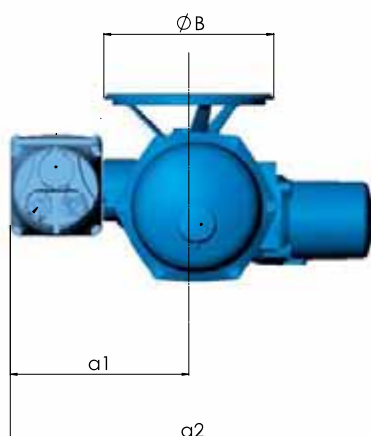
	Wt (kg)	$\varnothing B$	a_1	a_2 max.	a_3	a_4	a_5	s_1 B3/C type	s_2 A type	s_2 B1 type
ST6	25	300	151	472	150	446	313	283	341	341
ST14	33	300	151	479	150	424	332	317	375	375
ST30	54	450	145	578	225	544	\	364	441	450
ST70	78	550	133	617	275	612	451	447	547	547

Technical specifications

Max. torque	ST6 = 60 Nm ST14 = 140 Nm ST30 = 300 Nm ST70 = 700 Nm Contact our marketing dept. for higher torque values. See "Performance data" section for further details.
Type of service	ON/OFF - Modulating class III
Casing	- Cast aluminium. - Casings are watertight to IP68 & NEMA 6 and can withstand pressure of 10 metres WC for 96 hours.
Motor technology	Totally-enclosed, squirrel cage 3-phase or 1-phase motor, class F insulation with integral thermal overload protection. Motors easy to remove with sealed ball bearings fitted at front and rear.
Motor duty rating	- S4 motor service (intermittent service on start-up) to IEC 34-1. - S4 - 30% for ON/OFF operation - up to 360 starts per hour. - S4 - 50% for Modulating class III - up to 1,200 starts per hour.
Ambient operating temperature	- Standard version: -20 °C ... +70 °C (-4 °F ... +158 °F) - Low temperature version: -40 °C ... +70 °C (-40 °F ... +158 °F) - High temperature version: +0 °C ... +90 °C (+32 °F ... +194 °F)
External corrosion protection	Standard paint system: Zinc rich primer, epoxy undercoat and RAL5002 blue polyurethane top coat. Special anti-corrosion protection for marine, aggressive or abrasive environments available on request
Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (Contact our marketing dept. for higher vibration levels).
Lubrication	ST actuators are lubricated for the product lifetime and do not require any special service.
Manual control	- By handwheel which does not rotate when electrical operation system in service. - Switch between manual and electrical operation automatically without clutch release lever (except for ST6 models). Electrical control has always priority. - Manual gear ratios: ST6 1:1, ST14-30 1:2, ST70 1:21
Power supply	ST 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, etc.
Output flange	ST actuator flanges comply with ISO 5210. See "Mounting flange specifications" section for further details.
Conduit entries	Standard configuration: 2 x M20 Other cable entry configuration options available on request.
Travel limit systems	- Position: movement reading on output shaft. - Range: 1.5 to 1,080 turns. 2 contacts as standard (6 as option) ; 16A to 250V under resistive load
Torque limiting systems	- Torque: dynamometer measuring torque transmitted. - The torque limiting system is calibrated at the factory to the torque setting selected by the customer. 2 contacts as standard; 16A to 250V under resistive load
Visual position indicator	Graduated indicator showing position at all times, even if no power supply present.
Remote position indication (options)	1000 Ohm potentiometer, 0.3W - wiper current = max. 1 mA. - TAM position transmitter: 4-20mA (12, 24 or 32V power supply for maximum permissible load of 150, 750 or 1,050 Ohms). - Intermediate positions given by SPDT switches. - Others on request.
Compliance with EC Directives	Weatherproof version ST actuators comply with: - directive 89/336/EEC, as amended by 93/68/EEC: Electromagnetic compatibility - directive 73/23/EEC, as amended by 93/68/EEC: 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)

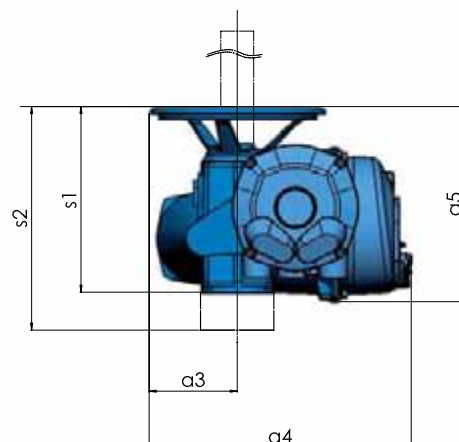
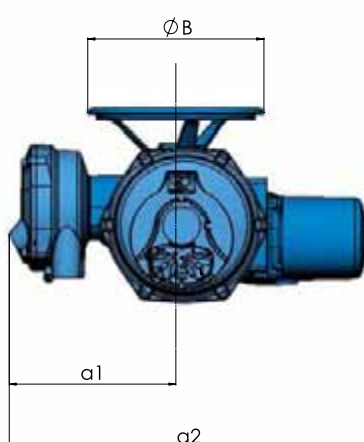
Specifications for weatherproof version with integrated control

Overall dimensions - ST6 to ST70 with INTEGRAL+ or INTELLI+



	Wt (kg)	Ø B	a1	a2 max.	a3	a4	a5	s1 B3/C form	s2 A form	s2 B1 form
ST6	32	300	315	636	150	472	313	283	341	341
ST14	40	300	315	642	150	450	332	317	375	375
ST30	61	450	309	743	225	570	\	364	441	450
ST70	85	550	297	781	275	638	451	447	547	547

Overall dimensions - ST175 & ST220 with INTELLI+



	Wt (kg)	Ø B	a1	a2 max.	a3	a4	a5	s1 B3/C form	s2 A form	s2 B1 form
ST175	294	1000	377	1099	500	882	\	525	661	661
ST220	315	1000	377	1099	500	882	\	525	661	661

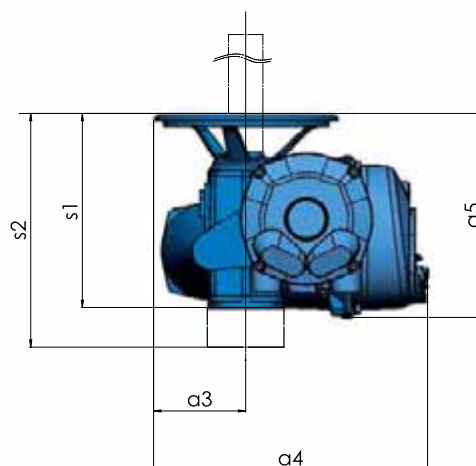
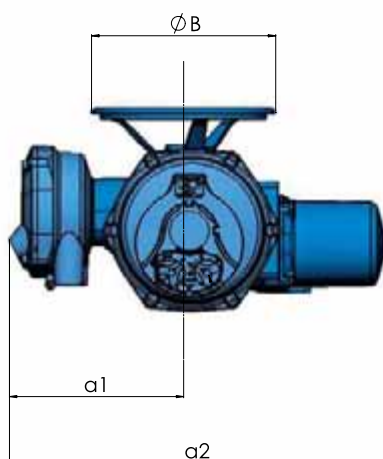
Technical specifications

Max. torque	ST6 = 60 Nm ST14 = 140 Nm ST30 = 300 Nm ST70 = 700 Nm ST175 = 1750 Nm ST220 = 2200 Nm Contact our marketing dept. for higher torque values. See "Performance data" section for further details.
Type of service	ON/OFF - Modulating class III
Casing	- Cast aluminium. Cast DI for models ST175/ST220. - Casings are watertight to IP68 & NEMA 6 and are C.S.A NRTL certified. They can withstand pressure of 5 metres WC for 72 hours.
Motor technology	Totally-enclosed, squirrel cage 3-phase or 1-phase motor, class F insulation with integral thermal overload protection. Motors easy to remove with sealed ball bearings fitted at front and rear.
Motor duty rating	- S4 motor service (intermittent service on start-up) to IEC 34-1 - S4 - 30% for ON/OFF operation - up to 360 starts per hour. - S4 - 50% for Modulating class III - up to 1,200 starts per hour.
Ambient operating temperature	- Standard version: -20 °C ... +70 °C (-4 °F ... +158 °F) - Low temperature version: -40 °C ... +70 °C (-40 °F ... +158 °F)
External corrosion protection	Standard paint system: Zinc rich primer, epoxy undercoat and RAL5002 blue polyurethane top coat. Special anti-corrosion protection for marine, aggressive or abrasive environments available on request
Double seal protection	The control section of the actuator is totally isolated from the terminal compartment to protect electronic components.
Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (Contact our marketing dept. for higher vibration levels).
Lubrication	ST actuators are lubricated for the product lifetime and do not require any special service.
Manual control	- By handwheel which does not rotate when electrical operation system in service. - Switch between manual and electrical operation automatically without clutch release lever (except for ST6 models). Electrical control has always priority. - Manual control gear ratios: ST6 1:1 - ST14-30 1:2 - ST70 1:21 - ST175 ST220 1:31
Power supply	ST 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, etc.
Output flange	ST actuator flanges comply with ISO 5210. See "Mounting flange specifications" section for further details.
Conduit entries	3xM20 (ST6, ST14, ST30, ST70), 1xM40 + 2xM32 (ST175/220) Other conduit entry configurations available on request.
Installation	Simple commissioning procedure
Travel limit systems	- Position: movement reading on output shaft. - Range: 1.5 to 900 turns.
Torque limiting systems	- Torque: dynamometer measuring torque transmitted. - The torque limiting system is calibrated at the factory to the torque setting selected by the customer.
Visual position indicator	- INTEGRAL+: graduated indicator showing position at all times - INTELLI+: back-lit graphics display with language selection
Options	- Remote position indication: position transmitter (4-20 mA) - Positioned: proportional control - Fieldbus: PROFIBUS, MODBUS or Foundation Fieldbus, depending on type of command
Compliance with EC Directives	Weatherproof version ST actuators comply with: - directive 89/336/EEC, as amended by 93/68/EEC: Electromagnetic compatibility - directive 73/23/EEC, as amended by 93/68/EEC: 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)

See INTEGRAL+ (A115) or INTELLI+ (A116) catalogues for further information on control functions.

Specifications for explosion-proof version with INTELLI+

Overall dimensions



	Wt (kg)	$\varnothing B$	a_1	a_2 max.	a_3	a_4	a_5	s_1 B3/C form	s_2 B1 form	s_2 A form
ST6	33	300	284	605	150	468	313	283	341	341
ST14	41	300	284	611	150	446	332	317	375	375
ST30	62	450	278	711	225	566	\	364	450	441
ST70	86	550	266	749	275	634	541	447	547	547
ST175	295	800	335	1056	400	797	\	523	661	661
ST220	316	1000	335	1056	400	797	\	523	661	661

Technical specifications

Max. torque	ST6 = 60 Nm ST30 = 300 Nm ST175 = 1750 Nm ST14 = 140 Nm ST70 = 700 Nm ST220 = 2200 Nm Contact our marketing dept. for higher torque values. See "Performance data" section for further details.
Type of service	ON/OFF - Modulating class III
Explosion protection	ATEX Directive 94/9/EC - standard CENELEC EN 60079-0, EN60079-1 As standard: Ex d II B T4 (option T5 or T6) On request: Ex d II C T4 (option T5 or T6) On request: Ex t DA21 IP68 T=135°C (option T=100°C, T=85°C) IEC Ex - standard IEC 60079-0, IEC60079-1 As standard: Ex d II B T4 (option T5 or T6) On request: Ex d II C T4 (option T5 or T6) On request: Ex t DA21 IP68 T=135°C (option T=100°C, T=85°C) NEMA 7 C.S.A. NRTL - NEMA 6 C.S.A. NRTL certified Class I Group B, C, D div 1&2 - Class II Group E, F, G div 1&2
Casing	- Cast aluminium. Cast DI for models ST175/ST220. - Casings are watertight to IP68 & NEMA6 and are C.S.A NRTL certified. They can withstand pressure of 10 metres WC for 96 hours.
Motor technology	Totally-enclosed, squirrel cage 3-phase or 1-phase motor, class F insulation with integral thermal overload protection. Motors easy to remove with sealed ball bearings fitted at front and rear.
Motor duty rating	- S4 motor service (intermittent service on start-up) to IEC 34-1 - S4 - 30% for ON/OFF operation - up to 360 starts per hour. - S4 - 50% for Modulating class III - up to 1,200 starts per hour.
Ambient operating temperature	- Ex d II B T4: -20°C to +70°C (-4°F to +158°F) - (-40°C and -50°C as option) - Ex d II C T4: -20°C to +70°C (-4°F to +158°F)
External corrosion protection	Standard paint system: Zinc rich primer, epoxy undercoat and RAL5002 blue polyurethane top coat. Special anti-corrosion protection for marine, aggressive or abrasive compartment to protect electronic components.
Double seal protection	The control section of the actuator is totally isolated from the terminal compartment to protect electronic components.
Vibration resistance	1g (9.8 m/s ²) at 10-500 Hz. (Contact our marketing dept. for higher vibration levels).
Lubrication	ST actuators are lubricated for the product lifetime and do not require any special service.
Manual control	- By handwheel which does not rotate when electrical operation system in service. - Switch between manual and electrical operation automatically without clutch release lever (except for ST6 models). Electrical control has always priority. - Manual control gear ratios: ST6 1:1 - ST14-30 1:2 - ST70 1:21 - ST175 ST220 1:31
Power supply	ST 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 ...
Output flange	ST actuator flanges comply with ISO 5210. See "Mounting flange specifications" section for further details.
Cable entries	1" 1/2 NPT + 2x1" NPT Other cable entry configurations available on request.
Installation	Can be commissioned without opening unit
Travel limit systems	- Position : movement reading on output shaft. - Range: 1.5 to 900 turns. (Range above 900 rpm available as an option)
Torque limiting systems	- Torque: dynamometer measuring torque transmitted. - The torque limiting system is calibrated at the factory to the torque setting selected by the customer.
Position indicator	Back-lit graphics display with language selection
Options	- Remote position indication: 4-20mA position indicator - Positioner: proportional control - Fieldbus: MODBUS RTU or PROFIBUS DP V1 or Fieldbus Foundation - Fire protection: 30 minutes at 1,000°C - Battery: to determine and transmit actuator position when power supply not present.

See catalogue A116 for further information on INTELLI+ control functions.

Performance data

This table shows performance data for 3-phase actuators with a 400/460 V AC power supply. Refer to ST Technical Guide for further details and information for other voltages.

Type	3 PH - ON/OFF			3 PH - CLASSE III			
	Nominal torque (Nm)	Output speed 50Hz (rpm)	Output speed 60Hz (rpm)	Instantaneous torque (Nm)	Permanent torque (Nm)	Output speed 50Hz (rpm)	Output speed 60Hz (rpm)
ST6	60	11	13	60	30	11	13
	60	16	19	60	30	16	19
	60	23	28	60	30	23	28
	60	30	36	60	30	30	36
	60	46	55	60	30	46	55
	60	61	73				
	60	92	110				
ST14	140	11	13	140	70	11	13
	140	16	19	140	70	16	19
	140	23	28	140	70	23	28
	140	30	36	-	-	-	-
	140	46	55	-	-	-	-
	140	61	73	140	70	61	73
	140	92	110				
ST30	300	16	19	300	150	16	19
	300	23	28	300	150	23	28
	300	30	36	-	-	-	-
	300	46	55	-	-	-	-
	300	61	73	300	150	61	73
	300	92	110				
	300	120	144				
ST70	700	16	19	700	350	16	19
	700	23	28	700	350	23	28
	700	30	36	-	-	-	-
	700	46	55	-	-	-	-
	700	61	73	700	350	61	73
	700	92	110				
	650	120	144				
ST175	1750	36	43				
	1750	46	55				
	1750	61	73				
ST220	2200	16	19				
	2200	23	28				
	2200	30	36				
	2200	36	43				
	2200	46	55				
	2200	61	73				
	2200	92	110				
	1700	120	144				

Mounting flange

specifications

	Flange	Max. stem diameter (mm)			
		Type A (max)	Type B1 (max)	Type B3 (max)	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

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=298mm

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