

# ExMax ¼ turn actuators – size S

ExMax - ... - BF
ExMax - ... - CTS
ExMax - ... - VAS

Subject to change!

Electrical, explosion proof rotary actuators with integrated Ex-i circuit for thermal tripping device  
 On-off / 3-pos. control mode, 24...240 VAC/DC, 95° angle of rotation incl. 5° pretension  
 5/10 – 15 Nm with safety operation (spring return)  
 ATEX tested in acc. with directive 2014/34/EU for zone 1, 2, 21, 22

**Compact. Easy installation. Universal. Cost effective. Safe.**

Type	Torque	Supply	Motor running time	Spring return	Control mode	Feedback	Wiring diagram
ExMax- 5.10 - BF	5 / 10 Nm	24...240 VAC/DC	3 / 15 / 30 / 60 / 120 s / 90°	3 or 10 s / 90°	On-off, 3-pos.	2 × limit switches + Ex-i circuit	SB 7.0 + 7.1
ExMax- 15 - BF	15 Nm	24...240 VAC/DC	3 / 15 / 30 / 60 / 120 s / 90°	3 or 10 s / 90°	On-off, 3-pos.	2 × limit switches + Ex-i circuit	SB 7.0 + 7.1
ExMax- ... - CTS	Types as above with aluminium housing and seawater resistant coating (cable glands brass nickel-plated)						
ExMax- ... - VAS	Types as above with stainless steel housing for aggressive ambient (cable glands brass nickel-plated)						

## Product views and applications



## Description Highlights

The ExMax actuators are a revolution for safety, fire and shut-off dampers, VAV systems, ball valves, throttle valves and other motorized applications for HVAC systems in chemical, pharmaceutical, industrial and offshore/onshore plants, for use in Ex-areas zone 1, 2 (gas) and zone 21, 22 (dust). Highest protection class (ATEX) and IP66 protection, small dimensions, only 3,5 kg weight, universal functions and technical data, an integrated heater and an optional stainless steel housing guarantee safe operation even under difficult environmental conditions. High quality brushless motors guarantee long life.

All actuators are programmable and adjustable on site. Special tools or equipment are not required. Motor running times and torques as well as spring return times, according to the actuator type, are selectable or adjustable on site. The integrated universal power supply is self adaptable to input voltages in the range of 24...240 VAC/DC. The actuators are 100 % overload protected and self locking.

...Max-...-BF actuators are equipped with spring return fail safe function, with integrated aux. switches for end position indication and an intrinsically safe circuit to connect an external passive potential free thermostat (e.g. ...Pro-TT-...). Standard shaft connection is a double square direct coupling with 12 × 12 mm.

Different accessories are available to adapt auxiliary switches, terminal boxes or adaptations for ball valves and throttle valves and other armatures.

- For all type of gas, mists, vapours and dust for use in zone 1, 2, 21 and 22
- Universal supply unit from 24...240 VAC/DC
- Motor running times 3–15–30–60–120 s/90° adjustable on site
- On-off and 3-pos. control with spring return function, running times ~ 3–10 s/90°
- Ex-i circuit for direct connection of a passive potential free safety thermostat
- 2 integrated auxiliary switches, switching at 5° and 85° angle of rotation
- 5–10–15 Nm actuators in the same housing size
- 100 % overload protected and self locking
- Compact design and small dimension (L × W × H = 210 × 95 × 80 mm)
- Direct coupling to the damper shaft with double square connection 12 × 12 mm
- 95° angle of rotation inclusive 5° pretension
- Robust aluminium housing (optional with seawater resistant coating) or in stainless steel
- IP66 protection
- Simple manual override included + preparation for comfortable manual override
- Gear made of stainless steel and sinter metal
- Weight only ~ 3,5 kg
- Integral heater for ambient temperatures down to -40 °C
- Integral safety temperature sensor
- Integral equipment for manual adjustment (push button, lamp, switch)
- Preparation for adaptable and adjustable auxiliary switches type ...Switch
- Wide range of accessories



Technical data	ExMax- 5.10 - BF	ExMax- 15 - BF
Torque motor (min.)	5 / 10 Nm selectable on site	15 Nm
Torque spring (F)	min. 10 Nm	min. 15 Nm
Dimension of external torque	Above mentioned torques are min. torques in blocked position, external torque should be max. 80 % of max. actuator torque but min. 3 Nm	
Supply voltage / frequency	24...240 VAC/DC, $\pm 10\%$ , self adaptable, frequency 50...60 Hz $\pm 20\%$	
Power consumption	max. starting currents see ⓘ Extra information (in acc. with voltage, $I_{start} \gg I_{rated}$ ), approx. 5 W holding power, approx. 16 W for heater	
Protection class	Class I (grounded)	
Angle of rotation and indication	95° incl. $\sim 5^\circ$ pretension, mechanical value indication	
Working direction	Selectable by left/right mounting to the damper/valve shaft	
Motor running times	3 / 15 / 30 / 60 / 120 s/90° selectable on site	
Motor	Brushless DC motor	
Spring return (F)	$\sim 3$ or 10 s/90°, selectable on site, function in the event of loss of power	
3 sec. mode – spring return	In acc. with external torque $\sim 3$ to 4 s/90° angle of rotation	
Safety operation at 10 sec. (F)	min. 10,000 in acc. with construction of damper and ambient	
at 3 sec. (F)	min. 1,000 in acc. with construction of damper and ambient	
Response time spring return	up to 1 sec. after power failure	
Control mode	On-off and 3-pos. in acc. with wiring, selectable on site	
Intrinsically safe circuit	Additional Ex-i circuit to connect a passive potential free thermostat (e.g. ExPro-TT...) as a safety sensor for fire dampers	
IS connection	Directly to the actuator with quick connection M12	
Integrated aux. switches	2 aux. switches, switching at 5° and 85° angle of rotation	
Axle of the actuator	Double square 12 x 12 mm, direct coupling, 100 % overload protected and self locking up to 15 Nm	
Electrical connection	Cable $\sim 1$ m, wire cross section 0.5 mm <sup>2</sup> , equipotential bonding 4 mm <sup>2</sup> . Connections in hazardous areas require an Ex-e terminal box!	
Diameter of cable	$\sim \varnothing 9.6$ mm	
Cable gland	M16 x 1.5 mm	
Manual override	Use delivered socket wrench, max. 4 Nm	
Integral heater	Integral, controlled heater for ambient temperature down to $-40^\circ\text{C}$	
Housing material	Aluminium die-cast housing, coated. Optional with seawater resistant coating (...-CTS) or stainless steel housing, № 1.4581 / UNS-J92900 / similar AISI 316Nb (...-VAS)	
Dimensions (L x W x H)	210 x 95 x 80 mm, for diagrams see ⓘ Extra information	
Weight	$\sim 3.5$ kg aluminium housing, stainless steel $\sim 7$ kg	
Ambients	Storage temperature $-40...+70^\circ\text{C}$ , working temperature $-40...+40^\circ\text{C}$ at T6 and $-40...+50^\circ\text{C}$ at T5	
Humidity	0...90 % rH, non condensing	
Operating 3 sec. motor run time	In 3 s mode the motor will work only after 1 minute of voltage supply. While open/close operation (open voltage supply and shut it down) motor works only with speed of 15 s/90°	
$\geq 15$ sec. motor run time	at 15 / 30 / 60 / 120 s 100 % of ED is permitted (ED = duty cycle)	
Maintenance	Maintenance free relative to function, maintenance must comply with regional standards, rules and regulations	
Wiring diagrams	SB 7.0 / 7.1	SB 7.0 / 7.1
Scope of delivery	Actuator with 1 m cable, 4 screws M4 x 100 mm, 4 nuts M4, Allen key for simple manual override	
Parameter at delivery	5 Nm, 30 s/90°	15 Nm, 30 s/90°

Approbations	
ATEX directive	2014/34/EU
EC type-approved	PTB 04 ATEX 1028 X
IECEX certified	IECEX PTB 07.0057X
Approval for gas	II 2 (1) G Ex d [ja] IIC T6, T5
Approval for dust	II 2 (1) D Ex tD [iaD] A21 IP66 T80, T95°C
CE identification	CE № 0158
EMC directive	2014/30/EU
Low voltage directive	2014/35/EU
Enclosure protection	IP66 in acc. with EN 60529
Ex-i circuit data	see table (T 1.0)

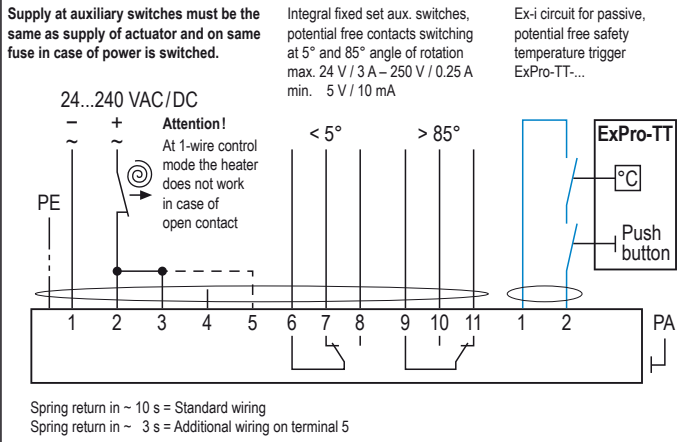
Special solutions and accessories	
...-CTS	Types in aluminium housing with seawater resistant coating, parts nickel-plated
...-VAS	Types in stainless steel housing, parts nickel-plated
ExBox-...	Ex-e terminal boxes for zone 1, 2, 21, 22
MKK-S	Mounting bracket for boxes type ...Box-... directly on actuator
ExPro-TT-...	Safety temperature trigger in acc. with ATEX
ExSwitch	2 external aux. switches, adjustable for zone 1, 2, 21, 22
HV-S...	Comfortable manual override for ...Max actuators size S
KB-S	Clamp for damper shafts $\varnothing 10...20$ mm and $\square 10...16$ mm
AR-12-xx	Reduction part for 12 mm square connection to 11, 10, 9 or 8 mm shafts
BSH-S	Mounting holder for actuators in fire danger areas
Kit-S8	Cable glands nickel-plated
Adaptions	for dampers and valves on request
ExMax-...-S3	Ambient temperature up to $+60^\circ\text{C}$ (T4), 110...240 VAC/DC, 25 % ED
ExMax-... S7	Actuator shock approved up to 500 g



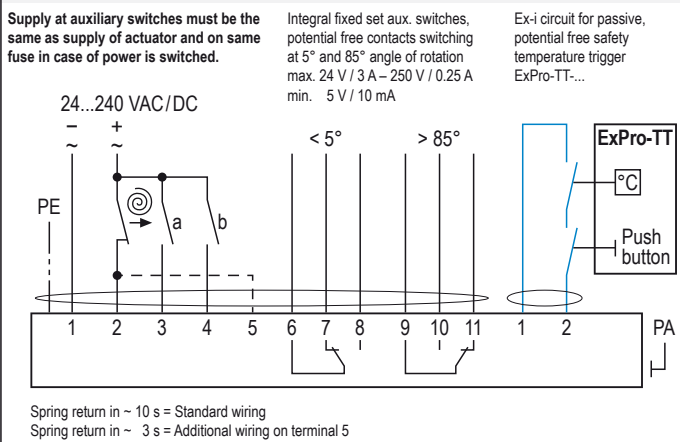
Electrical connection

All actuators are equipped with a universal supply unit working at a voltage range from 24...240 VAC/DC. The supply unit is self adjusting to the connected voltage! The safety operation of the spring return function works if the supply voltage is cut. For electrical connection inside hazardous areas an Ex-e terminal box, certificated in acc. with ATEX is required (e.g. ExBox).

On-off (1-wire) – spring return + Ex-i trigger circuit SB 7.0



On-off / 3-pos. – spring return + Ex-i trigger circuit SB 7.1



Ex-i intrinsic safe data – for temperature trigger ExPro-TT T 1.0

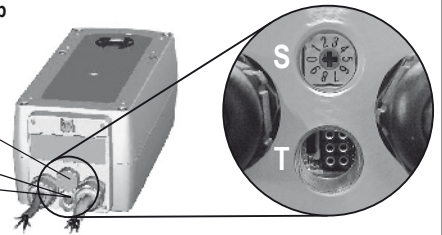
Table with intrinsic safe data: Uo = 10,6 V, Io = 11 mA, Po = 30 mW, Ci = 0, Li = 0. Also includes IIC, IIB, IIA, Lo, Co values.

Attention! During commissioning apply a self adjustment drive. Regard duty cycle at motor running times! Never use spring return actuators without external load.

Parameters, adjustments and failure indication

Switch – Push button – Lamp for adjustment (behind the blanking plug)

10-position switch (S)
Push button (T)
3-colour LED



Parameter selection

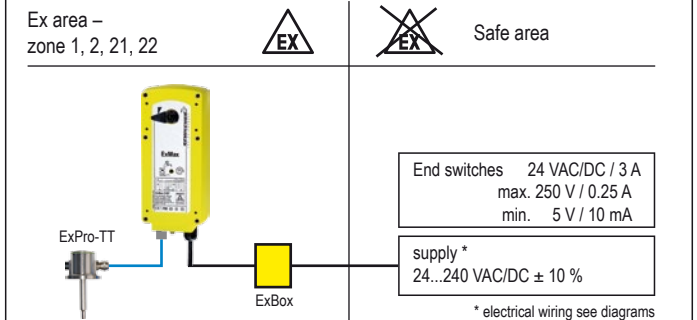
Example: ExMax-5.10-BF
Requested parameter: Torque 10 N, Motor running time 60 s/90°

Parameter selection table with columns: Type, Torques, Running times, Position of switch (S).

Functions, adjustments and parameters

- A) Self adjustment of angle of rotation: Switch (S) into position 02 (low torque) or 07 (high torque), then push button (T) for minimum 3 seconds.
B) Selection of running time and torque: Put switch (S) into the correct selected position in acc. to above table.
C) Running time spring return: The running time of 3 or 10 sec. spring return is selected by wiring.
D) Function of a passive sensor in the Ex-i circuit: If the sensor opens the Ex-i circuit the actuator runs into its safety end-position with spring return.
E) Additional information for 3-pos. operation: a closed, b open = direction I; b closed, a open = direction II; a and b closed = motor doesn't work; a and b open = motor doesn't work.

Installation





### Important information for installation and operation

#### A. Installation, commissioning, maintenance

All national and international standards, rules and regulations for hazardous Ex-areas must be complied. Certified apparatus must be installed in accordance with manufacturer instructions. If the equipment is used in a manner not specified by the manufacturer, the safety protection provided by the equipment may be impaired. For electrical installations design, selection and erection, EN/IEC 60079-14 can be used.

For electrical connection an Ex-e terminal box is required (e.g. ExBox-...).

**Attention:** If the actuator is put out of operation all Ex rules and regulations must be applied. You have to cut the supply voltage before opening the terminal box!

The cables of the actuator must be installed in a fixed position and protected against mechanical and thermal damage. Connect potential earth. Avoid temperature transfer from armature to actuator! Close all openings with min. IP66.

For outdoor installation a protective weather shield against sun, rain and snow should be applied to the actuator as well as a constant supply at terminal 1 and 2 for the integral heater.

Actuators are maintenance free. An annual inspection is recommended. For electrical installations inspection and maintenance, EN/IEC 60079-17 can be used. Ex-actuators must not be opened by the customer.

#### B. Manual override

Manual override only if supply voltage is cut. Use delivered socket wrench with slow motions, usage can be tight.

**Attention:** Releasing or letting go the Allen key too fast at manual operating actuators with spring return causes risk of injury!

#### C. Shaft connection, selection of running time

Actuators are equipped with a direct coupling double square shaft connection of 12 x 12 mm. For round shafts adaptors/clamping connection (accessories, e.g. KB-S) are available. The housing of the actuator is axially symmetrically built to select Open-close direction of the spring return function by left-right mounting. Using the 10-position switch different motor running times and spring return running times can be selected on site in acc. to the actuator type.

#### D. Temperature trigger ...Pro-TT-...

The actuator ...Max-...-BF will work only with the temperature trigger ExPro-TT-...

#### E. Operation with 3 sec. motor running time

Note following:

1. The 3 sec. motor running time mode is only available in switch position 0 and 5 and at a constant supply voltage applied for a minimum of 1 minute on terminal 1 and 2.
2. The actuator opens at voltage on terminal 3 (resp. closes) and closes at voltage on terminal 4 (resp. opens) – depending on mounting position of the actuator.
3. The max. duty ratio is 10 % resp. 1 cycle/minute. Between two fully 3 sec. cycles in the same direction there must be a minimum intermission of 1 minute. Trying to run the actuator in the same direction in less than the required minimum of 1 minute the function will be blocked for the rest of the idle period. Later the release for the next cycle is made automatically by an internal timing relay.
4. Same function is applied on spring return actuators, fail safe operation is regarded same as a motor running cycle.
5. Trying to use the 1 wire On-off method in switch position 0 and 5, software changes the motor running time temporarily and automatically to 15 s/90° to protect the actuator for overheating due to uncontrolled duty ratio.
6. The actuator must be operated with an outside load of at least 3 Nm.
7. After installing the actuator to the damper/armature an automatic alignment has to be accomplished in order to obtain a "gentle" blockade/stop. This function protects the damper/armature by reducing the end position/blockade speed in order to avoid

mechanical overload. The actuator aligns specifically once with 30 s/90° onto each end position and recognizes the blockade position in order to reduce the motor performance during operation briefly before reaching the end/blockade position.

#### F. 3-position control mode

...Max actuators are in the best way suitable for the 3-pos. operation. To protect such elements as gears and mounting elements against harmful influences like minimum pulse time, ...Max actuators are protected via internal electronics. It ignores impulses < 0.5 s, the cyclic duration must be min. 0.5 s. At changing direction the pause is 1 s.

#### G. Spring return

Spring return function works only if the supply voltage for terminal 1 or 2 is cut. In the event of an electrical interruption, the spring returns to its end position even if supply voltage is available again during return function. Thereafter operation will continue.

#### H. Operation at ambient temperatures below -20 °C

All actuators are equipped with a regulated integrated heating device designed for employments down to -40 °C ambient temperature. The heater will be supplied automatically by connecting the constant voltage supply on the clamps 1 and 2.

1. After mounting the actuator must be immediately electrically connected.
2. The heater switches on automatically when actuator reaches internally -20 °C. It heats up the actuator to a proper working temperature, then heater switches off automatically. Actuator will not run during heating process.
3. The adjustment options are only ensured after this heating up period.

#### I. Excess temperatures

In acc. to the ATEX rules and regulations Ex actuators must be protected against excess temperature. The internal thermostat works as a maximum limiter and, in the event of failure at incorrect temperatures, shuts off the actuator irreversible. An upstream connected temperature sensor stops the actuator before reaching its max. temperature. This safety feature is reversible, after cooling down the actuator is completely functional again. In this case the failure must be eliminated immediately on site!

#### J. Synchron mode

Do not connect several actuators to one shaft or link mechanically together.

#### K. Mechanical protection

The actuator must be operated with an outside load of at least 3 Nm.

After installing the actuator to the damper/armature an automatic alignment has to be accomplished in order to obtain a "gentle" blockade/stop. This function protects the damper/armature by reducing the end position's/blockade speed in order to avoid mechanical overload. The actuator aligns specifically once with 30 s/90° onto each position and recognizes the blockade position in order to reduce the motor performance during operation briefly before reaching the end/blockade position.

#### L. Intrinsically safe circuits

The actuator itself has a flameproof enclosure. The supply of the push button (adjustment drive), the 10-position switch (adjustment of torque and running time), the LED indicator and the sensor connection ExPro-TT are intrinsically safe!

#### M. Routine tests of fire dampers

For periodic inspection of fire dampers cut off the supply line (current of actuator). The switch contact at ExPro-TT-... is only for test aims of actuator's function.

### ⓘ Extra information (see additional data sheet)

Additional technical information, dimensions, installation instruction, illustration and failure indication

#### Accessory ExSwitch – adaptable Ex-d auxiliary switch



For an end or inclined position indication it is possible to retrofit external, adjustable, explosion proof auxiliary switches type ExSwitch. The switch housing is mounted directly to the actuator and the switches are linked to the actuator's square connector. The switches deliver a potential free output and can be adjusted separately. They are connected by the included cable tail.

#### Accessory ExBox – adaptable Ex-e terminal box



For electrical connection of ...Max actuators inside the hazardous area an Ex-e terminal box is required. ExBoxes are appropriate terminal boxes and placed at the disposal. To adapt the ...Box directly to the actuator housing a mounting bracket type MKK-S is required.  
ExBox- BF for ...Max-...-BF with integral auxiliary switches