ExMax – Revolution

Electrical, explosion proof rotary actuators size S
On-off, 24...240 VAC/DC, 95° Angle of rotation incl. 5° pretention
8 resp. 15 Nm with safety operation
Fast spring return < 1 sec.
PTB-tested in acc. with ATEX RL 94/9/EC for zone 1, 2, 21, 22.

ExMax - 8 - F1
ExMax - 8 - SF1
ExMax - 8 - BF1
ExMax - 15 - F1
ExMax - 15 - SF1
ExMax - 15 - BF1
ExMax - ... - VAS
ExMax - ... - CTS

Subject to change!

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

Type	Torque	Supply	Motor running time	Spring return	Control mode	Additional features	Wiring diagram
ExMax - 8 - F1	8 Nm	24..240 VAC/DC	3/15/30/60/120 sec. at 90°	< 1 at 90°	On-off	-	SB 1.4/1.5
ExMax - 8 - SF1	8 Nm	24..240 VAC/DC	3/15/30/60/120 sec. at 90°	< 1 at 90°	On-off	2 contact (5/85°)	SB 1.4/1.5
ExMax - 8 - BF1	8 Nm	24..240 VAC/DC	3/15/30/60/120 sec. at 90°	< 1 at 90°	On-off	2 contact (5/85°) + fire trigger connection	SB 7.5/7.6
ExMax - 15 - F1	15 Nm	24..240 VAC/DC	3/15/30/60/120 sec. at 90°	< 1 at 90°	On-off	-	SB 1.4/1.5
ExMax - 15 - SF1	15 Nm	24..240 VAC/DC	3/15/30/60/120 sec. at 90°	< 1 at 90°	On-off	2 contact (5/85°)	SB 1.4/1.5
ExMax - 15 - BF1	15 Nm	24..240 VAC/DC	3/15/30/60/120 sec. at 90°	< 1 at 90°	On-off	2 contact (5/85°) + fire trigger connection	SB 7.5/7.6
ExMax- ... - VAS	Type as above but with stainless steel housing for aggressive ambient (12 × 12 shaft, shaft manual override, cable glands and hollow rivet nickel-plated)						
ExMax- ... - CTS	Type as above but with aluminium housing and Amercoat painting (12 × 12 shaft connenction, shaft manual override, cable glands and hollow rivet nickel-plated)						

Application

Fire Damper

Ball valve

Throttle valve

Original view ExMax-..-F1

Description size S

The new ExMax actuators are a revolution for safety, fire and shut-off dampers and other motorized applica1tions 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 IP 66 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.

Special tools or equipment are not required. 5 motor running times 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.

ExMax-...-F1 actuators are equipped with spring return fail safe function.

Futher the **ExMax-..-SF1** with integrated aux. switches for end position indication and the **ExMax-..-BF1** with an additional circuit to connect an external passive potential free thermostat Type ExPro-TT-...

Standard shaft connection is a double squared direct coupling with 12 × 12 mm.

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

Highlights

- For all type of gas, mixtures, vapours and dust for use in zone 1, 2, 21 and 22
- Universal supply unit from 24 to 240 VAC/DC
- Circuit for directly connection of a thermal trigger sensor (option -BF1)
- 2 integral aux. switches , switching at 5° and 85° angle of rotation (option -SF1)
- 5 different motor running times (3-15-30-60-120 sec./90°), adjustable on site
- spring return running time < 1 sec./90°
- On-off control with spring return function
- 100 % overload protected, selflocking
- Compact design and small dimension (L × W × H = 210 × 95 × 80 mm)
- Direct coupling to the damper shaft with double-squared connection 12 × 12 mm
- 95° Angle of rotation incl. 5° pre-tention
- Robust aluminium housing (optional stainless steel or marine coating)
- IP66 protection
- Simple manual override include + preparation for comfortable manual override
- Gear made of stainless steel and sinter metal
- Only 3,5 kg weight
- 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 aux. switches (type ExSwitch)

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Technical data	ExMax-8-..F1	ExMax-15-..F1
Torque motor	8 Nm	15 Nm
Torque spring return (F)	min. 8 Nm	min. 15 Nm
Dimension of external torque	minimum 2 Nm (lower load reduce lifetime)	minimum 5 Nm (lower load reduce lifetime)
Supply voltage/Frequency	24...240 VAC/DC, ± 10 % , self adaptable, Frequency 50...60 Hz ± 20 %	
Dimension	max. starting currents see table (in acc. with voltage, $I_{start} >> I_{rated}$), max. 20 W blocking position, approx. 16 W for heater	
Protection class	class I (grounded)	
Angle of rotation and indication	95°, incl. ~ 5° pre-tention, mechanical value indication	
Working direction	selectable by left/right mounting to the damper/valve shaft	
Motor running time	3 / 15 / 30 / 60 / 120 sec. at 90° selectable on site	
3 sec. mode - motor	In acc. with the supply voltage and external torque 3 to 4 sec at 90° Angle of rotation	
Motor	brushless DC Motor	
Spring return (F)	spring return in the event of loss of power or open wire 3	
Spring return running time (F)	spring return in < 1 sec. at 90°	
Safety operations at 1 sec (F)	min. 1.000 in acc. with construction of damper and ambient, consider minimum load	
Response time spring return	up to 1 sec. after power failure	
Control mode	On-off	
Thermal circuit	Additional circuit to connect a passive potential free thermostat as a safety sensor, e.g. type ExPro-TT or ExPro-TT-.. in version **..-BF1**	
ExPro-TT-.. connection	direct to the actuator with M12 × 1,5 fast connection	
Integrated aux. switches	2 aux. switches, switching at 5° and 85° Angle of rotation in types **..-SF1 and ..-BF1**	
Axle of the actuator	double squared 12 × 12 mm, direct coupling, 100 % overload protected	
Electrical connection	cable, ~1 m, diameter of wires 0,5 mm², for connection inside hazardous areas an Ex-e terminal box is required!	
Diameter of cable	~ Ø 7,1...9,3 mm acc. to type	
Cable gland	M16 × 1,5 standard - cable - and wire entries are integral part of explosions proof encapsulation; tested acc. to EN 60079-1	
Manual override	Manual override only if supply voltage is cut, use delivered socket wrench, slow motion, enogh torque/force is required	
	Attention: with manual operation of actuators with spring return danger of injury exists, with release/let go the allen key.	
Integral heater	integral heater, controlled, for ambient temperature down to -40°C	
Housing material	Aluminium die cast housing, painted (optional in stainless steel version AISI 316 - type ExMax-...**-VAS,** marine coating type ExMax **...-CTS**)	
Dimensions	L × W × H = 210 × 95 × 80 mm, for diagramm see extra information "ME-S"	
Weight	~ 3,5 kg Aluminium housing (stainless steel ~ 7 kg)	
Ambients	storage temp. -40…+70°C, working temperature -40…+40°C at T6 and -40…+50°C at T5	
Humidity	0…90 % RH, non condensing	
Operation mode at	The motor will work in 3 seconds only after 1 minute voltage supply. While open/close-operation (open voltage supply and shut it down) the	
runningtime motor 3 sec	motor works only with speed 15 sec./90°	
Operation mode	at 15/30/60/120 sec. 100 % ED (ED = duty cycle)	
Self adjustment	if you select 3 sec. and 15 sec. mode for motor you need to start the self adjustment mode or the angle of rotation is less than 90°	
Maintenance	maintenance free, maintenance must be complied with regional standards, rules and regulations	
Wiring diagrams (SB)	**SB 1.4 / 1.5 / 7.5 / 7.6**	**SB 1.4 / 1.5 / 7.5 / 7.6**
Delivery	1 actuator, 1 m cable, double squared shaft connection 12 × 12 mm, 4 screws M4 × 100, 4 nuts M4 socket wrench for simple manual override	
Parameter at delivery	8 Nm, 30 sec./90°	15 Nm, 30 sec./90°

Explosion proof	ExMax actuators – size S
PTB-tested	PTB 04 ATEX 1028 X
In acc. with ATEX	RL 94/9/EC (ATEX)
Approval for gas	II2(1)G Ex d [ia] IIC T6/T5 gas, mist, vapour, zone 1 and 2
Approval for dust	II2(1)D Ex tD A21 [iaD] IP66 T80°C dust, zone 21 and 22
Identification	CE No. 0158
EMC	2004/108/EC
Low voltage	2006/95/EC
IP-Protection	IP 66, in acc. with EN 60529
Potential compensation	external PA-terminal, 4 mm²

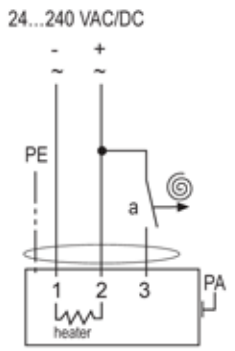
Accessories or special solutions – size S	
...-VAS	above listed types in stainless steel housing AISI 316, parts nickel-plated
...-CTS	above listed types in Al-housing with amercoat painting, parts nickel-plated
ExBox-...	Ex-e terminal boxes for zone 1, 2, 21, 22.
ExSwitch	2 external aux. switches, adjustable, for zone 1, 2, 21, 22
MKK-S	mounting bracket for Ex-e terminal boxes type ExBox-... direct on actuator
KB-S	clutch for damper shafts Ø 10…20 mm and □10…16 mm
HV-S	comfortable manual override for ExMax actuators size S
Adaptations	various adaptations for dampers/valves on request
BFH-S	Mounting holder for actuators at fire danger area
ExPro-TT-..	Sensor with EC type examination certificate in acc. with ATEX
AR-12-xx	Reduction of square damper connection from 12 mm to 11, 10, 9, 8
ExMax-.. S19	Cable BFOU(i), ~2 m, 0,75 mm², ~ Ø12 mm supply cable, SF1 Ø18 mm
	limit switches Cable gland M25 brass nickel plated resp. M32x1,5

Electrical connection

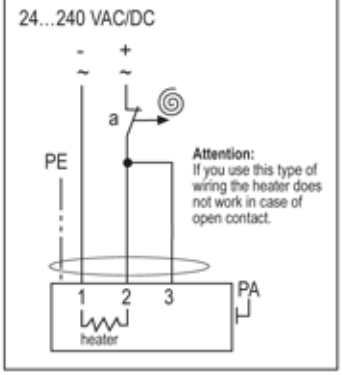
ExMax actuators are equipped with a universal supply unit working at a voltage range from 24...240 VAC/DC. The supply unit is self adjustable to the connected voltage!
The safety operation of the spring return function works if the supply voltage is cut or open the wire no 3. For electrical connection inside hazardous areas an Ex-e terminal box, certificated in acc. with ATEX is required (e.g. ExBox).

Wiring diagram

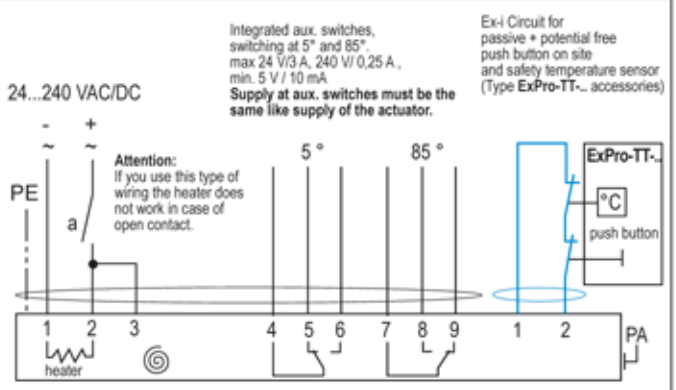
On / Off SB 1.4



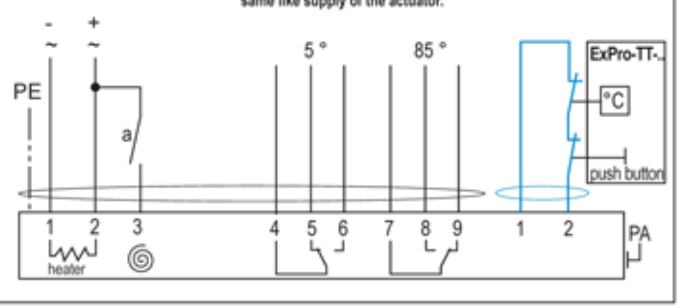
On / Off 1-wire SB 1.5



On-off 1-wire- spring return + thermal trigger circuit SB 7.5



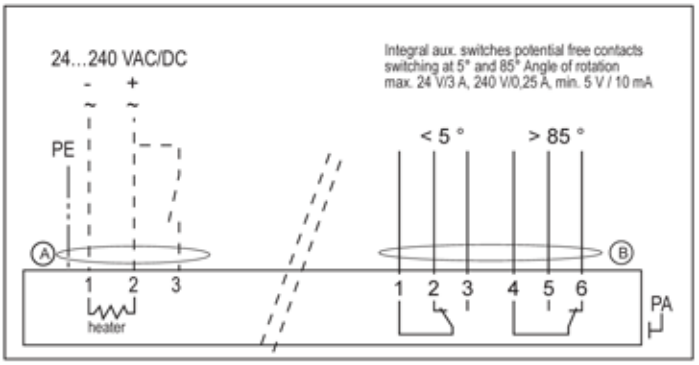
On-off - spring return + thermal trigger circuit SB 7.6



Attention

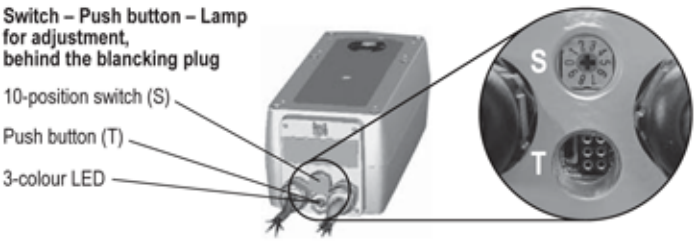
Never use actuators without external torque/force. If 3 sec. motor running time is selected, the self adjustment of Angle of rotation must be started and operation mode of max. 10% ED must be guaranteed. (1 cycle per minute)
In 1 wire connenction is 3 sec motor running time not possible

Wiring diagram ExMax-..-.SF1 with integral aux. switches



Parameter, Adjustment – Failure indication

Switch – Push button – Lamp for adjustment, behind the blancking plug



Parameter selection

Example: ExMax-15-BF1

Requested parameter:
Torque 15 Nm
Running time motor 30 sec/90°

Result: switch position (S) 02

Type		Torques
ExMax- 8-BF1	▶	8 Nm
ExMax-15-BF1	▶	15 Nm

Running times		Position of switch S	
3 sec./90°	▶	00	05
15 sec./90°	▶	01	06
30 sec./90°	▶	02	07
60 sec./90°	▶	03	08
120 sec./90°	▶	04	09

Function, adjustment and parameter

A) Self adjustment of Angle of rotation:
Switch (S) into position 02, then push button (T) for minimum 3 seconds. The actuator will drive into both end positions to be adjusted.
LED indicates green flashing. The actuator must be in position off.
Adjustment time needs approx. (30 sec. On, 1 sec. Off). After that, switch S into position 00-09 in acc. with your required torque and running time.

B) Selection of running time and torque:
Put switch (S) into the correct/selected position in acc. to above table.
The selected parameter will work at next operation of the actuator.
Adjustment can be done even without supply voltage. If supply voltage is available turn switch only if actuator is not running.

C) Additional information for operation:
a closed = actuator goes ON
a opened = spring return mode
Direction depends on left/right mounting of the actuator to the damper/valve.

D) Function of a passive sensor in the circuit:
If the sensor opens the circuit the actuator runs into its safety end-position with spring return.

Error indication

See extra information "EL"

Mounting instructions and important information for operation and installation

Important information for installation and operation

A. Installation, commissioning, maintenance
The cable of the actuator must be installed in a fixed position and protected against mechanical and thermical damage. In acc. with operation ExMax actuators are maintenance free. Nevertheless maintenace must comply with regional standards, rules and regulations. The flameproof enclosure is protected against mechanical shock in acc. with EN 60079 by the housing of the actuator
The actuators must not be opened by the customer. For outdoor installation a protective housing against rain, snow and sun should be applied to the actuator, as well as a constant supply at terminal 1 and 2 for the integral heater. For electrical connection inside hazardous areas an Ex-e terminal box is requested (e.g. type ExBox).
Attention: If the actuator is put out of operation all Ex-rules and regulation must be applied.
Example: you have to cut the supply voltage before opening an Ex-e terminal box

B. Shaft connection, selection of running time, heater
ExMax actuators are equipped with a direct coupling double squared shaft connection of 12 × 12 mm. For round shafts an adaptor is available (Accessory type KB-S).
The housing of the actuator is axially symmetrically built to select open/close direction of the spring return function by left/right mounting.
In acc. to the actuator type 5 different motor running times and 2 different spring return running times can be selected on site. The integral heater is for ambient temperatures down to -40°C.

C. Working with 3 sec. motor running time
See extra information "EL".

D. Spring return
Spring return function works if the supply voltage (terminal 1 or 2) is cut. In the event of an electrical interruption, the spring returns to its end position.

E. Operation at an ambient temperature below -20°C
See extra information "EL".

F. Excess temperature
In acc. to the ATEX rules and regulations Ex actuators must be protected against excess temperature. An internal thermostat guarantees the temperature class in the event of failure. If this thermostat is working the actuator must be sent to the factory. ExMax actuators are equipped with an additional temperature sensor to stop the actuator before reaching this max. temperature. In this case the failure must be eliminated immediately on site.

G. ExPro-TT-..
The actuator ...-BF1 works only with the temperature sensor type ExPro-TT-.. otherwise the LED shows red

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

Important information for routine test

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

Extra information "EL-S" (see additional data sheet)

extra technical information, versions of circuit diagrams and failure indication

Extra information "ME-S" (see additional data sheet)

extra technical information, dimensions, installation instruction and illustration

Mounting on air dampers with double squared shaft connection

Details see extra information "ME"

Mounting on air dampers with clutch

Details see extra information "ME"

Mounting of quarter turn valves

Details see extra information "ME"

ExSwitch – adaptable external Ex-d aux. switches

ExSwitch is an accessory to ExMax actuators size S, fixing directly onto the actuator. ExSwitch are aux. switches with with 2 potential free contacts, adustable on site. The electrical wiring needs an Ex-e terminal box.

ExBox – adaptable Ex-e terminal box

For electrical connection of an ExMax inside the hazardous area an Ex-e terminal box is required.
ExBox-3P for ExMax-..- F1
ExBox-YS for ExMax-..-SF1
ExBox-BF for ExMax-..-BF1
To adapt the ExBox direct to the actuator housing an additional accessory **type MKK-S** is required.

Ex-i safety temperature sensor – ExPro-TT

The safety thermostat type ExPro-TT-.. is passive and potential free for use in intrinsic safe circuits, directly connectable to the Ex-i circuit of the ...-BF1 actuators. The sensor switches at an ambient temperature of 72°C and starts the fail safe spring return function of the actuator. Sensor with EC type examination certificate in acc. with ATEX.

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