

## RedMax ¼ turn actuators – size M

Electrical, explosion-proof rotary actuators with integrated Ex-i tripping circuit for safety temperature trigger ExPro-TT  
On-off / 3-pos. control mode, 24...240 VAC/DC, 95° angle of rotation incl. 5° pretension  
30 – 50 – 60 Nm with safety operation (spring return)  
ATEX tested in acc. with directive 2014/34/EU for zone 2, 22

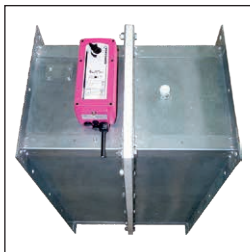
|                    |
|--------------------|
| RedMax - ... - BF  |
| RedMax - ... - CTM |
| RedMax - ... - VAM |

Subject to change!

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

| Type              | Torque                                                                                                  | Supply          | Motor running time             | Spring return | Control mode   | Feedback                                  | Wiring diagram |
|-------------------|---------------------------------------------------------------------------------------------------------|-----------------|--------------------------------|---------------|----------------|-------------------------------------------|----------------|
| RedMax- 30 - BF   | 30 Nm                                                                                                   | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 20 s/90°    | On-off, 3-pos. | 2 × aux. switches + Ex-i tripping circuit | SB 7.2/7.3     |
| RedMax- 50 - BF   | 50 Nm                                                                                                   | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 20 s/90°    | On-off, 3-pos. | 2 × aux. switches + Ex-i tripping circuit | SB 7.2/7.3     |
| RedMax- 60 - BF   | 60 Nm                                                                                                   | 24...240 VAC/DC | 40 / 60 / 90 / 120 s/90°       | ~ 20 s/90°    | On-off, 3-pos. | 2 × aux. switches + Ex-i tripping circuit | SB 7.2/7.3     |
| RedMax- ... - CTM | Types as above with aluminium housing and seawater-resistant coating (cable glands brass nickel-plated) |                 |                                |               |                |                                           |                |
| RedMax- ... - VAM | Types as above with stainless steel housing for aggressive ambient (cable glands brass nickel-plated)   |                 |                                |               |                |                                           |                |

### Product views and applications



Fire damper



Ball valve



Throttle valve



### Description

The RedMax 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 2 (gas) and zone 22 (dust).

Highest protection class (ATEX) and IP66/IP67 protection, small dimensions, only 9,5 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 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.

...Max-...-BF actuators are equipped with spring return fail-safe function, with 2 integrated auxiliary switches for end position indication and an intrinsically safe tripping circuit for connecting the ...Pro-TT-... safety temperature trigger. Standard shaft connection is a double square direct coupling with 16 x 16 mm.

...Max-...-BF actuators are fully qualified for integration into fire damper systems, ensuring conformity with the requirements stipulated in the standards:

- EN 15650: Ventilation for buildings - Fire dampers
- EN 1366-2: Fire resistance tests on service installations: Fire damper
- EN 13501-3: Fire classification of construction products and building elements - Part 3

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

### Highlights

- › For all types of gases, mists, vapours and dusts in zones 2 and 22
- › Universal supply unit from 24...240 VAC/DC
- › Motor running times 40–60–90–120–150 s/90° adjustable on-site
- › On-off and 3-pos. control with spring return function, running time ~ 20 s/90°
- › Ex-i circuit for direct connection of the ...Pro-TT-... safety temperature trigger
- › 2 integrated auxiliary switches, switching at 5° and 85° angle of rotation
- › 30–50–60 Nm actuators in the same housing size
- › 100 % overload protected
- › Compact design and small dimension (L x W x H ~ 288 x 149 x 116 mm)
- › Direct coupling to the damper shaft with double square connection 16 x 16 mm
- › 95° angle of rotation inclusive 5° pretension
- › Robust aluminium housing (optional with seawater-resistant coating) or in stainless steel
- › IP66/IP67 protection
- › Simple manual override included + preparation for comfortable manual override
- › Gear made of stainless steel and sintered metal
- › Weight only ~ 9,5 kg
- › Integrated heater for ambient temperatures down to –40 °C
- › Integrated safety temperature sensor
- › Integrated equipment for manual adjustment (push button, lamp, switch)
- › Preparation for adaptable and adjustable auxiliary switches type ...Switch
- › Wide range of accessories

## Technical data

| Technical data                   | RedMax- 30 - BF                                                                                                                                                                                                                                                                                                                                                          | RedMax- 50 - BF                | RedMax- 60 - BF                             |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------------------------------------|
| Torque motor (min.)              | 30 Nm                                                                                                                                                                                                                                                                                                                                                                    | 50 Nm                          | 60 Nm                                       |
| Torque spring (F)                | min. 30 Nm                                                                                                                                                                                                                                                                                                                                                               | min. 50 Nm                     | min. 60 Nm                                  |
| Torque blockade                  | In blockade and end positions torques are higher than above specified torques for motor and spring.                                                                                                                                                                                                                                                                      |                                |                                             |
| Dimensioning of external load    | Upon spring return the external load should be max. 80 % of torque spring (F), but min. 10 Nm                                                                                                                                                                                                                                                                            |                                |                                             |
| Supply voltage / frequency       | 24...240 VAC/DC $\pm$ 10 %, self adaptable, frequency 50...60 Hz $\pm$ 20 %                                                                                                                                                                                                                                                                                              |                                |                                             |
| Power consumption                | max. starting currents see ① Extra information (in acc. with voltage, $I_{start} \gg I_{rated}$ ), approx. 4 to 11 W holding power depending on the supply voltage, approx. 16 W for heater                                                                                                                                                                              |                                |                                             |
| Protection class                 | Class I (grounded)                                                                                                                                                                                                                                                                                                                                                       |                                |                                             |
| Angle of rotation and indication | 95° incl. $\sim$ 5° pretension, mechanical value indication                                                                                                                                                                                                                                                                                                              |                                |                                             |
| Working direction                | selectable by left/right mounting to the damper/valve shaft                                                                                                                                                                                                                                                                                                              |                                |                                             |
| Motor running times              | 40 / 60 / 90 / 120 / 150 s/90°                                                                                                                                                                                                                                                                                                                                           | 40 / 60 / 90 / 120 / 150 s/90° | 40 / 60 / 90 / 120 s/90° selectable on-site |
| Motor                            | Brushless DC motor                                                                                                                                                                                                                                                                                                                                                       |                                |                                             |
| Control mode                     | On-off and 3-pos. in acc. with wiring, selectable on-site                                                                                                                                                                                                                                                                                                                |                                |                                             |
| Spring return (F)                | spring return upon voltage interruption, response time up to 1 sec. after voltage interruption                                                                                                                                                                                                                                                                           |                                |                                             |
| Spring return running time (F)   | $\sim$ 20 s/90°                                                                                                                                                                                                                                                                                                                                                          |                                |                                             |
| Safety operations at 20 sec. (F) | min. 10,000 acc. to construction of damper and ambient                                                                                                                                                                                                                                                                                                                   |                                |                                             |
| Ex-i tripping circuit            | Intrinsically safe circuit to connect the ExPro-TT... safety temperature trigger directly to the actuator with M12 quick connection                                                                                                                                                                                                                                      |                                |                                             |
| Auxiliary switches               | 2 integrated auxiliary switches, switching at 5° and 85° angle of rotation, potential free. Grid fuse-protection is recommended!<br>$U_{max}/I_{max}$ AC = 250 V/5 A; $U_{min}$ AC/DC = 5 V; After one-time operation with $U > 24$ V AC/DC or $I > 100$ mA: $U_{min}$ AC/DC = 12 V<br>$U_{max}/I_{max}$ DC = 48 V/1 A; $I_{min}$ AC/DC = 5 mA; $I_{min}$ AC/DC = 100 mA |                                |                                             |
| Axle of the actuator             | Double square 16 x 16 mm, direct coupling, 100 % overload protected                                                                                                                                                                                                                                                                                                      |                                |                                             |
| 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 a terminal box!                                                                                                                                                                                                              |                                |                                             |
| Diameter of cable                | $\sim$ Ø 9,6 mm                                                                                                                                                                                                                                                                                                                                                          | $\sim$ Ø 9,6 mm                | $\sim$ Ø 9,6 mm                             |
| Cable gland                      | M16 x 1.5 mm                                                                                                                                                                                                                                                                                                                                                             |                                |                                             |
| Manual override                  | Use delivered socket wrench, max. 4 Nm                                                                                                                                                                                                                                                                                                                                   |                                |                                             |
| Heater                           | Integrated, controlled heater for ambient temperature down to $-40$ °C                                                                                                                                                                                                                                                                                                   |                                |                                             |
| Housing material                 | Aluminium die-cast housing, coated. Optional with seawater-resistant coating (...-CTM) or stainless steel housing, No. 1.4581 / UNS-J92900 / similar AISI 316Nb (...-VAM)                                                                                                                                                                                                |                                |                                             |
| Dimensions (L x W x H)           | $\sim$ 288 x 149 x 116 mm, for diagrams see ① Extra information                                                                                                                                                                                                                                                                                                          |                                |                                             |
| Weight                           | $\sim$ 9.5 kg aluminium housing, stainless steel $\sim$ 15 kg                                                                                                                                                                                                                                                                                                            |                                |                                             |
| Ambients                         | Storage temperature $-40...+70$ °C, working temperature $-40...+40$ °C at T6 and $-40...+50$ °C at T5                                                                                                                                                                                                                                                                    |                                |                                             |
| Humidity                         | 0...90 % rH, non condensing                                                                                                                                                                                                                                                                                                                                              |                                |                                             |
| Operation mode                   | 80 % ED are permitted (ED = duty cycle)                                                                                                                                                                                                                                                                                                                                  |                                |                                             |
| Maintenance                      | Maintenance free relative to function, maintenance must comply with regional standards, rules and regulations                                                                                                                                                                                                                                                            |                                |                                             |
| Wiring diagrams                  | SB 7.2/7.3                                                                                                                                                                                                                                                                                                                                                               | SB 7.2/7.3                     | SB 7.2/7.3                                  |
| Scope of delivery                | Actuator, 4 screws M8 x 140 mm, 4 nuts M8, Allen key for simple manual override                                                                                                                                                                                                                                                                                          |                                |                                             |
| Parameter at delivery            | 30 Nm, 90 s/90°                                                                                                                                                                                                                                                                                                                                                          | 50 Nm, 90 s/90°                | 60 Nm, 90 s/90°                             |

## Approbations

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| ATEX Directive                    | 2014/34/EU                                    |
| ATEX Conformity                   | EPS 18 ATEX 1 216 X                           |
| IECEX Conformity                  | IECEX EPS 18.0107X                            |
| Marking Gases                     | II 3 (3) G Ex db [ic Gc] IIC T6, T5 Gc        |
| Marking Dusts                     | II 3 (3) D Ex tc [ic Dc] IIIC T80°C, T95°C Dc |
| IECEX Conformity (non-electrical) | IECEX EPS 20.0027X                            |
| Marking Gases                     | II 3 G Ex h IIC T6, T5 Gc                     |
| Marking Dusts                     | II 3 D Ex h IIIC T80°C, T95°C Dc              |
| Ex-i circuit data                 | see table (T 1.0)                             |
| CE Marking                        | CE                                            |
| EMC Directive                     | 2014/30/EU                                    |
| Low Voltage Directive             | 2014/35/EU                                    |
| Enclosure Protection              | IP66/IP67 in acc. with EN 60529               |

## Special solutions and accessories

|               |                                                                                                     |
|---------------|-----------------------------------------------------------------------------------------------------|
| ...-CTM       | Types in aluminium housing with seawater-resistant coating, parts nickel-plated                     |
| ...-VAM       | Types in stainless steel housing, parts nickel-plated                                               |
| RedBox-...    | Terminal boxes for zone 2, 22                                                                       |
| MKK-M         | Mounting bracket for boxes type ...Box-... directly on actuator                                     |
| ExPro-TT-...  | Safety temperature trigger for fire dampers                                                         |
| RedSwitch     | 2 external aux. switches, adjustable for zone 2, 22<br>MTTF <sub>D</sub> = $1.28 \times 10^4$ years |
| HV-MK         | Comfortable manual override for ...Max actuators size M                                             |
| AR-16-xx      | Reduction part for 16 mm square connection to 14 or 12 mm shafts                                    |
| Kit-S8        | Cable glands nickel-plated                                                                          |
| WS-M          | Stainless steel weather shield adaptable to...Max actuators Size M                                  |
| Adaptions     | for dampers and valves on request                                                                   |
| RedMax-...-S3 | Ambient temperature up to $+60$ °C (T4), 110...240 VAC/DC, 25 % ED                                  |

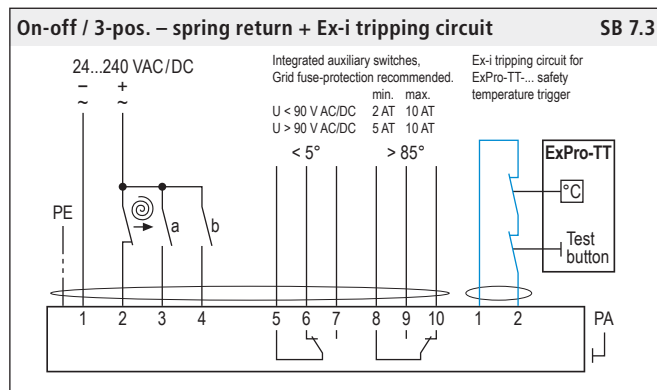
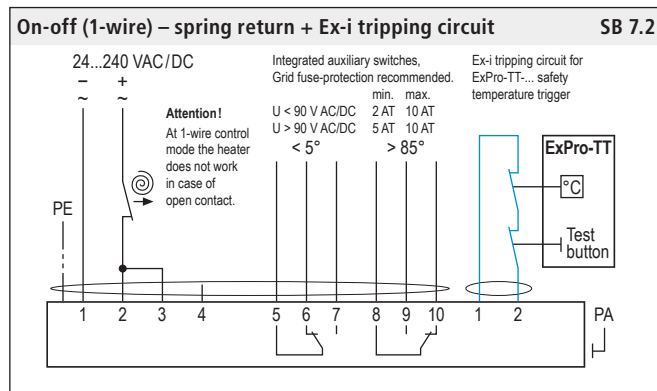
## Electrical connection

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 a terminal box is required (e.g. RedBox).

When installed, the electrical protection shall be designed with regard to the inrush current and the starting current (see additional data sheet – extra information).

Integrated auxiliary switches signal the rotation angle's position.  $U_{min}$  and  $I_{min}$  change once the switches were operated with higher voltage or current.



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

|                  |            |              |              |
|------------------|------------|--------------|--------------|
| $U_o = 5,88$ V   |            |              |              |
| $I_o = 24,75$ mA |            |              |              |
| $P_o = 37$ mW    |            |              |              |
| $C_i = 0$        |            |              |              |
| $L_i = 0$        |            |              |              |
|                  | IIC        | IIB          | IIA          |
| $L_o$            | 50 mH      | 50 mH        | 50 mH        |
| $C_o$            | 43 $\mu$ F | 1000 $\mu$ F | 1000 $\mu$ F |



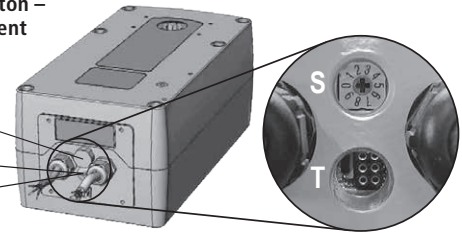
**Caution**

During commissioning apply a self adjustment drive.  
Regard duty cycle at motor running times!  
Never use spring return actuators without external load.  
Risk of injury due to rotating handwheel for actuators with spring return!

## 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:  
RedMax-30-BF

| Type              | Torques                |    |
|-------------------|------------------------|----|
| RedMax- 30 -BF ▶  | 30 Nm                  |    |
| RedMax- 50 -BF ▶  | 50 Nm                  |    |
| RedMax- 60 -BF ▶  | 60 Nm                  |    |
|                   | ▼                      |    |
| Running times     | Position of switch (S) |    |
| 40 s/90° ▶        | 00                     | 05 |
| 60 s/90° ▶        | 01                     | 06 |
| <b>90 s/90° ▶</b> | <b>02</b>              | 07 |
| 120 s/90° ▶       | 03                     | 08 |
| 150 s/90° ▶       | 04                     | 09 |

**Result:**  
Switch position 02

### Functions, adjustments and parameters

#### A) Self adjustment of angle of rotation

Turn switch (S) to position 02. Press button (T) for a minimum of 3 seconds. The actuator drives to both end positions and detects the blocking positions. The LED flashes GREEN during adjustment.

The adjustment takes about 60 seconds (30 sec. "On", 30 sec. "Off").

#### B) Selecting motor running time and torque

Adjust parameters only if actuator is in idle state or without applied potential. Turn switch (S) to the position required for the intended operation acc. to table above. The selected parameters will be carried out at the actuator's next operation.

#### C) Function of the ExPro-TT... in the Ex-i tripping circuit

When the ...Pro-TT's tripping circuit is opened the actuator runs into its end position with spring return.

#### D) Additional information for control in 3-pos. operation

a closed, b open = direction I  
a and b closed = motor doesn't work  
b closed, a open = direction II  
a and b open = motor doesn't work

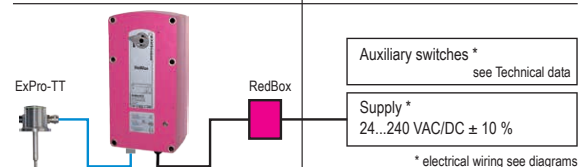
The rotation direction (I and II) depends on left/right mounting of the actuator to the damper. To reverse the rotation direction (by motor) exchange the electrical wiring of terminal 3 and 4.

### Installation

Ex area –  
zone 2, 22



Safe area



- Do not open the cover when circuits are live
- Connect potential earth
- Close all openings to ensure enclosure protection
- Clean only with damp cloth, avoid dust accumulation



### WARNING

**Warning for enclosure with coating:** The enclosure with a coating must not be used in areas affected by charge-producing processes, mechanical friction and separation processes, electron emission, and pneumatically conveyed dust. Clean only with damp cloth!

## 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 with. 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. RedBox-...).

**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/IP67.

**Attention:** For outdoor installation a protective weather shield WS against sun, rain and snow must be applied to the actuator as well as a constant supply at terminal 1 and 2 for the integrated heater. During commissioning apply a self adjustment drive.

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 16 x 16 mm. 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. 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, a minimal break of 0.5 s between the impulses is recommended. At changing direction the pause is 1 s.

### F. 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.

### G. 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.

### H. 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 irreversibly. 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!

### I. Synchron mode

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

### J. Mechanical protection

Actuators must be operated with a minimum external load.

After installing the actuator to the damper/armature a self adjustment drive has to be performed in order to protect the damper/armature against mechanical overload. During operation the actuator reduces briefly its speed (motor power) before reaching the end position for a "gentle" blockade/stop.

### K. Intrinsically safe circuits

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!

### L. Routine tests of fire dampers

For periodic inspection of fire dampers cut off the supply line (current of actuator).

The test button 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 RedSwitch – auxiliary switch



For an end or inclined position indication it is possible to retrofit external, adjustable, explosion-proof auxiliary switches type RedSwitch.

The ...Switch is mounted directly to the actuator. The switches deliver a potential free output and can be adjusted separately. They are connected by cable.

### Accessory RedBox – terminal box



For electrical connection of the ...Max actuator in a hazardous area an explosion-proof terminal box is required.

To adapt the ...Box directly to the actuator housing a mounting bracket is required.

RedBox- BF for ...Max-...-BF

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