# InMax ¼ turn actuators – size M

Electrical rotary actuators with integrated thermal circuit limiter (optional) for use in safe areas
On-off / 3-pos. control mode, 24…240 VAC/DC, 95° angle of rotation incl. 5° pretension
24 – 40 Nm with safety operation (spring return), optional with auxiliary switches

| |
|---|
| **InMax - ... - F3** |
| **InMax - ... - SF3** |
| **InMax - ... - BF3** |
| **InMax - ... - CTM** |
| **InMax - ... - VAM** |

**Subject to change!**

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

| Type | Torque | Supply | Motor running time | Spring return* | Control mode | Feedback | Wiring diagram |
|---|---|---|---|---|---|---|---|
| **InMax- 30 - F3** | 24 Nm | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 3 s/90° | On-off | – | SB 2.4/2.5 |
| **InMax- 50 - F3** | 40 Nm | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 3 s/90° | On-off | – | SB 2.4/2.5 |
| **InMax- 30 - SF3** | 24 Nm | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 3 s/90° | On-off | 2 × aux. switches | SB 2.4/2.5 + 3.2 |
| **InMax- 50 - SF3** | 40 Nm | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 3 s/90° | On-off | 2 × aux. switches | SB 2.4/2.5 + 3.2 |
| **InMax- 30 - BF3** | 24 Nm | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 3 s/90° | On-off | 2 × aux. switches + tripping circuit | SB 2.4/2.5 + 7.4 |
| **InMax- 50 - BF3** | 40 Nm | 24...240 VAC/DC | 40 / 60 / 90 / 120 / 150 s/90° | ~ 3 s/90° | On-off | 2 × aux. switches + tripping circuit | SB 2.4/2.5 + 7.4 |
| **InMax- ... - CTM** | Types as above with aluminium housing and seawater resistant coating (cable glands brass nickel-plated) | | | | | | |
| **InMax- ... - VAM** | Types as above with stainless steel housing for aggressive ambient (cable glands brass nickel-plated) | | | | | | |

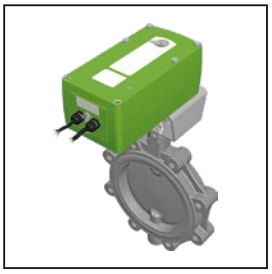
*At low temperatures the spring return time might vary. For further assistance please contact our sales team.

## Product views and applications

**Fire/air damper**

**Ball valve**

**Throttle valve**



## Description

The InMax 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.
IP67 protection, small dimensions, only 9,5 kg weight, universal functions 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-...-F3** actuators are equipped with spring return fail safe function. Additionally the **...Max-...-SF3** and **...-BF3** actuators are equipped with 2 integrated, potential free auxiliary switches each and **...Max-...-BF3** comes with a tripping circuit for connecting the ...Pro-TT-... safety temperature trigger. Standard shaft connection is a double square direct coupling with 16 × 16 mm.
Different accessories are available to adapt auxiliary switches, terminal boxes or adaptions for ball valves and throttle valves and other armatures.

## Highlights

- ▶ Industrial use
- ▶ Universal supply unit from 24…240 VAC/DC
- ▶ Motor running times 40–60–90–120–150 s/90° adjustable on site
- ▶ On-off control with spring return function
- ▶ Circuit for direct connection of the ...Pro-TT-... safety temperature trigger (type ...-BF3)
- ▶ 2 integrated auxiliary switches, switching at 5° and 85° angle of rotation
- ▶ 30–50 Nm actuators in the same housing size
- ▶ 100 % overload protected
- ▶ Compact design and small dimension (L × W × H ~ 288 × 149 × 116 mm)
- ▶ Direct coupling to the damper shaft with double square connection 16 × 16 mm
- ▶ 95° angle of rotation inclusive 5° pretension
- ▶ Robust aluminium housing (optional with seawater resistant coating) or in stainless steel
- ▶ IP67 protection
- ▶ Simple manual override included + preparation for comfortable manual override
- ▶ Gear made of stainless steel and sinter metal
- ▶ Weight only ~ 9,5 kg
- ▶ 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



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| Technical data | InMax- 30 - F3 | InMax- 50 - F3 | InMax- ... - SF3 | InMax- ... - BF3 |
|---|---|---|---|---|
| **Torque motor (min.)** | 30 Nm | 50 Nm | 30 resp. 50 Nm | 30 resp. 50 Nm |
| **Torque spring (F)** | ~ 24 Nm | ~ 40 Nm | ~ 24 resp. ~ 40 Nm | ~ 24 resp. ~ 40 Nm |
| **Torque blockade** | In blockade and end positions torques are higher than above specified torques for motor and spring | | | |
| **Dimensioning of external load** | min. 8 Nm | min. 15 Nm | min. 8 resp. 15 Nm | min. 8 resp. 15 Nm |
| **Supply voltage / frequency** | 24...240 VAC/DC ± 10 %, self adaptable, frequency 50...60 Hz ± 20 % | | | |
| **Power consumption** | max. starting currents see ⓘExtra information (in acc. with voltage, $I_{start}$ >> $I_{rated}$), approx. 5 W holding power, approx. 16 W waiting time electronic | | | |
| **Protection class** | Class I (grounded) | | | |
| **Angle of rotation and indication** | 95° incl. ~ 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° selectable on site | | | |
| **Motor** | Brushless DC motor | | | |
| **Control mode** | On-off | | | |
| **Spring return (F)** | spring return upon voltage interruption or opening of line 3, response time up to 1 sec. after voltage interruption | | | |
| **Spring return running time (F)** | ~ 3 s/90° (For usage at low temperatures please contact our sales team) | | | |
| **Safety operations at 3 sec. (F)** | min. 1,000 acc. to construction of damper and ambient. Consider minimum external load! | | | |
| **Tripping circuit ...-BF3** | Circuit to connect the InPro-TT-... safety temperature trigger directly to the actuator with M12 quick connection | | | |
| **Aux. switches ...-SF3, ...-BF3** | 2 integrated auxiliary switches, switching at 5° and 85° angle of rotation, potential free. Grid fuse-protection is recommended! | | | |
| | $U_{max}$/ $I_{max}$ 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 | | | |
| | $U_{max}$/ $I_{max}$ DC = 48 V/1 A; $I_{min}$ AC/DC = 5 mA; $I_{min}$ AC/DC = 100 mA | | | |
| **Axle of the actuator** | Double square 16 × 16 mm, direct coupling, 100 % overload protected | | | |
| **Electrical connection** | Cable ~ 1 m, wire cross section 0.5 mm², equipotential bonding 4 mm². Connections require a terminal box! | | | |
| **Diameter of cable** | ~ Ø 7.0 mm | ~ Ø 7.0 mm | ~ Ø 7.0 + 7.6 mm | ~ Ø 9.6 mm |
| | 2 cables in version ...-SF3 | | | |
| **Cable gland** | M16 × 1.5 mm | | | |
| **Manual override** | Use delivered socket wrench, max. 4 Nm | | | |
| **Housing material** | Aluminium die-cast housing, coated. Optional with seawater resistant coating (...-CTM) or stainless steel housing, | | | |
| | № 1.4581 / UNS-J92900 / similar AISI 316Nb (...-VAM) | | | |
| **Dimensions (L × W × H)** | ~ 288 × 149 × 116 mm, for diagrams see ⓘExtra information | | | |
| **Weight** | ~ 9.5 kg aluminium housing, stainless steel ~ 15 kg | | | |
| **Ambients** | Storage temperature −40…+70 °C, working temperature −20…+50 °C | | | |
| **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 2.4 / 2.5 | SB 2.4 / 2.5 | SB 2.4 / 2.5 + 3.2 | SB 2.4 / 2.5 + 7.4 |
| **Scope of delivery** | Actuator, 4 screws M8 × 140 mm, 4 nuts M8, Allen key for simple manual override | | | |
| **Parameter at delivery** | 90 s/90° | 90 s/90° | 90 s/90° | 90 s/90° |

| Approbations | |
|---|---|
| **CE identification** | CE |
| **EMC directive** | 2014/30/EU |
| **Low voltage directive** | 2014/35/EU |
| **Enclosure protection** | 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 |
| **InBox-...** | Terminal boxes |
| **MKK-M** | Mounting bracket for boxes type ...Box-... directly on actuator |
| **InPro-TT-...** | Safety temperature trigger for fire dampers |
| **InSwitch** | 2 external aux. switches, adjustable |
| **AR-16-xx** | Reduction part for 16 mm square connection to 14 or 12 mm shafts |
| **Kit-S8** | Cable glands nickel-plated |
| **Adaptions** | for dampers and valves on request |
| **InMax-...-S3** | Ambient temperature up to +60 °C, 110...240 VAC/DC, 25 % ED |


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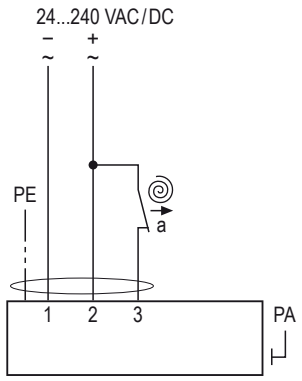
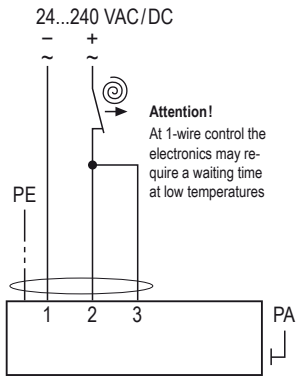
## Electrical connection

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 or line 3 opened. For electrical connection a terminal box is required (e.g. InBox).
An over-current protection fuse < 10 A has to be provided by installer.
Note: The initial current is appr. 2 A for 1 second.
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.

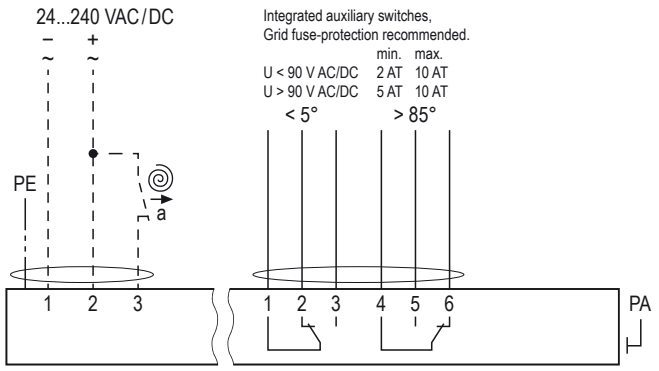
### On-off SB 2.4



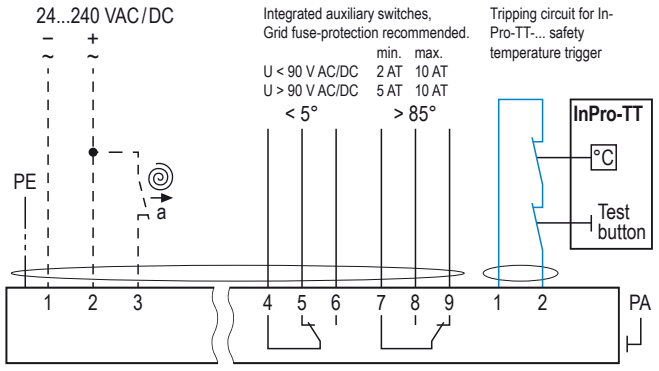

### On-off (1 wire) SB 2.5




### Wiring of integrated auxiliary switches SB 3.2




### On-off – spring return + tripping circuit SB 7.4

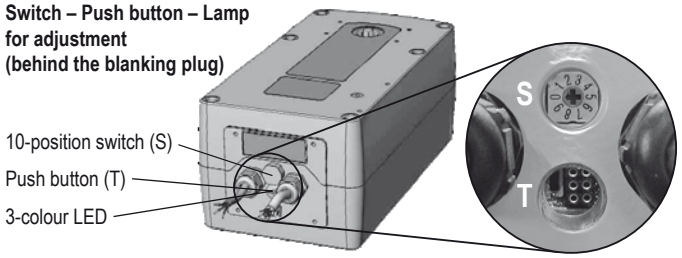



**⚠ Attention ⚠**

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)**




### Parameter selection

Example:
InMax-30-BF

**Requested parameter:**
Torque 30 Nm
Motor running time 90 s/90°

**Result:**
Switch position 02

| Type | | Torques (motor) | | |
|---|---|---|---|---|
| **InMax- 30 -BF3** | ▶ | **30 Nm** | | |
| InMax- 50 -BF3 | ▶ | 50 Nm | | |
| ▼ | | | | |
| **Running times** | | **Position of switch (S)** | | |
| 40 s/90° | ▶ | 00 | 05 | |
| 60 s/90° | ▶ | 01 | 06 | |
| **90 s/90°** | ▶ | **02** | 07 | |
| 120 s/90° | ▶ | 03 | 08 | |
| 150 s/90° | ▶ | 04 | 09 | |

### Functions, adjustments and parameters

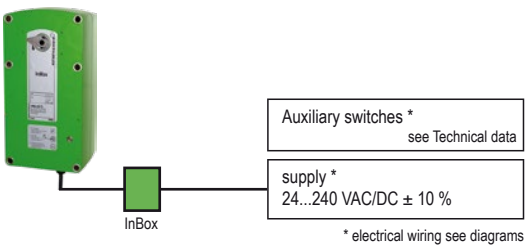
**A) Self adjustment of angle of rotation**
**ATTENTION:** To adjust the angle of rotation connect only wire 1 and 2. Do not connect wire 3.
Apply supply voltage to wire 1 and 2. Turn switch (S) to position 02. Press button (T) for a minimum of 3 seconds. The actuator drives to the first end position, detects the blocking position and performs a spring return to the starting position. The LED flashes GREEN during adjustment. After that disconnect from the mains and connect wire 3.
The adjustment takes about 93 seconds (90 sec. "On", 3 sec. "Off").

**B) Selecting motor running time**
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 InPro-TT-... in the 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 On-off operation**
a closed = actuator opens
a open = spring return
The rotation direction (clockwise/counter clockwise) depends on left/right mounting of the actuator to the damper.

### Installation





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## Important information for installation and operation

**A. Installation, commissioning, maintenance**

All national and international standards, rules and regulations must be complied with. 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 connection a terminal box is required (e. g. InBox-...).
**Attention:** If the actuator is put out of operation all 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 thermical damage. Connect potential earth. Avoid temperature transfer from armature to actuator! Close all openings with min. IP67. For outdoor installation a protective weather shield against sun, rain and snow should be applied to the actuator. The waiting time of the electronics at low temperatures can be minimized by a constant voltage supply to terminals 1 and 2. During commissioning apply a self adjustment drive. Actuators are maintenance free. An annual inspection is recommended. 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 × 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-...-BF3 will work only with the temperature trigger InPro-TT-...

**E. 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.

**F. Operation at low ambient temperatures**

The spring return time at low temperatures might vary. Please contact our sales team for further information.

**G. Excess temperatures**

All actuators are 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!

**H. Synchron mode**

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

**I. 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.

**J. Routine tests of fire dampers**

For periodic inspection of fire dampers cut off the supply line (current of actuator). The test button at InPro-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 InSwitch – auxiliary switch

For an end or inclined position indication it is possible to retrofit external, adjustable auxiliary switches type InSwitch.
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 InBox – terminal box

For electrical connection of the ...Max actuator a terminal box is required.
To adapt the ...Box directly to the actuator housing a mounting bracket is required.

| | |
|---|---|
| InBox- 3P | for ...Max-...-F3 |
| InBox- Y/S | for ...Max-...-SF3 |
| InBox- BF | for ...Max-...-BF3 |


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# Extra information for ...Max actuators – size M

for optimization of planning, installation and initial startup for safe operation

## Assembly

- Dimensions, drill plate
- Control elements: switch – push buttons – LED
- Outdoor installation
- Mounting on air dampers (form-fit)
- Mounting on fire dampers (form-fit)
- Mounting on butterfly valves and ball valves
- Mounting of terminal box ...Box
  and auxiliary switch ...Switch

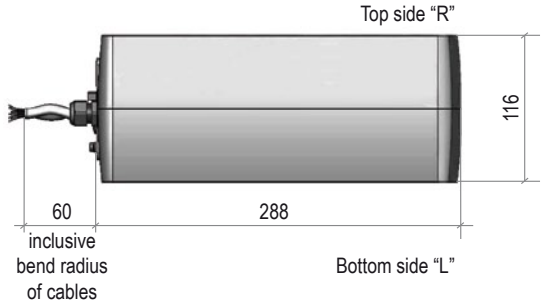
## Electric

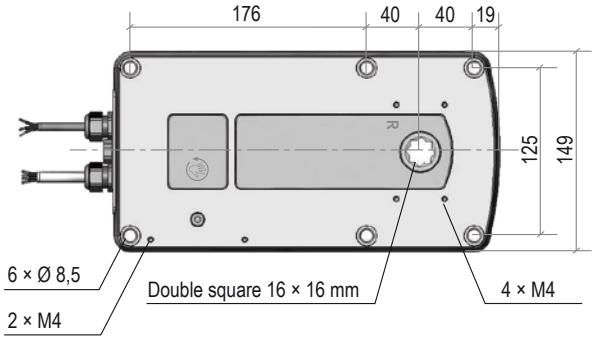
- Power supply design
- Line cross sections
- Problem treatment / error indication

**Subject to change!**

## ► Dimensions

Dimensioning in mm

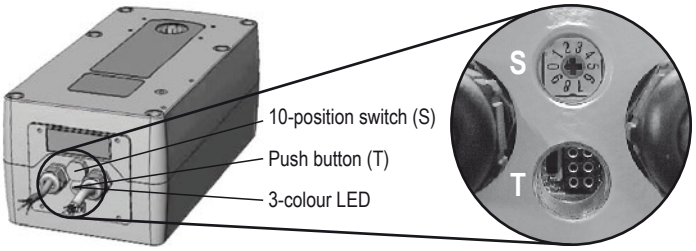



## ► Control elements: switch – push button – LED

All actuators are equipped with a 10-position switch, a push button and a multicolour LED for calibration. These control elements are to be found cable-laterally behind the two middle sectioned dummy plugs. For operation these must be removed. The calibration can be achieved despite lining up power supply at the actuator. The explosion prevention is not impaired thereby. However, it has to be of great concern that the dummy plugs must be rescrewed in order to comply with the IP-protection class.
The operation of the switch and button has to be done by means of a small screwdriver. Force with strong pressure and /or rotation is to be avoided in any case, since otherwise control electronics can be damaged irreparably. Adjustments of torque and running time can be achieved also before mounting. The adjustment of angle of rotation can be started only with an outside load and accurate mounting.

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




## ► Outdoor installation

When mounting actuator outdoors it has to be certain that the actuator is protected against direct sun exposure (heat and UV!), rain and snow by employing an enclosure roof. Supply voltage is to be applied immediately after mounting in order to assure integrated heating at start.
Since actuators must have an internal temperature fuse, they may not be exposed to a too high temperature, neither at storage nor during operation. Otherwise the fuse could respond and switch off the actuator irreversibly.

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## ▶ Mounting of ...Max actuators

...Max actuators size M are equipped with a 16 × 16 mm (double square) shaft connection by default. The form-fitting shaft connection is the most secure connection between damper shaft and actuator because slipping or slipping through is avoided compared to the force-fit clamp-connection.
The actuator will be connected firmly to the damper or fixed to a mounting bracket by means of four screws M8 (scope of delivery).
For square damper shafts 12 × 12 mm or 14 × 14 mm reducing bushes are also available.

The actuators are axially symmetric developed. In case of spring return function the safety position must be selected by turning the actuator to 180°.
Furthermore it is to be considered that the actuators have a total angle movement of approx. 95° in order to realize a pretension on the control element (damper or the like). Therefore the actuator sits tilted on the damper shaft.

In order to adjust this and to induce pretension, the driving shaft has to be alined mechanically over the hand-operated control socket "HV" when connecting to the damper shaft.
The socket wrench has to be turned **counterclockwise** when facing the actuator's **"side R"**, facing **"side L"** turn manual override **clockwise.**

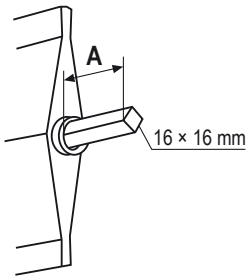
**Attention: Mount with appropriate safety precautions only!**
- The drive shaft may only be mechanically adjusted either with the provided socket wrench or the optional accessory "HV-MK" manual override (turn off power supply). External force applied to the shaft can lead to mechanical damage of the actuator!
- At the manual override counteracting forces occure when mounting spring return actuators. **Do NOT release manual override under spring tension!**

## ▶ Mounting on air dampers

### Form-fitted shaft connection – Mounting on square damper shaft

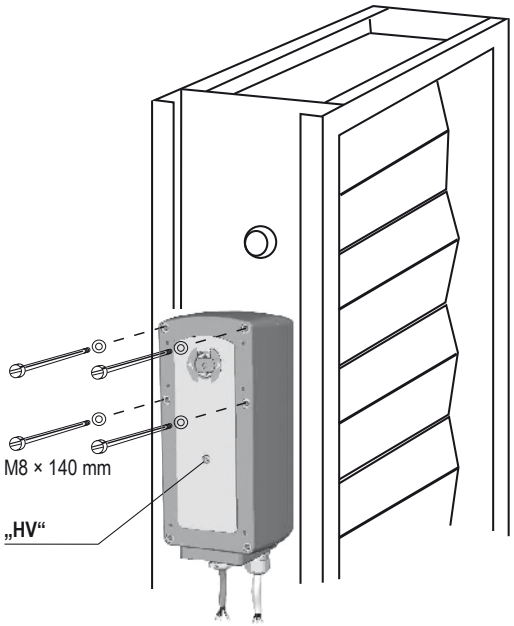
**Mounting:**
1. Affix tap holes M8 (in accordance with drill template) on the damper or to a mounting bracket.
2. Adjust drive shaft of the actuator with the socket wrench that the drive stands perpendicularly to the damper before plugging actuator onto the damper shaft.
3. Plug actuator onto damper shaft and fix diagonally with 2 screws.
4. Remove the socket wrench.
5. Pivot and tighten the remaining screws.

### Dimension of the damper shaft




**Length A**
Measure A in acc. with indicator:

| | |
|---|---|
| 1. Actuator without indicator | **A = no limit** |
| 2. Actuator with indicator, no accessories | **A < 95 mm** |




4 screws M8 × 140 mm as well as a socket wrench are part of delivery.
For square damper shafts 12 × 12 mm or 14 × 14 mm reducing bushes are available as optional accessories.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## ▶ Mounting on fire dampers

ExMax-...-BF and RedMax-...-BF actuators integrate an intrinsically safe circuit in order to connect an ExPro-TT-... sensor which works like a temperature trigger. InMax-... and InPro-TT-... are for non hazardous areas.

**Mounting:**

1. Affix tap holes M8 (in accordance with drill template) on the damper or to a mounting bracket
2. Adjust drive shaft of the actuator with the socket wrench that the drive stands perpendicularly to the damper before plugging actuator onto the damper shaft
3. Plug actuator onto damper shaft and fix diagonally with 2 screws
4. Remove the socket wrench
5. Pivot and tighten the remaining screws
6. Mount temperature trigger ...Pro-TT-...
7. Mount terminal box (type ...Box-BF)
8. Plug sensor connector into actuator's socket

**Connection of safety temperature trigger ...Pro-TT-...**

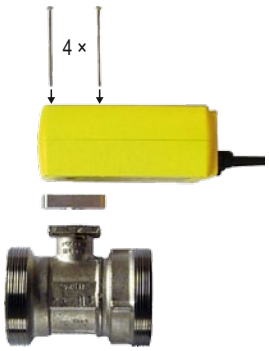
The temperature trigger is mounted directly to the duct or damper wall with pre-assembled tapping screws. The position of the safety elements must guarantee free air flow. ...Pro-TT-... is mounted to the actuator by means of quick fastener M12.

## ▶ Mounting to ball valves and butterfly valves

Actuators of size M are equipped by default with a 16 × 16 mm double square form-fitting shaft connection. For mounting to butterfly valves or ball valves a special mounting bracket in acc. with DIN EN ISO 5211 is required.

Since this standard provides only certain basic conditions there can be substantial geometrical differences between armatures which require a special adaption.

**Mounting to a ball valve**




**Mounting to a butterfly valve**

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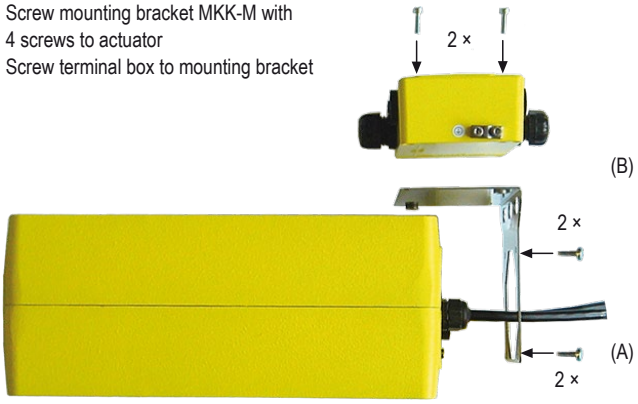
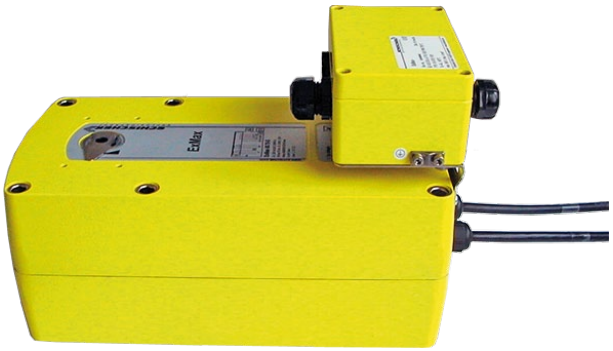
## ► Mounting of terminal boxes ...Box to actuator via mounting bracket MKK-M (accessory)

A) Screw mounting bracket MKK-M with 4 screws to actuator
B) Screw terminal box to mounting bracket




**Mounting bracket can be mounted every 90°**

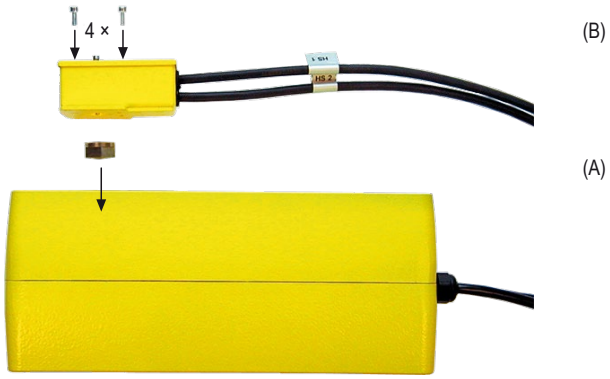
**Terminal box mounted above the actuator**



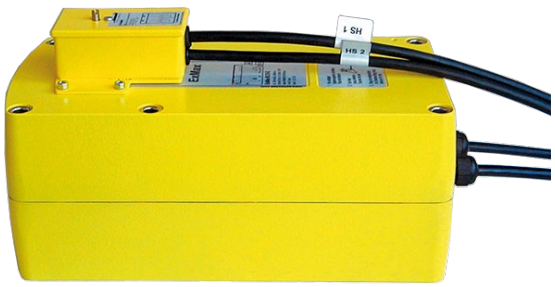
**Terminal box mounted beside the actuator**

## ► Mounting of auxiliary switch ...Switch to actuator

A) Place square connection part on actuator's shaft
B) Mount ...Switch and fix it with screws




**...Max with mounted ...Switch**

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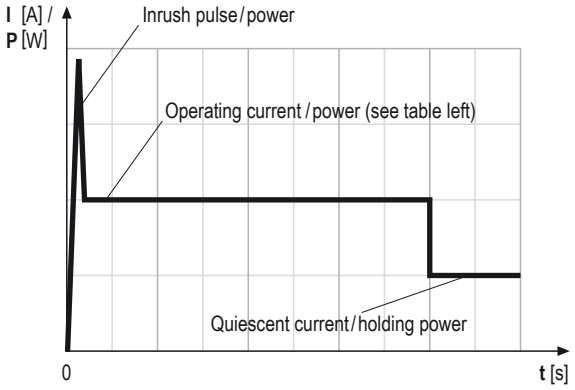
## ► Power input depending on supply voltage

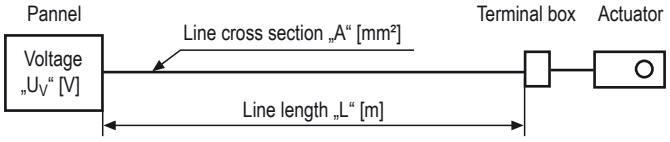
The design of the on-site supply depends on the selected motor running time and selected supply voltage. Accompanying values are “about values” since there can be construction unit dispersions within electronics. The holding power is run time independently typical at ~ 5 W. The power consumption for the heater is ~ 16 W. In the heating phase the motor is not active!
The initial starting supply voltage required by the actuators power supply unit is ~ 2.0 A. The starting pulse takes about 1 sec. (please consider this while concepting the cross section of the supply line). The power factor is between 0.8 and 0.5 in dependence of motor running time. A line protection should be min. 2 AT.

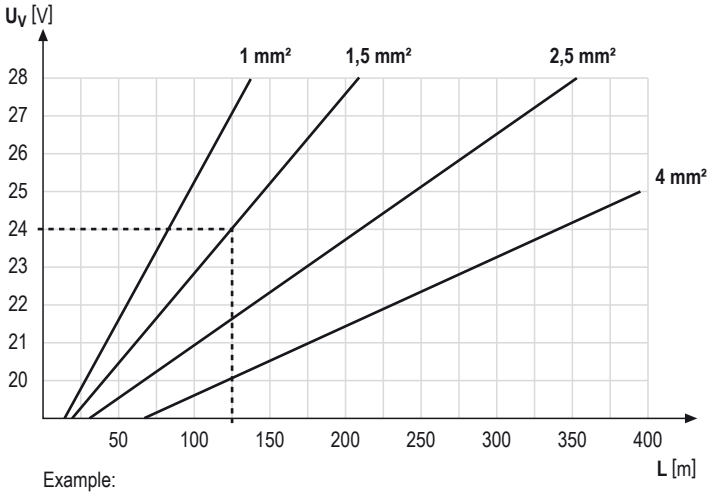
| | | Rated current in acc. with motor running time | | | | |
|---|---|---|---|---|---|---|
| **Voltage** | **Current** | **40 s** | **60 s** | **90 s** | **120 s** | **150 s** |
| **24 V DC** | $I_{Nominal}$ | 1,5 A | 1,0 A | 0,8 A | 0,7 A | 0,7 A |
| **120 V AC** | $I_{Nominal}$ | 0,26 A | 0,18 A | 0,14 A | 0,12 A | 0,12 A |
| **240 V AC** | $I_{Nominal}$ | 0,13 A | 0,09 A | 0,07 A | 0,06 A | 0,06 A |




## ► Cross sections of the inlet line

On long distances between voltage supply and drive, voltage drops occur due to line resistances. As a consequence with 24 VAC/DC the actuator receives a too low tension and does not start. In order to prevent this the cross section of the inlet line is to be dimensioned accordingly.
The accompanying formulas allow the calculation of the necessary line cross section respectively maximal permitted conduit length respectively utilizing the existing line cross section.
Alternatively the secondary voltage can be increased by selecting a transformer.




Example:
24 V power supply with wire diameter 1.5 mm² = cable length 126 m

Required **cable cross section A** at existing cable length L

$$A = 0{,}0714 \times L : (U_V - 18\ V)$$

Example: L = 250 m, $U_V$ = 30 V
Cross section A = 1,5 mm²

Maximum **cable length L** at existing cross section A

$$L = A \times (U_V - 18\ V) : 0{,}0714$$

Example: A = 1.5 mm², $U_V$ = 24 V
Length of cable L = 126 m

For calculation following characteristics are essential:

$U_V$ = supply voltage [V]
A = line cross section [mm²]
L = conduit length [m]

Factor 0.0714 = drive specific factor [Vmm²/m]
(based on the electrical conductivity of electrolytic copper with a coefficient of 56 m/Ωmm²)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## ► Problem handling / Error indication

| | Problem | Possible cause | Course of action |
|---|---|---|---|
| 01 | Actuator does not work<br>LED does not light | • No power supply attached | • Attach power supply and turn on |
| | | • The actuator is operated at ambient temperature beyond specifications and the internal temperature fuse shuts down irreversibly | • Caused by inadmissable operation and for safety relevant reasons the actuator drove into an irreversable condition and must be exchanged. accompanying new installation the ambient temperature has to be reduced accordingly |
| 02 | Actuator does not work<br>LED lights RED | • The actuator is operated at a too high ambient temperature and the internal temperature sensor responded | • Shut off actuator and let temperature decrease, reduce ambient temperature by suitable measures e.g. ventilation or other mounting position of the actuator |
| | | • ...-BF actuators require a temperature trigger type ...Pro-TT or FireSafe | • Connect trigger, LED changes to GREEN, actuator is ready-to-operate |
| 03 | Actuator does not work<br>LED lights GREEN | • 3-pos. control signal is wired on both entrances | • Readjust / correct circuit |
| | | • Required torque is greater than actuators torque | • Adjust a higher torque at the actuator if possible otherwise exchange for a type with higher torque |
| | | • Control signals are not attached or attached on a wrong conductor | • Examine rule and adjusting signals and connect in accordance with diagram |
| | | • Actuator is incorrectly mounted and is blocked by an external stop unit | • Dismount actuator and testdrive without load for operability. Then install actuator accordingly so that the power transmission of the actuator runs the armature/damper without external blockade or torsion |
| | | • Interchanged supply lines | • Switch wires: 1 must be connected to (−, N) and wire 2 to (+, L) |
| 04 | Actuator does not work<br>LED is blinking RED | • The actuator has been mounted at temperatures < −20 °C and did not reach is operating temperatur of at least −20 °C | • Ensure that a constant voltage supply is applied on conductor 1–2<br>• Wait until the required operating temperature is achieved by the actuators internal heating system.The actuator will start operating independently |
| 05 | Y-drive in 3-pos. mode cannot gear into intermediate positions | • The conversion of constant mode to 3-pos. mode was not set | • Recalibrate the actuator in accordance with assembly instructions |
| 06 | Actuator sits diagonally on square damper shaft | • Actuators have an angle of rotation of 95° incl. 5° pretension. While assembling the pre-load was not considered | • Dismount actuator off the damper, use enclosed socket wrench to draw up approx. 5° over the hand operated control device before remounting on the damper shaft. Consider assembly instructions! |
| 07 | A modulating Y-actuator working with reduced angle of rotation, reaches its end positions already at > 0 V / 4 mA resp. < 10 V / 20 mA | • At start up no self-adjustment of angle of rotation was accomplished | • Accomplish self adjustment of angle of rotation in accordance with assembly instruction |
| 08 | LED flashes irregularly and actuator does not work | • Actuator does not receive sufficient supply voltage | • Increase line cross section or power supply |
| | | • Cable to long, voltage drop in the supply line to large | • Increase line cross section or power supply |



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