

InMax ¼ turn actuators – size S

Electrical rotary actuators for use in safe areas On-off / 3-pos. control mode, 24...240 VAC/DC, 95° angle of rotation incl. 5° pretension 5/10 Nm, 15/30 Nm without and 5/10 Nm, 15 Nm with safety operation (spring return)

InMax
InMax F
InMax S
InMax SF
InMax CTS
InMax VAS

Subject to change!

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

Туре	Torque	Supply	Motor running time	Spring return	Control mode	Feedback	Wiring diagram
InMax-5.10	5 / 10 Nm	24240 VAC/DC	3 / 15 / 30 / 60 / 120 s/90°	-	On-off, 3-pos.	-	SB 1.0
InMax-15.30	15 / 30 Nm	24240 VAC/DC	3 / 15 / 30 / 60 / 120 s/90°	-	On-off, 3-pos.	-	SB 1.0
InMax-5.10 - F	5 / 10 Nm	24240 VAC/DC	3 / 15 / 30 / 60 / 120 s/90°	3 or 10 s/90°	On-off, 3-pos.	-	SB 2.0/2.1
InMax-15 - F	15 Nm	24240 VAC/DC	3 / 15 / 30 / 60 / 120 s/90°	3 or 10 s/90°	On-off, 3-pos.	-	SB 2.0/2.1
InMax S/SF	Types as above with 2 integrated, potential free auxilliary switches, 5° and 85° angle of rotation 2 × aux. switches SB 3.0						
InMax CTS	Types as above with aluminium housing and seawater resistant coating (cable glands brass nickel-plated)						
InMax VAS	Types as above with stainless steel housing for aggressive ambient (cable glands brass nickel-plated)						

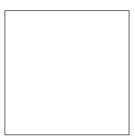
Product views and applications











Safety damper

Ball valve

Throttle valve

Description

The InMax actuators are a revolution for safety, control 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.

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-...F actuators are equipped with spring return fail safe function. Standard shaft connection is a double square direct coupling with 12 \times 12 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
- ▶ 5 different motor running times 3–15–30–60–120 s/90°, adjustable on site
- 2 different spring return running times ~ 3–10 s/90°, selectable on site
- On-off and 3-pos. control with or without spring return function
- > 5-10-15-30 Nm actuators in the same housing size
- 100 % overload protected and self locking
-) Compact design and small dimension (L \times W \times H = 210 \times 95 \times 80 mm)
-) Direct coupling to the damper shaft with double square connection $12 \times 12 \text{ mm}$
- > 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
-) 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		InMax- 5.10	InMax- 15.30	InMax- 5.10 -F	InMax- 15 -F		
Torque motor (min.)		5 / 10 Nm selectable on site	15 / 30 Nm selectable on site	5 / 10 Nm selectable on site	15 Nm		
Torque spring (F)		-	-	min. 10 Nm	min. 15 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. 3 Nm					
Supply voltage / frequency		24240 VAC/DC ± 10 %, self adaptable, frequency 5060 Hz ± 20 %					
Power consumption		max. starting currents see ① Extra information (in acc. with voltage, I start >> I rated), approx. 5 W holding power, approx. 16 W for heater					
Protection class		Class I (grounded)					
Angle of rotation and indic	ation	95° incl. ~ 5° 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° sele	ectable on site				
3 sec. mode – motor		In acc. with the supply voltage	and external torque 3 to 4 s/90°	angle of rotation			
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 inte	rruption		
Spring return response time	e	-	-	up to 1 sec. after voltage interr	ruption		
Spring return running time	(F)	-	-	~ 3 or 10 s/90° selectable on site			
3 sec. mode – spring return		-	-	~ 3 to 4 s/90° angle of rotation acc. to external load			
Safety operations at	10 sec. (F)	-	-	min. 10,000 acc. to construction of damper and ambient			
at 3 sec. (F)		– min. 1,000 acc. to construction of damper and ambient					
Auxiliary switches	S,SF	2 integrated auxiliary switches, switching at 5° and 85° angle of rotation, potential free. Grid fuse-protection is recommended! Umax I Imax AC = 250 V/5 A; Umin AC/DC = 5 V; After one-time operation with U > 24 V AC/DC or I > 100 mA: Umin AC/DC = 12 V Umax I Imax DC = 48 V/1 A; Imin AC/DC = 5 mA; Imin AC/DC = 100 mA;					
Axle of the actuator		Double square 12 × 12 mm, direct coupling, 100 % overload protected and self locking up to 15 Nm					
Electrical connection		Cable ~ 1 m, wire cross section 0.5 mm², equipotential bonding 4 mm² Connections require a terminal box!					
Diameter of cable		~ Ø 7.1 mm	~ Ø 7.1 mm	~ Ø 7.4 mm	~ Ø 7.4 mm		
		2 cables in the versionsS an	dSF (~ Ø + 7.4 mm)				
Cable gland		M16 × 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 (CTS) or stainless steel housing, No. 1.4581 / UNS-J92900 / similar AISI 316Nb (VAS)					
Dimensions (L × W × H)		210 × 95 × 80 mm, for diagrams see ① Extra information					
Weight		~ 3,5 kg aluminium housing, stainless steel ~ 7 kg					
Ambients		Storage temperature –40+70 °C, working temperature –40+50 °C					
Humidity		090 % rH, non condensing					
Operating 3 sec. moto	r 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 i down) motor works only with speed of 15 s/90°					
≥ 15 sec. moto	r run time	At 15 / 30 / 60 / 120 s 100 % o	of ED is permitted (ED = duty cycle	e)			
Wiring diagrams		SB 1.0	SB 1.0	SB 2.0 / 2.1	SB 2.0 / 2.1		
Scope of delivery		Actuator, 4 screws M4 × 100 mm, 4 nuts M4, Allen key for simple manual override					
Parameter at delivery		5 Nm, 30 s/90°	15 Nm, 30 s/90°	5 Nm, 30 s/90°	15 Nm, 30 s/90°		

Approbations

CE identification	CE
EMC directive	2014/30/EU
Low voltage directive	2014/35/EU
Enclosure protection	P66 in acc. with EN 60529





Electrical connection

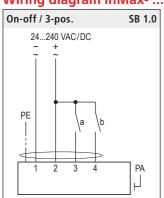
All actuators are equipped with a universal supply unit working at a voltage range from 24...240 VAC/DC. The supply unit is self adjusting to the connected voltage!

The safety operation of the spring return function works if the supply voltage is cut. For electrical connection a terminal box is required (e.g., InBox).

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.

Wiring diagram InMax- ... (without spring return)





Caution



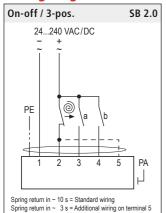
During commissioning apply a self adjustment drive.

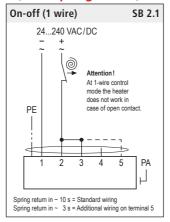
Regard duty cycle at motor running times!

Never use spring return actuators without external load.

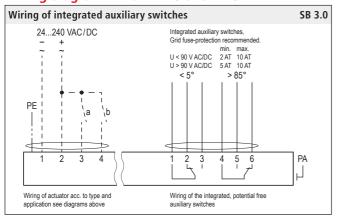
Risk of injury due to rotating handwheel for actuators with spring return!

Wiring diagram InMax- ... -F (with spring return)

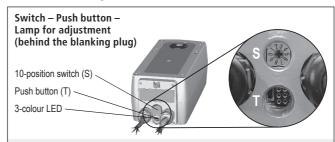




Wiring diagram InMax- ... -S and ... -SF



Parameters, adjustments and failure indication



Parameter selection

Example:
InMax-15.30

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

Result: Switch position 07

Туре			Toro	ques
InMax-	5.10	\blacktriangleright	5 Nm	10 Nm
InMax-	15.30	\blacktriangleright	15 Nm	30 Nm
InMax-	5.10-F		5 Nm	10 Nm
InMax-	15-F		15 Nm	
			▼	▼
Runnin	g times		Position of	f switch (S)
3	s/90°	\blacktriangleright	00	05
15	s/90°	\blacktriangleright	01	06
30	s/90°	\blacktriangleright	02	07 08
60	s/90°		03	08
120	s/90°	\blacktriangleright	04	09

Functions, adjustments and parameters

A) Self adjustment of angle of rotation

Turn switch (S) to position 02 (low torque) or 07 (high torque). 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) Selecting spring return time

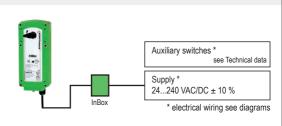
Spring return time is selected by wiring.

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

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



- 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



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 an terminal box is requested (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 a terminal box!

The cable 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. IP66.

For outdoor installation a protective housing against sun, rain and snow should 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. 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 12×12 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. Operation with 3 sec. motor running time Note following:

- 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.
- 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.
- Same function is applied on spring return actuators, fail safe operation is regarded same as a motor running cycle.
- Trying to use the 1 wire On-off methode 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.

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, ...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.

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 $-40\,^{\circ}\text{C}$ 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.
- 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

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!

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. Loss of voltage

In switch position 00, 01 and 05, 06 (motor running times 3 sec. and 15 sec.) and after interrupted voltage the actuator (types 5.10 and 15.30 and ...-S) moves in OFF position then the actuators works regarding control signal.

i Extra information (see additional data sheet)

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

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
Adaptions	for dampers and valves on request
InMaxS3	Ambient temperature up to +60 °C, 110240 VAC/DC, 25 % ED
InMaxS7	Actuator shock approved up to 500 g
InMaxS17	Connection cable ~ 3 m
InMaxS36	Actuator shock approved up to 500 g, connection cable ~ 3 m
InMaxS32	Actuator shock approved up to 500 g, connection cable ~ 3 m, ambient temperature up to +60 °C, 110240 VAC/DC, 25 % ED

InBox	Terminal boxes
MKK-S	Mounting bracket for boxes typeBox directly on actuator
InSwitch	2 external aux. switches, adjustable
HV-S	Comfortable manual override forMax actuators size S
KB-S	Clamp for damper shafts Ø 1020 mm and □ 1016 mm
AR-12-xx	Reduction part for 12 mm square connection to 11, 10, 9 or 8 mm shafts
Kit-S8	Cable glands nickel-plated

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