AXT 411: Thermal actuator for unit valves with stroke indicator

How energy efficiency is improved

Reliable actuation in efficient control systems

Features

- Low-force fitting on the valve using First Open function
- Actuator closing dimension 10.8 mm
- Max. closing force 110 N
- With 230 V or 24 V thermal expansion element
- Easily visible stroke indicator
- NC “normally closed” and NO “normally open” versions
- Re-open function for manually opening the actuator for servicing
- Low-noise and maintenance-free
- Fixed harmonised cable, 1 m, with stripped wire ends
- Valve adaptation with M30 × 1.5 plastic cap nut
- Fitting in any position, including upside down

AXT411F110

AXT411F210

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ValveDim app

Technical data

Power supply		
	Power supply 24 V~	±20%, 50…60 Hz
	Power supply 24 V=	±20%
	Power supply 230 V~	±15%, 50…60 Hz
	Rated power during continuous operation	1.7 W (230 V~) 1.6 W (24 =/~)
	Starting power 24 V~/=	5 W / 5 VA
	Starting power 230 V~	35 W / 35 VA
	Start-up current 24 V~	200 mA
	Start-up current 230 V~	150 mA
Parameters		
	Closing force	110 N
	Stroke	Max. 4.5 mm
	Closing dimension	10.8 mm (actuator)
Ambient conditions		
	Operating temperature for valve	Max. 100 °C
	Storage and transport temperature	−25…70 °C
	Ambient temperature	0…50 °C
	Ambient humidity	< 85% rh, no condensation
Construction		
	Housing	Traffic white (RAL 9016)
	Position indicator	Luminous yellow (RAL 1026)
	Housing material	Flame retardant plastic, fire protection as per EN 60695-2-11, EN 60695-10-2
	Power cable	2 × 0.75 mm², white, H05
	Weight	0.1 kg
Standards, directives		
	Type of protection	IP54 (EN 60730-1)
	Protection class 24 V	III (EN 60730-1)
	Protection class 230 V	II (EN 60730-1)
CE conformity according to	Low-Voltage Directive 2014/35/EU	EN 60730-1, EN 60730-2-14
	RoHS Directive 2011/65/EU	EN IEC 63000
	EMC Directive 2014/30/EU	EN 60730-1, EN 60730-2-14

Overview of types					
Type	Voltage	Direction of closure	Min. running time	Cable length	Cable type
AXT411F110	230 V	NC	3.5 min	1 m	H05 (0.75 mm²)
AXT411F120	230 V	NC	3.5 min	2 m	H05 (0.75 mm²)
AXT411F150	230 V	NC	3.5 min	5 m	H05 (0.75 mm²)
AXT411F210	230 V	NO	3.5 min	1 m	H05 (0.75 mm²)
AXT411F220	230 V	NO	3.5 min	2 m	H05 (0.75 mm²)
AXT411F250	230 V	NO	3.5 min	5 m	H05 (0.75 mm²)
AXT411F120H	230 V	NC	3.5 min	2 m	H05 (0.75 mm²), halogen-free
AXT411F112	24 V	NC	4.5 min	1 m	H05 (0.75 mm²)
AXT411F122	24 V	NC	4.5 min	2 m	H05 (0.75 mm²)
AXT411F152	24 V	NC	4.5 min	5 m	H05 (0.75 mm²)
AXT411F212	24 V	NO	4.5 min	1 m	H05 (0.75 mm²)
AXT411F222	24 V	NO	4.5 min	2 m	H05 (0.75 mm²)
AXT411F252	24 V	NO	4.5 min	5 m	H05 (0.75 mm²)
AXT411F122H	24 V	NC	4.5 min	2 m	H05 (0.75 mm²), halogen-free

Individually packaged, including M30 × 1.5 mm cap nut, white, and closing dimension adapter.

Accessories	
Type	Description
0371361001	Adapter for fitting to Herz valves, type Herz-TS'90
0550393001	Adapter for fitting to Danfoss valves, type RA-N 15, 22 mm, metal
0550393003	Adapter for fitting to Danfoss valves, type RAV 25/8, 34 mm
0550393004	Adapter for fitting to Danfoss valves, type RA-N 15, 22 mm, plastic
0550394002	Adapter for fitting to Giacomini TH valves
0559390001	Closing dimension adapter, set of 10
0550240002	Removal protection (available from 2023)

Description of operation

The AXT 411 thermal actuator is equipped with an electrically heated expansion element. After a control signal, the heating element heats up and the expansion element expands. This transfers its stroke directly to the attached valve.

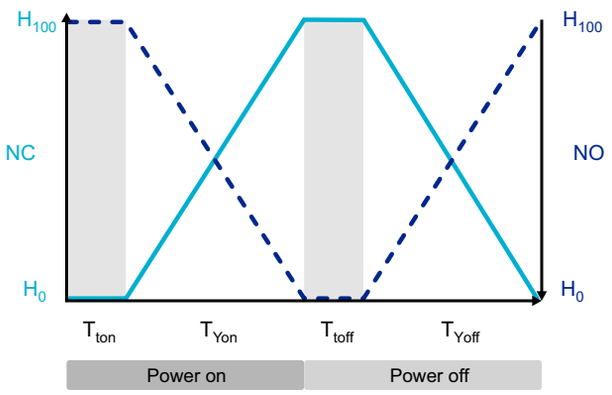
When the heating element is switched on from a cold condition (at room temperature), the valve starts to open after a warming-up time of about 1 minute (230 V version) or 2 minutes (24 V version) and reaches its maximum stroke of 4.5 mm after another 2 minutes (230 V version) or 3 minutes (24 V version).

After the heating element is switched off, the expansion element cools down and the valve is closed by the spring force of the actuator. Quasi-continuous control is achieved with a “pulse-pause” clock signal on the controller side, which causes the expansion element to heat up and cool down periodically.

The AXT 411 operates quietly and is maintenance-free.

Runtime behaviour

Runtime behaviour with a switching cycle of 10 minutes, ambient temperature approx. 25 °C.



	AXT411F**0 230 V	AXT411F**2 24 V
T_{ton}	60 s	120 s
T_{Yon}	120 s	180 s
T_{toff}	60 s	60 s
T_{Yoff}	300 s	300 s

H0	Valve closed
H100	Stroke at full opening
T_{ton}	Dead time after first switch-on
T_{Yon}	Actuator running time for full stroke
T_{toff}	Dead time after switch-off
T_{Yoff}	Actuator running time after switch-off

When warm, the actuator reaches its maximum stroke of 4.5 mm after:
- 230 V version: 2 minutes
- 24 V version: 3 minutes

Control with thermal actuator

Controller type:

Quasi-continuous or discontinuous (2-point) controllers can be used for control with the SAUTER AXT4. Quasi-continuous controllers are used if the controlled section has a linear behaviour, e.g. for room temperature control. The control quality is higher when using a quasi-continuous controller than with a discontinuous controller. Discontinuous controllers are recommended for the control of non-linear sections. The assumption that the AXT 411 can move to any desired position cannot be guaranteed. Only the positions “extended” and “retracted” are ensured. This is why the thermal actuator is also called a 2-point actuator.

Continuous control is not possible with the AXT 411.

The AXT 411 thermal actuator is suitable for controlling moderately inert systems (radiator, chilled beam, radiant chilled ceiling) and inert systems (panel heating and chilled ceiling, thermoactive component systems (TABS)).

The following control parameters are recommended:
- For moderately inert systems: Quasi-continuous control with pulse width modulation, PWM period < 4 minutes
- For inert systems: Quasi-continuous control with pulse width modulation, PWM period > 12 minutes

First-open function

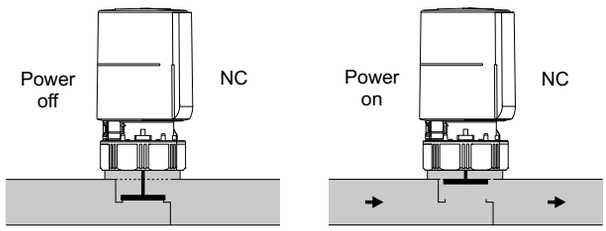
The NC version has a first-open function, which is activated when delivered. The first-open function is used for low-force mounting of the actuator on the valve and for purging the system before start-up. During initial start-up, the first-open function is deactivated and the actuator opens and closes as intended.

To reactivate the first-open function, e.g. before disassembly, the actuator can be moved to the Open position using a screwdriver or locked in the energised open state (see fitting instructions).

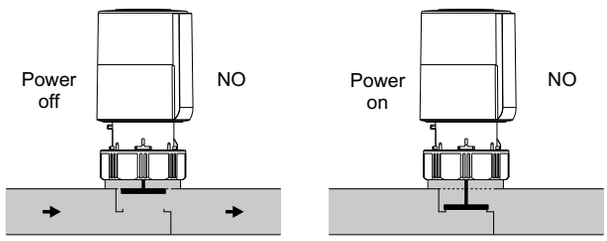
Definition of NC/NO

Version NC “Normally closed”:

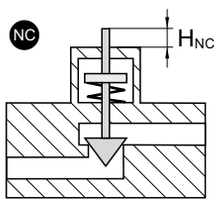
After the actuator is fitted, the valve is closed in the idle state. When voltage is applied to the actuator, the actuator spindle retracts and the valve opens.

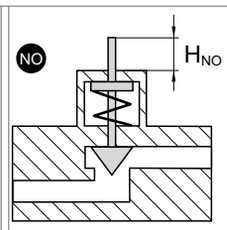


Version NO "Normally open":
After the actuator is fitted, the valve is open in the idle state. When voltage is applied to the actuator, the actuator spindle extends and the valve is closed.



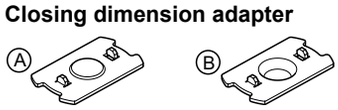
Definition of closing dimension (actuator de-energised)





	Actuator closing dimension (H_{NC})		Actuator closing dimension (H_{NO})
NC	10.8 mm	NO	15.1 mm
NC + A	10.2 mm	NO + A	14.5 mm
NC + B	8.4 mm	NO + B	12.7 mm

Closing dimension adapter



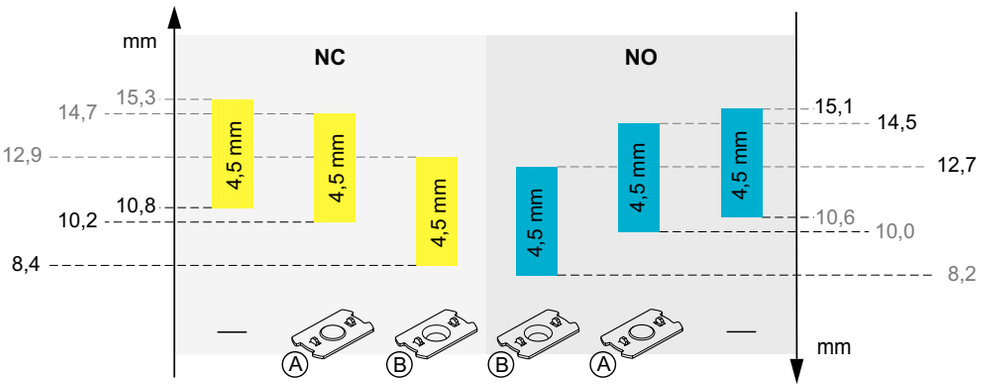
The AXT 411 is supplied with two stainless steel closing dimension adapters. If neither of the two adapter plates is inserted before the actuator is mounted on the valve, the closing dimension of the actuator is 10.8 mm.
Note that the closing directions of the NC version and the NO version are opposite.

Valve adapter

Manufacturer	Valve type	Cap nut	Mounting adapter art. no.
Danfoss	RA-N 15, 22 mm, metal	M30 × 1.5	0550393001
Danfoss	RA-N 15, 22 mm, plastic	M30 × 1.5	0550393004
Danfoss	RAV, 25/8 (34 mm)	M30 × 1.5	0550393003
Herz	TS'90	M28 × 1.5	0371361001
Giacomini	Type R450, R452, R456, Program 60	M30 × 1.5	0550394002

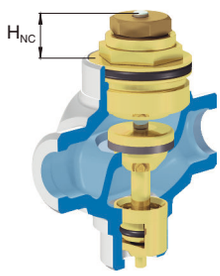
When using a valve adapter, no closing dimension adapter is necessary

Closing dimensions with and without adapter



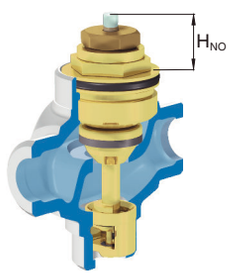
Version NC "Normally closed":

The closing dimension (H_{NC}) of the valve is the distance between the face of the spindle, pressed in with a preload of < 110 N, and the valve contact surface. The actuator rests on this surface.



Version NO "Normally open":

The closing dimension (H_{NO}) of the valve is the distance between the face of the spindle, not pressed in, and the valve contact surface. The actuator rests on this surface.



Combination of valve and closing dimension adapter

SAUTER valve type	Closing dimension (H) [mm]	Valve stroke [mm]	Closing dimension adapter	Distance piece (cap)
VUT010…020	11.5	3.0	A	No
BUT010F**0	11.5	3.0	None	No
BUT015F210	11.5	3.0	None	No
BUT015F4*0	11.5	4.0	None	No
BUT020F*00	11.5	4.0	None	No
VUL010…020	11.5	4.0	None	No
BUL010…020	11.5	3.7	None	No
BXL025…040	11.5	2.9	None	No
VDL010F200	9.3	5.0	A	Yes
VDL010F210	11.4	2.5	None	No
VDL010F201	9.3	5.0	A	Yes
VDL010F211	11.4	2.5	None	No
VDL015F200	11.4	2.5	None	No
VDL015F200H	9.3	5.0	A	Yes
VDL015F210	9.3	5.0	A	Yes
VDL015F220	11.4	2.5	None	No
VDL015F201	11.4	2.5	None	No
VDL015F201H	9.3	5.0	A	Yes
VDL015F211	9.3	5.0	A	Yes
VDL015F221	11.4	2.5	None	No

SAUTER valve type	Closing dimension (H) [mm]	Valve stroke [mm]	Closing dimension adapter	Distance piece (cap)
VDL020F200	9.3	5.0	A	Yes
VDL020F210	11.4	4.0	None	No
VDL020F210H	8.8	5.5	B	No *)
VDL020F220	11.4	2.5	None	No
VDL020F201	9.3	5.0	A	Yes
VDL020F211	11.4	4.0	None	No
VDL020F211H	8.8	5.5	B	No *)
VDL020F221	11.4	2.5	None	No
VDL025F200	8.8	5.5	B	No *)
VDL025F210	8.8	5.5	B	No *)
VDL025F201	8.8	5.5	B	No *)
VDL025F211	8.8	5.5	B	No *)
VDL032F200	8.8	5.5	B	No *)
VDL032F201	8.8	5.5	B	No *)

Height of closing dimension adapter A: 0.6 mm
Height of closing dimension adapter B: 2.4 mm

**) Cap is pre-assembled on delivery and must be removed before combination with AXT4*

All listed SAUTER valves with M30 × 1.5 mm connection thread

Intended use

This product is only suitable for the purpose intended by the manufacturer, as described in the “Description of operation” section.
All related product regulations must also be adhered to. Changing or converting the product is not admissible.

Engineering and fitting notes

When selecting the control elements and mains fuses, the start-up current of the AXT 411 thermal actuator must be taken into account. To comply with the technical data, the voltage loss through the electrical supply lines must not exceed 10%. For the 230 V version of the actuator, the outer conductor (L, brown) must always be switched. The neutral conductor (N, light blue) must not be switched. With the 24 V version, either one of the two conductors or both conductors can be switched simultaneously.

Fitting

The actuator is mounted on the valve with little force by screwing the cap nut onto the unit valve. It must be ensured that the actuator is aligned during installation so that the position indicator can be easily read.
Mounting is possible in all positions.
The ultrasonically welded cable ends do not require any additional ferrules.

Removal

To disassemble the actuator, interrupt the operating voltage and remove the connecting cable to the controller. If necessary, the NC version can be set to the first-open state before disassembly.
For easy disassembly, a cooling phase of 6 minutes is recommended.

Position indicator

All versions of the AXT 411 have a position indicator on the side near the cap nut. The valve stroke can be clearly distinguished from the rest of the housing by the yellow indicator surface.

Additional technical documents

Declaration on materials and the environment	MD 55103
Fitting instructions for AXT 411	P100019372 C

Valve design
SAUTER provides various tools for valve design and engineering:
- ValveDim smartphone app
- ValveDim PC program
- ValveDim slide rule

You can find the tools under the link www.sauter-controls.com/en/performance/valve-calculation/
or scan the QR code

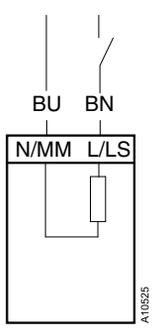
Materials

Component	Designation
Hood	PA6 (polyamide 6)
Housing base	
Cap nut M30 × 1.5 mm	
Pressure sleeve	
Adapter spindle	
Compression spring	Steel
Stroke element with PTC 230 V 2 mm	CuZn (brass)
Moulded seal	EPDM
O-ring	
Re-open spring clip	Stainless steel
Closing dimension adapter	
Lubricant	IKV-Triboflon MYA 142 FG

Disposal

When disposing of the product, observe the currently applicable local laws.
More information on materials can be found in the Declaration on materials and the environment for this product.

Connection diagram



BU = blue
BN = brown

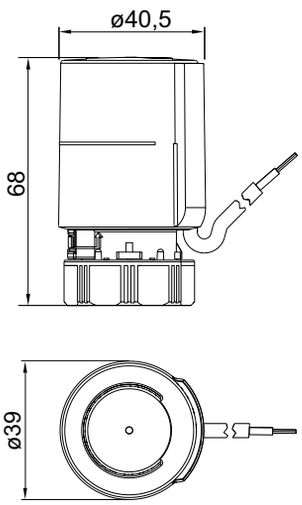
Power consumption at nominal voltage.

Note
Neutral conductor (N) must not be switched.

Dimension drawing

All dimensions in mm.

AXT411F*** NC



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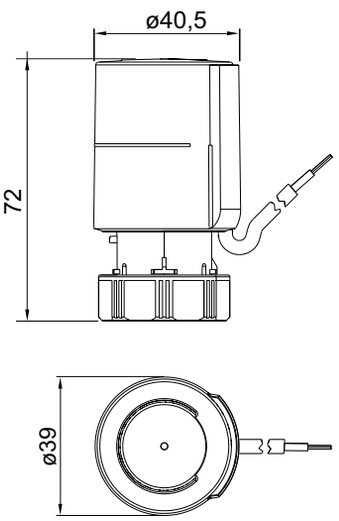

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