

AXT 201, 211: Thermal actuator for unit valves with stroke indicator

How energy efficiency is improved

Reliable actuation in efficient control systems

Features

- Fitted to the valve using no force thanks to the Low-Force-Locking (LFL) connector
- Fitted onto valve with M30 x 1.5 thread with automatic adjustment of closing dimension
- Pushing force max. 125 N
- With 230 V or 24 V thermal expansion element
- Large visible position indicator
- NC "normally closed" and NO "normally open" models (with and without auxiliary contacts)
- Model with manual adjustment
- Silent and maintenance-free
- Modular electrical plug connection (various functions, cable lengths and types)
- Connected to valve with plastic bayonet connection
- Suitable for retrofitting existing installations without an adaptor
- Fitting in any position, including upside down



AXT201F110



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
Power consumption during operation		2.5 W (230 V~), 3 W (24 V=)
Starting power 24 V~/=		5 W/5 VA
Starting power 230 V~		40 W/40 VA
Start-up current 24 V~		220 mA
Start-up current 230 V~		150 mA
Parameters		
Stroke		Max. 4.5 mm
Ambient conditions		
Operating temperature at valve		100 °C max.
Storage and transport temperature		-25...70 °C
Admissible ambient temperature		0...50 °C
Admissible ambient humidity		< 85% rh, no condensation
Construction		
Housing		Pure white (RAL 9010) or jet black (RAL 9005), high-gloss surface (FV-0 as per EN 60707 and V-0 as per UL94)
Housing material		Fire-retardant plastic
Power cable		Standard length 0.8 m (AXT201), 1 m (AXT211, H03...), PVC/halogen-free, Ø 0.5 mm², white/black
Standards and directives		
Type of protection		IP 54 (EN 60529)
Protection class 24 V		III (EN 60730-1)
Protection class 230 V		II (EN 60730-1)
CE conformity according to	Electrical safety 2006/95/EC	Devices (cable type H03) EN 60335-1 Devices (cable type H05) EN 60730-1,-2-14
	EMC directive 2004/108/EC	EN 61000-6-1/EN 61000-6-2 EN 61000-6-3/EN 61000-6-4



Overview of types

Type	Properties
AXT201F110	White version, neutral, incl. raised M30 × 1.5 bayonet nut, cable 0.8 m
AXT201F112	White version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F100	White version, including M30 × 1.5 bayonet nut, without cable, pack of one
AXT211F100B	Black version, including M30 × 1.5 bayonet nut, without cable, pack of one
AXT211F102	White version, including M30 × 1.5 bayonet nut, without cable, pack of one
AXT211F102B	Black version, including M30 × 1.5 bayonet nut, without cable, pack of one
AXT211F110	White version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F110B	Black version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F110M	White version, with manual adjuster, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F112	White version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F112B	Black version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F112M	White version, with manual adjuster, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F190	White version, packing unit of 50 pieces, including M30 × 1.5 bayonet nut, without cable
AXT211F192	White version, packing unit of 50 pieces, including M30 × 1.5 bayonet nut, without cable
AXT211F200	White version, including M30 × 1.5 bayonet nut, without cable, pack of one
AXT211F202	White version, including M30 × 1.5 bayonet nut, without cable, pack of one
AXT211F210	White version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211F212	White version, including M30 × 1.5 bayonet nut, cable 1 m
AXT211HF110	White version, with auxiliary contacts, including M30 × 1.5 bayonet nut, cable 1 m
AXT211HF210	White version, with auxiliary contacts, including M30 × 1.5 bayonet nut, cable 1 m
AXT211HF112	White version, with auxiliary contacts, including M30 × 1.5 bayonet nut, cable 1 m
AXT211HF212	White version, with auxiliary contacts, including M30 × 1.5 bayonet nut, cable 1 m

Accessories

Connectors with different cable lengths for thermal actuator

Type	Description
0550602801	Plug with cable, white, 0.8 m, PVC H03VV, Ø 0.50 × 2 mm
0550602021	Plug with cable, white, 2 m, PVC H03VV, Ø 0.50 × 2 mm
0550602032	Plug with cable, white, 3 m, PVC H05VV, Ø 0.75 × 2 mm
0550602032B	Plug with cable, black, 3 m, PVC H05VV, Ø 0.75 × 2 mm
0550602042	Plug with cable, white, 4 m, PVC H05VV, Ø 0.75 × 2 mm
0550602052	Plug with cable, white, 5 m, PVC H05VV, Ø 0.75 × 2 mm
0550602052B	Plug with cable, black, 5 m, PVC H05VV, Ø 0.75 × 2 mm
0550602062	Plug with cable, white, 6 m, PVC H05VV, Ø 0.75 × 2 mm
0550602072	Plug with cable, white, 7 m, PVC H05VV, Ø 0.75 × 2 mm
0550602102	Plug with cable, white, 10 m, PVC H05VV, Ø 0.75 × 2 mm
0550602102B	Plug with cable, black, 10 m, PVC H05VV, Ø 0.75 × 2 mm
0550602152	Plug with cable, white, 15 m, PVC H05VV, Ø 0.75 × 2 mm
0550602152B	Plug with cable, black, 15 m, PVC H05VV, Ø 0.75 × 2 mm
0550602023	Plug with cable, halogen-free, white, 2 m, Hal F H05Z1Z1, Ø 0.75 × 2 mm
0550602053	Plug with cable, halogen-free, white, 5 m, Hal F H05Z1Z1, Ø 0.75 × 2 mm
0550602103	Plug with cable, halogen-free, white, 10 m, Hal F H05Z1Z1, Ø 0.75 × 2 mm

Connectors with auxiliary contacts

Type	Description
0550484121	Plug, white, with integrated auxiliary contacts for NC actuator, 2 m cable, PVC H03VV, Ø 0.5 × 4 mm
0550484221	Plug, white, with integrated auxiliary contacts for NO actuator, 2 m cable, PVC H03VV, Ø 0.5 × 4 mm

Various accessories

Type	Description
0550240001	Removal-protection device for AXT/AXS211 (prevents the unauthorised removal of the plug and actuator)

Adaptors & adaptor sets

Type	Description
0550390001	Raised M30 × 1.5 bayonet nut (black), with N-insert (normal, black) and S-insert (reduced, white), for all valves with M30 × 1.5 threads and angle valves or valves with measurement sockets; dimension of actuator 5 mm. Closing dimension depending on type of use: NC 4.5 mm to 18.5 mm and NO 8.5 mm to 22.5 mm
0550390101	Raised M28 × 1.5 bayonet nut (grey), with N-insert (normal, black) and S-insert (reduced, white), for all valves with M28 × 1.5 threads and angle valves or valves with measurement sockets; dimension of actuator 5 mm. Closing dimension depending on type of use: NC 4.5 mm to 18.5 mm and NO 8.5 mm to 22.5 mm, e.g. Pettinaroli
0550390201	Raised M30 × 1.0 bayonet nut (white), with N-insert (normal, black) and S-insert (reduced, white), for all valves with M30 × 1.0 threads and angle valves or valves of different manufacturers; dimension of actuator 5 mm. Closing dimension depending on type of use: NC 4.5 mm to 18.5 mm and NO 8.5 mm to 22.5 mm, e.g. Oventrop (up to 1997), Beulco (up to 2004)
0550393001	Adaptor for fitting to Danfoss valves, type RA 2000, 22 mm
0550393002	Adaptor for fitting to Danfoss valves, type RAVL, 26 mm
0550393003	Adaptor for fitting to Danfoss valves, type RAV, 34 mm
0550394001	Adaptor for fitting to Giacomini valves, type R450, R452, R456 and range 60
0550399001	Adaptor set comprising: raised bayonet nut, black M30 × 1.5 (all manufacturers, M30 × 1.5); raised bayonet nut, grey M28 × 1.5 (all manufacturers, M28 × 1.5); raised bayonet nut, white M30 × 1.0 (e.g. Oventrop, Beulco); 2 × N-inserts (black) and 2 × S-inserts (white); Danfoss adaptor RA 2000 (Ø 22 mm); Giacomini adaptors

Connectors with continuous actuation (for 24 V version only)

Type	Description
0550423121	Continuous activation NC adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 2 m white cable, PVC Ø 0.22 × 3 mm
0550423221	Continuous activation NO adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 2 m white cable, PVC Ø 0.22 × 3 mm
0550423151	Continuous activation NC adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 5 m white cable, PVC Ø 0.22 × 3 mm
0550423251	Continuous activation NO adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 5 m white cable, PVC Ø 0.22 × 3 mm
0550423171	Continuous activation NC adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 7 m white cable, PVC Ø 0.22 × 3 mm
0550423271	Continuous activation NO adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 7 m white cable, PVC Ø 0.22 × 3 mm
0550423123	Continuous activation NC adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 2 m white halogen-free cable, Ø 0.22 × 3 mm
0550423153	Continuous activation NC adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3 mm stroke, 5 m white halogen-free cable, Ø 0.22 × 3 mm
0550423173	Continuous activation NC adjustable: 0(2)...10 / 10...0(2) V, split-range unit 0...4.5 V or 5.5...10 V, for 4.5 mm or 3.2 mm stroke, 7 m white halogen-free cable, H03 Ø 0.22 × 3 mm

Connectors with integrated LED, lights up in blue (for 24 V version only)

Type	Description
0550120022	White plug with integrated LED, lights up in blue, cable 2 m, PVC H03VV, Ø 0.5 × 2
0550120052	White plug with integrated LED, lights up in blue, cable 5 m, PVC H03VV, Ø 0.75 × 2

Description of operation

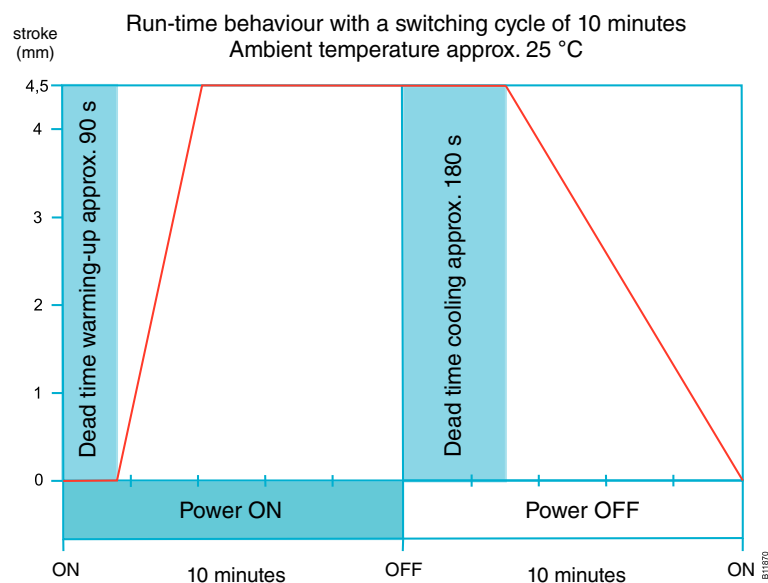
AXT211: Actuation of 2- and 3-way valves of the VUL, BUL, VUT, VCL and VDL series.

AXT201 and AXT211: Actuation of common third-party unit valves.

The actuator has an electrically heated expansion element which transfers its stroke directly to the attached valve. It operates noiselessly and is maintenance-free. If the heating element is turned on when it is cold (ambient temperature approx. 21 °C), the valve begins opening after a warming-up time of approx. 1.5 min (230 V and 24 V models), and after an additional period of approx. 2.5 min (230 V) or 3 min (24 V), the valve has carried out a stroke of 4.5 mm. When the heating element is turned off, the expansion element cools and the valve is closed by spring force.

With a "pulse-pause" signal that causes a periodic OPEN or CLOSE position, quasi-continuous control is possible.

Runtime behaviour with a switch cycle of 10 min



The runtime behaviour for the 230 V model is slightly shorter than the 24 V model, taking 3.5 min (to achieve a stroke of 4.5 mm).

The thermal SAUTER actuators are suitable for efficient control with medium-inertia systems, such as radiators, chilled beams and radiant cooling ceilings, as well as for inert systems, such as panel heating and cooling systems or thermoactive building systems (TABS). With the proper control strategy, the actuators contribute to energy savings.

- Medium-inertia systems: Quasi-continuous control with pulse width modulation, PWM period > 14 min
- Inert systems: Quasi-continuous control with pulse width modulation, PWM period > 27 min
- Alternatively: 2-point control

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 documents must also be adhered to. Changing or converting the product is not admissible.

Appendix to standards and directives

The actuator is tested to standards, i.e. the required EN standards (see table) are taken into account. The area of use of the devices determines the correct choice of power cable. Cables of type H03 are suitable for use in the home, e.g. in underfloor heating/cooling. Cables of type H05 are suitable for use in the home, in shops, in industry and in agriculture. During the electric installation, the applicable building installation standards must be observed.

Control with thermal actuator

Controller type

For control with AXT2, there are basically two options: the quasi-continuous and the discontinuous (2-point) controller. The quasi-continuous controller can always be used if the section has linear behaviour, as is usually the case with room temperature control. The control performance using a quasi-continuous controller is better than with a discontinuous controller.

Discontinuous controllers (2-point) are recommended for control of non-linear sections.

Continuous control is not possible with actuator AXT2. Actuators AXS215S and AXM117S are available for these purposes.

Position control

The ability to move to any desired position of the AXT2 actuator cannot be ensured with a controller. Only the “moved out” and “moved in” actuator positions are ensured with a controller, so this actuator is also known as a 2-point actuator.

Energy limiter

The AXT2 can consume more energy than needed for opening. The result is that the cooling and thus the closing time are increased unnecessarily. There should be an element between the controller output terminal and the actuator that ensures that the supplied energy is limited. Reduction of the supplied energy helps shorten the closing time. This element is called an energy limiter and is independ-

ent of the controller parameters. The only dependency arises through the ambient temperature of the AXT2. Consequently, fixed parameters can be set for the energy limiter and used unchanged for each controller setting. (For more details on the energy limiter, see the manual SAUTER AXT211 Control Guidelines – 7010082001)

Definition of NC/NO

NC version "normally closed"

After the actuator is fitted, the VUL/BUL valves (or standard radiator valves) are closed in the idle state. When voltage is applied to the actuator, the actuator spindle moves in and the valve spindle moves out, and the valve is opened.

Valve state with actuator without power: Closed.

NO version "normally open"

After the actuator is fitted, the VUL/BUL valves (or standard radiator valves) are open in the idle state. When voltage is applied to the actuator, the actuator spindle moves out and pushes the valve spindle, and the valve is closed.

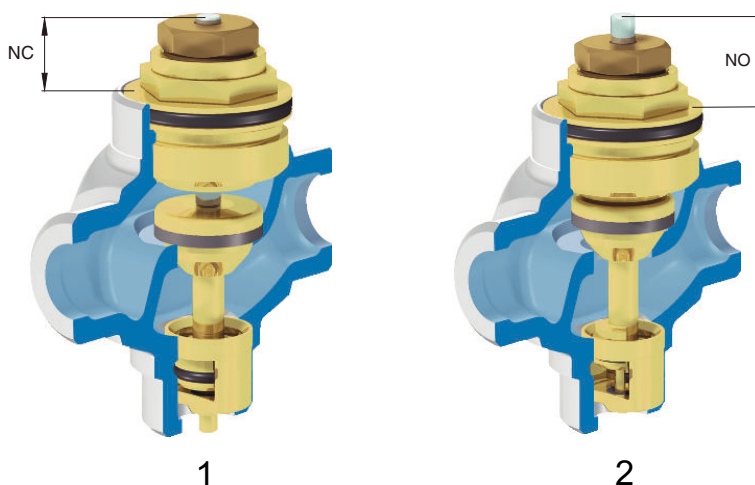
Valve state with actuator without power: Open.

Definition of the closing dimension

NC version "normally closed"

The closing dimension of a valve is the distance between the front surface of the spindle, pressed in with a preloading of < 100 N and the contact surface of the lower thread. The bayonet nut rests on this surface.

Cross-section of the unit valve



NO version "normally open"

The closing dimension of a valve is the distance between the front surface of the spindle when it is not pressed in and the contact surface of the lower thread. The bayonet nut rests on this surface.

Fitting

The actuator is fitted to the valve based on the Low-Force-Locking technique (LFL). When the actuator is removed from the valve, the closing dimension and the preloading are released again. The condition as delivered ex works is restored and the actuator can be used again with full LFL functionality. First screw the bayonet nut onto the valve and tighten it to 2 Nm. Then put the actuator onto the valve without any force. The openings on the actuator ring show the suitable fitting position with respect to the three ribs on the bayonet nut. Turn the bayonet ring in the clockwise direction through an angle of rotation of 90° until the first "click" - the valve plug is preloaded. After the second "click" the actuator is ready for operation. This position is also the security position against loosening due to vibrations. While the bayonet ring is being turned, the actuator automatically adjusts to the closing dimension of the valve.

To ensure problem-free operation with the NO actuator model, the compression spring in the valve must produce a force of $F_v \geq 30$ N. Additionally, the NO model should only be removed from the valve in the cooled state.

Closing dimension compensation

The closing dimension is compensated mechanically. While the bayonet ring is being turned, a compensation pin is released in the actuator. In the NC model, the built-in spring uses a force of min.

105 N (AXT211) and 90 N (AXT201) in the locked state to press onto the valve spindle. Thus the closing dimension is set between the compensation pin and a compensation casing and is fixed by gear teeth. The gear teeth are designed so that the compensation pin automatically slots into the next row of teeth below. This ensures that there is always preloading on the valve plug and the valve is sealed. Valves can become permeable due to ageing or a defective plug seal. In this case, the bayonet ring can be loosened easily and then turned in the clockwise direction until the second “click”. The actuator has adjusted to the new closing dimension and the valve is sealed again. With the NO model, the compensation pin positions itself on the valve spindle without any force.

Closing dimension compensation with “normally closed”

When the standard bayonet nut supplied is used, the actuator can compensate a closing dimension of 8.5 mm to 13.5 mm.

Closing dimension compensation with “normally open”

When the standard bayonet nut supplied is used, the actuator can compensate a closing dimension of 12.5 mm to 17.5 mm.

Closing dimension compensation with raised bayonet nut (accessory)

The raised bayonet nut is used if the diameter of the bayonet ring on the actuator of 42.5 mm can prevent the fitting, e.g. in angle valves, valves with measuring connection pieces or underfloor heating distributors. The standard closing dimension named above is achieved when the raised bayonet nut is combined with the N-insert (normal, black). When the raised bayonet nut is combined with the S-insert (reduced, white), the closing dimension is reduced by 5 mm. When the raised bayonet nut is combined with the valve without an insert, the closing dimension is increased by 5 mm.

Closing dimension range for various bayonet nuts

Bayonet nut	Raised	Standard	Raised	Raised
M30 × 1.5 (thread on valve neck)	Yes, black	Yes, black	Yes, black	Yes, black
M28 × 1.5 (thread on valve neck)	Yes, grey	Yes, grey	Yes, grey	Yes, grey
M30 × 1.0 (thread on valve neck)	Yes, white		Yes, white	Yes, white
N-/S insert	S (reduced, white)	Not required	N (normal, black)	No insert
Closing dimension range NC (mm)	8.5...13.5	3.5...8.5	8.5...13.5	13.5...18.5
Closing dimension range NO (mm)	12.5...17.5	7.5...10.5	12.5...17.5	17.5...22.5

Position indicator

The cover is used as the biggest possible position indicator. It is clearly visible from all positions and can be felt in the dark.

With the “normally closed” model, the cover rises and the grey lifting part becomes visible. With a full lift, the cover is up to 5 mm above the top edge of the plug.

With the “normally open” model, the cover falls until it is level with the top edge of the plug. The grey lifting part is no longer visible.

Model with manual adjustment

The model with manual adjustment is only available as a “normally closed” model. With this function the valve can be opened manually. Two positions are available for this, approx. 2.4 mm and approx. 3.3 mm stroke. When the actuator is activated, it is not automatically reset. The actuator must be reset manually. The valve can be secured in a closed position by removing the connection plug.

This function enables operation when there is no mains power supply, even in the case of a power failure, or in order to flush through or ventilate the system during commissioning.

Modular plug module; modifying types

The actuator gets its type function from the plug. This means that the basic function of the basic device remains unchanged. This provides a number of advantages. For example, after it has been delivered and used, the actuator can be converted into a new device at a later point in time. All that is required is to put a new type plug on the bottom part of the housing and if necessary an accessory part on the lifting part. The voltage compatibility of the plug module with the related actuator must be checked before fitting.

The following modifications are possible:

- 2-point model with auxiliary contacts and vice versa
- 2-point model with continuous 0...10 V and vice versa, only with 24 V power supply
- Continuous 0...10 V model in auxiliary contacts (position panel must be removed first and replaced with switching cam)

It is not possible to convert the model with auxiliary contacts, due to the switching cam which cannot be removed after fitting, into a continuous model.

The plug module can be removed from the actuator without a tool by pushing it by hand (up to approx. 30 N).

Engineering and fitting notes

When selecting the switching contacts and the mains fuses, the start-up current of the heating element must be considered. To adhere to the specified technical data, the voltage loss due to the electric lines must not exceed 10%.

The BU wire (light blue) must not be switched and must be connected to the neutral wire locally. The controller must always switch the BN wire.

Accessories

Auxiliary contacts

Can be retrofitted with auxiliary contacts (accessory) to control a circulation pump, for example. The auxiliary contacts switch on between 35% and 50% stroke. The switch rating of these auxiliary contacts is 3 A for a resistive load and 2 A for an inductive load. The switch rating for DC is: 4...30 V, 1...100 mA, 1 A, 48 V=.

The electrical circuits on the auxiliary contacts and the actuator must come from the same phase. It is not admissible to connect 400 V~ to the 4 x 0.5 mm² cable. It is not admissible to operate different electrical circuits on this cable, such as extra low voltage and low voltage.

Before the plug is fitted, the actuator switching cam must be clicked in. This switching cam cannot be removed again. However, if necessary, a 2-point plug can still be fitted subsequently.

Accessories for "normally closed" NC actuator model:

When the actuator opens, the internal contact is closed. If normally-closed contacts are desired, the "normally open" auxiliary contacts accessory can be used. The contact opens when the actuator opens.

Accessories for "normally open" NO actuator model:

When the actuator lowers, the internal contact is closed. If normally-closed contacts are desired, the "normally closed" auxiliary contacts accessory can be used. The contact opens when the actuator lowers.

LED indicator

The blue LED visualises the activation of the actuator, as it lights up synchronously with the 2-point control signal. It is helpful during commissioning and maintenance.

Removal protection

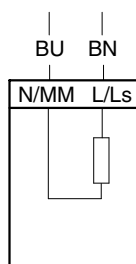
The removal protection consists of a shell that is fitted around the actuator. When this shell is closed, it can only be removed by destroying it. The removal protection prevents the actuator from being removed from the valve and the electric plug from being removed. The position indicator remains easy to see and touch.

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.

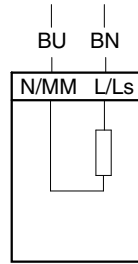
Connection diagram



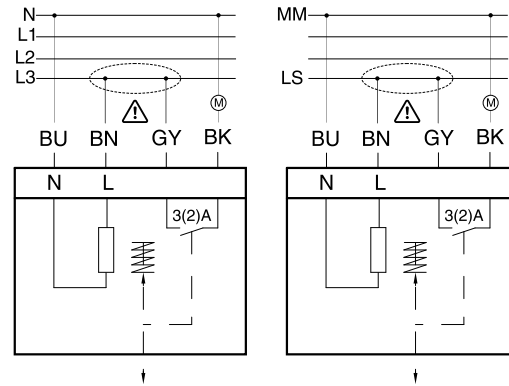
BU = blue
 BN = brown
 GY = grey
 BK = black

Accessories

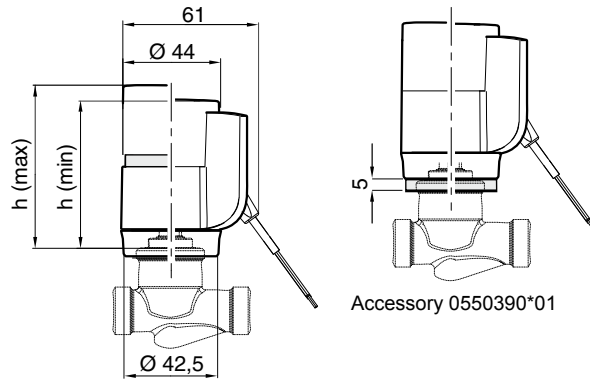
05501200*2



0550484***



Dimension drawing



	h (min.)	h (max.)
NC	59	66
NO	59	64
●	66.5	73.5