

# M4410C/L

## SMALL LINEAR THERMOELECTRIC ACTUATORS

### PRODUCT DATA



### APPLICATION

The M4410C/L Small Linear Thermoelectric Actuators are used in room and zone applications for time-controlled two-point regulation of heating and cooling systems such as fan coil units, radiators, floor heating systems, chilled ceilings, and convectors.

- Fit on standard M30 x 1.5 heating/cooling valves, thermostatic radiator valves, and valve inserts for manifolds and compact radiators.
- The actuator (in combination with adapter VA80, incl. in the delivery) is suitable use with the following valves having a closing dimension of  $11.5 \pm 0.3$  mm:
  - the 2-way and 3-way V58xxA4, V58xxC4, and VSO series of small linear valves with 2.5-mm stroke;
  - TRVs V300 and V2000;
  - Therafix TRV V2464 and V2474 series with 2.5 to 3-mm stroke.
- Additional valve adapters on request.

### FEATURES

- No mounting tools required (easily mounted using valve adapter)
- Water-protected housing design (IP54) in all mounting positions
- Auxiliary switch models for driving pumps or fans
- Normally-open (N.O. = stem retracted when actuator not under current) and normally-closed (N.C. = stem extended when actuator not under current) models
- Compact design allows installation in limited space
- Function display showing stem position (extended or retracted)
- Noiseless, reliable long-term operation
- Surge protection (2.5 kV)

### SPECIFICATIONS

<b>Max. stroke</b>	5 mm
<b>Power supply</b>	M4410C: 24 VAC/DC +20...-10% M4410L: 230 VAC +10...-10%, 50/60 Hz
<b>Power consumption</b>	1 W $\pm$ 15%
<b>Max. permissible aux. switch current</b>	M4410C4540: 3 A res., 1 A ind. M4410L4540: 5 A res., 1 A ind.
<b>Switching point</b>	Approx. 2 mm (versions with aux. switch)
<b>Stem force</b>	100 N $\pm$ 5%
<b>Fluid temperature</b>	0 ... +100 °C (or higher, depending upon chosen adapter)
<b>Storage temperature</b>	-25 ... +60 °C
<b>Ambient temperature</b>	0 ... +60 °C
<b>Opening/closing time</b>	see Table 2 on pg. 2
<b>Protection Class</b> (according to EN60730)	M4410C: III; M4410L: II
<b>Protection standard</b> (according to EN60529)	IP54 in all mounting positions
<b>CE conformity</b>	EN 60730
<b>Housing material</b>	Polyamide / light gray (RAL 7035)
<b>Cable</b>	Fixed, 1 m, PVC / light gray (RAL 7035)
<b>Wires</b>	2 x 0.75 mm <sup>2</sup> (with aux. switch: 4 x 0.75 mm <sup>2</sup> )
<b>Surge protection</b>	2.5 kV
<b>Humidity</b>	max. 95%
<b>End position</b>	15.5 mm

## ORDERING INFORMATION

Table 1. Models

order no.	action	additional features	voltage	max. stroke
M4410C4000	normally open (i.e.: not powered → actuator stem retracts)	--	24 VAC/DC	5 mm
M4410C4500	normally closed (i.e.: not powered → actuator stem extends)			
M4410C4540	normally closed (i.e.: not powered → actuator stem extends)	with auxiliary switch	230 VAC	
M4410L4000	normally open (i.e.: not powered → actuator stem retracts)	--		
M4410L4500	normally closed (i.e.: not powered → actuator stem extends)			
M4410L4540	normally closed (i.e.: not powered → actuator stem extends)	with auxiliary switch		

EXAMPLE: In combination with a standard 2-way valve, the stem of the M4410C4500 (which is normally closed) will extend when power is removed, thus closing the valve. When power is restored, the actuator's stem will retract, thus opening the valve.

Table 2. Electrical specifications

order number	inrush current*	power consumption*	Closing and opening time for nominal valve stroke*
M4410Cxxxx	< 300 mA**	1 W ± 15%	~4.0 min
M4410Lxxxx	< 550 mA**	1 W ± 15%	~4.0 min

\* All values at nominal voltage 24 VAC/DC, 230 VAC, 50 Hz, ambient temperature: 20 °C. \*\*Average over max. 2 min (M4410Cxxxx) or max. 100 ms (M4410Lxxxx).

### DIMENSIONS

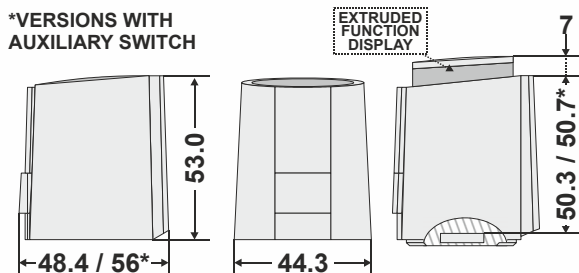


Fig. 1. Dimensions (in mm)

### INSTALLATION ORIENTATIONS

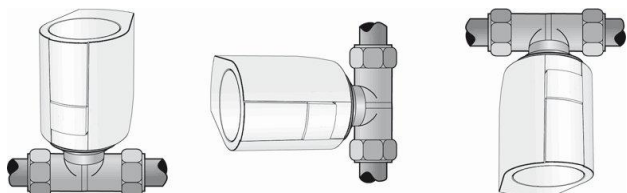


Fig. 2. Installation orientations (vertical, horizontal, "overhead")

The actuator is installed preferably in the vertical or the horizontal orientation.

**NOTE:** Connection cables must not touch the piping (heat transfer)!  
 Only a safety-isolating transformer in accordance with EN 60335 may be used. The rated capacity of the transformer must be based on the initial current of the actuators.  
 Rule of thumb:  $P_{\text{TRANSFORMER}} = n \times 6 \text{ VA}$  (where "n" = the number of drives)

### ASSEMBLY

The valve adapter assortment guarantees a perfect match of the actuator to almost all valve bottoms and heating circuit distributors available on the market. The actuator is simply plugged on to the appropriate valve adapter previously installed manually.

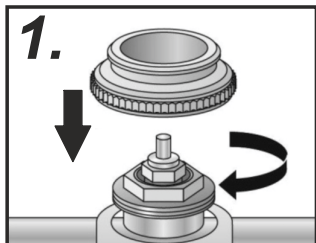


Fig. 3. Step 1: Manually screwing the adapter onto valve

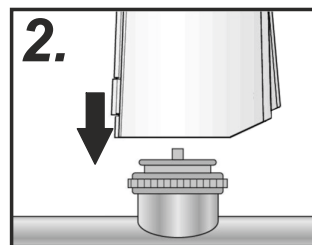


Fig. 4. Step 2: Manually positioning actuator

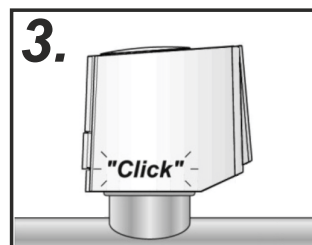
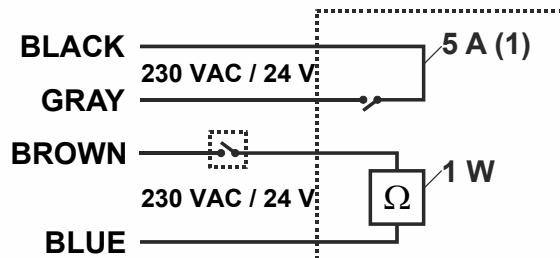


Fig. 5. Step 3: Pressing down actuator onto valve adapter

### WIRING DIAGRAM

**NOTE:** To protect against overloading, fusing appropriate to the given cable cross-section must be installed.

#### M4410C4540 / M4410L4540



#### M4410Cxx00 / M4410Lxx00

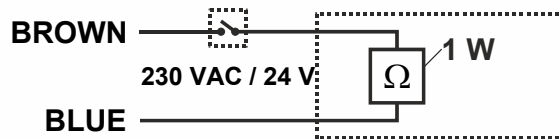


Fig. 6. Wiring diagram

## FUNCTION

The M4410C/L actuator uses a PTC resistor-heated wax element and a compression spring. The wax element is heated by applying the operating voltage and moves the integrated stem. The force generated by the movement is transferred to the valve lifter, thus opening or closing the valve (depending upon the valve type – see Fig. 7).

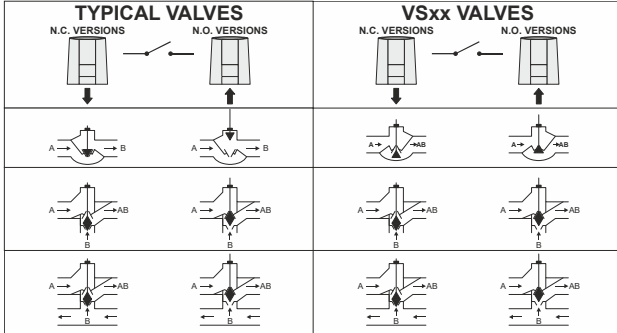


Fig. 7. Opening / closing depending upon valve type

### N.C. VERSIONS

In the case of N.C. versions, upon application of the operating voltage and expiration of the dead time, the stem retracts and thus steadily opens (closes – see Fig. 7) the valve.

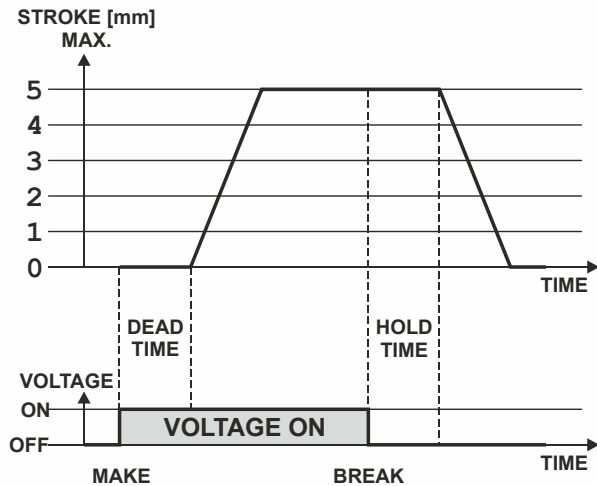


Fig. 8. Opening / closing time of N.C. versions

After the operating voltage is cut and the hold time expires, the elastic force of the compression spring extends the stem and thus steadily closes (opens) the valve. The elastic force of the compression spring matches the closing/opening force of commercially-available valves, and thus keeps the valve securely closed (open).

### N.O. VERSIONS

In the case of N.O. versions, upon application of the operating voltage and expiration of the dead time, the stem extends and thus steadily closes (opens – see Fig. 7) the valve.

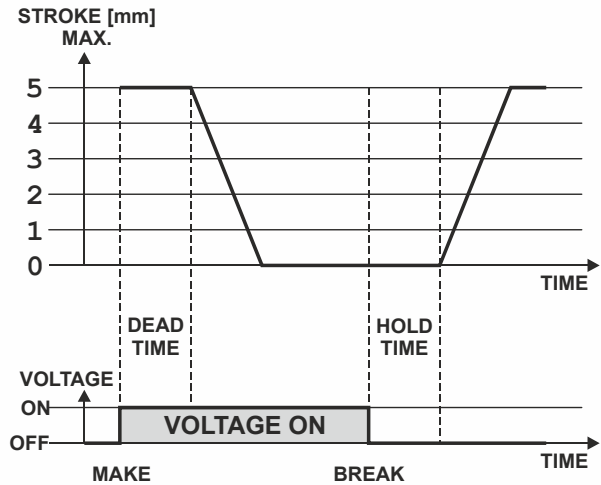


Fig. 9. Opening / closing time of N.O. versions

After the operating voltage is cut and the hold time expires, the elastic force of the compression spring retracts the stem and thus steadily opens (closes) the valve.

### N.C. VERSIONS WITH AUXILIARY SWITCH

In the case of N.C. versions with auxiliary switch, upon application of the operating voltage and expiration of the dead time, the stem retracts and thus steadily opens (closes – see Fig. 7) the valve. The integrated micro-switch is closed with a travel path of approx. 2 mm.

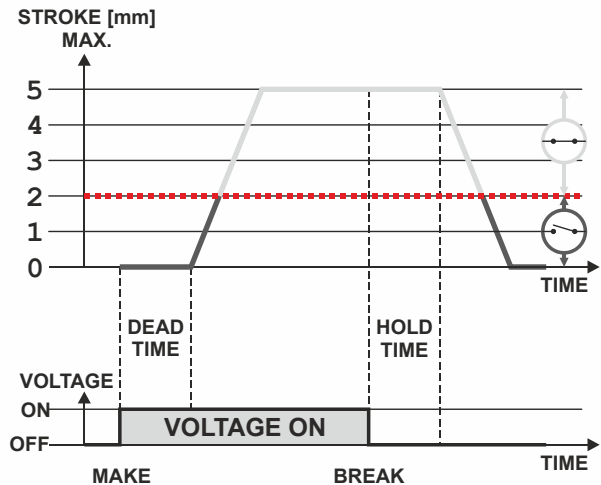
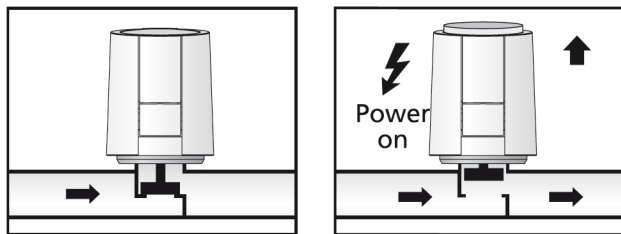


Fig. 10. Opening / closing time of N.C. versions with aux. switch

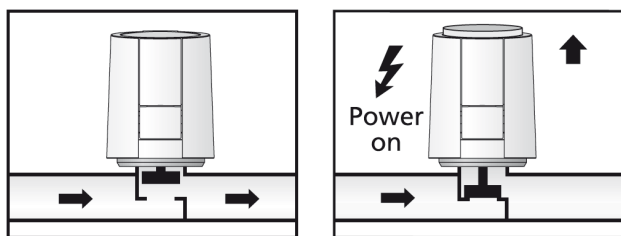
After the operating voltage is cut and the hold time expires, the elastic force of the compression spring extends the stem and thus steadily closes (opens) the valve. The integrated micro-switch is opened after an actuator travel of approx. 3 mm.

## FUNCTION DISPLAY

The function display (all-round display) of the actuator shows at first glance whether the stem is extended or retracted; this can be also felt in the dark.



**Fig. 11. Extrusion of the function display of N.C. versions when stem has retracted**



**Fig. 12. Extrusion of the function display of N.O. versions when stem has extended**

## "FIRST OPEN" FUNCTION (N.C. VERSIONS, ONLY)

At delivery, and before the N.C. actuator is powered for the first time, it functions like an N.O. version; this is due to the "First Open" function. This enables heating operation during early construction phases even before completion of the electric wiring. When subsequently commissioning the system, upon applying current (for more than 6 minutes) to the actuator for the first time, the "First Open" function is automatically disabled and the actuator henceforth functions like an N.C. actuator.



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