

Alpha-Actuator 4: Proportional AA 5004

The Alpha-Actuator 4: Proportional is a thermo-electronic actuator for opening and closing valves in a direct proportion to the applied control voltage.

Powerless control is by a 0-10 V signal which is provided either by a room thermostat or, in most cases, by a central DDC system in the application range of the building service management.

If a control voltage is applied, the actuator opens the valve proportionally to the detected actuator travel.

The wide choice of valve adapters guarantees perfect adaptation to 99 % of all valve bottoms and heating circuit distributors available on the market.



Features

- Control by a 0-10 V DC signal
- Short response times, resulting in improved control response
- Faster response times by stand-by operation
- Self-calibration once every 24 h
- Small dimensions
- First Open function
- Function display
- Maintenance-free
- Noiseless
- High functional safety and long expected service life
- Low power consumption
- Plug-in connecting cable
- 360° installation position
- Plug-in installation
- Valve adapter system
- Adaptation check on valve bottom
- 100% protection in case of leaky valves
- Antitheft function by means of removable clear view visor

Application

- Control systems in heating, air conditioning and ventilation systems
- Single room control of concealed heating systems
- Comfortable control of heating circuit distributors, radiators, cooling ceilings and similar units.
- Ideally suited in combination with central DDC systems in building services management systems

General information

Scope of delivery (Standard)

- 1 x Alpha-Actuator 4: Proportional with first-open function
- 1 x connection line, 1 metre (plug-in type)
- 1 x installation instructions in 10 languages

Type

AA 5004: Version 0 – 10 V; 100 kΩ – normally closed

Alternative design

AA 5014: Version 2 – 10 V; 100 kΩ – normally closed
AA 5024: Version 10 – 0 V; 100 kΩ - normally closed

Optionally available extensions

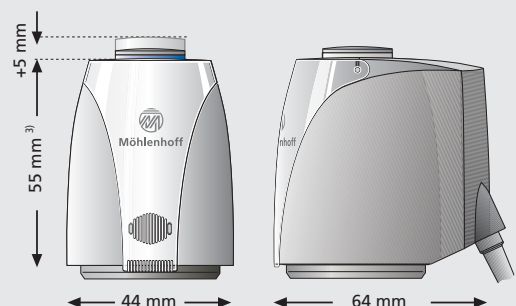
- Non halogen connection line
- Other control voltage variants
- Input resistance 10 kW
- Connection line up to 20 m
- Operation voltage: DC

Accessories

- Valve adapters for the most common valve bottoms available on the market must be ordered separately.

Technical data

Type	AA 5004
Version	normally closed
Operating voltage	24 V AC, -10%...+40%, 50–60 Hz
Max. inrush current	<250 mA during 2 min. max.
Operating current	83 mA
Operating power	2 W
Control voltage	0 - 10 V DC
Input resistance	100 kΩ, (10 kΩ as option)
Actuator travel	4 mm (minus over-elevation); max. 3.5 mm
Average actuation delay	30 s/mm
Actuating force	100 N± 5%
Fluid temperature	0 - 100 °C ¹⁾
Storage temperature	-25 to +65°C
Ambient temperature	0 to +60°C
Protection type / protection Class	IP 54 ²⁾ / III
CE conformity according to	60730
Housing / housing colour	polyamide, white (RAL 9003)
Weight	100 g without adapter and cable
Connecting cable / cable length / weight	3 x 0.22 mm ² PVC, white / 1 m / 30 g
Special length of connecting cable	up to 20 m max.



¹⁾ or higher, depending on the adapter length

²⁾ in all mounting positions with plug-in connection line

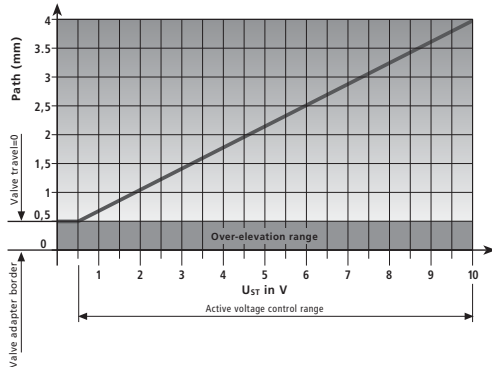
Functions

General

The actuator mechanism of the Alpha-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 piston. The force generated by this movement is transferred to the piston, thus opening or closing the valve.

Standard Version

For the variant "normally closed", the valve is opened once by 0.5 mm and then closed again after applying the operating voltage of 24 V AC. For this, the first open function is unlocked and the valve closing point is detected. This ensures an optimum match with the specific valve used.



If a control voltage of 0.5 – 10 V DC is applied after the calibration process, the actuator opens the valve – after the dead time has elapsed – with the piston movement, evenly and permanently corresponding to the valve travel. An internal optical path measurement controls the temperature required for the maximum stroke of 4 mm (minus over-elevation) and consequently the energy intake of the wax element. No excess energy is stored inside the wax element. If the control voltage is reduced, the electronic control system immediately adapts the heat input to the wax element. In the range of 0 – 0.5 V, the actuator remains in a quiescent state in order to ignore ripple voltage occurring in long cables (U_{min}). After the waiting time is elapsed, the valve is closed evenly with the closing force of the compression spring. The closing force of the compression spring is matched to the closing force of commercially available valves and keeps the valve closed when de-energised (NC).

Stand-by operation

The wax element is maintained at stand-by temperature 20 minutes after the control voltage has dropped below U_{min}.

Valve Adapter Concept

A valve adapter concept guarantees a perfect match of the actuator to almost any valve bottom or heating circuit distributor available on the market. Simply snap-on the Alpha-Actuator 4 to the pre-installed valve adapter.

Function display

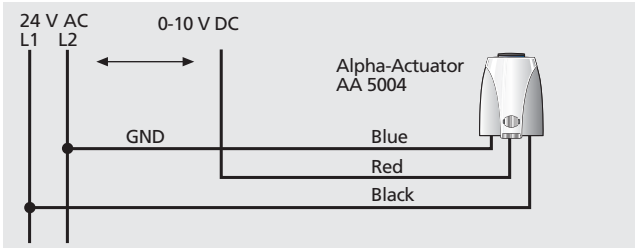
The function display (all-round display) of the Alpha-Actuator shows at the first glance whether the valve is "open" or "closed".

First open function (for NC only)

In its delivery condition, the Alpha-Actuator is kept open when de-energised due to the First open function (filling). This enables heating operation during the carcass construction phase even when the electric wiring is not yet complete. During the later electrical start-up, the first open function is unlocked by applying the operating voltage for more than 6 minutes. The Alpha-Actuator 4 will then be completely operable.

Planning and installation notes

Connections survey



Calculation of maximum cable length (copper cable) for 24 V rated voltage

$$L = K \times A / n$$

- A Conductor cross-section in mm²
- n Number of Alpha-Actuators
- C Constant (269 m/mm²)
- L Cable length in m

We recommend the following cables for installing a 24 V system:

Bell wire:	Y(R)	0.6 mm ²
Light plastic-sheathed cable	NYM	1.5 mm ²
Flat webbed building wire	NYIF	1.5 mm ²

Transformer:

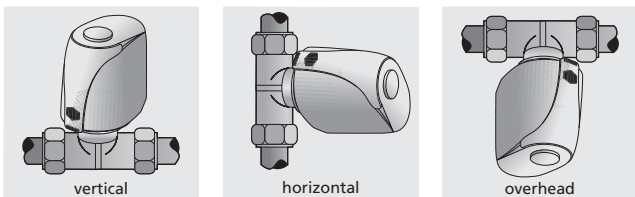
A safety isolating transformer according to EN 61558-2-6 (Europe) or class II FCC-quality proofed (North America) must always be used. Transformer dimensioning results from the making capacity of the Alpha-Actuators.

Rule-of-thumb formula:

$$P_{\text{Transformer}} = 6W \times n$$

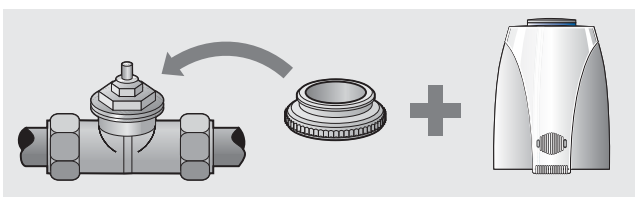
n = Number of Alpha-Actuators

Installation positions



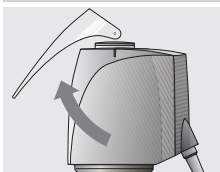
Preferred installation positions of the Alpha-Actuator are vertical and horizontal. An up-side down position may reduce product life through special circumstances (e.g. contaminated water).

Valve adaptation



Valve adaptation is achieved by a valve adapter which is available in different versions to suit the most common valve bottoms and heating circuit distributors (please consider when ordering).

Antitheft device



The Alpha-Actuator can be protected against unauthorised access simply by removing the visor, e.g. on the radiator.