

## OEM Actuator 5: Proportional

The OEM Actuator 5: Proportional is a thermoelectric actuator for the discrete control of heating and cooling systems in direct proportion to the applied control voltage. The control of the actuators is performed by a 0-10 V DC signal via a central DDC system or by a room thermostat. Principal area of application is the building management systems range.

Furthermore, the variants with valve path recognition automatically register the valve path for an optimum use of the active control voltage range. This guarantees an even more precise control of all valves.

The OEM Actuator of the 5th generation has been specially developed for the customer-specific use in OEM businesses. The modular structure offers diverse differentiation possibilities for customer-specific designs.



### 1.1 Features

- Modern OEM design
- Travel path variants 4.0 mm / 5.0 mm (further variants on request)
- Designs “normally closed” (NC) and “normally open” (NO)
- Power consumption of only 1 watt
- Control by a 0-10 V DC signal
- Optionally with valve path recognition
- Short response times, resulting in improved control response
- Closing point verification and possible adaptation during operation
- Complete compatibility to the valve adapter system
- Simple plug-in installation
- 360° installation position
- Patented 100% protection in case of leaky valves
- “First open” function
- Adaptation check on the valve
- Plug-in connecting cable
- Alignment aid on the valve
- Compact size, small dimensions
- All-round function display
- Noiseless and maintenance-free
- High functional safety and long expected service life
- Optionally also as 24 V DC variant
- Certified by the TÜV

### 1.2 Variants

In its basic version, the OEM Actuator 5: Proportional is delivered in a neutral design without logo with plugged connection cable, function display white/white and without valve adapter. The following variants are available in the basic version.

Types	Valve path recognition	Operating voltage		Control voltage	Actuator travel	Closing force	Control direction	Average actuation delay	Scope of supply
APR 40405-00N	no	24 V	AC	0 – 10 V	4.0 mm	100 N	NC	30 s/mm	<ul style="list-style-type: none"> <li>• OEM Actuator 5: Proportional in individual packaging</li> <li>• 1 m connection line (plug-in), white PVC 3 x 0.22 mm<sup>2</sup></li> <li>• Installation instruction in 12 languages</li> </ul>
APR 40405-01N	no	24 V	AC	2 – 10 V	4.0 mm	100 N	NC	30 s/mm	
APR 40405-02N	no	24 V	AC	10 – 0 V	4.0 mm	100 N	NC	30 s/mm	
APR 40405-02N	no	24 V	DC	0 – 10 V	4.0 mm	100 N	NC	30 s/mm	
APV 41405-10N	yes	24 V	AC	0 – 10 V	4.0 mm	100 N	NO	30 s/mm	
APV 41405-11N	yes	24 V	AC	2 – 10 V	4.0 mm	100 N	NO	30 s/mm	
APV 41405-12N	yes	24 V	AC	10 – 0 V	4.0 mm	100 N	NO	30 s/mm	
APV 43405-10N	yes	24 V	DC	0 – 10 V	4.0 mm	100 N	NO	30 s/mm	
APR 40505-00N	no	24 V	AC	0 – 10 V	5.0 mm	100 N	NC	30 s/mm	
APR 40505-01N	no	24 V	AC	2 – 10 V	5.0 mm	100 N	NC	30 s/mm	
APR 40505-02N	no	24 V	AC	10 – 0 V	5.0 mm	100 N	NC	30 s/mm	
APR 42505-00N	no	24 V	DC	0 – 10 V	5.0 mm	100 N	NC	30 s/mm	
APV 40505-00N	yes	24 V	AC	0 – 10 V	5.0 mm	100 N	NC	30 s/mm	
APV 40505-01N	yes	24 V	AC	2 – 10 V	5.0 mm	100 N	NC	30 s/mm	
APV 40505-02N	yes	24 V	AC	10 – 0 V	5.0 mm	100 N	NC	30 s/mm	
APV 42505-00N	yes	24 V	DC	0 – 10 V	5.0 mm	100 N	NC	30 s/mm	

**The following extension possibilities resp. differentiations from the basic version are available optionally:**

Line lengths	2 m, 3 m, 5 m, 10 m, 15 m; PVC in white – 3 x 0.22 mm <sup>2</sup> (special lengths shorter than 25 m)
Valve adapters	are available for almost all valves and distributors
Packaging	Packaging can be manufactured and printed individually according to requirements.
Imprint on casing	Laser marking of the company logo and the individual type designation
Colour of casing and cable	Homogenous colouring, colour of the function display or function cap matching your product design or corporate design
Non-halogen line	1 m, 2 m, 3 m, 5 m, Hal F H03Z1Z1 in white – 3 x 0.22 mm <sup>2</sup> For the compliance with fire protection and environmental regulations.
Please contact us if you have further wishes.	

**Accessories**

- Protection cap SK 1004

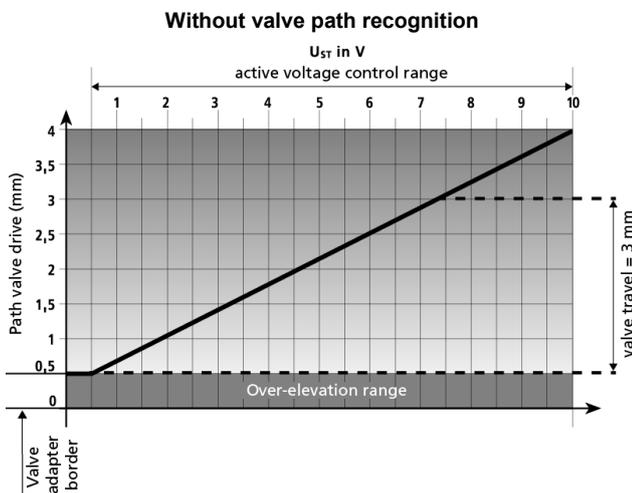
**2 Function**

The actuator mechanism of the OEM Actuator uses a PTC resistor-heated elastic element and a compression spring. The elastic element is heated by applying the operating voltage and moves the integrated plunger. The force generated by this movement is transferred to the plunger, thus opening or closing the valve.

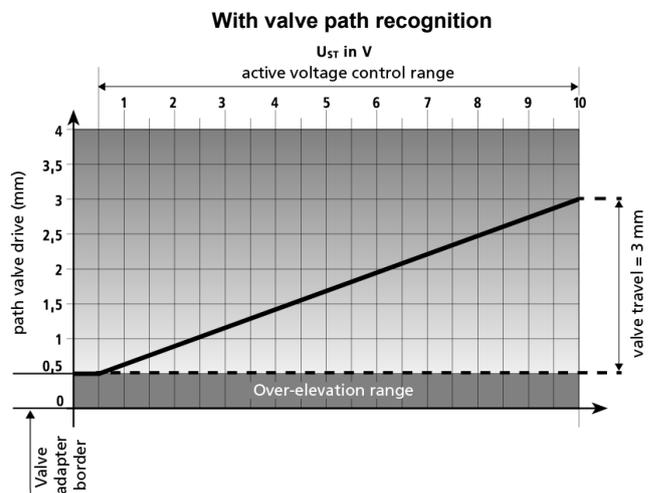
**2.1 Version NC: Normally-closed with and without valve path recognition (valve closed)**

After switching on the operating voltage, the first-open function is unlocked. Directly after that, the actuator automatically detects the valve closing point and switches to regular operation. This process guarantees an optimum adaptation of the actuator to the valve. If a control voltage is applied after the closing point detection, the actuator opens the valve evenly with the plunger movement after the dead time has elapsed.

An internal wear-free position detection controls the temperature required for the maximum stroke (minus over-elevation) and consequently the energy intake of the elastic element. No excess energy is stored inside the elastic element. If the control voltage is reduced, the electronic control system immediately adapts the heat input to the elastic element. In the range of 0 – 0.5 V (depending on the model) the actuator remains in a quiescent state in order to ignore ripple voltage occurring in long cables (r<sub>pm</sub>). 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.



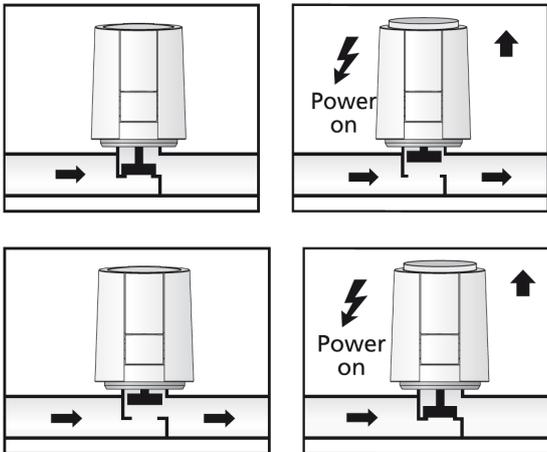
If a 4 mm actuator without valve path recognition is used for valves with an actuator travel of 3 mm, the actuator travels without load for control voltages from 7.5 V to 10 V.



For the variant with valve path recognition, the actuator calculates the valve path and automatically adapts the active control voltage range to this. This allows an even more precise control of the valve and prevents the actuator from traveling without load. The complete voltage spike of the thermostat is used for flow control purposes.

**2.2 Function display**

The function display (all-round display) of the OEM Actuator shows at first glance whether the valve is open or closed; this can be also felt in the dark.



- For the version NC: Normally closed extracts the function display when the valve opens.
- For the version NO: **Normally open** extracts the function display when the valve is closed.

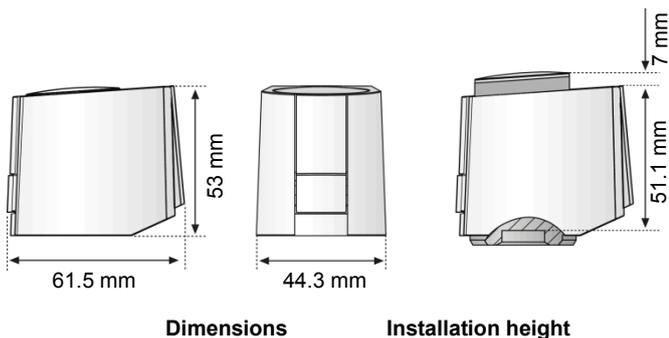
**2.3 "First open" function (for NC variants only)**

In its delivery condition, the OEM Actuator is normally open due to the "First Open" function. This enables heating operation during the carcass construction phase even when the electric wiring of the single room control is not yet complete. When commissioning the system at a later date, the "First Open" function is automatically unlocked by applying the operating voltage (for more than 6 minutes) and the actuator is fully operable.

**3 Technical data**

Voltage (according to variant)	24 V AC, -10% ... +20 %, 50-60 Hz 24 V AC, -20% ... +20 %,	
Control voltage range	0 V... 10 V (reverse polarity protected)	
Max. inrush current	< 300 mA during max. 2 min.	
Operating power	1 W <sup>1)</sup>	
Resistance of control voltage input	100 kΩ	
Actuator travel	4.0 / 5.0 mm (minus 0.5 mm over-elevation)	
Actuating force	100 N ± 5 %	
Fluid temperature	0 to +100°C <sup>2)</sup>	
Storage temperature	-25 °C to +65 °C	
Ambient temperature	0 to +60 °C	
Degree / class of protection	IP 54 <sup>3)</sup> / III	
CE conformity according to	EN 60730	
Casing material / colour	Polyamide / white	
Connection line / colour	3 x 0.22 mm <sup>2</sup> PVC, white	
Line length	1 m	
Weight with connection cable (1 m)	111 g	
Overtoltage strength according to EN 60730-1	min. 1 kV	1) measured with precision power meter LMG95 2) or higher, depending on the adapter 3) in all installation positions

**3.1 Dimensions**



**3.2 Certificates**

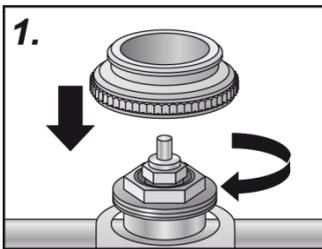


The OEM Actuator 5 is certified by TÜV Süd

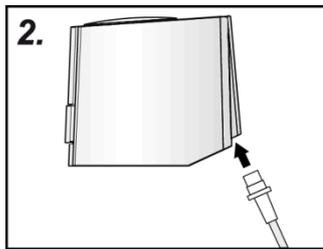
**4 Installation notes**

**4.1 Installation with valve adapter**

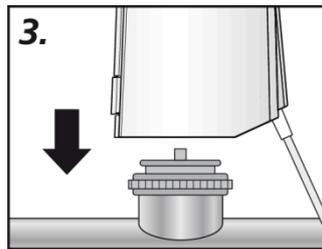
The valve adapter assortment guarantees a perfect match of the actuator to almost all valve bottoms and heating circuit distributors available on the market. The OEM Actuator 5 is simply plugged on to the valve adapter previously installed manually.



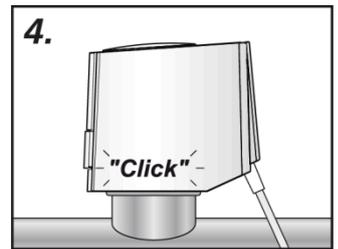
1. Screw the adapter manually onto the valve.



2. Connect the line to the actuator.

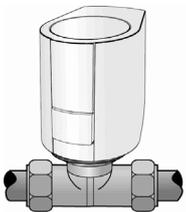


3. Position the OEM Actuator manually in vertical position to the valve adapter.

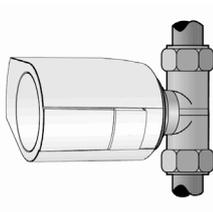


4. Latch the OEM Actuator 5 to the valve adapter by manually applied vertical pressure; this can be done noiselessly and without any problems.

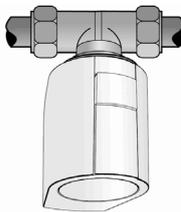
**4.2 Installation position**



vertical



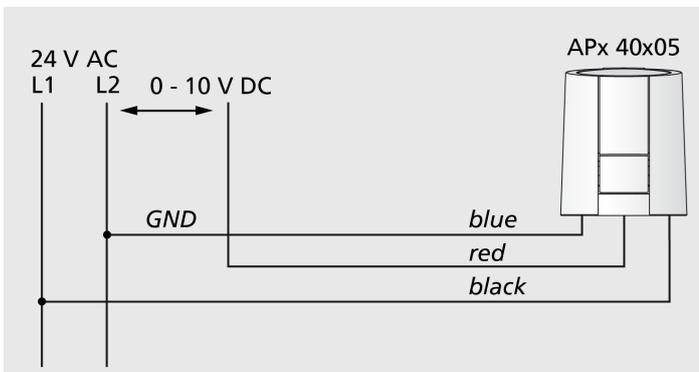
horizontal



“overhead”

The OEM Actuator must be installed preferably in vertical or horizontal installation position. For “overhead” installation special circumstances (e. g. drainwater) can reduce the lifetime of the actuator.

**4.3 Electric connection**



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

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

L Cable length in m  
 K Constant (269 m/mm<sup>2</sup>)  
 A Conductor cross-section in mm<sup>2</sup>  
 n Number of Alpha-Actuators

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

Telephone line	J-Y(ST)Y	0.8 mm <sup>2</sup>
Light plastic-sheathed cable:	NYM	1.5 mm <sup>2</sup>
Flat webbed building wire:	NYIF	1.5 mm <sup>2</sup>

Transformer:  
A safety isolating transformer according to EN 61558-2-6 must always be used. Transformer dimensioning results from the making capacity of the OEM Actuators.

Rule-of-thumb formula:

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

n = Number of OEM Actuators

Technical changes reserved. Reprint, including partial reprint, only with consent of Möhlenhoff GmbH.