Innovation Value Research

IVR 823

Thermoelectric Valve Drives

Technical Data Sheet

OEM Actuator 5: 230 V Standard

The OEM-Actuator 5: 230 V Standard is a thermoelectric valve drive for opening and closing valves on heating circuit distributors of concealed floor heating and cooling systems. The main field of application is the energy-efficient individual room temperature control in the range of building management systems and home automation. The OEM-Actuator 230 V is controlled by a 230 V room thermostat with two point output or pulse-width modulation.

The OEM-Actuator of the fifth generation has been developed especially for customer-specific usage in the OEM business. The modular design offers several possibilities for differentiations for tailor-made versions.

1.1 Features

- Modern OEM design
- Stroke variants 4.0 mm / 5.0 mm (other stroke variants on demand)
- Available in normally closed (NC) or normally open (NO)
- Power consumption 1 watt
- Complete compatibility to Valve-Adapter-System
- Simple snap-on installation
- 360° installation position
- Patented 100% protection against leaky valves
- First-Open function (NC type only, optional)
- Adaptation check on valve
- Alignment aid on the valve
- Compact size, small dimensions
- All around function indicator
- Noiseless and maintenance-free
- High functional safety and long expected service life
- Surge protection guarantee
- Certified by TÜV

1.2 Versions

In the basic version the OEM-Actuator 5: 230 V Standard is delivered as a neutral version without logo, with fixed connecting cable, function indicator blue / gray, without valve adapter and laser marking. The following versions are available in the basic version

CODE	Stroke	Actuating force	De-energised direction	Closing and opening time
182311101	5.0 mm	100 N	NC	approx. 4 min
182311112	5.0 mm	100 N	NO	approx. 4 min

Optionally, the following extensions and differentiations of the basic version are available:

Cable length	2 m, 3 m, 5 m, PVC H03VV in grey – 2 x 0.75 mm²
Valve Adapter	Adapters are available for all standard valves and manifolds
Packaging	Packaging can be printed or produced individually according to your requirements
Imprint on casing	Laser imprint of your company logo and of an individual type designation
Colour of casing and cable	Homogenous colouring, colour function indicator and 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 – 2 x 0.75 mm² Compliance with fire protection and environmental regulations
NRTL approval	Approval according to UL specification
Further versions available on request.	

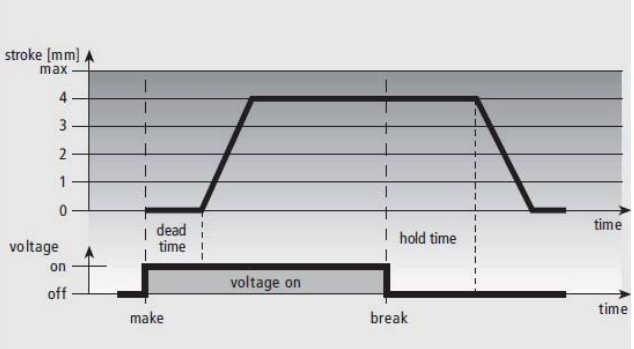
Accessories

- Protection Cap SK 1004

2 Functions

The actuator mechanism of the OEM-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 ram. The force generated by the movement is transferred on the valve lifter and thus opens and closes the valve.

2.1 **Normally Closed** (valve closed)

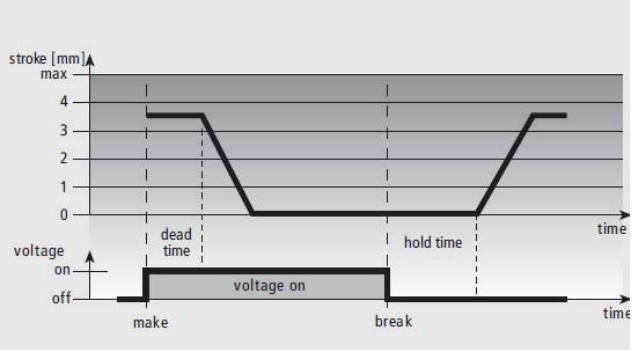


In case of the normally closed version, the valve is opened steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time, the valve is closed evenly by 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 normally closed.

Fig.: Example for 4 mm stroke. Characteristic line for stroke 5 mm results analogous.

2.2 **Normally Open** (valve opened)



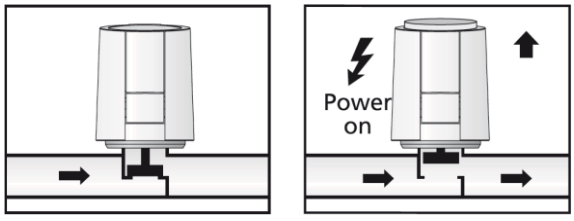
In case of the normally open version, the valve is closed evenly by the ram motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time, the valve is opened evenly by the closing force of the compression spring.

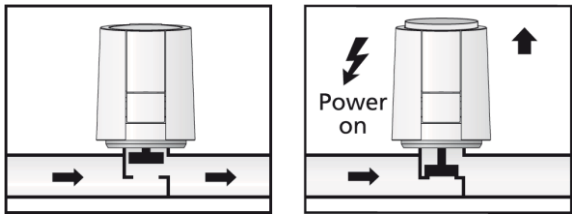
Fig.: Example for 4 mm stroke. Characteristic line for stroke 5 mm results analogous.

2.3 Function Display

The function display of the OEM-Actuator (all-around display) allows identifying the operating condition (valve open or closed) at a glance.



- In case of the **NC version**, an extended function display shows opening of the valve.



- In case of the **NO version**, an extended function display shows that the valve is closed.

2.4 First-Open Function (for NC only)

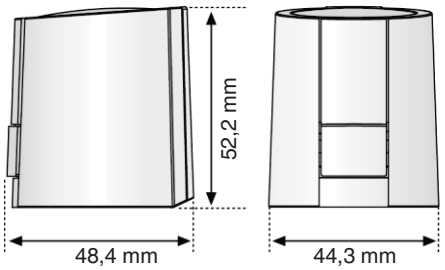
In its delivery condition, the OEM-Actuator is kept open when de-energised due to the First-Open function. This enables heating operation during the carcass construction phase even when the electric wiring is not yet complete. During the later electrical start-up, the First-Open function is unlocked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

3 Technical Informations

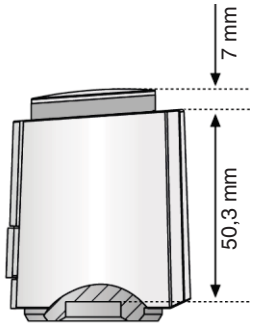
Operating voltage	230 V AC, +10%...–10%, 50/60 Hz
Max. inrush current	< 550 mA during 100 ms max.
Operating power	1 W [1)]
Stroke (actuator travel)	4.0 / 5.0 mm
Actuating force	100 N +10 %
Fluid temperature	0 to +100°C [2)]
Storage temperature	-25°C to +60°C
Ambient temperature	0 to +60°C
Degree of protection	II
Type of protection	IP 54 [3)]
CE conformity according to	EN 60730
Housing material/housing colour	Polyamide / light grey (RAL 7035)
Connecting cable/colour	2 x 0.75 mm² PVC / light grey (RAL 7035)
Cable length	1 m
Weight with connecting cable (1 meter)	100 g
Surge protection according to EN 60730-1	2.5 kV

1) measured with precision reference instrument LMG95
2) in dependence of the adapter even higher
3) in all installation positions

3.1 Dimensions



Dimensions



Installation height

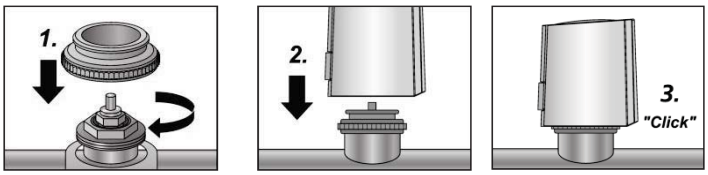
3.2 Certificates

The OEM Actuator 5 is certified by TÜV Süd.

4 Installation Notes

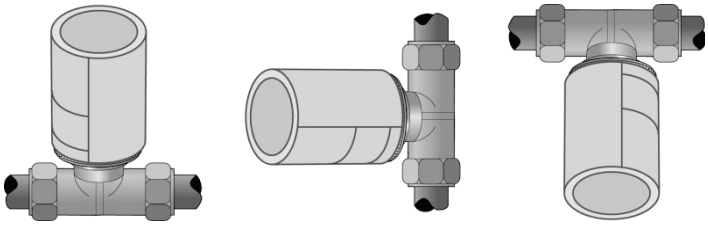
4.1 Installation with Valve Adapter

The wide selection of valve adapters guarantees a perfect match of the OEM-Actuator to almost any valve bottom or manifold available on the market. Simply snap-on the OEM-Actuator to the manually pre-installed valve adapter.



- First the valve adapter is screwed on the valve manually
- The OEM-Acutator is placed vertically on the valve adapter.
- The OEM-Actuator snaps onto the valve adapter with a “click” when pressed down vertically by hand.

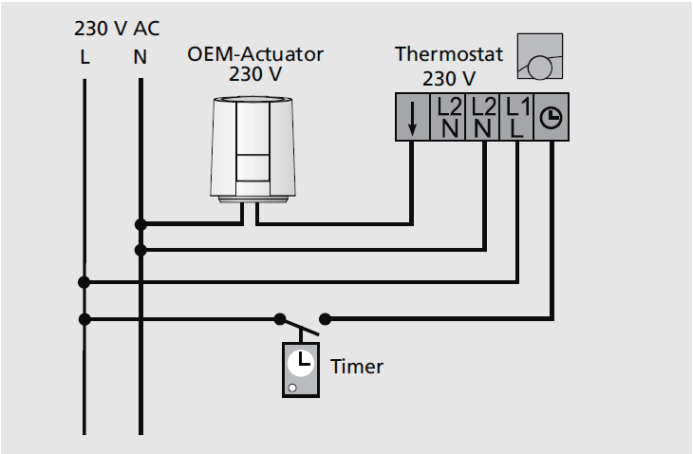
4.2 Installation Positions



Vertical **Horizontal** **Upside Down**

Preferred installation position of the OEM-Acutator is vertical or horizontal. An upside down position may reduce product life through special circumstances (e.g. contaminated water).

4.3 Electrical Installation



We recommend usage of the following lines for installing a 230 V system:

Light plastic-sheathed cable	NYM 1.5 mm²
Flat webbed building wire	NYIF 1.5 mm²

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Thermoelectric Valve Drives **Technical data sheet**

OEM Actuator 5: 230 V End switch

The OEM Actuator 5: 230 V End switch is a thermoelectric valve drive for opening and closing valves and small valves used in the scope of HVAC technology. The integrated micro switch with floating contact allows direct operation of a pump or fan control unit. The OEM Actuator 230 V End switch is controlled by a 230 V room thermostat with two-point output or pulse-width modulation.

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

1.1 Features

- Modern OEM design
- Integrated switch with floating contact
- Stroke variants 4.0 mm / 5.0 mm (further variants on request)
- Available in normally closed (NC) and normally open (NO)
- Power consumption 1 watt
- Complete compatibility to the valve adapter system
- Simple snap-on installation
- 360° installation position
- Patented 100% protection in case of leaky valves
- First-Open function
- Adaptation check on the valve
- 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
- Surge protection guarantee
- Certified by TÜV Süd

1.2 Variants

In its basic version, the OEM Actuator 5: 230 V End switch is delivered in a neutral design without logo with fixed connection cable, function display blue/grey, without valve adapter and laser marking. The following variants are available in the basic version.

CODE	Stroke	Actuating force	De-energised direction	Closing and opening time
182311140	5.0 mm	100 N	NC	approx. 4 min

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

Line lengths	2 m, 3 m, 5 m, PVC H05V2V2-F in grey – 4 x 0.75 mm^2
Valve adapter	adapters are available for 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
Please contact us if you have further wishes.	

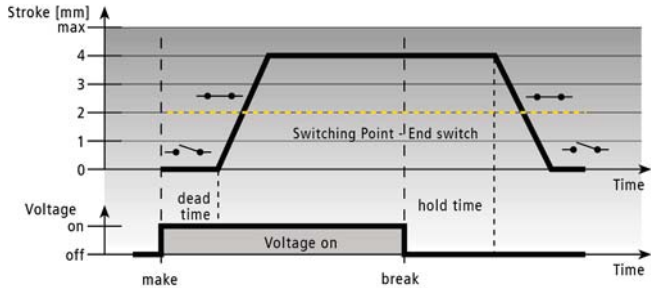
Accessories

- Protection cap SK 1004

2 Function

The actuator mechanism of the OEM Actuator with end switch 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 ram. The force generated by this movement is transferred on the valve lifter and opens and closes the valve. The integrated micro switch allows the use of its switching signal depending on the opening of the valve.

2.1 Version NC: normally closed (valve closed)



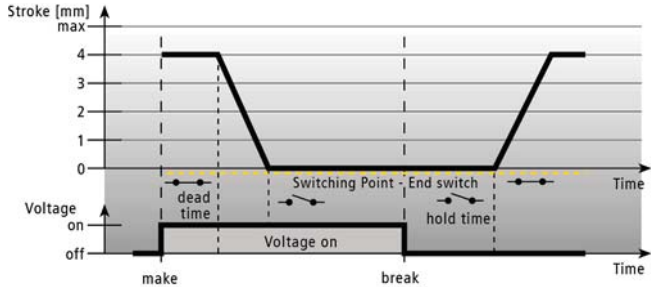
In case of the normally closed version, the valve is opened steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time. The integrated micro switch is switched with a travel path of approx. 2 mm.

After the operating voltage is cut and after expiry of the hold time the valve is closed evenly by the closing force of the compression spring. The integrated switch is closed after an actuator travel of approx. 2 mm.

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.

Figure: Example with respect to the travel path of 4 mm. The characteristic curves of the travel path of 5 mm result from this.

2.2 Version NO: normally open (valve open)



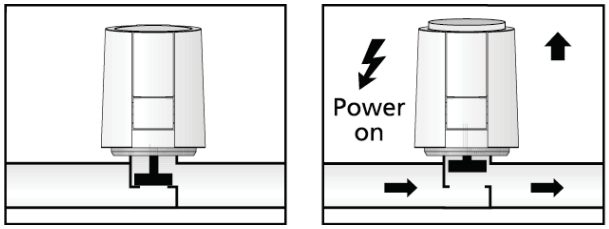
In case of the normally open version, the valve is closed steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time. When the valve is completely closed, the valve drive goes to over-elevation and the integrated end switch is opened.

After the operating voltage is cut and after expiry of the hold time, the integrated micro switch is closed and the valve is opened evenly by the force of the valve spring.

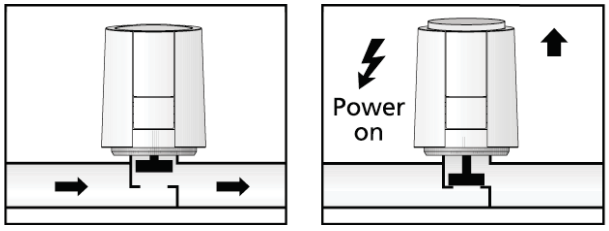
Figure: Example with respect to the travel path of 4 mm.

2.3 Function display

The function indicator of the OEM-Actuator (all around view) allows identifying the operating condition (valve open or closed) at a glance. It is also possible to feel the current operating state when it's dark.



- In case of the **NC version**, an extended function display shows opening of the valve.



- In case of the **NO version**, an extended function display shows that the valve is closed.

2.4 "First open" function (for NC variants only)

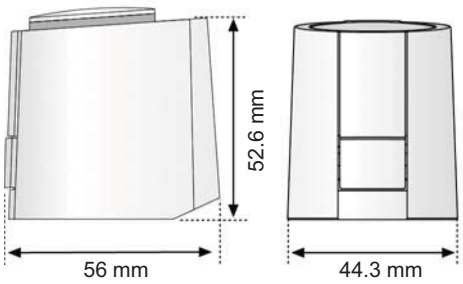
In its delivery condition, the OEM Actuator is kept open when de-energised due to the First-Open function. This enables heating operation during the carcass construction phase even when the electric wiring of the individual room control is not yet complete. During the later electrical start-up, the First-Open function is automatically unlocked by applying the operating voltage for more than 6 minutes. The valve drive is now fully operable.

3 Technical data

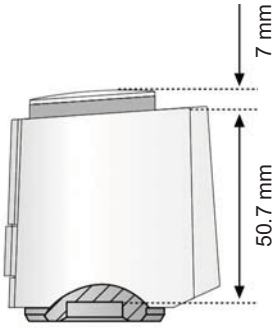
Operating voltage		230 V AC, -10 %...+10 %, 50/60 Hz
Max. inrush current		< 550 mA during max. 100 ms
Operating power		1 W [1]
Stroke (actuator travel)		4.0 / 5.0 mm
Actuating force		100 N +5 %
Closing and opening time	at Stroke 4 mm	approx. 3.5 min
	at Stroke 5 mm	approx. 4 min
Switching current for micro switch		230 V AC: 5 A resistive load, 1 A inductive load
Switching point of micro switch NC		approx. 2 mm
Switching point of micro switch NO		for completely closed valve
Fluid temperature		0 °C to +100 °C [2]
Storage temperature		-25 °C to +60 °C
Ambient temperature		0 °C to +60 °C
Degree of protection		IP 54 [3]
Class of protection		II
CE conformity according to		EN 60730
Casing	material	Polyamide
	colour	light grey (RAL 7035)
Connection line	type	4 x 0.75 mm² PVC
	colour	light gray (RAL 7035)
	length	1 m
Weight with connecting cable (1 m)		approx. 150 g
Surge protection according to EN 60730-1		2.5 kV

1) measured with precision power meter LMG95
2) or higher, depending on the adapter length
3) in all installation positions

3.1 Dimensions



Dimensions



Installation height

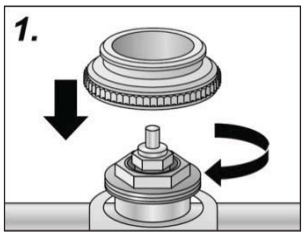
3.2 Certificates

The OEM Actuator 5 is certified by TÜV Süd

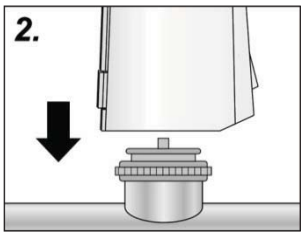
4 Installation notes

4.1 Installation with valve adapter

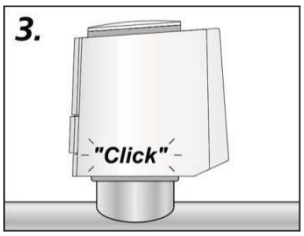
The valve adapter assortment guarantees a perfect match of the valve drive to almost any valve bottom and heating circuit distributor available on the market. Simply snap-on the OEM-Actuator 5 to the manually pre-installed valve adapter.



Screw the adapter manually onto the valve.

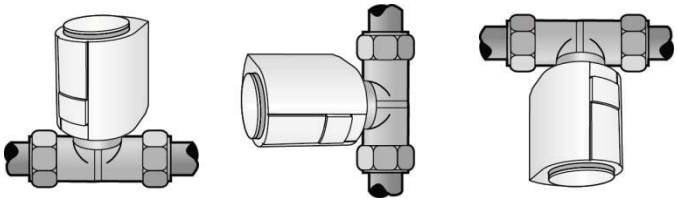


Place the OEM Actuator vertically on the valve adapter.



The OEM Actuator snaps onto the valve adapter with a “click” when pressed down vertically by hand.

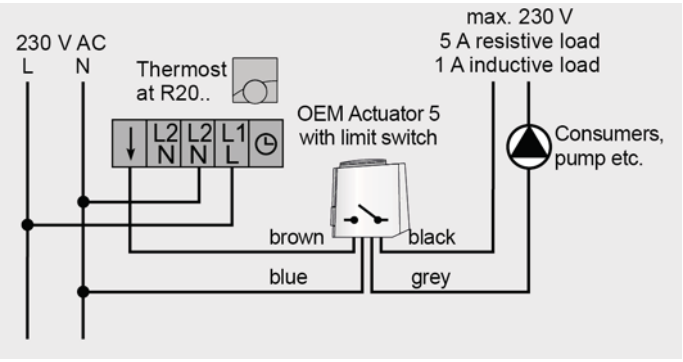
4.2 Installation position



vertical **horizontal** **overhead**

Preferred installation position of the OEM-Acutator is vertical or horizontal. An upside down position may reduce product life through special circumstances (e.g. contaminated water).

4.3 Electric connection



We recommend the following cables for installing a 230 V system:

Light plastic-sheathed cable: NYM 1.5 mm²
Flat webbed building wire: NYIF 1.5 mm²

Innovation Value Research

IVR 824

Thermal actuators **Technical Data Sheet**

OEM Actuator 5: 24 V Standard

The The OEM Actuator 5: 24 V Standard is a thermoelectric actuator for opening and closing valves and small valves on heating circuit distributors of surface heating and cooling systems. The predominant area of application is the energy-efficient room-by-room temperature control in the area of building services and automation. The OEM Actuator 24 V Standard is controlled by a 24 V room thermostat with two-point output or pulse-width modulation.

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 1 watt
- 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
- Alignment aid on the valve
- Compact size, small dimensions
- All around function display
- Noiseless and maintenance-free
- High functional safety and long expected service life
- Certified by the TÜV

1.2 Variants

In its basic version, the OEM Actuator 5: Standard is delivered in a neutral design without logo with fixed connection cable, function display blue/grey, without valve adapter and laser marking. The following variants are available in the basic version.

CODE	Stroke	Actuating force	De-energised direction	Closing and opening time
182411101	5.0 mm	100 N	NC	approx. 4 min
182411110	5.0 mm	100 N	NO	approx. 4 min

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

Cable	Standard	2 m, 3 m, 5 m, PVC H03VV in grey – 2 x 0.75 mm² (special lengths shorter than 25 m)
	Non-halogen	1 m, 2 m, 3 m, 5 m, Hal F H03Z1Z1 in white – 2 x 0.75 mm² For the compliance with fire protection and environmental regulations.
Valve adapters		adapters are available for 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		Homogeneous colouring, colour of the function display or function cap matching your product design or corporate design
NRTL approval		Approval according to UL specification
Please contact us if you have further wishes.		

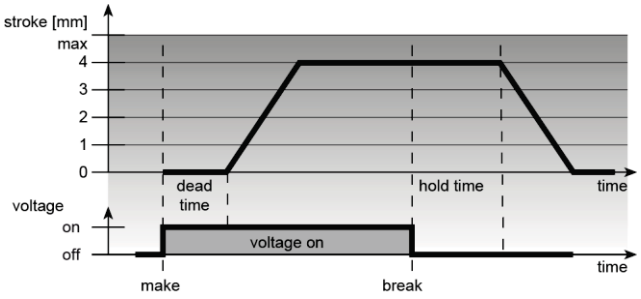
Accessories

- 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** (valve closed)



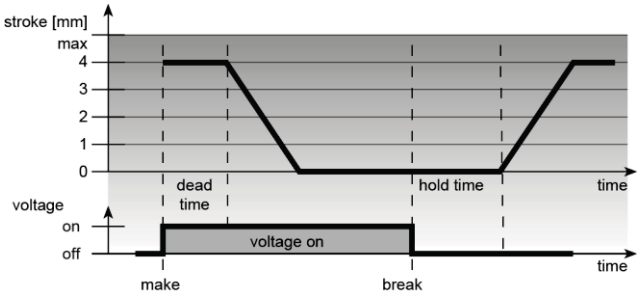
In case of the normally closed version, the valve is opened steadily by the plunger motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time the valve is closed evenly by 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.

Figure: Example with respect to the travel path of 4 mm. The characteristic curve of the travel path of 5 mm is the result.

2.2 **Version NO: Normally open** (valve open)



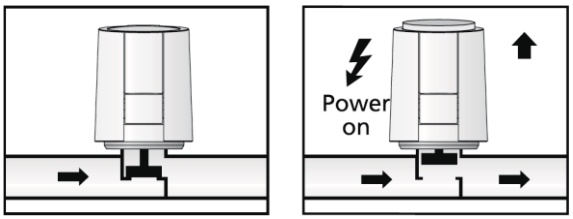
In case of the normally open version, the valve is closed steadily by the plunger motion upon switching on the operating voltage and after expiry of the dead time.

After the operating voltage is cut and after expiry of the hold time the valve is opened evenly by the closing force of the compression spring.

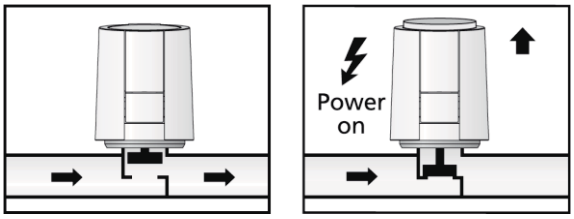
Figure: Example with respect to the travel path of 4 mm. The characteristic curve of the travel path of 5 mm is the result.

2.3 Function display

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

2.4 “First Open” function (for NC variants only)

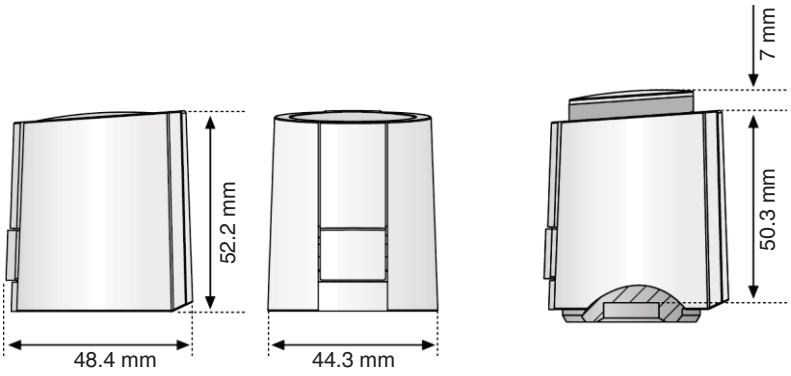
In its delivery condition, the OEM Actuator is normally open due to the “First Open” function. This enables heating operation during the carcass construction phase even when the electric wiring of the room-by-room temperature control is not yet complete. When commissioning the system at a later date, 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		24 V AC/DC, +20%...-10%
Max. inrush current		< 300 mA during max. 2 min.
Operating power		1 W [1]
Stroke		4.0 / 5.0 mm
Actuation force		100 N +10 %
Fluid temperature		0 to +100 °C [2]
Storage temperature		-25 °C to +60 °C
Ambient temperature		0 to +60 °C
Protection class		III
Degree of protection		IP 54 [3]
CE conformity according to		EN 60730
Casing	Material	Polyamide
	Colour	Light grey (RAL 7035)
Connection line	Type	2 x 0.75 mm² PVC
	Colour	Light grey (RAL 7035)
	Length	1 m
Weight with connection cable (1 m)		100 g
Surge strength according to EN 60730-1		1 kV

1) measured with precision power meter LMG95
2) or higher, depending on the adapter
3) in all installation positions

3.1 Dimensions



Dimensions

Installation height

3.2 Certificates

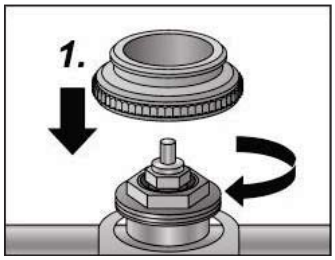
The OEM Actuator 5 is certified by TÜV Süd

The EU Directive 2012/19/EG controls the return and the environment-compatible disposal of electric and electronic devices.

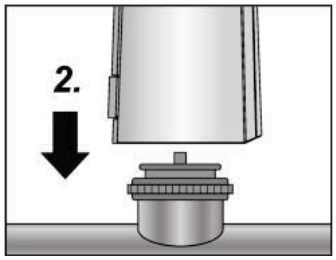
4 Installation notes

4.1 Installation with valve adapter

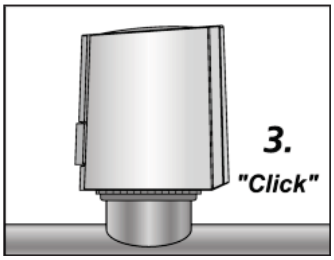
The valve adapter assortment guarantees a perfect match of the actuator to almost all valve bottoms and heating circuit distributors available on the market. The OEM Actuator 5 is simply plugged on to the valve adapter previously installed manually.



Screw the valve adapter manually onto the valve.

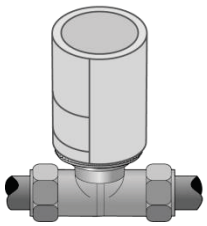


Position the OEM Actuator manually in vertical position to the valve adapter.

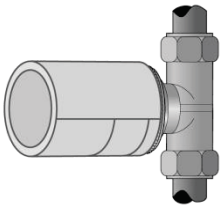


Latch the OEM Actuator 5 to the valve adapter by manually applied vertical pressure until a clicking sound is heard.

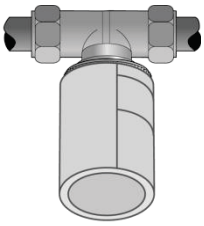
4.2 Installation position



vertical



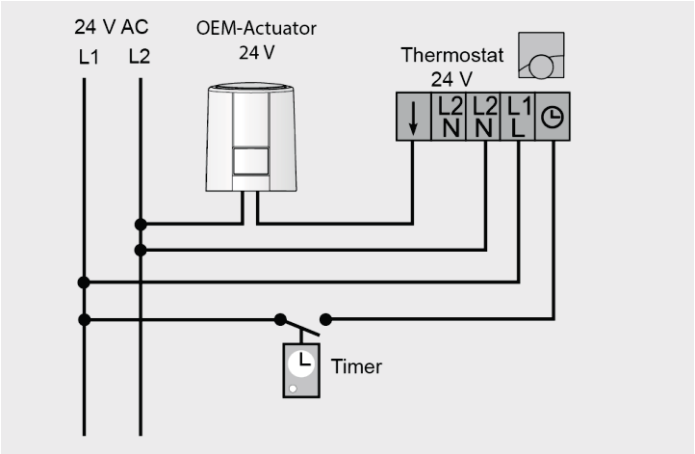
horizontal



“overhead”

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

4.3 Electric connection



Cable
We recommend the following cable lengths for installing a 24 V system:

Cable	Section / diameter	Length
J-Y(ST)Y	0.8 mm	45 m
NYM / NYIF	1.5 mm²	136 m

Transformer/power supply (unknown power supply)
A safety isolating transformer according to EN 61558-2-16 (for the AC variant) or a switching power supply according to EN 61558-2-16 (for DC variant) must always be used.

The dimensioning of the transformer or the switching power supply results from the making capacity of the OEM Actuators:

Rule-of-thumb formula: $P_{transformer}$ = 6 W x n
n = number of OEM Actuators

When used in a control system, the specifications of the base station apply to the maximum permissible number of actuator.

Innovation Value Research

IVR 824

Thermoelectric Valve Drives **Technical Data Sheet**

OEM Actuator 5: 24 V End switch

The OEM Actuator 5: 24 V End switch is a thermoelectric valve drive for opening and closing valves and small valves used in the scope of HVAC technology. The integrated micro switch with floating contact allows direct operation of a pump or fan control unit. The OEM Actuator 24 V End switch is controlled by a 24 V room thermostat with two-point output or pulse-width modulation.

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

1.1 Features

- Modern OEM design
- Integrated switch with floating contact
- Stroke variants 4.0 mm / 5.0 mm (further variants on demand)
- Available in normally closed (NC) or normally open (NO)
- Power consumption 1 watt
- Complete compatibility to the valve adapter system
- Simple snap-on installation
- 360° installation position
- Patented 100% protection against leaky valves
- First-Open function
- Adaptation check on valve
- 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
- Certified by TÜV Süd

1.2 Variants

In its basic version, the OEM Actuator 5: 24 V End switch is delivered in a neutral design without logo with fixed connection cable, function display blue/grey, without valve adapter and laser marking. The following variants are available in the basic version.

CODE	Stroke	Actuating force	De-energised direction	Closing and opening time
182411140	5.0 mm	100 N	NC	approx. 4 min

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

Cable length	2 m, 3 m, 5 m, PVC H05V2V2-F in grey – 4 x 0.75 mm^2
Valve adapter	adapters are available for 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
Further versions available on request	

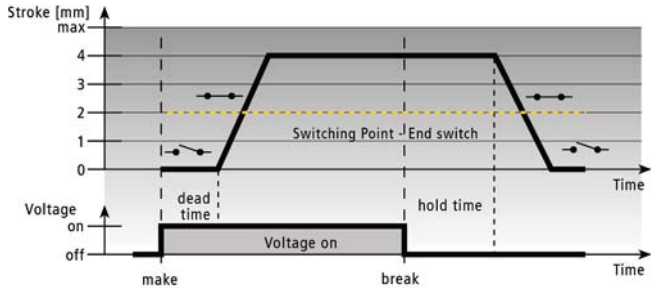
Accessories

Protection cap SK 1004

2 Function

The actuator mechanism of the OEM Actuator with end switch 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 ram. The force generated by this movement is transferred on the valve lifter and opens and closes the valve. The integrated micro switch allows the use of its switching signal depending on the opening of the valve.

2.1 **Version NC: normally closed** (valve closed)



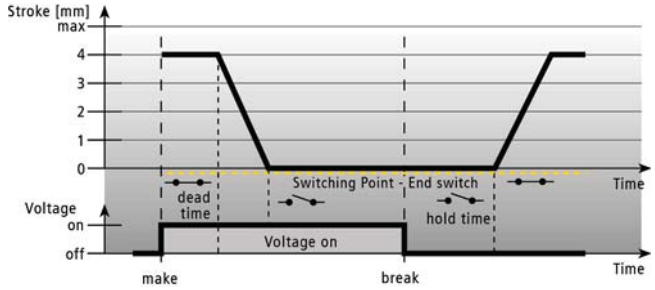
In case of the normally closed version, the valve is opened steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time. The integrated micro switch is switched with a travel path of approx. 2 mm.

After the operating voltage is cut and after expiry of the hold time the valve is closed evenly by the closing force of the compression spring. The integrated switch is closed after an actuator travel of approx. 2 mm.

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.

Figure: Example with respect to the travel path of 4 mm. The characteristic curves of the travel path of 5 mm result from this.

2.2 **Version NO: normally open** (valve open)

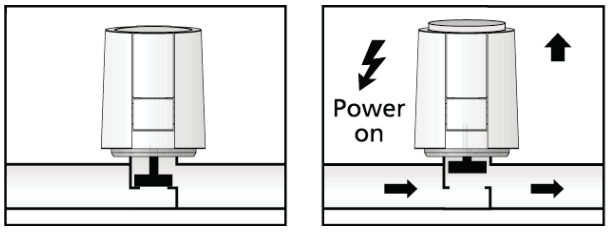


In case of the normally open version, the valve is closed steadily by the ram motion upon switching on the operating voltage and after expiry of the dead time. When the valve is completely closed, the valve drive goes to over-elevation and the integrated end switch is opened.

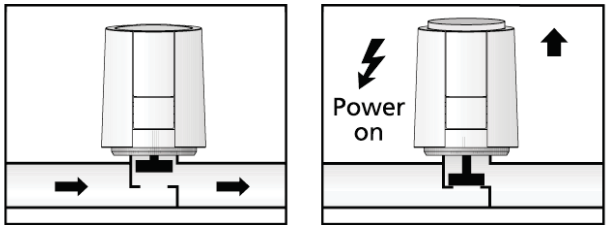
After the operating voltage is cut and after expiry of the hold time, the integrated micro switch is closed and the valve is opened evenly by the force of the valve spring.

2.3 Function display

The function indicator of the OEM-Actuator (all around view) allows identifying the operating condition (valve open or closed) at a glance. It is also possible to feel the current operating state when it's dark.



- In case of the **NC version**, an extended function display shows opening of the valve.



- In case of the **NO version**, an extended function display shows that the valve is closed.

2.4 "First open" function (for NC only)

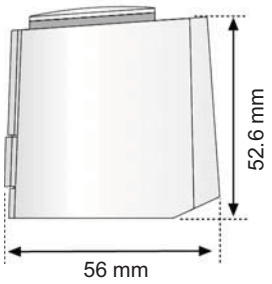
In its delivery condition, the OEM Actuator is kept open when de-energised due to the First-Open function. This enables heating operation during the carcass construction phase even when the electric wiring of the individual room control is not yet complete. During the later electrical start-up, the First-Open function is automatically unlocked by applying the operating voltage for more than 6 minutes. The valve drive is now fully operable.

3 Technical data

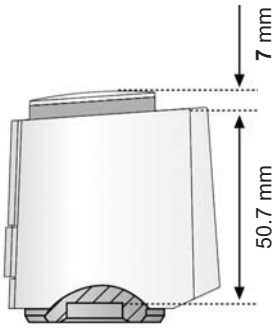
Operating voltage		24 V AC/DC, +20%...-10%
Max. inrush current		< 300 mA during max. 2 min.
Operating power		1 W [1]
Stroke (actuator travel)		4.0 / 5.0 mm
Actuating force		100 N +5 %
Switching current for micro switch		24 V: 3 A resistive load, 1 A inductive load
Switching point of micro switch NC		approx. 2 mm
Switching point of micro switch NO		for completely closed valve
Fluid temperature		0 to +100°C [2]
Storage temperature		-25 °C to +60 °C
Ambient temperature		0 °C to +60 °C
Degree of protection		IP 54 [3]
Class of protection		III
CE conformity according to		EN 60730
Housing	material	Polyamide
	colour	light grey (RAL 7035)
Connection line	type	4 x 0.75 mm² PVC
	colour	light gray (RAL 7035)
	length	1 m
Weight with connecting cable (1 m)		approx. 150 g
Surge protection according to EN 60730-1		1 kV

1) measured with precision reference meter LMG95
2) depending on the adapter even higher
3) in all installation positions

3.1 Dimensions



Dimensions



Installation height

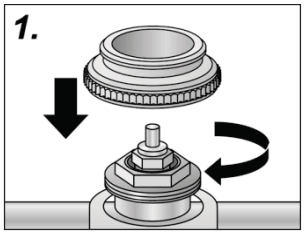
3.2 Certificates

The OEM Actuator 5 is certified by TÜV Süd

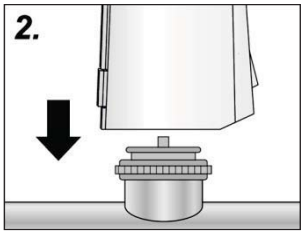
4 Installation notes

4.1 Installation with valve adapter

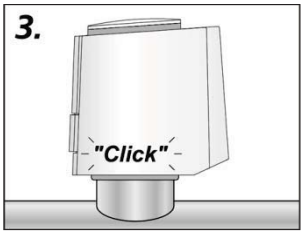
The valve adapter assortment guarantees a perfect match of the valve drive to almost any valve bottom and heating circuit distributor available on the market. Simply snap-on the OEM-Actuator to the manually pre-installed valve adapter.



Screw the adapter manually onto the valve.

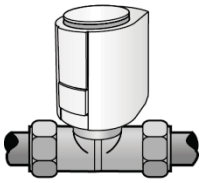


Place the OEM Actuator vertically on the valve adapter.

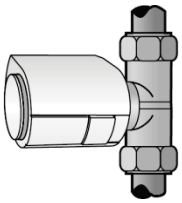


The OEM Actuator snaps onto the valve adapter with a “click” when pressed down vertically by hand.

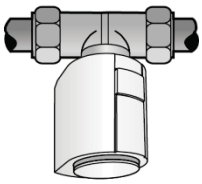
4.2 Installation position



vertical



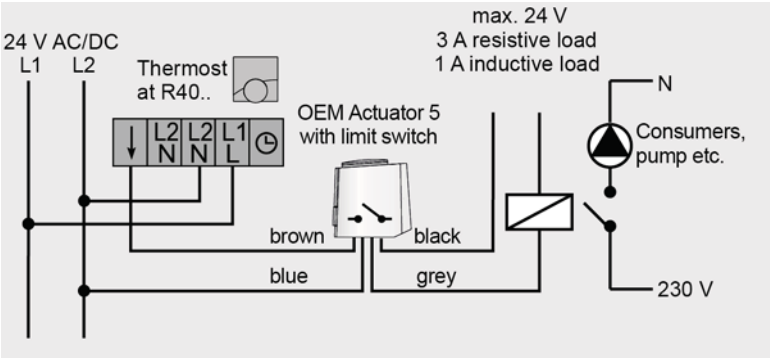
horizontal



overhead

Preferred installation position of the OEM-Acutator is vertical or horizontal. An upside down position may reduce product life through special circumstances (e.g. contaminated water).

4.3 Electric connection



Cable
We recommend the following cable lengths for installing a 24 V system:

Cable	Section	Length
J-Y(ST)Y	0.8 mm	45 m
NYM / NYIF	1.5 mm²	136 m

Transformator/power supply
A safety isolating transformer according to EN 61558-2-16 (for the AC variant) or a switching power supply according to EN 61558-2-16 (for DC variant) must always be used.

The dimensioning of the transformer or the switching power supply results from the making capacity of the OEM Actuators.

Rule-of-thumb formula: $P_{transformer}$ = 6 W x n
n = Number of OEM Actuators