

EMOtec

**Thermal actuator
for floor heating**



To be precise.



Description



The EMOtec thermal actuator is a two-point actuator for connection to a temperature controller with two-point output, e.g. HEIMEIER room Thermostat P or Radiocontrol F-System for floor heating.

The actuator NC is equipped with a position indicator on the top (valve closed / valve open).

Models with 230 V (with built-in overvoltage protection 2.5 kV) and 24 V operating voltages, each NC or NO.

EMOtec has an electrically heated expansion system which is secured against overtravel.

The positioning force within the close range is adapted to thermostatic valve bodies with soft valve discs.

It is maintenance free and functions without noise.

Depending on the model, in a currentless status, EMO T holds the valve closed (NC model) or open (NO model).

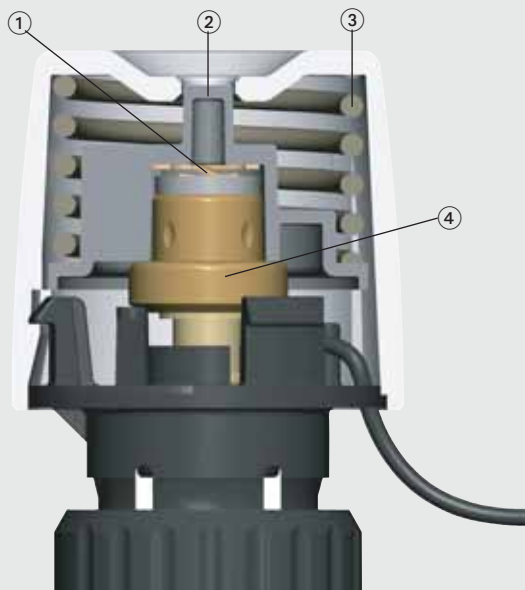
The body is designed in a white RAL 9016, heat-resistant, shock-proof plastic.

The EMOtec is designed to be installed on all HEIMEIER thermostatic valve bodies and three-way valves. Adapters enable the mounting of thermostatic valve bodies of other manufacturers, see accessories.

Its compactness also makes it especially suited to install in manifold cabinets.

Assembly

EMOtec 230 V model (NC)



- ① PTC heating element
- ② Position indicator
- ③ Spring
- ④ Expansion system

- **compact sizes especially suited to manifold cabinets**
- **simple functional testing by means of position indicator (with NC model)**
- **safe because of overvoltage protection (with 230 V model)**
- **trouble-free because it is silent and needs no maintenance**

Function

Closed when currentless (NC model)

Initiating operating voltage heats up the expansion system of the actuator. After the time lag, a uniform opening process ensues.

If the voltage is cutoff, the actuator closes via the cooling of the expansion system after the time lag.

Open when currentless (NO model)

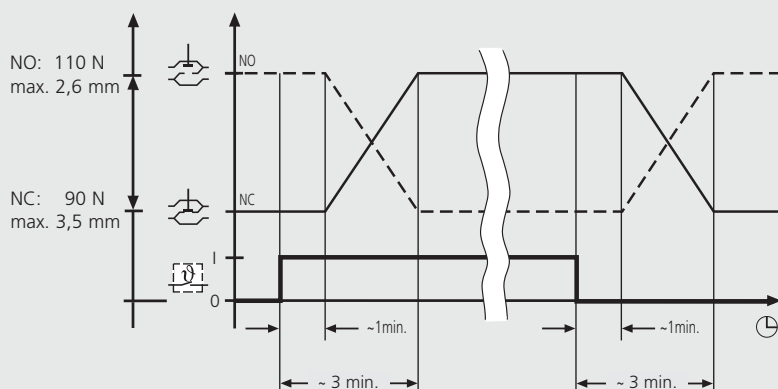
Initiating operating voltage heats up the expansion system of the actuator. After the time lag, a uniform closing process ensues.

If the voltage is cutoff, the actuator opens via the cooling of the expansion system after the time lag.

Note

When conducting a performance test, be sure to check the time response (time lag)!
Opening and closing times are dependent on the ambient temperature.

Action chart



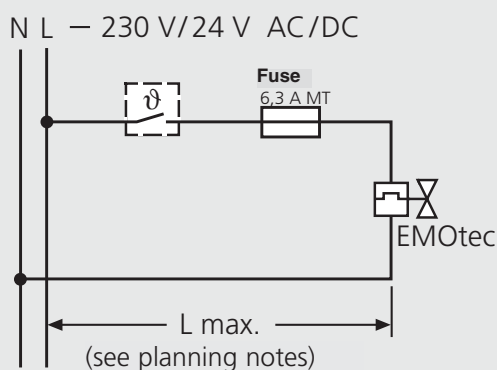
Application

The EMOtec thermal actuator can be installed in temperature and/or time-related 2-point control systems, especially for floor heating.



The position indicator with model NC enables simple functional testing, e.g. during the mounting of the actuator on heating manifolds.

Depending on the operating conditions to be fulfilled, EMOtec can also be used in other applications in heating, ventilation and air-conditioning systems.

Connection diagram



Technical data

EMOtec	230 V model	24 V model
Operating voltage: – frequency	230 V AC/DC (+10% / –15%) 0 to 60 Hz	24 V AC/DC (+25% / –10%) 0 to 60 Hz
Power consumption: – switch-on phase	3 W (VA) continuous operation 90 W (VA)	3 W (VA) continuous operation 9 W (VA)
Travel:	model NO 2.6 mm / model NC 3.5 mm	model NO 2.6 mm / model NC 3.5 mm
Positioning force:	model NO 110 N / model NC 90 N	model NO 110 N / model NC 90 N
Close and open time:	approx. 3 min.	approx. 3 min.
Type of protection: – horizontal installation – vertical standing installation	according to EN 60529 IP 43 IP 43	according to EN 60529 IP 43 IP 43
Protection class:	II according to EN 60730;  only with appropriate installation	II according to EN 60730;  only with appropriate installation
Overvoltage protection:	Varistor	–
Body, colour:	ABS/PC (shock-proof), white RAL 9016	ABS/PC (shock-proof), white RAL 9016
Connection cable:	1 m fixed, 2 x 0.50 mm ² (custom lengths up to 2 m on request)	1 m fixed, 2 x 0.50 mm ² (custom lengths up to 20 m on request)
CE certification (EMC and LV):	EN 55014 -1 and EN 60730 -2 -14	EN 55014 -1 and EN 60730 -2 -14
Ambient temperature:	0 °C to 50°C in operation	0 °C to 50°C in operation
Medium temperature:	max. 100 °C	max. 100 °C
Storage temperature:	-20 °C to +70 °C	-20 °C to +70 °C
Mounting:	fits all HEIMEIER thermostatic valve bodies and three-way valves	

Max. permissible differential pressure with which the valve is still closed: See prospectus for thermostatic valve body; three-way reversing valve; three-way mixing valve; control valves for floor heating systems.

Article numbers

Currentless closed (NC)
1807-00.500

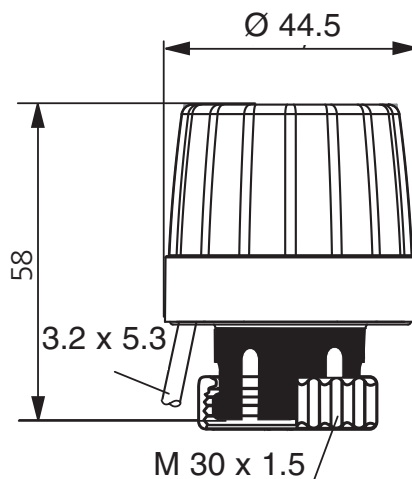
Currentless open (NO)
1809-00.500

Currentless closed (NC)
1827-00.500

Currentless open (NO)
1829-00.500

110 V model on request

Dimensions



Planning notes

24 V transformer dimensioning

For operation with 24 V low voltage, a transformer is required which is in compliance with EN 60730 and possesses sufficient capacity.

For dimensioning transformer power, the value for the operating phase needs to

be taken into account. The same applies to the layout of switching contacts of room temperature controllers.

The minimum transformer power supplied results from:
the sum of the power consumed by the

EMOtec 24 V (in the switch-on phase) plus the sum of the power consumed by the Thermostat P.

Room temperature controller (art. no. 1946/48-00.500) needs not be taken into account.

Calculation example:

2 ea. Thermostat P 24 V (art. no 1942-00.500)	at 1.5 VA each =	3 VA
6 ea. EMOtec 24 V (art. no. 1827-00.500)	at 9 VA each =	54 VA
Total consumption		= 57 VA
(= minimum transformer power delivery)		
Selected transformer		= 63 VA

24 V protective low voltage

If protective low voltage (SELV according to DIN VDE 0100) is required, a safety-isolating transformer in compliance with EN 60742 must be used.

Length of cable

In order to maintain the specified opening times for the actuators, the voltage loss (dependent on length of cable and cross section) in the operating phase on the supply lines to the actuators may not exceed 4%.

For general dimensioning with copper lines, use the following standard formula:

$$L \text{ max.} = \frac{l}{n}$$

L max.: max. length of cable in [m]
(see connection diagram, p. 3)
l: table value in [m]
n: number of actuators

Line: Type/name	Cross section: A	I for each model: 230 V 24 V		Note: Application; comparison
LiY/twin flexible rod	0.34 mm ²	-	24 m	only for 24 V; corresponds to ø 0.6 mm
Y(R)/bell wire	0.60 mm ²	-	43 m	only for 24 V; also with Y(R) 2 x 0.8 mm ²
H03VVFPVC mains cable	0.75 mm ²	494 m	53 m	not to be concealed under plaster
NYM/house wiring cable	1.50 mm ²	988 m	106 m	also for NYIF 1.5 mm ²
NYIF/flat webbed house wire	2.50 mm ²	1646 m	177 m	also for NYM 2.5 mm ²

Calculation example

Target:	max. length of cable	L max.	Solution:	$L \text{ max.} = \frac{l}{n} = \frac{106 \text{ m}}{4} = 26.5 \text{ m}$
Given:	Voltage	U = 24 V		
	Conductor cross section	A = 2 x 1.5 mm ²		
	Value in table	l = 106 m		
	Number of actuators	n = 4		

Accessories

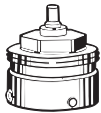

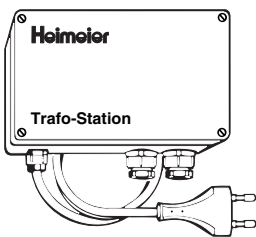
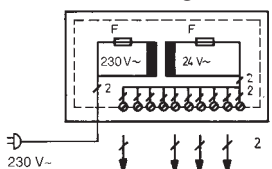
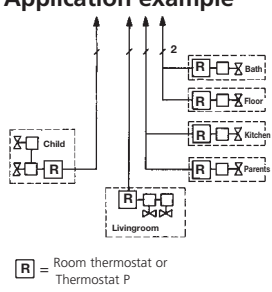

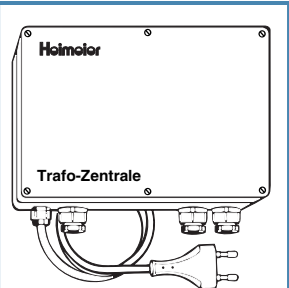
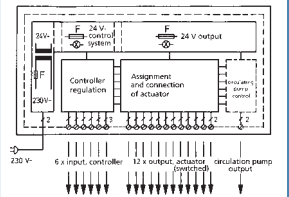
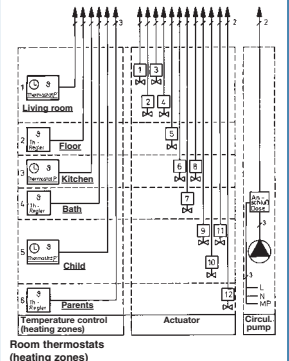
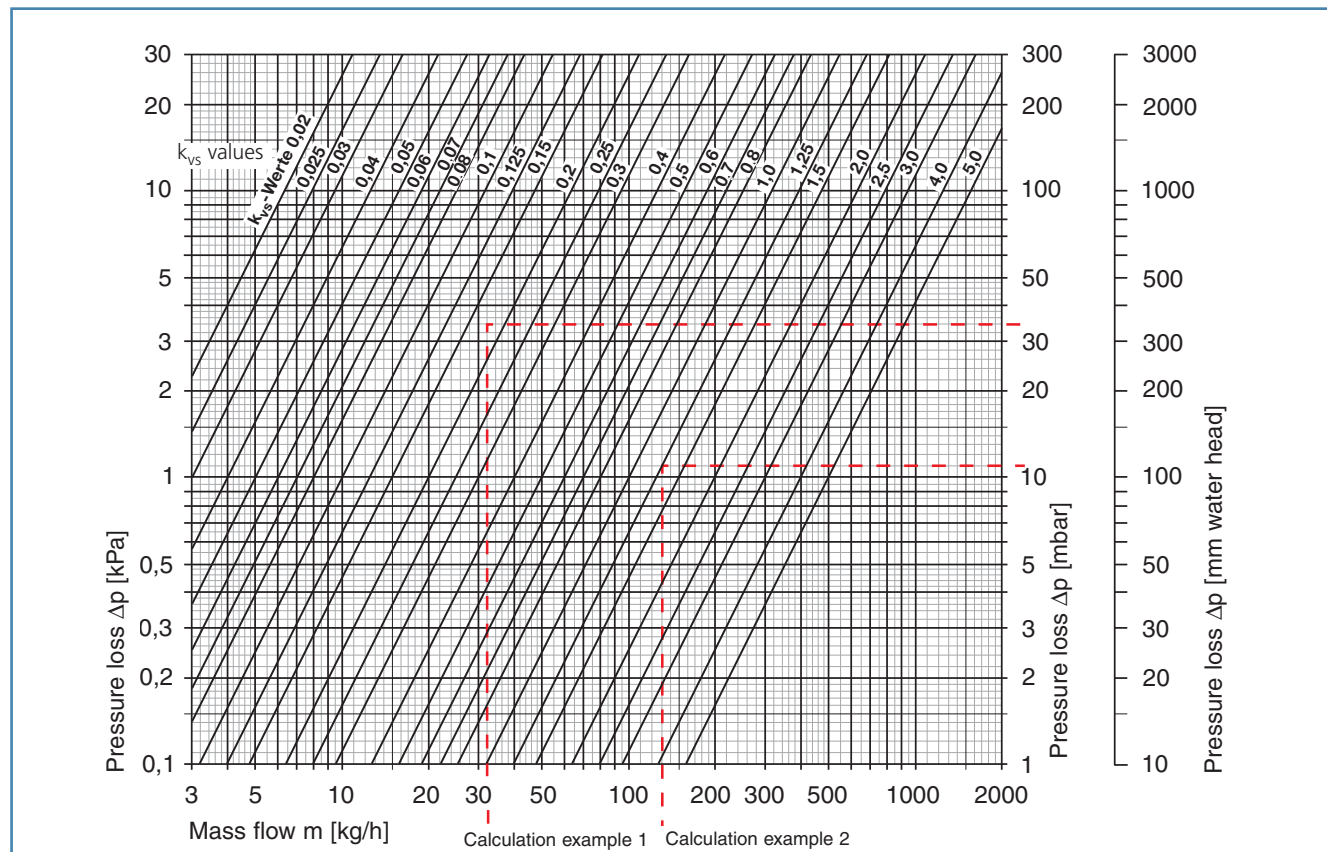
Illustration	Description	Manufacturer	Art. no.
	Connecting to other brands Adapter for mounting the EMOtec on valve bodies of other manufacturers. Threads M 30 x 1.5 factory standard.	Danfoss RA	9702-24.700
		Danfoss RAV	9800-24.700
		Danfoss RAVL	9700-24.700
		Vaillant (Ø ≈ 30 mm)	9700-27.700
		TA (M 28 x 1.5)	9701-28.700
		Herz	9700-30.700
		Markaryd	9700-41.700
		Comap	9700-55.700
		Oventrop (M 30 x 1,0)	9700-10.700
		Giacomini	9700-33.700
		Ista	9700-36.700
		Rotex	9700-32.700
		Uponor (Velta)	
		- Euro-/Kompakt distributor or return valve 17	9700-34.700
		- Provario distributor	9701-34.700
	Connecting to radiators with integrated valves Adapter for mounting the EMOtec with M 30 x 1.5 connection on thermostatic insert for Series 2 clamping joint. Adapter for mounting the EMOtec with M 30 x 1.5 connection on thermostatic insert for Series 3 clamping joint. M 30 x 1.5 threading, factory standard.		9703-24.700
			9704-24.700
	Transformer station The transformer station is a 24 V low-voltage transformer in accordance with EN 60335 in a protective insulation and a shock-proof plastic body. It is used as a power supply for actuators and room thermostats. Room temperature controllers (max. 10 room thermostats 24 V or Thermostat P 24 V) may be connected to the output terminals in conjunction with a maximum of 10 EMOtec 24 V, in random assignment, depending on installation conditions. It is possible to connect thermal actuators which are currentless open (NC) or closed (NO). The transformer station is protected at the output and line ends by standard fine-wire fuses.		1600-00.000
Connection diagram 	Technical data Operating voltage: 230 V AC (+ 6% / -15%); 50/60 Hz; 60 VA Output voltage: 24 V AC (+ 25% / -10%); 50/60 Hz Power output: max. 56 VA in continuous operation Output connections: max. 10 actuators and 10 room thermostats or 10 Thermostat P (see connection diagram/application example) – Length of cable ø max. values see planning notes on page 5 Type of protection: IP 22 according to EN 60529 (depending on installation requirements)		
Application example  <p>  = Room thermostat or Thermostat P </p>	Safety class: II according to EN 60335 Body, -colour: ABS (shock-proof), light grey according to RAL 7035 Power supply connection: plug-in device; 1 m; 2 x 0.75 mm ² with European plug Connector terminal: clamping area max. 2.5 mm ² CE certification (EMC / LV): EN 55014-1 and EN 50082-1 / EN 60335 Ambient temperature: 0°C to 60°C in operation Mounting: mounted to wall; cable fed from below Dimensions: 200 mm x 120 mm x 90 mm (w x h x d)		

Illustration	Description	Art. no.
	Central transformer <p>The central transformer is a 24 V low-voltage transformer in accordance with EN 60335 in a protective insulation and a shock-proof plastic body. It is used as a central power supply for actuators and room thermostats.</p> <p>Due to the short time required for cabling, it is especially suited to connecting centrally arranged actuators, e.g. on heating manifolds for floor heating systems.</p> <p>On the input side, a maximum of 6 room thermostats 24 V or Thermostat P 24 V and on the output side a maximum of 12 EMOtec 24 V can be connected to the existing terminal.</p> <p>The distribution of thermostats to be connected can be configured as desired with the EMOtec 24 V devices to be connected on the output side, depending on installation and application requirements. It is also possible to connect thermal actuators that are currentless open (NO) or currentless closed (NC).</p> <p>The central transformer is protected at the output and line ends by standard fine-wire fuses (on the secondary side with an optical operating check).</p> <p>For the model with pump control, a relay switches the circulating pump on or off via a floating contact, as required. This means the circulating pump only runs if at least one room temperature controller requires heat (the function requires an actuator model which is closed when currentless).</p>	without pump control 1610-00.000
	<p>Connection diagram</p>  <p>Application example</p> 	with pump control 1611-00.000
	<p>Technical data</p> <p>Operating voltage: 230 V AC (+ 6% / -15%), 50/60 Hz, 60 VA</p> <p>Output voltage: 24 V AC (+25% / -10%), 50/60 Hz</p> <p>Power output: max. 20 VA for thermostats</p> <p>– actuators Continuous operation max. 36 VA</p> <p>Input/output circuits: max. 6 room thermostats or 6 Thermostat P and 12 actuators</p> <p>(see connection diagram/application example)</p> <p>– Length of cable EMOtec max. values see planning notes on page 5</p> <p>– Room temperature controllers max. 50 m for 3 x 0.14 mm²</p> <p>max. 100 m for 3 x 0.34 mm²</p> <p>Pump control: contact; floating; max. 250 V AC 8 (2) A</p> <p>Type of protection: IP 22 according to EN 60529</p> <p>(depending on installation requirements)</p> <p>Safety class: II according to EN 60335</p> <p>Body, -colour: ABS (shock-proof), light grey according to RAL 7035</p> <p>Power supply connection: plug-in device; 1 m; 2 x 0.75 mm² with European plug</p> <p>Connector terminal clamping area max. 2.5 mm²</p> <p>CE certification (EMC / LV): EN 55014-1 and EN 50082-1 / EN 60335</p> <p>Ambient temperature: 0°C to +60°C in operation</p> <p>Mounting: mounted to wall; cable fed from below</p> <p>Dimensions: 240 mm x 160 mm x 90 mm (w x h x d)</p>	

Technical data

Diagram



K_{vs} value

The k_{vs} value of a valve indicates the volume flow for a completely open valve with a pressure loss of 1.0 bar.

Standard formula for water medium:

$$k_{vs} = \frac{V}{\sqrt{\Delta p}}$$

Symbols and units of measure

k_{vs}	Valve characteristic in m ³ /h
\dot{V}	Flow volume in m ³ /h
Δp	Pressure loss in bar

Calculation example 1

Target:	k_{vs} value for determining valve
Given:	Mass flow $\dot{m} = 32$ kg/h Pressure loss $\Delta p_v = 34$ mbar
Solution:	k_{vs} value from diagram: 0.175 m ³ /h
Selected:	thermostatic valve body V-exact Presetting: 3 (see thermostatic valve body prospectus)

Calculation example 2

Target:	Δp thermostatic valve body
Given:	standard thermostatic valve body DN 10 straight form k_{vs} value = 1.25 m ³ /h Mass flow $\dot{m} = 130$ kg/h
Solution:	Δp valve from diagram: 11 mbar



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