EMO T

Thermal actuator for heating, ventilation, and air conditioning systems

To be precise.

Heimeier

EMO T

Description

The EMO T thermal actuator is a VDE-tested two-point actuator for connecting to room temperature controllers with a two point output, e.g. HEIMEIER roomthermostats or Thermostat P.

Models with 230 V (with built-in overvoltage protection 4 kV) and 24 V operating voltage, each currentless closed (NC) or opened (NO), enable a versatile application in heating, ventilation, and air conditioning systems.

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

The pressure power within the closed range is adapted for 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).

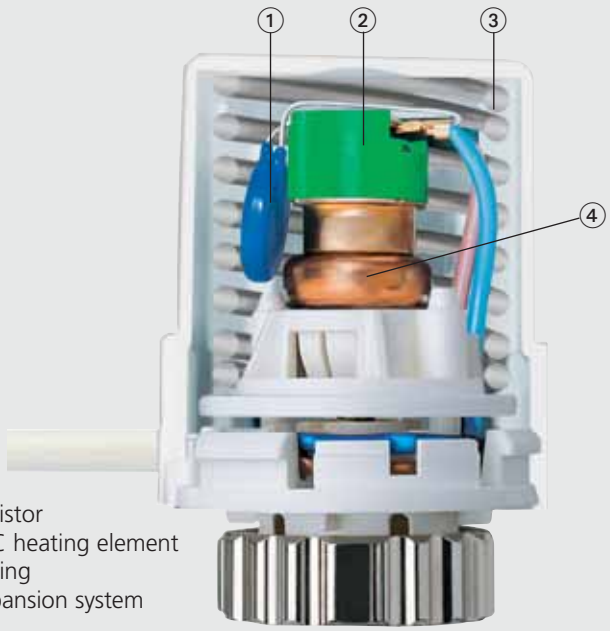
The attractively designed body of the EMO T is constructed of a white (RAL 9016), heat-resistant, shock-proof plastic.

The EMO T is designed to be installed on all HEIMEIER thermostatic valve bodies and three-way valves.

Its compactness also makes it suited to installations in manifolds cabinets.

Assembly

EMO T 230 V model (NC)



① Varistor
② PTC heating element
③ Spring
④ Expansion system

- **Wide range of uses due to versatility of available models**
- **Functional dimensions**
- **Built-in overvoltage protection guarantees security of operation (with 230 V model)**
- **Reliable, silent and maintenance-free**
- **Elegant design**

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)

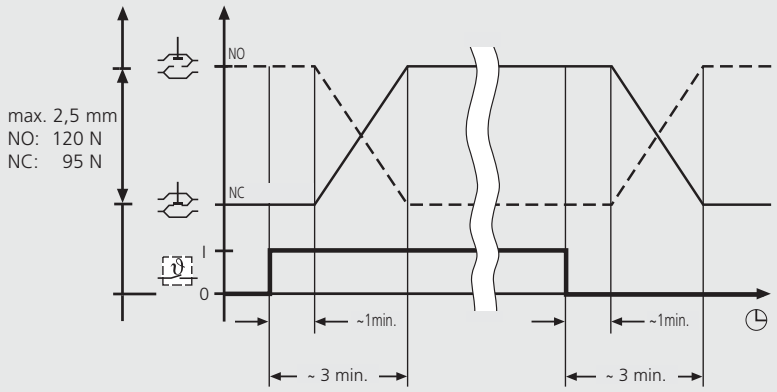
Initiating operating voltage heats up the expansion system of the actuator. After the time lag, a uniform closing process ensues.

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 EMO T thermal actuator can be installed in temperature and/or time-related 2-point control systems in, for example:

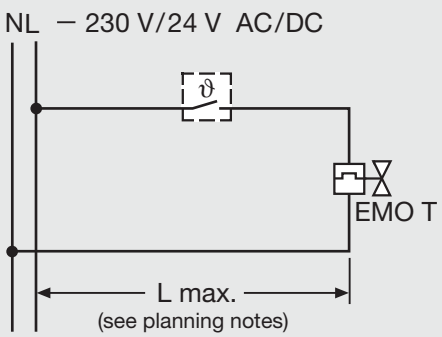
Heating installations
For floor, ceil, and radiator heating systems for individual room temperature control or group control in:

– apartments, conference rooms, storage rooms, schools, etc.
– For reverse switching, mass flow control, etc.

Ventilation installations
For room temperature control, e.g. controlling the flow of hot water through the air heaters.

Air conditioning systems
For room temperature control, e.g. regulating the flow of cold water from fan-coil units, ceil cooling systems, etc.

Connection diagram



EMO T

Technical data

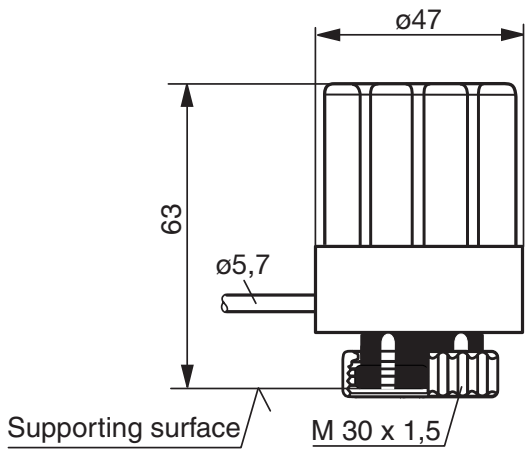
EMO T	230 V model	24 V model
Operating voltage: - frequency	230 V AC/DC (+10% / –15%) 0 to 60 Hz	24 V AC/DC (+25% / –10%) 0 to 60 Hz
Power draw: - when operating	3 W (VA) continuous operation 90 W (VA)	3 W (VA) continuous operation 9 W (VA)
Stroke:	2,5 mm	2,5 mm
Pressure power:	model NO 120 N / model NC 95 N	model NO 120 N / model NC 95 N
Close and open time:	ca. 3 min.	ca. 3 min.
Type of protection: - horizontal installation - vertical standing installation	based on EN 60529 IP 42 IP 43	based on EN 60529 IP 42 IP 43
Protection class:	II based on EN 60335	II based on EN 60335
Overvoltage protection:	Varistor	-
Body, color:	PC (shock-resistant), white RAL 9016	PC (shock-resistant), white RAL 9016
Connection cable:	1 m fixed, 2 x 0.75 mm² (custom lengths upon request)	1 m fixed, 2 x 0.75 mm² (custom lengths upon request)
CE certification (EMV / NS):	EN 55014/EN 60730 and EN 60335	EN 55014/EN 60730 and EN 60335
Ambient temperature:	0°C to 50°C in operation	0°C to 50°C in operation
Medium temperature:	max. 100°C (212°F)	max. 100°C (212°F)
Storage temperature:	–20°C to +70°C (-4°F to +158°F)	–20°C to +70°C (-4°F to +158°F)
Mounting:	fits all HEIMEIER thermostatic valve bodies and three-way valves	

Max. permissible differential pressure with closed valve: 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) **1831-00.500**	Currentless closed (NC) **1841-00.500**
Currentless open (NO) **1835-00.500**	Currentless open (NO) **1845-00.500**

Dimensions



Planning notes

24 V transformer dimensioning

For operation with 24 V low voltage, a transformer is required which is in compliance with EN 60335 and possesses sufficient capacity.

For dimensioning transformer performance, 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.

Minimum transformer power delivery results from:
the sum of the take-up of the 24 V EMO T (in the operating phase) in addition to the sum of the take-up capacities of Thermostat P.
Room temperature controllers (art. no. 1946/48-00.500) need 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. EMO T 24 V (art. no. 1841/45-00.500)	at 9 VA each	= 54 VA
Total of take-up (≙ minimum transformer power delivery)		= 57 VA
Selected transformer		= 63 VA

24 V protective low voltage

With the required protective low voltage (SELV based on DIN VDE 0100) a safety isolating transformer in compliance with EN 60742 must be used.

Length of cable

In order to maintain the declared opening times for the actuators, the voltage loss (depending 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:

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

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

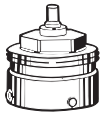
Line: Type/name	Cross section: A	l for each model: 230 V	24 V	Note: Application; comparison
LiY/twin flexible rod	0.34 mm²	-	24 m	only for 24 V; corresponds to ø 0.6 mm
Y(R)/bell wire	0.60 mm²	-	43 m	only for 24 V; also with Y(R) 2 x 0.8 mm²
H03VVF/PVC mains cable	0.75 mm²	494 m	53 m	not to be concealed under plaster
NYM/house wiring cable	1.50 mm²	988 m	106 m	also for NYIF 1.5 mm²
NYIF/flat webbed house wire	2.50 mm²	1646 m	177 m	also for NYM 2.5 mm²

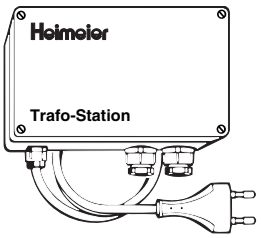
Calculation example

Goal:	max. length of cable	L max.	
Given:	Voltage	U =	24 V
	Conductor cross section	A =	2 x 1.5 mm²
	Value in table	l =	106 m
	Number of actuators	n =	4

Solution: $L\ max. = \frac{l}{n} = \frac{106\ m}{4} = 26.5\ m$

Accessories

Illustration	Description	Manufacturer	Art. no.
	**Connecting to other brands** Adapter for mounting the EMO T on valve bodies of other manufacturers. Threads M 30 x 1.5 factory standard.	Danfoss RA Danfoss RAV Danfoss RAVL Vaillant (Ø ≈ 30 mm) TA (M 28) Herz Markaryd Comap Oventrop (M 30 x 1,0) Giacomini Ista Rotex Uponor (Velta) - Euro-/Kompakt distributor or return valve 17 - Provario-Verteiler	**9702-24.700** **9800-24.700** **9700-24.700** **9700-27.700** **9701-28.700** **9700-30.700** **9700-41.700** **9700-55.700** **9700-10.700** **9700-33.700** **9700-36.700** **9700-32.700** **9700-34.700** **9701-34.700**
	**Connecting to radiators with integrated valves** Adapter for mounting the EMO T with M 30 x 1.5 connection on thermostatic insert for **Series 2** clamping joint. Adapter for mounting the EMO T with M 30 x 1.5 connection on thermostatic insert for **Series 3** clamping joint. M 30 x 1.5 threading, factory standard Radiator manufacturers: thermostatic head prospectus		**9703-24.700** **9704-24.700**



Transformer station **1600-00.000**

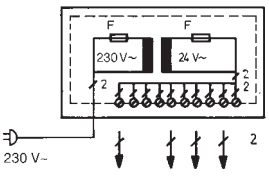
The transformer station is a 24 V low-voltage transformer in accordance with EN 60335 in a protective insulation and a shock-proof plastic body.
It is used as a power supply for actuators and room temperature controllers.

Room temperature controllers (max. 10 room temperature controllers 24 V or Thermostat P 24 V) may be connected to the output terminals in conjunction with a maximum of 10 EMO T 24 V, in random assignment, depending on installation conditions.
It is also possible to connect thermal actuators which are currentless open or closed.
The transformer station is protected at the output and line ends by standard fine-wire fuses.

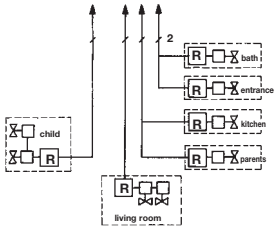
Technical data

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 temperature controllers 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 based on EN 60529 (depending on installation requirements)
Safety class:	II based on EN 60335
Body, -color:	ABS (shock-proof), light grey based on RAL 7035
Power supply connection:	plug-in device; 1 m; 2 x 0.75 mm² with European plug
Connector terminal:	clamping area max. 2.5 mm²
CE certification (EMV / NS):	EN 55014 and EN 50082-1 / EN 60335
Ambient temperature:	0°C to 60°C (32°F to 140°F) in operation
Mounting:	Mounted to wall; cable fed from below
Dimensions:	200 mm x 120 mm x 90 mm (w x h x d)

Connection diagram



Application example



R = Room thermostat or Thermostat P

Illustration	Description	Art. no.

Central transformer

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 temperature controllers.

Due to the minimized time required for cabling, it is especially suited to connecting centrally assigned actuators, e.g. on heating manifolds for floor heating systems.

On the input side, a maximum of 6 room temperature controllers (24 V) or 24 V Thermostat P, and on the output side a maximum of 12 EMO T 24 V can be connected to the existing terminal.

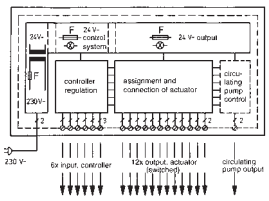
The distribution of thermostats to be connected can be configured as desired with the EMO T 24 V devices to be connected on the output side, depending on requirements. It is also possible to connect thermal actuators which are currentless open (NO) or currentless closed (NC).

The central transformer is protected at the output and line ends by standard fine-wire fuses (secondarily with an optical check).

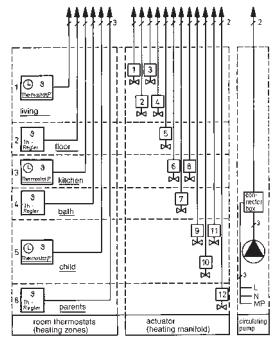
For the model with pump control, a relay switches the circulating pump on or off via a floating contact, as required. This means the circulating pump only runs if at least one room temperature controller requires heat (function requires actuator model which is closed when currentless).

Art. no.	
without pump control	**1610-00.000**
with pump control	**1611-00.000**

Connection diagram



Application example

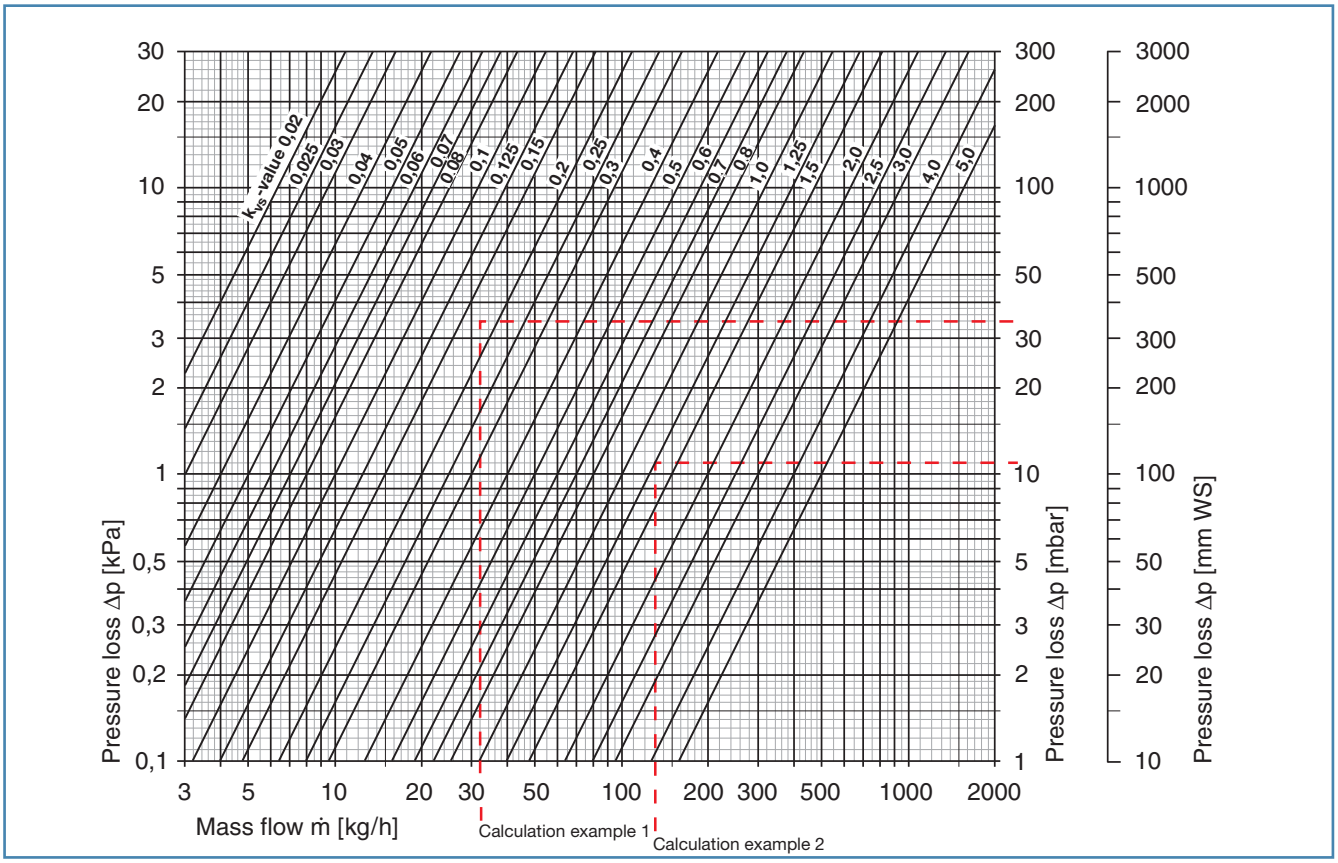


Technical data

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. 20 VA for thermostats
– actuators	Continuous operation max. 36 VA
Input/output circuits:	max. 6 room temperature controllers or 6 Thermostat P and 12 actuators (see connection diagram/application example)
– Length of cable EMO T	max. values see planning notes on page 5
– Room temperature controllers	max. 50 m for 3 x 0.14 mm² max. 100 m for 3 x 0.34 mm²
Pump control:	contact; floating; max. 250 V AC 8 (2) A
Type of protection:	IP 22 based on EN 60529 (depending on installation requirements)
Safety class:	II based on EN 60335
Body, -color:	ABS (shock-proof), light grey based on RAL 7035
Power supply connection:	plug-in device; 1 m; 2 x 0.75 mm² with European plug
Connector terminal:	clamping area max. 2.5 mm²
CE certification (EMV / NS):	EN 55014 and EN 50082-1 / EN 60335
Ambient temperature:	0°C to +60°C (32°F to 140°F) in operation
Mounting:	Mounted to wall; cable fed from below
Dimensions:	240 mm x 160 mm x 90 mm (w x h x d)

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:

$$k_{VS} = \frac{\dot{V}}{\sqrt{\Delta p}}$$

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 Δp_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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Prospectus 2.3
2300-18.483/03.07