EMO T

Thermal actuator

for heating, ventilation and air conditioning systems

eu.bac european building automation controls association

HEIMEIER

Pressurisation & Water Quality › Balancing & Control › Thermostatic Control

ENGINEERING ADVANTAGE

PNEUMATEX › TA › HEIMEIER ›

TA HYDRONICS

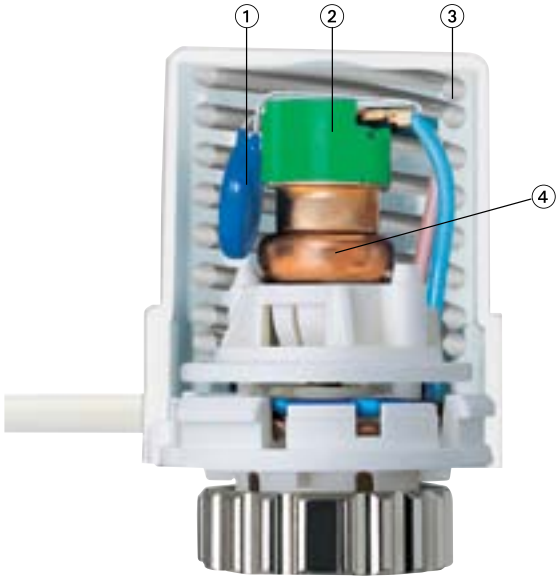
EMO T

Description

The EMO T thermal actuator is a twopoint actuator for connecting to room temperature controllers with a two point output, e.g. HEIMEIER room thermostats 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)



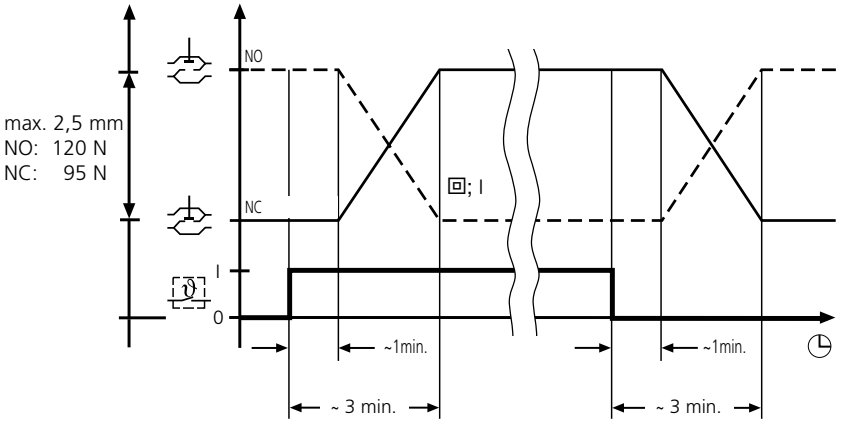
1. Varistor
2. PTC heating element
3. Spring
5. Expansion system

- **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**
- **Model with theft protection**
- **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



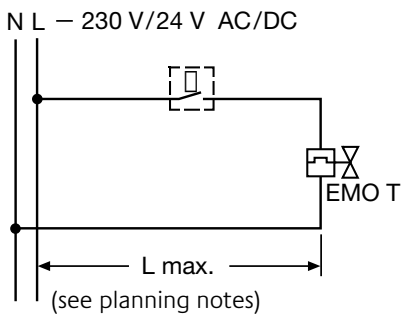
Application

The EMO T thermal actuator can be installed in temperature and/or timerelated 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



Technical data

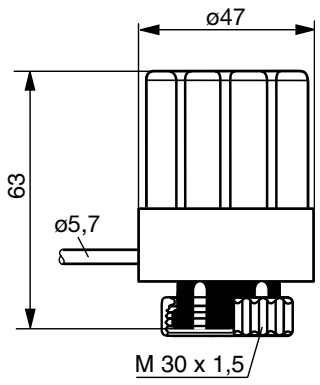
	230 V	24 V
Operating voltage:	230 V AC/DC (+10%/-15%)	24 V AC/DC (+25%/-10%)
- Frequency	0–60 Hz	0–60 Hz
Power draw (continuous operation):	3 W (VA)	3 W (VA)
- when operating	90 W (VA)	9 W (VA)
Stroke:	2,5 mm	2,5 mm
Pressure power:	NO 120 N / NC 95 N	NO 120 N / NC 95 N
Close and open time:	~3 min.	~3 min.
Type of protection:	EN 60529	EN 60529
- horizontal installation	IP 42	IP 42
- vertical standing installation	IP 43	IP 43
Protection class:	⧈; II, EN 60730	⧈; II, EN 60730
Overvoltage protection:	Varistor	-
Body, colour:	PC (shock-resistant), white RAL 9016	PC (shock-resistant), white RAL 9016
Connection cable:	1 m*), 2 x 0,75 mm²	1 m*), 2 x 0,75 mm²
CE certification (EMV / NS):	EN 55014-1, EN 60730-2-14	EN 55014-1, EN 60730-2-14
Ambient temperature (in operation):	0°C – 50°C	0°C – 50°C
Medium temperature:	max. 100°C (212°F)	max. 100°C (212°F)
Storage temperature:	-20°C – +70°C (-4°F – +158°F)	-20°C – +70°C (-4°F – +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

		Art. No.
230 V		
Currentless closed (NC)		1831-00.500
Currentless closed (NC)	with theft protection using security ring	1831-00.530
Currentless open (NO)		1835-00.500
24 V		
Currentless closed (NC)		1841-00.500
Currentless open (NO)		1845-00.500

Dimensions



1 mm = 0,0394 inch

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	= 57 VA
(≙ minimum transformer power delivery)	
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. = l / n
L max.: max. length of cable in [m] (see connection diagram)
l: table value in [m]
n: number of actuators

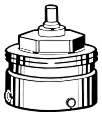
Line: Type/name	Cross section: A	l for each model: 230 V	24 V	Note: Application; comparison
	[mm²]	[m]	[m]	
LiY/twin flexible rod	0,34	-	24	only for 24 V; corresponds to ø 0.6 mm
Y(R)/bell wire	0,50	-	35	only for 24 V; model Y(R) 2 x 0.8
H03VVF/PVC mains cable	0,75	494	53	not to be concealed under plaster
NYM/house wiring cable	1,50	988	106	also for NYIF 1.5 mm²
NYIF/flat webbed house wire	2,50	1646	177	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. = l / n = 106 m / 4 = 26,5 m

Accessories

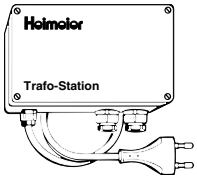


Connecting to other brands
Adapter for mounting the EMO T on valve bodies of other manufacturers. Threads M 30 x 1.5 factory standard.

Danfoss RA		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
Uponor (Velta)	- Provario distributor	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 or Series 3** clamping joint. M 30 x 1.5 threading, factory standard Radiator manufacturers: thermostatic head prospectus

Serie 2	9703-24.700
Serie 3	9704-24.700

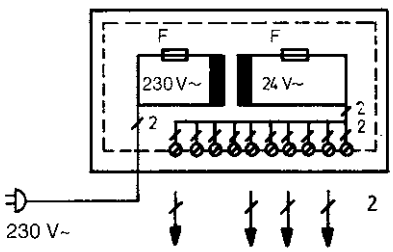


Transformer station
The transformer station is a 24 V low-voltage transformer in accordance with EN 60335 in a protective insulation and a shock-proof plastic body. It is used as a power supply for actuators and room temperature controllers. Room temperature controllers (max. 10 room temperature controllers 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.

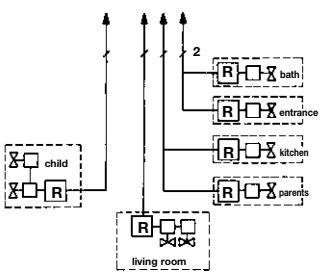
Art. No.

1600-00.00

Connection diagram



Application example

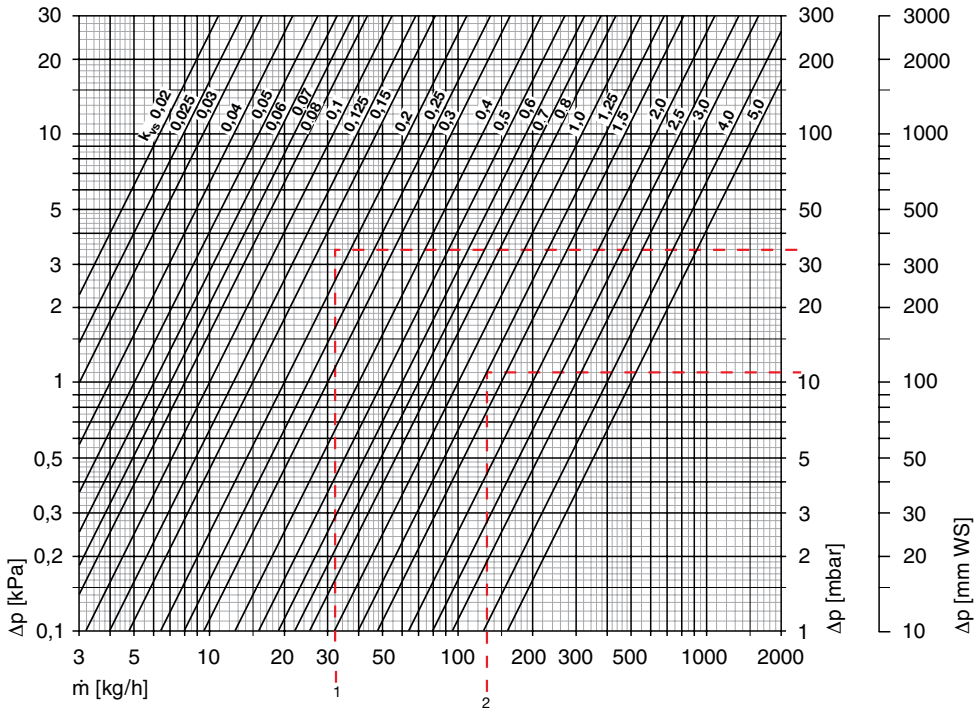


R = Room thermostat or Thermostat P

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”
Type of protection:	IP 22 on EN 60529 (depending on installation requirements)
Safety class:	II, 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 mm^2 with European plug
Connector terminal:	clamping area max. 2.5 mm^2
CE certification (EMV / NS):	EN 55014-1, EN 55014-2 / EN 60335-1
Ambient temperature:	0°C – 60°C (32°F – 140°F) in operation
Mounting:	Mounted to wall; cable fed from below
Dimensions:	200 mm x 120 mm x 90 mm

Technical data



K_{vs} value

The kvs 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:
$k_{vs} = \dot{V} / (\sqrt{\Delta p})$
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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