Danfoss
Industrial Automation Partner

Data sheet

Thermostats
Type RT

Description

A thermostat is a temperature-controlled switch. The position of the contacts depends on the temperature of the sensor and the set scale value. The RT series covers thermostats for general industrial and marine applications, including diff erential thermostats with room sensors, duct sensors, and capillary tube sensors

Contents

Kontakt:
MARTEL ENERGO s.r.o.,
Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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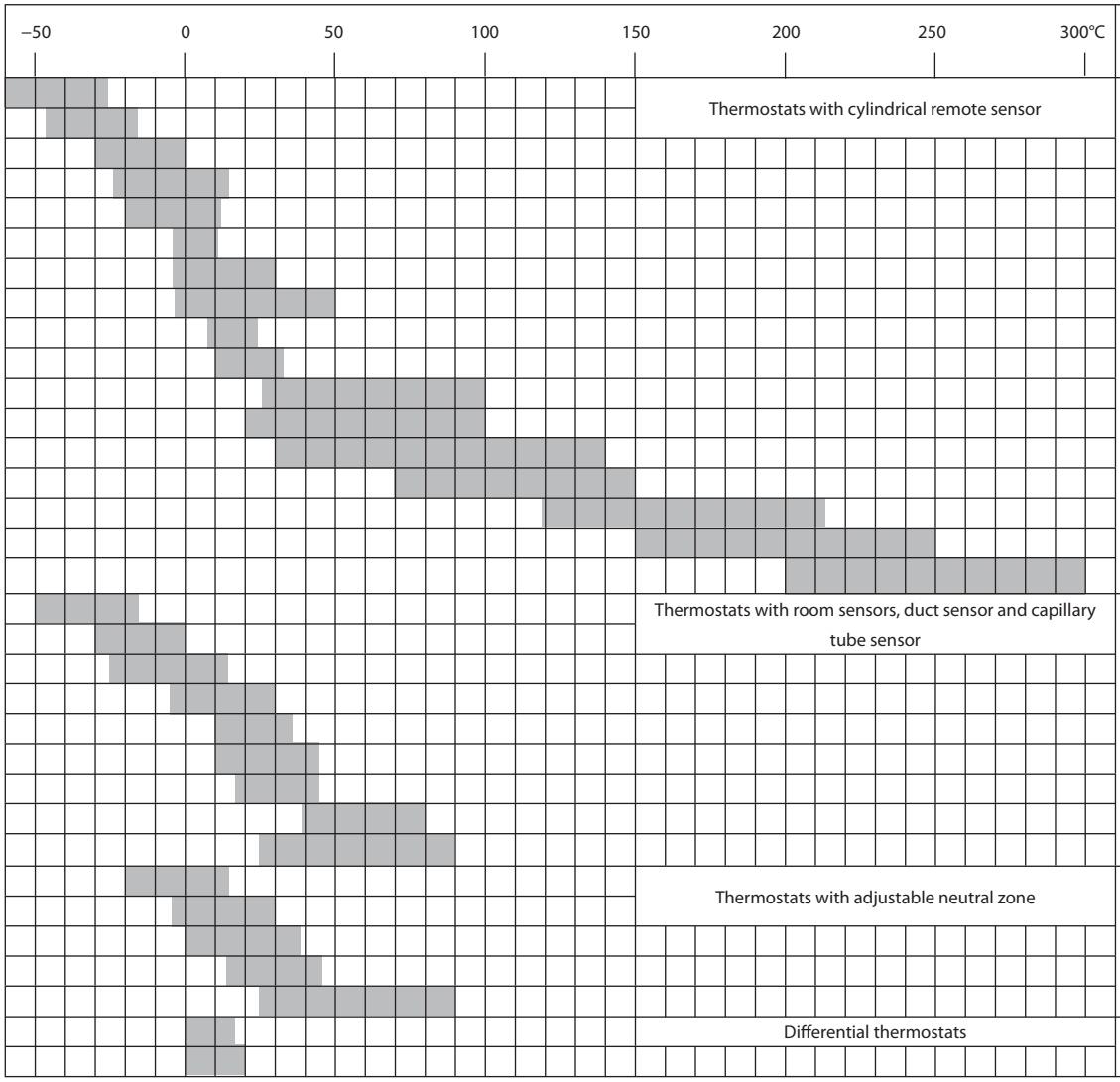
Thermostats type RT



Range p_e bar	Type
Thermostats with cylindrical remote sensor	
–60 → –25	RT 10
–45 → –15	RT 9
–30 → 0	RT 13
–25 → 15	RT 3,2,7
–20 → 12	RT 8
–5 → 10	RT 12
–5 → 30	RT 14
–5 → 50	RT 26
5 → 22	RT 23
8 → 32	RT 15
25 → 90	RT 101
20 → 90	RT 106
30 → 140	RT 108
70 → 150	RT 107
120 → 215	RT 120
150 → 250	RT 123
200 → 300	RT 124
Thermostats with room sensors, duct sensor and capillary tube sensor	
–50 → –15	RT 17
–30 → 0	RT 11
–25 → 15	RT 34
–5 → 30	RT 4
10 → 35	RT 115
10 → 45	RT 103
15 → 45	RT 140
40 → 80	RT 141
25 → 90	RT 102
Thermostats with adjustable neutral zone	
–20 → 12	RT 8L
–5 → 30	RT 14L
0 → 38	RT 16L
15 → 45	RT 140 L
25 → 90	RT 101L
Differential thermostats	
0 → 15	RT 270
0 → 20	RT 271

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MARTEL ENERGO s.r.o.,
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Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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Technical data and code nos.

When ordering, please state type and code number.

Types of charge
- A: Vapour charge - sensor must not be the warmest part.
- B: Adsorption charge
- C: Partial charge - the sensor must not be the coldest part

RT 107
with cylindrical remote sensor, cover with windows and hand setting knob

RT 106
with cylindrical remote sensor, cover with windows and hand setting knob

Thermostats with cylindrical remote sensor

Preferred charge

Setting range °C	Adjustable differential range*) At lowest range setting °C	At highest range setting °C	Max. sensor temperature °C	Type of charge	Capillary tube length m	Code no. DANFOSS A17-680.12 SPDT	Code no. DANFOSS A17-679.12 max. reset SPDT	Code no. DANFOSS A17-677.12 SPDT	Type
−60 → −25	1.7 → 7	1 → 3	150	A	2	**017-507766**			RT 10
−45 → −15	2.2 → 10	1 → 4.5	150	A	2	**017-506666**			RT 9
−30 → 0	1.5 → 6	1 → 3	150	A	2	**017-509766**			RT 13
−25 → 15	2.8 → 10	1 → 4	150	A	2	**017-501466**			RT 3
−25 → 15	2.8 → 10	1 → 4	150	A	5	**017-501666**			RT 3
−25 → 15	2.8 → 10	1 → 4	150	A	8	**017-501766**			RT 3
−25 → 15	5 → 18	6 → 20	150	B	2	**017-500866**			RT 2
−25 → 15	2 → 10	2.5 → 14	150	B	2	**017-505366**			RT 7
−25 → 15	2 → 10	2.5 → 14	150	B	5	**017-505566**			RT 7
−25 → 15	2 → 10	2.5 → 14	150	B	8	**017-505666**			RT 7
−20 → 12	1.5 → 7	1.5 → 7	145	B	2	**017-506366**			RT 8
−5 → 10	1 → 3.5	1 → 3	65	B	2	**017-508966**			RT 12
−5 → 30	2 → 8	2 → 10	150	B	2	**017-509966**			RT 14
−5 → 30	2 → 8	2 → 10	150	B	3	**017-510066**			RT 14
−5 → 30	2 → 8	2 → 10	150	B	5	**017-510166**			RT 14
−5 → 30	2 → 8	2 → 10	150	B	8	**017-510266**			RT 14
−5 → 30	2 → 8	2 → 10	150	B	10	**017-510366**			RT 14
−5 → 50	2 → 9	3 → 19	150	B	2	**017-518066**			RT 26
5 → 22	1.1 → 3	1 → 3	85	B	2	**017-527866**			RT 23
8 → 32	1.6 → 8	1.6 → 8	150	B	2	**017-511566**			RT 15
25 → 90	2.4 → 10	3.5 → 20	300	B	2	**017-500366**	**017-500466**	**017-500566**	RT 101
25 → 90	2.4 → 10	3.5 → 20	300	B	3	**017-500666**			RT 101
25 → 90	2.4 → 10	3.5 → 20	300	B	5	**017-502266**	**017-502366**		RT 101
25 → 90	2.4 → 10	3.5 → 20	300	B	8	**017-502466**			RT 101
25 → 90	2.4 → 10	3.5 → 20	300	B	10	**017-502566**			RT 101
20 → 90	4 → 20	2 → 7	120	C	2	**017-504866**		**017-504966**	RT 106
20 → 90	4 → 20	2 → 7	120	C	3			**017-505166**	RT 106
20 → 90	4 → 20	2 → 7	120	C	5	**017-505066**			RT 106
30 → 140	5 → 20	4 → 14	220	B	2	**017-506066**			RT 108
70 → 150	6 → 25	1.8 → 8	215	C	2	**017-513566**	**017-513666**	**017-513766**	RT 107
70 → 150	6 → 25	1.8 → 8	215	C	3	**017-513966**			RT 107
70 → 150	6 → 25	1.8 → 8	215	C	5	**017-514066**	**017-514166**	**017-514366**	RT 107
70 → 150	6 → 25	1.8 → 8	215	C	8	**017-514466**			RT 107
70 → 150	6 → 25	1.8 → 8	215	C	10	**017-514566**			RT 107
120 → 215	7 → 30	1.8 → 9	260	C	2	**017-520566**[1]	**017-521166**[1]		RT 120
120 → 215	7 → 30	1.8 → 9	260	C	5	**017-520666**[1]			RT 120
120 → 215	7 → 30	1.8 → 9	260	C	8	**017-520766**[1]			RT 120
120 → 215	7 → 30	1.8 → 9	260	C	2	**017-520866**	**017-521466**[2]		RT 120
120 → 215	7 → 30	1.8 → 9	260	C	5	**017-520966**			RT 120
150 → 250	6.5 → 30	1.8 → 9	300	C	2	**017-522066**	**017-522466**		RT 123
150 → 250	6.5 → 30	1.8 → 9	300	C	5	**017-522266**			RT 123
200 → 300	5 → 25	2.5 → 10	350	C	2	**017-522766**	**017-523166**		RT 124
200 → 300	5 → 25	2.5 → 10	350	C	5	**017-522966**			RT 124

*) See also pages 5-6
[1] Thermostats fitted with neon lamp connected to terminal 4
[2] Thermostat with tamper-proof seal cap

Thermostat type RT 115
with room sensor

Thermostat type RT 140
with duct sensor

Neutral zone thermostat
type RT 16L with room sensor

Differential thermostat
type RT 270

Thermostats with room sensor, duct sensor and capillary tube sensor **Preferred versions**

Setting range °C	Adjustable differential range*) At lowest range setting °C	At highest range setting °C	Max. sensor temperature °C	Type of charge	Capillary tube length m	Sensor type**) Figur	Code no.	Type
−50 → − 15	2.2 → 7	1.5 → 5	100	A	-	1	**017-511766**	RT 17
−30 → 0	1.5 → 6	1 → 3	66	A	-	1	**017-508366**	RT 11
−25 → 15	2 → 10	2 → 12	100	B	-	1	**017-511866**	RT 34
−5 → 30	1.5 → 7	1.2 → 4	75	A	-	1	**017-503666**	RT 4
−5 → 30	1.5 → 7	1.2 → 4	75	A	-	1	**017-503766**[1]	RT 4
10 → 35	[5]	[5]	92	B	-	1	**017-519766**[2]	RT 115
10 → 35	[5]	[5]	92	B	-	1	**017-519866**[3]	RT 115
10 → 45	1.3 → 7	1 → 5	100	A	-	1	**017-515566**	RT 103
15 → 45	1.8 → 8	2.5 → 11	240	B	2	2	**017-523666**	RT 140
40 → 80	1.9 → 9	2.5 → 17	250	B	2	2	**017-524166**	RT 141
25 → 90	2.4 → 10	3.5 → 20	300	B	2	3	**017-514766**	RT 102

*) See also pages 5-6
**) See also fig. 1-5

[1] Bellows with built-in heating element which reduces the thermal differential (220V)
[2] Can be connected to 220 V and 380 V
[3] Can be connected to 220 V
[5] Special thermostat for ventilation plant

Thermostats with adjustable neutral zone

Setting range °C	Mechanical differential °C	Adjustable differential range*) At lowest range setting °C	At highest range setting °C	Max. sensor temperature °C	Type of charge	Capillary tube length m	Sensor type**) Figur	Code no.	Type
−20 → − 12	1.5	1.5 → 4.4	1.5 → 4.9	145	B	2	4	**017L003066**	RT 8L
−5 → 30	1.5	1.5 → 5	1.5 → 5	150	B	2	4	**017L003466**	RT 14L
0 → 38	1.5 / 0.7	1.5 → 5	0.7 → 1.9	100	A	-	1	**017L002466**	RT 16L
15 → 45	1.8 / 2	1.8 → 4.5	2 → 5	240	B	2	2	**017L003166**	RT 140L
25 → 90	2.5 / 3.5	2.5 → 7	3.5 → 12.5	300	b	2	4	**017L006266**[1]	RT 101L

*) See fig. 1-5

Differential thermostats

Setting range °C	Mechanical differential °C	Operating range (LT element) °C	Max. sensor temperature °C	Type of charge	Capillary tube length m	Sensor type*) Figur	Code no.	Type
0 → 20	3	20 → 100	200	B	2 × 10	5	**017D004466**	RT 271
0 → 15	2	−30 → 40	65	B	2 × 5	5	**017D003166**	RT 270

*) See fig. 1-5

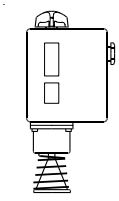

Fig. 1
Thermostat with room sensor

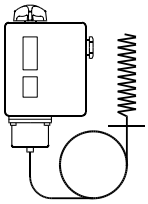

Fig. 2
Thermostat with duct sensor

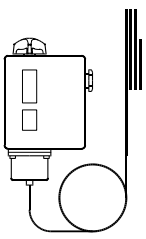

Fig. 3
Thermostat with capillary tube sensor

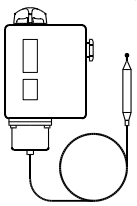

Fig. 4
Thermostat with cylindrical remote sensor

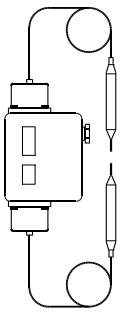

Fig. 5
Differential thermostat

Kontakt:
MARTEL ENERGO s.r.o.,
Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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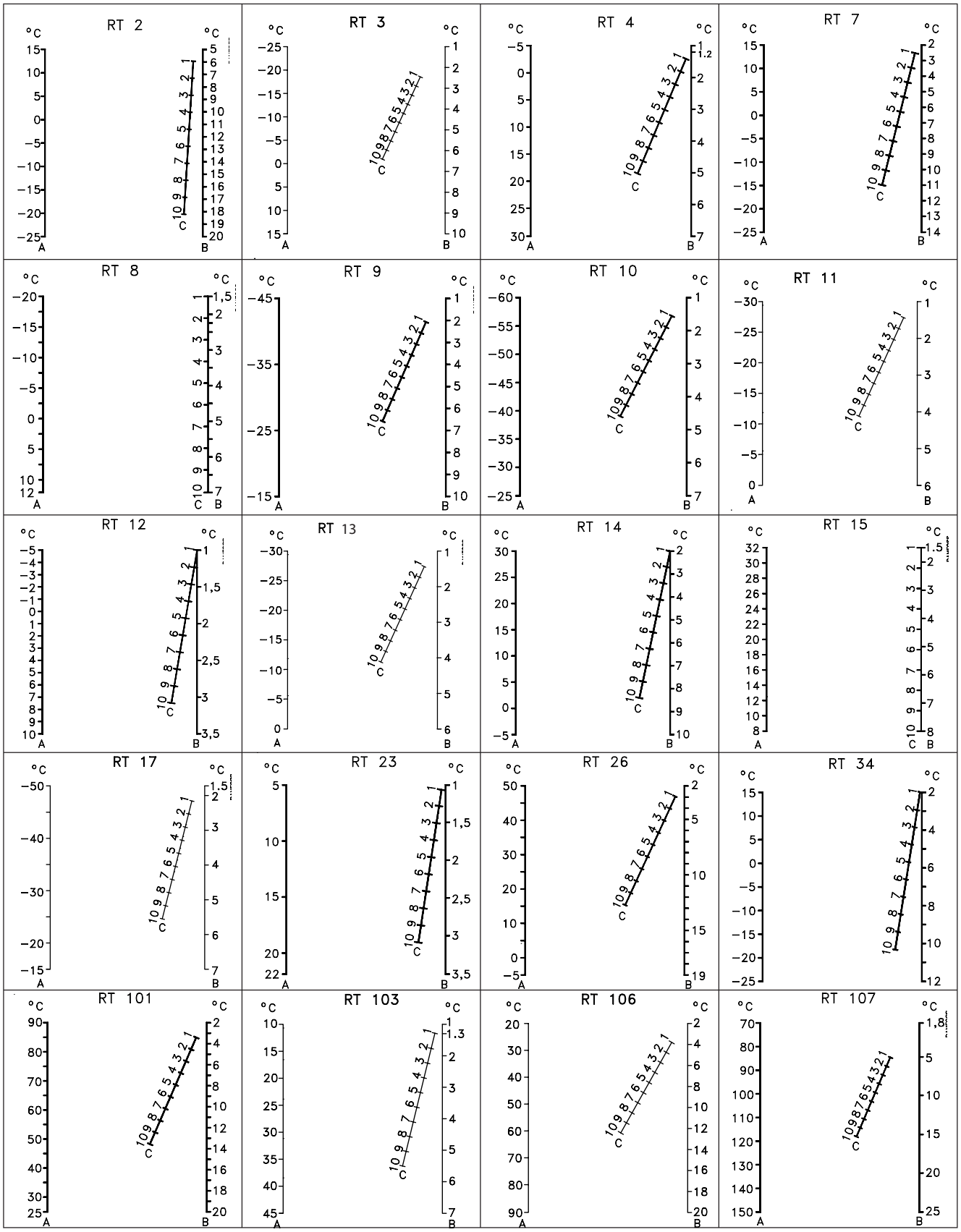
Nomograms for obtained differentials

A = Range setting
B = Obtained differential
C = Differential setting



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MARTEL ENERGO s.r.o.,
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Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
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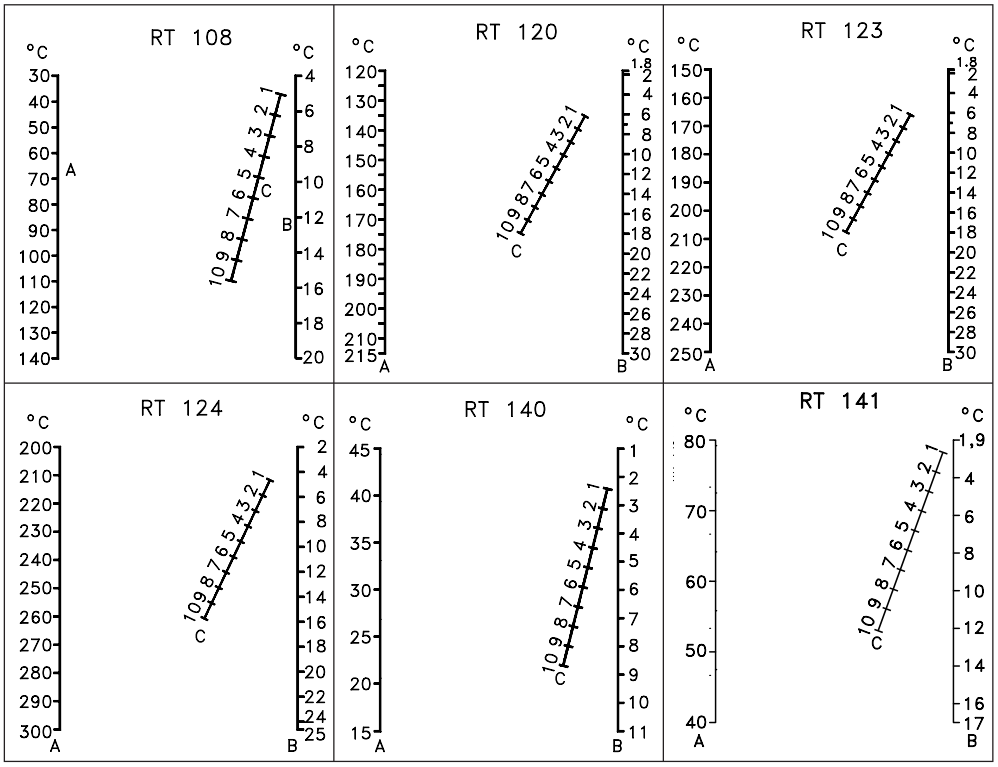
Nomograms for obtained differentials

A = Range setting
B = Obtained differential
C = Differential setting



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MARTEL ENERGO s.r.o.,
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Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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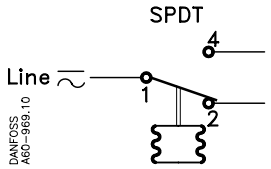
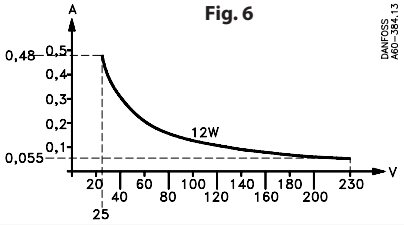
Technical data

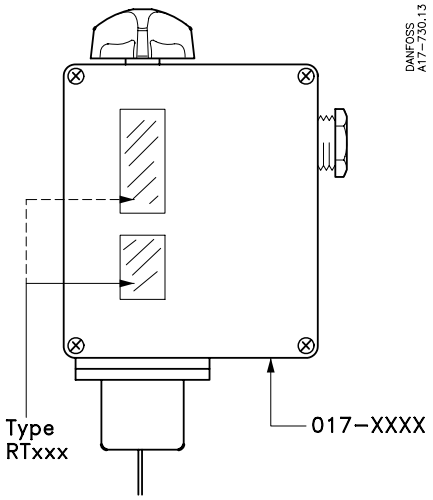
Designation	RT thermostats
Ambient temperature	–50 to 70°C . See remarks on charge types page 11
Contact system	 Single-pole changeover switch (SPDT)
Contact load Contact material: AgCdO	**Alternating current:** AC-1: 10A, 400 V AC-3: 4A, 400 V AC-15: 3A, 400 V **Direct current:** DC-13: 12 W, 230 V (see fig. 6) **Fig. 6** 
Special contact system	See “accessories” pages 15-16
Cable entry	2 PG 13.5 for 6 - 14 mm diameter cables
Enclosure	IP 66 acc. to IEC 529 and EN 60529. Units supplied with external reset. IP 54. The thermostat housing is made of bakelite acc. to DIN 53470 Cover is made of polyamide.

Approvals

RT 2 RT 23 RT 26 RT 108	RT 4 RT 10 RT 11 RT 16L RT 17 RT 140L	RT 3 RT 7 RT 8 RT 8L RT 9	RT 12 RT 13 RT 14 RT 14L RT 15	RT 16 RT 102 RT 141 RT 271 RT 270	RT 34 RT 103 RT 115 RT 140	RT 101	RT 106 RT 107 RT 123	RT 120	RT 124	Approvals
x	x	x	x	x	x	x	x	x	x	CE marked acc. to EN 60947-4/-5
						x	x	x	x	Det Norske Veritas, Norway
x	x	x	x	x	x	x	x	x	x	CCC, China Compulsory Certificate
							x			Lloyds Register of Shipping, UK
		x	x			x	x	x		Germanischer Lloyd, Germany
						x				Bureau Veritas, France
x	x	x	x	x	x	x	x	x	x	Registro Italiano Navale, Italy
x	x	x	x	x	x	x	x	x	x	RMRS, Russian Maritime Register of shipping
x		x	x			x	x	x	x	Nippon Kaiji Kyokai, Japan

Note: In addition we refer to the certificates, the copies of which can be ordered from Danfoss.
GL approval is conditional on the use of a ship’s cable entry

Identification



The type designation of the units is given on the setting scale. The code no. is stamped on the bottom of the thermostat housing

MARTEL ENERGO
meracia a regulačná technika

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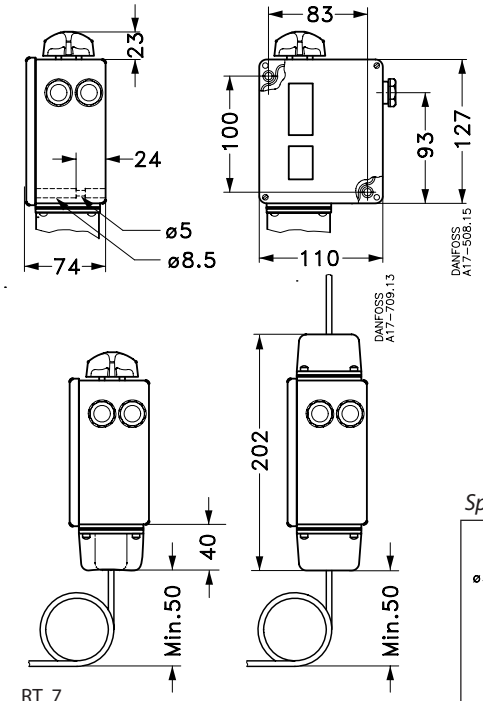
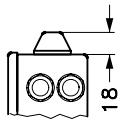
Dimensions and weight

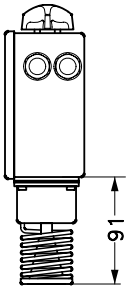


RT 7
RT 8, RT 8L
RT 10
RT 12
RT 13
RT 14, RT 14L
RT 15
RT 21
RT 23
RT 24
RT 26
RT 101, RT 101L
RT 108
RT 124
RT 140, RT 140L

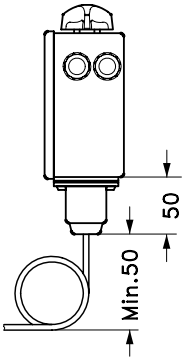
RT 270
RT 271



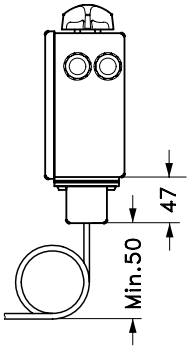
RT 101, 107, 120, 123
special versions with seal cap and blank cover



RT 4
RT 11
RT 16, RT 16L
RT 17
RT 34
RT 103
RT 115

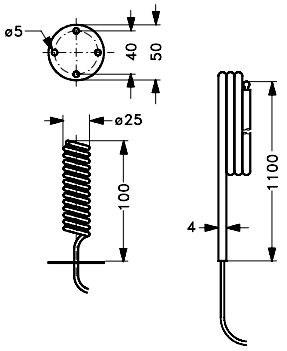


RT 106
RT 107
RT 120
RT 123



RT 2
RT 3
RT 9

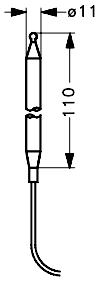
Special sensor



W. no
2.0090 copper

RT 140 / 140 L RT 102

Special sensor

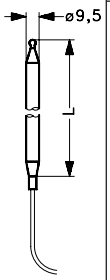
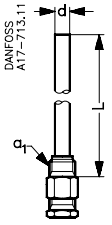
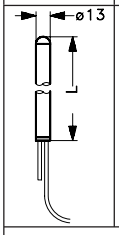


W. no.	Material
1.4301	18/8 steel

RT 124

Weight approx. 1 kg

Choice of suitable sensor pocket

	W. no.	Type	Capillary tube length m	L mm	Suitable sensor pocket Code no.	Material	W.no		L mm	a_1 mm	d mm
	2.0090 cop-per	RT2/3/7/9 10/13/26/120	2, 3, 5 8, 10	80	**017-437066** **017-436966**	Brass 18/8 steel	2.0321 1.4301		112	G ½	11
		RT 101/ 101L	2, 3		**017-437066** **017-436966**	Brass 18/8 steel	2.0321 1.4301		112	G ½	11
		RT8/8L/14/ 14L/15/107/123, 270	2, 3, 5, 8, 10	110	**017-437966** **017-436966**	Brass 18/8 steel	2.0321 1.4301		112	G ½	11
		RT 101	5, 8, 10		**017-437066** **017-436966**	Brass 18/8 steel	2.0321 1.4301		112	G ½	11
		RT 14	10	150	**017-436766**	Brass	2.0321		182	G ½	11
		RT 271	10	180	**017-421666**				465	G ½	11
		RT 12/13	2	210	**017-421666**						
		RT 108	2	410	**017-421666**						
	2.0240 brass	RT 106	2.3	76	**060L333066** **060L332766**	Brass	2.0235		110 160	G ½	15
					060L333166 **060L332966**	18/8 steel	1.4301		110 160	G ½	15
			5	86	**060L333066** **060L332766**	Brass	2.0235		110 160	G ½	15
					060L333166 **060L332966**	18/8 steel	1.4301		110 160	G ½	15
Sensor pocket, solid version, internal diameter 13.1 mm					**017-421866**	AISI 316L	1.4435		108	G ½	15.7

Installation

RT units have two fixing holes which become accessible when the front cover is removed. Units fitted with switch 017-018166*) must be installed with the setting knob upwards.
The other thermostats in the RT series can be installed in any position, except that on plant subjected to severe vibrations it is advantageous to have the screwed cable entry downwards.
*) Contact system with non snap-action function.
See spare parts and accessories, page 15.

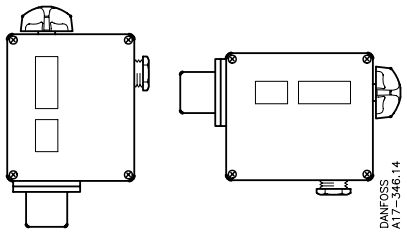


Fig. 7 Position of unit

Setting

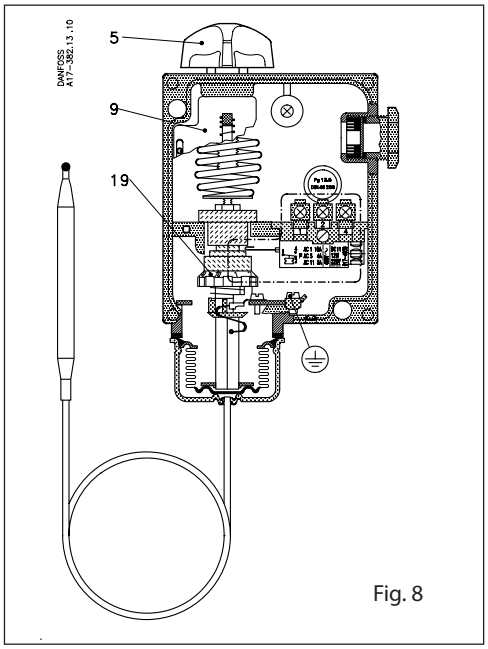


Fig. 8

5. Setting knob
9. Main scale
19. Differential setting disc

The range is set by using the setting knob (5) while at the same time reading the main scale (9). Tools must be used to set thermostats fitted with a seal cap. The differential is set by the differential disc (19).
The size of the obtained differential can be established by comparing the set main scale value and the scale value on the differential disc, with the help of the nomogram for the thermostat concerned (see pages 5-6)

Example
Unit: RT 120
Range setting: 160°C
Differential setting: 2

It will be seen on the nomogram on page 6 that by drawing a line from 160°C on scale A, through 2 on scale C, the value for the differential can be read from scale B: 6°C.

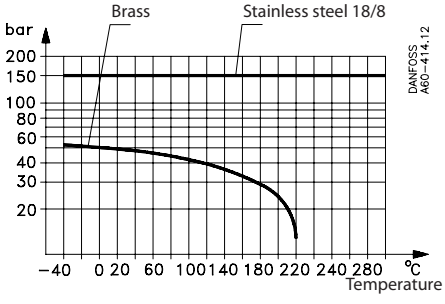
Selection of differential (mechanical differential)
To ensure that the plant functions properly, a suitable differential is necessary. Too small a differential will give rise to short running periods with a risk of hunting. Too high a differential will result in large temperature variations.

Differentials
The mechanical differential is the differential that is set on the differential disc in the thermostat. The thermal differential (operating differential) is the differential the system operates on. The thermal differential is always greater than the mechanical differential and depends on three factors:
1) flow velocity of the medium
2) temperature charge rate of the medium and
3) heat transmission

The medium
The fastest reaction is obtained from a medium having high specific heat and high thermal conductivity. It is therefore advantageous to choose a medium that fulfills these conditions (provided there is a choice). The flow velocity of the medium is also of significance.(Optimum flow velocity for liquids is approx. 0.3 m/s).

Example:
Regulation of a central heating boiler
The temperature in an oil-fired central heating boiler must be regulated by an RT 101. Max. temperature 76°C. Min. temperature 70°C. Differential 76-70 = 6°C.
1. Connect the oil burner via thermostat terminals 1-2.
2. Set the thermostat on 70°C using the hand knob (5), fig. 8.
3. Set the differential disc (19) on 3. This figure is obtained from the RT 101 nomogram, page 5.

When the plant has been operating for some time an assessment can be made of whether the thermal differential is satisfactory. If it is too large, reduce the mechanical differential of the thermostat.



Permissible media pressure on the sensor pocket as a function of temperature

Kontakt:
MARTEL ENERGO s.r.o.,
Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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Function

a. RT thermostats with automatic reset
The RT thermostats are set according to the function required on falling temperature.
Contacts 1-4 break while contacts 1-2 make when the temperature falls to the scale setting. The contacts changeover to their initial position when the temperature again rises to the scale setting plus the differential (see fig. 9).

Contact function
I. Contact changeover for rising temperature occurs at scale setting plus differential..
II. Contact changeover for falling temperatue occurs at scale setting.

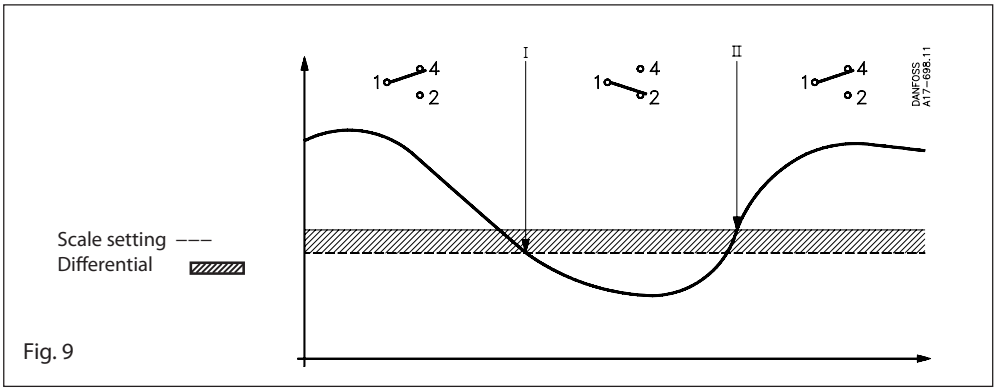

Fig. 9

b. RT thermostats with max. reset
Contacts 1-4 make while contacts 1-2 break when the temperature exceeds the set range value.
The contacts changeover to their initial position when the temperature falls to the scale value minus the differential (see fig. 10).

I. Alarm for rising temperature given at the set value.
II. Alarm for falling temperature given at the set value minus the differential.

Manual reset possible only when the temperature has fallen to the range setting minus differential.

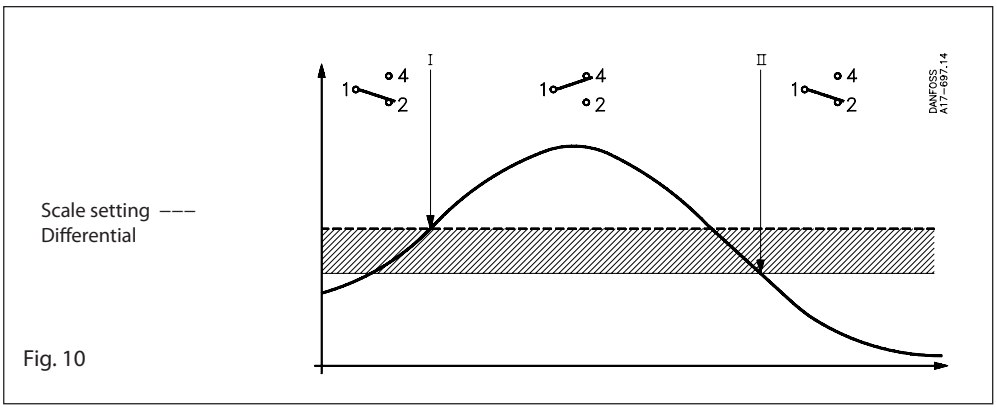

Fig. 10

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Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
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RT units with vapour charge

The method of operation of these units is based on the connection between the pressure and temperature of satuated vapour. The sensor system contains just a small amount of liquid and this is brought completely to vapour form. If the sensor in this type of unit is located coldest in relation to the capillary tube and bellows housing, the ambient temperature has no influence on regulation accuracy.

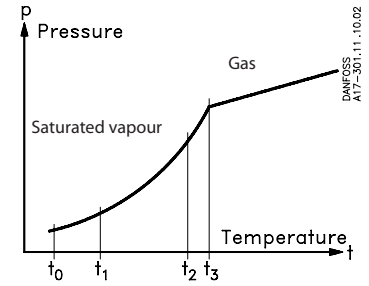

Fig. 11a

RT units with adsorption charge

The thermostatic element contains a superheated gas together with a solid substance (always in the sensor) having a large adsorption surface. This gives an advantage in that the sensor can be installed either colder or warmer than the remaining part of the thermostatic element. However, the charge is to some extent sensitive to changes in the temperature of the bellows and capillary tube.

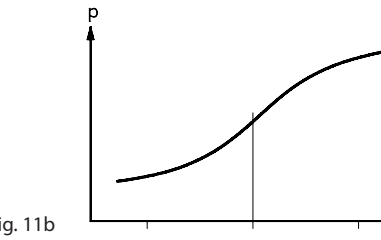

Fig. 11b

Scale correction
If the thermostat is to be used in ambient tempratures that differ significantly from the factory setting (20°C), compensation can be made for the scale deviation:
Scale correction = Z x a
Z can be found from fig. 11c, while a is the correction factor from the table.

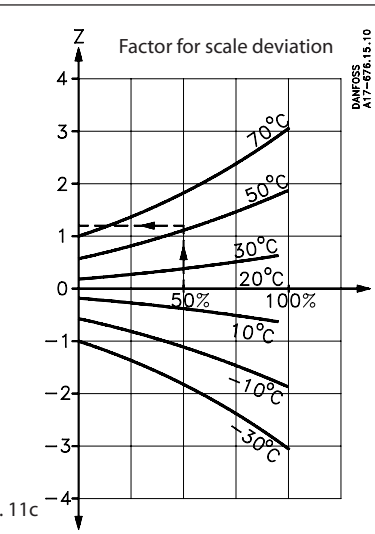

Fig. 11c

Example:
Find the necessary scale correction for a RT 108 with a regulation range +30 to + 140°C.
Setting: 85°C
Ambient temperature: 50°C
Correction:

$$\frac{\text{Set value - min. scale value}}{\text{max. scale value - min. scale value}} \times 100 = \%$$

$$\frac{85 - 30}{140 - 30} \times 100 = 50\%$$

Correction factor from table 2.0 (a)
Factor for scale deviation (see fig. 11c): + 1.2 (Z)
Scale correction: Z x a = 1.2 x 2.0 = 2.4°C
Corrected setting: 85 + 2.4 = 87.4

Type	Range °C	Correction factor a
RT 2	−25 → 15	2.3
RT 7	−25 → 15	2.9
RT 8/L	−20 → 12	1.7
RT 12	−5 → 10	1.2
RT 14/L	−5 → 20	2.4
RT 15	8 → 32	1.2
RT 23	5 → 22	0.6
RT 101/L	25 → 90	5.0
RT 102	25 → 90	5.0
RT 108	30 → 140	2.0
RT 140/L	15 → 45	3.1

RT units with solid charge

The method of operation of these units is based on the connection between the pressure and temperature of saturated vapour.
The sensor system contains a fairly large amount of liquid, of which only a small part is brought to vapour form. If the sensor in this type of unit is located warmest in relation to the capillary tube and bellows housing, the ambient temperature has no influence on regulation accuracy.

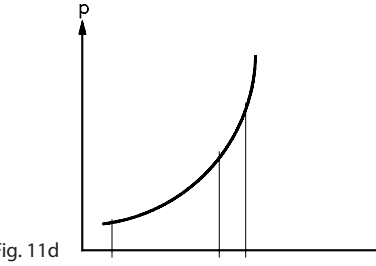

Fig. 11d

Kontakt:
MARTEL ENERGO s.r.o.,
Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
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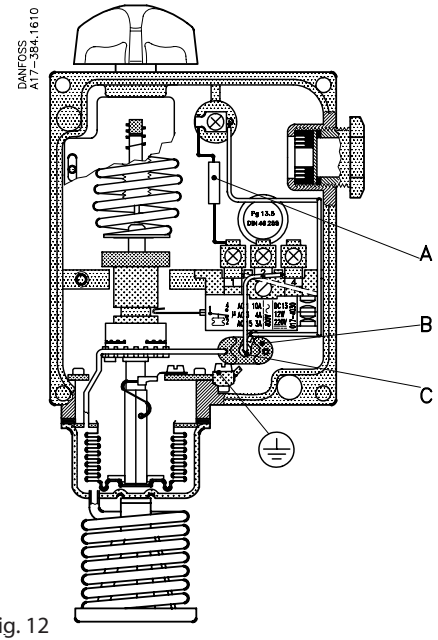
RT 115 for control of ventilation plant in livestock buildings

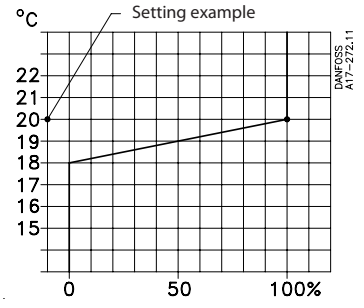


A. Series resistor
B. Bulb sensor
C. Heating element

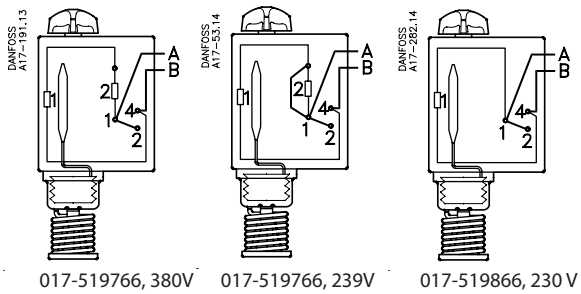
Fig. 12

RT 115 has two sensors, each of which is connected to the space between bellows and bellows housing; see fig. 12. One sensor is a normal, external, rigid coiled capillary tube type, the other is a bulb sensor located in the thermostat housing.

The bulb sensor is heated by an element which is cut in when the thermostat stops the fans and is cut out when the thermostat starts the fans.
The for of operation is as follows:
If the room temperature is more than the value set on the thermostat, 20°C for example, the fans run continuously (100% operating time). If the room temperature falls to 20°C, the switch contacts changeover, the fan stops and the bulb sensor heating element cuts in.
When the bulb sensor is heated up, pressure in the sensor system increases and after a certain time the switch changes over again thereby cutting in the fans and cutting out the element.
If the room temperature falls more than 2°C under the set temperature - in this example, lower than 18°C - the fans stop completely. The heating element is cut in as usual but can no longer heat the bulb sensor sufficiently to create the required pressure increase in the thermostatic element to cut in the fans again. Thus with a room temperature of less than 18°C the operating time is 0%.
An example is shown in fig. 13.
With temperature settings other than the one shown, the inclined line in the diagram is displaced parallel. The line break point on the right of the diagram always corresponds to the set value.
It is therefore possible to maintain a stable room temperature and at the same time obtain periodic ventilation where the duration of the ventilation periods depends on the difference between the actual room temperature and the set temperature.
By ensuring that the thermostat is always set at least 2°C over the lowest permissible room temperature, the thermostat will never allow the room temperature to fall below the desired level.



Ventilator running time in %



017-519766, 380V 017-519766, 239V 017-519866, 230 V

A: Phase input to fan
B: Control lead

Fig. 13

Connection diagrams for RT 115

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MARTEL ENERGO s.r.o.,
Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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Application

RT-L thermostats are fitted with an adjustable neutral zone. This enables the units to be used for floating control. The terminology involved is explained below.

Floating control
A form of discontinuous control where the correcting element (e.g. valve, damper, or similar) moves towards one extreme position at a rate independent of the magnitude of the error when the error exceeds a definite positive and towards the opposite extreme position when the error exceeds a definite negative value.

Hunting
Periodic variations of the controlled variable from the fixed reference.

Neutral zone
The interval in the controlled variable in which the correcting element does not respond.

Mechanical differential
The interval between the values of the controlled variable in which the correcting element does respond.

The contact system in neutral zone units cannot be exchanged, as the contact system adjustment is adjusted to the other parts of the unit.

Neutral zone setting

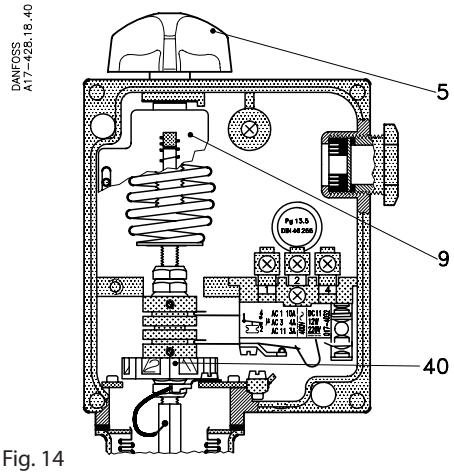

Fig. 14

5. Setting knob

9. Main scale

40. Neutral zone disc with scale

The range is set using the setting knob (5), fig. 14, while reading the main scale (9). The set value is the break temperature for contacts 1-4, fig. 15. The required neutral zone can be found in the diagram for the unit concerned, fig. 16. The position at which the neuttral zone disc (40) must be set can be read from the low scale in the diagram.

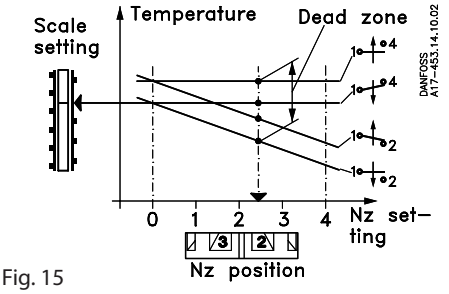

Fig. 15

Example: RT 16L
Setting temperature: +24°C
Required neutral zone: 1.9°C
Using the setting knob, set the thermostat on 24°C.
The dotted lines in the diagram for the RT 16L fig. 16 intersect each other on the curve for position 2.8 and the neutral zone setting disc (40) must be set to that position.

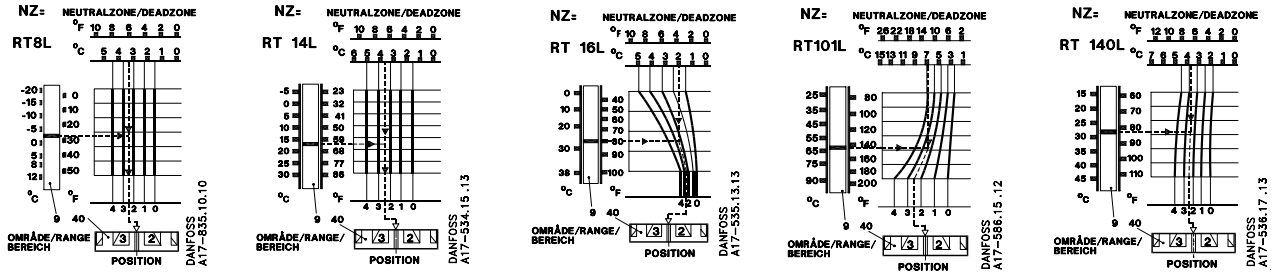

Fig. 16

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Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
www.martelenergo.sk, info@martelenergo.sk

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Application

Control and monitoring of temperature differentials
An RT differential thermostat is an electric single -pole changeover switch. The position of the switch contacts is controlled by the difference in temperature between the two sensors of the termostat.
The RT 270 is used in process plant, ventilation plant and refrigeration and heating plant, where there is a need to maintain a certain temperature difference, from 0 to 20°C, between two media. One of the sensors is used as a reference, the other as an indirect controlled variable. (The direct controlled variable is the temperature differential).

Setting

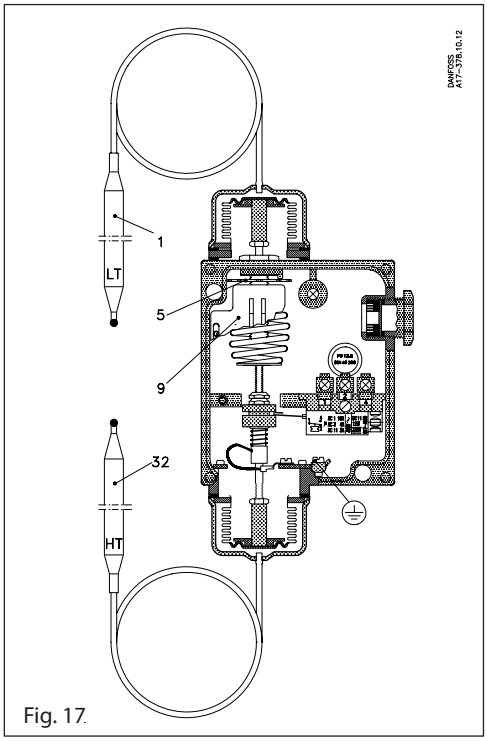

Fig. 17.

1. Sensor for the lowest temperature (LT)
5. Setting disc
9. Scale
32. Sensor for the highest temperature (HT)

The required temperature differential between the LT sensor (1) (lowest temperature) and the HT sensor (32) (highest temperature) is set using the setting disc (5) while reading the scale (9).
Fig. 17 is a cross-sectional drawing of the RT 270.
The differential thermostat has two bellows elements: an LT element whose sensor must be placed in the medium with the lowest temperature, and an HT element whose sensor must be placed in the medium with the highest temperature.
The main spring has a rectilinear characteristic. Within the differential range it can be set for different temperature differentials by means of the setting disc.
When the differential between LT and HT sensor temperatures is reduced, the main spindle moves downwards.
The contact arm is moved downwards by the guide bush so that contact 1-4 break and contacts 1-2 make when the set temperature differential is reached.
The switch contacts change back when the temperature differential has increased to the set value plus the fixed contact differential of approx. 2°C.

Function

Differential thermostats are fitted with a changeover switch (SPDT)
When the differential temperature falls below the set value, contacts 1-4 break and contacts 1-2 make. When the differential temperature rises to the set range value plus the fixed contact differential, contacts 1-2 break and contacts 1-4 make.

I. Contacts make when differential temperature falls below the range scale setting.
II. Contacts make when differential temperature rises above the range scale plus the fixed contact differential.

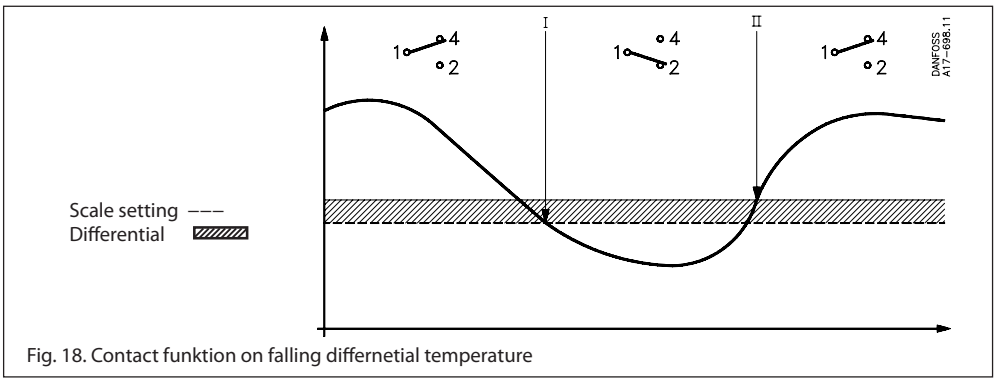

Fig. 18. Contact funktion on falling differnetial temperature

Example
The temperature rise across an air cooler must be held below 5°C. An alarm must be given when the differential temperature of the cooling water exceeds the 5°C
The choice is an RT 270 with a range of 0-15°C and a fixed contact differential of 2°C.
Range setting: 5-2°C = 3°C
When the differential temperature exceeds the range setting plus the fixed contact differential (3+2°C) an alarm will be given.

Kontakt:
MARTEL ENERGO s.r.o.,
Masarykova 23, 080 02 Prešov, IČO: 45412944
Tel./fax: 051/7958 518 Mobil: 0907/478475, 0907/933721
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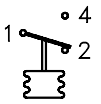
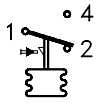
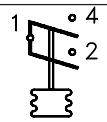
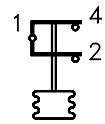
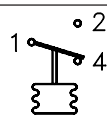
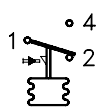
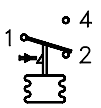
Spare parts and accessories

Version	Symbol	Description	Contact rating	Code no.
Standard		Single-pole changeover switch (SPDT) with terminal board proof against leakate current **Fitted in all standard versions of type RT**[1]. Snap action changeover contacts.		**017-403066**
With max. reset		For manual reset of unit after contact changeover on rising pressure **For units with max. reset.**	*Alternating current:* AC-1 (ohmic): 10 A, 400 V AC-3 (inductive): 4 A, 400 V AC-14/15 (coil/transformer): 3 A, 400 V Blocked rotor: 28 A, 400 V *Direct current:* DC 13/14: 12 W, 230 V	**017-404266**
With min. reset		For manual reset of units after contact changeover on falling pressure. **For units with min. reset.**		**017-404166**
Standard		Single-pole changeover switch (SPDT) with gold plated (oxide-free) contact surfaces. Increases cut-in reliability on alarm and monitoring systems, etc. Snap action changeover contacts. Terminal board proof against leakage current.	*Alternating current:* AC-1(ohmic): 10 A, 400 V AC-3 (inductive): 2 A, 400 V AC-14/15 1 A, 400 V Blocked rotor: 14 A, 400 V *Direct current:* DC-13/14: 12 W, 230 V	**017-424066**
Cuts in two circuits simultaneously		Single-pole changeover switch that cuts in two circuits simultaneously on rising pressure. Snap action changeover contacts. Terminal board proof against leakage current.	Alternating current: AC-1(ohmic): 10 A, 400 V AC-3 (inductive): 3 A, 400 V AC-14/15 2 A, 400 V Blocked rotor: 20 A, 400 V Direct current: DC-13/14: 12 W, 230 V * If current is led through contacts 2 and 4, i.e. terminals 2 and 4 connected but not 1, max. permissible load is increased to 90 W, 220 V - - -.	**017-403466**
Cuts out two circuits simultaneously		Single-pole changeover switch that cuts out two circuits simultaneously on rising pressure. Snap action changeover contacts. Terminal board proof against leakage current.		**017-403666**
With non-snap action changeover contacts		Single-pole changeover with non-snap action changeover gold plated (oxide-free) contacts.	*Alternating or direct current:* 25 VA, 24 V	**017-018166**

[1]) At load types with low currents/voltages contact failure may occure on the silver contacts because of oxidation. In systems where such a contact failure is of great importance (alarm etc.), gold plated contacts are recommended.
Contact systems for neutral zone units are not available as spare parts. Exchange not possible, as the contact system adjustment is adjusted to the other parts of the unit.

The switch contacts are shown in the position they assume on falling temperature, i.e. after downward movement of the RT main spindle.
The setting pointer of the control shows the scale value at which contact changeover occurs on falling temperature. An exception is switch no. **017-403066** with max. reset where the setting pointer shows the scale value at which contact changeover occurs on rising pressure.

Switches

Version	Symbol	Description	Contact rating	Code no.
With min. reset		For manual reset of unit after contact changeover on falling pressure. Gold plated (oxide-free) contact surfaces	*For Alarm application* *Alternating current:* AC-1 (ohmic): 10 A, 400 V AC-3 (inductive): 2 A, 400 V Full load current: 2 A, 400 V AC-14/15: 1 A, 400 V Blocked rotor: 14A, 400 V *Direct current* DC-13/14: 12W, 230 V *For control application* max. 100 mA / 30 V a.c./ d.c. min. 1 mA / 5 V a.c. / d.c.	**017-404766**
With max. reset		For manual reset of unit after contact changeover on rising pressure. Gold plated (oxide-free) contact surfaces		**017-404866**

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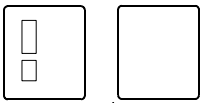
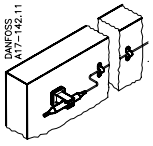
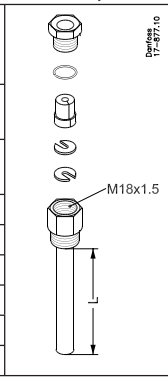
Part		Description			Qty.	Code no.
Cover		Covers: Colour:	Polyamide Pale grey RAL 7035	With window Without window	5 5	**017-436166** **017-436266**
Setting knob		Replacement	Pale grey Ral 7035		30	**017-436366**
Seal cap		Seal cap to replace setting knob so that Setting can only be altered with tools		Black	20	**017-436066**
Seal screws for cover and seal cap					1 + 1	**017-425166**
Capillary tube gland		For all RT thermostats with remote sensor. G½A (pipe thread ISO 228/1), oil resistant rubber washer for max. 110°C/90 bar			5	**017-422066**
Capillary tube gland		For RT 106 thermostats with remote sensor. G¾A (pipe thread ISO 228/1), oil resistant rubber washer for max. 110°C/90 bar			1	**003N0155**
Sensor clip		For all RT units with remote sensor		L = 76 mm	10	**017-420366**
Heat conductive compound		For RT thermostats with the sensor insert in a pocket. Tube with 3.5cm³ compound to be filled in the sensor pocket to improve heat transfer between pocket and sensor. Application range for compound: –20 to +150°C, momentarily up to 220°C			10	**041E0114**
Sensor holder		For RT 14, 101 and 270 Sensor holder for wall mounting incl. four capillary tube clips			20 set	**017-420166**

Sensor pocket for RT thermostats with cylindrical remote sensor

Used for the following types		Insertion length L mm	d mm	Material	Connection pipe thread ISO 228/1	Code no.
All except RT 12, 23, 106, 108, 124, 270		112	11	Brass	G ½A	**017-437066**
All except RT 12, 23, 106, 108, 124, 271		112	11	Stainless steel 18/8		**017-436966**
RT 106, RT 124 [2]		110	15	Brass		**060L327166**[1]
RT 106, RT 124 [2]		110	15	Stainless steel 18/8		**060L326866**[1]
RT 106, RT 124 [2]		160	15	Brass		**060L326366**[1]
RT 106, RT 124 [2]		160	15	Stainless steel 18(8		**060L326966**[1]
RT 271		182	11	Brass		**017-436766**
RT 108		465	11	Brass		**017-421666**

[1] Supplied without washer set
[2] Unit supplied with washer set

See possibly page 8.