

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 differential thermostats with room sensors, duct sensors, and capillary tube sensors

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Thermostats type RT

-50 0 50 100 150 200 250 300°C											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

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*)		Max. sensor temperature °C	Type of charge	Capillary tube length m	Code no.			Type
	At lowest range setting °C	At highest range setting °C							
-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

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



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

Setting range °C	Adjustable differential range*)		Max. sensor temperature °C	Type of charge	Capillary tube length m	Sensor type**) Figur	Code no.	Type
	At lowest range setting °C	At highest range setting °C						
-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	017-503766¹⁾	RT 4
10 → 35	⁵⁾	⁵⁾	92	B	-	1	017-519766²⁾	RT 115
10 → 35	⁵⁾	⁵⁾	92	B	-	1	017-519866³⁾	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

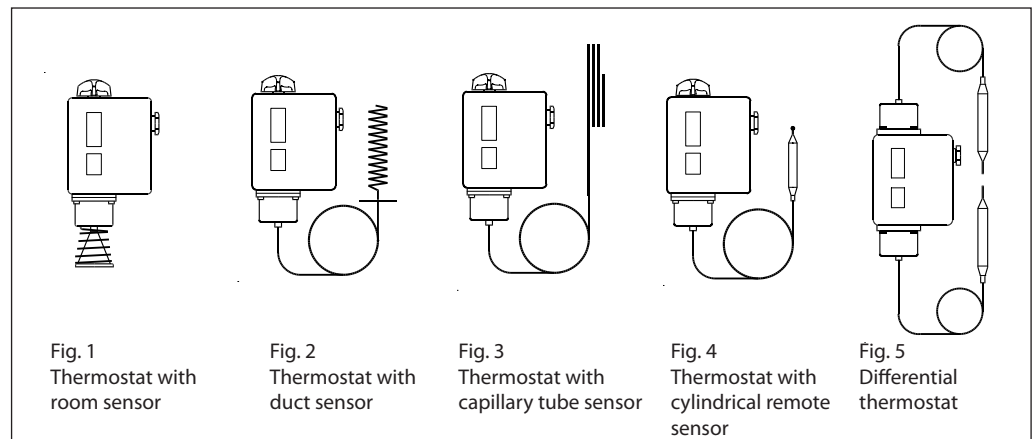
Setting range °C	Mechanical differential °C	Adjustable differential range*)		Max. sensor temperature °C	Type of charge	Capillary tube length m	Sensor type**) Figur	Code no.	Type
		At lowest range setting °C	At highest range setting °C						
-20 → -12	1.5	1.5 → 4.4	1.5 → 4.9	145	B	2	4	017L003066	RT 8L
-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	017L006266¹⁾	RT 101L

*) See fig. 1-5

Differential thermostats

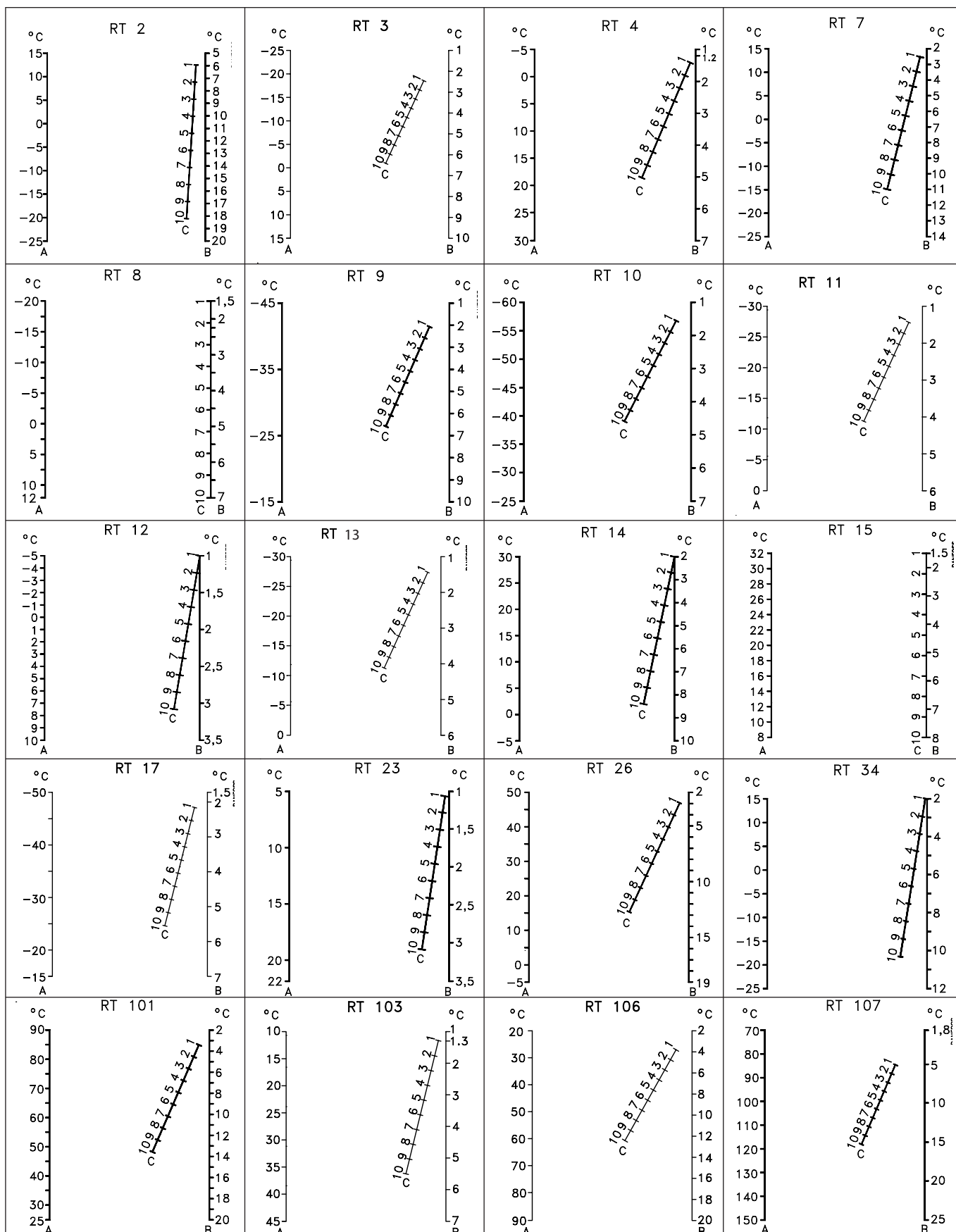
Setting range °C	Mechanical differential °C	Operating range (LT element) °C	Max. sensor temperature °C	Type of charge	Capillary tube length m	Sensor type*) Figur	Code no.	Type
0 → 20	3	20 → 100	200	B	2 × 10	5	017D004466	RT 271
0 → 15	2	-30 → 40	65	B	2 × 5	5	017D003166	RT 270

*) See fig. 1-5



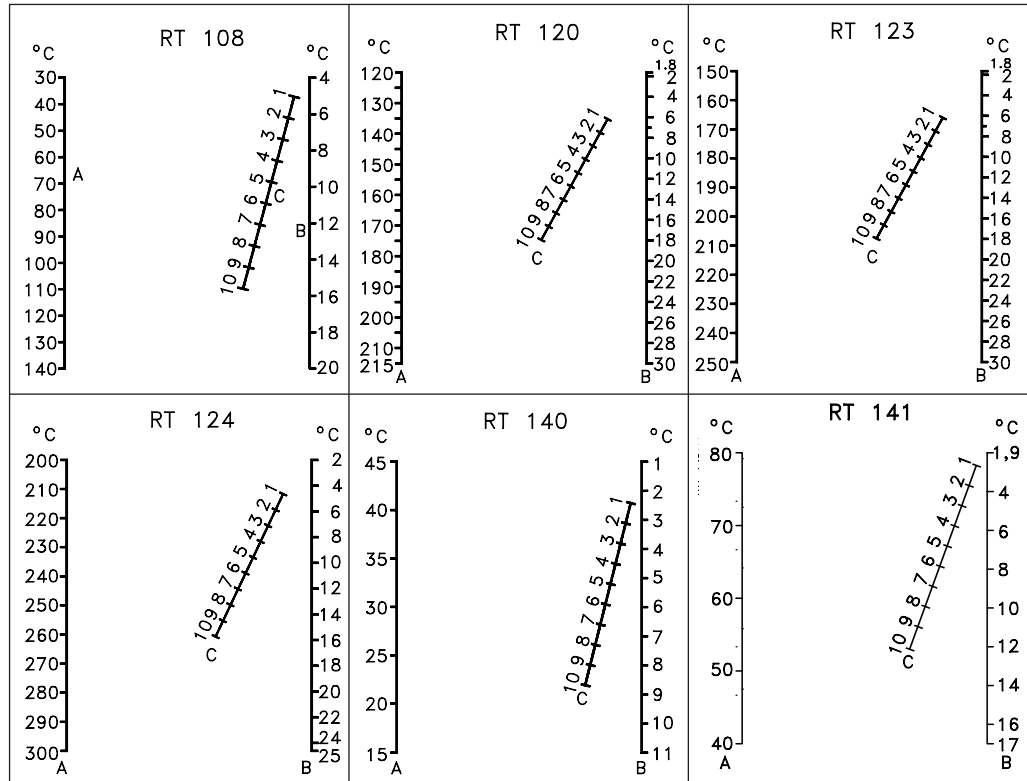
Nomograms for obtained differentials

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



Nomograms for obtained differentials

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



Technical data

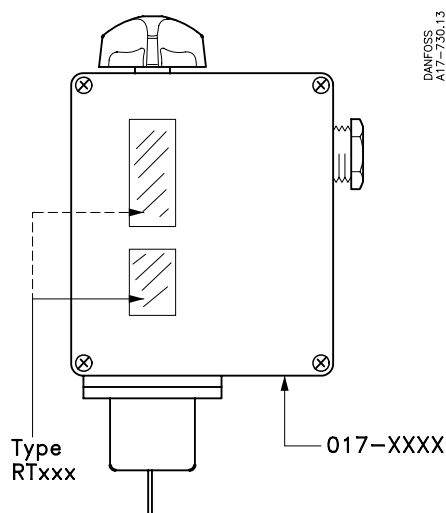
Designation	RT thermostats
Ambient temperature	-50 to 70°C . See remarks on charge types page 11
Contact system	<p>SPDT</p> <p>Line</p> <p>DANFOSS A60-969.10</p> <p>Single-pole changeover switch (SPDT)</p>
Contact load	<p>Alternating current: AC-1: 10A, 400 V AC-3: 4A, 400 V AC-15: 3A, 400 V</p> <p>Direct current: DC-13: 12 W, 230 V (see fig. 6)</p> <p>Fig. 6</p> <p>DANFOSS A60-984.13</p>
Contact material:	AgCdO
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 4	RT 3	RT 12	RT 16	RT 34	RT 101	RT 106	RT 120	RT 124	Approvals
RT 23	RT 10	RT 7	RT 13	RT 102	RT 103		RT 107			
RT 26	RT 11	RT 8	RT 14	RT 141	RT 115		RT 123			
RT 108	RT 16L	RT 8L	RT 14L	RT 271	RT 140					
	RT 17	RT 9	RT 15	RT 270						
	RT 140L									
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

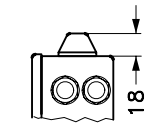
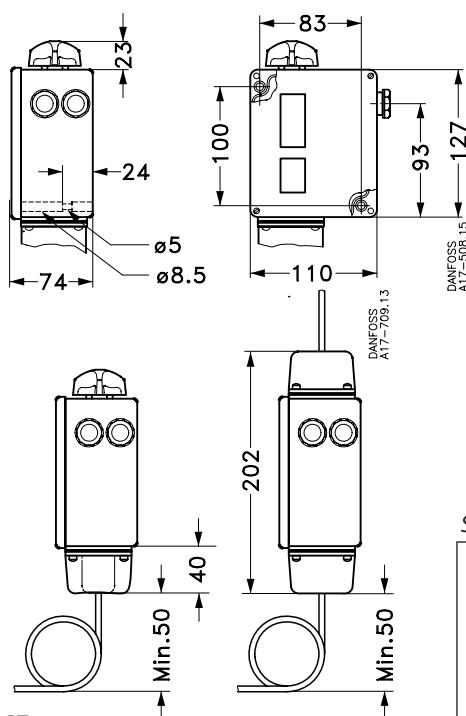
Note: In addition we refer to the certificates, the copies of which can be ordered from Danfoss.
GL approval is conditional on the use of a ship's cable entry

Identification

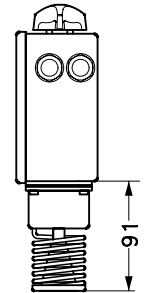


The type designation of the units is given on the setting scale. The code no. is stamped on the bottom of the thermostat housing

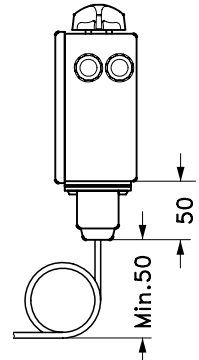
Dimensions and weight



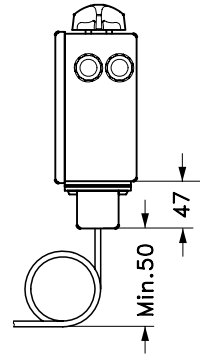
RT 101, 107, 120, 123
special versions with seal
cap and blank cover



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



RT 106
RT 107
RT 120
RT 123

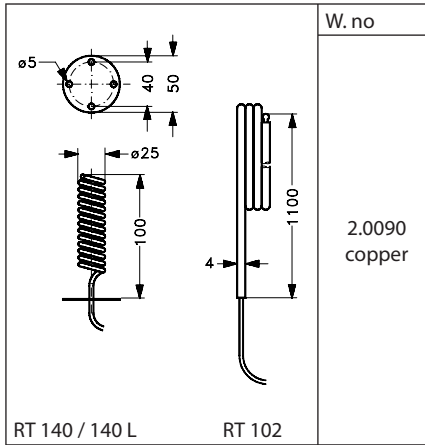


RT 2
RT 3
RT 9

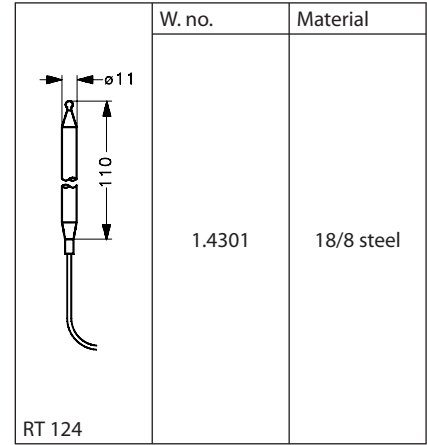
RT 7
RT 8, RT 8L
RT 10
RT 12
RT 13
RT 14, RT 14L
RT 15
RT 21
RT 23
RT 24
RT 26
RT 101, RT 101L
RT 108
RT 124
RT 140, RT 140L

Weight approx. 1 kg

Special sensor



Special sensor



Choice of suitable sensor pocket

Sensor pocket, solid version, internal diameter 13.1 mm	W. no.	Type	Capillary tube length m	L mm	Suitable sensor pocket Code no.	Material	W.no	L	a ₁	d		
								mm	mm	mm		
	2.0090 copper	RT2/3/7/9 10/13/26/120	2, 3, 5	80	017-437066	Brass	2.0321	112	G 1/2	11		
			8, 10		017-436966	18/8 steel	1.4301					
		RT 101/ 101L	2, 3	017-437066	Brass	2.0321						
				017-436966	18/8 steel	1.4301						
		RT8/8L/14/ 14L/15/107/123, 270	2, 3, 5, 8, 10	110	017-437966	Brass	2.0321					
					017-436966	18/8 steel	1.4301					
		RT 101	5, 8, 10	110	017-437066	Brass	2.0321					
					017-436966	18/8 steel	1.4301					
RT 14	10	150	017-436766	Brass	2.0321	112	G 1/2	11				
									RT 271	180	017-421666	
												RT 12/13
									RT 108	2	410	
	2.0240 brass	RT 106	2.3	76	060L333066	Brass	2.0235	110	G 1/2	15		
					060L332766	18/8 steel	1.4301					
					060L332966	18/8 steel	1.4301					
			5	86	060L333066	Brass	2.0235					
					060L332766	18/8 steel	1.4301					
					060L333166	18/8 steel	1.4301					
			060L332966	18/8 steel	1.4301							
Sensor pocket, solid version, internal diameter 13.1 mm								108	G 1/2	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.

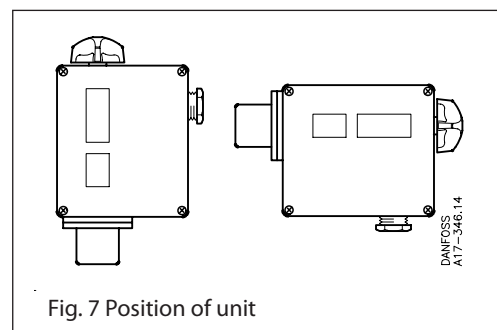


Fig. 7 Position of unit

Setting

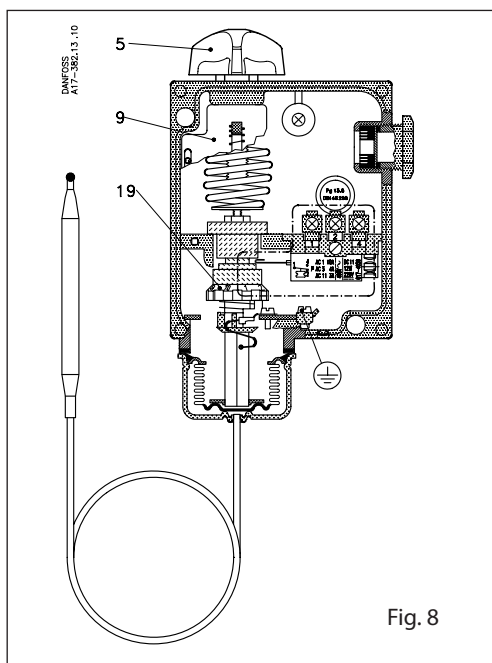


Fig. 8

- 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

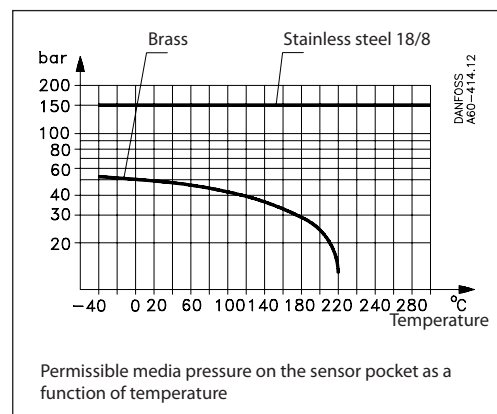
The fastest reaction is obtained from a medium having high specific heat and high thermal conductivity. It is therefore advantageous to choose a medium that fulfills these conditions (provided there is a choice). The flow velocity of the medium is also of significance. (Optimum flow velocity for liquids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