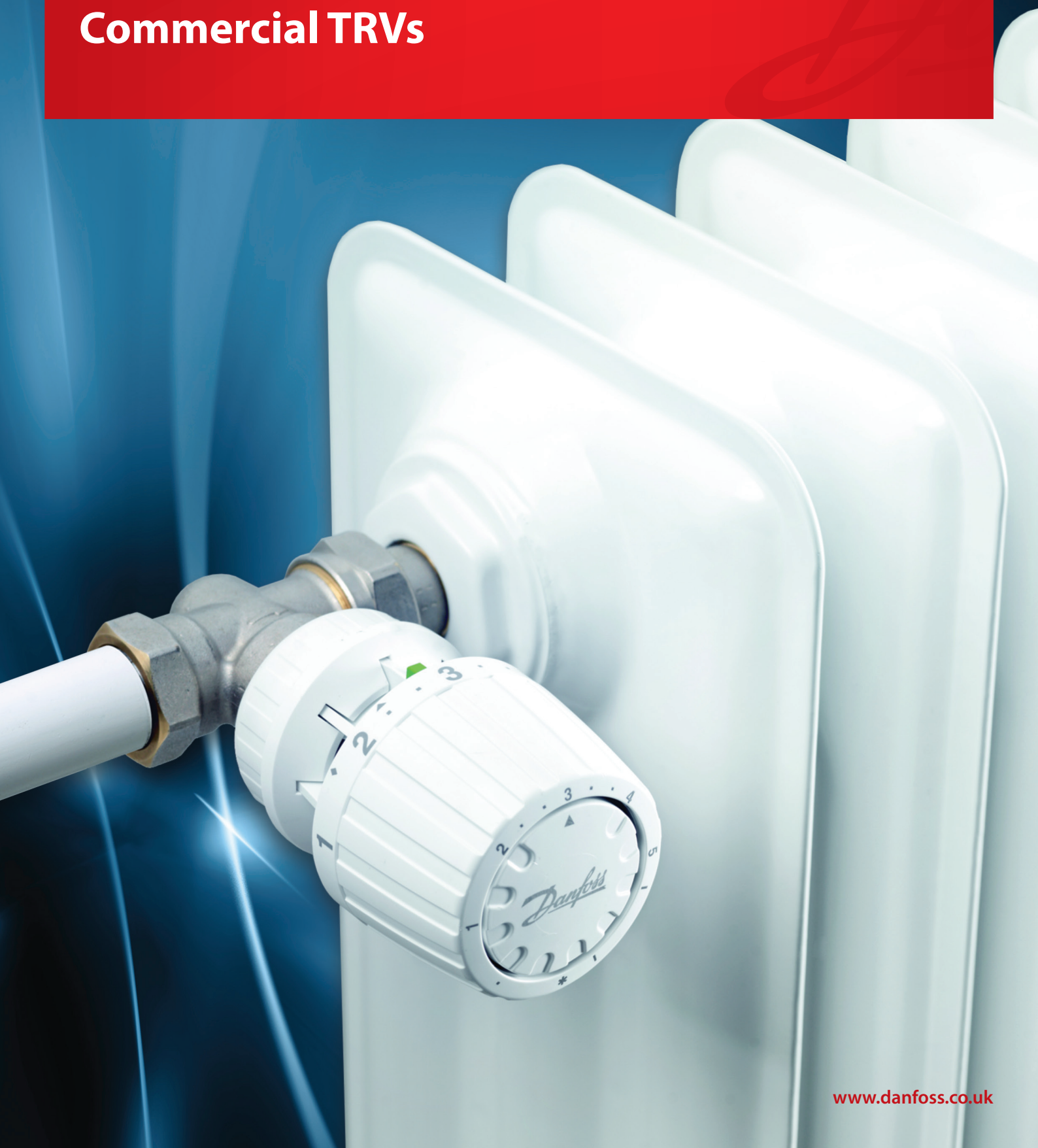
ENGINEERING
TOMORROW

Commercial TRVs



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Thermostatic **Radiator Valves**

Studies show that about eight out of ten buildings have inefficient heating systems that waste energy. However, completely replacing an entire system is not always necessary to reduce energy consumption – often, a considerable improvement can be achieved by optimising the existing heating systems for a "green" renovation. Condensing boilers are a prime example – they have the potential to run more efficiently with the right adjustments and components. Optimising the component match with a condensing boiler is an easy, budget-friendly "hack" to recommend to customers who are interested in improving the energy efficiency of their heating systems. With elements such as fast-reacting thermostatic radiator valves (TRVs) and automatic radiator balancing, condensing boiler efficiency can be fine-tuned for improved performance.

Today's condensing boilers are highly efficient and offer good fuel economy. However, modern condensing boilers only achieve maximum efficiency when they operate in condensing mode most of the time, which requires a low return water temperature. Yet often a new condensing boiler will be connected to the existing room controls, such as manual radiator valves or old TRVs without pre-setting, neither of which are designed to provide a low return water temperature. While the boiler still works this way, it is significantly less efficient. The result is condensing boilers which are not running in condensing mode, increasing the energy usage and therefore creating energy bills that are much higher than they should be. This can be avoided by matching the condensing boiler with high-quality components right from the start, such as best-in-class TRVs and dynamic valves.

Contents

Single Pipe and **Two Pipe** Systems

There are two main types of radiator system, each with unique operating properties and each requiring a different valve type selection. See below for a quick guide to single and two pipe heating systems:

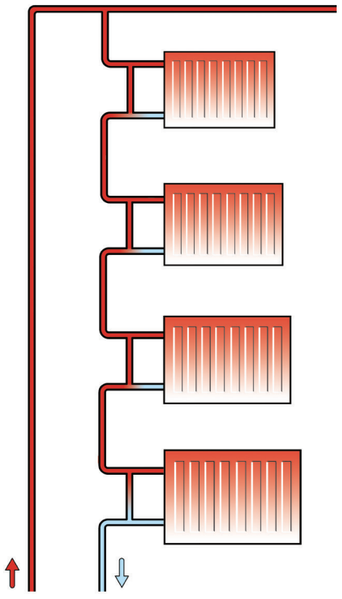
Single Pipe System

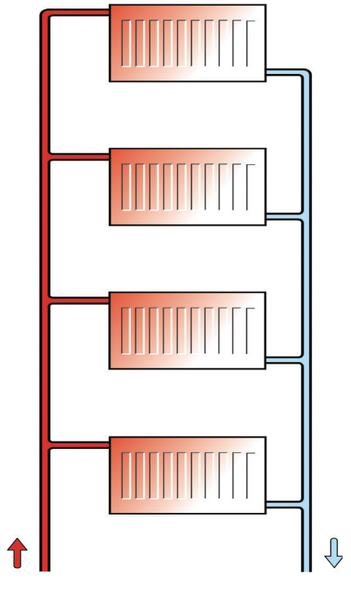
As the name implies, a single pipe system is a collection of radiators all connected to a single loop of pipe work throughout the building. Each radiator has the flow and return connected to the same pipe. Natural convection allowing heated water to rise into the radiator, displacing cooler water back into the single pipe circuit.

Single pipe systems can suffer from certain system specific problems:

- Because each radiator in the circuit extracts heat from the heated water, as you get further down the circuit the flow temperature is reduced requiring larger radiators to be fitted towards the end of the circuit.
- Larger pipe size required to feed the radiators.
- It is difficult to compensate for undersized radiators by increasing the water flow.

Single pipe systems are rarely fitted from new today, however many systems are still in operation and can be found in many industrial buildings, factories and schools. Designed for single pipe heating systems, the RA-G single pipe thermostatic valves have large diameter valve cones which deliver high capacity flow and control.





Two Pipe System

In the two pipe system there are separate flow and return pipes, with some form of bypass (preferably automatic) between the flow and the return. Because the flow and return in these systems is separate, the temperature of the water reaching each radiator is basically the same meaning radiator output is roughly the same at each branch of the circuit.

- Two pipe systems benefit from lower material costs due to pipe work and radiator surface area being smaller generally than in a one pipe system.
- Same size radiators can be used throughout the system.
- System balance is important to reduce noise and temperature variations in the system.

Two pipe systems can be fitted with pre-setting (RA-N) or fixed capacity (RA-FN) valves and RA-DV together with a thermostatic sensor from the RA2000 range.

Commercial Radiator Thermostat
Selection Guide

Key

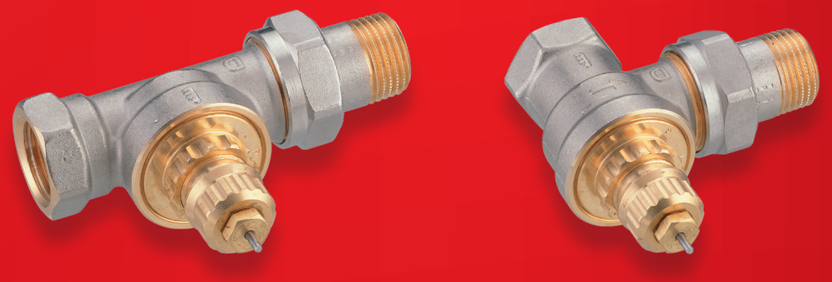
★	*Approved combination* *Refer to notes for any restrictions/advice*
1	*Mount sensor horizontally*
2	*Consider use of remote sensor to improve performance*
3	*Remote sensor is recommended*
4	*Valve for mounting in the return*

Description	Built-in Sensors						Remote Sensors (0-2m)				
	Standard	Snap On Mount		Low Temp.	Tamperproof	2/5/8/15m Wall Adjusters	Standard	Snap On Mount	Low Temp.	Tamperproof	2m Wall Adjuster
Model	 RA2910	 RA2990	 RA2940	 RA2914	 RA2920	 RA5062, RA5065 RA5068. RA5075	 RA2912	 RA2992	 RA2916	 RA2922	 RA5074
Codes	**013G2910**	**013G2990**	**013G2940**	**013G2914**	**013G2920**	**013G5062 013G5065 013G5068 013G5075**	**013G2912**	**013G2992**	**013G2916**	**013G2922**	**013G5074**
Temperature Range	5-26°C	5-26°C	5-26°C Positive Off	5-22°C	5-26°C	6-28°C	5-26°C	5-26°C	5-22°C	5-26°C	6-28°C

			Size	Standard Valves		Valves with pre-setting		Valves for low flow applications		Sensor Options											
				Type	Code No.	Type	Code No.	Type	Code No.												
2-Pipe System	Straight		½″	RA-FN 15	**013G0024**	RA-N 15	**013G0034**	RA-UN 15	**013G3004**	1 ★	1 ★	1 ★	1 ★	1 ★	★	★	★	★	★	★
								RA-UR 15[4]	**013G3228**											
			½″ / 15mm	RA-FN 15	**013G0084**	-	**-**	-	-											
			¾″	RA-FN 20	**013G0026**	RA-N 20	**013G0036**	-	-											
			1″	RA-FN 25	**013G0028**	RA-N 25	**013G0038**	-	-											
			³/₈″	RA-FN 10	**013G0022**	RA-N 10	**013G0032**	-	-											
	Vertical Angle		½″	RA-FN 15	**013G0023**	RA-N 15	**013G0033**	RA-UN 15	**013G3003**	2 ★	2 ★	2 ★	3 ★	2 ★	★	★	★	★	★	★
								RA-UR 15[4]	**013G3229**											
			¾″	RA-FN 20	**013G0025**	RA-N 20	**013G0035**	-	-											
			1″	RA-FN 25	**013G0027**	RA-N 25	**013G0037**	-	-											
			³/₈″	RA-FN 10	**013G0021**	RA-N 10	**013G0031**	-	-											
	Horizontal Angle		½″	-	**-**	RA-N 15	**013G0153**	RA-UN 15	**013G3043**	★	★	★	★	★	★	★	★	★	★	★
			½″ / 15mm	RA-FN 15	**013G0149**	-	**-**	-	-											
			¾″	RA-FN 20	**013G0145**	RA-N 20	**013G0155**	-	-											
			1″	-	**-**	-	**-**	-	-											
			³/₈″	RA-FN 10	**013G0141**	RA-N 10	**013G0151**	-	-											
	Side Angle		½″	RA-DV 15R	**013G7719**	RA-N 15R	**013G0233**	-	-	★	★	★	★	★	★	★	★	★	★	★
			½″	RA-DV 15L	**013G7720**	RA-N 15L	**013G0234**	-	-											
			³/₈″	RA-DV 10R	**013G7717**	RA-N 10R	**013G0231**	-	-											
			³/₈″	RA-DV 10L	**013G7718**	RA-N 10L	**013G0232**	-	-											
1-Pipe System	Straight		½″	RA-G 15	**013G1675**	-	-	-	-	1 ★	1 ★	1 ★	1 ★	1 ★	★	★	★	★	★	★
			¾″	RA-G 20	**013G1677**	-	-	-	-											
			1″	RA-G 25	**013G1679**	-	-	-	-											
	Vertical Angle		½″	RA-G 15	**013G1676**	-	-	-	-	2 ★	2 ★	2 ★	3 ★	2 ★	★	★	★	★	★	★
			¾″	RA-G 20	**013G1678**	-	-	-	-											
			1″	RA-G 25	**013G1680**	-	-	-	-											

Valves for 1-Pipe Systems

RA-G

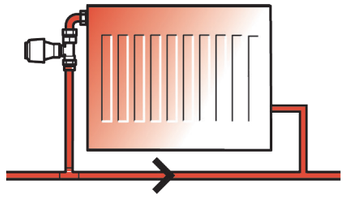


- RA-G valves in flow
- Suitable for use with all RA2000 sensors
- Available in both vertical angle and straight pattern designs in ½", ¾" and 1" sizes

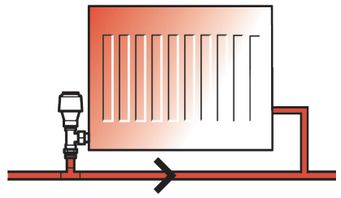
RA-G valves are high capacity low resistance valves for use in conventional 1-pipe heating systems in which water circulation through the radiator is mainly by thermo-siphon. In such systems the circulating pressure available to overcome the frictional resistance of the valve and the radiator is extremely low and is generally insufficient to overcome the resistance of normal 2-pipe radiator thermostats.

RA-G valves are specifically designed for use in such systems and have large diameter valve cones which deliver high capacities at low proportional offsets ensuring that comfort temperatures can be maintained under all load conditions.

All valves incorporate a gland-seal assembly that can be replaced without the need for special tools and without draining down the system.



RA-G straight

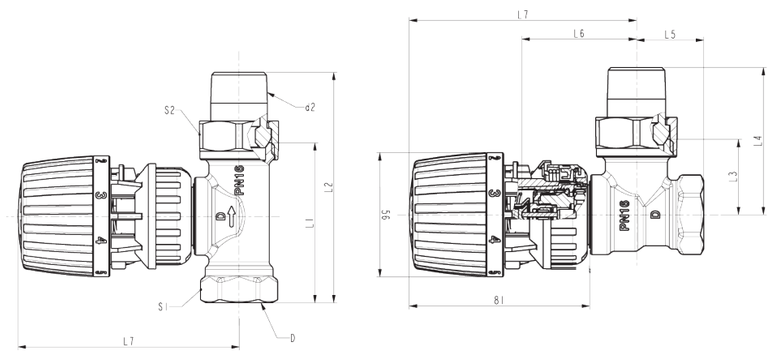


RA-G vertical angle

Pattern	Type	Code No	Connections		Kv Value Xp = 2K[2]
			Pipe[3]	Radiator Tail	
Straight	RA-G 15	**013G1675**	½" BSP	½" BSP	1.63
	RA-G 20	**013G1677**	¾" BSP	¾" BSP	2.06
	RA-G 25	**013G1679**	1" BSP	1" BSP	2.27
Vertical Angle [1]	RA-G 15	**013G1676**	½" BSP	½" BSP	2.06
	RA-G 20	**013G1678**	¾" BSP	¾" BSP	2.20
	RA-G 25	**013G1680**	1" BSP	1" BSP	2.41
By-pass restrictors for 1-Pipe Systems					
RTD-BR 15/10		**013G3210**	1/2" internal thread, Kvs: 6.8 m^3h		
RTD-BR 20/15		**013G3215**	1/2" internal thread, Kvs: 15.1 m^3h		
Please note: *(1) To ensure optimum performance use remote sensor* *(2) Kv values when used with RA2000 Sensors* *(3) Not suitable for use with Fittings listed on page 223*					
Technical Specifications					
Maximum Operating Temperature					120°C
Maximum Working Pressure					10 Bar
Maximum Differential Pressure (RA-G 25)					0.16 Bar
Maximum Differential Pressure (RA-G 15 & 20)					0.2 Bar

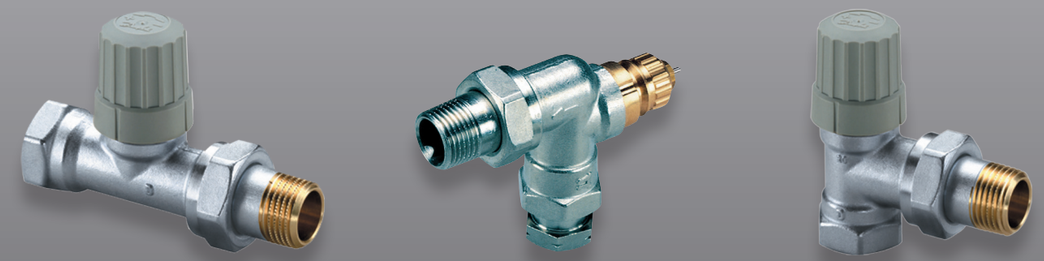
Type	DN	D	d_2	L_1	L_2	L_3	L_4	L_5	L_6	L_7	S_1	S_2
RA-G 15	15	½"	½"	68	96	30	58	27	52	103	27	30
RA-G 20	20	¾"	¾"	74	106	34	66	30	54	103	32	37
RA-G 25	25	1"	1"	90	126	42	78	34	57	106	41	46

Dimensions



Fixed Capacity Valve Bodies

RA-FN Valves for 2-Pipe Systems



- RA-FN valves without pre-setting
- RA-FN valves are easily recognised by a grey cover cap
- Wide range of fittings (see page 21)

RA-FN valves are designed for use in 2-pipe heating systems where circulation through both pipe work and radiator is pumped. They are conventional uni-directional valves without pre-setting; system balancing must be made using lockshield valves installed on the radiator return connection. Please refer to pages 16 and 17 for matching lockshield valves.

A wide range of compression fittings for copper, PEX and ALUPEX pipe are available for use with RA-FN valves, see page 19.

All valves incorporate a gland-seal assembly that can be replaced without the need for special tools and without draining down the system.

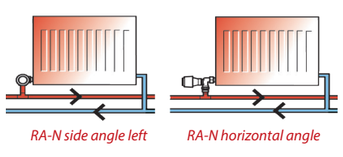
RA-FN valves are suitable for use with all **RA2000 sensors** (pages 12 and 13).

Pattern	Type	Code No	Connections		Kv Value Xp = 2K[2]
			Pipe	Radiator Tail	
Straight	RA-FN 10	**013G0022**	⅜" BSP	⅜" BSP	0.56
	RA-FN 15	**013G0024**	½" BSP	½" BSP	0.73
	RA-FN 15	**013G0084**	15mm or ½" BSP	½" BSP	0.73
	RA-FN 20	**013G0026**	¾" BSP	¾" BSP	1.04
	RA-FN 25	**013G0028**	1" BSP	1" BSP	1.04
Vertical Angle [1]	RA-FN 10	**013G0021**	⅜" BSP	⅜" BSP	0.56
	RA-FN 15	**013G0023**	½" BSP	½" BSP	0.73
	RA-FN 20	**013G0025**	¾" BSP	¾" BSP	1.04
	RA-FN 25	**013G0027**	1" BSP	1" BSP	1.04
Horizontal Angle	RA-FN 10	**013G0141**	⅜" BSP	⅜"BSP	0.56
	RA-FN 15 UK	**013G0143**	½" BSP	½" BSP	0.73
	RA-FN 15 UK	**013G0149**	15mm or ½" BSP	½" BSP	0.73
	RA-FN 20 UK	**013G0145**	¾" BSP	¾" BSP	0.80
(1) To ensure optimum performance use remote sensor			*(2) Kv values when used with RA2000 sensors*		
Technical Specifications					
Maximum Operating Temperature					120°C
Maximum Working Pressure					10 Bar
Maximum Differential Pressure					0.6 Bar

Pattern	Type	D	d_2 BSP	L_1	L_2	L_3	L_4	L_5	L_6	L_7*	L_8	L_9	L_{10}	L_{11}	Arc. Flats S_1	Arc. Flats S_2
Straight	RA-FN 10	⅜"	⅜"	60	85				47	96					22	27
	RA-FN 15	½"	½"	67	95				47	96					27	30
	RA-FN 20	¾"	¾"	74	106				52	101					32	37
	RA-FN 25	1"	1"	90	126				52	101					41	46
Vertical Angle	RA-FN 10	⅜"	⅜"			27	52	22	47	96					22	27
	RA-FN15	½"	½"			30	58	26	47	96					27	30
	RA-FN 20	¾"	¾"			34	66	29	52	101					32	37
	RA-FN 25	1"	1"			40	75	34	52	101					41	46
Horizontal Angle	RA-FN 10	⅜"	⅜"						59	108	26	51	22		22	27
	RA-FN 15 UK	½"	½"						60	98	26	54	33	44	27	30
	RA-FN 20	¾"	¾"						61	110	34	66	30		32	27

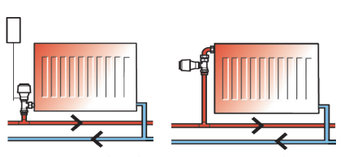
** Add 32mm to L_7 to allow for sensor removal.*

Dimensions



RA-N side angle left

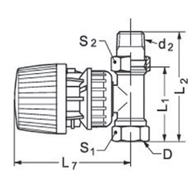
RA-N horizontal angle



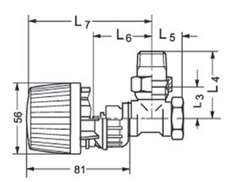
RA-N vertical angle

RA-N straight

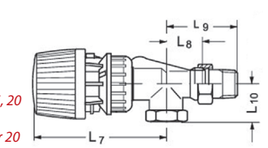
Straight RA-N or RA-FN



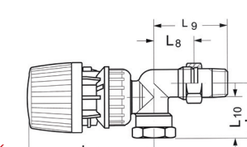
Vertical Angle RA-N or RA-FN



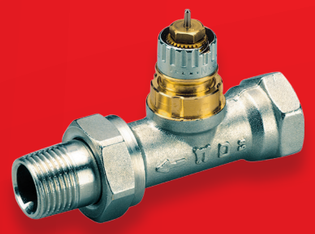
Horizontal Angle RA-N 10, 15, 20 & RA-FN 10 or 20

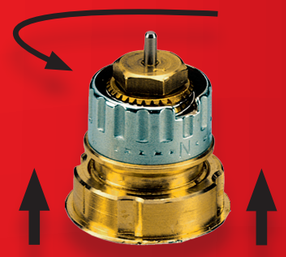


Horizontal Angle RA-FN 15 UK



Pre-Setting Valve Bodies
RA-N Valves for 2-Pipe Systems





Pattern	Type	Code No	Connections		Kv Value [1] [3] Xp = 2K	
			Pipe	Radiator Tail	Min	Max
Straight	RA-N 10	**013G0032**	3/8″ BSP	3/8″ BSP	0.04	0.56
	RA-N 15	**013G0034**	½″ BSP	½″ BSP	0.04	0.73
	RA-N 20	**013G0036**	¾″ BSP	¾″ BSP	0.10	1.04
	RA-N 25	**013G0038**	1″ BSP	1″ BSP	0.10	1.04
Vertical Angle [2]	RA-N 10	**013G0031**	3/8″ BSP	3/8″ BSP	0.04	0.56
	RA-N 15	**013G0033**	½″ BSP	½″ BSP	0.04	0.73
	RA-N 20	**013G0035**	¾″ BSP	¾″ BSP	0.10	1.04
	RA-N 25	**013G0037**	1″ BSP	1″ BSP	0.10	1.04
Horizontal Angle	RA-N 10	**013G0151**	3/8″ BSP	3/8″BSP	0.04	0.56
	RA-N 15	**013G0153**	½″ BSP	½″ BSP	0.04	0.73
	RA-N 20	**013G0155**	¾″ BSP	¾″ BSP	0.16	0.80
Side Angle[4]	RA-N 10L	**013G0231**	3/8″ BSP	3/8″ BSP	0.04	0.56
	RA-N 10R	**013G0232**	3/8″ BSP	3/8″ BSP	0.04	0.56
	RA-N 15L	**013G2330**	½″ BSP	½″ BSP	0.04	0.73
	RA-N 15R	**013G0234**	½″ BSP	½″ BSP	0.04	0.73

(1) Kv value at Xp =2 when used with RA2000 sensors. *(2) To ensure optimum performance use remote sensor.*
(3) Refer to setting table supplied with valves to adjust Kv. *(4) L = Left, R = Right*

Technical Specifications	
Maximum Operating Temperature	120°C
Maximum Working Pressure	10 Bar
Maximum Differential Pressure	0.6 Bar

- RA-N valves with pre-setting for larger heating systems
- RA-N valves in flow
- RA-N valves are easily recognised by a red cover cap
- Available in vertical angle, horizontal angle, side angle and straight pattern versions in 3/8", 1/2", and 1" sizes

RA-N are uni-directional valves with integrated pre-setting. Pre-setting allows the commissioning engineer to precisely set the flow rate through the valve by adjusting the valve capacity to match the radiator heat output requirement.
Pre-setting is carried out by setting a calibrated orifice within the valve. The setting is achieved by turning a scale located in the top part of the valve body. The setting mechanism is concealed once the thermostat sensor is fitted. This type of pre-setting is significantly more accurate than that possible with conventional lockshield valves. When pre-setting valves are used the role of the lockshield valve is simply to provide isolation for radiator removal.

Pattern	Type	D	d_2 BSP	L_1	L_2	L_3	L_4	L_5	L_6	L_7*	L_8	L_9	L_{10}	Arc. Flats S1	Arc. Flats S2
Straight	RA-N 10	3/8″	3/8″	60	85				47	96				22	27
	RA-N 15	½″	½″	67	95				47	96				27	30
	RA-N 20	¾″	¾″	74	106				52	101				32	37
	RA-N 25	1″	1″	90	126				52	101				41	46
Vertical Angle	RA-N 10	3/8″	3/8″			27	52	22	47	96				22	27
	RA-N15	½″	½″			30	58	26	47	96				27	30
	RA-N 20	¾″	¾″			34	66	29	52	101				32	37
	RA-N 25	1″	1″			40	75	34	52	101				41	46
Horizontal Angle	RA-N 10	3/8″	3/8″						59	108	26	51	22	22	27
	RA-N 15	½″	½″						60	109	26	55	27	27	30
	RA-N 20	¾″	¾″						61	110	34	66	30	32	27
Side Angle	RA-N 10	3/8″	3/8″						47	103	27	52	27	22	27
	RA-N 15	½″	½″						47	96	30	58	33	27	30

** Add 32mm to L_7 to allow for sensor removal.*

RA-N 10 Guideline basis RA2000 sensor

ΔT(K) 10K	15K	20K	
~Watt			
100	200	250	1
250	400	550	2
400	650	850	3
650	1000	1350	4
900	1350	1800	5
1200	1800	2400	6
1350	2050	2750	7
2050	3050	4100	N

RA-N 15 Guideline basis RA2000 sensor

ΔT(K) 10K	15K	20K	
~Watt			
100	200	250	1
250	400	550	2
400	650	850	3
700	1100	1450	4
1100	1650	2150	5
11450	2150	2900	6
1850	2800	3700	7
2650	4000	5350	N

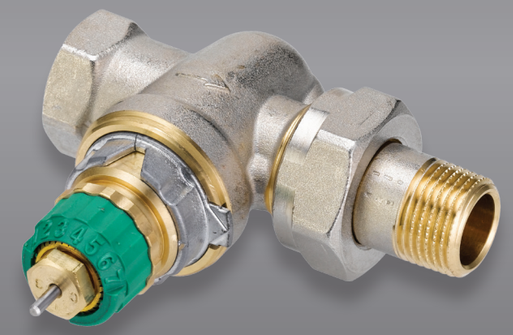
RA-N 20 Guideline basis RA2000 sensor

ΔT(K) 10K	15K	20K	
~Watt			
350	550	700	1
550	800	1100	2
600	900	1200	3
950	1400	1900	4
1250	1900	2550	5
1650	2500	3350	6
2650	4000	5350	7
3800	5700	7600	N

RA-N 20 UK Guideline basis RA2000 sensor

ΔT(K) 10K	15K	20K	
~Watt			
550	850	1150	1
700	1100	1450	2
900	1350	1800	3
1250	1900	2550	4
1700	2550	3400	5
2150	3250	4350	6
2650	4000	5350	7
2900	4350	5850	N

Pressure Independent Thermostatic Radiator Valve
RA-DV



- Fast consistent and comfortable heating
- Reduced system noise
- Reduced costs

Automatic balancing provides instant benefits under full and partial load conditions. It is quick and easy to achieve and is a one-off investment with a fast payback time.

Eliminating pressure fluctuations is the key to both successful balancing and removing the source of user complaints about over or under-heating, noise and excessive energy costs.

At the same time, the temperature control will benefit from the optimised system conditions, making room temperature more stable and precise.

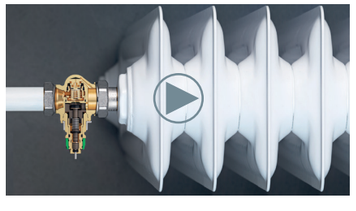
RA-DV valves are suitable for use with all **RA2000 sensors** (pages 12 and 13).

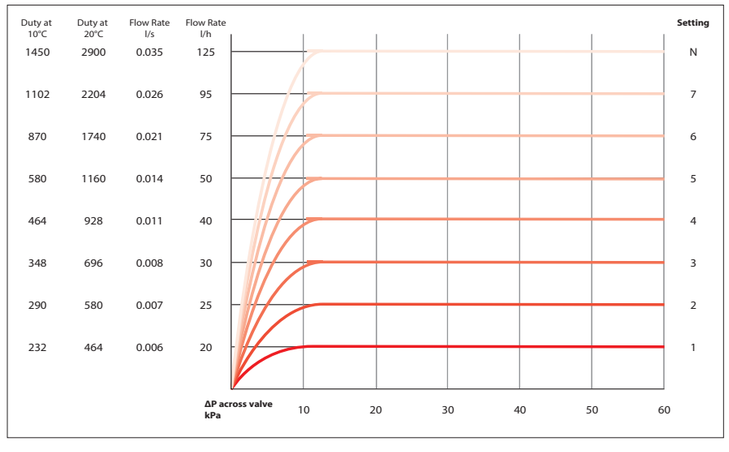
Please refer to page 19 for **fittings**.

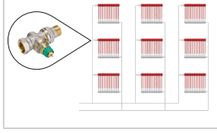
Description	Model	Version	Connection	Flow (l/h)*	Code Number
RA-DV 10	UK (Axial)	DIN	3/8″	25-125	**013G7709**
RA-DV 10	Angle	DIN	3/8″	25-125	**013G7721**
RA-DV 10	Straight	DIN	3/8″	25-125	**013G7722**
RA-DV 15	UK (Axial)	DIN	½″	25-125	**013G7710**
RA-DV 15	Angle	DIN	½″	25-125	**013G7723**
RA-DV 15	Straight	DIN	½″	25-125	**013G7724**
RA-DV 20	Angle	DIN	¾″	25-125	**013G7725**
RA-DV 20	Straight	DIN	¾″	25-125	**013G7726**

* 20-125 l/h including a gas filled RA2000 sensor

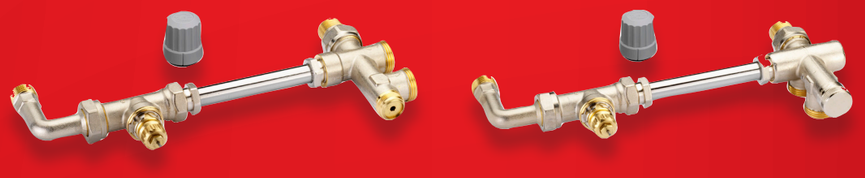
Description	Code Number
ΔP tool For simple verification of sufficient differential pressure and pump optimisation	**013G7855**





Solutions	Pressure	Radiator	System	Economy
Radiator fitted with RA-DV 	Max. differential pressure = 60 kPa	Max. flow = 13/h P = 3140 W at ΔT = 20K P = 4700 W at ΔT = 30K	• Best choice for complex riser designs • Best choice when main risers/ return pipes are difficult to access • Best choice when main riser/ return pipes are distant from each other	Best choice for risers with few radiators

Manifold Assemblies for 1-Pipe Systems
RA-KE for floor and RA-KEW for wall connection



Type	Description	Code Number
RA-KE Set	RA-KE set pack for florr connection incl. valve body with fittings and manifold valve	**013G3341**
RA-KEW Set	RA-KEW set pack for florr connection incl. valve body with fittings and manifold valve	**013G3343**
RA-KE	Manifold valve RA-KE for floor connection. Includes compression fittings for connection pipe	**013G3366**
RA-KEW	Manifold valve RA-KE for floor connection. Includes compression fittings for connection pipe	**013G3368**
Connection Pipe	Connection pipe L650 x 15mm	**013G3378**
	Connection pipe L950 x 15mm	**013G3377**
Technical Specifications		
Maximum Operating Temperature		120°C
Maximum Working Pressure		10 bar
Maximum Differential Pressure (1)		0.6 bar
(1) The maximum differential pressure specified is the maximum pressure at which the valves five satisafactory regulation.		

The RA-KE and RA-KEW manifold assemblies are versatile control units for all types of radiators with standard ½" side connections.

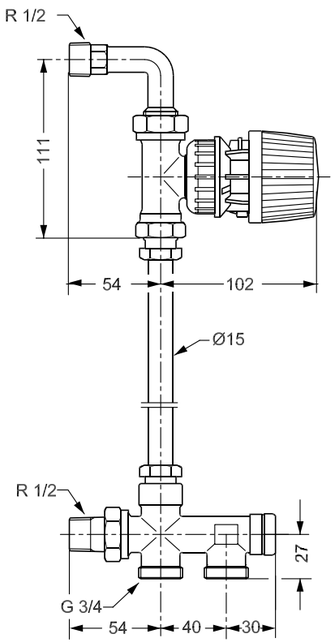
RA-KE and RA-KEW valves are for 1-pipe pumped systems.

The manifold assembly includes a manifold valve body with shut off facility, a connection pipe and a radiator valve body.

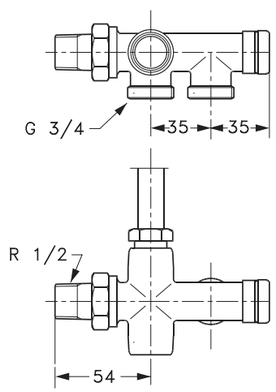
Danfoss manifold assemblies can be used with all RA 2000 sensors (pages 14 and 15) as well as thermal actuators, type TWA and ABNM.

Please refer to page 19 for **fittings**.

Dimensions



RA-KE
(Code: 013G3366)



RA-KEW
(Code: 013G3368)

Lance Valves for radiators with 1 connection point
RA 15/6TB and RA15/6T

The RA 15/6 valve bodies fit the RA 2000 thermostats (see pages 14 and 15) and the TWA thermal actuators.

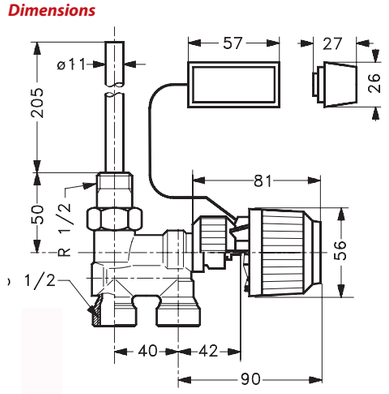
The RA 15/6 is a special lance valve body which allows the radiator to be connected at one point only, at the side of the radiator or underneath it as required.

RA 15/6TB is designed for conventional two-pipe systems with pumped circulation and the RA 15/6T is designed for conventional one-pipe systems with pumped circulation.

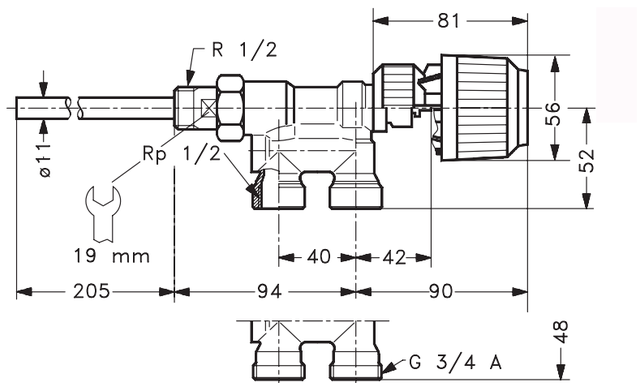
Please refer to page 19 for **fittings**.

Type	Description	Code Number
2-Pipe Systems		
RA 15/6TB floor	1/2" valve with internal 1/2" pipe connections from floor	**013G3210**
RA 15/6TB wall	1/2" valve with internal 1/2" pipe connections from wall	**013G3215**
1-Pipe Systems		
RA 15/6T floor	1/2" valve with internal 1/2" pipe connections from floor	**013G3368**
RA 15/6T wall	1/2" valve with internal 1/2" pipe connections from wall	**013G3378**
Technical Specifications		
Maximum Operating Temperature		120°C
Maximum Working Pressure		10 bar
Maximum Differential Pressure (1)		0.6 bar
(1) The maximum differential pressure specified is the maximum pressure at which the valves five satisafactory regulation.		

Dimensions

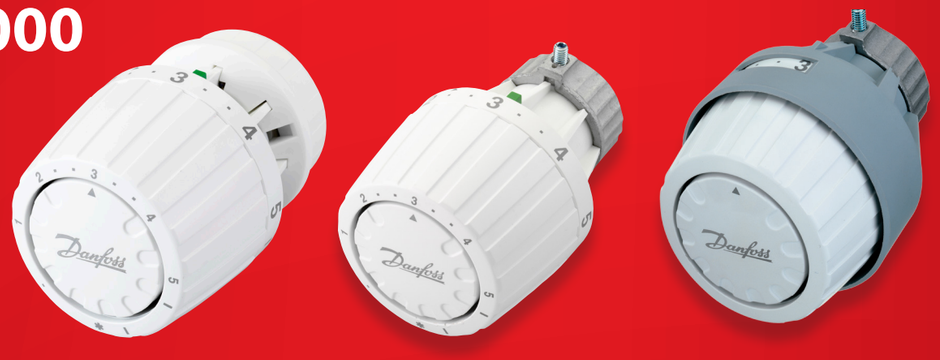


Floor Connection
1/2" and 3/4"



Side Connection
1/2" and 3/4"

Built-in Sensors
RA-2000



- RA2910 temperature range 5-26°C
- RA2920 tamperproof
- RA2990 tool free installation
- All models have locking and limiting feature
- Use with RA-DV, RA-N, RA-FN or RA-G valves

RA2000 sensors are high performance temperature sensors ideally suited for commercial applications. The temperature sensor uses frictionless bellows charged with a small volume of liquified gas.

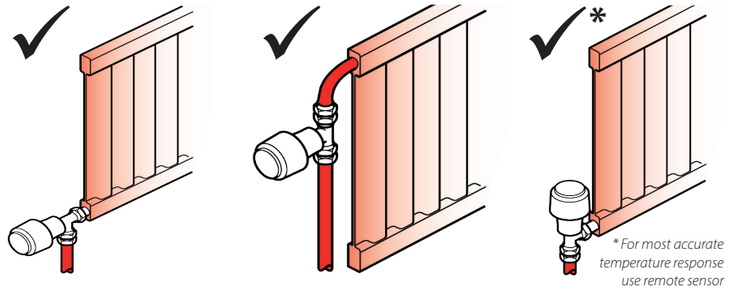
The sensor relies upon the state change from liquid to a gas as the temperature of the liquid increases to modulate the valve towards the closed position. When the temperature falls the gas condenses back to a liquid and the spring within the sensor allows the valve to modulate open until the bellows pressure and spring pressure are equal, and the valve cone is stationary.

This type of saturated vapour pressure sensor has many advantages including low thermal mass giving quick reaction times and a defined sensor location at coolest part of bellows system.

This latter feature gives the product a very low flow temperature dependence making it ideal for use in systems with weather compensated flow temperatures.

The range includes standard temperature range (5-26°C) and low temperature range (5-22°C) models. Both incorporate range locking and limiting features that allow the commissioning engineer to lock or limit the setting range of the sensor.

For best performance built-in temperature sensors should be mounted horizontally. Care should be taken not to cover the thermostat or to locate it where it may be influenced by heat from electrical appliances or cold draughts.

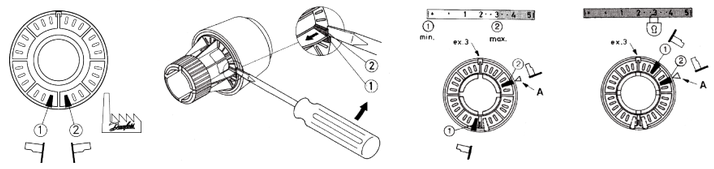


** For most accurate temperature response use remote sensor*

Type	Code No	Sensor (max. sensor temp 60°C)	Temp Range Xp = 2K
RA2910	**013G2910**	Built-in	5-26°C
RA2914	**013G2914**	Built-in, low temperature range model	5-22°C
RA2940 [1]	**013G2940**	Built-in, positive shut-off	5-26°C
RA2990 [1]	**013G2990**	Built-in	5-26°C
RA2920 [2]	**013G2920**	Tamperproof	5-26°C

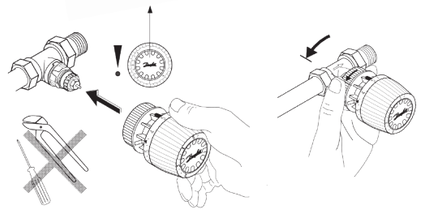
[1] Snap on coupling (Easy installation without the use of tools)
[2] Toolkit required

Locking and Limiting

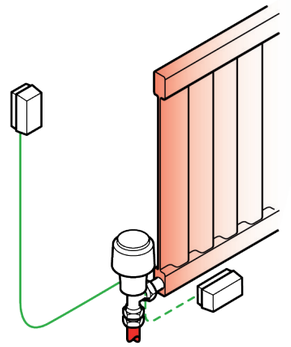


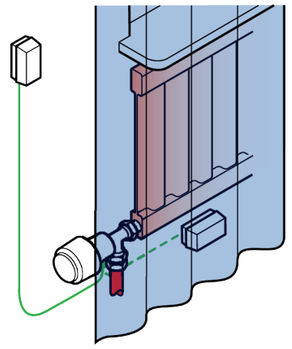
Standard Sensor Mounting

Snap Sensor Mounting



Remote Sensors and Adjusters
RA2000





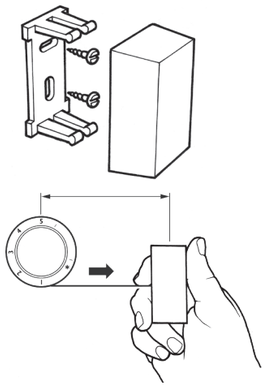
RA2000 Remote Sensors

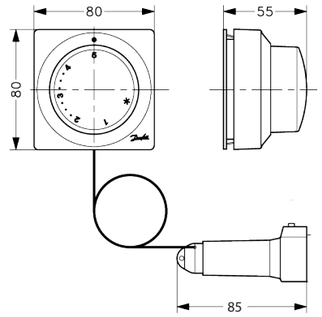
Type	Code No	Sensor (max sensor temp 60°C)	Temp Range Xp = 2K
RA2912	**013G2912**	Remote Sensor, 0-2m capillary tube	5-26°C
RA2992 [1]	**013G2992**	Remote Sensor, 0-2m capillary tube	5-26°C
RA2916	**013G2916**	Remote Sensor, 0-2m capillary tube	5-22°C
RA2922 [2]	**013G2922**	Remote Sensor, 0-2m capillary tube	5-26°C

[1] Snap on coupling (Easy installation without the use of tools)
[2] Toolkit required

RA2000 Remote Sensor Adjusters

Type	Code No	Sensor (max sensor temp 60°C)	Temp Range Xp = 2K
RA5062	**013G5062**	2m Capillary includes locking and limiting	8-28°C
RA5065	**013G5065**	5m Capillary includes locking and limiting	8-28°C
RA5068	**013G5068**	8m Capillary includes locking and limiting	8-28°C
RA5074	**013G5074**	2m Capillary includes locking and limiting	8-28°C
RA5075	**013G5075**	15m Capillary includes locking and limiting	8-28°C





- All models have locking and limiting
- Capillary can be adjusted between 0-2 metres on remote sensors
- Remote adjusters available
- Use with RA-DV, RA-N, RA-FN or RA-G valves

Utilising the same sensor technology as the built-in sensor, remote sensors are ideal for use in situations where built-in sensors may be adversely affected by heat gains or cold draughts.

Remote sensors comprise a setting unit that is mounted on the valve and a remote sensor which can be located up to 2 metres from the setting unit. The two components are interconnected by an ultra-thin capillary tube. During installation, the required length of tube is pulled out and fixed to the wall with clips or by staple gun.

The range includes standard (5-26°C) and low (5-22°C) temperature range models. Both incorporate range locking and limiting features that allow the commissioning engineer to lock or limit the setting range of the sensor.

The RA2000 range also includes versions that take both sensing and temperature adjustment away from the valve. These remote temperature adjusters are ideal for use in situations where radiators are encased or where the demand is to locate the temperature adjustment at a position more convenient than on the radiator e.g. in residential accommodation for the elderly. The product is also an ideal solution for heated ceiling applications.

The remote temperature adjuster models comprise an actuator that is mounted on the valve and a thermostat unit which provides temperature sensing and adjustment. These are interconnected by an ultra-thin capillary tube. During installation the required length of capillary is pulled out and fixed to the wall using clips or staples.

Lockshield Valves with Drain-Off

RLV

- Straight or angled versions
- Use in 1 or 2 pipe systems
- Maximum flow temperature 120°C
- Maximum working pressure 10 bar

The RLV range of lockshield valves match the finish and style of RA-G, RA-FN, RA-N and RA-DV valve bodies. They are available in vertical angle and straight pattern versions in 3/8", 1/2" and 3/4" sizes for screwed pipe-work and 15mm for copper pipe-work.

Adjustment of the valve is made using a 6mm Allen key. Once set, a screw-on brass cover conceals the valve setting mechanism.

In addition to providing a balancing and isolation function, RLV lockshield valves also incorporate a drain-down/filling feature. To utilise this feature a drain-off accessory is mounted to the valve in place of the decorative cap. The system can then be drained down or filled by connecting a hose to the drain down adapter.

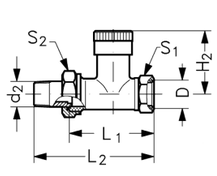
Pattern	Type	Code No	Connection Sizes	
			Pipe	Radiator
Vertical Angle	RLV 10	**003L0141**	3/8"	3/8"
	RLV 15	**003L0143**	½"	½"
	RLV 20	**003L0145**	¾"	¾"
Straight	RLV 10	**003L0142**	3/8"	3/8"
	RLV 15	**003L0144**	½"	½"
	RLV 20	**003L0146**	¾"	¾"

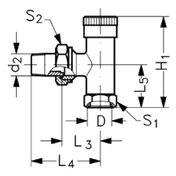
Drain-cock Adaptor and Compression Fittings for RLV Series Valves

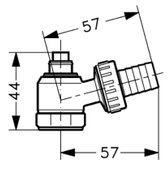
Code No	Description
003L0152	Drain-cock adaptor for use with RLV models only, not RLV-S

Specification	
Maximum working pressure	10 Bar
Maximum working temperature	120°C
Test pressure	16 Bar
Valve body finish	Nickel Plated
Gland seal type	Double O-ring
Supplied with LSV cap (nickel plated brass)	Yes
Supplied with wheel head cap	No

Dimensions

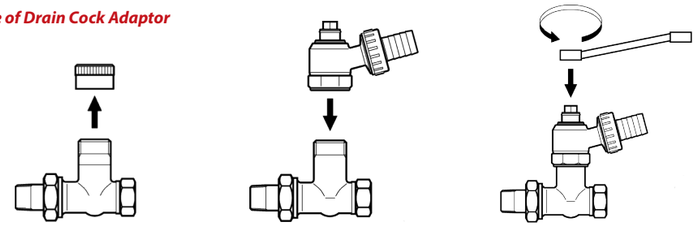






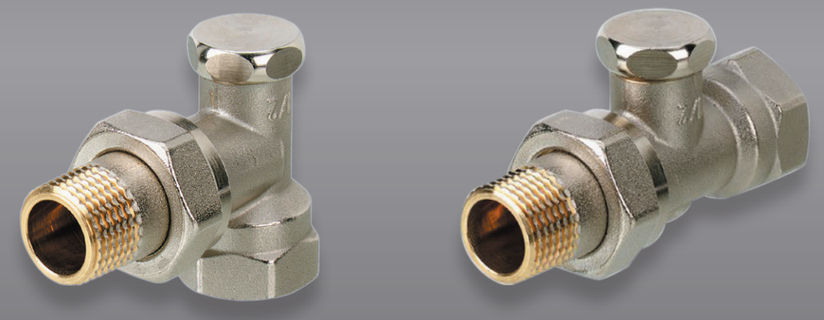
Type	D	d_2	H_1	H_2	L_1	L_2	L_3	L_4	L_5	S_1	S_2
RLV 10	R_p3/8	R_p3/8	55	40	49	75	26	52	22	22	27
RLV 15	R_p½	R_p½	59	40	51	80	29	58	27	27	30
RLV 20	R_p¾	R_p¾	62	42	59	91	34	66	30	32	37

Use of Drain Cock Adaptor



Lockshield Valves Without Drain-Off

RLV-S



Pattern	Type	Code No	Connection Sizes	
			Pipe	Radiator
Vertical Angle	RLV-S 10	**003L0121**	3/8"	3/8"
	RLV-S 15	**003L0123**	½"	½"
	RLV-S 20	**003L0125**	¾"	¾"
Straight	RLV-S 10	**003L0122**	3/8"	3/8"
	RLV-S 15	**003L0124**	½"	½"
	RLV-S 20	**003L0126**	¾"	¾"

- Straight or angled versions
- Use in 1 or 2-pipe systems
- Maximum flow temperature 120°C
- Maximum working pressure 10 bar

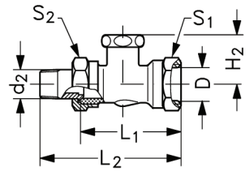
The RLV-S range of lockshield valves match the finish and style of RA-G, RA-FN, RA-N and RA-DV valve bodies. They are available in vertical angle and straight pattern versions in 3/8", 1/2" and 3/4" sizes for screwed pipe-work and 15mm for copper pipe-work.

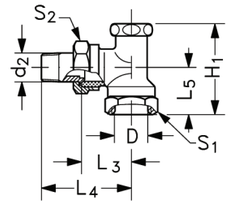
Adjustment of the valve is made using a 6mm Allen key. Once set, a screw-on brass cover conceals the valve setting mechanism.

The RLV-S does not incorporate a drain down feature.

Specification	
Maximum working pressure	10 Bar
Maximum working temperature	120°C
Test pressure	16 Bar
Valve body finish	Nickel Plated
Gland seal type	Double O-ring
Supplied with LSV cap (nickel plated brass)	Yes
Supplied with wheel head cap	No

Dimensions

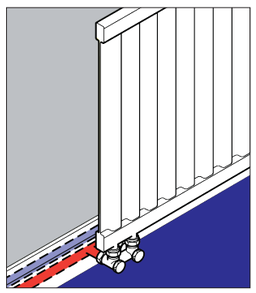


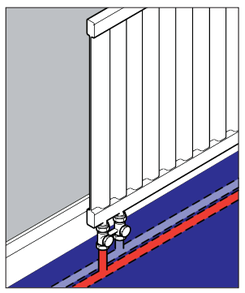


Type	D	d_2	H_1	H_2	L_1	L_2	L_3	L_4	L_5	S_1	S_2
RLV-S 10	G_p3/8	R_p3/8	42	26	51	75	27	51	23	22	27
RLV-S 15	G_p½	R_p½	52	28	53	80	30	57	27	27	30
RLV-S 20	G_p¾	R_p¾	52	28	61	92	34	65	30	32	37

H-Pieces with Drain-off feature

RLV-K





- Lockshield valve function
- Use in 2-pipe systems
- Straight or angled versions
- Self sealing radiator connection
- Maximum flow temperature 120°C
- Maximum working pressure 10 bar

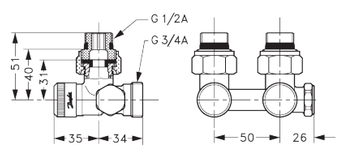
RLV-K H-Pieces allow system radiators with 50mm centre connections to be conveniently connected to copper, PEX or ALUPEX pipe systems. Radiator connections are normally either ½" internal or ¾" external threads and special adaptors ensure that the H-Piece valve can be used with either connection size.

RLV-K H-Pieces provide isolation of both flow and return connections essential for radiator removal. The valves are available for both bottom entry or rear entry pipe-work.

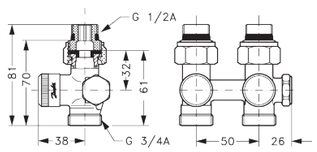
RLV-K incorporates a drain down facility.

RLV-K H-Pieces without drain facility [1]	
Code No	**Description**
003L0280	Bottom connection for use with radiators having ½" internal connections
003L0282	Back connection for use with radiators having ½" internal connections
003L0281	Bottom connection for use with radiators having ¾" external connections
003L0283	Back connections for use with radiators having ¾" external connections
003L0399	Adapter
Please note: (1) order pipe fittings separately, see page 19	

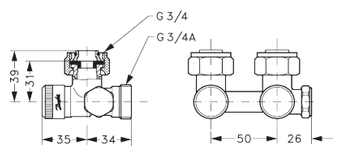
Dimensions



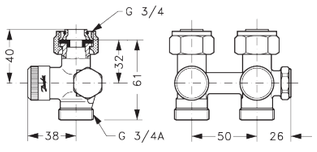
RLV-K bottom connection, ½" internal connection



RLV-K back connection, ½" internal connection



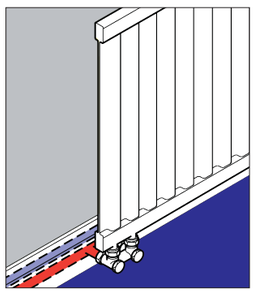
RLV-K bottom connection, ¾" internal connection

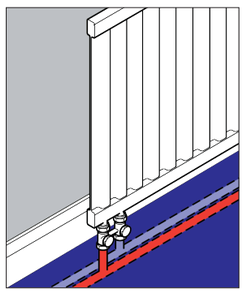


RLV-K back connection, ¾" internal connection

H-Pieces without Drain Off

RLV-KB





- Lockshield valve function
- Use in 2-pipe systems
- Straight or angled versions
- Self sealing radiator connection
- Maximum flow temperature 120°C
- Maximum working pressure 10 bar

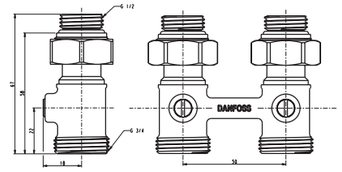
RLV-KB H-Pieces allow system radiators with 50mm centre connections to be conveniently connected to copper, PEX or ALUPEX pipe systems. Radiator connections are normally either ½" internal or ¾" external threads and special adaptors ensure that the H-Piece valve can be used with either connection size.

RLV-KB H-Pieces provide isolation of both flow and return connections essential for radiator removal. The valves are available for both bottom entry or rear entry pipe-work.

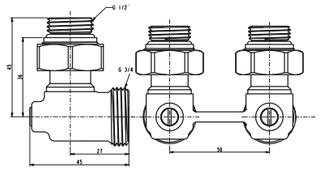
RLV-KB does not provide a drain down facility.

RLV-KB H-Pieces without drain facility [1]	
Code No	**Description**
003L0392	Bottom connection for use with radiators having ½" internal connections
003L0394	Back connection for use with radiators having ½" internal connections
003L0391	Bottom connection for use with radiators having ¾" external connections
003L0393	Back connections for use with radiators having ¾" external connections
003L0399	Adapter
Please note: (1) order pipe fittings separately, see page 19	

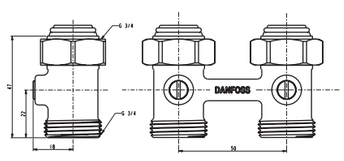
Dimensions



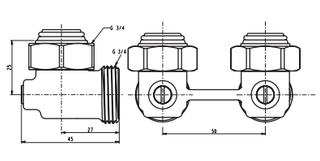
RLV-KB bottom connection, ½" internal connection



RLV-KB back connection, ½" internal connection



RLV-KB bottom connection, ¾" internal connection



RLV-KB back connection, ¾" internal connection

Spare Parts and Accessories
Gland Seals, Sensors and Adapters

Gland Seal
- Just two gland seals cover the whole range of Danfoss valves
- Can be replaced without draining down the system

Replacement Sensor
- Allows easy up-grade of old valves without the need to drain down
- Versions available for RAVL and RAV valve bodies
- Available in built-in and remote sensor versions

Gland Seals
All gland seals in Danfoss radiator thermostats are designed to provide a long and trouble free in-service life. However, periodically it may be necessary to replace seals should failure occur.

All valves produced by Danfoss since early 1960s incorporate gland seal assemblies which can be replaced without draining down the system.

Valve Adaptor
Adaptors to convert RA2000 remote temperature adjusters for use with RAV and RAVL bodies already installed.

Manual Positive Shut-Off Dial
The RA manual positive shut-off dial fits onto all valve bodies in the RA Series and can be used for manual opening and closing of the valve.

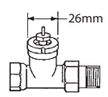
Replacement Sensors
Replacement sensors incorporate RA2000 sensor technology and design, and provide a simple and straight forward way to upgrade older radiator thermostats without the need to drain down the system.

Gland Seals	
013G0290	Gland Seal Assembly for RA-FR, RA-FN, RA-N, RA-DV and RA-G Valves
013U0070	Gland Seal Assembly for RAV and RAVL Valves
Accessories for RA2000 Sensors and Valves	
013G1232	Anti-Theft for Sensors (50 pieces)
013G1237	Threaded Range Limiting pins (30 pieces)
013G1233	RA2020 Scale Cover (20 pieces)
013G1350	90° Angle adaptor for 'Click' Sensors
013G5245	Anti-theft kit for 'Click' sensors
Accessories for RA2000 Remote Adjusters	
013G5193	Adaptor for RA5062, 5065 and 5068 for RAV Valves
013G5192	Adaptor for RA5062, 5065 and 5068 for RAVL Valves

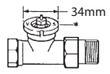
Accessories for RA-DV, RA-FN, RA-N & RA-G Valves					
Code No	**Description**	**RA-DV**	**RA-FN**	**RA-N**	**RA-G**
013G5001	Blanking Cap for Valve Outlet	•			
013G0275	Spare Protective Cap	•	•	•	•
013G5002	RA Hand Wheel	•	•	•	•

Selecting a suitable replacement sensor

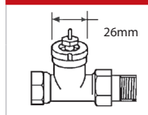
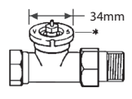
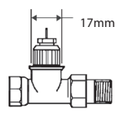
RAVL thermostats are replaced by RA/VL



RAV thermostats are replaced by RA/V



RA2000 Replacement Sensors and Gland Seals

Existing Valve Body Dimensions	**Existing Valve Body Type**	**Replacement Sensor - please note: the Code No's have changed**				
		New Code No	**Old Code No**	**Sensor Type**	**Description**	**Temp Range (Xp = 2k)**
	RAVL	013G2950	013G2210	RA/VL	Built-In Sensor	5 - 26°C
		013G2952	013G2212	RA/VL	Remote Sensor 2m Capillary	
	RAV	013G2960	013G2310	RA/V	Built-In Sensor	5 - 26°C
		013G2962	013G2312	RA/V	Remote Sensor 2m Capillary	
	RA-FN RA-G RA-N	Refer to RA2000 Sensors on p. 10-11				

Compression Fittings
For Copper, PEX and ALUPEX Pipe

For Valves with Female Threaded Connections	
Compression Fittings for:	**RA-FN, RA-N, RA-DV** Radiator Thermostat Valve Bodies, **RLV** and **RLV-S** Lockshield Valve Bodies
Pipe Type:	**Copper**
013G4100	3/8" x 10mm
013G4102	3/8" x 12mm
013G4110	1/2" x 10mm
013G4112	1/2" x 12mm
013G4115	1/2" x 15mm
Pipe Type:	**PEX**
013G4144	1/2" x 14 x 2.0mm
013G4147	1/2" x 15 x 2.5mm
Pipe Type:	**ALUPEX**
013G4174	1/2" x 14 x 2mm
Please note: Copper pipe must be in accordance with BS2871 part 1/BSEN1057. It is recommended to use supporting bushes with soft copper pipes. PEX pipe must be in accordance with DIN16892/16893 or BS7291 part 1:1990 or part 3:1990. Maximum operating pressure and temperature are given by the pipe manufacturer. However, 6 bar and 95°C must not be exceeded.	
Design: For use with valves having a female threaded connection. Fitting comprises olive and externally threaded compression nut, dimension of female thread is included in the description. For PEX and ALUPEX a pipe support insert is also included.	

For Valves with Male Threaded Connections	
Compression Fittings for:	**RA-KE, RA-KEW, RLV-S RLV-K and RLV-KB**
Pipe Type:	**Copper**
013G4120	3/4" x 10mm
013G4122	3/4" x 12mm
013G4125	3/4" x 15mm
Pipe Type:	**PEX**
013G4155	3/4" x 15mm x 2.5mm
013G4156	3/4" x 16mm x 2.0mm
013G4157	3/4" x 16mm x 1.5mm
013G4163	3/4" x 16mm x 2.2mm
013G4159	3/4" x 18mm x 2.5 mm
013G4160	3/4" x 20mm x 2.0mm
013G4161	3/4" x 20mm x 2.5mm
Pipe Type:	**ALUPEX**
013G4184	3/4" x 14mm x 2.0mm
013G4186	3/4" x 16mm x 2.0mm
013G4188	3/4" x 18mm x 2.0mm
013G4190	3/4" x 20mm x 2.0mm
Please note: Copper pipe must be in accordance with BS2871 part1/BSEN1057. It is recommended to use supporting bushes with soft copper pipes. PEX pipe must be in accordance with DIN16892/16893 or BS7291 part 1:1990 or part 3:1990. Maximum operating pressure and temperature are given by the pipe manufacturer. However, 6 bar and 95°C must not be exceeded.	
Design: For use with valves having a 3/4" male threaded connection. Fitting comprises olive and internally threaded compression nut. For PEX and ALUPEX a pipe support insert is also included.	

ENGINEERING
TOMORROW

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