

ENGINEERING  
TOMORROW

*Danfoss*

# Commercial

## Product Selection Guide

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# Thermostatic Radiator Valves

## Contents

Danfoss are world leaders in the design and manufacture of radiator thermostats. Having invented the concept in 1943 Danfoss have, in the ensuing years, gone on to develop and manufacture numerous generations of radiator thermostats, offering ever improved performance.

The knowledge and experience of radiator thermostats possessed by Danfoss is unsurpassed, bringing together more than half a century of design, manufacturing and application knowledge that is second to none.

The rapid growth in the sale of radiator thermostats has, to a large extent, been down to the simplicity of the products, in terms of application and ease of use. Generally the more sophisticated the design, the more energy efficient and reliable the product is and Danfoss are at the top of the list when it comes to energy efficiency and reliability.

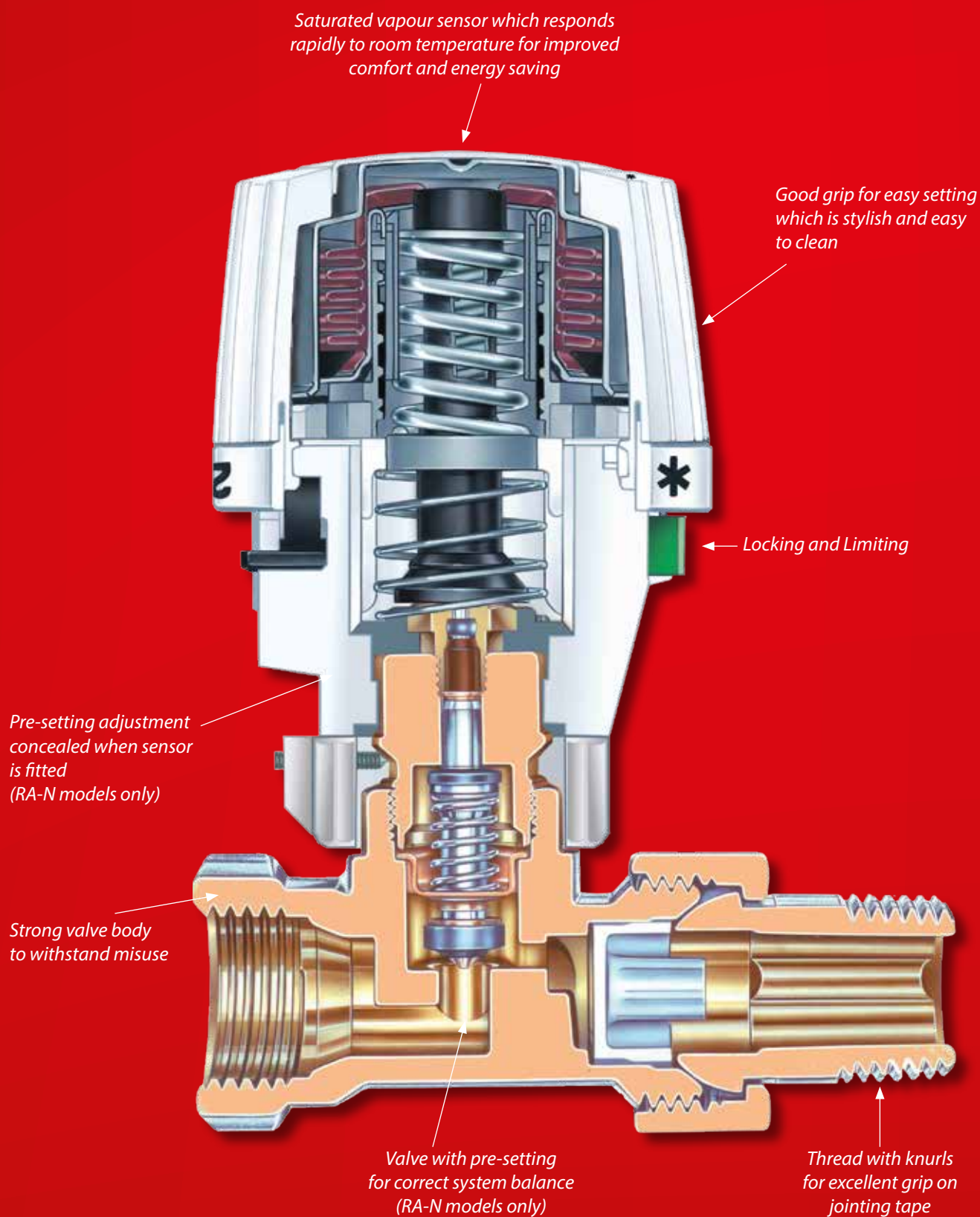
The need for high performance is never greater than in the demanding commercial heating market. In addition to expectations of high performance, specifiers and building owners also expect products which can withstand inevitable heavy handling and, in some cases misuse, plus be long lasting into the bargain.

The Danfoss RA2000 range is based on a saturated vapour sensor to provide the ultimate in control performance. The reason for this much improved performance is the well defined sensor location, and the small mass of the gas charge (saturated vapour) compared to other types (e.g. liquid or wax).

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# Working Principle





# 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:

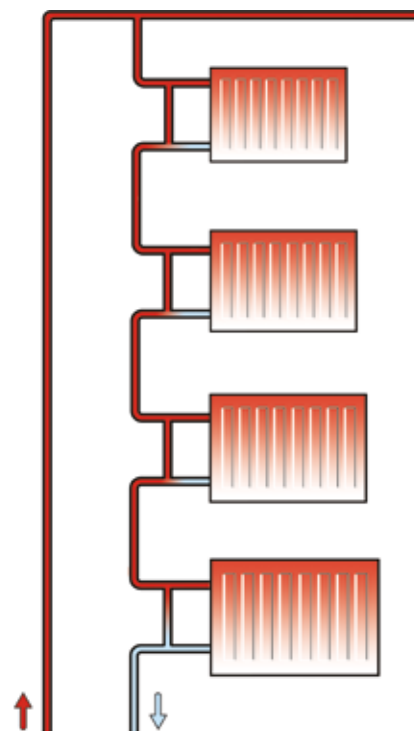
## Single Pipe System

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.

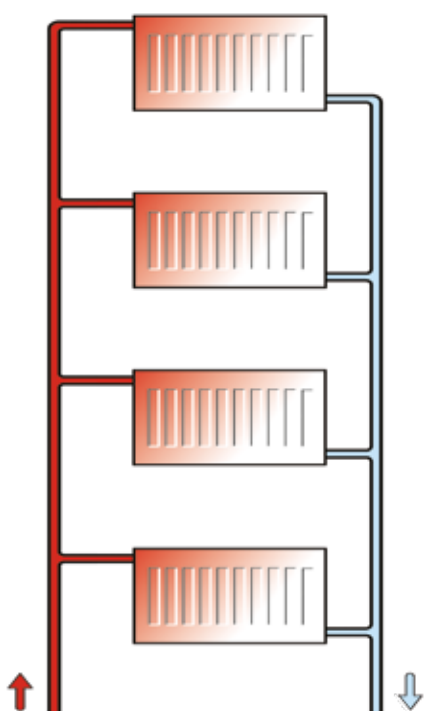


## Two Pipe System

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 body flow selector must be commissioned

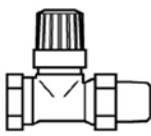
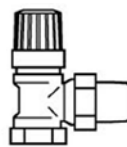
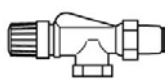
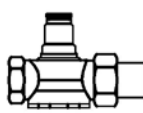
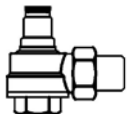
## Description

## Model

## Codes

## Temperature Range

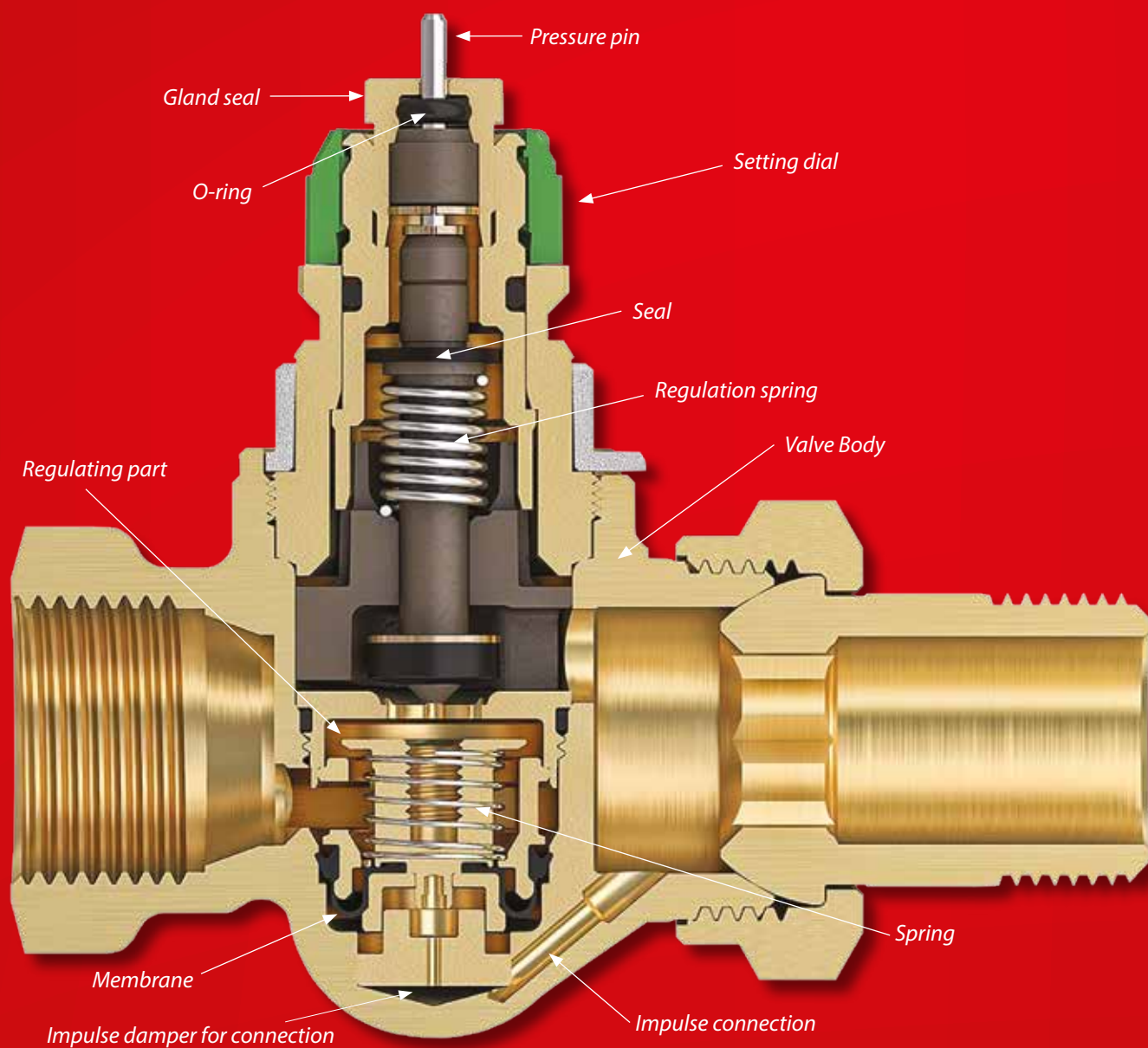
## Valve Options

			Size	Dynamic Valves		Standard Valves		Valves with pre-setting	
				Type	Code	Type	Code No.	Type	Code No.
2-Pipe System	Straight		8/10mm	-	-	RA-FS 15	<b>013G628300</b>	-	-
			15mm	-	-	RA-FS 15	<b>013G628100</b>	-	-
			½"	RA-DV 15	<b>013G772400</b>	RA-FN 15	<b>013G002400</b>	RA-N 15	<b>013G003400</b>
			½" / 15mm	-	-	RA-FN 15	<b>013G008400</b>	RA-N 15	<b>013G0034AA</b>
			¾"	-	-	RA-FN 20	<b>013G002600</b>	RA-N 20	<b>013G003600</b>
			1"	-	-	RA-FN 25	<b>013G002800</b>	RA-N 25	<b>013G003800</b>
			¾"	RA-DV 10	<b>013G772200</b>	RA-FN 10	<b>013G002200</b>	RA-N 10	<b>013G003200</b>
	Vertical Angle		½"	RA-DV 15	<b>013G772300</b>	RA-FN 15	<b>013G002300</b>	RA-N 15	<b>013G003300</b>
			½" / 15mm	-	-	RA-FN 15	<b>013G0023AA</b>	RA-N 15	<b>013G0033AA</b>
			¾"	-	-	RA-FN 20	<b>013G002500</b>	RA-N 20	<b>013G003500</b>
			1"	-	-	RA-FN 25	<b>013G002700</b>	RA-N 25	<b>013G003700</b>
			¾"	RA-DV 10	<b>013G772100</b>	RA-FN 10	<b>013G002100</b>	RA-N 10	<b>013G003100</b>
	Horizontal Angle		½" / 15mm	-	-	RA-FN 15	<b>013G014900</b>	RA-N 15	<b>013G0153AA</b>
			¾"	-	-	RA-FN 20	<b>013G014500</b>	RA-N 20	<b>013G015500</b>
			¾"	-	-	RA-FN 10	<b>013G014100</b>	RA-N 10	<b>013G015100</b>
1-Pipe System	Straight		½"	-	-	RA-G 15	<b>013G167500</b>	-	-
			¾"	-	-	RA-G 20	<b>013G167700</b>	-	-
			1"	-	-	RA-G 25	<b>013G167900</b>	-	-
	Vertical Angle		½"	-	-	RA-G 15	<b>013G167600</b>	-	-
			¾"	-	-	RA-G 20	<b>013G167800</b>	-	-
			1"	-	-	RA-G 25	<b>013G168000</b>	-	-



	Built-in Sensors			Remote Sensors (0-2m)			2/5/8m Wall Adjusters
	Standard	Low Temp.	Tamperproof	Standard	Low Temp.	Tamperproof	
							
	RA2910	RA2914	RA2920	RA2912	RA2916	RA2922	RA5062 RA5065 RA5068 RA5075
	<b>013G291000</b>	<b>013G291400</b>	<b>013G292000</b>	<b>013G291200</b>	<b>013G291600</b>	<b>013G292200</b>	<b>013G506200</b> <b>013G506500</b> <b>013G506800</b> <b>013G507500</b>
	5-26°C	5-22°C	5-26°C	5-26°C	5-22°C	5-26°C	6-28°C
	<b>Sensor Options</b>						
	4 ★	4 ★	4 ★	4 ★	4 ★	4 ★	4 ★
	1 ★	1 ★	1 ★	★	★	★	★
	2 ★	3 ★	2 ★	★	★	★	★
	★	★	★	★	★	★	★
	1 ★	1 ★	1 ★	★	★	★	★
	2 ★	3 ★	2 ★	★	★	★	★

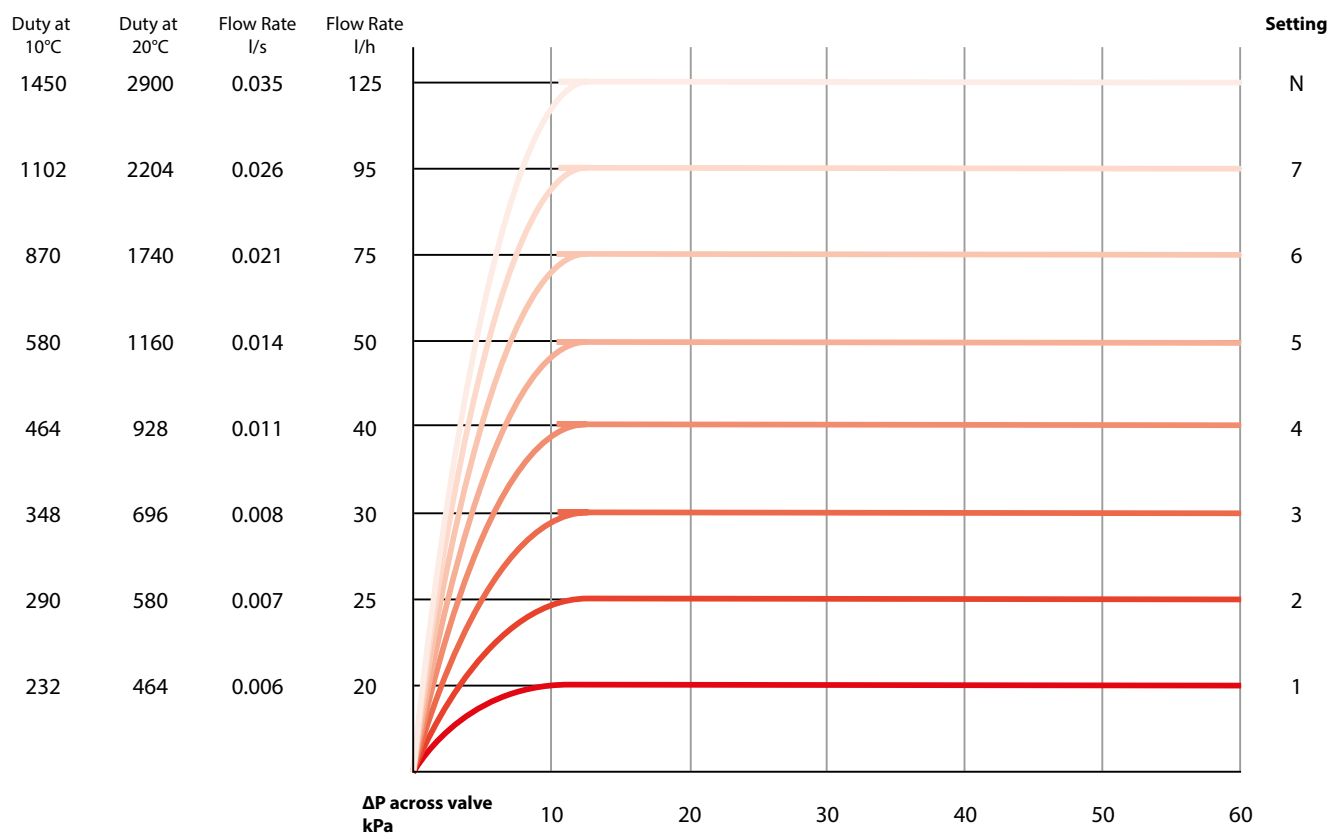
# Working Principle **RA-DV**





# Selection Guide

## RA-DV



# 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 and may also be used with RAS-D<sup>2</sup> and RAS-C<sup>2</sup> sensors. Please refer to our technical department for capacity information if using RAS-D<sup>2</sup> or RAS-C<sup>2</sup> sensors.

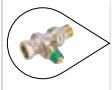




Please refer to page 23 for fittings.

Description	Model	Version	Connection	Flow (l/h)*	Code Number
RA-DV 10	Angle	DIN	3/8"	25-125	<b>013G772100</b>
RA-DV 10	Straight	DIN	3/8"	25-125	<b>013G772200</b>
RA-DV 15	Angle	DIN	1/2"	25-125	<b>013G772300</b>
RA-DV 15	Straight	DIN	1/2"	25-125	<b>013G772400</b>

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

Description	Code Number
<b>Pre-setting tool</b> For easy pre-setting of a Dynamic Valve	<b>013G783000</b>

Description	Code Number
<b>ΔP tool</b> For simple verification of sufficient differential pressure and pump optimisation	<b>013G785500</b>

Solutions	Pressure	Radiator	System	Economy
<b>Radiator fitted with RA-DV</b> 	 Max. differential pressure = 60 kPa	 Max. flow = 125 l/h P = 3140 W at ΔT = 20K P = 4700 W at ΔT = 30K	 <ul style="list-style-type: none"> <li>• Best choice for complex riser designs</li> <li>• Best choice when main risers/return pipes are difficult to access</li> <li>• Best choice when main riser/return pipes are distant from each other</li> </ul>	 Best choice for risers with few radiators



# Fixed Capacity Valve Bodies

## RA-FN Valves for 2-Pipe Systems



Pattern	Type	Code No	Connections		Kv Value $X_p = 2K^{(2)}$
			Pipe	Radiator Tail	
Straight	RA-FN 10	013G002200	$\frac{3}{8}$ " BSP	$\frac{3}{8}$ " BSP	0.56
	RA-FN 15	013G002400	$\frac{1}{2}$ " BSP	$\frac{1}{2}$ " BSP	0.73
	RA-FN 15	013G008400	15mm or $\frac{1}{2}$ " BSP	$\frac{1}{2}$ " BSP	0.73
	RA-FN 20	013G002600	$\frac{3}{4}$ " BSP	$\frac{3}{4}$ " BSP	1.04
	RA-FN 25	013G002800	1" BSP	1" BSP	1.04
Vertical Angle <sup>(1)</sup>	RA-FN 10	013G002100	$\frac{3}{8}$ " BSP	$\frac{3}{8}$ " BSP	0.56
	RA-FN 15	013G002300	$\frac{1}{2}$ " BSP	$\frac{1}{2}$ " BSP	0.73
	RA-FN 15	013G0023AA	15mm or $\frac{1}{2}$ " BSP	$\frac{1}{2}$ " BSP	0.73
	RA-FN 20	013G002500	$\frac{3}{4}$ " BSP	$\frac{3}{4}$ " BSP	1.04
	RA-FN 25	013G002700	1" BSP	1" BSP	1.04
Horizontal Angle	RA-FN 10	013G014100	$\frac{3}{8}$ " BSP	$\frac{3}{8}$ " BSP	0.56
	RA-FN 15 UK	013G014900	15mm or $\frac{1}{2}$ " BSP	$\frac{1}{2}$ " BSP	0.73
	RA-FN 20	013G014500	$\frac{3}{4}$ " BSP	$\frac{3}{4}$ " 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

- RA-FN valves without pre-setting
- RA-FN valves are easily recognised by a grey cover cap
- May also be used with RAS-D<sup>2</sup> and RAS-C<sup>2</sup> sensors (RA-FN only)
- Wide range of fittings (see page 23)

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 20 and 21 for matching lockshield valves.

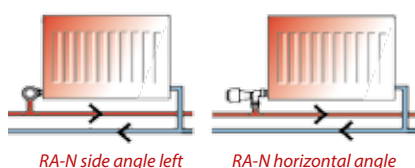
A wide range of compression fittings for copper, PEX and ALUPLEX pipe are available for use with RA-FN valves, see page 23.

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

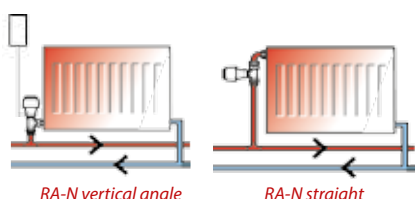
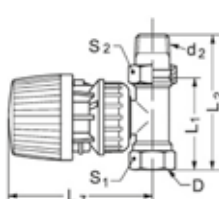
RA-FN valves are suitable for use with all RA2000 sensors and may also be used with RAS-D<sup>2</sup> and RAS-C<sup>2</sup> sensors. Please refer to our technical department for capacity information if using RAS-D<sup>2</sup> or RAS-C<sup>2</sup> sensors.

Pattern	Type	D d <sub>2</sub> BSP		L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub> *	L <sub>8</sub>	L <sub>9</sub>	L <sub>10</sub>	L <sub>11</sub>	Arc. Flats	
															S <sub>1</sub>	S <sub>2</sub>
Straight	RA-FN 10	$\frac{3}{8}$ "	$\frac{3}{8}$ "	60	85				47	96					22	27
	RA-FN 15	$\frac{1}{2}$ "	$\frac{1}{2}$ "	67	95				47	96					27	30
	RA-FN 20	$\frac{3}{4}$ "	$\frac{3}{4}$ "	74	106				52	101					32	37
	RA-FN 25	1"	1"	90	126				52	101					41	46
Vertical Angle	RA-FN 10	$\frac{3}{8}$ "	$\frac{3}{8}$ "			27	52	22	47	96					22	27
	RA-FN 15	$\frac{1}{2}$ "	$\frac{1}{2}$ "			30	58	26	47	96					27	30
	RA-FN 20	$\frac{3}{4}$ "	$\frac{3}{4}$ "			34	66	29	52	101					32	37
	RA-FN 25	1"	1"			40	75	34	52	101					41	46
Horizontal Angle	RA-FN 10	$\frac{3}{8}$ "	$\frac{3}{8}$ "						59	108	26	51	22		22	27
	RA-FN 15 UK	$\frac{1}{2}$ "	$\frac{1}{2}$ "						60	98	26	54	33	44	27	30
	RA-FN 20	$\frac{3}{4}$ "	$\frac{3}{4}$ "						61	110	34	66	30		32	27

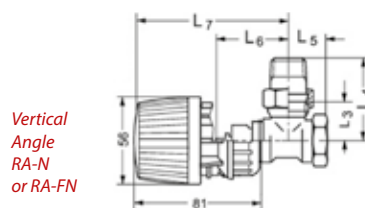
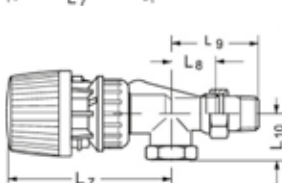
\* Add 32mm to L<sub>7</sub>, to allow for sensor removal.



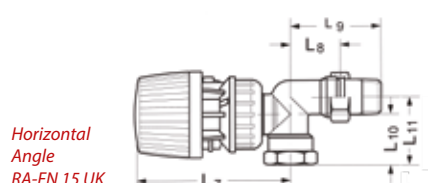
Straight  
RA-N or RA-FN



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



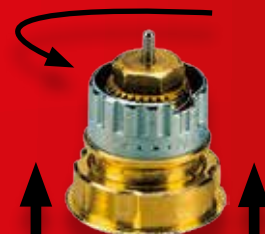
Vertical Angle  
RA-N or RA-FN



Horizontal Angle  
RA-FN 15 UK

# Pre-Setting Valve Bodies



## RA-N Valves for 2-Pipe Systems





- 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.

$\Delta p = 10 \text{ kPa}$

RA-N 10					RA-N 15				
Guideline basis RA2000 sensor					Guideline basis RA2000 sensor				
$\Delta T(K)$					$\Delta T(K)$				
10K	15K	20K			10K	15K	20K		
~Watt					~Watt				
100	200	250	1		100	200	250	1	
250	400	550	2		250	400	550	2	
400	650	850	3		400	650	850	3	
650	1000	1350	4		700	1100	1450	4	
900	1350	1800	5		1100	1650	2150	5	
1200	1800	2400	6		11450	2150	2900	6	
1350	2050	2750	7		1850	2800	3700	7	
2050	3050	4100	N		2650	4000	5350	N	

RA-N 20					RA-N 20 UK				
Guideline basis RA2000 sensor					Guideline basis RA2000 sensor				
$\Delta T(K)$					$\Delta T(K)$				
10K	15K	20K			10K	15K	20K		
~Watt					~Watt				
350	550	700	1		550	850	1150	1	
550	800	1100	2		700	1100	1450	2	
600	900	1200	3		900	1350	1800	3	
950	1400	1900	4		1250	1900	2550	4	
1250	1900	2550	5		1700	2550	3400	5	
1650	2500	3350	6		2150	3250	4350	6	
2650	4000	5350	7		2650	4000	5350	7	
3800	5700	7600	N		2900	4350	5850	N	

Pattern	Type	Code No	Connections		Kv Value <sup>(1) (3)</sup> Xp = 2K	
			Pipe	Radiator Tail	Min	Max
Straight	RA-N 10	013G003200	3/8" BSP	3/8" BSP	0.04	0.56
	RA-N 15	013G003400	1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 15	013G0034AA	15mm or 1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 20	013G003600	3/4" BSP	3/4" BSP	0.10	1.04
	RA-N 25	013G003800	1" BSP	1" BSP	0.10	1.04
Vertical Angle <sup>(2)</sup>	RA-N 10	013G003100	3/8" BSP	3/8" BSP	0.04	0.56
	RA-N 15	013G003300	1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 15	013G0033AA	15mm or 1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 20	013G003500	3/4" BSP	3/4" BSP	0.10	1.04
	RA-N 25	013G003700	1" BSP	1" BSP	0.10	1.04
Horizontal Angle	RA-N 10	013G015100	3/8" BSP	3/8" BSP	0.04	0.56
	RA-N 15	013G015300	1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 15	013G0153AA	15mm or 1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 20	013G015500	3/4" BSP	3/4" BSP	0.16	0.80
	RA-N 10L	013G023100	3/8" BSP	3/8" BSP	0.04	0.56
Side Angle <sup>(4)</sup>	RA-N 10R	013G023200	3/8" BSP	3/8" BSP	0.04	0.56
	RA-N 15L	013G0233000	1/2" BSP	1/2" BSP	0.04	0.73
	RA-N 15R	013G023400	1/2" BSP	1/2" 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

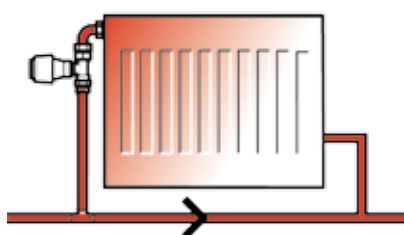
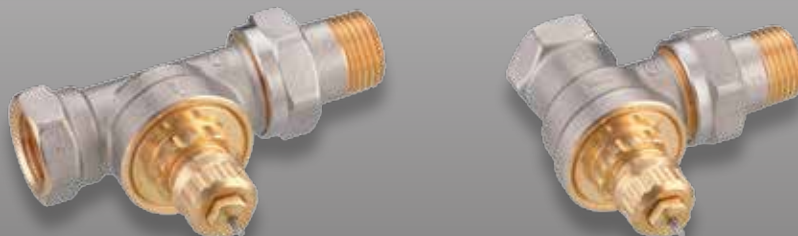
Maximum Operating Temperature	120°C
Maximum Working Pressure	10 Bar
Maximum Differential Pressure	0.6 Bar

Pattern	Type	D d <sub>2</sub> BSP	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub> *	L <sub>8</sub>	L <sub>9</sub>	L <sub>10</sub>	Arc. Flats	
													S <sub>1</sub>	S <sub>2</sub>
Straight	RA-N 10	3/8"	3/8"	60	85				47	96			22	27
	RA-N 15	1/2"	1/2"	67	95				47	96			27	30
	RA-N 20	3/4"	3/4"	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-N 15	1/2"	1/2"			30	58	26	47	96			27	30
	RA-N 20	3/4"	3/4"			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	27
	RA-N 15	1/2"	1/2"						60	109	26	55	27	30
	RA-N 20	3/4"	3/4"						61	110	34	66	30	32
Side Angle	RA-N 10	3/8"	3/8"						47	103	27	52	27	27
	RA-N 15	1/2"	1/2"						47	96	30	58	33	30

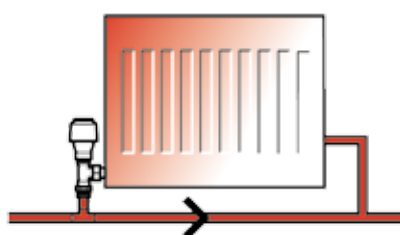
\* Add 32mm to L<sub>7</sub> to allow for sensor removal.

# Valves for 1-Pipe Systems

## RA-G



RA-G straight



RA-G vertical angle

- RA-G valves in flow
- Suitable for use with all RA2000 sensors
- Available in both vertical angle and straight pattern designs in 1/2", 3/4" 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.

Pattern	Type	Code No	Connections		Kv Value $X_p = 2K^{(2)}$
			Pipe <sup>(3)</sup>	Radiator Tail	
Straight	RA-G 15	<b>013G167500</b>	1/2" BSP	1/2" BSP	1.63
	RA-G 20	<b>013G167700</b>	3/4" BSP	3/4" BSP	2.06
	RA-G 25	<b>013G167900</b>	1" BSP	1" BSP	2.27
Vertical Angle <sup>(1)</sup>	RA-G 15	<b>013G167600</b>	1/2" BSP	1/2" BSP	2.06
	RA-G 20	<b>013G167800</b>	3/4" BSP	3/4" BSP	2.20
	RA-G 25	<b>013G168000</b>	1" BSP	1" BSP	2.41

Please note:

(1) To ensure optimum performance use remote sensor

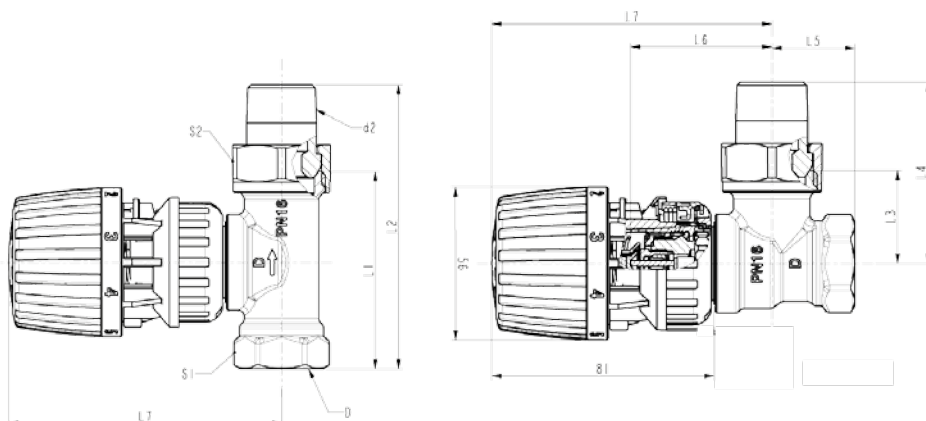
(2) Kv values when used with RA2000 Sensors

(3) Not suitable for use with Fittings listed on page 23

### 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 <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>	S <sub>1</sub>	S <sub>2</sub>
RA-G 15	15	1/2"	1/2"	68	96	30	58	27	52	103	27	30
RA-G 20	20	3/4"	3/4"	74	106	34	66	30	54	103	32	37
RA-G 25	25	1"	1"	90	126	42	78	34	57	106	41	46





# Combi Packs RA2000

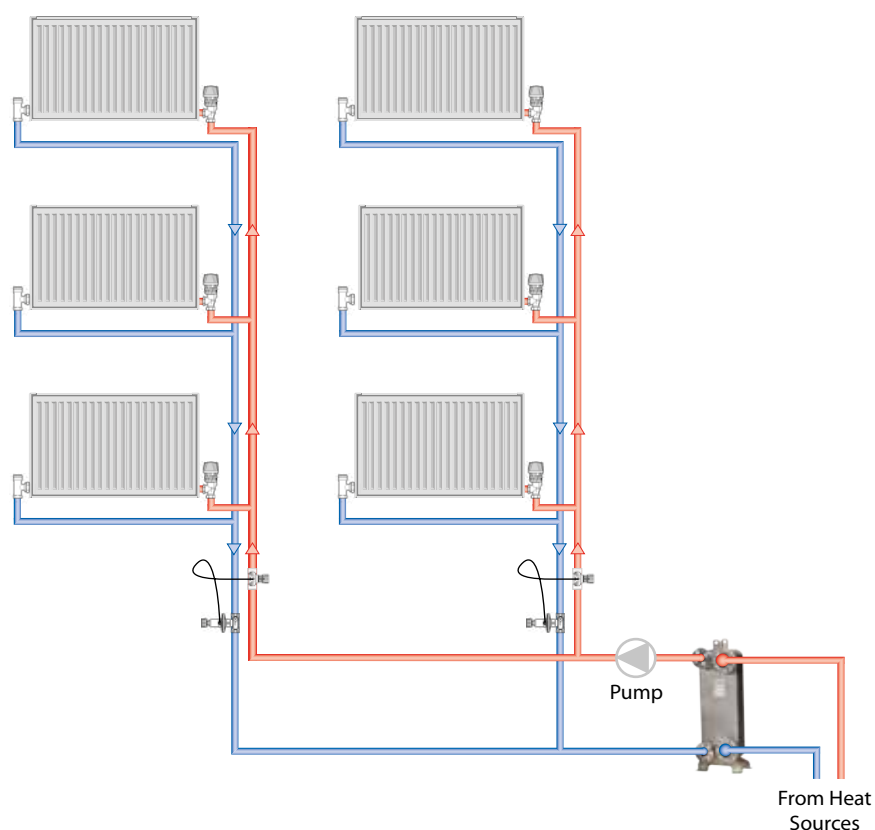


- Convenient pack based solution
- Packs available with or without lockshield
- 4 unique valve combinations covering the most popular RA2000 combinations

Complementing the range of individual separates available in the RA2000 range are the RA2000 Combi Packs. The range of four packs brings together the most popular RA2000 components into a convenient package allowing for simple ordering of all components with one code number.

Packs come complete with a standard RA2910 thermostatic head and are available in either ½" (complete with 15mm compression adaptors) or ¾" variations and with or without a lockshield valve.

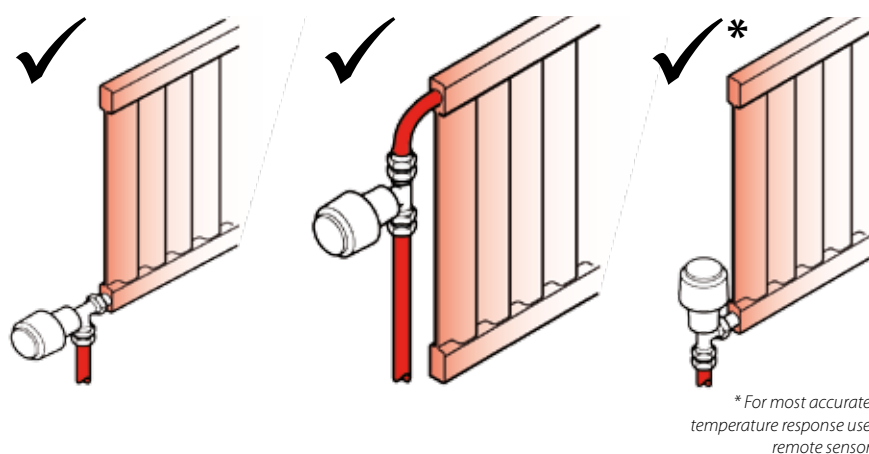
## Application



Description	Contains	Code No
Vertical Angle ½" / 15mm Combi pack	1 x RA2910 Thermostatic Head 1 x RA-FN15 Valve (inc. 15mm compression fitting)	<b>013G602100</b>
Vertical Angle ¾" Combi Pack	1 x RA2910 Thermostatic Head 1 x RA-FN20 Valve	<b>013G602200</b>
Vertical Angle + Lockshield Valve ½" / 15mm Combi Pack	1 x RA2910 Thermostatic Head 1 x RA-FN15 Valve (inc. 15mm compression fitting) 1 x RLV-S15 ½"/15mm Lockshield	<b>013G602300</b>
Vertical Angle + Lockshield Valve ¾" Combi Pack	1 x RA2910 Thermostatic Head 1 x RA-FN20 Valve 1 x RLV-S20 ¾" Lockshield	<b>013G602400</b>

# Built-in Sensors

## RA-2000



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

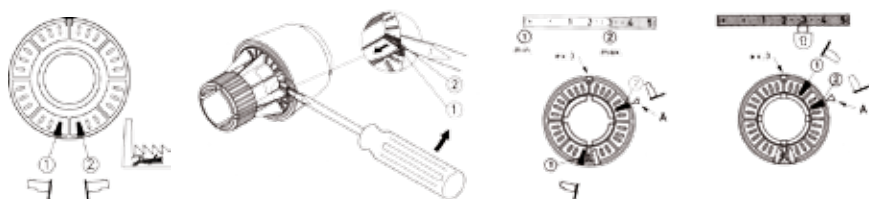
RA2000 sensors are high performance temperature sensors ideally suited for commercial applications. The temperature sensor uses frictionless bellows charged with a small volume of liquified gas.

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.

Type	Code No	Sensor (max. sensor temp 60°C)	Temp Range $\Delta p = 2K$
RA2910	013G291000	Built-in	5-26°C
RA2914	013G291400	Built-in, low temperature range model	5-22°C
RA2920 *	013G292000	Tamperproof	5-26°C

\* Toolkit required

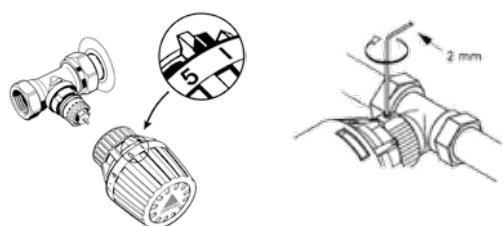
### Locking and Limiting



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.

### Sensor Mounting



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.

# Remote Sensors and Adjusters

## RA2000



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

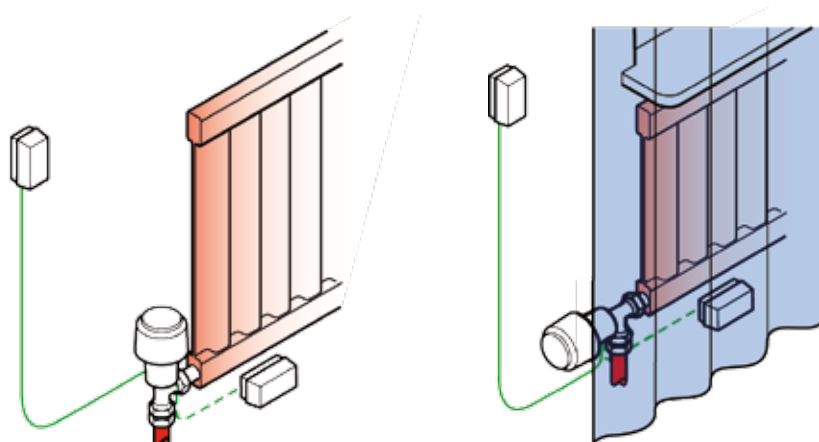
Utilising the same sensor technology as the built-in sensor, remote sensors are ideal for use in situations where built-in sensors may be adversely affected by heat gains or cold draughts.

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.

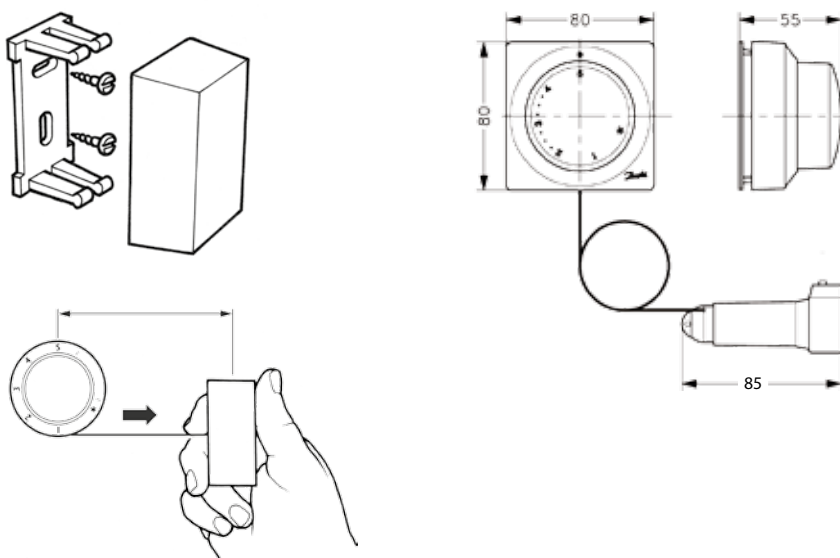


### RA2000 Remote Sensors

Type	Code No	Sensor (max sensor temp 60°C)	Temp Range Xp = 2K
RA2912	<b>013G291200</b>	Remote Sensor, 0-2m capillary tube	5-26°C
RA2916	<b>013G291600</b>	Remote Sensor, 0-2m capillary tube	5-22°C

### RA2000 Remote Sensor Adjusters

Type	Code No	Sensor (max sensor temp 60°C)	Temp Range Xp = 2K
RA5062	<b>013G506200</b>	2m Capillary includes locking and limiting	8-28°C
RA5065	<b>013G506500</b>	5m Capillary includes locking and limiting	8-28°C
RA5068	<b>013G506800</b>	8m Capillary includes locking and limiting	8-28°C
RA5075	<b>013G507500</b>	15m Capillary includes locking and limiting	8-28°C





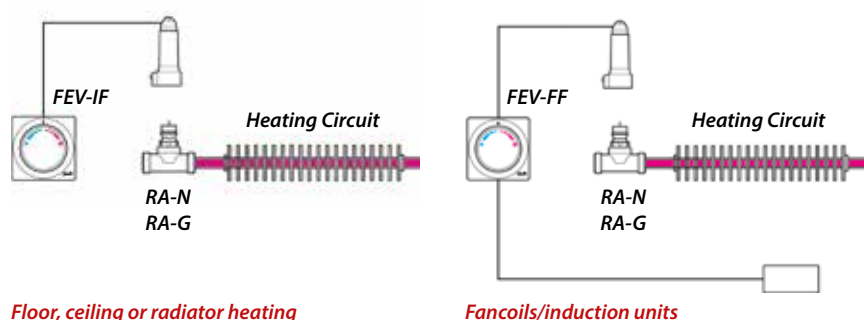
# Heating Controller FEV-IF and FEV-FF



Type	Code No.	Sensor	Capillary Tube	Setting Range
FEV-IF	013G546700	Integrated Sensor	5 metres	17-27°C
FEV-FF	013G546600	Remote Sensor	2 + 2 metres	

- Proportional controllers for heating circuits
- Can be used with RA-N and RA-G
- FEV-IF can be used in floor, ceiling or radiator heating
- FEV-FF can be used with fancoil or induction units

## Application

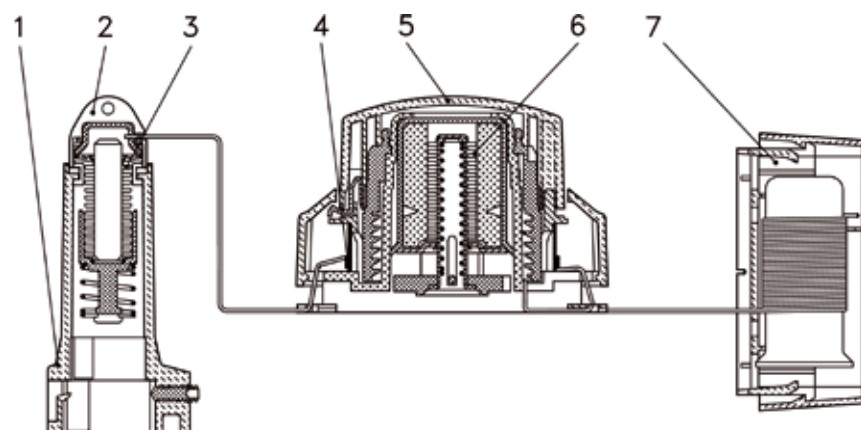


Floor, ceiling or radiator heating

Fancoils/induction units

The FEV is a proportional controller which opens or closes the heating valve as a function of the temperature deviation.

FEV sensors can be applied in combination with RA-N or RA-G valves. The FEV sensors are equipped with a direct acting valve-controller that opens the valve when the temperature drops below the set temperature. If the set temperature is equal to or higher than the room temperature the valve is closed.



1. Heating adapter
2. Actuator
3. Adjustment bellows
4. Capillary reel
5. Remote temperature adjuster
6. Bellows
7. Remote temperature sensor (FEV-FF)

## FEV-IF

To be applied in systems with ceiling, floor or radiator heating. The temperature adjuster/sensor should be mounted on an internal wall at a height of approximately 1.5 metres in such a way that the room temperature can be measured accurately.

## FEV-FF

To be applied in systems with fancoils or induction units. By placing the remote sensor in the room-air inlet of the unit a smaller response time to temperature changes can be achieved which will result in a more accurate temperature control.

# 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 and RA-N 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	<b>003L014100</b>	3/8"	3/8"
	RLV 15	<b>003L014300</b>	1/2"	1/2"
	RLV 15	<b>003L014315</b>	15mm	1/2"
	RLV 15	<b>003L182500</b>	Press Fit	1/2"
	RLV 20	<b>003L014500</b>	3/4"	3/4"
Straight	RLV 10	<b>003L014200</b>	3/8"	3/8"
	RLV 15	<b>003L014400</b>	1/2"	1/2"
	RLV 15	<b>003L014415</b>	15mm	1/2"
	RLV 15	<b>003L182400</b>	Press Fit	1/2"
	RLV 20	<b>003L014600</b>	3/4"	3/4"

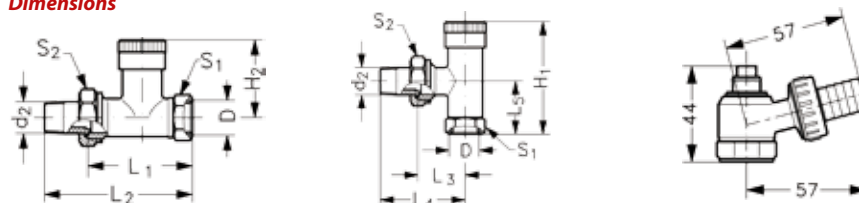
## Drain-cock Adaptor and Compression Fittings for RLV Series Valves

Code No	Description
<b>003L015200</b>	Drain-cock adaptor for use with RLV models only, not RLV-S

## Specification

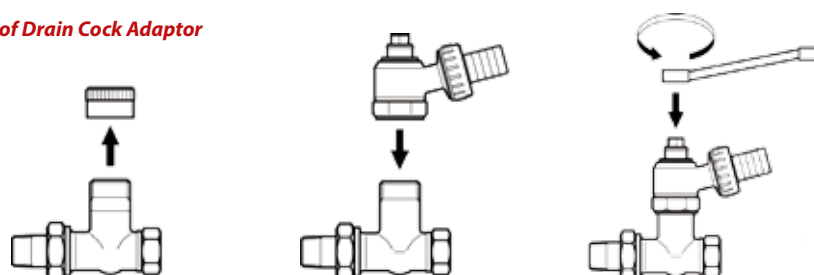
Maximum working pressure	10 Bar
Maximum working temperature	120°C
Test pressure	16 Bar
Valve body finish	Nickel Plated
Gland seal type	Double O-ring
Supplied with LSV cap (nickel plated brass)	Yes
Supplied with wheel head cap	No

## Dimensions



Type	D	d <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	S <sub>1</sub>	S <sub>2</sub>
RLV 10	R <sub>p</sub> 3/8	R <sub>p</sub> 3/8	55	40	49	75	26	52	22	22	27
RLV 15	R <sub>p</sub> 1/2	R <sub>p</sub> 1/2	59	40	51	80	29	58	27	27	30
RLV 20	R <sub>p</sub> 3/4	R <sub>p</sub> 3/4	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	<b>003L012100</b>	3/8"	3/8"
	RLV-S 15	<b>003L012300</b>	1/2"	1/2"
	RLV-S 15	<b>003L012315</b>	15mm	1/2"
	RLV-S 20	<b>003L012500</b>	3/4"	3/4"
Straight	RLV-S 10	<b>003L012200</b>	3/8"	3/8"
	RLV-S 15	<b>003L012400</b>	1/2"	1/2"
	RLV-S 15	<b>003L012415</b>	15mm	1/2"
	RLV-S 20	<b>003L012600</b>	3/4"	3/4"

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

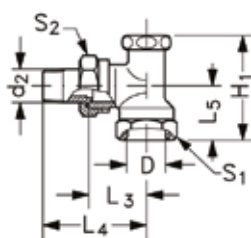
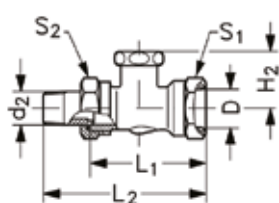
The RLV-S range of lockshield valves match the finish and style of RA-G, RA-FN and RA-N valve bodies. They are available in vertical angle and straight pattern versions in 3/8", 1/2" and 3/4" sizes for screwed pipe-work and 15mm for copper pipe-work.

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

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.

### Dimensions



Type	D	d <sub>2</sub>	H <sub>1</sub>	H <sub>2</sub>	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	S <sub>1</sub>	S <sub>2</sub>
RLV-S 10	G <sub>p</sub> 3/8	R <sub>p</sub> 3/8	42	26	51	75	27	51	23	22	27
RLV-S 15	G <sub>p</sub> 1/2	R <sub>p</sub> 1/2	52	28	53	80	30	57	27	27	30
RLV-S 20	G <sub>p</sub> 3/4	R <sub>p</sub> 3/4	52	28	61	92	34	65	30	32	37



# 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.

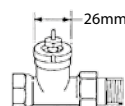
### Replacement Sensors

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.

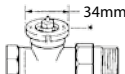
Gland Seals					
013G029000	Gland Seal Assembly for RA-FS, RA-FR, RA-FN, RA-N, RA-DV and RA-G Valves				
013U007000	Gland Seal Assembly for RAV and RAVL Valves				
Accessories for RA2000 Sensors and Valves					
013G123200	Anti-Theft for Sensors (50 pieces)				
013G123700	Threaded Range Limiting pins (30 pieces)				
013G123300	RA2020 Scale Cover (20 pieces)				
013G123600	Toolkit, comprising Allen Key and Locking Pin Tool				
013G123000	Accessory Bag for RA2000 Remote Sensor Base, Fixing Screw and Capillary Caps				
Accessories for RA2000 Remote Adjusters					
013G519300	Adaptor for RA5062, 5065 and 5068 for RAV Valves				
013G519200	Adaptor for RA5062, 5065 and 5068 for RAVL Valves				
Accessories for RA-FS, RA-FN, RA-N & RA-G Valves					
Code No	Description	RA-FS	RA-FN	RA-N	RA-G
013G500100	Blanking Cap for Valve Outlet	•			
013G027500	Spare Protective Cap	•	•	•	•
013G500200	RA Hand Wheel	•	•	•	•

### Selecting a suitable replacement sensor

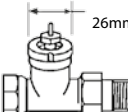
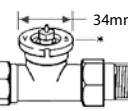
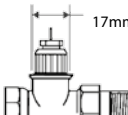
RAVL thermostats are replaced by RA/VL



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	013G295000	013G221000	RA/VL	Built-In Sensor	5 - 26°C
		013G295200	013G221200	RA/VL	Remote Sensor 2m Capillary	
	RAV	013G296000	013G231000	RA/V	Built-In Sensor	5 - 26°C
		013G296200	013G231200	RA/V	Remote Sensor 2m Capillary	
	RA-FN RA-G RA-N	Refer to RA2000 Sensors on p. 16-19				

# Compression Fittings For Copper, PEX and ALUPEX Pipe



## For Valves with Female Threaded Connections

Compression Fittings for:	<b>RA-FN, RA-N, RA-DV</b> Radiator Thermostat Valve Bodies, <b>RLV</b> and <b>RLV-S</b> Lockshield Valve Bodies
Pipe Type:	<b>Copper</b>
<b>013G410000</b>	3/8" x 10mm
<b>013G410200</b>	3/8" x 12mm
<b>013G411000</b>	1/2" x 10mm
<b>013G411200</b>	1/2" x 12mm
<b>013G411500</b>	1/2" x 15mm
Pipe Type:	<b>PEX</b>
<b>013G414400</b>	1/2" x 14 x 2.0mm
<b>013G414700</b>	1/2" x 15 x 2.5mm
<b>013G415600</b>	3/4" x 16 x 2.0mm
Pipe Type:	<b>ALUPEX</b>
<b>013G417400</b>	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:	<b>RA-KE, RA-KEW</b> and <b>FHF-F</b>
Pipe Type:	<b>Copper</b>
<b>013G412000</b>	3/4" x 10mm
<b>013G412200</b>	3/4" x 12mm
<b>013G412500</b>	3/4" x 15mm
Pipe Type:	<b>PEX</b>
<b>013G415500</b>	3/4" x 15mm x 2.5mm
<b>013G416300</b>	3/4" x 16mm x 2.2mm
<b>013G415900</b>	3/4" x 18mm x 2.5 mm
<b>013G416100</b>	3/4" x 20mm x 2.5mm
Pipe Type:	<b>ALUPEX</b>
<b>013G418400</b>	3/4" x 14mm x 2.0mm
<b>013G418600</b>	3/4" x 16mm x 2.0mm
<b>013G418800</b>	3/4" x 18mm x 2.0mm
<b>013G419000</b>	3/4" x 20mm x 2.0mm

*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 3/4" male threaded connection. Fitting comprises olive and internally threaded compression nut. For PEX and ALUPEX a pipe support insert is also included.*





# Motorised Control Valves

In a constantly evolving heating, ventilation and air conditioning (HVAC) market, it is important to improve flow and temperature control performance in every system and add essential features that offer high value for every customer. Danfoss has invested substantial development resources, which together with decades of experience has led to our new generation of intelligent and patented motorised control valves.

Our control valves are available in a range of different materials and with a variety of different connection types and sizes. Our motorised control valves range meets the requirements of virtually every application.



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# Special Functions of iMCV Electrical Actuators



## Self-stroking

The electrical actuator automatically adjusts to end positions of the control valve.

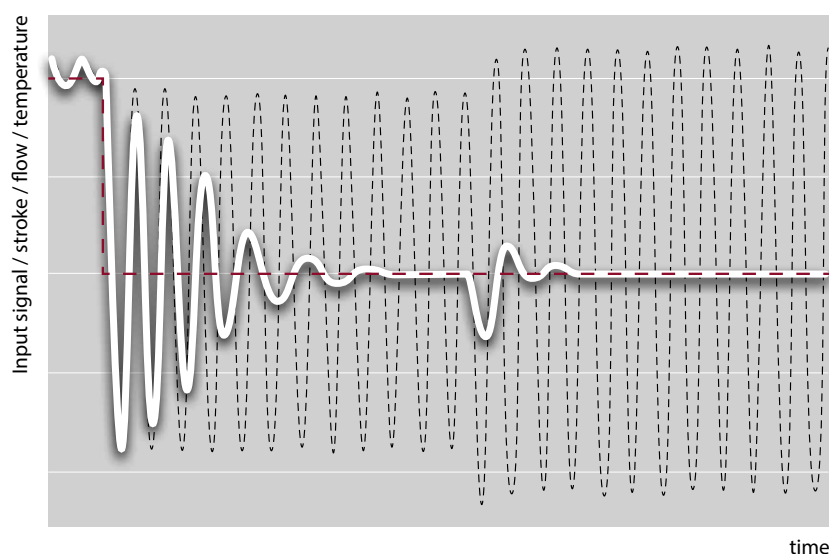
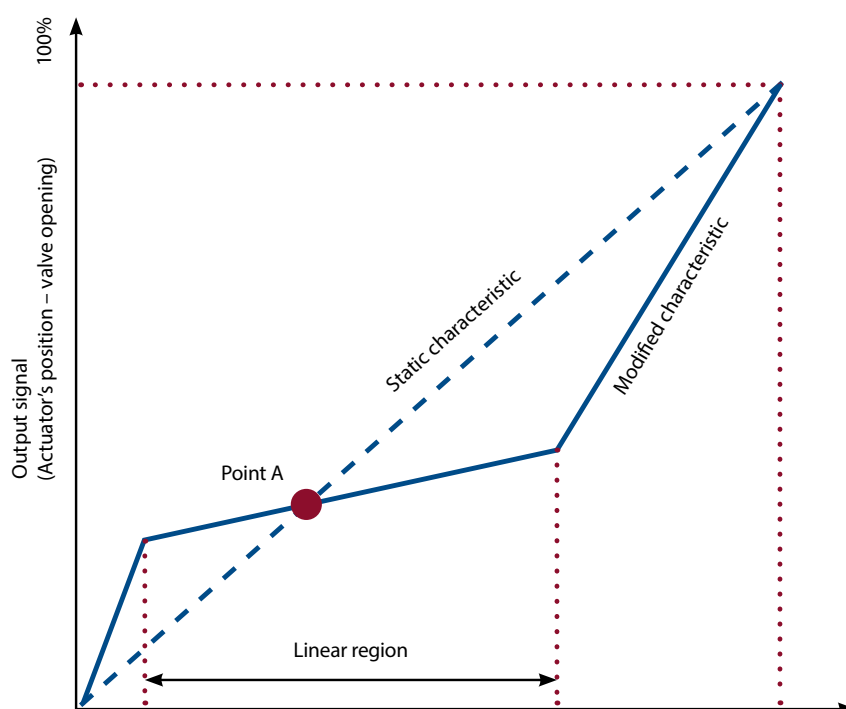
The self-stroking procedure starts by extracting the actuator stem. When the maximum force is detected at the end valve position, the actuator retracts the stem until the maximum force is detected again (on the other end position of the control valve).

## Anti-oscillation function

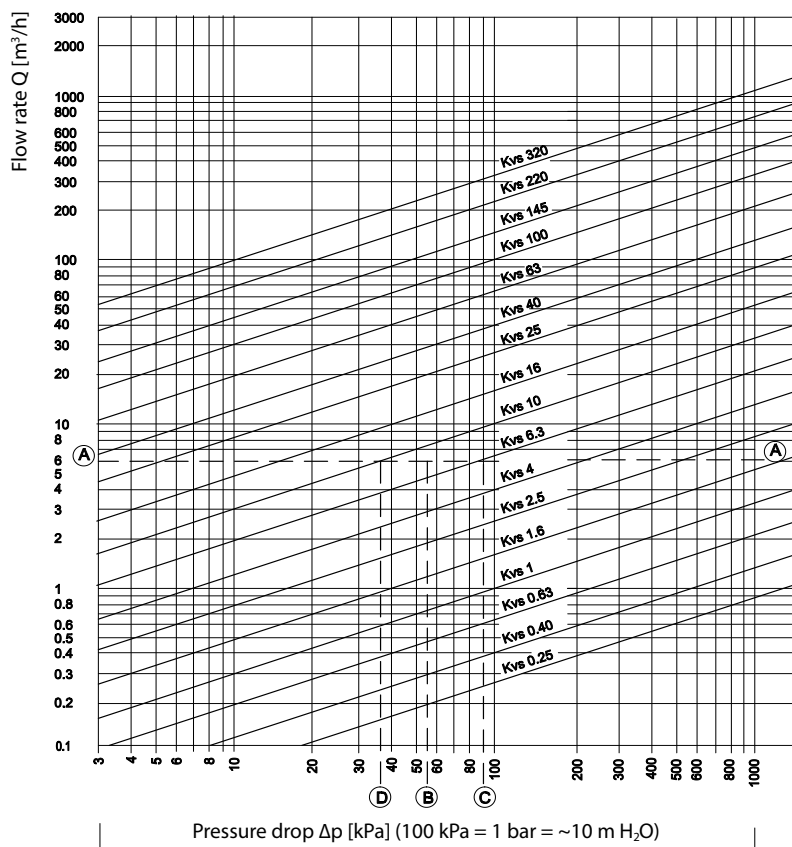
This function tracks oscillations in systems that are oversized or poorly controlled. It adjusts the actuator response to minimise hunting. This reduces temperature variations and improves comfort for HVAC system users.

## LED indicator

The LED indicator helps the user recognise the operating mode or function of the actuator at all times. Different colours or blinking signals are used to indicate different modes.



# Valve Sizing



**Example** – Design data:  
Flow rate: 6 m³/h  
System pressure drop: 55 kPa

Locate the horizontal line representing a flow rate of 6 m³/h (line A-A). The valve authority is given by the equation:

$$\text{Valve authority, } a = \frac{\Delta p_1}{\Delta p_1 + \Delta p_2}$$

Where:

$\Delta p_1$  = pressure drop across the fully open valve

$\Delta p_2$  = pressure drop across the rest of the circuit with a full open valve

The ideal valve would give a pressure drop equal to the system pressure drop (i.e. an authority of 0.5):

if:  $\Delta p_1 = \Delta p_2$

$$a = \frac{\Delta p_1}{\Delta p_1 + \Delta p_2}$$

In this example an authority of 0.5 would be given by a valve having a pressure drop of 55 kPa at the specified flow rate. (point B). The intersection of line A-A with a vertical line drawn from B lies between two diagonal lines; this means that no ideally-sized valve is available.

The intersection of line A-A with the diagonal lines gives the pressure drops produced by real (rather than ideal) valves. In this case, a valve with  $k_{vs}$  6.3 would give a pressure drop of 90.7 kPa (point C):

$$\text{hence valve authority} = \frac{90.7}{90.7 + 55} = 0.62$$

The second largest valve, with  $k_{vs}$  10, would give a pressure drop of 36 kPa (point D):






$$\text{hence valve authority} = \frac{36}{36 + 55} = 0.395$$

With a three-port application, the usual practice is to select the smaller valve because this yields a valve authority greater than 0.5, and therefore better control. However, this will increase the total pressure and should be checked by the system designer for compatibility with available pump heads, etc. The ideal authority is 0.5, with a preferred range of 0.5 to 0.8.

# Overview

## Control Valves



iMCV Valves		VRB 2	VRB 3	VF 2	VF 3	VFM 2
						
Technical Data		Page 36	Page 37	Page 38		Page 48
Valve type		Seated valve		Seated valve		Seated valve
Material		Red bronze		Grey cast iron (DN 15-100) Ductile iron (DN 125-300)		Grey cast iron
Connection		Internal or external thread		Flanged		Flanged
Nominal Pressure	PN	PN16		PN 16		PN 16
Max. closing pressure	bar	4		1.5 / 2.5 / 3 / 4 <sup>1</sup>		1.5
Ports		2	3	2	3	2
Medium temperature		(-10) <sup>2</sup> 2...130		(-10) <sup>2</sup> 2...130 (200) <sup>1</sup>		(-10) <sup>2</sup> 2...150
DN		15 ... 50		15 ... 300		65 ... 250
k <sub>vs</sub>		0.63 ... 40		0.63 ... 320		0.63 ... 900
Control characteristic		Logarithmic	Log: port A-AB Lin: port B-AB	Logarithmic	Log: port A-AB Lin: port B-AB	Lin (30%) Log (70%)
Control range		30:1 / 50:1 / 100:1 <sup>1</sup>		30:1 / 50:1 / 100:1 / 750:1 <sup>1</sup>		100:1
Leakage		Bubble tight	A - AB ≤ bubble tight B - AB ≤ 1% of k <sub>vs</sub>	Bubble tight	A - AB ≤ bubble tight B - AB ≤ 1% of k <sub>vs</sub>	<0.03% of k <sub>vs</sub>
Stroke	mm	10 / 15 <sup>1</sup>		10 / 15 / 20 / 30 / 40 / 70 / 80 <sup>1</sup>		30 / 34 / 40 / 50
Sealing type		Soft sealing		10 / 15 / 20 / 30 / 40 <sup>1</sup>		30 / 34 / 40 / 50

<sup>1</sup> Values are depending on size or different k<sub>vs</sub> type. Please see control valves section for detailed information.

<sup>2</sup> With stem heater

Fan Coil Valves		VZL 2	VZL 4
			
Technical Data		Page 32	
Valve type		Seated valve	
Material		Brass	
Connection		External thread	
Nominal Pressure	PN	PN 16	
Max. closing pressure	bar	1 / 2 / 2.5 <sup>1</sup>	
Ports		2	4
Medium temperature		2 ... 120	
DN		15 ... 20	
k <sub>vs</sub>		0.25 ... 3.5	
Control characteristic		Linear	
Control range		≥ 30:1	
Leakage		A - AB ≤ 0.05% of k <sub>vs</sub> B - AB ≤ 1% of k <sub>vs</sub>	
Stroke	mm	2.8	
Sealing type		metal sealing	





<sup>1</sup> Values are depending on size or different k<sub>vs</sub> type. Please see control valves section for detailed information.



# Overview

## Zone and Rotary Valves























Zone and Rotary Valves		AMZ 112	AMZ 113	HRB 3	HRB 4	HRE 3	HRE 4
							
Technical Data		Page 53		Page 50		Page 51	
Valve type		Ball valve - on/off zone valve incl. actuator		Rotary valve		Rotary valve	
Material		Nickel-plated brass		Dezincification resistant brass		Grey cast iron	
Connection		Internal thread		Internal thread (ISO 7/1)		Internal thread (ISO 7/1)	
Nominal Pressure	PN	PN 16		PN 10		PN 6	
Max. closing pressure	bar	6		Diverting: 2 bar Mixing: 1 bar		1 bar	
Ports		2	3	3	4	3	4
Medium temperature		2 ... 130		2 ... 110		2 ... 110	
DN		15 ... 32		15 ... 50		20 ... 50	
kvs	m³/h			0.4 ... 40		6.3 ... 40	
Max. torque	Nm	8		5		5	
Leakage		Leakage class A		0.05% kvs	1% kvs	0.05% kvs	1% kvs

<sup>1</sup> Values are depending on size or different kvs type. Please see control valves section for detailed information.

# Overview

## Electrical Actuators

Electrical Actuators		AME 435	AMV 435	AME 438 SU	AMV 438 SU	AME 55	AME 56	AMV 55	AMV 56	AME 85	AME 86	AMV 85	AMV 86	AME 855
														
Technical spec.		Page 39	Page 40	Page 41	Page 42	Page 43		Page 44		Page 45		Page 46		Page 47
Actuator type		Electric		Electric		Electric				Electric				Electric
Control input		modulating	3-point	modulating	3-point	modulating		3-point		modulating		3-point		3-point modulating
Closing force	N	400		450	450	2000	1500	2000	1500	5000	5000	5000	5000	15000
Speed	mm/s	7.5 or 15		15	15	8	4	8	4	8	3	8	3	2
Max stroke	mm	20		15	15	40				40				70(DN200-250) 80(DN300)
Power supply	V	24	24 or 230	24	24 or 230	24		24 or 230		24		24 or 230		24 or 230
Safety function		-		spring up	spring up	-				-				-
Grade of enclosure		IP 54		IP 54		IP 54				IP 54				IP 54
Special functions														
Self-stroking		•		•		•	•			•	•			•
Anti oscillation function		•												
LED indicator		•		•		•	•			•	•			•
Manual operation		•	•			•	•	•	•	•	•	•	•	•
Tool-free mounting		•	•											
Characteristic selection switch		•		•		•	•			•	•			













Electrical Actuators		AME 130	AME 130H	AMV 130	AMV 130H	AME 140	AME 140H	AMV 140	AMV 140H	AMB 162	AMB 182	TWA - ZL
												
Technical spec.		Page 33-34				Page 33-34				Page 52		Page 35
Actuator type		Electric				Electric				Electric		Thermal
Control input		modulating		3-point		modulating		3-point		3-point/modulating **		2-point (on/off)
Closing force	N	200				200				5nm	10/15nm	90
Speed	mm/s	24				12				15/30/60/120/480s - 90° (60/90/120s - 90° *		Full stroke time approx. 3 min
Max stroke	mm	5.5				5.5				-		
Power supply	V	24	24 or 230		24	24 or 230		24 or 230		24 or 230		
Safety function		-				-				-		-
Grade of enclosure		IP 42				IP 42				IP 42		IP 41
Special functions												
Self-stroking		•	•			•	•					-
Anti oscillation function												-
LED indicator												-
Manual operation			•		•		•		•	•	•	-
Tool-free mounting		•	•	•	•	•	•	•	•	•	•	-
Characteristic selection switch		•	•	•	•	•	•	•	•			-









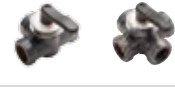
\* Modulating

\*\* 3-point controlled models with AS versions

# Combination Guide

## Motorised Control Valve

		Actuator type		AMV(E) 435	AMV(E) 438 SU	AMV(E) 56	AMV(E) 85	AMV(E) 86	AMV(E) 655	AMV(E) 658	AMV 855			
														
Valve type	DN	k <sub>VS</sub> [m³/h]	stroke [mm]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]	Δp clos. [bar]		
												Mixing	Diverting	
	15	0.63; 1; 1.6; 2.5; 4	10	4	4									
	20	6.3												
	25	10												
	32	16												
	40	25												
	50	40												
 	15	0.63; 1; 1.6; 2.5; 4	10	4	4									
	20	6.3												
	25	10												
	32	16												
	40	25	15	4	4									
	50	40												
	65	63	20	2.5										
	80	80												
	100	145	30		1									
	125	220	40					3	3					
	150	320												
	200	630	70											
	250	1000												
	300	1250												80
		65	63							8	8			
		80	100											
100		160												
125		250	4							4				
150		400												
200		630												
250		900	3							3				

Actuator type				TWA - ZL	AMV(E) 130(H)	AMV(E) 140(H)	AMB 162	AMB 182
								
Valve type	DN	$k_{vs}$ [m³/h]	stroke [mm]	$\Delta p$ clos. [bar]	$\Delta p$ clos. [bar]	$\Delta p$ clos. [bar]	$\Delta p$ clos. [bar]	$\Delta p$ clos. [bar]
	15	0.25; 0.4; 0.63	2.8	2.5	2.5	2.5		
		1.0; 1.6		2	2	2		
	20	2.5; 3.5		1	1	1		
	15	0.25; 0.4; 0.63; 1.0; 1.6; 2.5	5.5		3.5	3.5		
		2.5; 4.0			2.5	2.5		
	20							
	15	0.4						Diverting: 2 / Mixing: 1
		0.63						
		1.0						
		1.63						
		2.5						
		4.0						
	20	2.5						
		4.0						
		6.3						
	25	6.3						
		10						
		16						
	40	25						
	50	40						
	20	6.3						1
	25	10						
	32	16						
	40	25						
	50	40						

# Fan Coil Valves

## VZL 2 and VZL 4



- Push connection between valve and actuator
- Design that prevents sticking in closed position
- Linear characteristic
- Suitable to run together with thermic actuator TWA-ZL

VZL valves provide a high quality, cost effective solution for the control of hot and/or chilled water for fan coil units, small reheaters, and recoolers in temperature control systems.

### Applications

HVAC applications (water side).

### Compatible Actuators

AMV 130/140	Page 34
AME 130/140	Page 33
AMV 130H/140H	Page 34
AME 130H/140H	Page 33
TWA-ZL	Page 35

### VZL 2

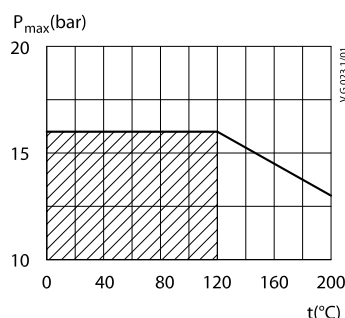
DN	$k_{vs}$ (m <sup>3</sup> /h)	max $\Delta p$ (bar)	Code number	
			Flat End	Compression
15	0.25	2.5	<b>065Z207000</b>	<b>065Z204000</b>
	0.4		<b>065Z207100</b>	<b>065Z204100</b>
	0.63		<b>065Z207200</b>	<b>065Z204200</b>
	1	2	<b>065Z207300</b>	<b>065Z204300</b>
	1.6		<b>065Z207400</b>	<b>065Z204400</b>
20	2.5	1	<b>065Z207500</b>	<b>065Z204500</b>
	3.5		<b>065Z207600</b>	<b>065Z204600</b>

### VZL 4

DN	$k_{vs}$ (A-AB) (m <sup>3</sup> /h)	$k_{vs}$ (B-AB) (m <sup>3</sup> /h)	max $\Delta p$ (bar)	Code number	
				Flat End	Compression
15	0.25	0.25	2.5	<b>065Z209000</b>	<b>065Z206000</b>
	0.4	0.25		<b>065Z209100</b>	<b>065Z206100</b>
	0.63	0.4		<b>065Z209200</b>	<b>065Z206200</b>
	1	0.63	2	<b>065Z209300</b>	<b>065Z206300</b>
	1.6	1		<b>065Z209400</b>	<b>065Z206400</b>
20	2.5	1.6	1	<b>065Z209500</b>	<b>065Z206500</b>
	3.5	2.5		<b>065Z209600</b>	<b>065Z206600</b>

Nominal diameter	DN	15	20
Stroke	mm	2.8	
Control range		min. 30:1	
Control characteristic		Linear	
Leakage		A - AB ≤ 0.05% of k <sub>vS</sub>	
		B - AB ≤ 1% of k <sub>vS</sub>	
Nominal pressure	PN	16	
Medium		Circulation water / Glycolic water up to 50%	
Medium pH		Min. 7, Max. 10	
Medium temperature	°C	2 ... 120	
Connections		External thread (flat end (MS 58) or compression	
Materials			
Body, seat, cone and stem		Brass	
Stuffing box sealing		EPDM	

### Operating Range





# Actuators for Modulating Control

## AME 130(H) and AME 140(H)



Type	Supply voltage	Speed	Code number
AME 130	24 V AC	24 mm/s	<b>082H804400</b>
AME 140		12 mm/s	<b>082H804500</b>
AME 130H		24 mm/s	<b>082H804600</b>
AME 140H		12 mm/s	<b>082H804700</b>

- Modulating control
- Load related "switch off" function that prevents overloading
- Manual operation (only H version)

AME 130, AME 140, AME 130H and AME 140H actuators are used with VZL valves. Actuators marked with "H" enable hand operation. The actuator can be used with fan coil units, induction units, small reheaters, recoolers, and zone applications in which hot/cold water is the controlled medium.

### Applications

Operation of fan coil valves.

### Compatible Valves

VZL.....Page 32

Type		AME 130, AME 130H	AME 140, AME 140H
Power supply	V	24 AC; +10 to -15%	
Power consumption	VA	1.3	
Frequency	Hz	50/60	
Control input Y	V	0-10 (2-10)	
	mA	0-20 (4-20)	
Output signal X	V	0-10 (2-10)	
Closing force	N	200	
Max. stroke	mm	5.5	
Speed	mm/s	24	12
Max. medium temperature	°C	130	
Ambient temperature	°C	0 ... 55	
Storage and transport temperature	°C	-40 ... +70	
Grade of enclosure		IP 42	
Weight	kg	0.3	
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3	



# Actuators for 3-Point Control

## AMV 130(H) and AMV 140(H)



- Load related "switch off" function that prevents overloading
- Manual operation (only H version)

AMV 130, AMV 140, AMV 130H and AMV 140H actuators are used with VZL valves. Actuators marked with "H" enable hand operation. The actuator can be used with fan coil units, induction units, small reheaters, recoolers, and zone applications in which hot/cold water is the controlled medium.

### Applications

Operation of fan coil valves.

### Compatible Valves

VZL..... Page 32

Type	Supply voltage	Speed	Code number
AMV 130	24 V AC	24 mm/s	<b>082H803600</b>
AMV 140		12 mm/s	<b>082H803800</b>
AMV 130H		24 mm/s	<b>082H804000</b>
AMV 140H		12 mm/s	<b>082H804200</b>
AMV 130	230 V AC	24 mm/s	<b>082H803700</b>
AMV 140		12 mm/s	<b>082H803900</b>
AMV 130H		24 mm/s	<b>082H804100</b>
AMV 140H		12 mm/s	<b>082H804300</b>

Type		AMV 130, AMV 130H	AMV 140, AMV 140H
Power supply	V	24 AC, 230 AC; +10 to -15%	
Power consumption	VA	1 (24 V AC); 8 (230 V AC)	
Frequency	Hz	50/60	
Control input		3-point	
Closing force	N	200	
Max. stroke	mm	5.5	
Speed	mm/s	24	12
Max. medium temperature	°C	130	
Ambient temperature	°C	0 ... 55	
Storage and transport temperature	°C	-40 ... +70	
Grade of enclosure		IP 42	
Weight	kg	0.3	
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3	



# Thermal Actuator TWA-ZL



Type	Supply voltage	Code number
TWA-ZL NC	24 V AC/DC	<b>082H310000</b>
TWA-ZL NO		<b>082H310100</b>
TWA-ZL NC	230 V AC	<b>082H310200</b>
TWA-ZL NO		<b>082H310300</b>

- Position indicator

Danfoss thermal actuator TWA-ZL is used with Danfoss valves type VZL. The actuator can be controlled with a on/off controller or switch. These provide a cost effective solution for the control of hot and /or chilled water for fan coil units, small reheaters and recoolers in temperature control systems.

## Applications

Operation of fan coil valves.

## Compatible Valves

VZL.....Page 32

Specification		
Power supply	V	24 AC/DC or 230 AC
Power consumption	VA	2
Frequency	Hz	50/60
Control input		ON/OFF
Closing force	N	90
Max. stroke	mm	2.8
Full stroke time	min	3 <sup>1)</sup>
Max. medium temperature	°C	120
Ambient temperature	°C	2 ... 60
Storage and transport temperature	°C	-40 ... +70
Protection Class		II
Grade of enclosure		IP 41
Weight	kg	0.15
Cable length	m	1.2

<sup>1)</sup> When heating the actuator full stroke time increases up to some minutes  
– it depends on ambient temperature



# 2-Port Seated Valves

## VRB 2



- Snap mechanical connection together with AMV(E) 435
- Soft sealing
- Logarithmic characteristic
- Control range up to 100:1
- Internal or external thread connection
- Dedicated 2-port valve

VRB valves provide a quality, cost effective solution for most water and chilled applications.

The valves are designed to be combined with AMV(E) 435 or AMV(E) 438 SU actuators.

### Applications

Heating systems and HVAC applications (water side).

### Compatible Actuators

AMV 435 .....	Page 40
AME 435 .....	Page 39
AMV 438SU .....	Page 42
AME 438 SU .....	Page 41

### Valves

DN	k <sub>vs</sub> (m <sup>3</sup> /h)	Code number	
		Internal thread	External thread *
15	0.63	<b>065Z023100</b>	<b>065Z017101</b>
	1	<b>065Z023200</b>	<b>065Z017201</b>
	1.6	<b>065Z023300</b>	<b>065Z017301</b>
	2.5	<b>065Z023400</b>	<b>065Z017401</b>
20	4	<b>065Z023500</b>	<b>065Z017501</b>
	6.3	<b>065Z023600</b>	<b>065Z017601</b>
25	10	<b>065Z023700</b>	<b>065Z017701</b>
32	16	<b>065Z023800</b>	<b>065Z017801</b>
40	25	<b>065Z023900</b>	<b>065Z017901</b>
50	40	<b>065Z024000</b>	<b>065Z018001</b>

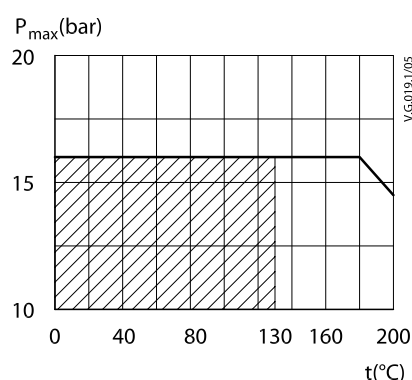
\* c/w tails

### Technical Data

Nominal diameter		DN	15					20	25	32	40	50
k <sub>vs</sub> value		m³/h	0.63	1.0	1.6	2.5	4.0	6.3	10	16	25	40
Stroke		mm	10							15		
Control range			30:1	50:1				100:1				
Control characteristic			Logarithmic									
Cavitation factor z			≥ 0.4									
Leakage			Bubble tight									
Nominal pressure	PN		16									
Max. closing pressure	bar		4									
Medium			Circulation water / glycolic water up to 50%									
Medium pH			Min. 7, Max. 10									
Medium temperature	°C		2 (-10 <sup>1)</sup> ) ... 130									
Connections			Internal or external thread									
Materials												
Valve body			Red bronze (Rg5)									
Valve stem			Stainless steel									
Valve cone			Dezincification resistant brass									
Stuffing box sealing			EPDM									

<sup>1)</sup> At temperatures from -10 up to +2 °C use stem heater

### Operating Range



V.G.019.1/05



# 3-Port Seated Valves

## VRB 3



### Valves

DN	$k_{vs}$ (m <sup>3</sup> /h)	Code number	
		Internal thread	External thread *
15	0.63	<b>065Z021100</b>	<b>065Z015101</b>
	1	<b>065Z021200</b>	<b>065Z015201</b>
	1.6	<b>065Z021300</b>	<b>065Z015301</b>
	2.5	<b>065Z021400</b>	<b>065Z015401</b>
	4	<b>065Z021500</b>	<b>065Z015501</b>
20	6.3	<b>065Z021600</b>	<b>065Z015601</b>
25	10	<b>065Z021700</b>	<b>065Z015701</b>
32	16	<b>065Z021800</b>	<b>065Z015801</b>
40	25	<b>065Z021900</b>	<b>065Z015901</b>
50	40	<b>065Z022000</b>	<b>065Z016001</b>

\* c/w tails

- Snap mechanical connection together with AMV(E) 435
- Soft sealing
- Logarithmic characteristic A-AB and linear characteristic B-AB
- Control range up to 100:1
- Internal or external thread connection
- Suitable for diverting applications

VRB valves provide a quality, cost effective solution for most water and chilled applications.

The valves are designed to be combined with AMV(E) 435 or AMV(E) 438 SU actuators.

### Technical Data

Nominal diameter	DN	15					20	25	32	40	50
k <sub>vs</sub> value	m³/h	0.63	1.0	1.6	2.5	4.0	6.3	10	16	25	40
Stroke	mm	10							15		
Control range		30:1	50:1				100:1				
Control characteristic		Logarithmic: port A-AB; Linear: port B-AB									
Cavitation factor z		≥ 0.4									
Leakage		A - AB bubble tight B - AB ≤ 1.0% of k <sub>vs</sub>									
Nominal pressure	PN	16									
Max. closing pressure	bar	Mixing: 4 Diverting: 1									
Medium		Circulation water / glycolic water up to 50%									
Medium pH		Min. 7, Max. 10									
Medium temperature	°C	2 (-10 <sup>1)</sup> ) ... 130									
Connections		Internal or external thread									
Materials											
Valve body		Red bronze (Rg5)									
Valve stem		Stainless steel									
Valve cone		Dezincification resistant brass									
Stuffing box sealing		EPDM									

<sup>1)</sup> At temperatures from -10 up to +2 °C use stem heater

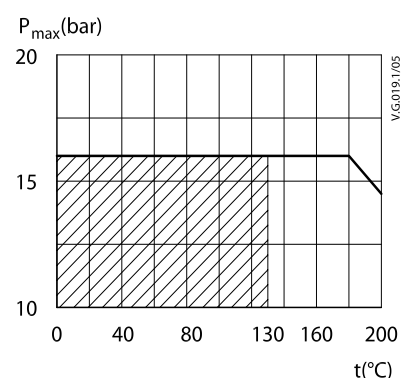
### Applications

Heating systems and HVAC applications (water side).

### Compatible Actuators

AMV 435	Page 40
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AMV 438SU	Page 42
AME 438 SU	Page 41

### Operating Range



# 2 and 3-Port Seated Valves

## VF 2 and VF 3



- Snap mechanical connection together with AMV(E) 435
- Soft sealing up to DN 80
- Logarithmic characteristic A-AB and linear characteristic B-AB
- Control range up to 100:1
- Flanged PN16 connection
- Dedicated 2-port valve
- Suitable for diverting applications

VF 2 and VF 3 valves provide a quality, cost effective solution for most water and chilled applications.

### Applications

Heating systems and HVAC applications (water side).

### Compatible Actuators

AMV 435	DN15-80	Page 40
AME 435	DN15-80	Page 39
AMV 438 SU	DN15-50	Page 42
AME 438 SU	DN15-50	Page 41
AMV 55	DN 100, 125, 150	Page 44
AME 55	DN 100, 125, 150	Page 43
AMV 56	DN 100, 125, 150	Page 44
AME 56	DN 100, 125, 150	Page 43
AMV 85	DN 125, 150	Page 46
AME 85	DN 125, 150	Page 45
AMV 86	DN 125, 150	Page 46
AME 86	DN 125, 150	Page 45
AME 855	DN 200, 300	Page 47

<sup>1)</sup> Only for DN 15  $k_{vs}$  0.63

<sup>2)</sup> For actuators AMV(E) 56

<sup>3)</sup> For actuators AMV(E) 55

<sup>4)</sup> For actuators AMV(E) 85, AMV(E) 86

<sup>5)</sup> At temperatures from -10 up to +2 °C use stem heater

DN	$k_{vs}$ (m <sup>3</sup> /h)	Code number	
		VF 2	VF 3
15	0.63	065Z027100	065Z025100
	1	065Z027200	065Z025200
	1.6	065Z027300	065Z025300
	2.5	065Z027400	065Z025400
20	4	065Z027500	065Z025500
	6.3	065Z027600	065Z025600
	10	065Z027700	065Z025700
	16	065Z027800	065Z025800
25	25	065Z027900	065Z025900
32	40	065Z028000	065Z026000
40	63	065Z028100	065Z026100
50	100	065Z028200	065Z026200
65	145	065B320500	065B168500
80	220	065B323000	065B312500
100	320	065B325500	065B315000
125	630	-	065B420000
150	1000	-	065B425000
200	1250	-	065B430000
250			
300			

Nominal diameter	DN	15	20	25	32	40	50	65	80	100	125	150	200	250	300			
Stroke	mm	10			15			20			30		40		70		80	
Control range		50:1 (30:1) <sup>1)</sup>	100:1											>50:1				
Control characteristic		Logarithmic: port A-AB; Linear: port B-AB																
Cavitation factor z		≥ 0.4											≥ 0.45					
Leakage		A - AB bubble tight																
		B - AB ≤ 1.0% of k <sub>vs</sub>																
Nominal pressure	PN	16																
Max. closing pressure (mixing)	bar	4					2.5		1.0 <sup>2)</sup> 1.5 <sup>3)</sup>	0.5 <sup>2)</sup> 1.0 <sup>3)</sup> 3.0 <sup>4)</sup>	0.2 <sup>2)</sup> 0.5 <sup>3)</sup> 1.5 <sup>4)</sup>	3.7	2.2	1.5				
Max. closing pressure (diverting)		1					Not applicable					2.0	1.5	1.0				
Medium		Circulation water / glycolic water up to 50%																
Medium pH		Min. 7, Max. 10																
Medium temperature	°C	2 (-10 <sup>5)</sup> ... 130									2 (-10 <sup>5)</sup> ... 200			2 (-10) ... 130				
Connections		Flange PN 16 acc. to EN 1092-2																
Materials																		
Valve body		Grey cast iron (GG-25)									Ductile iron (GGG 40)			Grey cast iron (GG-25)				
Valve stem		Stainless steel																
Valve cone		Dezincification resistant brass								Red bronze (Rg 5)	Ductile iron (GGG 40)			Stainless steel				
Stuffing box sealing		EPDM									PTFE			EPDM				

# Actuator for Modulating Control

## AME 435



### Actuator

Type	Supply voltage	Code number
AME 435	24 V AC/DC	<b>082H016100</b>

### Accessories

Type	DN	Power supply	Code number
Stem heater*	15-80	24 V AC	<b>065Z031500</b>

\* For valve types VRB, VRG, VF and VL gen. 2009

### Adapter

Valves	DN	max. $\Delta p$ (bar)	Code number
For old VRB, VRG, VF and VL valves	15	9	<b>065Z031300</b>
	20	4	
	25	2	
	32	1	
	40	0.8	
	50	0.5	

- "Self stroking" function
- Load related "switch off" function that prevents overloading
- Manual operation
- Position indication
- LED signalling
- Multifunctional DIP switch: speed selection, input range selection, signal inversion, characteristic setup and anti-oscillation
- Tool-free mounting
- Auto detection of input (Y) signal
- External RESET Button

AME 435 actuator is used with two and three way valves type VRB and VF up to DN 80 diameter.

### Applications

Operation of seated valves.

### Compatible Valves

VRB 2	Page 36
VRB 3	Page 37
VF 2	Page 38
VF 3	Page 38
VFM2	Page 48

Technical data		
Power supply	V	24 AC/DC; $\pm 10\%$
Power consumption	VA	4.5
Frequency	Hz	50/60
Control input Y	V	0-10 (2-10) [Ri = 95 k $\Omega$ ]
	mA	0-20 (4-20) [Ri = 500 $\Omega$ ]
Output signal X	V	0-10 (2-10) [RL = 650 $\Omega$ (maximal load)]
Closing force	N	400
Max. stroke	mm	20
Speed	mm/s	7.5 or 15
Max. medium temperature	$^{\circ}\text{C}$	130
Ambient temperature	$^{\circ}\text{C}$	0 ... 55
Storage and transport temperature	$^{\circ}\text{C}$	-40 ... +70
Protection class		II
Grade of enclosure		IP 54
Weight	kg	0.45
CE marking in accordance with standards	Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3	



# Actuator for 3-Point Control

## AMV 435



- "Self stroking" function
- Load related "switch off" function that prevents overloading
- Manual operation
- Position indication
- LED signalling
- DIP switch for speed selection
- Tool-free mounting

AMV 435 actuator is used with two and three way valves type VRB and VF up to DN 80 diameter.

### Applications

Operation of seated valves.

### Compatible Valves

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VRB 3	Page 37
VF 2	Page 38
VF 3	Page 38
VFM2	Page 48



### Actuator

Type	Supply voltage	Code number
AMV 435	24 V AC/DC	<b>082H016200</b>
	230 V AC	<b>082H016300</b>

### Accessories

Type	DN	Power supply	Code number
Stem heater*	15-80	24 V AC	<b>065Z031500</b>

\* For valve types VRB, VRG, VF and VL gen. 2009

### Adapters

Valves	DN	max. Δp (bar)	Code number
For old VRB, VRG, VF and VL valves	15	9	<b>065Z031300</b>
	20	4	
	25	2	
	32	1	
	40	0.8	
	50	0.5	

### Technical data

Power supply	V	24 AC/DC, 230 AC; +10 to -15%
Power consumption	VA	2
Frequency	Hz	50/60
Control input		3 point
Closing force	N	400
Max. stroke	mm	20
Speed	mm/s	7.5 or 15
Max. medium temperature	°C	130
Ambient temperature	°C	0 ... 55
Storage and transport temperature	°C	-40 ... +70
Protection class		II
Grade of enclosure		IP 54
Weight	kg	0.45
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3



# Actuator for Modulating Control

## AME 438 SU

### Spring Return



#### Actuator

Type	Supply voltage	Code number
AME 438 SU	24 V AC	082H012100

#### Accessories

Type	DN	Code number
Stem heater*	15-50	065Z031500

\* For valve types VRB, VRG, VF and VL gen. 2009

Technical data		
Power supply	V	24 AC; $\pm 10\%$
Power consumption	VA	14
Frequency	Hz	50/60
Control input Y	V	0-10 (2-10) [Ri = 24 k $\Omega$ ]
	mA	0-20 (4-20) [Ri = 500 $\Omega$ ]
Output signal X	V	0-10 (2-10)
Closing force	N	450
Max. stroke	mm	15
Speed	mm/s	15
Max. medium temperature	$^{\circ}\text{C}$	150
Ambient temperature	$^{\circ}\text{C}$	0 ... 55
Storage and transport temperature	$^{\circ}\text{C}$	-40 ... +70
Protection class		II
Grade of enclosure		IP 54
Weight	kg	2.3
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3

- "Self stroking" function
- Load related "switch off" function that prevents overloading
- Spring up function (safety)

AME 438 SU actuator is used with two and three-way valves type VRB, VRG, VF and VL up to DN 50 diameter.

#### Applications

Operation of seated valves.

#### Compatible Valves

VRB 2	Page 36
VRB 3	Page 37
VF 2	Page 38
VF 3	Page 38
VFM2	Page 48



# Actuator for 3-Point Control

## AMV 438 SU

### Spring Return



- Load related "switch off" function that prevents overloading
- Spring up function (safety)

AMV 438 SU actuator is used with two and three-way valves type VRB, VRG, VF and VL up to DN 50 diameter.

#### Applications

Operation of seated valves.

#### Compatible Valves

VRB 2	Page 36
VRB 3	Page 37
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VF 3	Page 38
VFM2	Page 48



#### Actuator

Type	Supply voltage	Code number
AMV 438 SU	24 V AC	<b>082H012200</b>
	230 V AC	<b>082H012300</b>

#### Accessories

Type	Code number
Additional switches (2x)	<b>082H701500</b>
Additional switches (2x) and potentiometer (10k $\Omega$ )	<b>082H701600</b>
Additional switches (2x) and potentiometer (1k $\Omega$ )	<b>082H701700</b>
Stem heater*	<b>06SZ031500</b>

\* For valve types VRB, and VF gen. 2009

Technical data		
Power supply	V	24 AC, 230 AC; +10 to -15%
Power consumption	VA	12
Frequency	Hz	50/60
Control input		3 point
Closing force	N	450
Max. stroke	mm	15
Speed	mm/s	15
Max. medium temperature	°C	150
Ambient temperature	°C	0 ... 55
Storage and transport temperature	°C	-40 ... +70
Protection class		II
Grade of enclosure		IP 54
Weight	kg	2.3
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3

# Actuator for Modulating Control

## AME 55 and AME 56



### Actuator

Type	Supply voltage	Code number
AME 55	24 V AC	<b>082H302200</b>
AME 56		<b>082H302500</b>

### Accessories

Type	Code number
Active return signal kit for AME 55, AME 56	<b>082H307000</b>
Stem heater (VF, VL valves DN 100)	<b>065Z702000</b>
Stem heater (VF valves DN 125, 150)	<b>065Z702200</b>

- "Self stroking" function
- Load related "switch off" function that prevents overloading
- Manual operation

The actuators AME 55 and AME 56 are used with VF 2, VF 3 valves from DN 100 up to DN 150 diameter.

### Applications

Operation of seated valves.

### Compatible Valves

VF 2 ..... Page 38  
VF 3 ..... Page 38

Technical data					
Type		AME 55		AME 56	
Power supply	V	24 AC; ±10%			
Power consumption	VA	9		19.5	
Frequency	Hz	50/60			
Control input Y	V	0-10 (2-10) [Ri = 24 kΩ]			
	mA	0-20 (4-20) [Ri = 500 Ω]			
Output signal X	V	0-10 (2-10)			
Closing force	N	2000		1500	
Max. stroke	mm	40			
Speed	mm/s	8		4	
Max. medium temperature	°C	200			
Ambient temperature	°C	0 ... 55			
Storage and transport temperature	°C	−40 ... +70			
Grade of enclosure		IP 54			
Weight	kg	3.8			
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3			



# Actuator for 3-Point Control

## AMV 55 and AMV 56



- Load related "switch off" function that prevents overloading
- Manual operation

The actuators AMV 55 and AMV 56 are used with VF 2, VF 3 valves from DN 100 up to DN 150 diameter.

### Applications

Operation of seated valves.

### Compatible Valves

VF 2 ..... Page 38  
VF 3 ..... Page 38



### Actuator

Type	Supply voltage	Code number
AMV 55	24 V AC	<b>082H302000</b>
AMV 55	230 V AC	<b>082H302100</b>
AMV 56	24 V AC	<b>082H302300</b>
AMV 56	230 V AC	<b>082H302400</b>

### Accessories

Type	Code number
Additional switches (2x)	<b>082H703700</b>
Potentiometer (10kΩ/30 mm - for VF, VL DN 100)	<b>082H703500</b>
Potentiometer (10kΩ/40 mm - for VF DN 125-150)	<b>082H703600</b>
Potentiometer (1kΩ/30 mm - for VF, VL DN 100)	<b>082H703800</b>
Potentiometer (1kΩ/40 mm - for VF DN 125-150)	<b>082H703900</b>
Stem heater (VF, VL valves DN 100)	<b>065Z702000</b>
Stem heater (VF valves DN 125, 150)	<b>065Z702200</b>

### Technical data

Type		AMV 55	AMV 56
Power supply	V	24 AC, 230 AC; ±10%	
Power consumption	VA	7	17.5
Frequency	Hz	50/60	
Control input		3-point	
Closing force	N	2000	1500
Max. stroke	mm	40	
Speed	mm/s	8	4
Max. medium temperature	°C	200	
Ambient temperature	°C	0 ... 55	
Storage and transport temperature	°C	-40 ... +70	
Grade of enclosure		IP 54	
Weight	kg	3.8	
CE marking in accordance with standards		Low Voltage Directive 73/23/EEC, EMC-Directive 2006/95/EEC: - EN 60730-1, EN 60730-2-14	

# Actuators for Modulating Control

## AME 85 and AME 86



### Actuator

Type	Supply voltage	Code number
AME 85	24 V AC	<b>082G145200</b>
AME 86		<b>082G146200</b>

- "Self stroking" function
- Load related "switch off" function that prevents overloading
- Manual operation

The actuators AME 85 and AME 86 are used with VF 2 and VF 3 valves DN 125 and DN 150 diameter.

### Accessories

Type	Code number
Stem heater for VF valves DN 125-150	<b>065Z702100</b>

### Applications

Operation of seated valves.

### Compatible Valves

VF 2 ..... Page 38  
VF 3 ..... Page 38

Technical data		AME 85	AME 86
Power supply	V	24 AC; +10% to -15%	
Power consumption	VA	12.5	25
Frequency	Hz	50/60	
Control input Y	V	0-10 (2-10) [Ri = 50 Ω]	
	mA	0-20 (4-20) [Ri = 500 Ω]	
Output signal X	V	0-10 (2-10)	
Closing force	N	5000	
Max. stroke	mm	40	
Speed	mm/s	8	3
Max. medium temperature	°C	200	
Ambient temperature	°C	0 ... 55	
Storage and transport temperature	°C	-40 ... +70	
Grade of enclosure		IP 54	
Weight	kg	9.8	10
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3	





# Actuators for 3-point control

## AMV 85 and AMV 86



- Load related "switch off" function that prevents overloading
- Manual operation

The actuators AMV 85 and AMV 86 are used with VF 2 and VF 3 valves DN 125 and DN 150 diameter.

### Applications

Operation of seated valves.

### Compatible Valves

VF 2 ..... Page 38

VF 3 ..... Page 38



### Actuator

Type	Supply voltage	Code number
AMV 85	24 V AC	<b>082G145000</b>
AMV 85	230 V AC	<b>082G145100</b>
AMV 86	24 V AC	<b>082G146000</b>
AMV 86	230 V AC	<b>082G146100</b>

### Accessories

Type	For actuators	Code number
Additional switches (2x)	AMV 86 / 24 V	<b>082H705000</b>
	AMV 86 / 230 V	<b>082H705100</b>
	AMV 85 / 24 V	<b>082H707200</b>
	AMV 85 / 230 V	<b>082H707100</b>
Additional switches (2x) and potentiometer (10kΩ)	AMV 86 / 24 V	<b>082H708100</b>
	AMV 86 / 230 V	<b>082H708000</b>
	AMV 85 / 24 V	<b>082H708300</b>
	AMV 85 / 230 V	<b>082H708200</b>
Stem heater for VF valves DN 125-150		<b>065Z702100</b>

Technical data			
Type		AMV 85	AMV 86
Power supply	V	24 AC/230 AC ; +10 to -15%	
Power consumption	VA	10.5	23
Frequency	Hz	50/60	
Control input		3-point	
Closing force	N	5000	
Max. stroke	mm	40	
Speed	mm/s	8	3
Max. medium temperature	°C	200	
Ambient temperature	°C	0 ... 55	
Storage and transport temperature	°C	-40 ... +70	
Grade of enclosure		IP 54	
Weight	kg	9.8	10
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3	

# Actuators for 3-point or modulating control

## AME 855



### Actuator

Type	Supply voltage	Code number
AME 855	24 V AC	<b>082G351000</b>
	230 V AC	<b>082G351100</b>

Technical data		
Type	AME 855	
Power supply	V	24 AC/230 AC
Power consumption	VA	50 (24V), 63 (230V)
Frequency	Hz	50/60
Closing force	N	15000
Max. stroke	mm	80
Speed	mm/s	2
Max. medium temperature	°C	130
Ambient temperature	°C	-10 ... 50
Protection class	II	

- 3-point or modulating control
- Easy to use manual operation (monitoring on terminal R)
- Position indication
- LED signalling
- Direct or inverse function
- Automatic adaptation of stroke to valve's end positions which reduces commissioning time
- Frost protection function
- Blockage detection
- Internal temperature control
- Selectable hysteresis
- Auto test function
- Auto pause function
- Remote reset possibility

The AME 855 actuators are used with the VF3 seated valves and are designed for use in District Heating/cooling, heating, ventilating and air conditioning systems. AME 855 actuators can be controlled by electronic controllers with modulating or 3-point control output.

### Compatible Valves

VF 3 (DN200 to DN 300) .....Page 38



# 2-Way Seated Control Valve

## VFM2



- Logarithmic control characteristic
- Control ratio - 100:1
- Pressure relieved design
- Temperature range (C): -10...150
- Flange connection

2-way seated control valve applicable for heating, district heating and district cooling systems.

DN	k <sub>vs</sub> (m³/h)	PN	Δp <sub>s</sub> <sup>2)</sup> (bar)	Δp <sub>max.</sub> (bar) <sup>1)</sup> for AMV/E 65x	Code number
65	63	16	16	8	065B350000
80	100				065B350100
100	160				065B350200
125	250				065B350300
150	400		10	4	065B350400
200	630	065B350500			
250	900	3		065B350600	

### Compatible Actuators

AMV 655	Page 49
AME 655	Page 49
AMV 658	Page 49
AME 658	Page 49

1)  $\Delta p_{max}$  is maximum permissible differential pressure across the valve referred for the whole actuating range of motorised valve (a function of the actuator's performance).

2)  $\Delta p_s$  is maximum permissible closing differential pressure applied in fully closed position of the valve, at which the valve will seal tightly (close off pressure).





# Actuators

## AMV 655 and AMV 658 for 3-Point Control

## AME 655 and AME 658 for Modulating Control

### Actuator

Type	Supply voltage	Code number
AMV 655	24V	<b>082G344000</b>
	230V	<b>082G344100</b>
AMV 658 SD	24V	<b>082G344400</b>
	230V	<b>082G344500</b>
AMV 658 SU	24V	<b>082G344600</b>
	230V	<b>082G344700</b>

### Accessories

Type	Code number
Adapter to fit actuator to VFG DN15-65 valves	<b>065B352500</b>
Adapter to fit actuator to VFG DN80-125 valves	<b>065B352600</b>
Adapter to fit actuator to VFG DN150-250 valves	<b>065B352700</b>

- Manual operation mechanical and/or electrical
- Position indication via LED signal
- Inverse function
- Pulse output signal
- Thermic and overload protection
- Precise regulation and fast response on 3-point signal (0.04s)

AMV electrical actuators provide three point control when fitted in conjunction with VFM2 valves.

### Compatible Valves

VFM2 .....Page 48

### Actuator

Type	Supply voltage	Code number
AME 655	24V	<b>082G344200</b>
	230V	<b>082G344300</b>
AME 658 SD	24V	<b>082G344800</b>
	230V	<b>082G344900</b>
AME 658 SU	24V	<b>082G345000</b>
	230V	<b>082G345100</b>

### Accessories

Type	Code number
Adapter to fit actuator to VFG DN15-65 valves	<b>065B352500</b>
Adapter to fit actuator to VFG DN80-125 valves	<b>065B352600</b>
Adapter to fit actuator to VFG DN150-250 valves	<b>065B352700</b>

- Manual operation mechanical and/or electrical
- Position indication via LED signal
- Selectable speed (2 or 6 s/mm)
- Self-stroking
- 3 point or modulation control setting
- Precise regulation and fast response on 3-point signal (0.04s)

AME actuators provide modulating control when fitted in conjunction with VFM2 valves.

### Compatible Valves

VFM2 .....Page 48

# Brass Rotary Valves

## HRB 3 and HRB 4



HRB rotary valves are used together with the actuators AMB 162 (also AMB 182 could be used as well if special speed is required).

The valves are used for controlling flow temperature in heating systems in which a certain leakage can be accepted and in which a defined control characteristic is not required.

### Applications

Water based heating and cooling applications. 3-port valves can be placed in diverting and mixing function whereas 4-port version function is double mixing.

### Compatible Actuators

AMB162.....Page 52

AMB182.....Page 52

Type	DN	k <sub>vs</sub> (m <sup>3</sup> /h)	PN	Connection	Code number	
					HRB 3	HRB 4
HRB 3 HRB 4	15	0.4	10	Rp ½"	<b>065Z039900</b>	-
		0.63			<b>065Z040000</b>	
		1.0			<b>065Z040100</b>	
		1.63			<b>065Z040200</b>	
		2.5			<b>065Z040300</b>	
		4.0			<b>065Z039800</b>	<b>065Z041100</b>
	20	2.5		Rp ¾"	<b>065Z039700</b>	-
		4.0			<b>065Z040400</b>	<b>065Z041200</b>
		6.3			<b>065Z040500</b>	<b>065Z041300</b>
		6.3			<b>065Z040600</b>	-
	25	10		Rp 1"	<b>065Z040700</b>	<b>065Z041400</b>
		16			<b>065Z040800</b>	<b>065Z041500</b>
	40	25		Rp 1½"	<b>065Z040900</b>	<b>065Z041600</b>
	50	40		Rp 2"	<b>065Z041000</b>	<b>065Z041700</b>

### Technical data

Nominal diameter	DN	15	20	25	32	40	50
Control characteristic		S characteristic					
Leakage	HRB 3	Diverting: max. 0.02% of flow / Mixing: max. 0.05% of flow Max. 1.0% of k <sub>vs</sub>					
	HRB 4						
Nominal pressure	PN	10					
Max. closing pressure	bar	Diverting: 2 / Mixing: 1					
Torque at PN	Nm	5					
Medium		Circulation water / glycolic water up to 50%					
Medium pH		Min. 7, Max. 10					
Medium temperature	°C	2 ... 110					
Connections		Internal thread ISO 7/1					
Materials							
Valve body and slide shoe		CuZn36Pb2As (Brass DZR, CW 602N)					
Stuffing box		CuZn36Pb2As (Brass DZR, CW 602N)					
Stuffing box sealing		EPDM					





# Cast Iron Rotary Valves

## HRE 3 and HRE 4



Type	DN (mm)	k <sub>vs</sub> (m³/h)	PN	Connection	Code number	
					HRE 3	HRE 4
HRE 3 HRE 4	20	6.3	6	Rp ¾"	<b>065Z041800</b>	<b>065Z042300</b>
	25	10		Rp 1"	<b>065Z041900</b>	<b>065Z042400</b>
	32	16		Rp 1¼"	<b>065Z042000</b>	<b>065Z042500</b>
	40	25		Rp 1½"	<b>065Z042100</b>	<b>065Z042600</b>
	50	40		Rp 2"	<b>065Z042200</b>	<b>065Z042700</b>

Technical data						
Nominal diameter	DN	20	25	32	40	50
Control characteristic		S characteristic				
Leakage	HRE 3	Diverting: max. 0.05% of $k_{VS}$ / Mixing: max. 1.0% of $k_{VS}$				
	HRE 4	Max. 1.5% $k_{VS}$				
Nominal pressure	PN	6				
Max. closing pressure	bar	1				
Torque at PN	Nm	5				
Medium		Circulation water / glycolic water up to 50%				
Medium pH		Min. 7, Max. 10				
Medium temperature	°C	2 ... 110				
Connections		Internal thread ISO 7/1				
Materials						
Valve body		Grey cast iron EN-GJL-250(GG25)				
Slide shoe		CuZn36Pb2As (Brass DZR, CW 602N)				
Stuffing box sealing		EPDM				

HRE rotary valves are used together with the actuators AMB 162 (also AMB 182 could be used as well if special speed is required).

The valves are used for controlling flow temperature in heating systems in which a certain leakage can be accepted and in which a defined control characteristic is not required.

### Applications

Water based heating and cooling applications. 3-port valves can be placed in diverting and mixing function whereas 4-port version function is double mixing.

### Compatible Actuators

AMB162.....Page 52  
AMB182.....Page 52



# Rotary Actuators

## AMB 162 and AMB 182



- Position indicator
- Manual operation

AMB 162 and AMB 182 actuators are used for temperature control in central heating systems together with 3-way and 4-way rotary valves of the types HRB and HRE.

The actuators are applicable with:

- Controllers with 3-point outlet
- Controllers with voltage or current output

### Applications

Operation of rotary valves

### Compatible Valves

HRB3.....	Page 50
HRB4.....	Page 50
HRE3.....	Page 51
HRE4.....	Page 51

Type	Torque (Nm)	Control signal	Speed (s/90°C)	Supply voltage (v)	Remark	Code number
AMB 162	5	3-point	120	24	-	082H021300
			120		AS	082H021800
			60	230	-	082H022200
			120		-	082H022300
			480		-	082H022400
			120		AS	082H022800
		Modulating	140	24	-	082H023000
AMB 182	10	3-point	60	24	-	082H023100
			60	230	-	082H023200
			240	24	-	082H023400
	15		240	230	-	082H023800
			240	230	AS	082H024000
			Modulating	140	24	-

\* Actuator with built-in auxiliary signal switch

Technical data		
Power supply	V	24 AC/DC or 230 AC
Power consumption	VA	AMB 162: 2,5
		AMB 182: 3,5
Frequency	Hz	50/60
Control input		3-point
		0-10 V (2-10 V)
Operating torque	Nm	5, 10 or 15
Rotation angle	°	90
Ambient temperature	°C	0 ... 50
Storage and transport temperature	°C	-10 ... +80
Protection Class		II
Grade of enclosure		IP 42
Weight	kg	AMB 162: 0.46
		AMB 182: 0.54
CE marking in accordance with standards		Low Voltage Directive (LVD) 2006/95/EC: EN 60730-1, EN 60730-2-14 EMC Directive 2004/108/EC: EN 61000-6-2, EN 61000-6-3



# Motorised Zone Valves

## AMZ 112, 113 and 122



### AMZ 112, 2-port ball valve with actuator

DN	k <sub>vs</sub> (m³/h)	Connection	max. Δp valve	Code number	
				24V	230V
15	17	Cu-Cu 22	6 bar	<b>082G542600</b>	-
20	41	Cu-Cu 22		<b>082G542700</b>	-
15	17	Rp ½"		<b>082G540000</b>	<b>082G540600</b>
20	41	Rp ¾"		<b>082G540100</b>	<b>082G540700</b>
25	70	Rp 1"		<b>082G540200</b>	<b>082G540800</b>
32	121	Rp 1¼"		<b>082G540300</b>	<b>082G540900</b>
40	200	RP 1 ½"		<b>082G540400</b>	<b>082G541000</b>
50	292	Rp 2		<b>082G540500</b>	<b>082G541100</b>

### AMZ 113, 3-port ball valve with actuator

DN	k <sub>vs</sub> (m³/h)	Connection	max. Δp valve	Code number	
				24V	230V
15	17	Rp ½"	6 bar	<b>082G541200</b>	<b>082G541800</b>
20	41	Rp ¾"		<b>082G541300</b>	<b>082G541900</b>
25	70	Rp 1"		<b>082G541400</b>	<b>082G542000</b>
32	121	Rp 1¼"		<b>082G541500</b>	<b>082G542100</b>

### AMZ 122, Tamperproof 2-port ball valve with actuator

DN	k <sub>vs</sub> (m³/h)	Connection	max. Δp valve	Code number (230V)
15	17	Rp ½"	6 bar	<b>082G548000</b>
25	70	Rp 1"		<b>082G543200</b>
32	121	Rp 1¼"		<b>082G543300</b>

Type		AMZ 112	AMZ 113
Power supply	V	24V AC / 230V AC	
Power consumption	VA	3.5 (<0.2W stand by)	
Frequency	Hz	50/60	
Control input		On/off	
Rotation angle	s/90°	30	60
Max. medium temperature	°C	110	
Ambient temperature	°C	0 ... 50	
Storage and transport temperature	°C	-10 ... +80	
Protection Class		II	
Grade of enclosure		IP 42	



- Indication of actual valve position
- LED indication of turning direction
- Manual valve turning mode enabled by a permanent clutch
- No damage in case of valve blocking
- Silent and reliable operation
- Maintenance free
- Integrated auxiliary switch
- LED indication of activated auxiliary switch

AMZ motorised control valves are primarily designed for domestic and commercial central heating applications, priority control in domestic hot water application, solar energy application and priority control of boiler and solid fuel installations.

		Valve - AMZ 112						Valve - AMZ 113			
DN		15	20	25	32	40	50	15	20	25	32
Nominal pressure	PN	16			25			40			
Flow (K <sub>vs</sub> )	m³/h	17	41	70	121	200	292	17	41	70	121
Medium temperature	°C	-20 ... 130									
Medium		Drinking water, water, glycol ≤ 50%, air, non aggressive fluids									
Max. operating torque	Nm	1.35	1.85	2.80	3.30	4.00	4.75	2.7	3.7	5.6	6.6
Max. operating ΔP	bar	6									
Connection		Internal thread Rp ISO 7/1									
Materials											
Body		CW 617 N UNI EN 12165									
Ball		CW 617 N UNI EN 12164									
Anti-friction ring		PTFE									

# Butterfly Valves

## VFY-WA



- Butterfly valve in 25mm-300mm complete with 24V or 230V On/Off actuators
- Comes built with actuator already connected to the valve
- Wafer style connection with 4 centring lugs
- Complete with position indicator and manual adjustment dial
- Small in build for installation in a confined space
- 30 second opening and closing speed
- Spare valves and actuators available

Technical Data	
Power Supply	24V and 230V
Actuator speed	30 sec/90°
Actuator working temperature (ambient)	minimum -10°C, maximum +50°C
Valves DN	DN 25 - DN 300
Leakage rate	Acc. to PED 97/23/CE, EN 12266-1, Rate A*
Valves pressure rating	16 bar from DN 32 - DN300 10 bar for DN 25
Medium	Chilled water 35% Glycol, Hot Water
Medium temperature	2 - 120°C
Protection code	IP 65 (DN 25 - DN 125), IP 66 (DN 150, 200), IP 67 (DN 250, 300)
Liner	EPDM
Material: Valve body	Cast iron EN GJL 250 (DIN GG25)
Flange:	Acc. to ISO 5211 and NF E 29-402 standards
Flange connection:	Between counter flanges acc. EN 1092-1

### VFY-WA 230V

Code No.	Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Opening time (s)	Weight (kg)
082G735000	VFY - WA	25	40	PN10	12	3.2
082G735100		32/40	62	PN16		3.3
082G740000		50	79			3.4
082G740100		65	174			4.5
082G740200		80	275		7	4.6
082G740300		100	496		12	6.4
082G740400		125	883			8.5
082G740500		150	1212			10.5
082G740600		200	2500		60	19.4
082G740700		250	3948	26.8		
082G740800		300	5635	38	47.5	
082G740900		350	8520		54	

### VFY-WA 24V

Code No.	Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Opening time (s)	Weight (kg)
082G736100	VFY - WA	25	49	PN10	12	3.2
082G736200		32/40	62	PN16		3.3
082G736300		50	79			3.4
082G736400		65	173			4.5
082G736500		80	275		7	4.6
082G736600		100	496		12	6.4
082G736700		125	883			8.5
082G736800		150	1212	10.5		
082G736900		200	2500	60	19.4	
082G737000		250	3948		26.8	

# Electrical Actuators for Air Dampers

## AMD



Type	Torque (Nm)	Max. Damper Area (m²)	Control Signal Type	Supply Voltage (V)	Spring Return	Auxiliary Switches	Code number (24V)	Code number (230V)
AMD 113	3	0.6	ON/OFF	24V / 230V	•		<b>082H113600</b>	<b>082H113800</b>
AMD 113 AS				24V / 230V	•	•	<b>082H113700</b>	<b>082H113900</b>
AMD 123			analogue 0...10V	24V	•		<b>082H114000</b>	
AMD 123 AS					•	•	<b>082H114100</b>	
AMD 213	5	1	ON/OFF	24V / 230V	•		<b>082H114200</b>	<b>082H114400</b>
AMD 213 AS				24V / 230V	•	•	<b>082H114300</b>	<b>082H114500</b>
AMD 223			analogue 0...10V	24V	•		<b>082H114600</b>	
AMD 223 AS					•	•	<b>082H114700</b>	
AMD 210	5	1	ON/OFF	24V / 230V			<b>082H110000</b>	<b>082H110200</b>
AMD 210 AS				24V / 230V		•	<b>082H110100</b>	<b>082H110300</b>
AMD 220			analogue 0...10V	24V			<b>082H110400</b>	
AMD 220 AS						•	<b>082H110500</b>	
AMD 310	8	1.6	ON/OFF	24V / 230V			<b>082H110600</b>	<b>082H110800</b>
AMD 310 AS				24V / 230V		•	<b>082H110700</b>	<b>082H110900</b>
AMD 420	10	2	analogue 0...10V	24V			<b>082H111000</b>	
AMD 420 AS						•	<b>082H111100</b>	
AMD 413	10	2	ON/OFF	24V / 230V	•		<b>082H114800</b>	<b>082H115000</b>
AMD 413 AS				24V / 230V	•	•	<b>082H114900</b>	<b>082H115100</b>
AMD 423			analogue 0...10V	24V	•		<b>082H115200</b>	
AMD 423 AS					•	•	<b>082H115300</b>	
AMD 510	15	3	ON/OFF	24V / 230V			<b>082H111200</b>	<b>082H111400</b>
AMD 510 AS				24V / 230V		•	<b>082H111300</b>	<b>082H111500</b>
AMD 520			analogue 0...10V	24V			<b>082H111600</b>	
AMD 520 AS						•	<b>082H111700</b>	
AMD 613	20	3	ON/OFF	24V / 230V	•		<b>082H115400</b>	<b>082H115600</b>
AMD 613 AS				24V / 230V	•	•	<b>082H115500</b>	<b>082H115700</b>
AMD 623			analogue 0...10V	24V	•		<b>082H115800</b>	
AMD 623 AS					•	•	<b>082H115900</b>	
AMD 610	20	4	ON/OFF	24V / 230V			<b>082H111800</b>	<b>082H112000</b>
AMD 610 AS				24V / 230V		•	<b>082H119000</b>	<b>082H112100</b>
AMD 620			analogue 0...10V	24V			<b>082H112200</b>	
AMD 620 AS						•	<b>082H112300</b>	
AMD 710	30	6	ON/OFF	24V / 230V			<b>082H112400</b>	<b>082H112600</b>
AMD 710 AS				24V / 230V		•	<b>082H112500</b>	<b>082H112700</b>
AMD 720			analogue 0...10V	24V			<b>082H112800</b>	
AMD 720 AS						•	<b>082H112900</b>	
AMD 810	40	8	ON/OFF	24V / 230V			<b>082H113000</b>	<b>082H113200</b>
AMD 810 AS				24V / 230V		•	<b>082H113100</b>	<b>082H113300</b>
AMD 820			analogue 0...10V	24V			<b>082H113400</b>	
AMD 820 AS						•	<b>082H113500</b>	

AMD (AS) actuators are available as either 2/3 point control or modulating control versions. They all have spring return function and are for use in heating, ventilation and air conditioning applications (HVAC)

The actuators are used for the regulation of air dampers with a 90° angle of rotation. The AS versions include 2 built-in auxiliary switches.





# Hydronic Balancing Valves

If you are dedicated to establish indoor climate solutions that provide optimal air quality, comfortable living and/or work conditions and maximum energy efficiency, then Danfoss is your ideal partner.

You already know that the most efficient heating or cooling installations can only be realised by ensuring optimal hydronic balance and perfect temperature control. We have many years of experience and a complete range of products in this area.

We supply high quality products for innovative, energy saving and easy to use solutions.

In this section we present a basic overview of our many products for different applications. Each has its own special features and benefits to make your daily work easier, faster or better.



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# Why use Balancing Valves?



MSV-O

There are many reasons to use automatic or manual balancing valves. Some symptoms of badly balanced heating/cooling systems are:

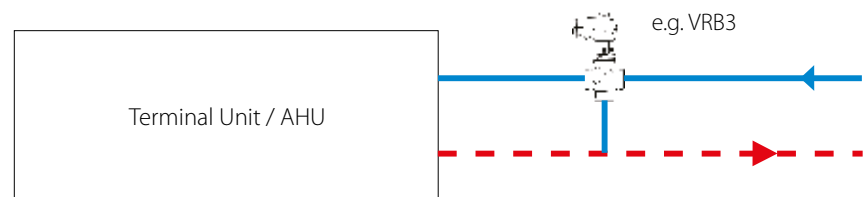
- Noise Problems
- Insufficient Capacity
- Poor/inaccurate control
- Long start-up times
- Energy wastage

Balancing valves can provide a solution to all of these problems providing an economical and cost effective solution to common hydronic problems.

There are two main types of system, each of them present differing challenges when it comes to balancing the system:

## Constant Flow System

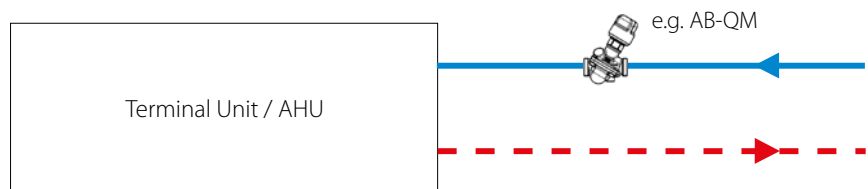
Involves the use of a 3 port valve and a bypass, to maintain the flow around a system when there is no demand from the terminal units. In these systems, the overall flow remains constant.



MSV-BD

## Variable Flow System

Involves the use of 2 port valves to shut off the flow to the terminal units when there is no demand. In these systems the overall flow varies depending on demand for heating or cooling.

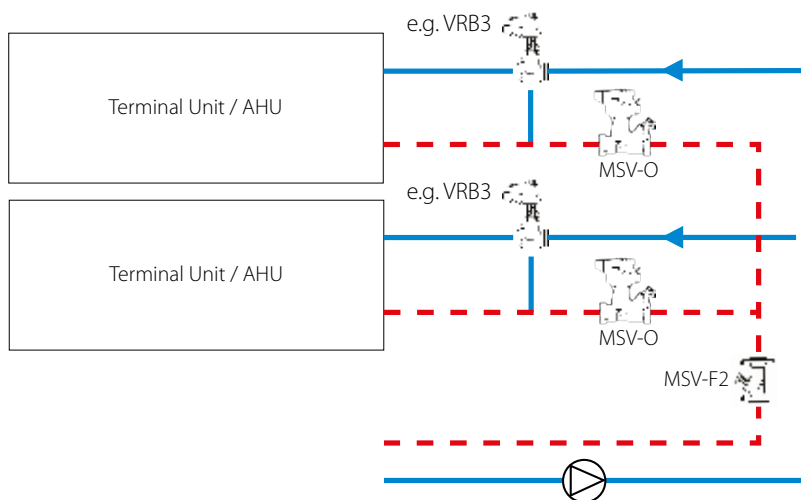


MSV-F2

## Solutions for Constant Flow Systems

Danfoss offers a range of solutions using both manual and automatic balancing valves, using a combination of the LENO™ MSV-O and MSV-BD valves can provide ease of installation and balancing. In the MSV-O valve, the flow is measured over a fixed venturi orifice, providing very fast and accurate measurement. The MSV-O and MSV-F2 valves can then be adjusted to provide the required flow rates.

In order to reduce installation and commissioning costs, the AB-QM valve can be used to good effect as a constant flow regulator (CFR). The setting of the flow is simply a case of calculating the required flow, selecting a valve which covers the flow rate you require and setting the valve (desired flow/max flow x 100 = setting). This means no commissioning or measurement is needed, however the AB-QM valves do have nipples for differential pressure recording and verification purposes.



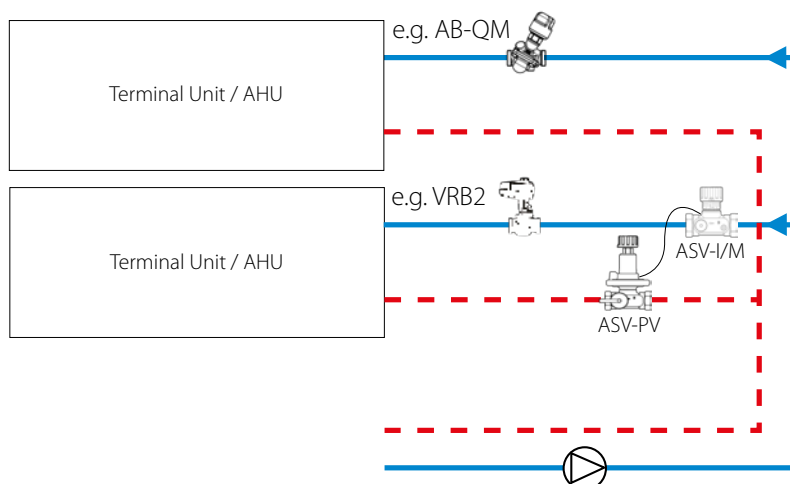
ASV-PV



ASV-I

## Solutions for Variable Flow Systems

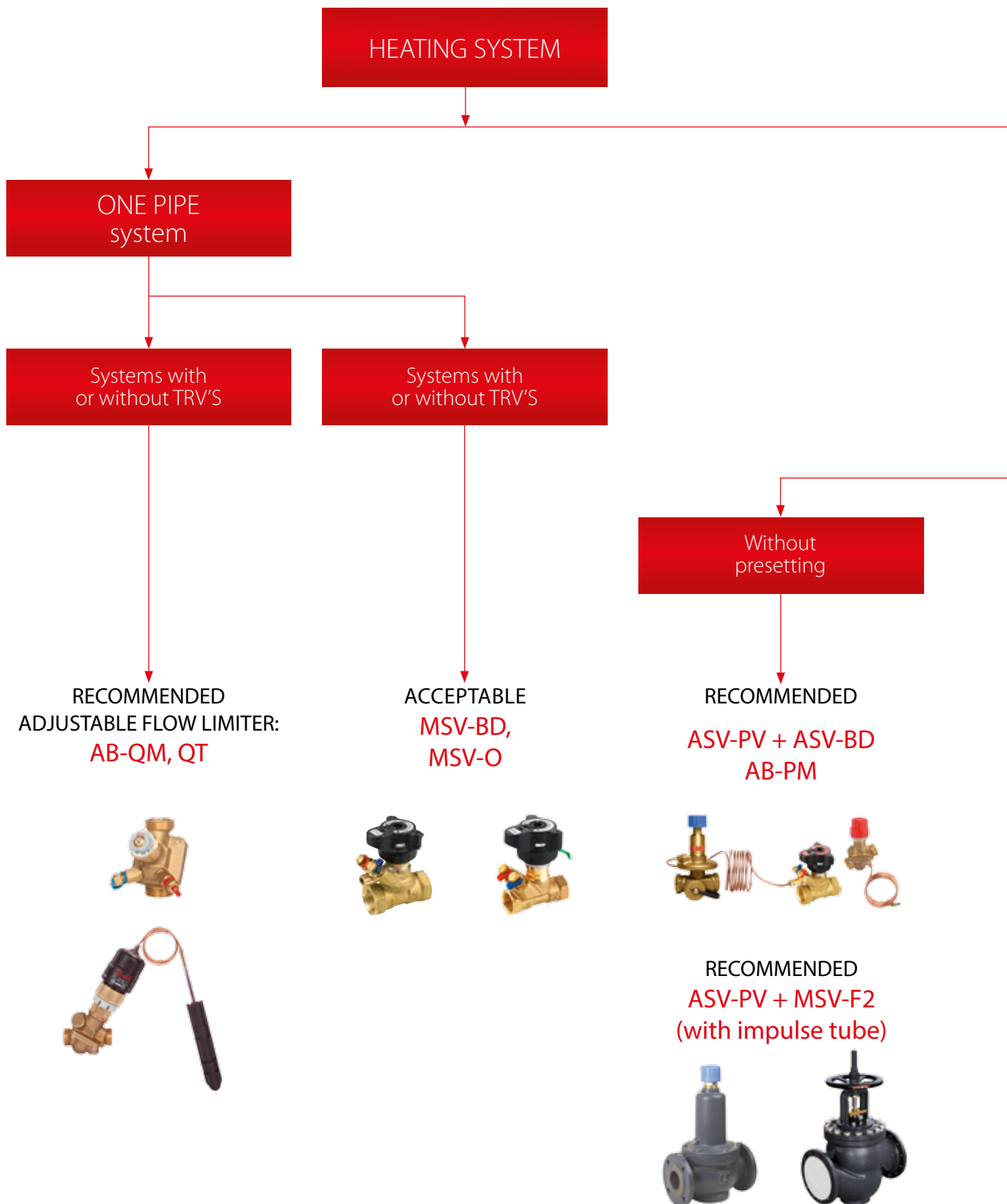
Variable flow systems are perfectly suited to automatic balancing valve solutions (ASV), or by using the AB-QM, combined with an actuator (see pages 46 to 49) to act as a flow regulator and control valve in one. As with the constant flow system, when using an AB-QM the need for additional valves is removed, and setting up for a required flow is simple using the built in scale on the valve.



AB-QM

# Balancing Valve Selection Guide

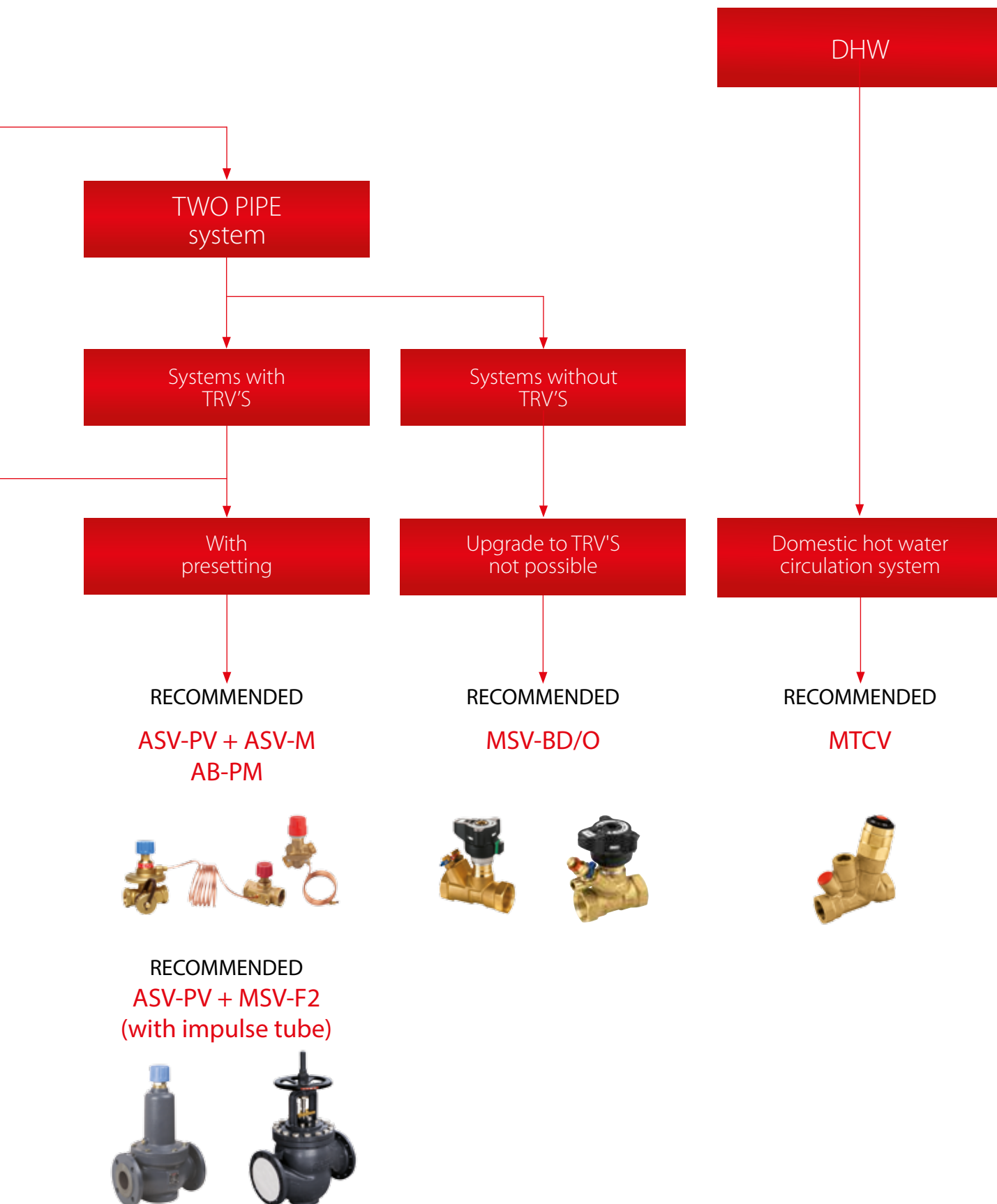
## Heating Systems





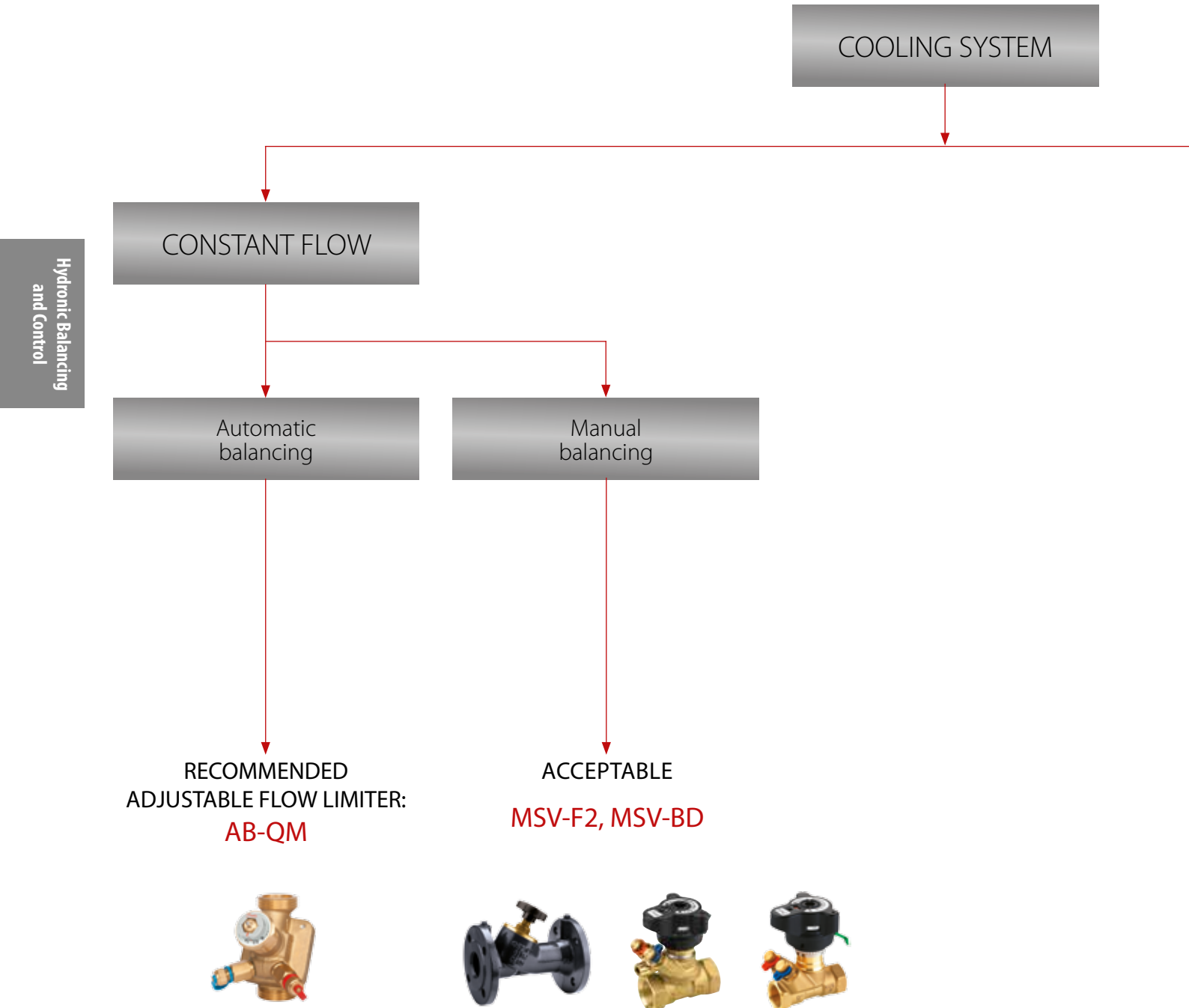
# Balancing Valve Selection Guide

## Heating Systems



# Balancing Valve Selection Guide

## Cooling Systems



# Balancing Valve Selection Guide

## Cooling Systems

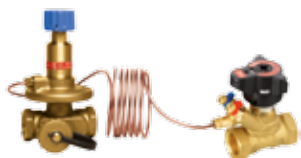
VARIABLE FLOW

Pressure controller

Adjustable pressure

RECOMMENDED

ASV-PV + ASV-M/BD



RECOMMENDED

ASV-PV (flange) + MSV-F2 (with impulse tube)



Combined pressure  
independent control

Control valves with  
actuators and automatic  
adjustable flow limiter

RECOMMENDED

AB-QM + TWA-Z  
AB-QM + ABNM  
AB-QM + AMV(E)



# Fixed Orifice Commissioning Valve MSV-O



- Fixed venturi orifice
- Removable hand wheel for easy mounting
- Numeric presetting scale, visible from more angles
- Easy locking of presetting
- Built-in measuring nipples for 3mm needles
- Open-Closed colour indicator
- Measuring accuracy is 8% up to 25% of maximum setting
- Internal thread
- Sizes DN15LF - DN50
- All valves are DZR Brass

MSV-O is a new generation of manual valves for balancing flow in heating, cooling and domestic hot water systems. These combined presetting and shut off valves have a range of unique features and may be mounted in flow or return.

It is recommended to use MSV-O for balancing and shut-off in constant flow systems, i.e. in front of boilers, flat stations or heat pumps in one-family houses.

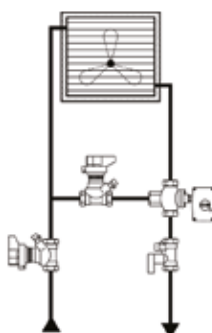


MSV-O has a fixed venturi orifice in the valve body with constant kvs-value. This feature makes it possible to read flow on the measuring device, without typing in presetting. This feature saves time for commissioning for each valve installed.

MSV-O valve with internal thread					
Type	Material	Size	Kvs (m³/h)	Connection	Code No.
	DZR Brass	DN 15 LF	0.63	Rp ½"	003Z402000
		DN 15	2.8	Rp ½"	003Z402100
		DN 20	5.7	Rp ¾"	003Z402200
		DN 25	9.7	Rp 1"	003Z402300
		DN 32	16.6	Rp 1¼"	003Z402400
		DN 40	25.4	Rp 1½"	003Z402500
		DN 50	37.9	Rp 2"	003Z402600

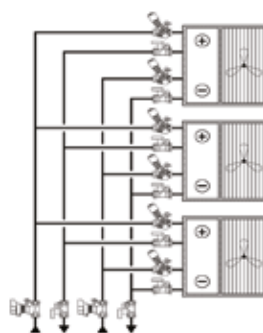
Accessories	
Type	Code No.
Standard measuring nipples, 2pcs.	003Z466200
Extended measuring nipples, 60mm, 2 pcs.	003Z465700
Operating handle	003Z465200
Identification tag and strips, 10 pcs.	003Z466000

## Applications



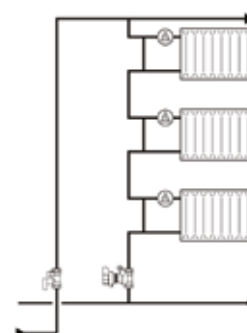
### Air handling unit

- For constant flow
- For balancing
- Shut-off function for service/repair



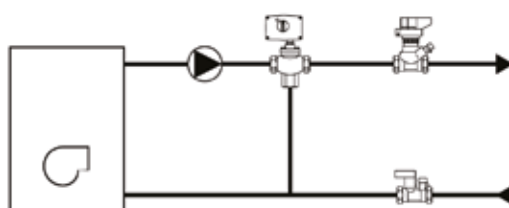
### Fan coils

- For flow verification
- Shut-off function for service/repair



### Radiators

- For flow verification
- Shut-off function for service/repair



- Boiler, flat station or heat pump in 1-family houses.
- For balancing.
  - Shut-off function for service/repair.

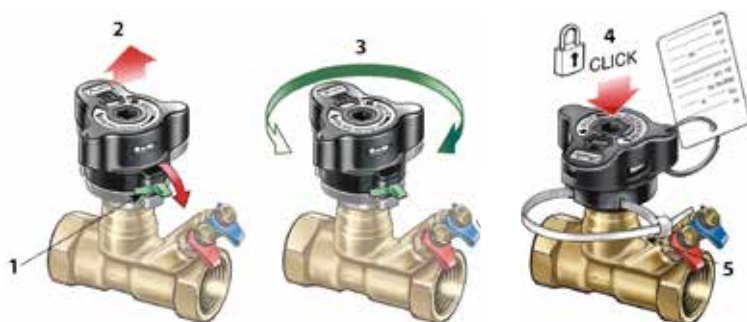
# Variable Orifice Commissioning Valve MSV-BD



MSV-BD valve with internal thread					
Type	Material	Size	Kvs (m <sup>3</sup> /h)	Connection	Code No.
	DZR Brass	DN 15 LF	2.5	Rp 1/2"	<b>003Z400000</b>
		DN 15	3.0	Rp 1/2"	<b>003Z400100</b>
		DN 20	6.0	Rp 3/4"	<b>003Z400200</b>
		DN 25	9.5	Rp 1"	<b>003Z400300</b>
		DN 32	18	Rp 1 1/4"	<b>003Z400400</b>
		DN 40	26	Rp 1 1/2"	<b>003Z400500</b>
		DN 50	40	Rp 2"	<b>003Z400600</b>

- Removable hand wheel for easy mounting
- 360° rotating measuring station for convenient measuring and draining
- Numeric presetting scale, visible from more angles
- Easy locking of presetting
- Built-in measuring nipples for 3mm needles
- Built-in drain cock with separate flow/return draining
- Open-Closed colour indicator
- Measuring accuracy is 8% up to 25% of maximum setting
- Internal thread
- Sizes DN15LF - DN50
- All valves are DZR Brass

## Setting and Locking



The valve has a built-in presetting feature for accurate flow ratings. Setting the required flow is made in 5 steps:

1. Release the lock using the green lever.
2. The handle pops up automatically.
3. The calculated value can now be set.
4. The setting is locked when the handle is pressed to click.
5. Seal - the setting can be protected by using a strip as shown.

## Shut-Off

In order to shut-off the valve the handle must be pressed down.

The shut-off function features a ball valve, which only requires a 90 degree turn to shut the valve completely.

An indicator window shows the actual setting:

- red = closed
- white = open



MSV-BD is a new generation of manual valves for balancing flow in heating, cooling and domestic hot water systems. These combined presetting and shut off valves have a range of unique features.

It is recommended to use MSV-BD in constant flow systems. The valve may be mounted in flow or return.

DN 15 and 20 valves are available with internal or external thread. Other dimensions with internal thread.



# Variable Orifice Commissioning Valve MSV-F2



- Available in sizes from DN15 – DN400
- Easy pre-setting – digital display
- Stroke limiter and non-rising handwheel for all versions
- Lockable handwheel
- G 1/4 thread for various measuring nipples
- Fast and precise flow measurement using measuring orifices together with valve

The MSV-F2 is the second generation of flanged manual balancing valves from Danfoss. The MSV-F2 can be used in numerous HVAC applications such as Air Handling Units (AHUs), fan coil systems, boiler stations etc.

The MSV-F2 is compact by design, with excellent flow characteristics making it an ideal valve for almost any situation where a larger sized manual balancing valve is needed. It is made of cast iron (GG25 for PN16 versions and GGG40.3 for PN25 versions) and operates within the temperature range of -10 to 130°C (up to 150°C for PN25 versions).

All MSV-F2 valves have flow limitation via a built in stroke limiter and enable a constant pressure drop in constant flow systems.

MSV-F2 valves - PN16	DN <sup>1)</sup> mm	Kvs m <sup>3</sup> /h	Tmax °C	PN Bar	Code No. (with measuring nipples)
	15	3.1	130	16	<b>003Z108500</b>
	20	6.3			<b>003Z108600</b>
	25	9.0			<b>003Z108700</b>
	32	15.5			<b>003Z108800</b>
	40	32.3			<b>003Z108900</b>
	50	53.8			<b>003Z106100</b>
	65	93.4			<b>003Z106200</b>
	80	122.3			<b>003Z106300</b>
	100	200.0			<b>003Z106400</b>
	125	304.4			<b>003Z106500</b>
	150	400.8			<b>003Z106600</b>
	200	685.6			<b>003Z106700</b>
	250	952.3			<b>003Z106800</b>
	300	1380.2			<b>003Z106900</b>
	350	2046.1			<b>003Z109000</b>
	400	2584.6			<b>003Z109100</b>

1) Flange valves dimension DN 15-40, 350 and 400 available on request

MSV-F2 valves - PN25	DN <sup>1)</sup> mm	Kvs m <sup>3</sup> /h	Tmax °C	PN Bar	Code No. (with measuring nipples)
	15	3.1	150	25	<b>003Z109200</b>
	20	6.3			<b>003Z109300</b>
	25	9.0			<b>003Z109400</b>
	32	15.5			<b>003Z109500</b>
	40	32.3			<b>003Z109600</b>
	50	53.8			<b>003Z107000</b>
	65	93.4			<b>003Z107100</b>
	80	122.3			<b>003Z107200</b>
	100	200.0			<b>003Z107300</b>
	125	304.4			<b>003Z107400</b>
	150	400.8			<b>003Z107500</b>
	200	685.6			<b>003Z107600</b>
	250	952.3			<b>003Z107700</b>
	300	1380.2			<b>003Z107800</b>
	350	2046.1			<b>003Z109700</b>
	400	2584.6			<b>003Z109800</b>

## Accessories

Type	Code No.	Type	Code No.
Needle nipple, 2 pcs.	<b>003Z010400</b>	Hand-wheel	DN 15-50 <b>003Z017900</b>
Extension of measuring nipple 45mm, 2 pcs	<b>003Z010300</b>		DN 65-150 <b>003Z018000</b>
Extension of measuring nipple 80mm, 2 pcs	<b>003Z010500</b>		DN 200 <b>003Z018100</b>
			DN 250-300 <b>003Z018200</b>
			DN 350 - 400 <b>003Z018300</b>

# Differential Pressure Control Valves

Hydronic balancing of the district heating network provided by the self-acting controllers through flow and differential pressure ensures adequate heating supply to all subscriber stations, reduces flow and heat loss in the district heating network and increases pump performance.

Self-acting controls maintain constant differential pressure ( $\Delta p$ ) across the control valves. This ensures the adequate pressure conditions assumed at control valves sizing and enables accurate temperature control and low return temperature, as well as prolonging the life of the control components.

Low differential pressure ( $\Delta p$ ) across the control valves provided by Danfoss self-acting controllers prevents cavitation and reduces noise emission in the district heating system.

To achieve optimum operational conditions for the district heating system, it is very important to provide the system with hydronic balancing.

Flow Rate l/s	Flow Rate l/h										
35	126400									DN250	
28	101120									DN200	
25	88480									DN150	
14	50560									DN125	DN125
11	39500									DN100	DN100
7.0	25280									DN80	DN80
6.7	24016									DN65	DN65
4.4	15800		DN100	DN100	DN100					DN50	DN50
4.2	15168		DN80	DN80	DN80					DN40	DN40
2.8	10112		DN65	DN65	DN65	DN50		DN50		DN32	DN32
2.6	9480		DN50	DN50	DN50	DN40		DN40		DN25	DN25
2.2	7900		DN40	DN40	DN40	DN32	DN32	DN32		DN20	DN20
1.8	6320		DN32	DN32	DN32	DN25	DN25	DN25		DN15 4.0	DN15 4.0
1.4	5056		DN25	DN25	DN25	DN20	DN20	DN20		DN15 2.5	DN15 2.5
1.1	3950		DN20	DN20	DN20	DN15 1.6	DN15 1.6	DN15 1.6		DN15	DN15
0.9	3160	DN40	DN40	DN40							
0.71	2538	DN32	DN32	DN32							
0.55	1991										
0.48	1738										
0.35	1264										
0.30	1074										
0.22	790										
0.17	600										
Type:		ASV	ASV	ASV	ASV	ASV	AVP	AVP	AVP	AFP	AFP
Size Range:		DN15-40	DN15-40	DN32-100	DN50-100	DN50-100	DN15-50	DN15-32	DN15-50	DN15-250	DN15-125
Opening Pressure Range:		5-25 kPa	20-60 kPa	35-75 kPa	20-40 kPa	60-100 kPa	20-100 kPa	80-160 kPa	30-200 kPa	15-150 kPa	50-300 kPa
$\Delta P = < 10 \text{ kPa}$											

This chart is for guidance only. Any selections must be checked with a Danfoss representative before a final selection can be made.

An assumed maximum pressure loss, across the valve, of 10 kPa has been applied. Higher flow ranges can be achieved by increasing the differential pressure across the valve. To select, take your required design flow rate. Find the flow points it falls between on the flow axis, draw a line horizontally. The valve sizes on the line are acceptable sizes to select. The circuit pressure is the pressure from the impulse tube on the flow to the inlet on the differential pressure control valve on the return. Please ensure you select a valve with a suitable circuit pressure for your application. The DPCV should be installed on the return. Some valves have flow mounting versions which are available on request. Consult Danfoss for guidance on installation.

# Differential Pressure Control Valve

## ASV-PV and ASV-BD/ASV-M





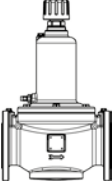
- Maintains differential pressure across risers
- ASV-PV valves are settable in different ranges:
  - 5-25 kPa setting is mostly used for radiator applications
  - 20-60 kPa setting is used for radiator, fan coil, chilled beam and flat station applications
  - 35-75 kPa setting is used for flat station and fan coil, chilled beam applications
  - 60-100 kPa setting is used for large terminal unit applications (air handling units, fan coils etc.)
- Shut-off function
- An adapted membrane for every valve dimension which provides constant performance
- Low noise emission


ASV-PV can control the differential pressure in several ranges if different pressure is needed. ASV valves in dimensions DN 15-40 are supplied with an internal or external thread while DN 50 is supplied with external thread only. Dimensions DN 65-100 are supplied as flanged valves.


Connection of the valves is simple with all serviceable features at 90° to the pipework, easy connection for the impulse tube and a large selection of spares for all valves in the range.

ASV-PV valves are to be mounted in return pipe, in combination with partner valves mounted in flow pipe. As a partner valve ASV-M/ASV-BD are recommended for dimensions DN 15 to DN 50 and MSV-F2 for dimensions DN 65 to DN 100.

ASV-PV balancing valve inclusive 1.5m impulse tube (G 1/16 A) and drain cock (G 3/4 A)					
Type	DN	Kvs (m³/h)	Connection		Δ bar setting range
	15	1.6	Internal thread ISO 7/1	Rp 1/2	0.05 - 0.25
	20	2.5		Rp 3/4	
	25	4.0		Rp 1	
	32	6.3		Rp 1 1/4	
	40	10.0		Rp 1 1/2	0.20 - 0.60 <sup>1)</sup>
	15	1.6		Rp 1/2	
	20	2.5		Rp 3/4	
	25	4.0		Rp 1	
	32	6.3		Rp 1 1/4	
	40	10.0		Rp 1 1/2	0.35 - 0.75
	32	6.3		Rp 1 1/4	
	40	10.0		Rp 1 1/2	
	50	20	External thread ISO 228/1	G 2 1/2 A	0.05 - 0.25
					0.20 - 0.40
					0.35 - 0.75
					0.60 - 1.00

ASV-PV balancing valve inclusive 1.5m impulse tube (G 1/16 A)					
Type	DN	Kvs (m³/h)	Connection		Δ bar setting range
	65	1.6	Flange EN 1092-2	PN16	0.20 - 0.40
	80	2.5			
	100	4.0			
	65	6.3			0.35 - 0.75
	80	10.0			
	100	1.6			
	65	2.5			0.60 - 1.00
	80	4.0			
	100	6.3			
	100	6.3			0.03Z064500

ASV-BD shut-off valve, multifunctional partner valve (shut-off, rotating measuring station)				
Type	DN	Kvs (m³/h)	Internal Thread	Code No.
	15	3.0	Rp 1/2	003Z404100
	20	6.0	Rp 3/4	003Z404200
	25	9.5	Rp 1	003Z404300
	32	18	Rp 1 1/4	003Z404400
	40	26	Rp 1 1/2	003Z404500
	50	40	Rp 2	003Z404600

ASV-M shut-off valve, multifunctional partner valve (shut-off, rotating measuring station)				
Type	DN	Kvs (m³/h)	Connection	Code No.
	15	1.6	Internal thread	Rp 1/2 003L769100
	20	2.5		Rp 3/4 003L769200
	25	4.0		Rp 1 003L769300
	32	6.3		Rp 1 1/4 003L769400
	40	10		Rp 1 1/2 003L769500
	50	16	External thread ISO 228/1	G 2 1/2 A 003L770200

# Differential Pressure Controller

## AVPL



AVPL Differential pressure control valve Includes impulse tube set (1.5m at Kvs 1.0 and 2.5m at Kvs 1.6) and nipple $\frac{1}{16}$ - $R\frac{3}{8}$					
DN (mm)	Kvs (m <sup>3</sup> /h)	Connection		$\Delta P$ Setting Range (bar)	Code No.
15	1.0	External thread ISO 228/1	G $\frac{3}{4}$ A	0.05 - 0.25	003L503001
	1.6				003L503101

- Maintains a constant differential pressure regardless of flow rates
- Establishes and maintains system balance
- Compact design, ideal for consumer units
- Self-acting controls, no external power required

AVPL differential pressure control valves are used in block and district heating systems to reduce and maintain differential pressure within a dwelling.

Accessories				
Type	DN (mm)	Connection		Code No.
Weld-on tailpieces	15	-	-	003H690800
External tailpieces		Conical ext. thread according to EN 10226-1		R½ 003H690200
Fitting for impulse tube connection to pipe			G 1/16 - R¼	003L815100
10 EPDM o-rings for impulse tube				003L817500



# Self-Acting Differential Pressure Control Valves

## AVP



AVP self-acting differential pressure control valves are primarily for use in district heating systems. The controller closes on rising differential pressure.

AVP Controller (Return Mounting)									
DN	Kvs m³/h	Connection		Δ bar setting range	Code No.	Δ bar setting range	Code No.	Δ bar setting range	Code No.
15	1.6	Cylinder ext. thread acc. to ISO 228/1	G ¾ A	0.2-1.0	003H620600	0.8-1.6	003H621200	0.3-2.0	003H629300
	2.5				003H621300		003H621300		003H629400
	4.0				003H620800		003H621400		003H629500
20	6.3		G 1 A		003H620900		003H621500		003H929600
25	8.0		G 1 ¼ A		003H621000		003H621600		003H629700
32	12.5		G 1 ¾ A		-		003H621700		-
40	16		G 2 A		-		-		-
50	20		G 2½ A		-		-		-
32*	12.5		G 1¾ A		-		-		003H635400
40*	20		G 2 A		-		-		003H635500
50*	25		G 2½A		-		-		003H635600

\* Flanged connections

AVP Controller (Flow Mounting)							
DN	Kvs m³/h	Connection		Δ bar setting range	Code No.	Δ bar setting range	Code No.
15	1.6	Cylinder ext. thread acc. to ISO 228/1	G ¾ A	0.2-1.0	003H624400	0.3-2.0	003H632500
	2.5				003H624500		003H632600
	4.0				003H624600		003H632700
20	6.3		G 1 A		003H624700		003H632800
25	8.0		G 1¼ A		003H624800		003H632900
32*	12.5		G 1½ A		003H637200		003H637800
40*	16		G 2 A		003H637300		003H637900
50*	20		G 2½ A		003H637400		003H638000

\* Flanged connections

Accessories			
Description	DN No.	Connection	Code No.
Weld-on tailpieces	15	-	003H690200
	20		003H690300
	25		003H690400
	32		003H690500
	40		065F606100
	50		065F606200
Impulse tube	Description: 1 x copper tube Ø6 x 1 x 15m	R <sup>1</sup> / <sub>8</sub>	003H685200
	1 x compression fitting got impulse tube connection to pipe Ø6 x 1mm	R <sup>3</sup> / <sub>8</sub>	003H685300
		R ½	003H685400
10x compression fittings for impluse tube connection to pipe Ø6 x 1, R <sup>1</sup> / <sub>8</sub> "			003H685700
10x compression fittings for impluse tube connection to pipe Ø6 x 1, R <sup>3</sup> / <sub>8</sub> "			003H685800
10x compression fittings for impluse tube connection to pipe Ø6 x 1, R ½"			003H685900
10x compression fittings for impluse tube connection to pipe Ø6 x 1, G <sup>1</sup> / <sub>8</sub> "			003H693100
Shut off valve Ø6mm			003H027600

Actuators			
Description	Δ bar setting range	Code No.	
		Return Mounting	Flow Mounting
Actuator (with adjustable handle for ΔP)	0.2-1.0	003H682900	003H683400
Actuator (with adjustable handle for ΔP)	0.3-2.0	003H683000	003H683500





# Self-Acting Differential Pressure Controller

## AFP

VFG 2							
DN (mm)	Kvs (m³/h)	Tmax (°C)		Connections	PN16	PN25	PN40
15	4.0	150	200 <sup>1)</sup>	Flange	065B238800	065B240100	065B241100
20	6.3				065B238900	065B240200	065B241200
25	8.0				065B239000	065B240300	065B241300
32	16				065B239100	065B240400	065B241400
40	20				065B239200	065B240500	065B241500
50	32				065B239300	065B240600	065B241600
65	50				065B239400	065B240700	065B241700
80	80				065B239500	065B240800	065B241800
100	125				065B239600	065B240900	065B241900
125	160				065B239700	065B241000	065B242000
150	280	140			065B239800	-	065B242100
200	210				065B249900		065B242200
250	400				065B240000		065B242300

The VFG 2 valves combine with the AFP and AFPA self-acting differential pressure controllers, and are designed for use in district heating systems.

Hydronic Balancing and Control

Type	Δ bar setting range (bar)	For DN	Code No.
AFP <sup>1)</sup>	1 - 6	15 - 125	003G101400
	0.5 - 3		003G101500
AFP	0.15 - 1.5	15 - 250	003G101600
	0.1 - 0.7		003G101700
	0.05 - 0.35		003G101800

<sup>1)</sup> Actuator does not have excess pressure safety valve

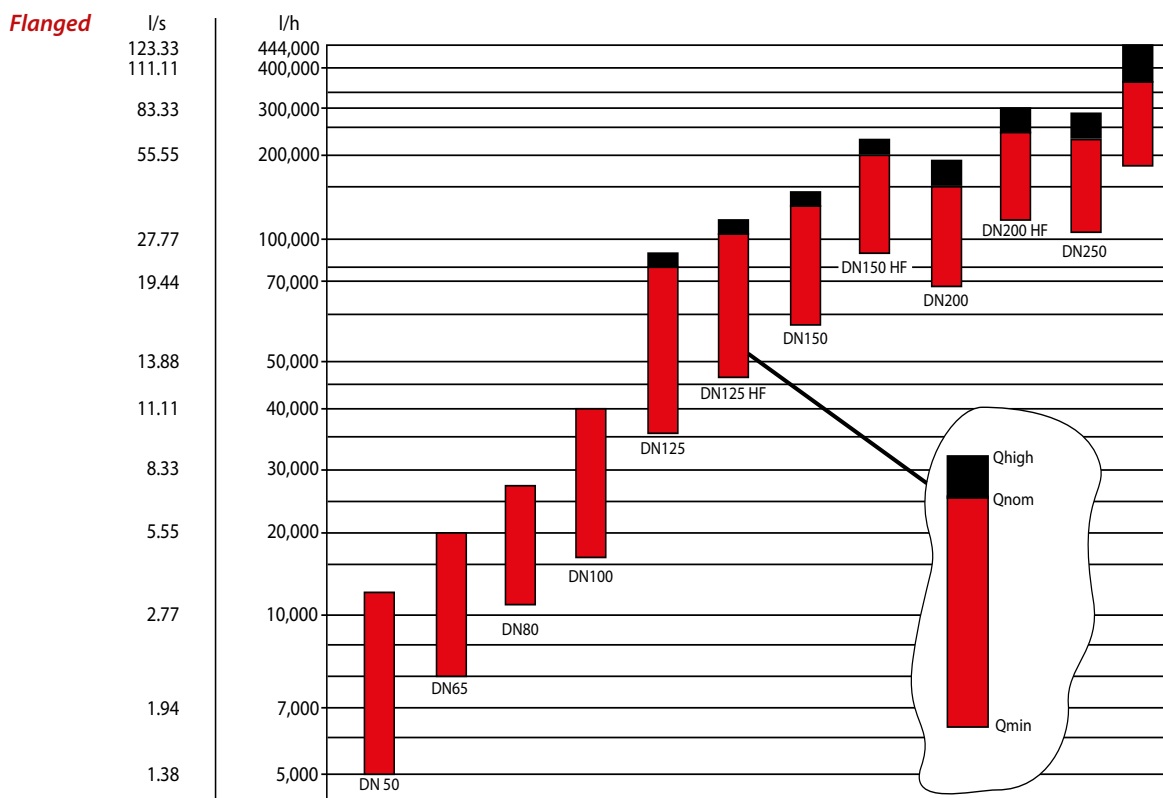
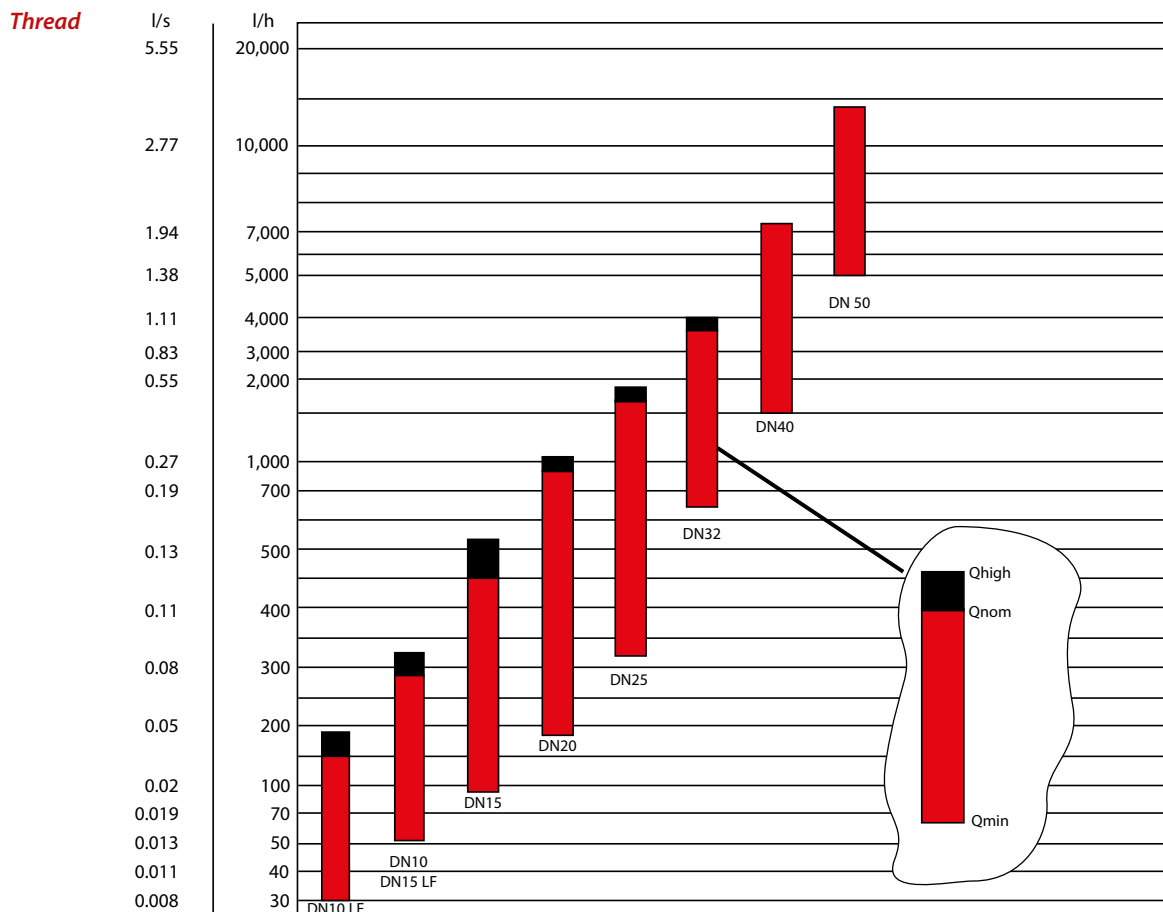
Accessories			
Type	Description	Connections	Code No.
Impulse tube set AF	1 x copper tube Ø10 x 1.5m, one threaded fitting G¼", two sockets (2 required per AFP actuator)	-	003G139100
Seal pot V1	1.0l capacity with threaded fittings for Ø10mm tube	-	003G139200
Seal pot V2	3.0l capacity with threaded fittings for Ø10mm tube	-	003G140300
KF2	For combination with pressure and electrical actuators	G 1¼" / 2 x G 1¼"	003G139800
KF3	For combination with thermostat		003G139700

Designed for use with VFG valves, AFP is a self-acting differential pressure controller primarily used in district heating systems. The controller closes on rising differential pressure.



# Sizing Chart

## AB-QM



# Pressure Independent Balancing and Control Valve **AB-QM**

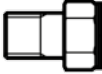


DN	Q <sub>max</sub> (l/h)	With measuring points		Without measuring points	
		External Thread	Code No.	External Thread	Code No.
10 LF	150	G ½ A	<b>003Z126100</b>	G ½ A	<b>003Z125100</b>
10	275		<b>003Z121100</b>		<b>003Z120100</b>
15 LF	275	G ¾ A	<b>003Z126200</b>	G ¾ A	<b>003Z125200</b>
15	450		<b>003Z121200</b>		<b>003Z120200</b>
20	900	G 1 A	<b>003Z121300</b>	G 1 A	<b>003Z120300</b>
25	1,700	G 1¼ A	<b>003Z121400</b>	G 1¼ A	<b>003Z120400</b>
32	3,200	G 1½ A	<b>003Z121500</b>	G 1½ A	<b>003Z120500</b>
40	7,500	G 2 S	<b>003Z077000</b>		
50	12,500	G 2½ A	<b>003Z077100</b>		
DN	Q <sub>max</sub> (l/h)	Flange Connection	Code No.		
50	12,500	PN 16	<b>003Z077200</b>		
65	20,000		<b>003Z077300</b>		
80	28,000		<b>003Z077400</b>		
100	38,000		<b>003Z077500</b>		
125	90,000		<b>003Z070500</b>		
125 HF	110,000		<b>003Z071500</b>		
150	145,000		<b>003Z070600</b>		
150 HF	190,000		<b>003Z071600</b>		
200	190,000		<b>003Z070700</b>		
200 HF	250,000		<b>003Z071700</b>		
250	280,000		<b>003Z070800</b>		
250 HF	370,000		<b>003Z071800</b>		

- No Kv or authority calculations needed. Flow is the only parameter to be considered when designing
- Maximum setting corresponds with international standards for flow speeds in pipes
- Linear or logarithmic characteristic when combined with gear actuators
- Compact design
- Easy commissioning
- Energy savings
- Increased comfort
- Easy trouble shooting
- Fast start-up - AB-QM does not need to be flushed or de-aired before use

The AB-QM is a PIBCV (Pressure Independent Balancing and Control Valve) which combines the benefits of a control valve and a differential pressure controller, which work in tandem to provide the ultimate in system control and setting accuracy. The differential pressure controller within the valve keeps a constant differential pressure across the valve cone, meaning that changes in system pressure do not affect the control characteristics of the valve.

Setting the valve is simple – all you need to know is the required flow through the valve, and the max flow of the valve. With these two figures you just divide one by the other to establish the correct setting for the valve e.g. Design flow (270l/h) / Valve max flow (450l/h) x 100 = 60% setting on the dial. Different sizes of ABQMs cover a range of maximum flows, enabling the right size valve for the application to be selected easily. The maximal flow speeds of AB-QM corresponds with the maximal flow speed through pipe dimensions according to international standards. With a standard M30x1.5 connection the AB-QM is suitable for a range of actuators providing control solutions for 0-10v, 3point and on/off control.

Accessories and Spare Parts			
Type	To pipe	To valve	Code No.
Union connection (1 pcs.) 	R ¾	DN 10	<b>003Z023100</b>
	R ½	DN 15	<b>003Z023200</b>
	R ¾	DN 20	<b>003Z023300</b>
	R 1	DN 25	<b>003Z023400</b>
	R 1¼	DN 32	<b>003Z023500</b>
	R 1½	DN 40	<b>003Z027900</b>
Tailpieces for soldering (2 nuts, 2 gaskets, 2 soldering nipples)	12 x 1 mm	DN 10	<b>065Z701600</b>
	15 x 1 mm	DN 15	<b>065Z701700</b>
Locking ring		DN 10-32	<b>003Z023600</b>
Shut-off & protection piece (max. closing pressure 16 bar)			<b>003Z023000</b>
Shut-off - plastic (max. closing pressure 1 bar)			<b>003Z024000</b>
Handle AB-QM (for details refer to instructions)		DN 40-100	<b>003Z069500</b>
		DN 125-250	<b>003Z069600</b>

For actuator combinations see page 74 and 75

# Actuator Selection Chart

## AB-QM

					TWA-Z	ABNM A5	AMI 140					
Supply	3-Position	Modulating	Safety Function	ON/OFF	0-10V							
24	✓		✗									
24	✓		✓									
24		✓	✗		ABNM A5	AMI 140						
230	✓		✗									
230	✓		✓									
230		✓	✓			AMI 140						
Potentiometer	✓	✗	✓	✗	✗	✗						
Switch	✓	✗	✓	✗	✗	✗						
			Speed (s/mm)	24	24	12						
			F (N)	100	100	200						
			Stroke (mm)	3	3	5.5						
PN Bar	Tmax °C	Valve Type	DN (mm)	Max flow l/h	Stroke (mm)							
16	-10 - +120°C	AB-QM - Down to close	10 LF	0-150	2.25	✓	✓	✓				
			10	0-275								
			15 LF	0-275								
			15	0-450								
			20	0-900								
			25	0-1700	4.5					✗		
			32	0-3200								
	40		7,500	10	✗	✗	✗					
	50		12,500	10								
	65		20,000	15								
	85		28,000	15								
	100		38,000	15								
	125		190,000	25								
	125 HF		110,000	30								
	150		145,000	25								
	150 HF		190,000	30								
	200		190,000	27								
	200 HF		250,000	27								
	250		280,000	27								
	250 HF		370,000	27								



	NovoCon®	AMV/E 110 NL - 120 NL		AMV/E/H 130 - 140		AME 435 QM	AME 55 QM	AME 85 QM
		AMV 110NL	AMV 120NL	H=Knob Version		AME 435 QM	AME 55 QM	AME 85 QM
		AMV 110NL	AMV 120NL	AMV 130	AMV 140	AME 435 QM	AME 55QM	AME 85 QM
		AME 110 NL	AME 120NL	AME 130	AME 130	AME 435 QM	AME 55 QM	AME 85 QM
				AMV 130	AMV 140			
		X	X	X	X	✓	✓	✓
		X	X	X	X	✓	✓	✓
	3, 6, 12, 24	24	12	24	12	7.5 or 15	8	8
	90	130	130	200	200	400	2000	5000
	6	5	5	5.5	5.5	20	40	40
	✓	✓	✓	✓	✓	X	X	X
						✓	X	X
	X	X	X	X	X		✓	
						X		
							X	✓



# NovoCon® S

## Four-in-one actuator

### Actuator

NovoCon® is a highly accurate multi-functional actuator designed for use with AB-QM in sizes from DN 10-32. It delivers best-in-class hydronic performance in, e.g. fan coil units, chilled beams, and radiant panels.

### Flow indicator

NovoCon® functions as a flow indicator thanks to the high position accuracy of the actuator and the pressure independent and linear characteristics of the AB-QM valve.



### Bus communication device

With the NovoCon® it is now possible to connect hydronics to Building Automation. All setting and control is possible via Fieldbus and requires only minimal data points.

### Data logger

The NovoCon® facilitates collection and storage of data that can be used to benchmark building performance over time, and to identify best practice in energy consumption behavior.

Best in class hydronic performance  
combined with BMS connectivity

# Digital Actuator

## NovoCon®



Type	Code
NovoCon® Hybrid	<b>003Z850000</b>
NovoCon® Digital	<b>003Z850100</b>

Type	Length	Connections	Code
Cable NovoCon® Digital	1.5 m	bus / power	<b>003Z860000</b>
Cable NovoCon® Digital	5 m	bus / power	<b>003Z860100</b>
Cable NovoCon® Digital	10 m	bus / power	<b>003Z860200</b>
Cable NovoCon® Digital, daisy chain	1.5 m	actuator / actuator	<b>003Z860300</b>
Cable NovoCon® Digital, daisy chain	5 m	actuator / actuator	<b>003Z860400</b>
Cable NovoCon® Digital, daisy chain	10 m	actuator / actuator	<b>003Z860500</b>
Cable NovoCon® Analog	1.5 m	0-10 V / power / voltage booster	<b>003Z860600</b>
Cable NovoCon® Analog	5 m	0-10 V / power / voltage booster	<b>003Z860700</b>
Cable NovoCon® Analog	10 m	0-10 V / power / voltage booster	<b>003Z860800</b>

*Please note: Cables are not included with actuator and must be ordered separately.*

Type	Code
Power supply range	24 V AC/DC, $\pm 25\%$ , 50 / 60 Hz
Power consumption	Running: 3.25 VA / Standby: 0.8 W
Protection class	III safety extra-low voltage
Electrical connection	Halogen free cable
Control options	LOG / MDF (alpha setting controlled)
Control signal NovoCon® Hybrid	0-10 VDC, 0-5 VDC, 2-10 VDC, 5-10 VDC, 2-6 VDC, 6-10 VDC, 0-20 mA, 4-20 mA, BACnet MS/TP
Control signal NovoCon® Digital	BACnet MS/TP
Actuator speed selections (open to close)	3 sec/mm, 6 sec/mm, 12 sec/mm, 24 sec/mm, Constant Time
Stroke	6 mm
Force	90 N
Position accuracy	$\pm 0.05$ mm
Ambient temp. range	$-10^{\circ}\text{C}$ to $55^{\circ}\text{C}$
Max. medium temp.	$120^{\circ}\text{C}$
Storage temp. range	$-40$ to $70^{\circ}\text{C}$
Grade of enclosure	IP 54 (IP 40 upside down)
Weight	0.4 kg

### BACnet data

Type	Length
BACnet device profile	BACnet Application Specific Controller (B-ASC)
BACnet protocol	BACnet Master Slave / Token Passing (MS/TP)
BACnet baud rates supported	Auto baud rate detection / 9600 bps / 19200 bps / 38400 bps / 56700 bps / 76800 bps / 115200 bps



- BACnet: B-ASC (BACnet Application Specific Controller)
- Remote commissioning/Reset/Flush features
- Flow indication
- High position accuracy
- LED bar displaying status
- No tools required for mounting
- Maintenance-free during lifetime
- Valve blockage alarm

NovoCon® Digital Actuator is a high accuracy multi-function actuator, specifically designed for use in combination with Pressure Independent Balancing Control Valve type AB-QM in sizes from DN 10-32.

The high position accuracy of the actuator, together with the pressure independent and linear characteristic of AB-QM valve, allow NovoCon® Digital Actuator to be used as flow indicator.

Setup of actuator and valve parameters is made via fieldbus. Control is made via analog inputs or field bus for NovoCon®. NovoCon® Digital Actuator is controlled via field bus.

The actuator with AB-QM is used to control water supply to fan coil units, chilled beams, induction units, small re-heaters, re-coolers, AHU's and other terminal units for zone control in which hot/cold water is the controlled medium. Due to its accuracy, remote functionality and flow indication features can significantly add to an accelerated commissioning process, easy maintenance, improved indoor comfort, energy saving and fair allocation of heat/cool energy.

# AB-QM Actuators

## TWA-Z and ABNM



Use with AB-QM DN10-20 and  
DN25-32 (Qmax 60%)

- Cost effective
- On/Off control
- Valve position indicator
- 24 or 230 Vac/dc
- Available in Normally Open (NO) or Normally Closed (NC)

Technical Data	
Type	TWA-Z
Supply voltage	24 Vac/Vdc, 230 Vac/Vdc +10 to -15%
Frequency	50/60Hz
Consumption	2 W
Power output	90N
Max Stroke	2.8mm
Full Stroke Time	Approx. 3 minutes
Grade of enclosure	IP 41
Ambient temperature	2 to 60°C

Type	Power Supply	Code No.
TWA-Z NC 1.2m cable	24 Vac/Vdc	<b>082F138000</b>
TWA-Z NC 1.2m cable	230 Vac/Vdc	<b>082F138200</b>
TWA-Z NC 5m cable	24 Vac/Vdc	<b>082F138400</b>
TWA-Z NC 5m cable	230 Vac/Vdc	<b>082F138800</b>

Use with AB-QM DN10-20 and  
DN25-32 (Qmax 85%) ABNM Thermal  
Actuator

- Thermoelectric
- 0-10V control
- Automatic calibration - optical path measurement allows very accurate positioning
- Theft protection
- Ideal for use in fast heating/cooling systems (e.g. fan coils, air conditioner boxes etc.)
- Normally Closed, apply power to open

Type	Power Supply	Code No.
ABNM	24V (0.01V)	<b>082F116000</b>

Technical Data	
Type	ABNM A5
Supply voltage	24 Vac, -10 to +20%
Frequency	50/60Hz
Consumption	2 W
Power output	100N
Max Stroke	5mm
Full Stroke Time	30 sec p/mm
Grade of enclosure	IP54
Ambient temperature	0 to 60°C

Accessories	
Cables	Code No.
1 metre	<b>082F108100</b>
5 metres	<b>082F108200</b>
10 metres	<b>082F108300</b>

# AB-QM Actuators

## AME/AMV 110/120 NL

## AME 110 NLX

## AMI 140



Type	Supply Voltage (V)	Speed (s/mm)	Cable Length (m)	Code
AMV 110 NL	24 AC	24	1.5	<b>082H805600</b>
			5.0	<b>082H807600</b>
			10	<b>082H808600</b>
AMV 120 NL		12	1.5	<b>082H805800</b>
			5.0	<b>082H805700</b>
			10	<b>082H807700</b>
AME 110 NL		24	1.5	<b>082H806000</b>
			5.0	<b>082H806200</b>
			10	<b>082H806400</b>
			1.5	<b>082H805900</b>
AME 110 NLX		12	1.5	<b>082H804800</b>
AME 120 NL				
AMI 140				

Used in conjunction with automatically balanced combination valve type AB-QM in sizes DN10 to DN32, the AME actuators can be used for control of fan coil units, induction units, small re-heaters, re-coolers and zone applications where hot/cold water is the controlled medium.

AME actuators offer modulating control, while AMV offer 3-point control.

### Compatible Valves

#### AME/AMV

AB-QM (DN10-DN32).....Page 73

#### AMI

AB-QM (DN10-DN32).....Page 73

Technical Data			AME 110 NLX	AME 110 NL	AME 120 NL	AMV 110 NL	AMV 120 NL	AMI 140
Type								
Power supply		V	24 AC					
Power consumption	Running	VA	1.5	2		1		1
	Standby	W	0.4	0.5		0		-
Frequency		Hz	50/60					
Closing Force		N	130					200
Stroke		mm	5					5.5
Speed		mm/s	24	12	24	12		
Max. medium temperature		°C	120					130
Ambient temperature			0 ... 55					
Protection class			III					
Grade of enclosure			IP42					IP42



# Climate Sensor - **FEV-Z**

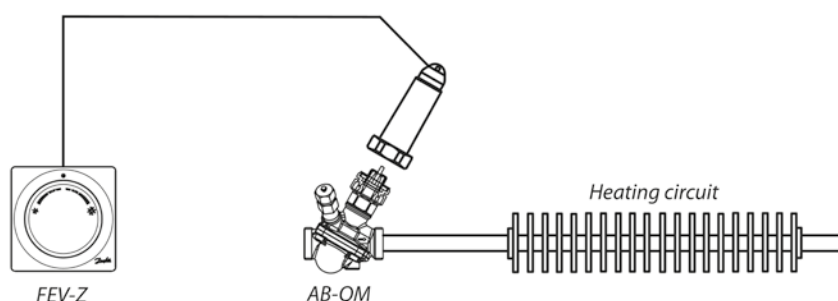
## Self-Acting Thermostatic Actuator - **QT**



- Non-electric proportional control
- Direct acting valve controller
- Easy set and install process
- Suitable for AB-QM valves DN10 – DN20 and RA-C/N/G valves
- Range limiting function

The FEV-Z climate sensor is a proportional controller which opens or closes an AB-QM automatic flow limiter valve dependant on the difference in temperature from the set-point. If the temperature in the room is equal or below setpoint then the valve will remain open, closing should the space temperature increase above set-point. The FEV-Z is used in climate systems with ceiling, floor or radiator heating.

### Heating: Floor, Ceiling or Radiator Heating



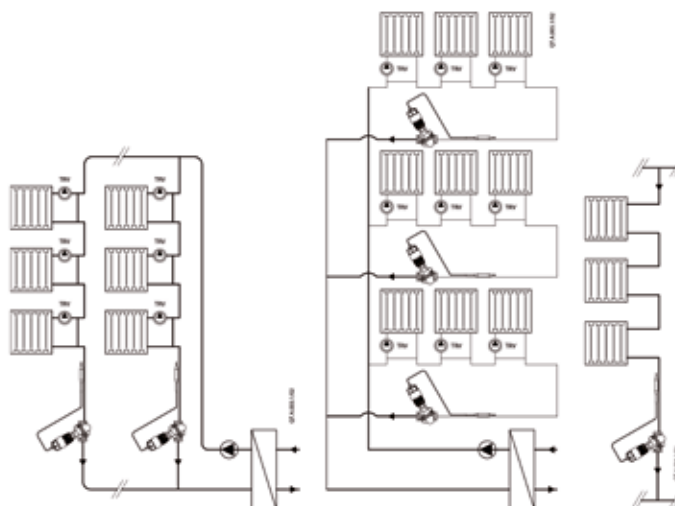
Type	Description	Setting Range	Code No.
FEV-Z	Climate sensor with adapter for AB-QM automatic flow limiter, 8 m capillary tube	17 - 27 °C	<b>013G545800</b>

- Setting range: 35-50°C, 45-60°C
- Designed for AB-QM DN 10-32
- Easy to install external surface sensor
- Reduces actual riser flow to match heat demand
- Improved room temperature control
- Reduced overheating of the building
- Reduced heating cost

QT is a self-acting thermostatic actuator designed to be used in combination with AB-QM in one-pipe heating systems. AB-QM together with QT converts a one-pipe heating system into an energy efficient variable flow system, where flow in the risers is dynamically adjusted to match the load in the riser by control of return water temperature.

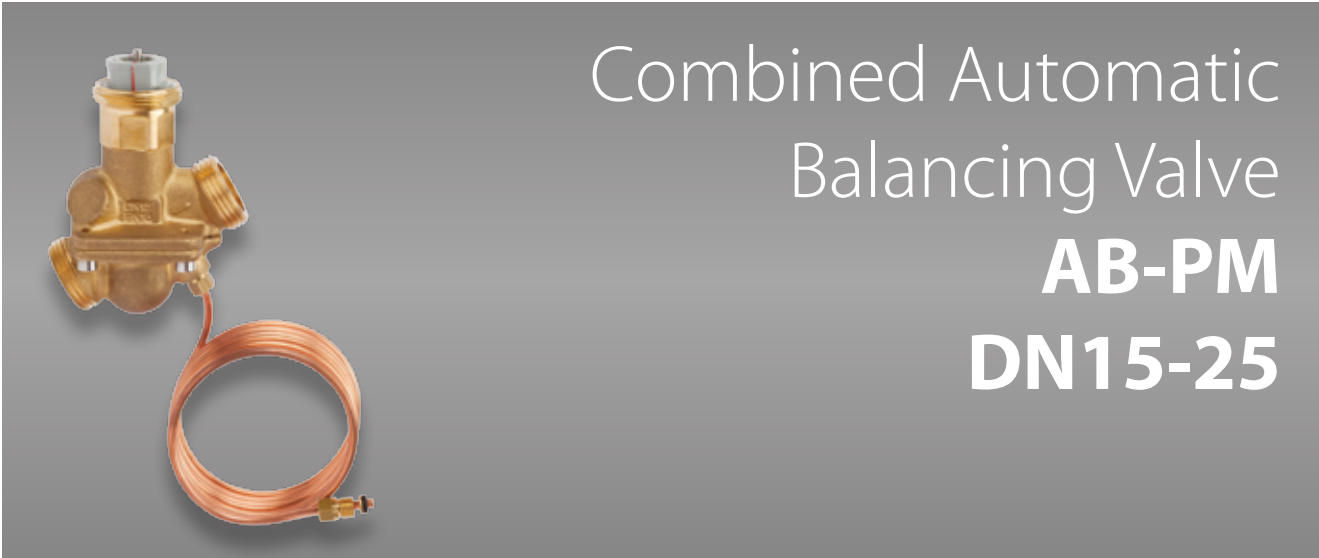
QT is dedicated to be used with AB-QM automatic balancing and control valve.

AB-QM together with QT is a complete one-pipe solution: ABQT.



QT Thermostatic Actuator	Setting Range	Fits to AB-QM	Code No.
	45-60	DN 10-20	<b>003Z038200</b>
		DN 25-32	<b>003Z038300</b>
	35-50	DN 10-20	<b>003Z038400</b>
		DN 25-32	<b>003Z038500</b>
Setting range		35-50	45-60
Temperature tolerance			±3
P-Band <sup>1)</sup>	°C		5 1/8 <sup>2)</sup>
Max temperature at sensor			90
Capillary tube length	m		0.6
1) with AB-QM DN 10-20, at 50 % flow setting			
2) with AB-QM DN 25-32, at 50 % flow setting			





# Combined Automatic Balancing Valve **AB-PM** **DN15-25**

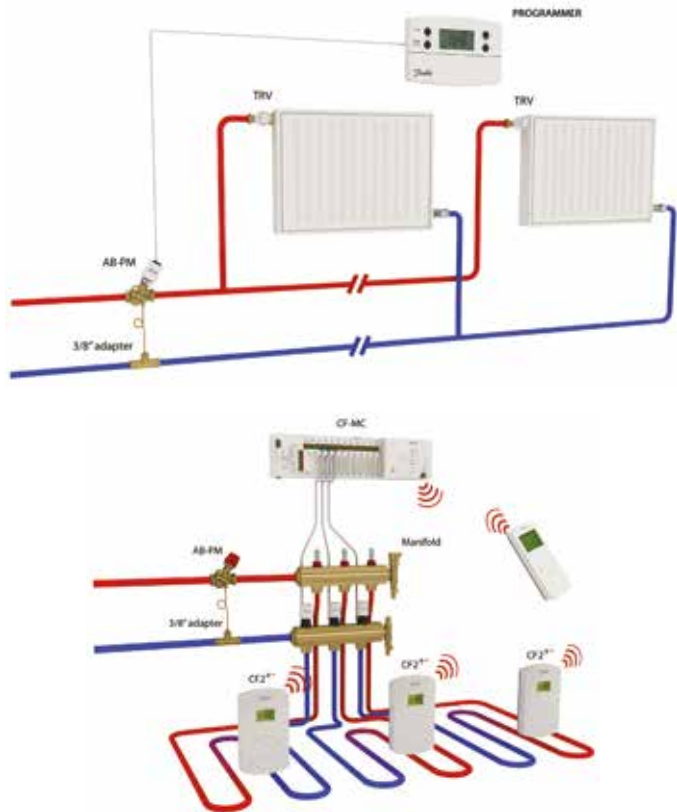
DN	Ext. thread (ISO 228/1)	Code
15	G ¾ A	<b>003Z140200</b>
20	G 1 A	<b>003Z140300</b>
25	G 1 ¼ A	<b>003Z140400</b>

Includes 1.5m impulse tube and impulse tube adapter

- More reliable heating system performance
- Lower heating cost
- Better indoor temperature control

Accessories			
Type	Power Supply	Cable Length	Code No.
TWA-Z NC	24V AC	1.2m	<b>082F138000</b>
	230V AC		<b>082F138200</b>
Type	To Pipe	To Valve	Code No.
Union Connection	R ½	DN 15	<b>003Z023200</b>
Union Connection	R ¾	DN 20	<b>003Z023300</b>
Union Connection	R 1	DN 25	<b>003Z023400</b>
Union Connection	½" (Internal thread)	DN 15	<b>003Z395500</b>
Union Connection	¾" (Internal thread)	DN 20	<b>003Z395600</b>
Union Connection	1" (Internal thread)	DN 25	<b>003Z395700</b>

AB-PM, is a combined automatic balancing valve. It incorporates a differential pressure controller, a flow limiter and a zone controller. Three functions in a single valve. The perfect solution for two-pipe radiator and underfloor heating systems, AB-PM is reliable and easy to maintain, and provides a solution that helps reduce heating costs, improves indoor comfort and eliminates system noise.



# AB-QM Actuators

## AME 55 / 85 / 435 QM



The AME QM actuators are used with the AB-QM pressure independent balancing and control valve.

The actuators automatically adapt the stroke to the valve end positions which reduces commissioning time. They are very flexible actuators, which can be controlled by all types of control signals like voltage and current.

### Compatible Valves

#### AME 435 QM

AB-QM (DN40-DN100).....Page 73

#### AME 55 QM

AB-QM (DN125-DN150).....Page 73

#### AME 85 QM

AB-QM (DN200-DN250).....Page 73

Type	Supply Voltage (V)	Speed (s/mm)	Code
AME 55 QM	24 V	8 mm/s	<b>082H307800</b>
AME 85 QM	24 VAC		<b>082G145300</b>
AME 435 QM	24 VAC/DC	7.5 or 15 mm/s	<b>082H017100</b>

Technical Data		AME 55 QM	AME 85 QM	AME 435 QM
Type				
Power consumption	VA	9 VA	12.5 VA	4.5 VA
Frequency	Hz	50/60 Hz		
Closing Force	N	2000	5000	400
Max. Stroke	mm	40		20
Max. medium temperature	°C	200		120
Ambient temperature		0 ... 55		
Protection class		II		
Grade of enclosure		IP 54		



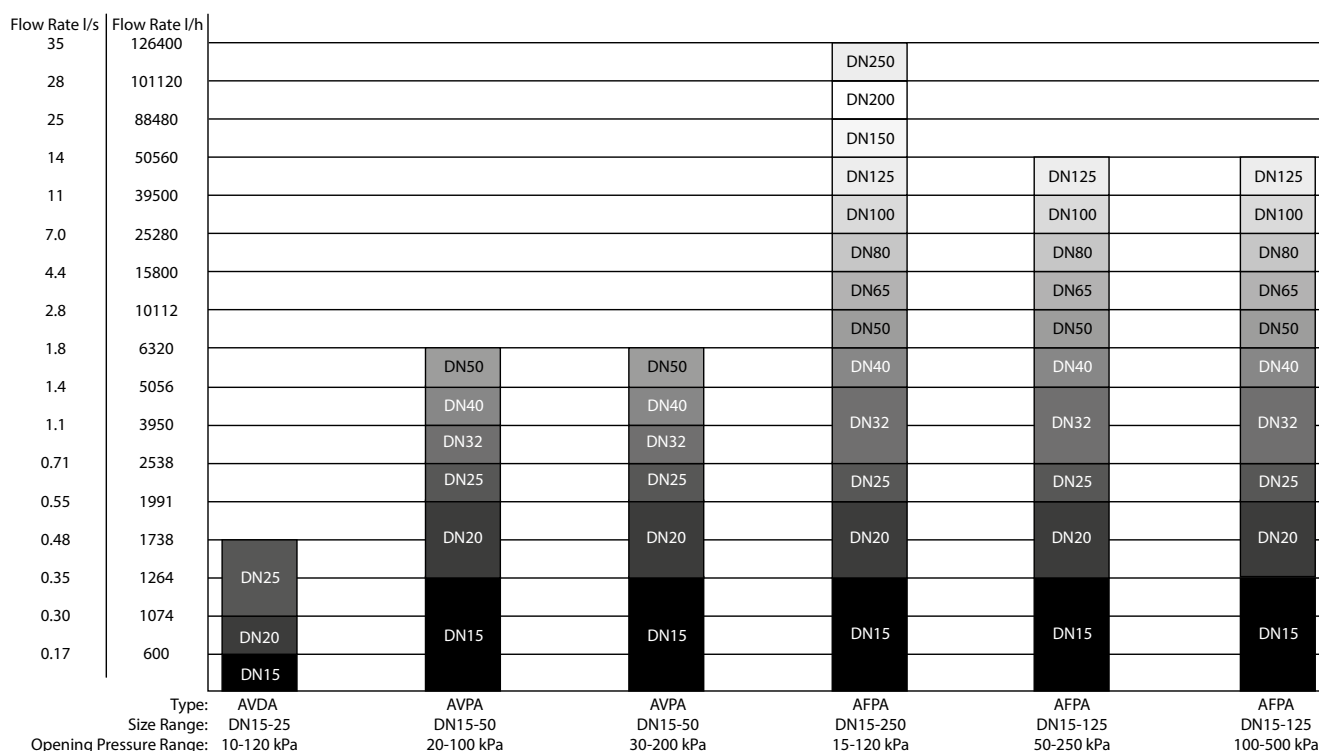
# Differential Pressure By-Pass Valves

The self-acting differential pressure relief by-pass controllers and pressure relief by-pass controllers are primarily for use in district heating systems.

The controllers open on rising differential pressure or pressure.

The controllers have a control valve, an actuator with control diaphragm and a spring for differential pressure setting.

Function of the controller: the diaphragm in the controller regulates the differential pressure of the valve according to the effect, which the spring power has on the diaphragm. The valve is normally closed and opens at rising differential pressure.



This chart is for guidance only. Any selections must be checked with a Danfoss representative before a final selection can be made.

An assumed maximum pressure loss, across the valve, of 10kPa has been applied. Higher flow ranges can be achieved by increasing the differential pressure across the valve. To select, take your required design flow rate. Find the flow points it falls between on the flow axis, draw a line horizontally. The valve sizes on the line are acceptable sizes to select. The opening pressure is the differential pressure at which the valve will start to open. Please ensure you select a valve with a suitable opening pressure for your application. The DPBV should be installed between the flow and return pipework. Consult Danfoss for guidance on installation.

# Automatic Bypass Valves

## AVDO

### DN15 - DN25

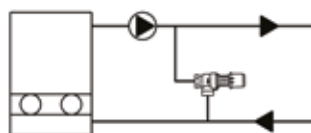


- Self acting flow controller
- Opens on rising differential pressure
- DN15, DN20, DN25
- Setting range of 0.05 to 0.5 bar
- Internal/External thread variants

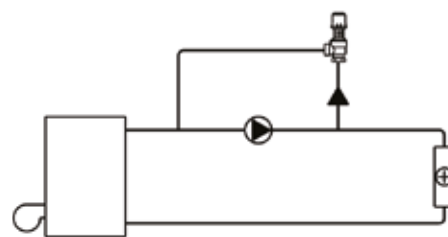
The AVDO range of automatic bypass valves can be used as either differential pressure controls or to provide a minimum flow through a system.

Available in a variety of sizes, the capacity of this range of valves is very high with large but linear changes in water throughput for relatively small increases in differential pressure. This allows a 15mm valve to be used in situations where 22mm valves are normally required.

Setting Range	0.05 - 0.5 bar
Max. differential pressure	0.5 bar
Operation pressure	PN 10
Max. flow temperature	120°C
Max. leakage at closed valve	50 l/h



*Low capacity gas boiler  
where maintenance of a  
minimum flow is required*



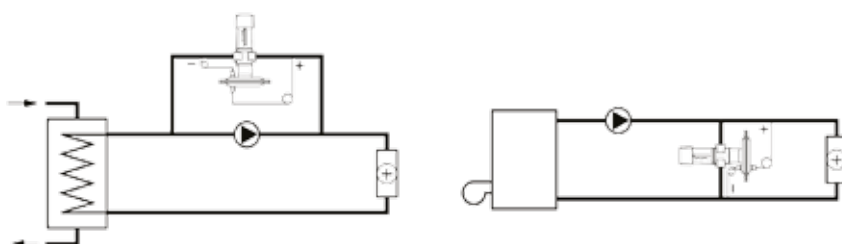
*Differential pressure control*

Code Number	Type	Setting Range (Bar)	Inlet Connection	Outlet Connection	Design
003L601800	AVDO 15	0.05 - 0.5	Rp ½"	Rp ½"	Straight
003L602300	AVDO 20	0.05 - 0.5	Rp ¾"	Rp ¾"	Straight
003L602800	AVDO 25	0.05 - 0.5	Rp 1"	Rp 1"	Straight
003L611500	AVDO*	0.05 - 0.5	15mm	15mm	Straight
003L612200	AVDO*	0.05 - 0.5	22mm	22mm	Straight
003L612800	AVDO*	0.05 - 0.5	28mm	28mm	Straight

\* incl. compression fittings for copper pipe

# By-Pass Valves

## AVDA



*Application Examples*

Self-acting differential pressure relief controller used for constant flow control or by-pass control primarily for apartment block heating, district heating plant and central heating systems. The controller opens on rising differential pressure.

Hydronic Balancing  
and Control

DN (mm)	Kvs m <sup>3</sup> /h	PN	Δ bar setting range	Connection - valve (int. thread ISO 7/1)	Connection - impulse tube flare	Code No. <sup>1)</sup>
15	1.9	10	0.1 - 1.2	RP ½	7/16-20 UNF	<b>003N003800</b>
20	3.4			RP ¾		<b>003N003900</b>
25	5.5			RP 1		<b>003N004000</b>

<sup>1)</sup> Includes 2 impulse tubes (0.5 and 1.5m) with compression fitting

Accessories		
Type	DN	Code No.
Repair Kit	DN15	<b>003N400600</b>
	DN20	<b>003N400700</b>
	DN25	<b>003N400800</b>
Diaphragm housing	-	<b>003N006500</b>
Nipple	-	<b>631X470000</b>



# Self-Acting Differential Pressure Relief Controller

## AVPA

### DN15-DN50



Self-acting differential pressure relief controller primarily for use in district heating systems. The controller is normally closed and opens on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting

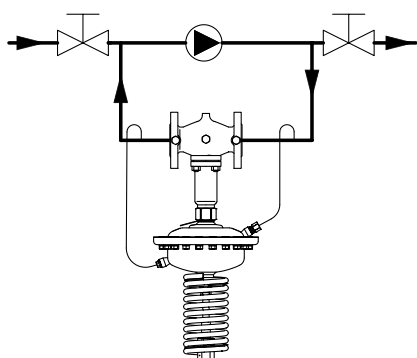
DN (mm)	Kvs m³/h	PN	Connection		Δ bar setting range	Code No.	Δ bar setting range	Code No.
15	4.0	PN16	Cylinder ext. thread acc. to ISO 228/1	G ¾ A	0.05 - 0.5	003H659300	0.2 - 1.0	003H659600
20	6.3			G 1 A		003H659400		003H659700
25	8.0			G 1¼A		003H659500		003H659800
15	4.0	PN25	Cylinder ext. thread acc. to ISO 228/1	G ¾ A	0.2 - 1.0	003H660200	0.3 - 2.0	003H660500
20	6.3			G 1 A		003H660300		003H660600
25	8.0			G 1¼ A		003H660400		003H660700
32	12.5			G 1¾ A		003H659900		-
40	16			G 2 A		003H660000		-
50	20			G 2½ A		003H660100		-
32	12.5		Flanges, acc. to EN 1029-2		-	003H661100		
40	20				-	003H661200		
50	25				-	003H661300		
					-			

Fittings/Spare Parts			
Description	DN	Connection	Code No.
Tailpiece	15	R ½"	003H690200
	20	R ¾"	003H690300
	25	R 1"	003H690400
	32	R 1 ¼"	003H690500
	40	R 1 ½"	065F606100
	50	R 2"	065F606200
Actuator with adjustable handle for AVPA PN25 (0.2 - 1.0 bar)			003H683400
Actuator with adjustable handle for AVPA PN25 (0.3 - 2.0 bar)			003H683500





# Pressure Actuator AFPA DN15-DN250



The VFG 2 valves combine with the AFPA self-acting differential pressure controllers, and are designed for use in district heating systems.



The AFPA pressure actuator with control diaphragm and a spring for differential pressure setting.

Combined with valve type VFG it is a self-acting differential pressure relief controller primarily used in district heating systems. The controller opens on rising differential pressure.

VFG 2							
DN (mm)	Kvs (m³/h)	Tmax (°C)		Connections	PN16	PN25	PN40
15	4.0	150	200 <sup>1)</sup>	Flange	065B238800	065B240100	065B241100
20	6.3				065B238900	065B240200	065B241200
25	8.0				065B239000	065B240300	065B241300
32	16				065B239100	065B240400	065B241400
40	20				065B239200	065B240500	065B241500
50	32				065B239300	065B240600	065B241600
65	50				065B239400	065B240700	065B241700
80	80				065B239500	065B240800	065B241800
100	125				065B239600	065B240900	065B241900
125	160				065B239700	065B241000	065B242000
150	280	140			065B239800	-	065B242100
200	210				065B249900		065B242200
250	400				065B240000		065B242300

Type	ΔP setting range (bar)	for DN	Code No.
AFPA	1.0 - 5.0	15 - 125	003G101900
	0.5 - 2.5		003G102000
	0.15 - 1.2	15 - 250	003G102100
	0.1 - 0.6		003G102200
	0.05 - 0.3		003G102300

Accessories		
Type	Description	Code No.
Impulse tube set AF	1 x copper tube Ø10 x 1.5m, one threaded fitting G1/4", two sockets	003G139100
Seal pot V1	1.0l capacity with threaded fittings for Ø10mm tube	003G139200
Seal pot V2	3.0l capacity with threaded fittings for Ø10mm tube	003G140300

# Thermostatic Circulation Valve

## MTCV



- Saves energy by limiting hot water circulation
- Provides water instantly at the right temperature
- Automatic disinfection process
- Electronic disinfection process
- Modular upgrading of the MTCV valve during operation, under pressurised conditions, is possible when using ½ or ¾ fittings with shut-off ball valves.
- Replaceable calibrated thermo-element

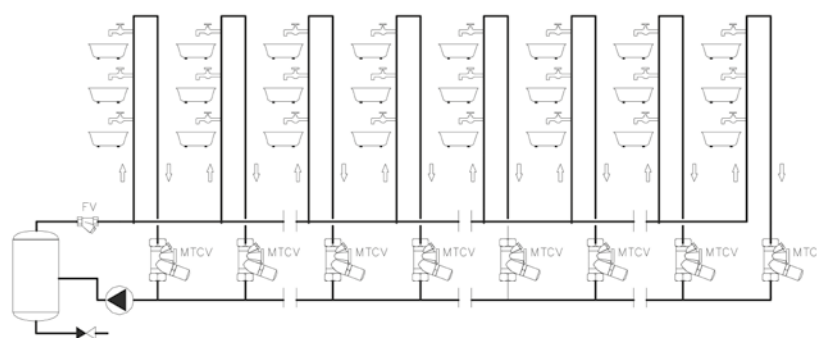
The MTCV is a thermostatic self acting proportional valve, operating primarily through the use of a thermo-element to limit circulation flow in cases of high temperature. The setting scale allows the hot water temperature to be limited within a range of 35–60°C.

There are 2 versions of the MTCV available:

- Version 'A' – provides thermostatic balancing of the HW system within a set temperature range.
- Version 'B' – provides automatic thermal disinfection at temperatures above 68°C, with a safety feature to prevent temperatures in excess of 75°C.

Max. working pressure	10 bar
Test pressure	16 bar
Max. flow temperature	100°C
Kvs at 20°C	- DN 20 1.8 m³/h
	- DN 15 1.5 m³/h
Hysteresis	1.5 K

Material of parts in contact with water	
Valve body	Rg5
O-rings	EPDM
Spring, cones	Stainless steel



Example of MTCV / basic version / placement in domestic hot water system

Valve - Basic version A	Code No.
DN 15	<b>003Z151500</b>
DN 20	<b>003Z152000</b>

Valve - Basic version B	Code No.
DN 15	<b>003Z151100</b>
DN 20	<b>003Z155700</b>

Accessories	Comments	Code No.
Thermostatic disinfection module - B	DN 15 / DN 20	<b>003Z202100</b>
Fittings with shut-off ball valve (for allen-key 5mm), DN 15	G ½ x Rp ½	<b>003Z102700</b>
	G ¾ x Rp ¾	<b>003Z102800</b>
Thermometer with adapter	DN 15 / DN 20	<b>003Z102300</b>
Adapter for thermo-actuator	DN 15 / DN 20	<b>003Z102200</b>
Temperature sensor ESMB Universal		<b>087B118400</b>
Temperature sensor ESMC contact		<b>087N001100</b>
Fittings for soldering Cu 15mm	DN 15	<b>003Z103400</b>
Fittings for soldering Cu 18mm	int. R ½"	<b>003Z103500</b>
Fittings for soldering Cu 22mm	DN 20	<b>003Z103900</b>
Fittings for soldering Cu 28mm	int. R ¾"	<b>003Z104000</b>

# Measuring Equipment

## PFM100



Description	Code No.
PFM100	003L826000

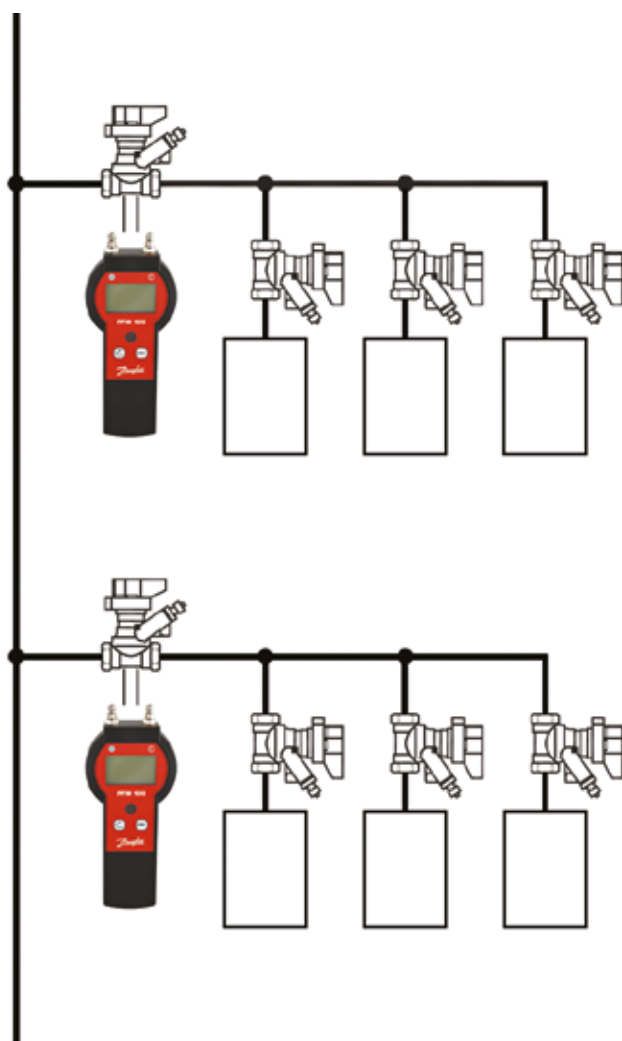
Accessories	Code No.
Measuring Hoses 2 x 1.5m	003L826100
Measuring Needle	003L826200
Quick Coupling	003L826300
Filters	003L826400
Strap	003L826500

- Easy commissioning
- Verification of pressure and flow
- 10 different languages
- Robust handheld device - IP65
- Universal measuring device - for any hydronic balancing valve

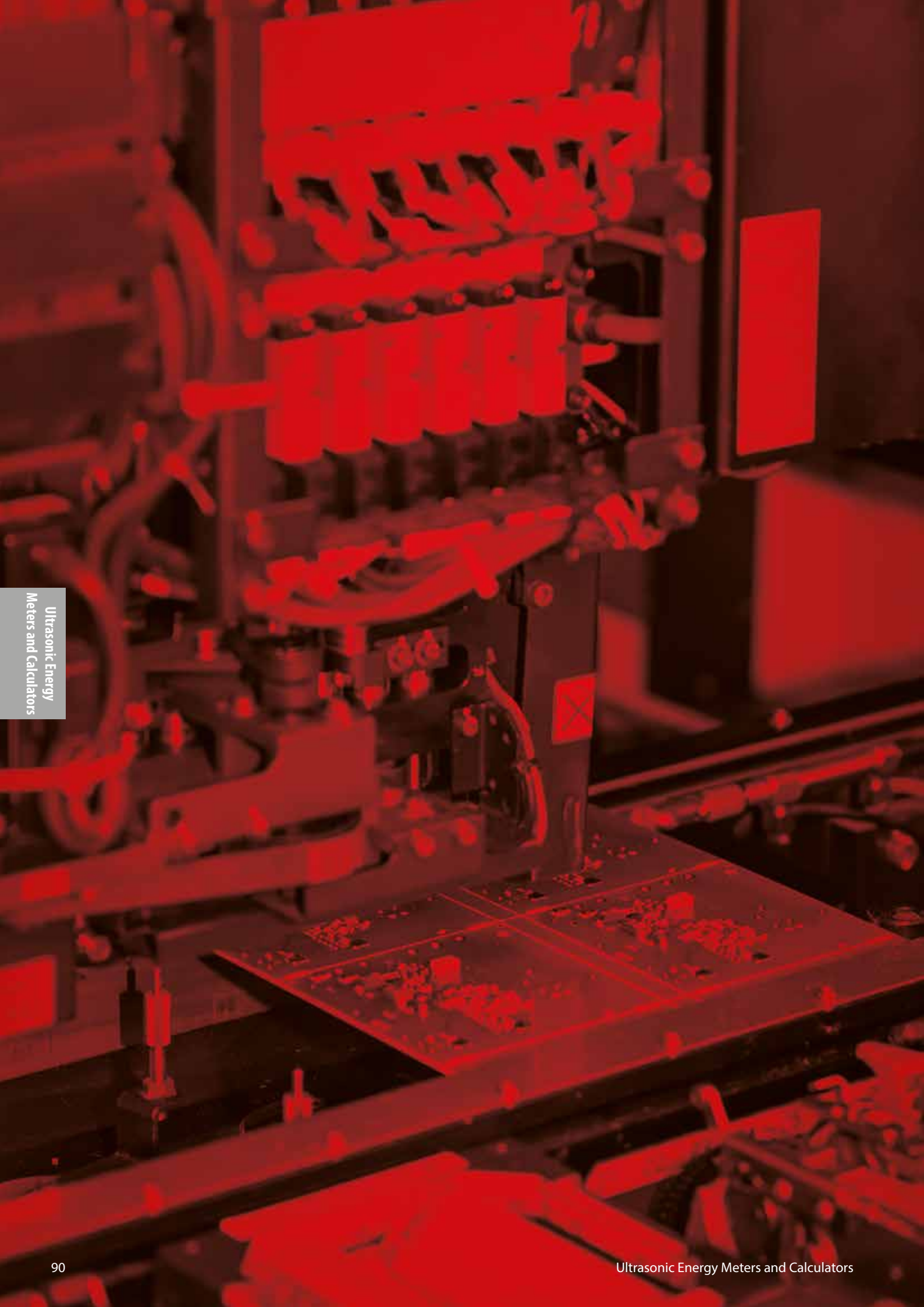
The PFM100 is a measuring device that measures the differential pressure on both sides of a valve in hydronic systems. After typing the kv value into the device it will calculate the flow in a very accurate manner. The PFM100 consists of a measuring instrument, two hoses with couplings and two measuring needles with ball valves.

### Compatible Valves

MSV-O	Page 64
MSV-BD	Page 65
MSV-F2	Page 66







# Ultrasonic Energy Meters and Calculators

## Contents

With the increasing focus on energy savings and reducing CO<sub>2</sub> emissions, measuring energy consumption is now a key focus of any district heating provider and end-user.

Energy consumption data ensures a transparent billing system for both district heating supplier and end user. By metering energy consumption, it is easy to keep track of the energy performance of any heating, district heating or cooling system.

Energy meters are the components that provide energy consumption measurement.

Ultrasonic Energy Meter - Sonometer.....	92
Energy Meter Sizing Chart .....	93





# Ultrasonic Energy Meter

## Sonometer



- No wear and tear due to static metering with no moving parts
- 1st approval in Europe for ultrasonic heat meter with dynamic range of  $q_i/q_p$  1:250 in class 2
- EN 1434 class 2 approval
- Replacing of the measuring insert without dismantling the transducers
- Power supply: battery, mains 230V ac or 24 V ac
- Remote reading via M-bus, radio, RS232 or optical interface
- Optional pulse input and pulse output module
- Radio module option for easy data transfer
- Battery lifetime up to 16 years
- MID examination certificate

The SONOMETER™500 is an ultrasonic static compact heat meter designed especially for residential sub-metering (i.e. HIUs).

The SONOMETER™1100 is an ultrasonic static compact heat meter especially designed for heating, cooling or combined heating/cooling application in local and district heating systems.

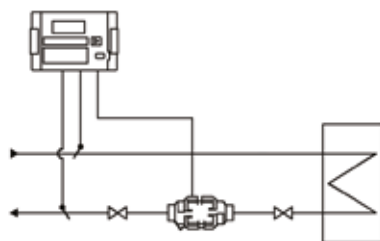
The SONOMETER™1100 as a compact heat meter consists of the following components:

- Ultrasonic flow sensor;
- Calculator with integral hardware and software for measuring flow rate, temperature and energy consumption;
- Temperature sensors.

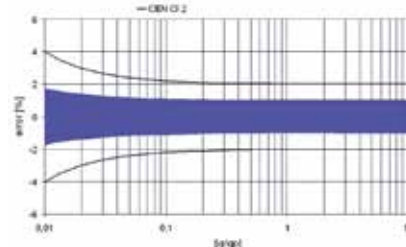
These heat meters give a precise and easy measure of your system's performance using a patented ultrasonic technology that guarantees high accuracy and reliable long-term stability.

A larger meter is available for sizes DN125-300 in the form of Sono 3500. Details available on request.

### Application



### Measuring Accuracy to EN 1434 Class 2



### Sono 500

Code No.	Flow Sensor <sup>1</sup>	Nominal Pressure	Installation	Interface	Cable Length <sup>2</sup>	Energy Unit
<b>187F0500</b>	qp 0.6m³/h /110mm thread/DN15/G¾B	PN16	Low temp.	M-BUS	1.45m	kWh
<b>187F0501</b>	qp 1.5m³/h /110mm thread/DN15/G¾B	PN16	Low temp.	M-BUS	1.45m	kWh
<b>187F0502</b>	qp 1.5m³/h /130mm thread/DN20/G1B	PN16	Low temp.	M-BUS	1.45m	kWh
<b>187F0503</b>	qp 2.5m³/h /130mm thread/DN20/G1B	PN16	Low temp.	M-BUS	1.45m	kWh
<b>187F0504</b>	qp 0.6m³/h /110mm thread/DN15/G¾B	PN16	High temp.	M-BUS	1.45m	kWh
<b>187F0505</b>	qp 1.5m³/h /110mm thread/DN15/G¾B	PN16	High temp.	M-BUS	1.45m	kWh
<b>187F0506</b>	qp 1.5m³/h /130mm thread/DN20/G1B	PN16	High temp.	M-BUS	1.45m	kWh
<b>187F0507</b>	qp 2.5m³/h /130mm thread/DN20/G1B	PN16	High temp.	M-BUS	1.45m	kWh

<sup>1</sup> Cable length between flow sensor and calculator is 0.5m

<sup>2</sup> Cable length of M-BUS communication and temperature cable sensor

### Sono 1100

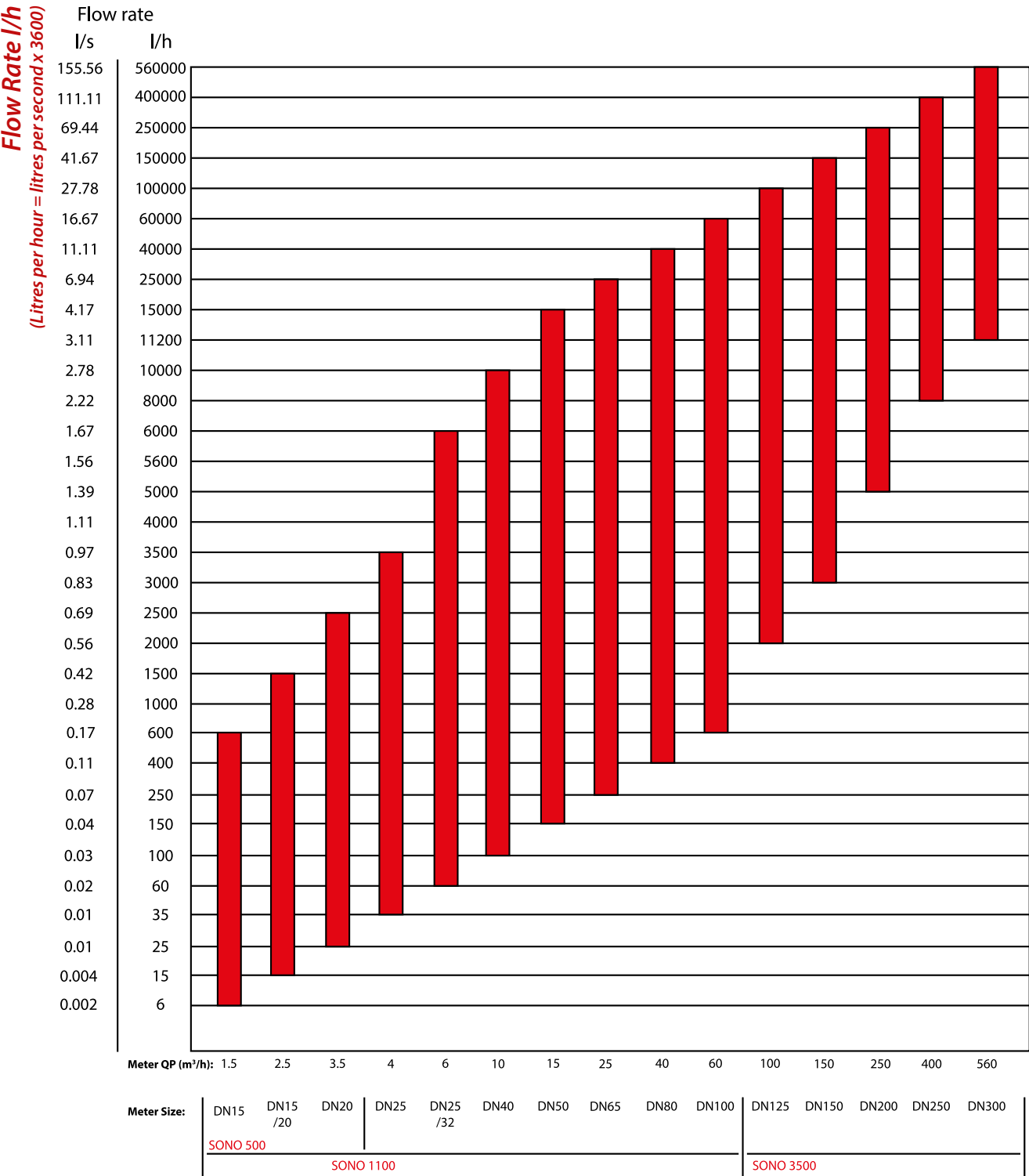
Code No.	Flow Sensor <sup>1</sup>	Nominal Pressure	Cable Length <sup>2</sup>	Module	Energy Unit	Cable Length <sup>3</sup>
<b>Heating Meters</b>						
<b>087G1040</b>	qp 0.6m³/h /110mm thread/DN15/G¾B	PN16	1.5m	M-BUS	kWh	1.9m
<b>087G1042</b>	qp 1.5m³/h /110mm thread/DN15/G1B	PN16	1.5m	M-BUS	kWh	1.9m
<b>087G1043</b>	qp 1.5m³/h /130mm thread/DN20/G1B	PN16	1.5m	M-BUS	kWh	1.9m
<b>087F1120</b>	qp 3.5m³/h /260mm thread/DN25/G1¼B	PN16	1.5m		kWh	1.9m
<b>187F1121</b>	qp 6m³/h /260mm thread/DN25/G1¼B	PN16	1.5m		kWh	1.9m
<b>087G1047</b>	qp 6m³/h /260mm thread/DN32/G1½B	PN16	3m	M-BUS	kWh	2.9m
<b>187F1123</b>	qp 10m³/h /300mm thread/DN40/G2B	PN16	1.5m		MWh	1.9m
<b>Cooling Meters - Heat &amp; Cool</b>						
<b>087G1206</b>	qp 0.6m³/h /110mm thread/DN15/G¾B	PN16	1.5m	M-BUS	kWh	1.9m
<b>087G1207</b>	qp 1.5m³/h /110mm thread/DN15/G¾B	PN16	1.5m	M-BUS	kWh	1.9m
<b>087G1208</b>	qp 2.5m³/h /130mm thread/DN20/G1B	PN16	1.5m	M-BUS	kWh	1.9m
<b>187F1140</b>	qp 3.5m³/h /260mm thread/DN25/G1¼B	PN16	1.5m		kWh	1.9m
<b>187F1141</b>	qp 6m³/h /260mm thread/DN32/G1½B	PN16	1.5m		kWh	1.9m
<b>187F1143</b>	qp 10m³/h /300mm thread/DN40/G2B	PN16	1.5m		MWh	1.9m
<b>087F1145</b>	qp 10m³/h /300mm flange/DN50	PN25	3m		MWh	2.9m
<b>187F1146</b>	qp 25m³/h /300mm flange/DN65	PN25	3m		MWh	2.9m
<b>187F1147</b>	qp 40m³/h /300mm flange/DN80	PN25	3m		MWh	2.9m
<b>187F1148</b>	qp 60m³/h /300mm flange/DN100	PN25	3m		MWh	2.9m

<sup>1</sup> Codes above have A-cell battery installed and are EN version heat/cool meters with 'low temperature' (return pipe) installation

<sup>2</sup> Cable length between calculator and flow sensor

<sup>3</sup> Cable length of temperature sensor

# Energy Meter Sizing Chart



- Sizing Method:
- Take the design maximum flow rate required for the meter
  - Ensure it is in litres per hour (l/h = l/s x 3600, l/h = m³/h x 1000)
  - Find your flow rate on the chart above
  - Select the smallest meter to meet the required design flow rate

**Meter QP**  
Nominal Flow and Size DN



# Butterfly and Check Valves

Butterfly valves and check valves are the components that provide on/off regulation and backflow prevention within the district heating, HVAC or water applications where limited space is available for components.

## Contents

Butterfly Valves	
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VFY-WH .....	97
VFY-LH .....	98
Check Valves	
NVD 402 and NVD 462 .....	99
NVD 802, NVD 805 and NVD 895 .....	100
NVD 812.....	101





# Butterfly Valves

## VFY-LG



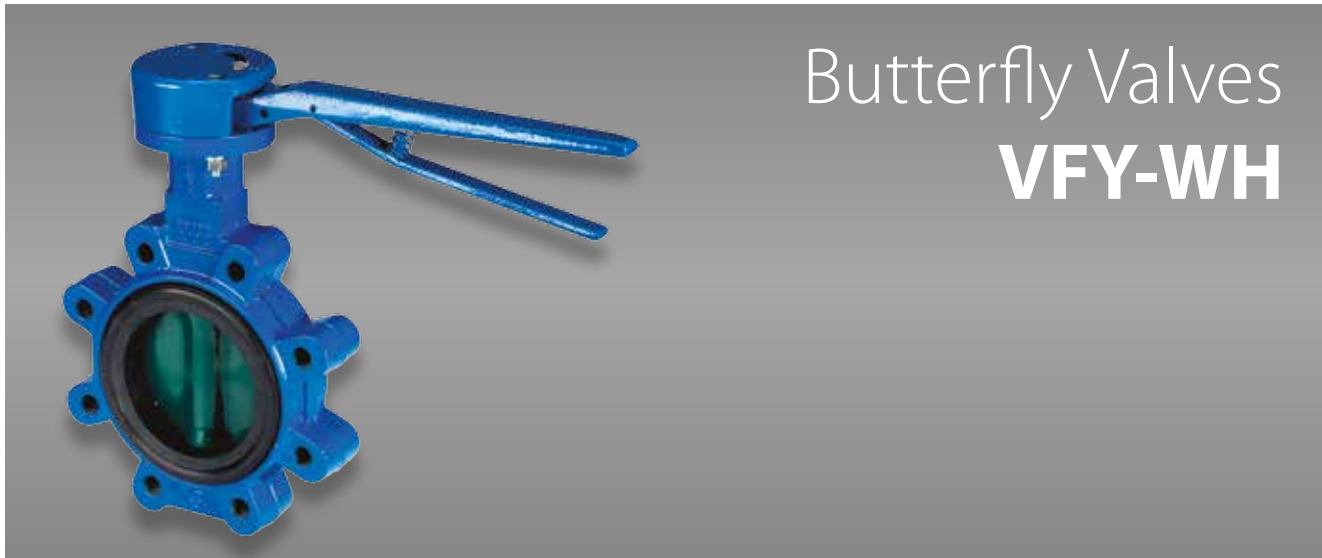
- Spline driven one piece shaft connected to spherically machined disc allows high torque transmission i.e. quick response and minimum backlash
- Long term reliability due to upper and lower anti-friction bearings
- Safe maintenance: shaft blow out protection with circlip
- Position indicator

Technical Data	
Nominal Diameter (DN)	150-350
kvs valve (m³/h)	1212-8520
Rotation Angle	90°
Leakage Rate	Acc. to PED 97/23/CE, EN 12266-1, Rate A <sup>1)</sup>
Nominal Pressure (PN)	16
Medium	Circulation water, Glycolic water up to 50 % or drinking water
Medium temperature (°C)	-10 ... 120
Connection	Lug (Tapped lugs)
Mounting	Mounting deadline

Material	
Body	Cast iron EN GJL 250 (DIN GG25) DN 50-150 Ductile iron (DIN GGG40) DN 200-350
Disc	Ductile iron EN GJS 400-15 (DIN GGG 40) with Polyamide coating or Stainless Steel
Shaft	Stainless steel AISI 420
Liner	EPDM
Circlip	Steel XC 75 / Stainless steel
O-ring	Nitrile/Viton
Upper guide bush	Zinc coated S. + PTFE
Lower guide bush	Zinc coated S. + PTFE
Hear Box	Aluminium

<sup>1)</sup> No visible detectable leakage during the testing procedure

Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Weight (kg)	Code No.
Gear operated lugged lever butterfly valve with stainless steel disc					
VFY-LG	150	1212	PN16	10.7	<b>065B746500</b>
VFY-LG	200	2500	PN16	22.3	<b>065B746600</b>
VFY-LG	250	3948	PN16	28.8	<b>065B746700</b>
VFY-LG	300	5635	PN16	40.8	<b>065B746800</b>
VFY-LG	350	8520	PN16	49.1	<b>065B746900</b>
Gear operated lugged lever butterfly valve with polyamide coated disc					
VFY-LG	150	1212	PN16	18.34	<b>065B737600</b>
VFY-LG	200	2500	PN16	26.23	<b>065B737700</b>
VFY-LG	250	3948	PN16	35.8	<b>065B737800</b>
VFY-LG	300	5635	PN16	50.0	<b>065B737900</b>
VFY-LG	350	8500	PN16	48.4	<b>065B745600</b>



# Butterfly Valves

## VFY-WH

Technical Data	
Nominal Diameter (DN)	25-300
kvs valve (m³/h)	40-5635
Rotation Angle	90°
Leakage Rate	Acc. to PED 97/23/CE, EN 12266-1, Rate A <sup>1)</sup>
Nominal Pressure (PN)	16 (from DN 32-300) / 10 (for DN 25)
Medium	Circulation water, Glycolic water up to 50 % or drinking water
Medium temperature (°C)	-10 ... 120
Connection	Wafer (centering lugs)
Mounting	Mounting between flanges

Material	
Body	Cast iron EN GJL 250 (DIN GG25)
Disc	Ductile iron EN GJS 400-15 (DIN GGG 40) with Polyamide coating or Stainless Steel
Shaft	Stainless steel AISI 420
Liner	EPDM
Circlip	Steel XC 75 / Stainless steel
O-ring	Nitrile/Viton
Upper guide bush	Zinc coated S. + PTFE
Lower guide bush	Zinc coated S. + PTFE
Cap	EN GJS-400-15/EN GJL-250
Hand lever	EN GJS-400-15

<sup>1)</sup> No visible detectable leakage during the testing procedure

- Butterfly valve in 25mm-150mm
- Spline driven one piece shaft connected to spherically machined disc allows high torque transmission i.e. quick response and minimum backlash
- Long term reliability due to upper and lower anti-friction bearings
- Safe maintenance: shaft blow out protection with circlip
- Padlockable hand lever with 10 positions

Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Weight (kg)	Code No.
Hand operated wafer lever butterfly valve with stainless steel disc					
VFY-WH	25	40	PN10	2.63	<b>065B735000</b>
VFY-WH	32/40	62	PN16	2.61	<b>065B735100</b>
VFY-WH	50	79	PN16	3.25	<b>065B741000</b>
VFY-WH	65	174	PN16	3.7	<b>065B741100</b>
VFY-WH	80	275	PN16	4.0	<b>065B741200</b>
VFY-WH	100	496	PN16	6.3	<b>065B741300</b>
VFY-WH	125	883	PN16	7.7	<b>065B741400</b>
VFY-WH	150	1212	PN16	9.2	<b>065B741500</b>
Hand operated wafer lever butterfly valve with polyamide coated disc					
VFY-WH	50	79	PN16	3.3	<b>065B735200</b>
VFY-WH	65	174	PN16	3.7	<b>065B735300</b>
VFY-WH	80	275	PN16	4.0	<b>065B735400</b>
VFY-WH	100	496	PN16	6.99	<b>065B735500</b>
VFY-WH	125	883	PN16	7.57	<b>065B735600</b>
VFY-WH	150	1212	PN16	8.5	<b>065B735700</b>



# Butterfly Valves

## VFY-LH



- Butterfly valve in 25mm-150mm
- Spline driven one piece shaft connected to spherically machined disc allows high torque transmission i.e. quick response and minimum backlash
- Long term reliability due to upper and lower anti-friction bearings
- Safe maintenance : shaft blow out protection with circlip
- Padlockable hand lever with 10 positions

Technical Data	
Nominal Diameter (DN)	32-300
kvs valve (m³/h)	62-5635
Rotation Angle	90°
Leakage Rate	Acc. to PED 97/23/CE, EN 12266-1, Rate A <sup>1)</sup>
Nominal Pressure (PN)	16
Medium	Circulation water, Glycolic water up to 50 % or drinking water
Medium temperature (°C)	-10 ... 120
Connection	Lug (tapped lugs)
Mounting	Mounting between flanges or mounting deadline

Material	
Body	Cast iron EN GJL 250 (DIN GG25) DN 32-150 Ductile iron (DIN GGG40) DN 200-300
Disc	Ductile iron EN GJS 400-15 (DIN GGG 40) with Polyamide coating or Stainless Steel
Shaft	Stainless steel AISI 420
Liner	EPDM
Circlip	Steel XC 75 / Stainless steel
O-ring	Nitrile/Viton
Upper guide bush	Zinc coated S. + PTFE
Lower guide bush	Zinc coated S. + PTFE
Cap	EN GJS-400-15/EN GJL-250
Hand lever	EN GJS-400-15

<sup>1)</sup> No visible detectable leakage during the testing procedure

Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Weight (kg)	Code No.
Hand operated lugged lever butterfly valve with stainless steel disc					
VFY-LH	32	62	PN16	2.91	<b>065B736500</b>
VFY-LH	40	62	PN16	2.92	<b>065B736600</b>
VFY-LH	50	79	PN16	3.7	<b>065B742000</b>
VFY-LH	65	174	PN16	4.2	<b>065B742100</b>
VFY-LH	80	275	PN16	5.1	<b>065B742200</b>
VFY-LH	100	496	PN16	7.6	<b>065B742300</b>
VFY-LH	125	883	PN16	10.2	<b>065B742400</b>
VFY-LH	150	1212	PN16	11.7	<b>065B742500</b>
Hand operated lugged lever butterfly valve with polyamide coated disc					
VFY-LH	50	79	PN16	3.7	<b>065B736700</b>
VFY-LH	65	174	PN16	4.3	<b>065B736800</b>
VFY-LH	80	275	PN16	5.13	<b>065B736900</b>
VFY-LH	100	496	PN16	9.12	<b>065B737000</b>
VFY-LH	125	883	PN16	10.24	<b>065B737100</b>
VFY-LH	150	1212	PN16	11.18	<b>065B737200</b>



# Check Valves

## NVD 402 and 462

Technical Data	NVD 402	NVD 462
Nominal Diameter (DN)	40 - 500	50 - 200
kvs valve (m³/h)	47 - 6914	69 - 1031
Nominal Pressure (PN)	PN 16 (10)	
Medium	Circulation water, drinking water or chilled glycolic water up to 50%	
Medium temperature (°C)	- 10 ... 100°C	
Connection	Flanged connection	
Directive	Compliance with Pressure Equipment Directive 97/23/EC	
Design Standard	Flange drilling according to EN1092-2	Face-to-face dimensions according to EN558-1 14 series

Material	NVD 402	NVD 462
Casing DN 40-400	Cast iron / epoxy	Cast iron
Casing DN 500	Ductile iron / epoxy	
Ring seal DN 40-250	EPDM	
Ring	Bronze	
Spring	Stainless steel	
Seal	EPDM	
Closing system DN 40 DN 50-65	Brass Bronze	Brass
DN 80-400 Stem Check Valve	Bronze Ductile iron / epoxy	Bronze
DN 500 Stem Check Valve	Bronze Ductile iron / epoxy	Bronze

Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Weight (kg)	Code No.
Flanged non-return valve - up to 100°C					
NVD 402	40	47	PN16	4.5	<b>065B747000</b>
NVD 462	50	69	PN16	6.7	<b>065B748500</b>
NVD 462	65	125	PN16	9.5	<b>065B748600</b>
NVD 462	80	157	PN16	11.0	<b>065B748700</b>
NVD 462	100	350	PN16	14.5	<b>065B748800</b>
NVD 462	125	582	PN16	21.0	<b>065B748900</b>
NVD 462	150	710	PN16	28.0	<b>065B749000</b>
NVD 462	200	1031	PN16	41.0	<b>065B749100</b>
NVD 402	250	2010	PN10	94.0	<b>065B747800</b>
NVD 402	300	2459	PN10	140.0	<b>065B747900</b>
NVD 402	350	2843	PN10	225.0	<b>065B748000</b>
NVD 402	400	4370	PN10	312.0	<b>065B748100</b>
NVD 402	500	6914	PN10	540.0	<b>065B748200</b>

### NVD 402

- Operates in any position
- Minimum head loss
- Silent, reliable sealing, compact
- Exceptional robustness
- Notch provided for cable to submerged pumps until DN 100.
- Closing system : long back axial guiding for reduced displacement
- Sealing guaranteed by a flat seal
- Return spring

### NVD 462

- Operates in any position
- Silent, reliable sealing, compact
- Exceptional robustness
- Notch provided for cable to submerged pumps up to DN 100
- Closing system : long back axial guiding
- Sealing guaranteed by O-ring.
- Return spring
- Body with integrated one-arm guide

# Check Valves

## NVD 802, 805 and 895



### NVD 802

- Operating position : horizontal and vertical
- Easy to install and dismantle, space-saving
- Minimum head loss
- Does not generate hammering
- Closing system : disc with parabolic edges with return spring ; lateral guiding by 3 or 4 ribs (DN 32 to 100)
- Closing system with back axial guiding and return spring (DN 125 to 200).
- Metal/metal seal (machined trim)
- Using these check valves on networks equipped with piston pumps or compressors is not recommended.

### NVD 895

- Operates in any position
- Silent, reliable sealing, compact
- Exceptional robustness
- Notch provided for cable to submerged pumps up to DN 100
- Closing system : long back axial guiding
- Sealing guaranteed by O-ring.
- Return spring
- Body with integrated one-arm guide

Technical Data	NVD 802	NVD 895	NVD 805
Nominal Diameter (DN)	32 - 40	50 - 400	450 - 600
kvs valve (m³/h)	18 - 28	35.7 - 5867	6547 - 11269
Nominal Pressure (PN)	PN 6/16	PN 10/16	PN 10/16
Medium	Circulation water, drinking water or chilled glycolic water up to 50%		
Medium temperature (°C)	- 10 ... 200°C		
Connection	Mounting between flanges		
Directive	Compliance with Pressure Equipment Directive 97/23/EC		
Design Standard	Flange drilling according to EN1092-2		

Material	NVD 802	NVD 895	NVD 805
Casing	DZR brass	Cast iron + epoxy Ductile iron + epoxy	Cast iron + epoxy
Closing system DN 40	Stainless steel		
Spring	Stainless steel	Stainless steel	Stainless steel
Stop guide	Stainless steel		
Plates		Stainless steel	Aluminium bronze
Seal		EPDM	NBR (nitrile)
Steam		Stainless steel	Stainless steel
Bearing		PTFE	PTFE
Eye bolt DN>150		Steel XC15	Steel XC15
Plugs		Brass	Brass

Code No.	Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Weight (kg)
Between flange non-return valve - DN32-50 up to 200°C, DN65-200 up to 100°C					
065B752000	NVD 802	32	18	PN16	0.4
065B752100	NVD 802	40	28	PN16	0.55
065B749500	NVD 895	50	35.7	PN16	1.5
065B749600	NVD 895	65	64.7	PN16	2.0
065B749700	NVD 895	80	116.1	PN16	3.0
065B749800	NVD 895	100	253.3	PN16	4.0
065B749900	NVD 895	125	481.8	PN16	6.0
065B750000	NVD 895	150	698.4	PN16	8.0
065B750100	NVD 895	200	1345.5	PN16	14.0
065B750200	NVD 895	250	2249.5	PN16	22.0
065B750300	NVD 895	300	3098	PN16	34.0
065B750400	NVD 895	400	5867	PN16	83.0
065B751600	NVD 805	450	6547	PN16	118
065B751700	NVD 805	500	7800	PN16	180
065B751800	NVD 805	600	11269	PN16	250

# Check Valves

## NVD 812



Technical Data	NVD 812
Nominal Diameter (DN)	15 - 200
kvs valve (m³/h)	4.24 - 546
Nominal Pressure (PN)	PN 25/40
Medium	Circulation water, drinking water or chilled glycolic water up to 50%
Medium temperature (°C)	- 10 ... 350°C
Leakage rate	According to EN12266-1 rate E
International Construction Standards	CE Conformity Directive 97/23/CE Connection according to ASA B16.1 class 125RF Connection according to ASA B16.5 class 150RF and 300RF Connection according to EN 1092.2 Overall dimensions according to EN558-1 series 49

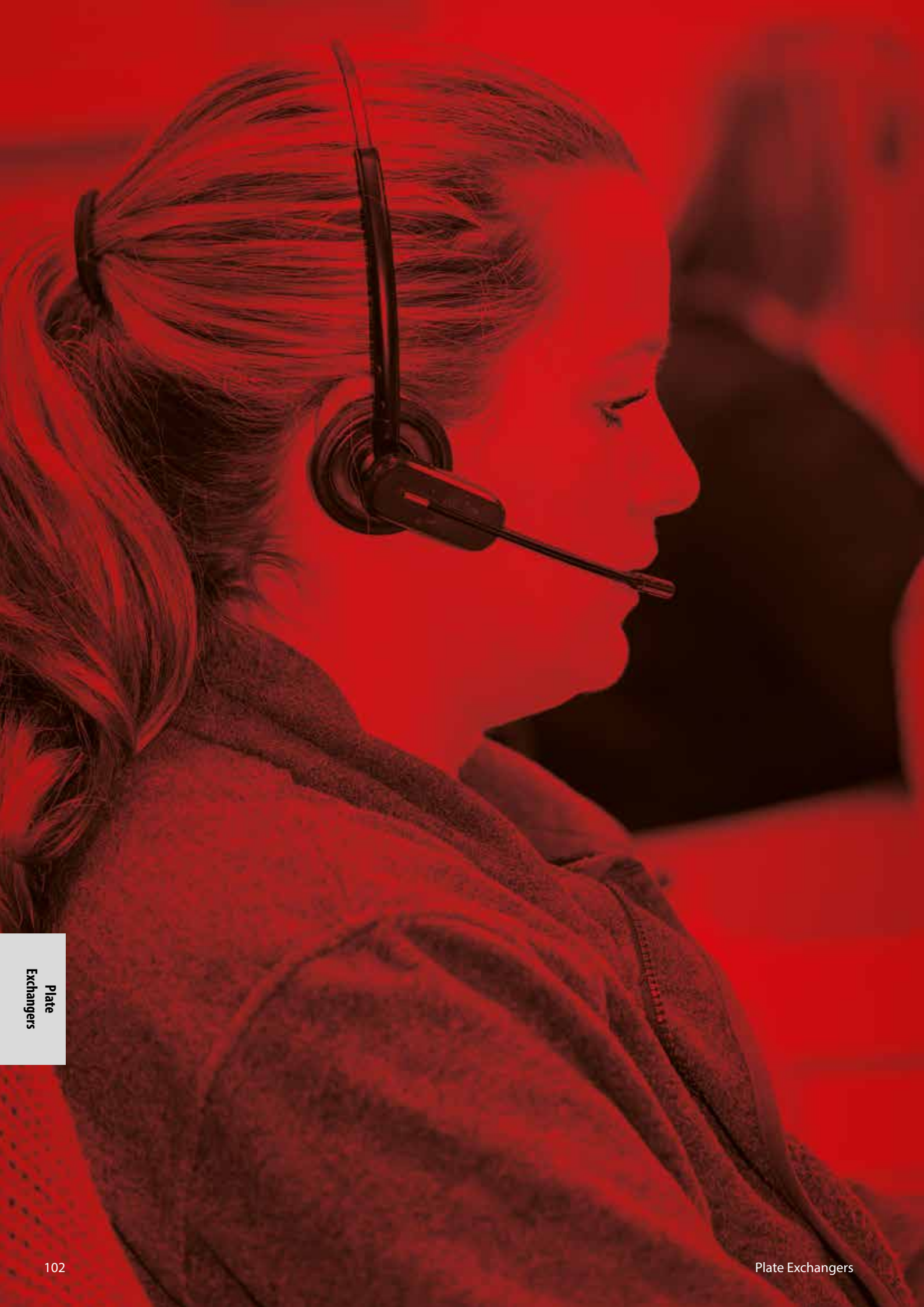
Material	NVD 402
Casing	Stainless steel
Closing system	Stainless steel
Spring	Stainless steel
Spring	Stainless steel
Stop / Guide	Stainless steel
Centering collar	Stainless steel
Clips	Stainless steel
Discharge anti-static braid	Copper

Code No.	Type	DN (mm)	Kvs (m³/h)	Nominal Pressure	Weight (kg)
Between flange non-return valve - up to 350°C					
065B753000	NVD 812	15	4.24	PN40	0.1
065B753100	NVD 812	20	7.80	PN40	0.15
065B753200	NVD 812	25	12.40	PN40	0.25
065B753300	NVD 812	32	18.00	PN40	0.35
065B753400	NVD 812	40	28.00	PN40	0.55
065B753500	NVD 812	50	40.10	PN40	0.75
065B753600	NVD 812	65	72.50	PN40	1.55
065B753700	NVD 812	80	111.00	PN40	2.5
065B753800	NVD 812	100	182.00	PN40	3.5
065B753900	NVD 812	125	302.00	PN40	8.5
065B754000	NVD 812	150	370.00	PN40	13.0
065B754100	NVD 812	200	546.00	PN40	30.0

### NVD 812

- Operates in any position
- Easy to install and dismantle, space-saving
- Minimum head loss
- Does not generate hammering
- Closing system: disc with parabolic edges with return spring and lateral guiding by 3 or 4 ribs (DN 15 to 100)
- Closing system with back axial guiding and return spring (ND 125 to 200).
- Metal/metal seal (machined trim)
- Using these check valves on networks equipped with piston pumps or compressors is not recommended.





# Heat Exchangers

The same model of heat exchangers has been in use for over 40 years, without any significant developments. But now, owing to Danfoss' latest invention the Micro Plate Heat Exchanger (MPHE), all is about to change.

Thanks to a unique plate pattern design, our new MPHEs give you an excellent route to better performance and lower environmental impact. By improving the flow of fluid across the plate and utilisation of the surface area, MPHEs enable much better heat transfer.

The micro plate pattern also allows for greater flexibility in application design. Simply by varying the number, size and placement of dimples on the plate, MPHEs can be adapted to give the optimal heat transfer and minimal pressure drop in a variety of different applications - from district heating to solar heating solutions.



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### Micro Plate™ Technology (MPHE)

Compared to traditional heat exchangers, Micro Plate™ technology deliver exceptional performance, efficiency and flexibility.

For the first time, you can now create a system individually suited to your network by varying the number, size and placement of dimples, Micro Plates™ can be adapted for optimal heat transfer and minimal pressure drop.

### Micro Plate™ Advantages

#### Up to 10% Enhanced Heat Transfer

MPHEs allow the fluid to move across the plate with a relatively uniform velocity. Between the fastest and slowest flowing areas, the difference is only x3, as opposed to x10 in older heat exchanger models. This improves the distribution of the mix fluid and enhances the heat transfer rate by up to 10%

#### Up to 35% Lower Pressure Loss

Thanks again to the unique plate design, the way that water is distributed inside the MPHE also reduces pressure loss. This means less energy is needed to drive the water around the system and consequently also lowers running costs.

#### Lower Carbon Footprint

By increasing the system's efficiency, less energy is required for the same result. The application can therefore be housed in a more compact design with fewer plates, so construction materials are kept to a minimum. Improved operational efficiency and a longer lifespan also help to reduce waste, all of which results in significant savings and a lower carbon footprint.



# Brazed Micro Plate™ Heat Exchangers

Brazed Micro Plate™ heat exchangers are a revolutionary technology from Danfoss. Characterised by their unique pattern, our innovative new plate design out performs everything else on the market with significantly lower pressure loss and vastly improved heat transfer.

- Up to 10% enhanced heat transfer rate
- Up to 35% reduced pressure loss
- Substantial cost and energy savings
- More flexible and compact design

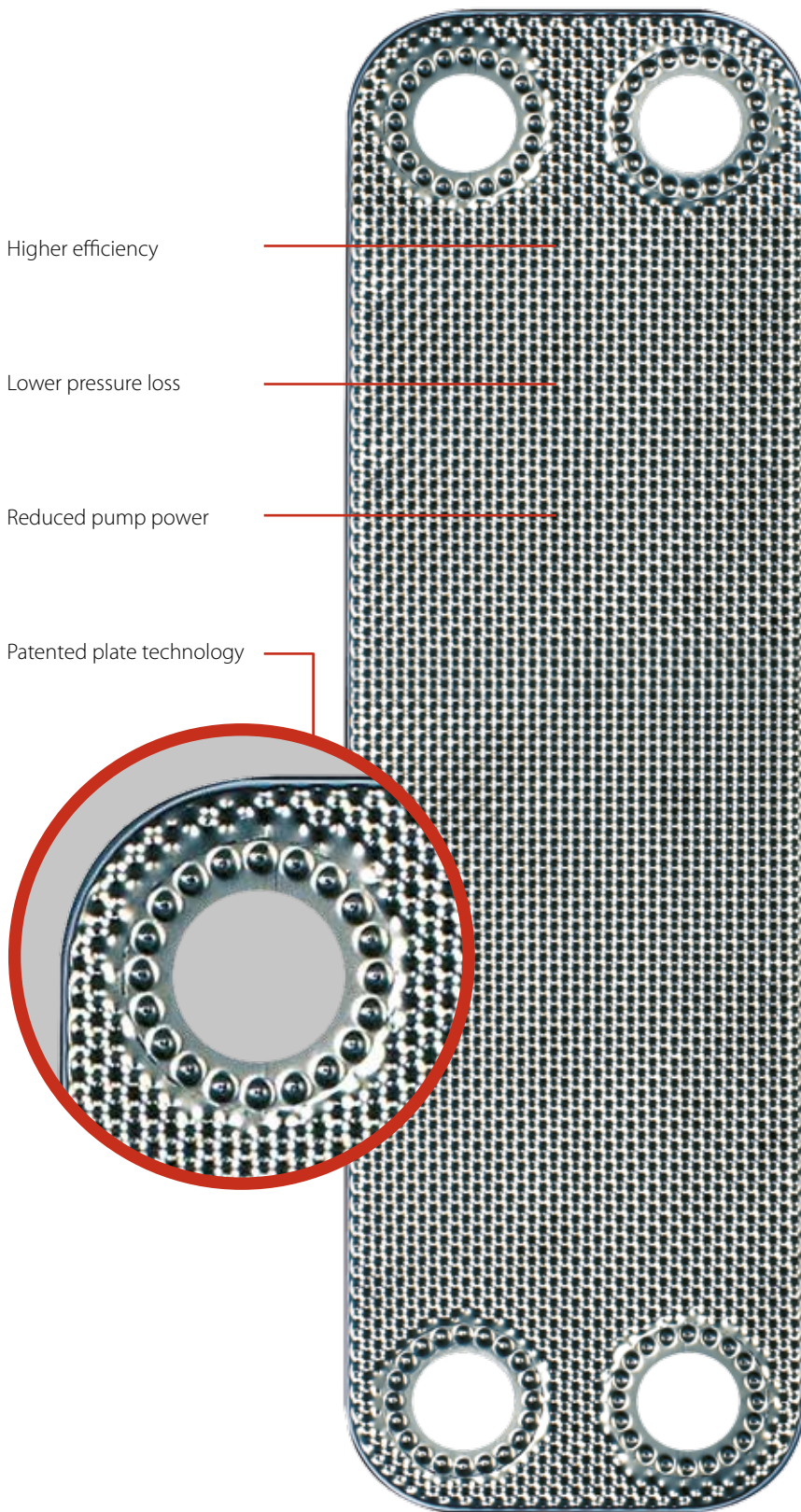
Embedded in our new range of brazed heat exchangers, Micro Plate™ technology is designed for smaller, lower duty applications with relatively constant pressures, temperatures and treated water supplies.

Higher efficiency

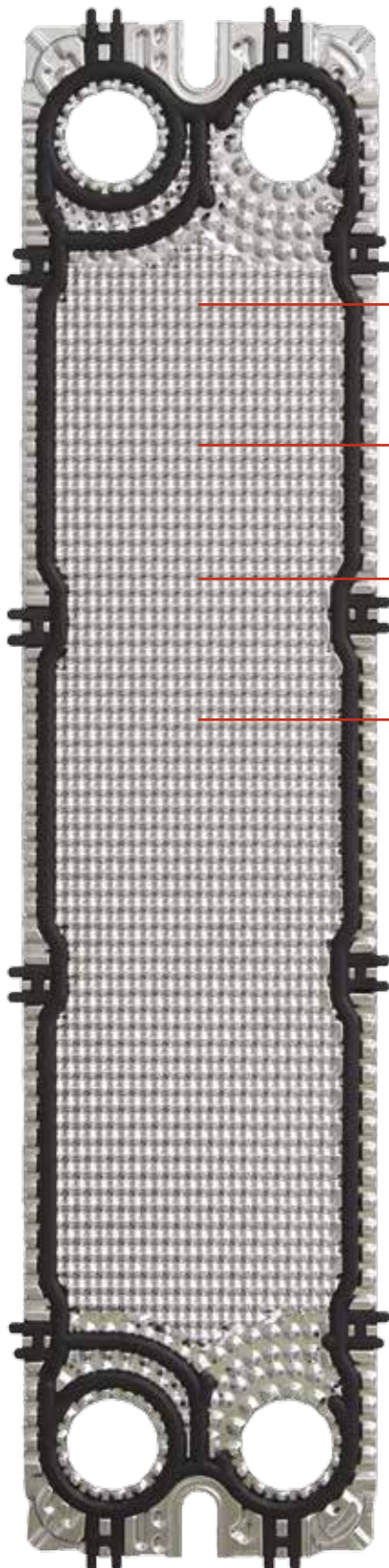
Lower pressure loss

Reduced pump power

Patented plate technology



# Gasketed Micro Plate™ Heat Exchangers



Higher efficiency

Lower pressure loss

Reduced pump power

Patented plate technology



XGM - the right choice for your business.

The small but perfectly formed XGM032 is the ideal solution to keep your business profitable with superior performance and lower costs, compared to competitors' models.

- Enhanced heat transfer performance
- Compact size (only index 70-75% compared with next best alternatives)
- 1 frame = 3 plate corrugations = 3 x the performance
- Thread connection (G1A), with 72mm porthole distance
- Flow rates: Up to 20 m³/h
- NTU valve: 0.5 - 4.0

Micro Plate™ heat exchangers are a revolutionary technology from Danfoss. Characterised by their unique pattern, our innovative new plate design out performs everything else on the market with significantly lower pressure loss and vastly improved heat transfer.

- Up to 10% enhanced heat transfer rate
- Up to 35% reduced pressure loss
- Substantial cost and energy-savings
- More flexible and compact design

As part of our new range of gasketed heat exchangers, Micro Plate™ technology is designed for smaller, lower duty applications with relatively constant pressures, temperatures and treated water supplies. Typical heating systems include:

1. District heating and cooling
2. Decentralised heating systems
3. Biomass Micro Networks
4. Solar Combi systems
5. Instantaneous domestic hot water production

# Heat Exchangers Selection Chart

## Heating Application

Application:	Heating				Heating			
Type:	Heat Pumps/UHFH				Radiators			
Primary Temperatures:	65/55 °C				80/60 °C			
Secondary Temperatures:	50/60 °C				55/75 °C			
HEX Loss:	5 °C				5 °C			
	Type	HEX Code	Insulation Code	Fittings (x2)	Type	HEX Code	Insulation Code	Fittings (2x)
5 kW	XB06L-1-8	004B2024	004B1191	004B2947	XB06H+-1-8	004B1206	004B1191	004B2947
10 kW	XB06L-1-16	004B2026	004B1191	004B2947	XB06H+-1-16	004B1209	004B1191	004B2947
15 kW	XB06L-1-20	004B2027	004B1191	004B2947	XB06H+-1-20	004B1211	004B1191	004B2947
20 kW	XB12L-1-16	004H7526	004H4210	004H4205	XB12H-1-20	004H7557	004H4210	004H4205
25 kW	XB12L-1-20	004H7527	004H4210	004H4205	XB12H-1-26	004H7558	004H4210	004H4205
30 kW	XB12L-1-26	004H7528	004H4210	004H4205	XB12H-1-30	004H7559	004H4210	004H4205
35 kW	XB12L-1-26	004H7528	004H4210	004H4205	XB12H-1-36	004H7560	004H4210	004H4205
40 kW	XB12L-1-30	004H7529	004H4210	004H4205	XB12H-1-36	004H7560	004H4210	004H4205
50 kW	XB12L-1-36	004H7530	004H4210	004H4205	XB37M-1-26	004H7288	004B1721	004B2903
60 kW	XB12L-1-50	004H7532	004H4211	004H4206	XB37M-1-30	004H7289	004B1722	004B2903
75 kW	XB12L-1-60	004H7533	004H4211	004H4206	XB37M-1-36	004H7290	004B1722	004B2903
100 kW	XB12L-1-80	004H7535	004H4212	004H4206	XB37M-1-50	004H7292	004B1723	004B2903
125 kW	XB61L-SB-1-40	004B1908	004B1655	004B2908	XB61M-SB-1-36	004B1914	004B1655	004B2908
150 kW	XB61L-SB-1-50	004B1909	004B1655	004B2908	XB61M-SB-1-40	004B1915	004B1655	004B2908
200 kW	XB52M-1-80	004H4528	004B1935	004B2909	XB59M-1-60	004B1932	004B1652	004B2908
300 kW	XB52M-1-130	004H4533	004B1950	004B2909	XB59M-1-90	004B1936	004B1652	004B2908
500 kW	XB66L-1-110	004B1968	004B3543	Flanged	XB59M-1-160	004B1941	004B1654	004B2908

Application:	Heating				Heating			
Type:	Radiators				Radiators			
Primary Temperatures:	82/71 °C				70/40 °C			
Secondary Temperatures:	66/77 °C				35/65 °C			
HEX Loss:	5 °C				5 °C			
	Type	HEX Code	Insulation Code	Fittings (x2)	Type	HEX Code	Insulation Code	Fittings (2x)
5 kW	XB06L-1-8	004B2024	004B1191	004B2947	XB06H+-1-20	004B1211	004B1191	004B2947
10 kW	XB06L-1-16	004B2026	004B1191	004B2947	XB37H-1-10	004H7300	004B1721	004B2913
15 kW	XB06L-1-20	004B2027	004B1191	004B2947	XB37H-1-10	004H7300	004B1721	004B2913
20 kW	XB12L-1-16	004H7526	004H4210	004H4205	XB37H-1-16	004H7301	004B1721	004B2913
25 kW	XB12L-1-20	004H7527	004H4210	004H4205	XB37H-1-16	004H7301	004B1721	004B2913
30 kW	XB12L-1-26	004H7528	004H4210	004H4205	XB37H-1-16	004H7301	004B1721	004B2913
35 kW	XB12L-1-26	004H7528	004H4210	004H4205	XB37H-1-20	004H7302	004B1721	004B2903
40 kW	XB12L-1-30	004H7529	004H4210	004H4205	XB37H-1-26	004H7303	004B1721	004B2903
50 kW	XB12L-1-36	004H7530	004H4210	004H4205	XB37H-1-26	004H7303	004B1721	004B2903
60 kW	XB12L-1-40	004H7531	004H4211	004H4205	XB37H-1-36	004H7304	004B1722	004B2903
75 kW	XB12L-1-50	004H7532	004H4211	004H4206	XB37H-1-36	004H7304	004B1722	004B2903
100 kW	XB12L-1-70	004H7534	004H4211	004H4206	XB37H-1-50	004H7307	004B1722	004B2903
125 kW	XB61L-SB-1-36	004B1907	004B1655	004B2908	XB37H-1-60	004H7308	004B1723	004B2903
150 kW	XB61L-SB-1-50	004B1909	004B1655	004B2908	XB59M-1-40	004B1922	004B1651	004B2908
200 kW	XB52M-1-70	004H4527	004B1924	004B2909	XB59M-1-60	004B1932	004B1652	004B2909
300 kW	XB52M-1-120	004H4532	004B1950	004B2909	XB59M-1-80	004B1934	004B1652	004B2909
500 kW	XB66L-SB-1-90	004B1966	004B3543	Flanged	XB59M-1-140	004B1940	004B1653	004B2909



# Heat Exchangers Selection Chart

## Cooling and DHW Applications

Application:	Cooling			
Type:	Chillers/FCU			
Primary Temperatures:	6/12 °C			
Secondary Temperatures:	13/7 °C			
HEX Loss:	1 °C			
	Type	HEX Code	Insulation Code	Fittings (x2)
3 kW	XB37H-1-20	004H7302	004B1721	004B2913
5 kW	XB37H-1-30	004H7304	004B1721	004B2913
7 kW	XB37H-1-40	004H7306	004B1722	004B2913
10 kW	XB37H-1-60	004H7308	004B1723	004B2913
15 kW	XB37H-1-80	004H7310	004B1723	004B2913
20 kW	XB59M-1-70	004B1933	004B1652	004B2908
25 kW	XB59M-1-80	004B1934	004B1652	004B2908
30 kW	XB59M-1-100	004B1937	004B1652	004B2908
35 kW	XB59M-1-110	004B1938	004B1653	004B2908
50 kW	XB59M-1-160	004B1941	004B1654	004B2908

Application:	Cooling			
Type:	Chillers/FCU			
Primary Temperatures:	6/12 °C			
Secondary Temperatures:	14/8 °C			
HEX Loss:	1 °C			
	Type	HEX Code	Insulation Code	Fittings (x2)
75 kW	XB59M-1-80	004B1934	004B1652	004B2909
100 kW	XB59M-1-100	004B1937	004B1652	004B2909
125 kW	XB59M-1-140	004B1940	004B1653	004B2909
150 kW	XB59M-1-160	004B1941	004B1654	004B2909
200 kW	XB70M-1-80	004B2003	004B2550	Flanged
300 kW	XB70M-1-120	004B2007	004B2570	Flanged

Application:	DHW				DHW			
Type:	Instant DHW				Instant DHW			
Primary Temperatures:	80/20 °C				80/20 °C			
Secondary Temperatures:	10/50 °C				10/60 °C			
	Type	HEX Code	Insulation Code	Fittings (x2)	Type	Code	Insulation Code	Fittings (2x)
30 kW	XB06H-1-16	004B2038	004B1191	004B2947	XB06H+-1-26	004B1212	004B1191	004B2947
35 kW	XB06H-1-20	004B2039	004B1191	004B2947	XB06H+-1-20	004B1211	004B1191	004B2947
40 kW	XB06H-1-20	004B2039	004B1191	004B2947	XB06H+-1-20	004B1211	004B1191	004B2947
50 kW	XB06H-1-26	004B2041	004B1191	004B2947	XB06H+-1-26	004B1212	004B1191	004B2947
55 kW	XB12H-1-20	004H7557	004H4210	004H4205	XB06H+-1-30	004B1214	004B1192	004B2947
60 kW	XB12H-1-20	004H7557	004H4210	004H4205	XB37H-1-16	004H7301	004B1721	004B2913
75 kW	XB12H-1-20	004H7557	004H4210	004H4205	XB37H-1-20	004H7302	004B1721	004B2913
90 kW	XB12H-1-30	004H7559	004H4210	004H4205	XB37H-1-26	004H7303	004B1721	004B2913
100 kW	XB12H-1-36	004H7560	004H4210	004H4206	XB37H-1-26	004H7303	004B1721	004B2913
125 kW	XB12H-1-50	004H7562	004H4210	004H4206	XB37H-1-36	004H7305	004B1722	004B2903
150 kW	XB12H-1-50	004H7562	004H4210	004H4206	XB37H-1-40	004H7306	004B1722	004B2903
250 kW	XB52M-1-26	004H4521	004B1924	004B2909	XB37H-1-50	004H7292	004B1723	004B2903
500 kW	XB52M-1-50	004H4525	004B1924	004B2909	XB59M-1-60	004B1932	004B1652	004B2909

**Please note:** These charts are for guidance only. Please check your selection with Danfoss prior to ordering a heat exchanger.

The pressure drop used in calculating the heat exchangers is 20kPa maximum

For selections outside of this criteria please contact [martyn\\_neil@danfoss.com](mailto:martyn_neil@danfoss.com)

# Heat Exchangers

## XB Range

The XB series is a range of copper brazed plate heat exchangers for use in District Heating(DH) and District Cooling (DC) applications that offer a compact design and excellent heat transfer properties.

### XB06 - Compact performance

The small XB06 copper brazed stainless steel heat exchanger with one pass is designed for district heating systems with varying differential pressure and where high idle temperature is required.

### XB37 - Exceptional efficiency

The XB37 copper brazed stainless steel heat exchanger comes in a larger size than the XB06, giving you even greater application flexibility with the same high system efficiency and excellent heat transfer properties.

### XB70 - Compact design with excellent performance

The XB70 is the largest copper brazed stainless steel heat exchanger in the range, thanks to its compact design and excellent heat transfer properties, it is ideal for heating and domestic hot water applications, and also suitable for HVAC, cooling and industrial applications.

Type	Connection size (DN)	Connection type	Width (mm)	Length (mm)	Max Design Pressure (bar)	Max working temperature (°C)
XB 06	¾"	Thread	95	320	25	180
XB 20	1"	Thread	118	338		
XB 37	1"	Thread	119	525		
XB 59	2"	Thread	188	613		
XB 61	2"	Thread + Flange	243	525		
XB 70	65/100	Flange	365	991	25/16	



# Find the perfect match with 2nd generation Hexact



The screenshot shows the Hexact software website. At the top, the logo 'heatexchangers' is on the left, and a computer monitor displays the software box and a CD with the text 'The new calculation software from Danfoss!'. Below the logo, the heading 'Hexact' is followed by the tagline 'The accurate timesaver from Danfoss'. A paragraph describes the software's benefits: saving time, trouble, and money by providing an immediate solution with an intuitive interface and smart algorithms. A red button with a download icon says 'Go to download page', and a grey button says 'Version 1.5.6'. The 'All about Hexact' section states the software works with Micro Plate Heat Exchangers (MPHEs) and traditional Braze Plate Heat Exchangers (BPHEs). The 'Features' section lists: 'Easy to use', 'Instant calculations for BPHEs and MPHEs', 'Based on verified laboratory data', 'All types of condenser and evaporator calculations', and 'Application based models'. Three small screenshots of the software interface are shown with plus signs.

heatexchangers

## Hexact

**The accurate timesaver from Danfoss**

Save yourself time, trouble and money: use our new Hexact software to choose your heat exchangers. Hexact gives you an immediate solution for your application, with an intuitive interface and smart algorithms that mean you can start saving within minutes. Download it now and try it for yourself.

Go to download page Version 1.5.6

### All about Hexact

The software works smoothly and accurately with our innovative Micro Plate Heat Exchangers (MPHEs) as well as our traditional Braze Plate Heat Exchangers (BPHEs). To find the optimal heat exchanger for your needs, simply enter your application data. The software responds immediately with our recommended MPHE or BPHE product.

### Features

Easy to use  
Instant calculations for BPHEs and MPHEs  
Based on verified laboratory data  
All types of condenser and evaporator calculations  
Application based models

**"Very easy to use"**

**"Best software yet"**

- Quick and easy to use
- Define your own profile, including temperature and pressure, connection sizes/types, delivery options and more
- Wide range of print options, including datasheets, drawings, punch lists, BOM and Tender Text.

Now in its user-friendly second generation, Hexact makes it faster and easier than ever to find the right Danfoss heat exchanger for you needs.

Our intelligent software will help you to discover the most appropriate and competitive solution for your district heating applications and network. A range of new features mean you can order tailor-made heat exchangers, control order handling and even print out tender documentation.

Simply follow the step-by-step guide and Hexact does the rest.

Start saving energy today at:  
[www.hexact.danfoss.com](http://www.hexact.danfoss.com)





# Danfoss/Trend Cross Reference

## Plant and Steam Valves

Trend Code	Danfoss Product Type	Danfoss Part Number	Trend code	Danfoss Product Type	Danfoss Part Number
<b>Plant Valves - Screwed Internal Brass</b>			<b>Plant Valves - Flanged</b>		
VG2N/15/0.6	VRB2 15/0.63 internal	065Z023100	VC2/15/0.63	VF2 15/0.63 <sup>(2)</sup>	065Z027100
VG2N/15/1.0	VRB2 15/1.0 internal	065Z023200	VC2/15/1.0	VF2 15/1.0 <sup>(2)</sup>	065Z027200
VG2N/15/1.6	VRB2 15/1.6 internal	065Z023300	VC2/15/1.6	VF2 15/1.6 <sup>(2)</sup>	065Z027300
VG2N/15/2.5	VRB2 15/2.5 internal	065Z023400	VC2/15/2.5	VF2 15/2.5 <sup>(2)</sup>	065Z027400
VG2N/15/4.0	VRB2 15/4.0 internal	065Z023500	VC2/15/4.0	VF2 15/4.0 <sup>(2)</sup>	065Z027500
VG2N/20/6.3	VRB2 20/6.3 internal	065Z023600	VC2/20/6.3	VF2 20/6.3 <sup>(2)</sup>	065Z027600
VG2N/25/10	VRB2 25/10 internal	065Z023700	VC2/25/10	VF2 25/10 <sup>(2)</sup>	065Z027700
VG2N/32/16	VRB2 32/16 internal	065Z023800	VC2/32/16	VF2 32/16 <sup>(2)</sup>	065Z027800
VG2N/40/25	VRB2 40/25 internal	065Z023900	VC2/40/25	VF2 40/25 <sup>(2)</sup>	065Z027900
VG2N/50/40	VRB2 50/40 internal	065Z024000	VC2/50/40	VF2 50/40 <sup>(2)</sup>	065Z028000
VG3N/15/0.6	VRB3 15/0.63 internal	065Z021100	VC2/65/63	VF2 65/63 <sup>(3)</sup>	065Z028100
VG3N/15/1.0	VRB3 15/1.0 internal	065Z021200	VC2/80/100	VF2 80/100 <sup>(3)</sup>	065Z028200
VG3N/15/1.6	VRB3 15/1.6 internal	065Z021300	VC2/100/145	VF2 100/145	065B320500
VG3N/15/2.5	VRB3 15/2.5 internal	065Z021400	VC2/125/220	VF2 125/220	065B323000
VG3N/15/4.0	VRB3 15/4.0 internal	065Z021500	VC2/150/320	VF2 150/320	065B325500
VG3N/20/6.3	VRB3 20/6.3 internal	065Z021600	VC3/15/0.63	VF3 15/0.63 <sup>(2)</sup>	065Z025100
VG3N/25/10	VRB3 25/10 internal	065Z021700	VC3/15/1.0	VF3 15/1.0 <sup>(2)</sup>	065Z025200
VG3N/32/16	VRB3 32/16 internal	065Z021800	VC3/15/1.6	VF3 15/1.6 <sup>(2)</sup>	065Z025300
VG3N/40/25	VRB3 40/25 internal	065Z021900	VC3/15/2.5	VF3 15/2.5 <sup>(2)</sup>	065Z025400
VG3N/50/40	VRB3 50/40 internal	065Z022000	VC3/15/4.0	VF3 15/4.0 <sup>(2)</sup>	065Z025500
			VC3/20/6.3	VF3 20/6.3 <sup>(2)</sup>	065Z025600
<b>Plant Valves - Screwed External Brass</b>			VC3/25/10	VF3 25/10 <sup>(2)</sup>	065Z025700
VG2X/15/0.6	VRB2 15/0.63 external	065Z017101	VC3/32/16	VF3 32/16 <sup>(2)</sup>	065Z025800
VG2X/15/1.0	VRB2 15/1.0 external	065Z017201	VC3/40/25	VF3 40/25 <sup>(2)</sup>	065Z025900
VG2X/15/1.6	VRB2 15/1.6 external	065Z017301	VC3/50/40	VF3 50/40 <sup>(2)</sup>	065Z026000
VG2X/15/2.5	VRB2 15/2.5 external	065Z017401	VC3/65/63	VF3 65/63 <sup>(3)</sup>	065Z026100
VG2X/15/4.0	VRB2 15/4.0 external	065Z017501	VC3/80/100	VF3 80/100 <sup>(3)</sup>	065Z026200
VG2X/20/6.3	VRB2 20/6.3 external	065Z017601	VC3/100/145	VF3 100/145	065B168500
VG2X/25/10	VRB2 25/10 external	065Z017701	VC3/125/220	VF3 125/220	065B312500
VG2X/32/16	VRB2 32/16 external	065Z017801	VC3/150/320	VF3 150/320	065B315000
VG2X/40/25	VRB2 40/25 external	065Z017901			
VG2X/50/40	VRB2 50/40 external	065Z018001	<b>Plant Valves - Flanged Steam</b>		
VG3X/15/0.6	VRB3 15/0.63 external	065Z015101	VC2H/15/0.4 LOG	VFS2 15/0.4	065B151000
VG3X/15/1.0	VRB3 15/1.0 external	065Z015201	VC2H/15/0.63 LOG	VFS2 15/0.63	065B151100
VG3X/15/1.6	VRB3 15/1.6 external	065Z015301	VC2H/15/1.0 LOG	VFS2 15/1.0	065B151200
VG3X/15/2.5	VRB3 15/2.5 external	065Z015401	VC2H/15/1.6 LOG	VFS2 15/1.6	065B151300
VG3X/15/4.0	VRB3 15/4.0 external	065Z015501	VC2H/15/2.5 LOG	VFS2 15/2.5	065B151400
VG3X/20/6.3	VRB3 20/6.3 external	065Z015601	VC2H/15/4.0 LOG	VFS2 15/4.0	065B151500
VG3X/25/10	VRB3 25/10 external	065Z015701	VC2H/20/6.3 LOG	VFS2 20/6.3	065B152000
VG3X/32/16	VRB3 32/16 external	065Z015801	VC2H/25/10 LOG	VFS2 25/10	065B152500
VG3X/40/25	VRB3 40/25 external	065Z015901	VC2H/32/16 LOG	VFS2 32/16	065B153200
VG3X/50/40	VRB3 50/40 external	065Z016001	VC2H/40/25 LOG	VFS2 40/25	065B154000
			VC2H/50/40 LOG	VFS2 50/40	065B155000
			VC2H/65/63 LOG	VFS2 65/63	065B336500
			VC2H/80/100 LOG	VFS2 80/100	065B338000
			VC2H/100/145 LOG	VFS2 100/145	065B340000

# Danfoss/Trend Cross Reference

## Actuators and Fan Coil Valves

Trend Code	Danfoss Product Type	Danfoss Part Number	Trend Code	Danfoss Product Type	Danfoss Part Number
<b>Actuators</b>			<b>Fan Coil Valves - Flat Short Stroke</b>		
AT103/24	TWA-Z	<b>082F126200</b>	SVB2/15/0.25/F	VZL2 DN 15/0.25	<b>065Z207000</b>
ATR103/24-NC	TWA-A 24V AC/DC NC	<b>088H311100</b>	SVB2/15/0.4/F	VZL2 DN 15/0.4	<b>065Z207100</b>
ATR103/24-NO	TWA-A 24V AC/DC NO	<b>088H311000</b>	SVB2/15/0.6/F	VZL2 DN 15/0.6	<b>065Z207200</b>
A203/230	AMV 130 230V	<b>082H803700</b>	SVB2/15/1.0/F	VZL2 DN 15/1.0	<b>065Z207300</b>
A203/230/K	AMV 130-H 230V	<b>082H804100</b>	SVB2/15/1.6/F	VZL2 DN 15/1.6	<b>065Z207400</b>
A203/24	AMV 130 24V	<b>082H803600</b>	SVB2/20/2.5/F	VZL2 DN 20/2.5	<b>065Z207500</b>
A203/24/K	AMV 130-H 24V	<b>082H804000</b>	SVB2/20/3.5/F	VZL2 DN 20/3.5	<b>065Z207600</b>
A203/P	AME 130 24V	<b>082H804400</b>	SVB3/15/0.25/F	VZL4 DN 15/0.25	<b>065Z209000</b>
A203/P/K	AME 130-H 24V	<b>082H804600</b>	SVB3/15/0.4/F	VZL4 DN 15/0.4	<b>065Z209100</b>
A204/230	AMV 140 230V	<b>082H803900</b>	SVB3/15/0.6/F	VZL4 DN 15/0.6	<b>065Z209200</b>
A204/230/K	AMV 140-H 230V	<b>082H804300</b>	SVB3/15/1.0/F	VZL4 DN 15/1.0	<b>065Z209300</b>
A204/24	AMV 140 24V	<b>082H803800</b>	SVB3/15/1.6/F	VZL4 DN 15/1.6	<b>065Z209400</b>
A204/24/K	AMV 140-H 24V	<b>082H804200</b>	SVB3/20/2.5/F	VZL4 DN 20/2.5	<b>065Z209500</b>
A204/P	AME 140 24V	<b>082H804700</b>	SVB3/20/3.5/F	VZL4 DN 20/3.5	<b>065Z209600</b>
A204/P/K	AME 140-H 24V	<b>082H804500</b>	SVB4/15/0.25/F	VZL4 DN 15/0.25	<b>065Z209000</b>
A301/230	AMV 435 230V	<b>082H016300</b>	SVB4/15/0.4/F	VZL4 DN 15/0.4	<b>065Z209100</b>
A301/24	AMV 435 24V	<b>082H016200</b>	SVB4/15/0.6/F	VZL4 DN 15/0.6	<b>065Z209200</b>
A301/P	AME 435 24V	<b>082H016100</b>	SVB4/15/1.0/F	VZL4 DN 15/1.0	<b>065Z209300</b>
A302/230	AMV 435 230V	<b>082H016300</b>	SVB4/15/1.6/F	VZL4 DN 15/1.6	<b>065Z209400</b>
A302/24	AMV 435- 24V	<b>082H016200</b>	SVB4/20/2.5/F	VZL4 DN 20/2.5	<b>065Z209500</b>
A302/P	AME 435 24V	<b>082H016100</b>	SVB4/20/3.5/F	VZL4 DN 20/3.5	<b>065Z209600</b>
A401/230	AMV 435 230V	<b>082H016300</b>			
A401/24	AMV 435 24V	<b>082H016200</b>			
A401/P	AME 435 24V	<b>082H016100</b>			
A402/230	AMV 435 230V	<b>082H016300</b>			
A402/24	AMV 435 24V	<b>082H016200</b>			
A402/P	AME 435 24V	<b>082H016100</b>			
A501/230	AMV 55 230V	<b>082H302100</b>			
A501/24	AMV 55 24V	<b>082H302000</b>			
A501/P	AME 55 24V	<b>082H302200</b>			
A502/230	AMV 56 230V	<b>082H302400</b>			
A502/24	AMV 56 24V	<b>082H302300</b>			
A502/P	AME 56 24V	<b>082H302500</b>			
A601/230	AMV 85 230V	<b>082G145100</b>			
A601/24	AMV 85 24V	<b>082G145000</b>			
A601/P	AME 85 24V	<b>082G145200</b>			
A602/230	AMV 86 230V	<b>082G146100</b>			
A602/24	AMV 86 24V	<b>082G146000</b>			
A602/P	AME 86 24V	<b>082G146200</b>			
<b>Actuators - Spring Return</b>					
A353/2/230	AMV 13 230V SU	<b>082H304200</b>			
A353/2/24	AMV 13 24V SU	<b>082H304300</b>			
A353/2/P	AME 13 24V SU	<b>082H304400</b>			
A451/1/230	AMV 25SD 230V	<b>082H303700</b>			
A451/1/24	AMV 25SD 24V	<b>082H303600</b>			
A451/1/P	AME 25SD	<b>082H303800</b>			
A451/2/230	AMV 438SU 230V	<b>082H012300</b>			
A451/2/24	AMV 438SU 24V	<b>082H012200</b>			
A451/2/P	AME 438SU	<b>082H012100</b>			
<b>Fan Coil Valves - Compression Short Stroke</b>					
SVB2/15/0.25	VZL2 DN 15/0.25	<b>065Z204000</b>			
SVB2/15/0.4	VZL2 DN 15/0.4	<b>065Z204100</b>			
SVB2/15/0.6	VZL2 DN 15/0.6	<b>065Z204200</b>			
SVB2/15/1.0	VZL2 DN 15/1.0	<b>065Z204300</b>			
SVB2/15/1.6	VZL2 DN 15/1.6	<b>065Z204400</b>			
SVB2/20/2.5	VZL2 DN 20/2.5	<b>065Z204500</b>			
SVB2/20/3.5	VZL2 DN 20/3.5	<b>065Z204600</b>			
SVB4/15/0.25	VZL4 DN 15/0.25	<b>065Z206000</b>			
SVB4/15/0.4	VZL4 DN 15/0.4	<b>065Z206100</b>			
SVB4/15/0.6	VZL4 DN 15/0.6	<b>065Z206200</b>			
SVB4/15/1.0	VZL4 DN 15/1.0	<b>065Z206300</b>			
SVB4/15/1.6	VZL4 DN 15/1.6	<b>065Z206400</b>			
SVB4/20/2.5	VZL4 DN 20/2.5	<b>065Z206500</b>			
SVB4/20/3.5	VZL4 DN 20/3.5	<b>065Z206600</b>			

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