

Data sheet

Pressure reduction controllers (PN 25)

AVD - for water

AVDS - for steam

Description



AVD(S) is a self-acting pressure reduction controller primarily for use in district heating systems. The controller is normally opened and closes on rising pressure.

The controller has a control valve, an actuator with one control diaphragm and a spring(s) for pressure setting.

Main data AVD:

- DN 15-50
- k_{vs} 0,4-25 m³/h
- PN 25
- Setting range:
1-5 bar / 3-12 bar
- Temperature:
- Circulation water/glycolic water up to 30 %:
2 ... 150 °C
- Connections:
- Ext. thread (weld-on, thread and flange tailpieces)
- Flange

Main data AVDS:

- DN 15-25
- k_{vs} 1,0-6,3 m³/h
- PN 25
- Setting range:
1-5 bar / 3-12 bar
- Temperature:
- Steam/circulation water/glycolic water up to 30 %: 2 ... 200 °C
- Connections:
- External thread (weld-on, thread and flange tailpieces)

Ordering

Example 1 - AVD controller:
Pressure reduction controller for water, DN 15, k_{vs} 4,0, PN 25, setting range 1-5 bar, T_{max} 150 °C, ext. thread

- 1x AVD DN 15 controller
Code No: **003H6644**

Option:

- 1x Weld-on tailpieces
Code No: **003H6908**

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator.

AVD Controller

Picture	DN (mm)	k _{vs} (m³/h)	Connection		Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	0,4	Cylindr. ext. thread acc. to ISO 228/1	G ¾ A	1-5	003H6957	3-12	003H6978
		1,0				003H6958		003H6979
		4,0				003H6644		003H6650
	20	6,3		G 1 A		003H6645		003H6651
	25	8,0		G 1¼ A		003H6646		003H6652
	32	12,5	Flanges PN 25, acc. to EN 1092-2			003H6659		003H6662
	40	20				003H6660		003H6663
	50	25				003H6661		003H6664

Note: other controllers available on special request.

Data sheet

Pressure reduction controllers AVD(S) (PN 25)

Ordering (continuous)

Example 2 - **AVDS** controller:
Pressure reduction controller for
steam, DN 15, k_{vs} 3,2, PN 25, setting
range 1-5 bar, T_{max} 200 °C,
ext. thread

- 1x AVDS DN 15 controller
Code No: **003H6667**
- 1x Impulse tube set AV 1/8
Code No: **003H6852**

Option:

- 1x Weld-on tailpieces
Code No: **003H6908**
- 1x Seal pot
Code No: **003H0277**

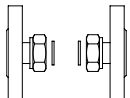
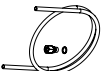
The controller will be delivered
completely assembled. External
impulse tube (AV) and seal pot must
be ordered separately.

AVDS Controller ¹⁾

Picture	DN (mm)	k_{vs} (m ³ /h)	Connection	Δp setting range (bar)	Code No.	Δp setting range (bar)	Code No.
	15	1,0	Cylindr. ext. thread acc. to ISO 228/1	1-5	003H6665	3-12	003H6670
		1,6			003H6666		003H6671
		3,2			003H6667		003H6672
	20	4,5	G 1 A		003H6668		003H6673
	25	6,3	G 1 1/4 A		003H6669		003H6674

¹⁾ Seal pot has to be used on impulse tubes always in steam applications when $T_{max} \geq 150$ °C

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		003H6908
		20			003H6909
		25			003H6910
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	003H6902
		20		R ¾	003H6903
		25		R 1	003H6904
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		003H6915
		20			003H6916
		25			003H6917
	Impulse tube set AV	Description: - 1x copper tube Ø 6 × 1 × 1500 mm - 1x compression fitting) for imp. tube connection to pipe Ø 6 × 1 mm		R ⅛	003H6852
				R ⅜	003H6853
				R ½	003H6854
	¹) 10 compression fittings for impulse tube connection to pipe, Ø 6 × 1 mm R ⅛				003H6857
	¹) 10 compression fittings for impulse tube connection to pipe, Ø 6 × 1 mm R ⅜				003H6858
	¹) 10 compression fittings for impulse tube connection to pipe, Ø 6 × 1 mm R ½				003H6859
	¹) 10 compression fittings for impulse tube connection to actuator, Ø 6 × 1 mm G ⅝				003H6931
	Shut off valve Ø 6 mm				003H0276
	²) Seal pot, 0,3 l, with two compression fittings Ø 6 × 1 mm				003H0277

¹⁾ Compression fitting consists of a nipple, compression ring and nut.

²⁾ Seal pot has to be used on impulse tubes always in steam applications when $T_{max} \geq 150$ °C

Service kits

Picture	Type designation	DN	k_{vs} (m ³ /h)	Code No.
	Valve insert ¹⁾	15	0,4	003H6869
			1,0	003H6870
			4,0	003H6873
		20	6,3	003H6874
		25	8,0	003H6875
	Valve body extension with stuffing box ²⁾	32/40/50	12,5/20/25	003H6876
		15	3,2	003H6877
		20	4,5	
		25	6,3	
	Actuator with setting spring	Δp setting range (bar)		Code No.
		1-5		003H6844
		3-12		003H6845

¹⁾ for AVD controller only

²⁾ for AVDS controller only

Technical data

Valve (AVD)

Nominal diameter	DN	15			20	25	32	40	50
k _{vs} value	m³/h	0,4	1,0	4,0	6,3	8,0	12,5	20	25
Cavitation factor z		≥ 0,6				≥ 0,55		≥ 0,5	
Leakage acc. to standard IEC 534	% of k _{vs}	≤ 0,02					≤ 0,05		
Nominal pressure	PN	25							
Max. differential pressure	bar	20					16		
Medium		Circulation water / glycolic water up to 30 %							
Medium pH		Min. 7, max. 10							
Medium temperature	°C	2 ...150							
Connections	valve	External thread					Flange		
	tailpieces	Weld-on, external thread and flange					-		
Materials									
Valve body	thread	Red bronze CuSn5ZnPb (Rg5)					-		
	flange	-					Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
Valve seat		Stainless steel, mat. No. 1.4571							
Valve cone		Dezincing free brass CuZn36Pb2As							
Sealing		EPDM							
Pressure relieve system		Piston							

Valve (AVDS)

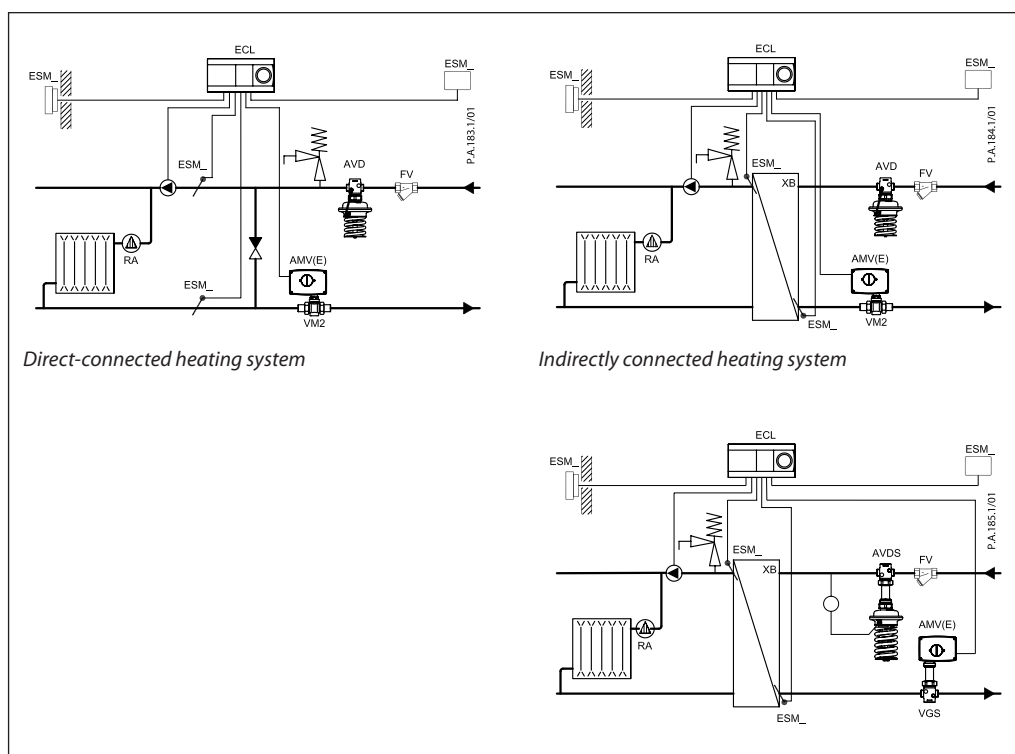
Nominal diameter		DN	15			20	25
k _{vs} value		m³/h	1,0	1,6	3,2	4,5	6,3
Cavitation factor z			≥ 0,6				≥ 0,55
Leakage acc. to standard IEC 534		% of k _{vs}	≤ 0,02				
Nominal pressure		PN	25				
Max. differential pressure		bar	10				
Medium			Steam / Circulation water / glycolic water up to 30 %				
Medium pH			Min. 7, max. 10				
Medium temperature		°C	2 ... 200 ¹⁾				
Connections	valve		External thread				
	tailpieces		Weld-on, external thread and flange				
Materials							
Valve body			Red bronze CuSn5ZnPb (Rg5)				
Valve seat			Stainless steel, mat. No. 1.4571				
Valve cone			Stainless steel, mat. No. 1.4122				
Pressure relieve system			Bellows				

¹⁾ Seal pot has to be used on impulse tubes always in steam applications when $T_{max} \geq 150$ °C

Actuator

Type		AVD, AVDS	
Actuator size	cm²	54	
Nominal pressure	PN	25	
Diff. pressure setting ranges and spring colours	bar	1-5	3-12
		blue	black, green
Materials			
Actuator housing	Upper casing of diaphragm	Stainless steel, mat. No.1.4301	
	Lower casing of diaphragm	Dezincing free brass CuZn36Pb2As	
Diaphragm		EPDM	
Impulse tube		Copper tube Ø 6 × 1 mm	

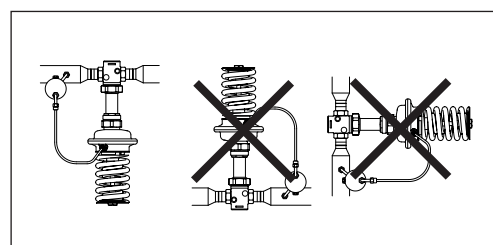
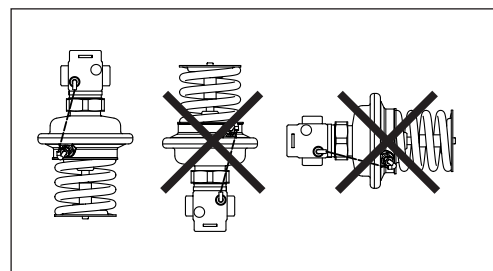
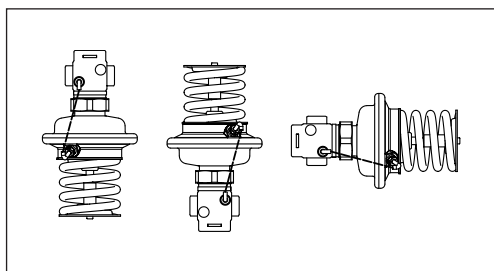
Application principles



Installation positions

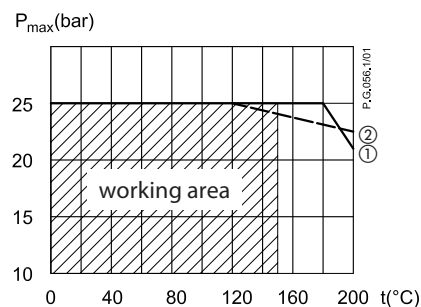
Up to medium temperature of 100 °C the controllers can be installed in any position (valid for AVD controller only).

For higher temperatures (valid for AVD controller) and **always** in steam applications (AVDS controller) the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.

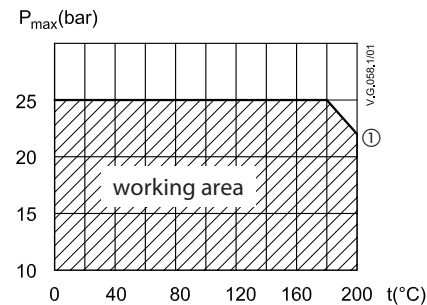


Pressure temperature diagram

AVD



AVDS



Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Sizing

Pressure reduction controller has to control 6,0 bar behind the controller. Max. flow through the system is less than 2,0 m³/h, min. flow pressure is 7,5 bar.

Given data:

$$Q_{\max} = 2,0 \text{ m}^3/\text{h}$$

$$p_{1 \min} = 7,5 \text{ bar}$$

$$p_{\text{reduced}} = 6,0 \text{ bar}$$

Nominal pressure PN 25

The min. differential pressure across the controller is calculated from the formula:

$$\Delta p_{\text{AVD}} = p_{1 \min} - p_{\text{reduced}} = 7,5 - 6,0$$

$$\Delta p_{\text{AVD}} = 1,5 \text{ bar}$$

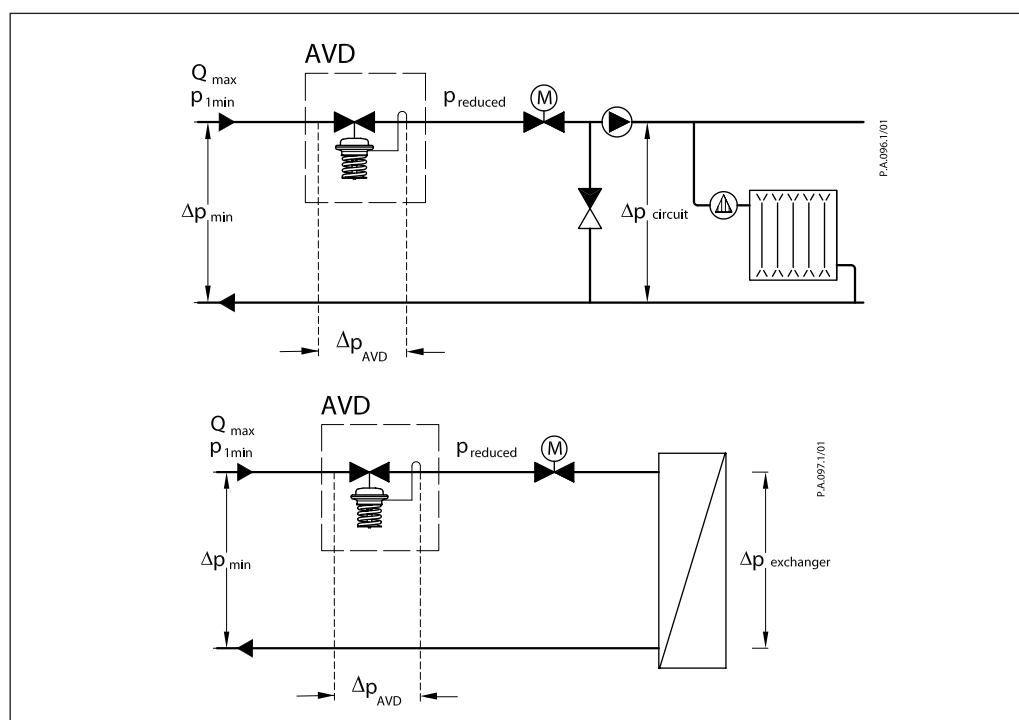
k_v value is calculated according to formula:

$$k_v = \frac{Q_{\max}}{\sqrt{\Delta p_{\text{AVD}}}} = \frac{2,0}{\sqrt{1,5}}$$

$$k_v = 1,6 \text{ m}^3/\text{h}$$

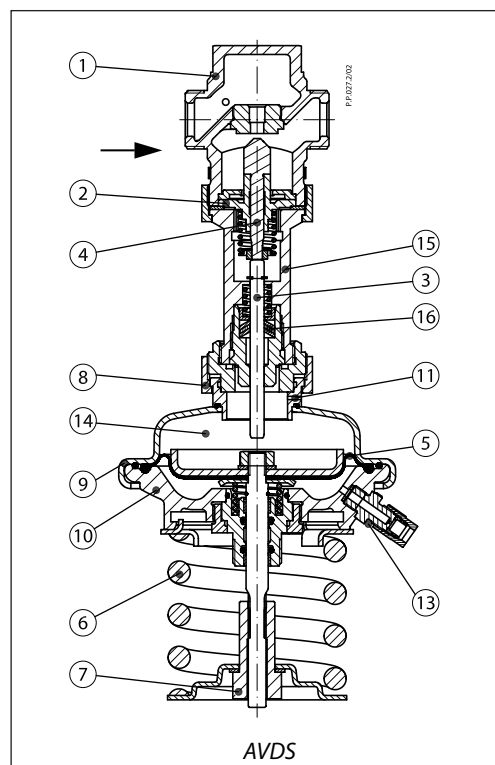
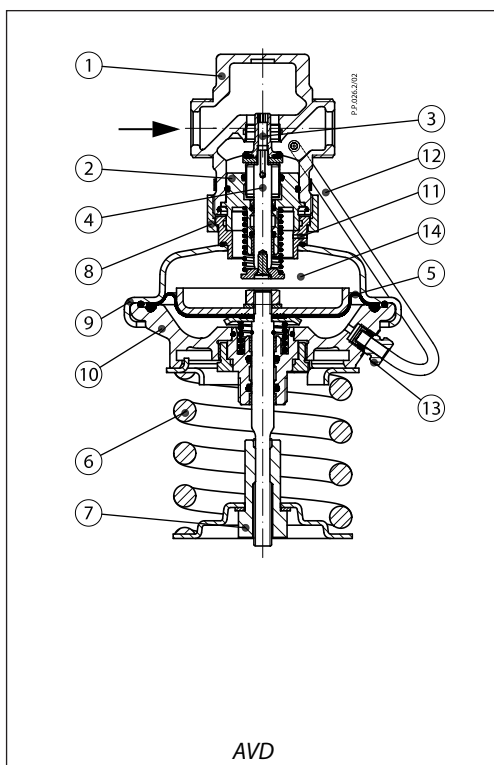
Solution:

The example selects AVD DN 15, k_{v5} value 4,0, with pressure setting range 3-12 bar



Design

1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control diaphragm
6. Setting spring for pressure control
7. Adjuster for pressure setting, prepared for sealing
8. Union nut
9. Upper casing of diaphragm
10. Lower casing of diaphragm
11. Air space bore
12. Impulse tube
13. Compression fitting for impulse tube
14. Actuator
15. Valve body extension
16. Stuffing box



Function

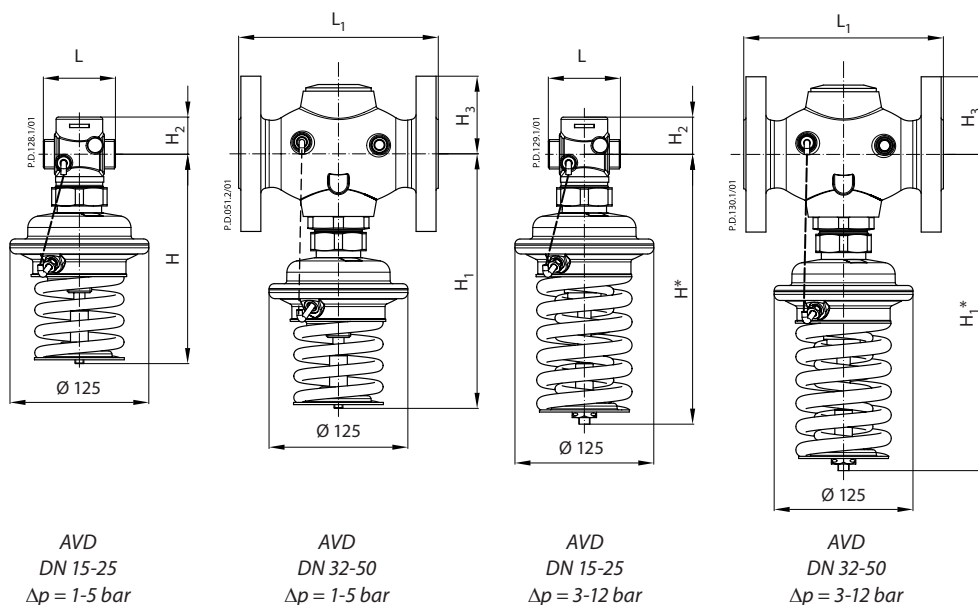
The pressure behind of the control valve is being transferred through the impulse tube to the actuator chamber and act on control diaphragm. On the other side of the diaphragm atmospheric pressure is acting (through air space bore). Control valve is normally opened. It closes on rising pressure and opens on falling pressure to maintain constant pressure.

Settings

Pressure setting

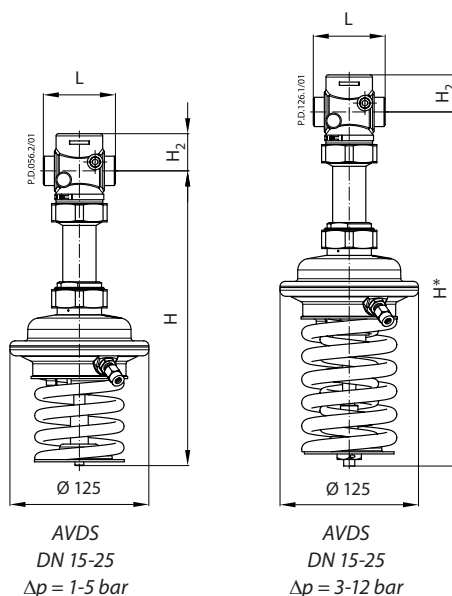
Differential pressure setting is being done by the adjustment of the setting spring for pressure control. The adjustment can be done by means of spring for pressure setting and/or pressure indicators.

Dimensions



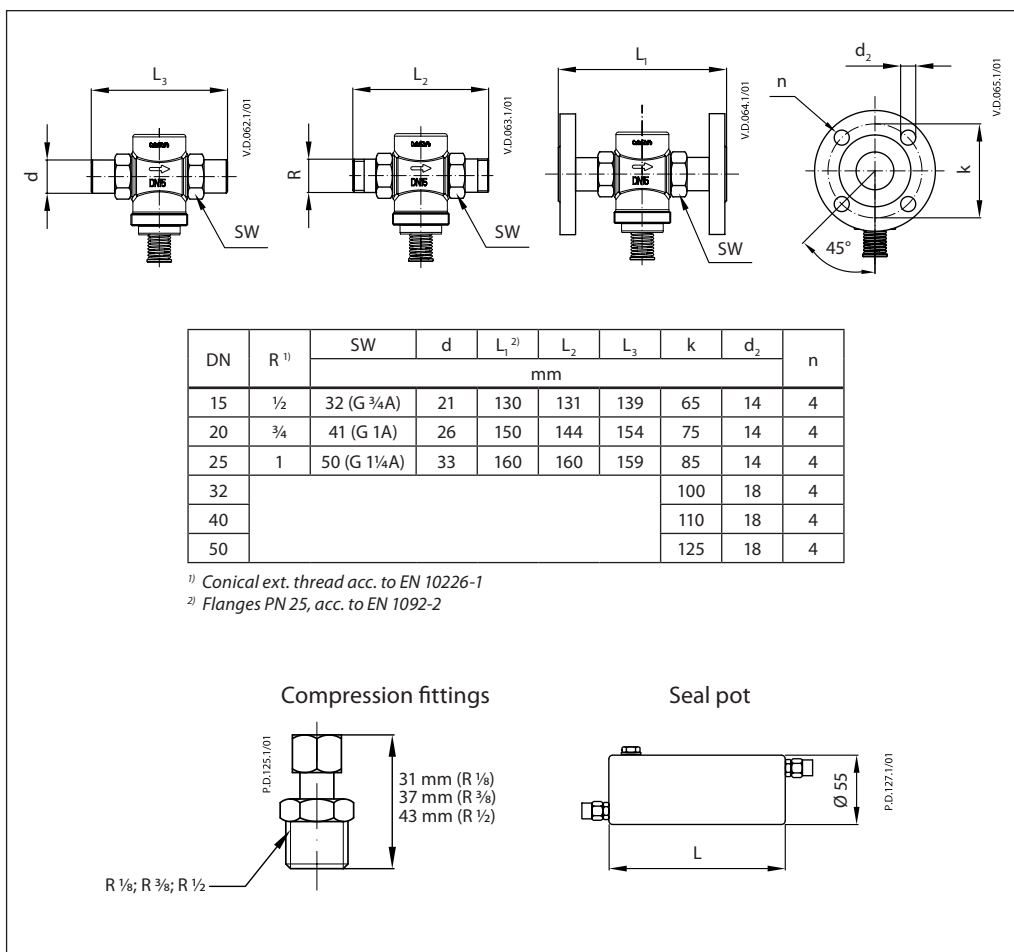
DN	L	L ₁	H	H*	H ₁	H ₁ *	H ₂	H ₃	Weight (kg)	
	mm								1-5 bar	3-12 bar
15	65	-	189	243	-	-	34	-	3,5	3,7
20	70	-	189	243	-	-	34	-	3,5	3,7
25	75	-	189	243	-	-	37	-	3,7	3,8
32	-	180	-	-	231	285	-	70	10,2	10,4
40	-	200	-	-	231	285	-	75	11,8	11,9
50	-	230	-	-	231	285	-	82	13,9	14,0

Note: Other flange dimensions - see table for tailpieces.



DN	L	H	H*	H ₂	Weight (kg)	
	mm				1-5 bar	3-12 bar
15	65	266	320	34	3,5	3,7
20	70	266	320	34	3,5	3,7
25	75	266	320	37	3,7	3,9

Dimensions (*continuous*)



Data sheet

Differential pressure relief controller (PN 16, 25, 40)

AFPA / VFG 2(1)

Description



The controller is a 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 spring for differential pressure setting.

Further on two valve versions are available:

- VFG 2 with metallic sealing cone
- VFG 21 with soft sealing cone

Main data:

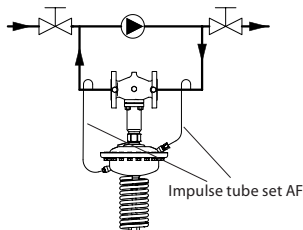
- DN 15-250
- k_{vs} 4,0-400 m³/h
- PN 16, 25, 40
- Setting range:
 - 0,05-0,3 bar / 0,1-0,6 bar / 0,15-1,2 bar / 0,5-2,5 bar / 1-5 bar
- Temperature:
 - Circulation water / glycolic water up to 30 %: 2 ... 150/200 °C
- Connections:
 - Flange

Ordering

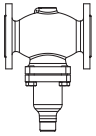
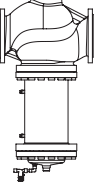
Example 1:
Differential pressure relief controller;
DN 15; k_{vs} 4,0; PN 16; metallic sealing; setting range 0,15-1,2 bar;
 T_{max} 150 °C; flange;

- 1x VFG 2 DN 15 valve
Code no: **065B2388**
- 1x AFPA actuator
Code no: **003G1021**
- 2x Impulse tube set AF
Code no: **003G1391**

Products will be delivered separately.



VFG 2 Valves (metallic sealing cone)

Picture	DN (mm)	k_{vs} (m ³ /h)	Connections	T_{max} (°C)	Code No.	T_{max} (°C)	Code No.	
					PN 16		PN 25	PN 40
	15	4,0	Flanges acc. to EN 1092-1	150	065B2388	200 ¹⁾	065B2401	065B2411
	20	6,3			065B2389		065B2402	065B2412
	25	8,0			065B2390		065B2403	065B2413
	32	16			065B2391		065B2404	065B2414
	40	20			065B2392		065B2405	065B2415
	50	32			065B2393		065B2406	065B2416
	65	50			065B2394		065B2407	065B2417
	80	80			065B2395		065B2408	065B2418
	100	125			065B2396		065B2409	065B2419
	125	160			065B2397		065B2410	065B2420
	150	280			065B2398	150	–	065B2421
	200	320			065B2399		–	065B2422
	250	400			065B2400		–	065B2423
	150	280			–	200 ¹⁾	–	On request
	200	320			–		–	On request
	250	400			–		–	On request

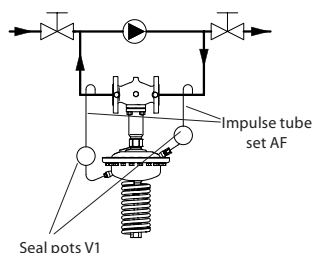
¹⁾ at temperatures above 150 °C only with seal pots (see Accessories)

Ordering (continuous)

Example 2:
Differential pressure relief
controller;
DN 15; k_{VS} 4,0; PN 25; metallic
sealing; setting range 0,15-1,2 bar;
 T_{max} 200 °C; flange;

- 1× VFG 2 DN 15 valve
Code no: **065B2401**
- 1× AFPA actuator
Code no: **003G1021**
- 2× Impulse tube set AF
Code no: **003G1391**
- 2× Seal pot V1
Code no: **003G1392**

Products will be delivered separately.



VFG 21 Valves (soft sealing cone)

Picture	DN (mm)	k_{VS} (m³/h)	T_{max} (°C)	Connections	Code No.
					PN 16
	15	4,0	150	Flanges acc. to EN 1092-1	065B2502
	20	6,3			065B2503
	25	8,0			065B2504
	32	16			065B2505
	40	20			065B2506
	50	32			065B2507
	65	50			065B2508
	80	80			065B2509
	100	125			065B2510
	125	160			065B2511
	150	280			065B2512
	200	320			065B2513
	250	400			065B2514

Note: other valves available on special request.

AFPA Actuators

Picture	Δp setting range (bar)	for DN	Code No.
	1-5	15-125	003G1019
	0,5-2,5		003G1020
	0,15-1,2	15-250	003G1021
	0,1-0,6		003G1022
	0,05-0,3		003G1023

Accessories

Picture	Type designation	Description	Connections	Code No.
	Impulse tube set AF	– 1× Copper tube $\varnothing 10 \times 1 \times 1500$ mm – 1 × compression fitting for imp. tube connection to pipe (G 1/4) – 2 × socket	–	003G1391
	Seal pot V1 ¹⁾	Capacity 1 liter; with compression fittings for imp. tube $\varnothing 10$	–	003G1392
	Seal pot V2 ¹⁾	Capacity 3 liter; with compression fittings for imp. tube $\varnothing 10$, for actuator size 630 cm²	–	003G1403
	Compression fitting ²⁾	For impulse tube $\varnothing 10$ connections to controller	G 1/4	003G1468
	Shut off valve	For impulse tube $\varnothing 10$	–	003G1401
	Throttle valve			065B2909

¹⁾ Seal pot has to be used on impulse tubes always when $T_{max} \geq 150$ °C

²⁾ Consist of a nipple, compression ring and nut

Ordering (continuous)
Service kits

Picture	Type designation	DN	k _{vs}	Code No.	
		(mm)	(m³/h)	for VFG 2	for VFG 21
	Valve insert	15	4,0	065B2796	065B2790
		20	6,3	065B2797	065B2791
		25	8	065B2798	065B2792
		32	16		
		40	20	065B2799	065B2793
		50	32		
		65	50	065B2800	065B2894
		80	80		
		100	125	065B2801	065B2895
		125	160		
		150	280	065B2964	065B2966
		250	400	065B2965	–
	Stuffing cone (with EPDM O-rings)			003G1464	

Technical data
Valve

Nominal diameter		DN	15	20	25	32	40	50	65	80	100	125	150	200	250
k _{vs} value		m³/h	4,0	6,3	8,0	16	20	32	50	80	125	160	280	320	400
Cavitation factor z			0,6	0,6	0,6	0,55	0,55	0,5	0,5	0,45	0,4	0,35	0,3	0,2	0,2
Leakage acc. to standard IEC 534 (% of k _{vs})	VFG 2	≤ 0,03											≤ 0,05		
	VFG 21	≤ 0,01													
Nominal pressure		PN	16, 25, 40												
Max. differential pressure	PN 16	bar	16								15		12	10	
	PN 25, 40		20												
Media			Circulation water / glycolic water up to 30 %												
Media pH			Min. 7, max. 10												
Media temperature	VFG 2	°C	2 ... 150 / 2 ... 200 ¹⁾										2 ... 150 (200 ²⁾)		
	VFG 21		2 ... 150												
Connections			Flange												
Materials															
Valve body	PN 16	Grey cast iron EN-GJL-250 (GG-25)													
	PN 25	Ductile iron EN-GJS-400(GGG-40.3)													
	PN 40	Cast steel GP240GH (GS-C 25)													
Valve seat		Stainless steel, mat. No. 1.4021											Stainless steel, mat. No. 1.4313		
Valve cone		Stainless steel, mat. No. 1.4404											Stainless steel, mat. No. 1.4021		
Sealing	VFG 2	Metal													
	VFG 21	EPDM													
Pressure relieve system		Bellows (Stainless steel, mat. No. 1.4571)											Diaphragm (EPDM)		

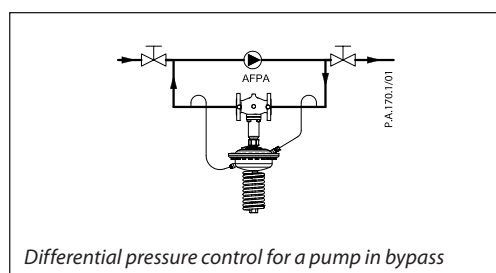
¹⁾ at temperatures above 150 °C only with seal pots (see Accessories)

²⁾ on request

Actuator

Type		AFPA				
Actuator size	cm²	80		250		630
Max. operating pressure	bar	25		25		16
Diff. pressure setting ranges and spring colours	bar	silver	yellow	silver	yellow	yellow
		1-5	0,5-2,5	0,15-1,2	0,1-0,6	0,05-0,3
Materials						
Actuator housing		Stainless steel, mat. No. 1.0338, zinc plated and yellow chromate				
Control diaphragm		EPDM (Rolling; fibre enforced)				

Application principles



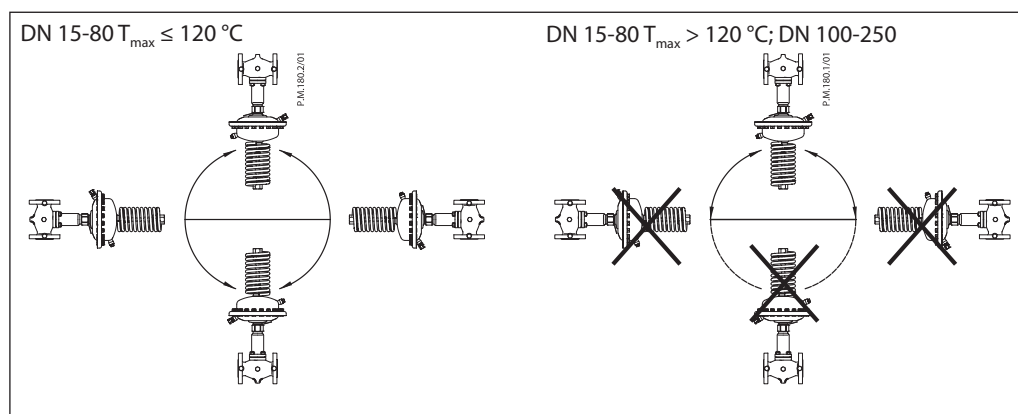
Installation position

DN 15-80 $T_{max} \leq 120\text{ }^{\circ}\text{C}$

The controllers can be installed in any position.

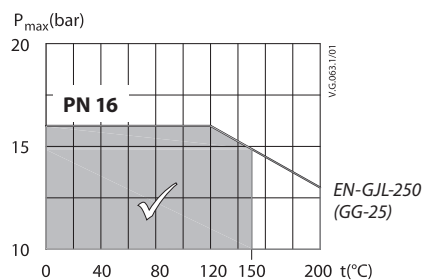
DN 15-80 $T_{max} > 120\text{ }^{\circ}\text{C}$; DN 100-250

The controllers can be installed in horizontal pipes only, with a pressure actuator oriented downwards.

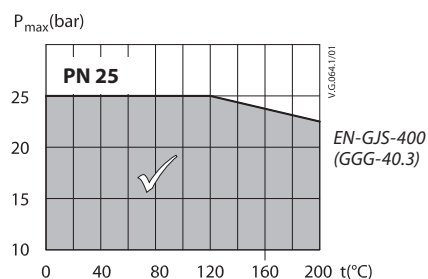


Pressure temperature diagram

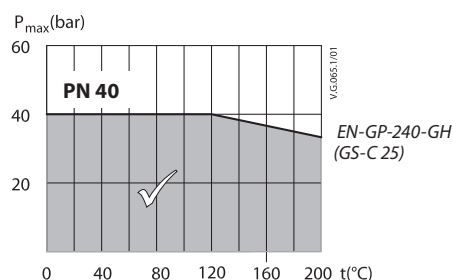
Working area is below P-T line and it ends at T_{max} for each valve



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-2)



Maximum allowed operating pressure as a function of media temperature (according to EN 1092-1)

Sizing

Given data:
 $Q_{max} = 4,5 \text{ m}^3/\text{h}$
 $\Delta p_{AFPA} = 1,4 \text{ bar}$
 Nominal pressure PN 16

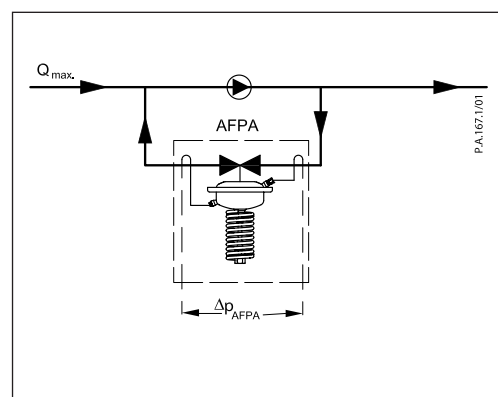
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AFPA}}} = \frac{4,5}{\sqrt{1,4}}$$

$$k_v = 3,8 \text{ m}^3/\text{h}$$

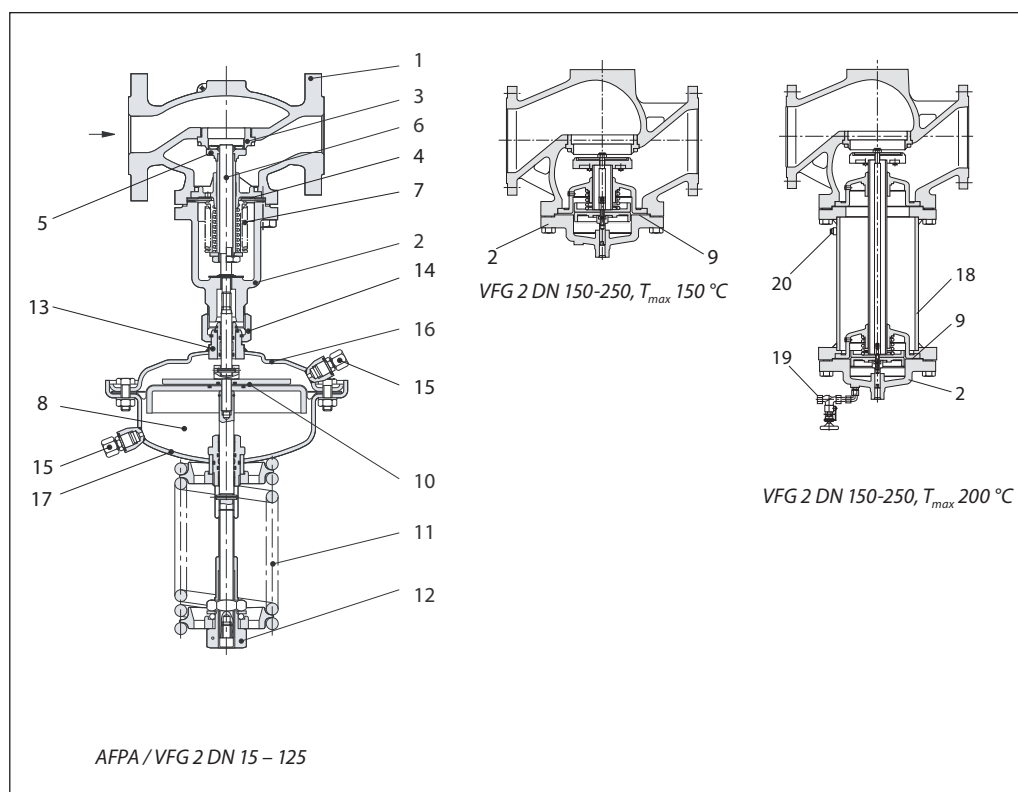
Solution:

The example selects AFPA VFG 2 PN 16 DN 15,
 k_{vs} value 4,0 with differential pressure setting
 range 0,5-2,5 bar.



Design

1. Valve body
2. Cover
3. Valve seat
4. Valve insert
5. Pressure relieved valve cone
6. Valve stem
7. Bellows for pressure relief of valve cone
8. Actuator
9. Diaphragm for pressure relief of valve cone
10. Control diaphragm for differential pressure control
11. Setting spring for diff. pressure control
12. Adjuster for diff. pressure setting, prepared for sealing
13. Stuffing cone
14. Union nut
15. Compression fitting for impulse tube
16. Upper casing of diaphragm
17. Lower casing of diaphragm
18. Valve body extension
19. Shut off valve for water filling
20. Closing plug



Function

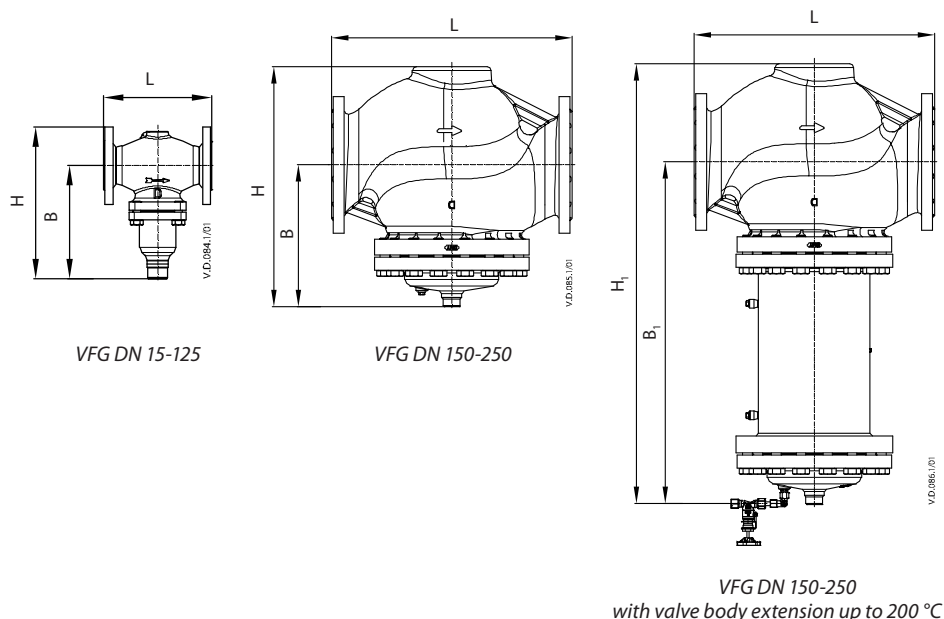
The pressures in front and behind of the control valve are being transferred through the impulse tubes to the actuator chambers and act on control diaphragm for diff. pressure control. Control valve is normally closed. It opens on rising differential pressure and closes on falling differential pressure to maintain constant differential pressure.

Settings

Differential pressure setting

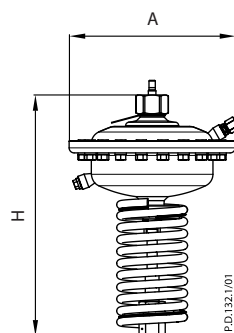
Differential pressure setting is being done by the adjustment of the setting spring for differential pressure control. The adjustment can be done by means of spring for differential pressure setting and pressure indicators.

Dimensions



VFG 2, VFG 21 Valves

DN		15	20	25	32	40	50	65	80	100	125	150	200	250	
L		mm	130	150	160	180	200	230	290	310	350	400	480	600	730
B			213	213	239	239	241	241	276	276	381	381	326	354	401
H			267	267	304	304	323	323	370	370	505	505	505	591	661
Weight	PN 16 / 25	kg	7,5	8,5	10	12	15	18	27,5	30	58	68	115	185	323
	PN 40								30	32,5	60,5	69	141	253	333
B ₁		mm											620	852	1199
H ₁													799	1089	1459
Weight (valve with body extension)	PN 16 / 25	kg											154	301	469
	PN 40												179	336	505



AFPA Actuator

Actuator size	cm ²	80	250	630
A	mm	172	263	380
H	mm	430	470	520
Weight	kg	7,5	13	28

