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

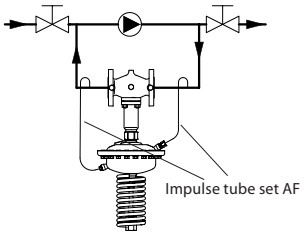
Main data:
- DN 15-250
- k_{VS} 4.0-400 m^3/h
- PN 16, 25, 40
- Setting range:
  – 0.05-0.3 bar / 0.1-0.6 bar / 0.15-1.2 bar / 0.5-2.5 bar / 1-5 bar
- Temperature:
  – Circulation water / glycolic water up to 30 %: 2 … 150/200 °C
- Connections:
  – Flange

Ordering

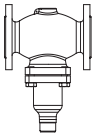
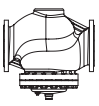
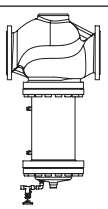
Example 1:
Differential pressure relief controller;
DN 15; k_{VS} 4.0; PN 16; metallic sealing; setting range 0.15-1.2 bar; T_{max} 150 °C; flange;

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

Products will be delivered separatly.



VFG 2 Valves (metallic sealing cone)

Picture	DN (mm)	k_{VS} (m^3/h)	Connections	T_{max} (°C)	Code No. PN 16	T_{max} (°C)	Code No. PN 25	Code No. 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**

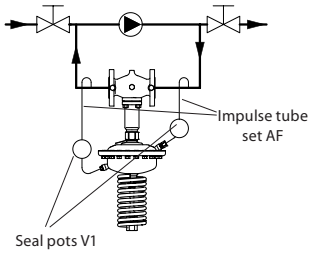
[1] *at temperatures above 150 °C only with seal pots (see Accessories)*

Ordering *(continuous)*

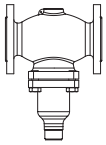
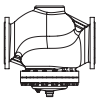
Example 2:
Differential pressure relief controller;
DN 15; k_{VS} 4.0; PN 25; metallic sealing; setting range 0.15-1.2 bar; T_{max} 200 °C; flange;

- *1× VFG 2 DN 15 valve*
  Code no: ***065B2401***
- *1× AFPA actuator*
  Code no: ***003G*1021**
- *2× Impulse tube set AF*
  Code no: ***003G1391***
- *2× Seal pot V1*
  Code no: ***003G1392***

Products will be delivered separatly.

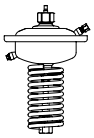


VFG 21 Valves (soft sealing cone)

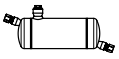
Picture	DN (mm)	k_{VS} (m^3/h)	T_{max} (°C)	Connections	Code No. PN 16
	15	4.0	150	Flanges acc. to EN 1092-1	**065B2502**
	20	6.3			**065B2503**
	25	8.0			**065B2504**
	32	16			**065B2505**
	40	20			**065B2506**
	50	32			**065B2507**
	65	50			**065B2508**
	80	80			**065B2509**
	100	125			**065B2510**
	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 Ø10 × 1 × 1500 mm – 1 × compression fitting for imp. tube connection to pipe (G ¼) – 2 × socket	–	**003G1391**
	Seal pot V1 [1]	Capacity 1 liter; with compression fittings for imp. tube Ø10	–	**003G1392**
	Seal pot V2 [1]	Capacity 3 liter; with compression fittings for imp. tube Ø10, for actuator size 630 cm^2	–	**003G1403**
	Compression fitting [2]	For impulse tube Ø10 connections to controller	G ¼	**003G1468**
	Shut off valve	For impulse tube Ø10	–	**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 (mm)	k_{vs} (m^3/h)	Code No. for VFG 2	Code No. 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**	**065B2794**
		80	80		
		100	125	**065B2801**	**065B2795**
		125	160		
		150	280	**065B2964**	**065B2966**
		250	400	**065B2965**	–
	Stuffing cone (with EPDM O-rings)			**003G1464**	

Technical data

Valve

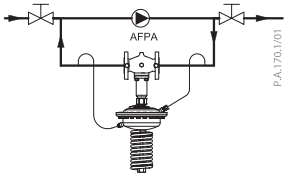
Nominal diameter		**DN**	**15**	**20**	**25**	**32**	**40**	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**
k_{vs} value		m^3/h	4.0	6.3	8.0	16	20	32	50	80	125	160	280	320	400
Cavitation factor z			0.6	0.6	0.6	0.55	0.55	0.5	0.5	0.45	0.4	0.35	0.3	0.2	0.2
Leakage acc. to standard IEC 534 (% 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	cm^2	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		Steel, mat. No. 1.0338, zinc plated				
Control diaphragm		EPDM (Rolling; fibre enforced)				

Application principles



Differential pressure control for a pump in bypass

Installation position

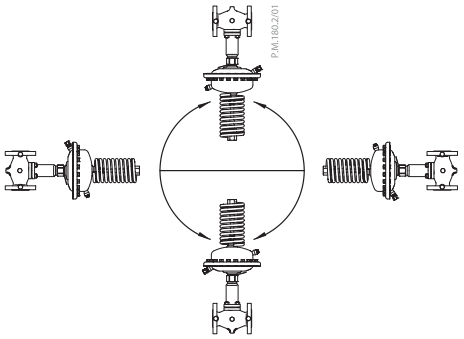
DN 15-80 T_{max} ≤ 120 °C

The controllers can be installed in any position.

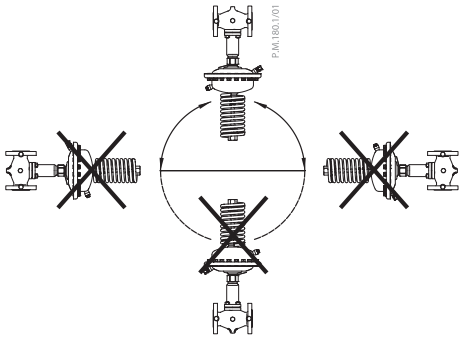
DN 15-80 T_{max} > 120 °C; DN 100-250

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

DN 15-80 T_{max} ≤ 120 °C

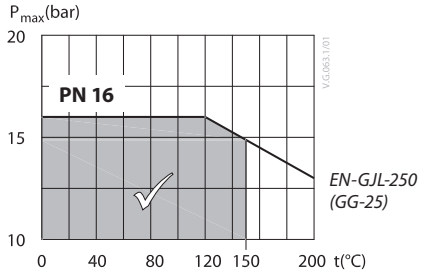


DN 15-80 T_{max} > 120 °C; DN 100-250

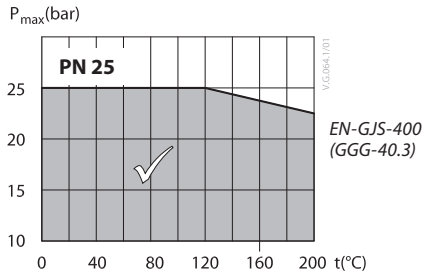


Pressure temperature diagram

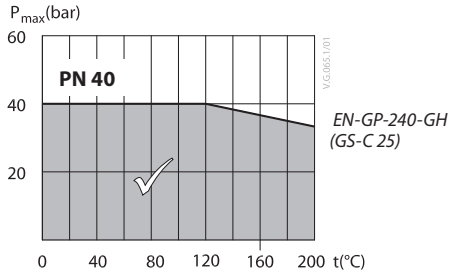
Working area is below P-T line and it ends at T_{max} for each valve



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

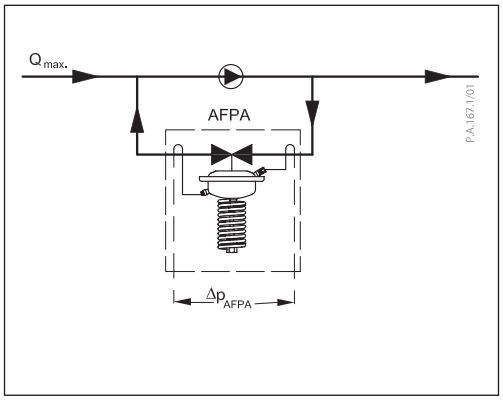
Given data:
Q_{max} = 4.5 m³/h
Δp_{AFPA} =1.4 bar
Nominal pressure PN 16

k_v value is calculated according to formula:

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

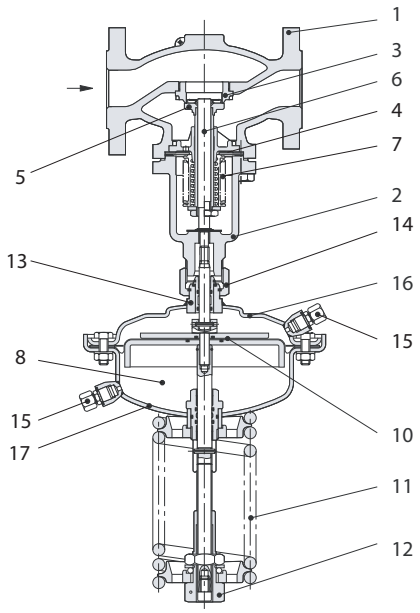
k_v = 3.8 m³/h

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.

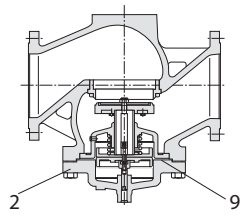


Design

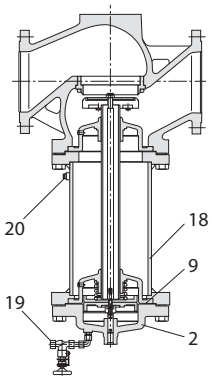
1. Valve body
2. Cover
3. Valve seat
4. Valve insert
5. Pressure relieved valve cone
6. Valve stem
7. Bellows for pressure relief of valve cone
8. Actuator
9. Diaphragm for pressure relief of valve cone
10. Control diaphragm for differential pressure control
11. Setting spring for diff. pressure control
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



AFPA / VFG 2 DN 15 – 125



VFG 2 DN 150-250, T_{max} 150 °C



VFG 2 DN 150-250, T_{max} 200 °C

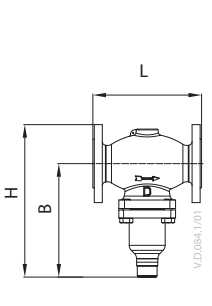
Function

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. The controller became normally closed after commissioning (stretching the spring). It opens on rising differential pressure and closes on falling differential pressure to maintain constant differential pressure.

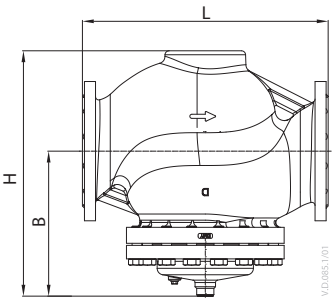
Settings

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.

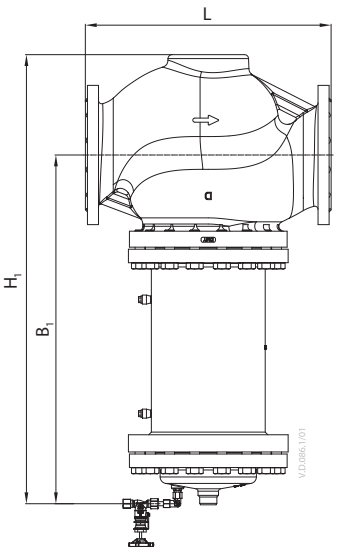
Dimensions



VFG DN 15-125



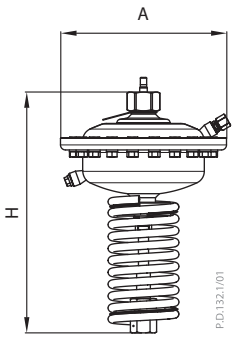
VFG DN 150-250



VFG DN 150-250
with valve body extension up to 200 °C

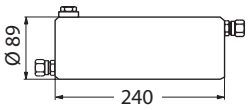
VFG 2, VFG 21 Valves

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

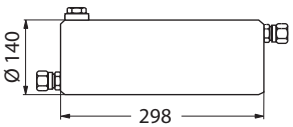


AFPA Actuator

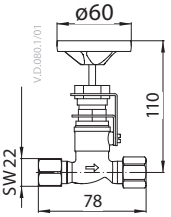
Actuator size	cm^2	80	250	630
A	mm	172	263	380
H	mm	430	470	520
Weight	kg	7.5	13	28



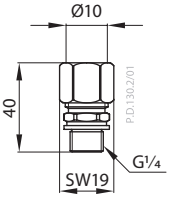
Seal pot V1



Seal pot V2



Shut off valve



Compression fitting

Danfoss A/S
Heating Segment • heating.danfoss.com • +45 7488 2222 • E-Mail: heating@danfoss.com