

Data sheet

Pressure relief controller AFPA 2/VFG 22(1)

Description



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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 a spring(s) for pressure setting.

Further on two valve versions are available:

- VFG 22 with metallic sealing cone
- VFG 221 with soft sealing cone

Together with Danfoss intelligent electrical actuator AMEi 6 intelligent optimization functions are available:

- iNET-intelligent network balancing

Main data:

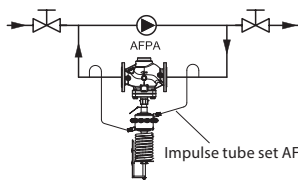
- DN 65-250
- k_{vs} 60-800 m³/h
- PN 16, 25, 40
- Setting range:
0.1-0.4 bar / 0.2-0.8 bar / 0.3(0.4)-1.5 bar / 0,5(1)-3 bar / 1.5-6 bar
- Temperature:
– Circulation water / glycolic water up to 30%:
2 ... 150°C
- Connections:
– Flange

Ordering

Example 1:
Differential pressure controller,
return mounting, DN 65, k_{vs} 60 m³/h,
PN 16, metallic sealing, setting
range 1-3 bar, T_{max} 150 °C, flange

- 1x VFG 22 DN 65 valve
Code no: **065B5500**
- 1x AFPA 2 actuator
Code no: **003G5691**
- 2x Impulse tube set AF
Code no: **003G1391**

Products will be delivered
separately.



VFG 22 Valve (metallic sealing cone)

Picture	DN (mm)	k_{vs} (m ³ /h)	Connections	T _{max.} (°C)	Code No.		
					PN 16	PN 25	PN 40
	65	60	Flanges acc. to EN 1092-1	150	065B5500	065B5507	065B5514
	80	80			065B5501	065B5508	065B5515
	100	160			065B5502	065B5509	065B5516
	125	250			065B5503	065B5510	065B5517
	150	380			065B5504	065B5511	065B5518
	200	650			065B5505	065B5512	065B5519
	250	800			065B5506	065B5513	065B5520

VFG 221 Valve (soft sealing cone)

Picture	DN (mm)	k_{vs} (m ³ /h)	Connections	T _{max.} (°C)	Code No.		
					PN 16	PN 25	PN 40
	65	60	Flanges acc. to EN 1092-1	150	065B5521	065B5528	065B5535
	80	80			065B5522	065B5529	065B5536
	100	160			065B5523	065B5530	065B5537
	125	250			065B5524	065B5531	065B5538
	150	380			065B5525	065B5532	065B5539
	200	650			065B5526	065B5533	065B5540
	250	800			065B5527	065B5534	065B5541

Ordering (continuous)

AFPA 2 Actuator

Picture	Setting range (bar)	Possible combinations with DN							Actuator size (cm ²)	Spring colour	Code No.	
		65	80	100	125	150	200	250			PN 16	PN 40
	1.5-6	✓	✓	✓	✓	-	-	-	80	red	003G5689	003G5696
	0.5-3	✓	✓	✓	✓	-	-	-	80	yellow	003G5690	003G5697
	1-3	✓	✓	✓	✓	✓	✓	✓	160	red	003G5691	003G5698
	0.3-1.5	✓	✓	✓	✓	-	-	-	160	yellow	003G5692	003G5699
	0.4-1.5	✓	✓	✓	✓	✓	✓	✓	320	red	003G5693	003G5700
	0.2-0.8	✓	✓	✓	✓	✓	✓	✓	320	yellow	003G5694	003G5701
	0.1-0.4	✓	✓	✓	✓	✓	✓	✓	640	yellow	003G5695	003G5702

Accessories

Picture	Type designation	Description	Connections	Code No.
	Impulse tube set AF	- 1x Copper tube Ø10 x 1 x 1500 mm - 1x compression fitting for imp. tube connection to pipe (G ¼) - 2x socket	-	003G1391
	Compression fitting ¹⁾	For impulse tube Ø10 connections to controller	G ¼	003G1468
	Shut off valve	For impulse tube Ø10	-	003G1401
	Static throttle valve			065B2909
	Adapter	For combination of new Virtus pressure actuators AFx 2, with old generation of valves VFx 2 (DN15-250)	-	003G1780
	AMEi 6 iNET el. actuator 230 V	Intelligent Δp actuator with iNET function	-	082G4302
	AMEi 6 iNET el. actuator 24 V		-	082G4303

¹⁾ Consist of a nipple, compression ring and nut

Service kits

Picture	Type	k _{vs} (m ³ /h)	PN	DN	Code No.
	Pressure control insert VFG/Q 22	60	16/25/40	65	003G1800
		80		80	003G1801
		160		100	003G1802
		250		125	003G1803
		380		150	003G1804
		650		200	003G1805
		800		250	003G1806
	Pressure control insert VFG/Q 221	60		65	003G1807
		80		80	003G1808
		160		100	003G1809
		250		125	003G1810
		380		150	003G1811
		650		200	003G1812
		800		250	003G1813
	Pressure stuffing box VFG/Q 221			65-125	003G1730
				150-250	003G1731

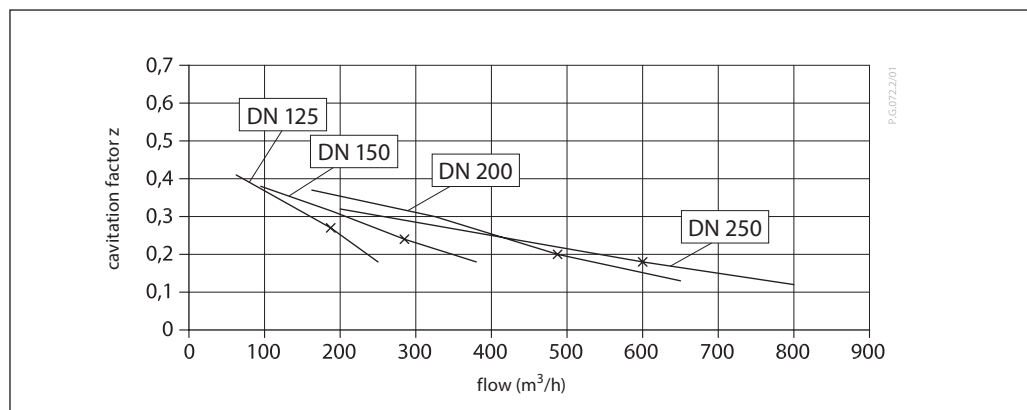
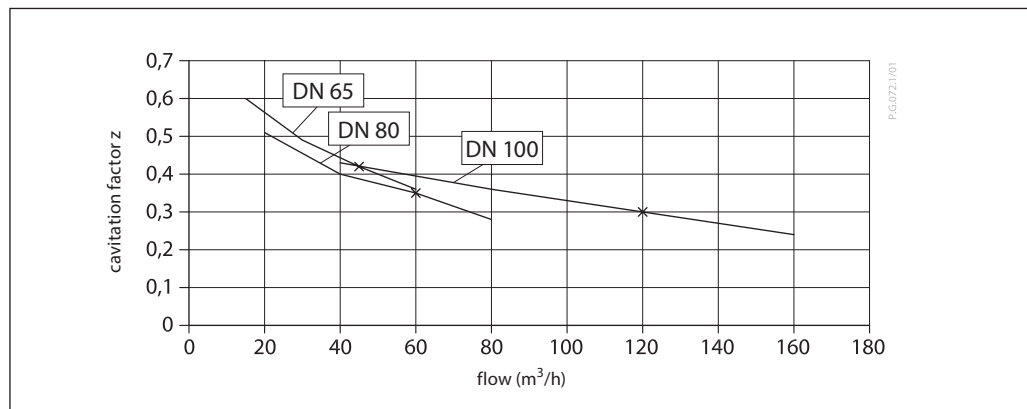
Technical data

Valve

Nominal diameter		DN	65	80	100	125	150	200	250
k_{vs} value		m ³ /h	60	80	160	250	380	650	800
Leakage acc. to standard IEC 534 (% of k_{vs})	VFG 22		≤ 0.03				≤ 0.05		
	VFG 221		≤ 0.01						
Nominal pressure		PN	16, 25, 40						
Max. differential pressure	PN 16	bar	16	15			12	10	
	PN 25, 40		20						
Pressure relieve system	Chamber relieved								
Media	Circulation water / glycolic water up to 30%								
Media pH	Min. 7, max. 10								
Media temperature	VFG 22(221)	°C	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								
Valve cone	Stainless steel, mat. No. 1.4021								
Sealing	VFG 22	Metal							
	VFG 221	EPDM							

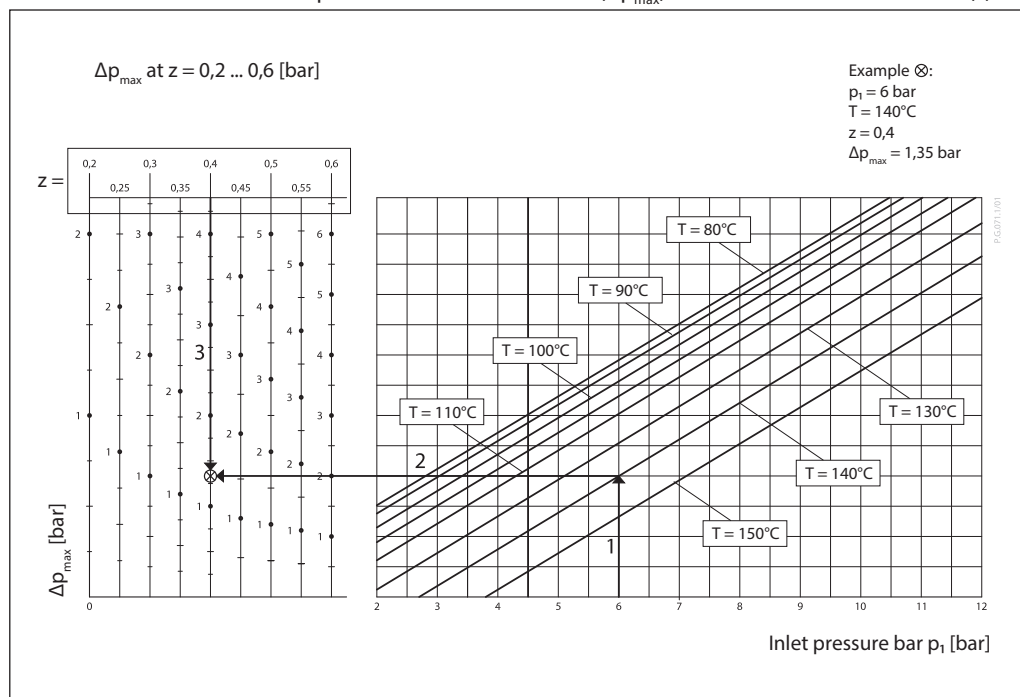
AFPA 2 Actuator

Actuator size	cm ²	80	160	320	640				
Max. operating pressure	bar	16, 40							
Diff. pressure setting ranges and spring colours	bar	red	yellow	red	yellow	red	yellow	yellow	
		1.5-6	0.5-3	1-3	0.3-1.5	0.4-1.5	0.2-0.8	0.1-0.4	
For valve DN		65-125	65-250	65-100	125-250	65-250			
Materials									
Actuator housing	Steel, mat. No. 1.0345, zinc plated								
Control diaphragm	EPDM								

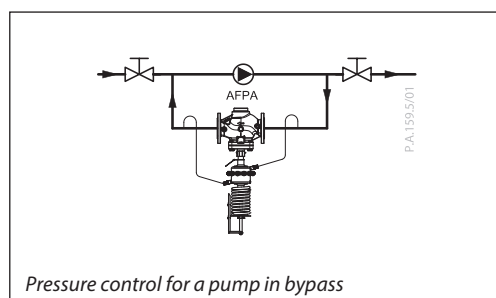


Operating area

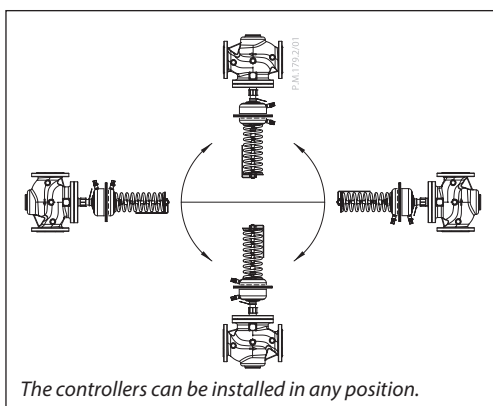
Maximum allowed differential pressure over the controller (Δp_{max}) at different cavitation factors (z)



Application principles

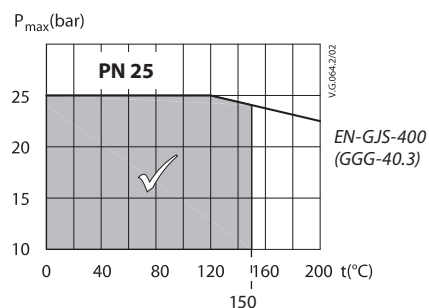
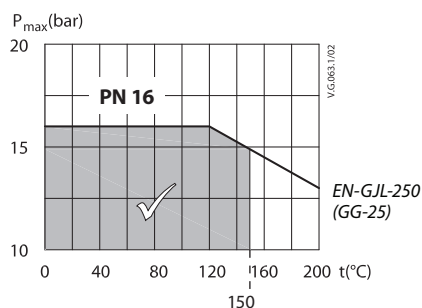


Installation position

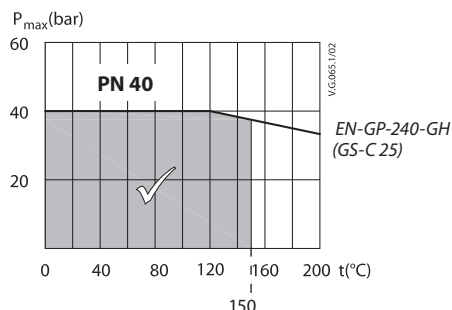


Pressure temperature diagram

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 1092-1)

Sizing

Example:

The application demands a maximal flow of 60 m³/h. The minimal differential pressure available over controller is 1.3 bar. Demanded opening setting pressure is 2 bar.

The first bigger k_{vS} to 52.6 m³/h is 60 m³/h and gives VFG 22 DN 65.

The available setting range to control 2 bar is 0.5-3 bar and is available for DN 65.

Given Data:

$$Q_{\max} = 60 \text{ m}^3/\text{h}$$

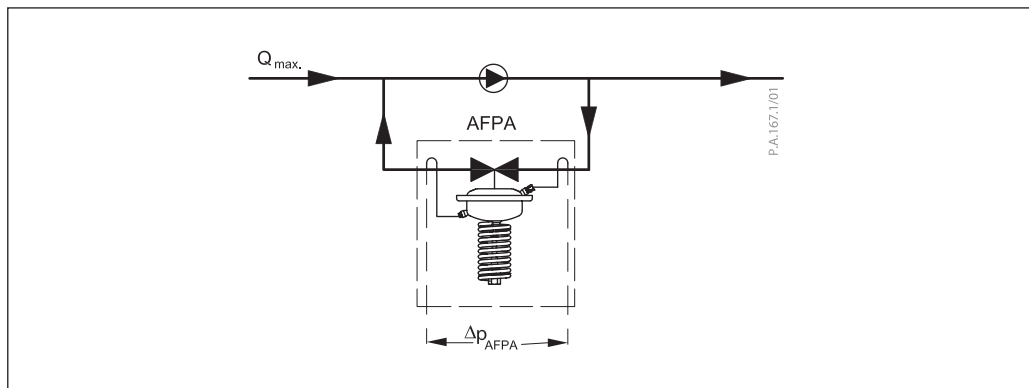
$$\Delta p_{\text{AFPA}} = 1.3 \text{ bar}$$

Solution:

AFPA 2 0.5-3 bar
VFG 22 (221) DN 65 k_{vS} 60 m³/h

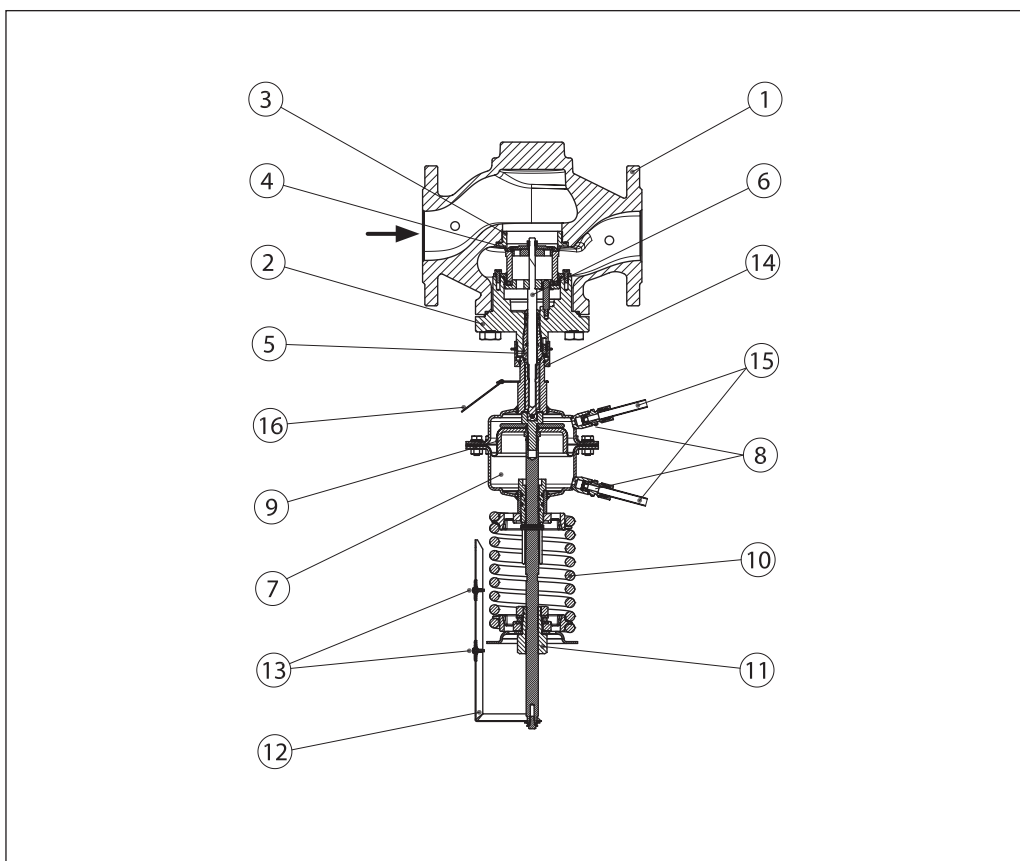
Calculate the k_v value:

$$k_v = \frac{Q_{\max}}{\sqrt{\Delta p_{\text{AFPA}}}} = \frac{60}{\sqrt{1.3}} = 52.6 \text{ m}^3/\text{h}$$



Design

- 1. Valve body
- 2. Valve cover
- 3. Valve seat
- 4. Pressure control insert
- 5. Pressure stuffing box
- 6. Valve stem
- 7. Pressure actuator
- 8. Impulse tube connection
- 9. Diaphragm
- 10. Differential pressure setting spring
- 11. Differential pressure setting nut
- 12. Setting scale
- 13. Setting indicator
- 14. Union nut
- 15. Impulse tube
- 16. Identification plate



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 differential 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

Pressure setting

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 pressure indicators.

Dimensions

VFG 22(1) DN 65-250

VFG 22, VFG 221 Valves

DN	L	B	H	H _v	Weight		
					PN 16	PN 25	PN 40
mm							
kg							
65	290	245	370	285	24	24	27
80	310	240	365	290	29	29	32
100	350	275	425	350	47	48	53
125	400	270	435	370	60	60	68
150	480	330	520	460	105	106	121
200	600	365	610	550	204	206	235
250	730	420	680	620	343	350	404

AFPA 2 Actuator

Size (cm ²)	ØA mm	H _A mm	H _{AI} mm	Weight (kg)			
				AFPA 2 PN 16	AFPA 2 PN 16 + AMEi 6	AFPA 2 PN 16	AFPA 2 PN 16 + AMEi 6
80	175	490	590	9	11.5	16	8.5
160	230	490	590	12.5	15	25	27.5
320	300	490	590	17	19.5	37	39.5
640	300	610	710	40	42.5	58	60.5

Total installation height of the controller (VFG 22(1) valve + AFPA 2 pressure actuator) is sum of H_v and H_A (H_{AI})

AMEi 6 intelligent actuator with iNET functionality should be ordered separately

Shut off valve

Compression fitting

Danfoss A/S

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