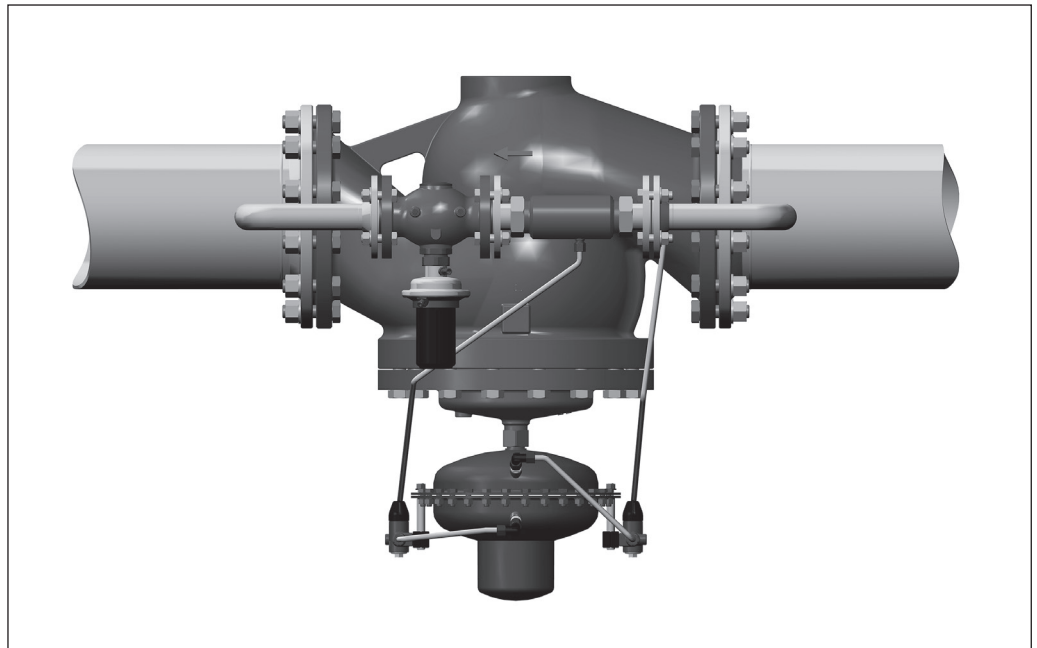




Data sheet

Pilot-controlled differential pressure controller (PN 16, 25, 40) PCVP - flow and return mounting, adjustable setting

Description



Pilot-controlled differential pressure controller is a self-acting differential pressure controller primarily for use in district heating, district cooling or in industrial systems as well. It can be flow and return mounted in applications with and without heat exchanger like large substations and distribution stations.

The controller consist of main controller, installed in main pipe, and pilot controller and with a throttling element, both installed in bypass.

Setting is done on pilot controller.

Throttle valve data can be found on page 10.

Main data¹⁾ :

- DN 50-250²⁾
- k_{VS} 32-630 m³/h
- PN 16, 25, 40³⁾
- Temperature:
 - Circulation water/glycolic water up to 30%: 2 ... 200°C
- Connections:
 - Pilot controller: ext. thread (weld-on tailpieces) or flange
 - Main valve: flange

¹⁾ for details see Technical data and Ordering sections

²⁾ smaller DN on request

³⁾ PN 40 on special request

Features:

- Differential pressure controller
- Extremely high control ratio (see Tab.1) as a result of low pilot controller min. flow rate (k_{VS} value) and high flow rate (k_{VS}) of the main valve
- Small overall dimensions comparing to standard design (especially height)
- Higher valve capacities for DN 150-250 comparing to standard design
- High control stability
- Smooth operation differential pressure controller

Tab. 1

DN	Min. control ratio
50	100 : 1
65	140 : 1
80	220 : 1
100	300 : 1
125	400 : 1
150	400 : 1
200	550 : 1
250	750 : 1

Technical Data

Main valve

Nominal diameter		DN	50	65	80	100	125	150	200	250	
k _{vs} value		m ³ /h	32	50	80	125	160	320	450	630	
Cavitation factor z			0.5	0.5	0.45	0.4	0.35	0.3	0.2	0.2	
Leakage acc. to standard IEC 534			≤ 0.05% of k _{vs}								
Nominal pressure		PN	16, 25, 40								
Max. differential pressure	PN 16	bar	16			15		12	10		
	PN 25, 40		20								
Min. differential pressure			0.5								
Min. static pressure			1.5								
Medium	VFG 2(1)	Circulation water/glycolic water up to 30%									
Medium pH			Min. 7, max. 10								
Medium temperature	VFG 21 PN 16, 25, 40	2 ... 150 °C									
	VFG 2 PN 16, 25, 40	2 ... 200 °C ²⁾									
Connections	Main controller	Flange									
	Pilot controller	Ext. thread (weld-on tailpieces) or flange						Flange			
Weight	PN 16 /25	kg	18	27.5	30	58	68	115	185	323	
	PN 40			30	32.5	60.5	69	141	253	333	
Materials											
Valve body	PN 16	Grey cast iron EN-GJL-250 (GG-25)									
	PN 25	Ductile cast iron EN-GJS-400-18-LT (GGG-40.3)						Cast steel EN-GP-240-GH (GS-C 25)			
	PN 40	Cast steel EN-GP-240-GH (GS-C 25) ²⁾									
Valve seat			Stainless steel M. No. 1.4021						Stainless steel M. No. 1.4313		
Valve cone	VFG 2(1)		Stainless steel M. No. 1.4404						Stainless steel M. No. 1.4021		
Sealing	VFG 21	EPDM									
	VFG 2	Metal									
Pressure relieve system			Bellows ³⁾						Diaphragm ⁴⁾ (T _{max} 150 °C) Bellows ³⁾ (T _{max} 300 °C)		

²⁾ On request

³⁾ Stainless steel M. No. 1.4571

⁴⁾ EPDM

Main actuator

For main valve	DN	50 - 125	150 - 250
Actuator size	cm ²	250	630
Max. operational pressure		25	16, 25
Flow restrictor differential pressure Δp ₀ ¹⁾	bar	0.2/0.5	
Diff. pressure setting ranges ¹⁾		0.2-1.0/0.3-2.0/1-5/3-12	
Weight	kg	11	24
Materials			
Housing		Stainless steel M. No. 1.0338	
Control diaphragm		EPDM	
Impulse tube		Stainless steel tube Ø10 × 0.8 mm	
Nr. of throttle valves (mounted on impulse tubes)		1	2

Trotting element

For main valve	DN	50 - 125	150 - 250
Size of throttling element	DN	25	40
Connections		Welded end	Flange
Max. operational pressure		25	
Weight	kg	3.2	6.6
Materials			
Body material		Red bronze, M. No. 2.1090	
Impulse tube		Stainless steel tube Ø10 × 0.8 mm	

¹⁾ Defined by pilot controller

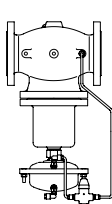


Ordering

Example 1:
Pilot-controlled differential pressure controller; DN 100; k_{vs} 125; PN 16; setting range 0.2-1.0 bar; T_{max} 150 °C; flange;




- 1x PCV-VFG 21 DN 100
Code No.: **003G1573**
- 1x AVP DN 25
Code No.: **003H6319**
- 1x Weld-on tailpieces DN 25
Code No.: **003H6910**
- 1x Mounting set for Impulse tube
Code No.: **003G1599**

DN 50-125

PCV-VFG 21 - Main controller, throttling element, throttle valve, impulse tubes

Image	DN (mm)	k_{vs} (m ³ /h)	T_{max} (°C)	PN	Connection	Δp_{max} (bar)	Code No.
	  DN 25 	50	32	150	16	Flange EN 1092-2	15
65		50	003G1558				
80		80	003G1559				
100		125	003G1573				
125		160	003G1574				
50		32	150	25	Flange EN 1092-2	15	003G6707
65		50					003G1568
80		80					003G1569
100		125					003G1523
125		160					003G1524
Impulse tube	Copper		Ø 6 × 1 × 3000 mm				
	Stainless steel		Ø 10 × 1 × 1500 mm				
			Ø 10 × 0.8 × 1500 mm				

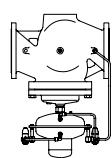


Pilot controller AVP

Image	DN (mm)	k_{vs} (m ³ /h)	T_{max} (°C)	PN	Connection	Δp setting range (bar)	Δp_{max} (bar)	Code No.
		25	8.0	150	25	Cylindr. ext. thread acc. to DIN ISO 228/1	G 1¼ A	20
0.2-1.0								003H6329
0.3-2.0								on request
1-5								
 DN 25 	Weld-on tailpieces DN 25						003H6910	
	Mounting set for impulse tube ¹⁾						003G1599	



¹⁾ Contains accessories for remounting the impulse tube on the pilot controller from internal connection (factory delivered) to external connection.

DN 150-250

PCV-VFG 21 - Main controller, throttling element, throttle valves, impulse tubes

Image	DN (mm)	k_{vs} (m ³ /h)	T_{max} (°C)	PN	Connection	Δp_{max} (bar)	Code No.	
	  DN 40 	150	320	150	16	Flange EN 1092-2	12	003G1505
200		450	10				003G1506	
250		630	10				003G1507	
150		320	25		12		003G1525	
200		450			10		003G1526	
250		630			10		003G1527	
Impulse tube		Copper		Ø 6 × 1 × 3000 mm				
		Stainless steel		Ø 10 × 1 × 1500 mm				
				Ø 10 × 0.8 × 1500 mm				

AVP

Image	DN (mm)	k_{vs} (m ³ /h)	T_{max} (°C)	PN	Connection	Δp setting range (bar)	Δp_{max} (bar)	Code No.
		40	20	150	25	Flange EN 1092-2	20	16
0.2-1.0							003H6379	
0.3-2.0							on request	
1-5								
	Mounting set for Impulse tube ¹⁾						003G1599	

¹⁾ Contains accessories for remounting the impulse tube on the pilot controller from internal connection (factory delivered) to external connection.

Ordering (continuous)

Example 2:
Pilot-controlled differential pressure controller; DN 150; k_{vs} 320; PN 16; setting range 0.2-1.0 bar; T_{max} 150 °C; flange;

- 1x PCV-VFG 21 DN 150
Code No.: **003G1505**
- 1x AVP DN 40
Code No.: **003H6373**
- 1x Mounting set for impulse tube
Code No.: **003G1599**

DN 150-250

PCV-VFG 2 - Main controller, throttling element, throttle valves, seal pots, impulse tubes

	DN (mm)	k_{vs} (m ³ /h)	T_{max} (°C)	PN	Connection Flange EN 1092-2	Δp_{max} (bar)	Code No.		
	150	320	200	16		12		on request	
	200	450				10			
	250	630				12	on request		
	150	320	200	25		10		on request	
	200	450				12			
	250	630				10			
	150	320	200	40		12	on request		
	200	450				10			
	250	630				12			
	Impulse tube	Copper		Ø 10 × 1 × 1500 mm					
		Stainless steel		Ø 10 × 0.8 × 1500 mm					

VFG 2 Valves (metallic sealing cone)

	DN (mm)	k_{vs} (m ³ /h)	T_{max} (°C)	Connections Flanges acc. to EN 1092-1	Code No.			
	40	20	150		200 ¹⁾	PN 16	PN 25	PN 40
						065B2392	065B2405	065B2415

AFP / AFP-9 Actuators

	Type	Δp setting range (bar)	for DN	Code No.
	AFP	0.15-1.5	15-250	003G1016
		0.1-0.7		003G1017
		0.05-0.35		003G1018

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

Accessories

	Type designation	Description	Connections	Code No.
	Impulse tube set AF ³⁾	- 1x Copper tube Ø10 × 1 × 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 Ø10	-	003G1392
	Compression fitting ²⁾	For impulse tube Ø10 connections to controller	G 1/4	003G1468
	Throttle valve-PCV	Regulating and shut-off device	-	065Z1502

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



³⁾ Impulse tubes on $T > 150$ °C or $PN > PN 16$ should be of stainless steel

Service kits AVP

	Type designation	DN (mm)	k_{vs} (m ³ /h)	Code No.	
	Valve insert	15	1.6	003H6863	003H6871
			2.5	003H6864	003H6872
			4.0	003H6865	003H6873
		20	6.3	003H6866	003H6874
			8	003H6867	003H6875
		32 / 40 / 50	12.5 / 20 / 25	003H6868	003H6876
	Type designation	Δp setting range (bar)	AVP return	AVP flow	
	Actuator with adjustable handle (AVP)	0.2-1.0	003H6829	003H6834	
		0.3-2.0	003H6830	003H6835	

Ordering (continuous)

Service kits AFP

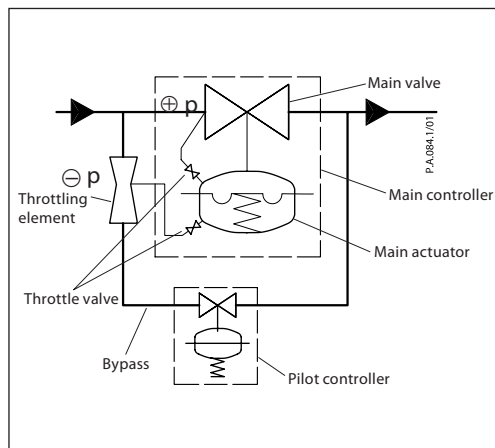
	Type designation	DN (mm)	k _{vs} (m ³ /h)	Code No.	
				for VFG 2	for VFG 21
 Valve insert		15	4.0	065B2796	065B2790
		20	6.3	065B2797	065B2791
		25	8	065B2798	065B2792
		32	16		
		40	20	065B2799	065B2793
		50	32		
		65	50	065B2800	065B2794
		80	80		
		100	125	065B2801	065B2795
		125	160		
		150	280	065B2964	065B2966
250	400	065B2965	-		
 Stuffing cone (with EPDM O-rings)				003G1464	

Function

The pilot valve maintains the differential pressure over selected part of system/application. By this action also flow through a bypass changes and therefore (-p) at the throttling element.

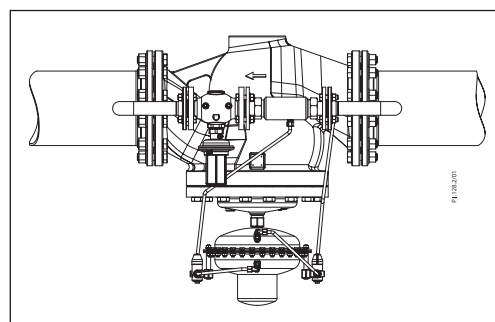
Pressure changes from inlet pipe (+p) and from throttling element (-p) are being transferred through the impulse tubes to the main actuator chambers and act on control diaphragm

In case of small flow rates the main controller is closed and control is taken by the pilot controller only. With increasing the flow rate, a negative pressure is built in the throttling element. This partial vacuum acts on the main actuator diaphragm and causes the main controller to open.

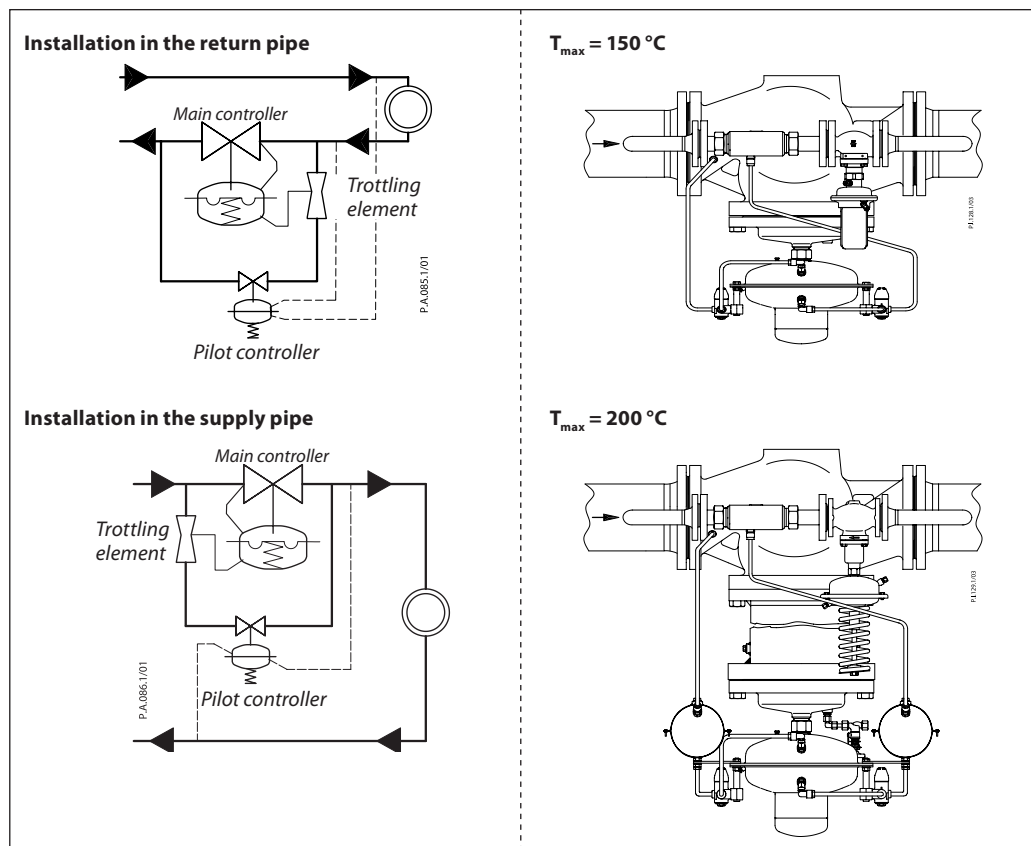


Installation positions

Both main and pilot controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.

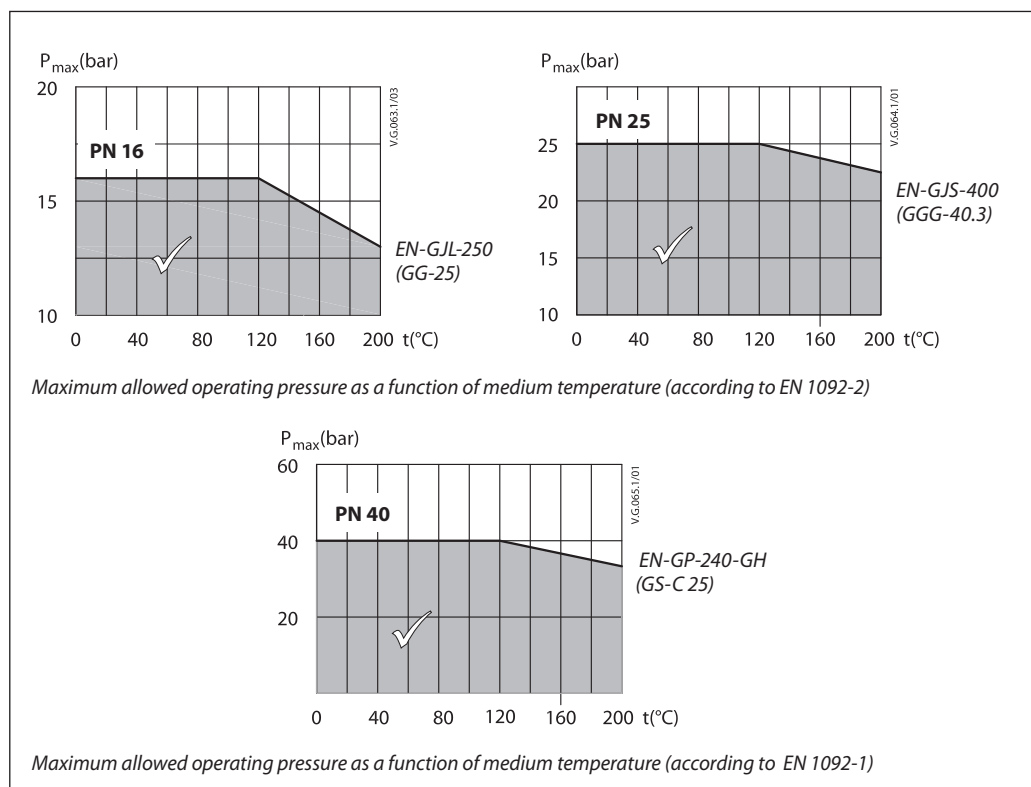


Installation positions
(continuous)



Pressure temperature diagram

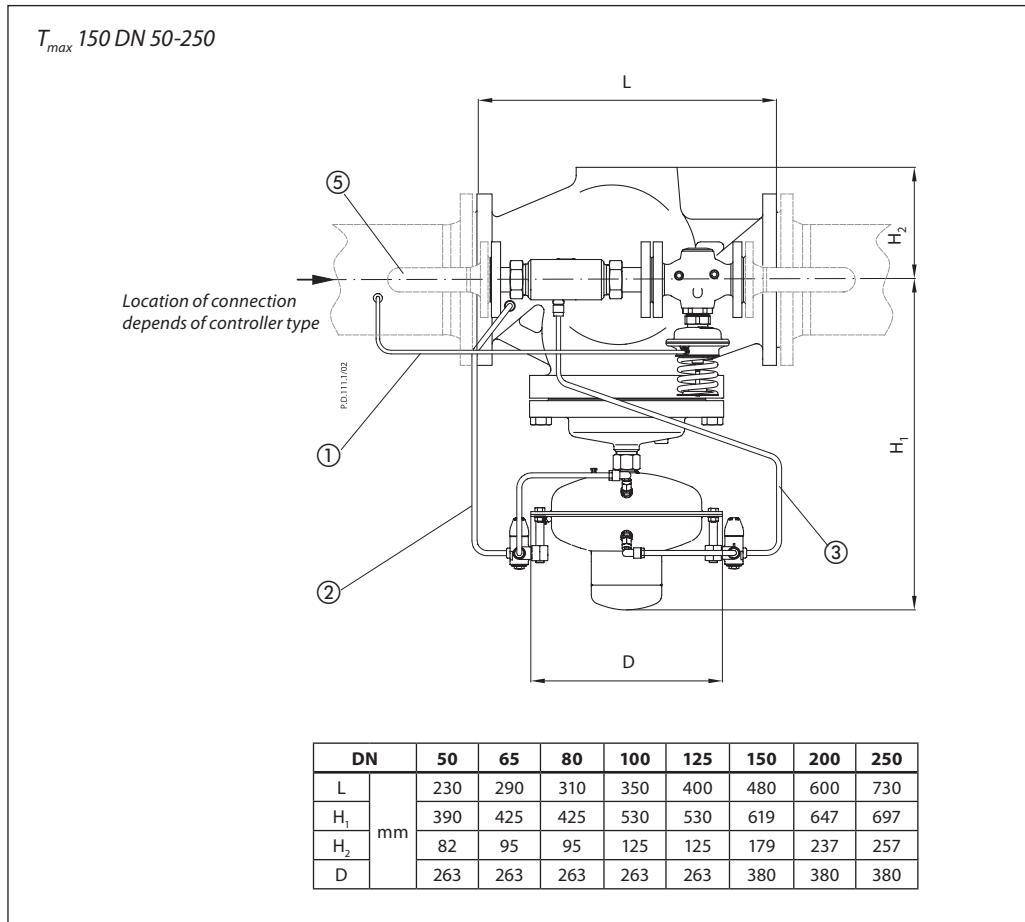
Working area is below P-T line and it ends at T_{max} for each valve



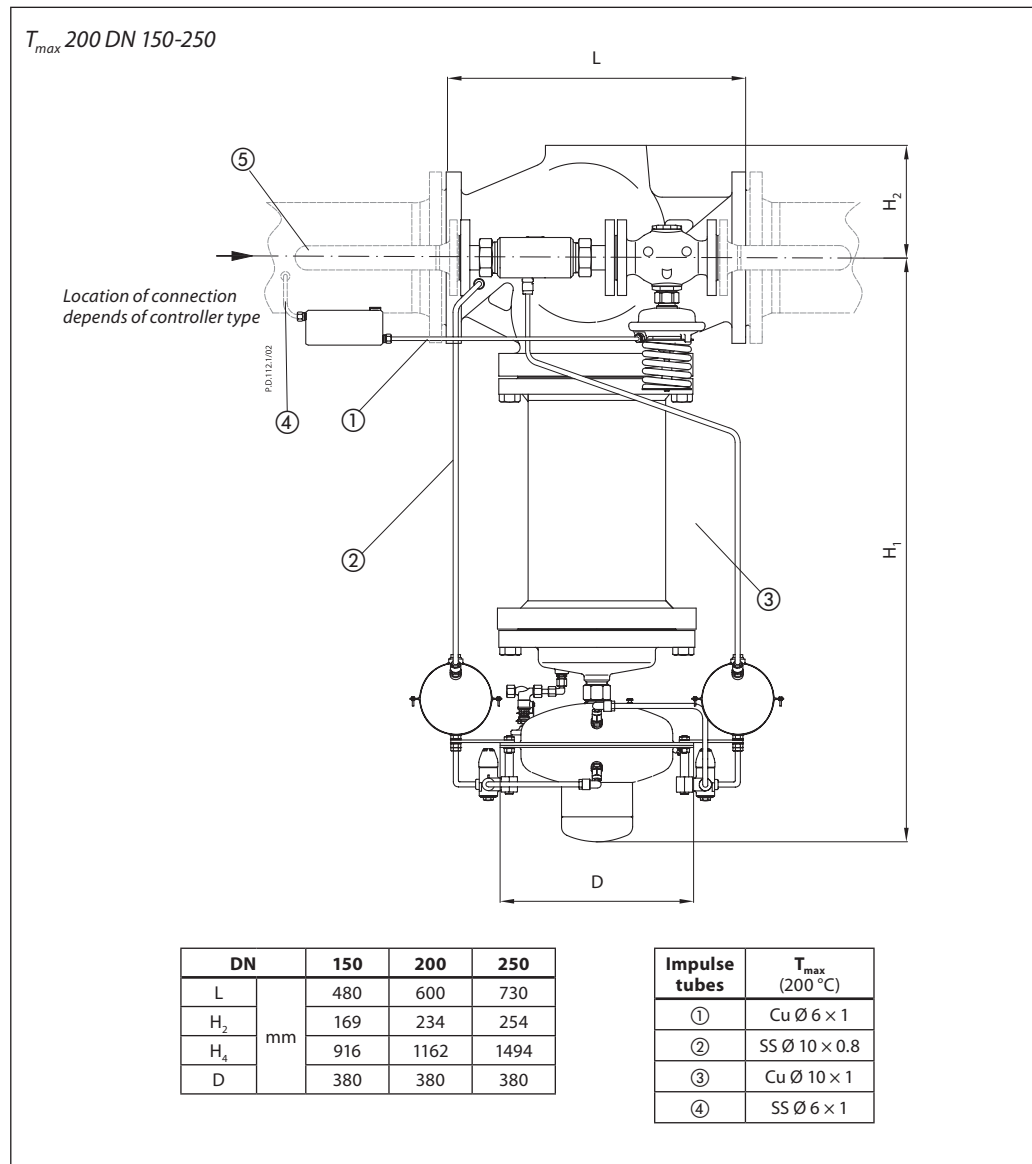
Dimensions

Impulse tubes (pos.1, 2, 3) are part of the delivery. Their shape depends on the controller type. In case of high temperatures ($T_{max} > 150$) seal pots have to be installed. For details see relevant Instructions.

The components shown with dashed lines are NOT part of the delivery. The pipes (pos. 5) must be welded during mounting.

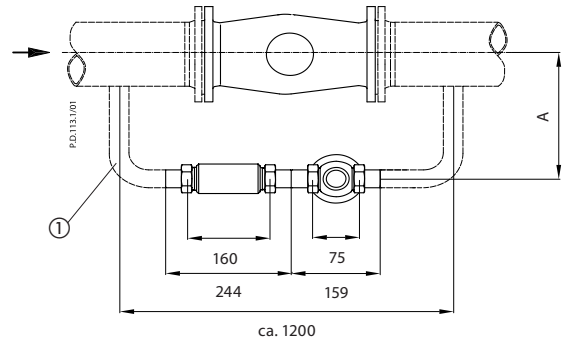


Dimensions (continuous)



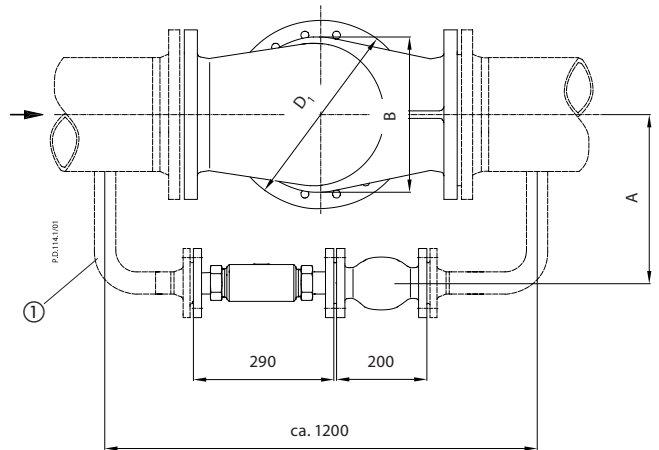
Dimensions (continuous)

T_{max} 150 °C DN 50-125



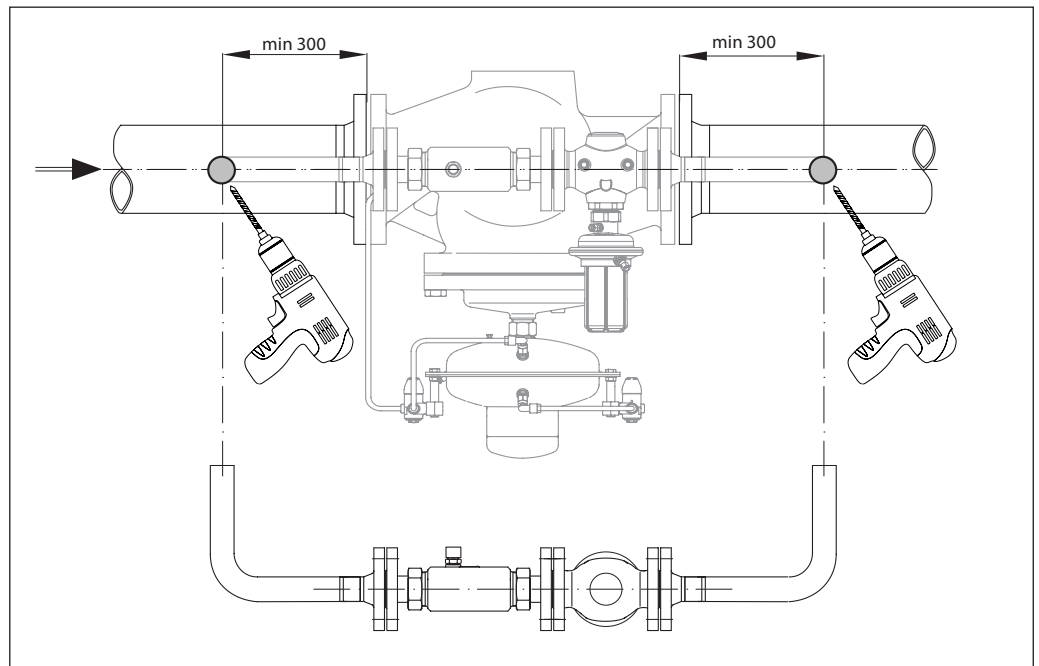
DN	50	65	80	100	125	
A	mm	290	290	290	290	290

T_{max} 150 °C DN 150-250



DN	150	200	250	
D ₁	mm	320	385	500
A	mm	320	350	410
B	mm	310	336	412

Pipes Pos. 1:
 DN 25: Pipes Ø 33.7 × 2.6
 DN 40: Pipes 48.3 × 3.2



Throttle valve



Function of throttle valve is to control flow speed through impulse tube and consequently influence on PCV's reaction time. Influence on reaction time is not completely defined and strongly depends on application conditions and could significantly vary from application to application.

In general:

- by opening of the valve (clockwise) PCV's reaction time increases
- by valve closing (counterclockwise) PCV's reaction time decreases

In case valve is completely closed it has function as shut-off valve.

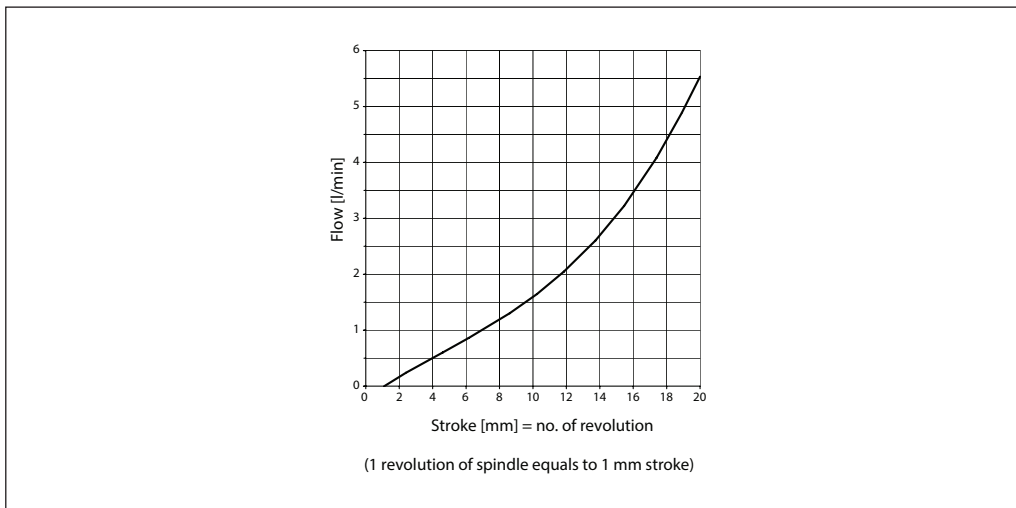
Throttle valve is delivered from factory in completely open position.

Throttle valve is regulating and shut-off device, which is / are installed on the impulse tubes connected to main PCV actuator. Number of used throttle valves can be seen in table for Main actuator in Technical Data section.

Main data:

- DN 4
- used for Ø10 mm impulse tube

Flow diagram





Danfoss A/S

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

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and all Danfoss logotypes are trademarks of Danfoss A/S. All rights reserved.
