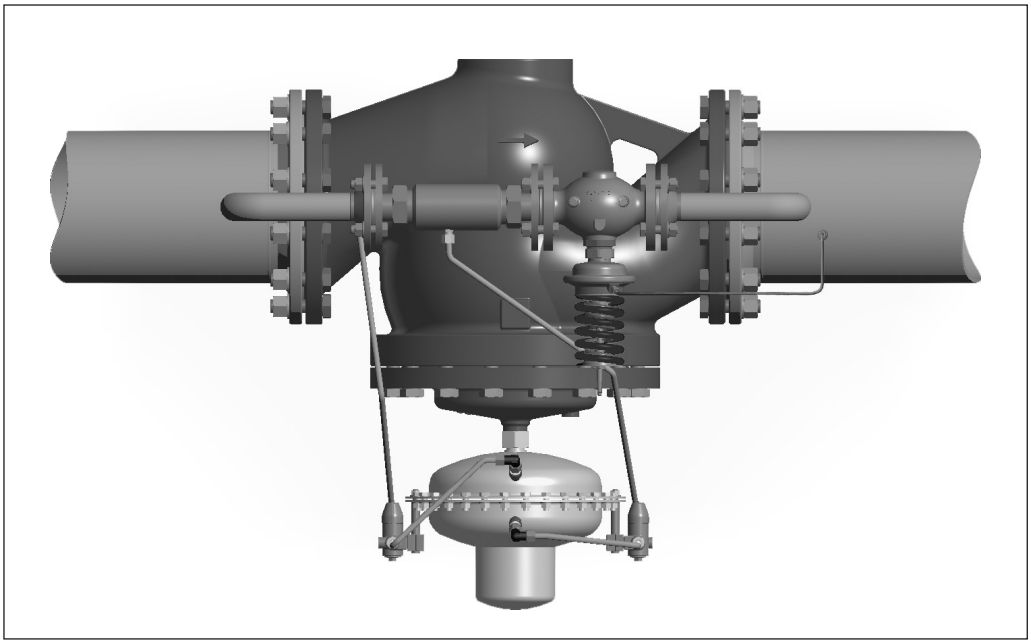
ENGINEERING
TOMORROW

Data sheet

Pilot-controlled differential pressure reducer (PN 16, 25, 40)

PCVD - flow and return mounting, adjustable setting

Description



Pilot-controlled pressure reducer 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 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 controler.

Throttle valve data can be found on page 9.

Main data[1] :
- DN 50-250[2]
- k_{VS} 32-630 m^3/h
- PN 16, 25, 40[3]
- 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:
- Pressure reducer
- 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

Note:
For pilot controllers technical data please see relevant Data Sheet

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		2 … 150°C							
	VFG 2		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	bar	25	16, 25
Flow restrictor differential pressure Δp_b[1]		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

[1] Defined by pilot controller

Trottling 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	

Ordering

Example 1:
Pilot-controlled differential pressure reducer; DN 100; k_{VS} 125; PN 16; setting range 1-5 bar; T_{max} 150 °C; flange;

- *1× PCV-VFG 21 DN 100*
  Code No.: ***003G1573***
- *1× AVD DN 25*
  Code No.: ***003H6646***
- *1× Weld-on tailpieces DN 25*
  Code No.: ***003H6910***
- *1× Mounting set for Impulse tube*
  Code No.: ***003G1599***

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

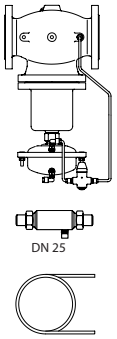
Example 2:
Pilot-controlled differential pressure reducer; DN 150; k_{VS} 320; PN 16; setting range 3-12 bar; T_{max} 150 °C; flange;

- *1× PCV-VFG 21 DN 150*
  Code No.: ***003G1505***
- *1× AVD DN 40*
  Code No.: ***003H6663***
- *1× Mounting set for impulse tube*
  Code No.: ***003G1599***

[1] For PN 40 pilot controller instead of AVD controller use AFD VFG 2 PN 40 DN 40 and one seal pots V3
[2] For temperatures Tmax = 140 … 200 °C instead of AVD controller use AFD VFG 2 PN 16/25/40 DN 40 , stem extension ZF4 or ZF5 and one seal pot V3
[3] Contains accessories for remounting the impulse tube on the pilot controller from internal connection (factory delivered) to external connection.

DN 50-125

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



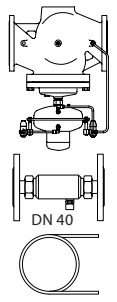
DN (mm)	k_{VS} (m^3/h)	T_{max} (°C)	PN	Connection	Δp_{max} (bar)	Code No.
50	32	150	16	Flange EN 1092-2	15	**003G1626**
65	50					**003G1558**
80	80					**003G1559**
100	125					**003G1573**
125	160					**003G1574**
50	32	150	25	Flange EN 1092-2	15	**003G6707**
65	50					**003G1568**
80	80					**003G1569**
100	125					**003G1523**
125	160					**003G1524**
Impulse tube		Copper		Ø 6 × 1 × 3000 mm		
				Ø 10 × 1 × 1500 mm		
		Stainless steel		Ø 10 × 0.8 × 1500 mm		

Pilot controller **AVD**

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	1-5	20	**003H6646**
						3-12		**003H6652**
Weld-on tailpieces DN 25								**003H6910**
Mounting set for impulse tube[1]								**003G1599**

DN 150-250

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



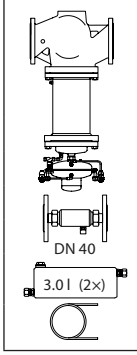
DN (mm)	k_{VS} (m^3/h)	T_{max} (°C)	PN	Connection	Δp_{max} (bar)	Code No.
150	320	150	16	Flange EN 1092-2	12	**003G1505**
200	450				10	**003G1506**
250	630					**003G1507**
150	320		25		12	**003G1525**
200	450				10	**003G1526**
250	630					**003G1527**
Impulse tube		Copper		Ø 6 × 1 × 3000 mm		
			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

Pilot controller **AVD**[1)2)]

DN (mm)	k_{VS} (m^3/h)	T_{max} (°C)	PN	Connection	Δp setting range (bar)	Δp_{max} (bar)	Code No.
40	16	150	25	Flange EN 1092-2	1-5	16	**003H6660**
					3-12		**003H6663**
Mounting set for Impulse tube[3]							**003G1599**

DN 150-250

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



DN (mm)	k_{VS} (m^3/h)	T_{max} (°C)	PN	Connection	Δp_{max} (bar)	Code No.
150	320	200	25	Flange EN 1092-2	12	**003G1618**
200	450				10	**003G1619**
250	630					**003G1620**
150	320		40		12	**003G1621**
200	450				10	**003G1622**
250	630					**003G1623**
Impulse tube		Copper		Ø 10 × 1 × 1500 mm		
		Stainless steel		Ø 10 × 0.8 × 1500 mm		

Ordering *(Continuous)*

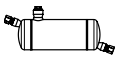
VFG 2 Valves (metallic sealing cone)

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

AFD Actuators

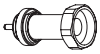
	Δp setting range (bar)	For DN	Code No.
	3-12	15-125	**003G1001**
	1-6		**003G1002**

Accessories

	Type designation	Description	Connections	Code No.
	Impulse tube set AF[3]	- 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**
	Compression fitting[2]	For impulse tube Ø10 connections to controller	G ¼	**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 AVD

	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**
		32/40/50	12.5/20/25	**003H6876**
	Valve body extension with stuffing box[2]	15	3.2	**003H6877**
		20	4.5	
		25	v	

		Pressure setting range (bar)	Code No.
	Actuator with setting spring	1-5	**003H6844**
		3-12	**003H6845**

[1] for AVD controller only
[2] for AVDS controller only

Service kits VFG 2

	Type designation	DN (mm)	k_{VS} (m^3/h)	Code No.
	Valve insert	15	4.0	**065B2796**
		20	6.3	**065B2797**
		25	8	**065B2798**
		32	16	
		40	20	**065B2799**
		50	32	
		65	50	**065B2800**
		80	80	
		100	125	**065B2801**
		125	160	
		150	280	**065B2964**
		250	400	**065B2965**
	Stuffing cone (with EPDM O-rings)			**003G1464**

Function

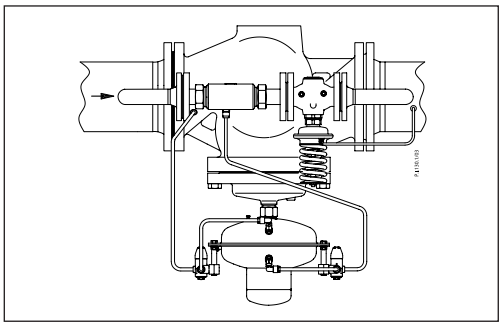
The pilot valve maintains the pressure in front of selected part of system/application. By this action also flow through a bypass changes and therefore (-p) at the throttling element.

Pressure changes from inlet pipe (+p) is being transferred through the impulse tube to the main actuator chamber and acts on control diaphragm.

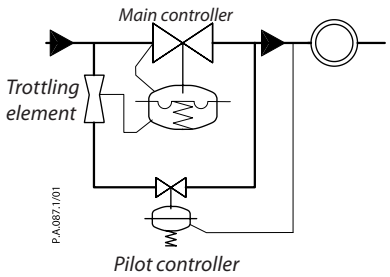
In case of small flow rates the main controller is closed and control is taken by the pilot controller only. With increasing the flow rate, a negative pressure is built in the throttling element. This partial vacuum acts on the main actuator diaphragm and causes the main controller to open.

Installation positions

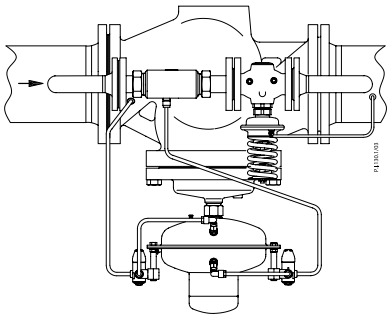
Both main and pilot controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.



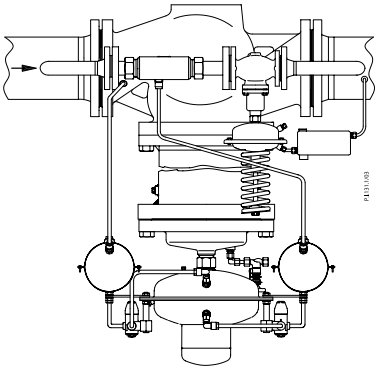
Installation in the return pipe



T_{max} = 150 °C

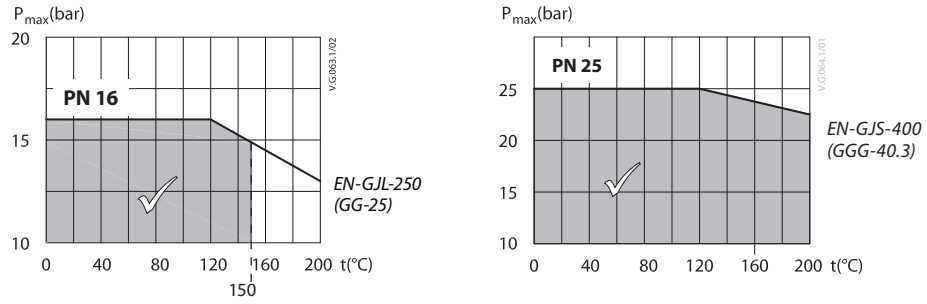


T_{max} = 200 °C

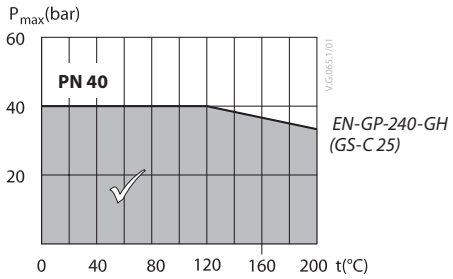


Pressure temperature diagram

Working area is below P-T line and it ends at Tmax for each valve



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



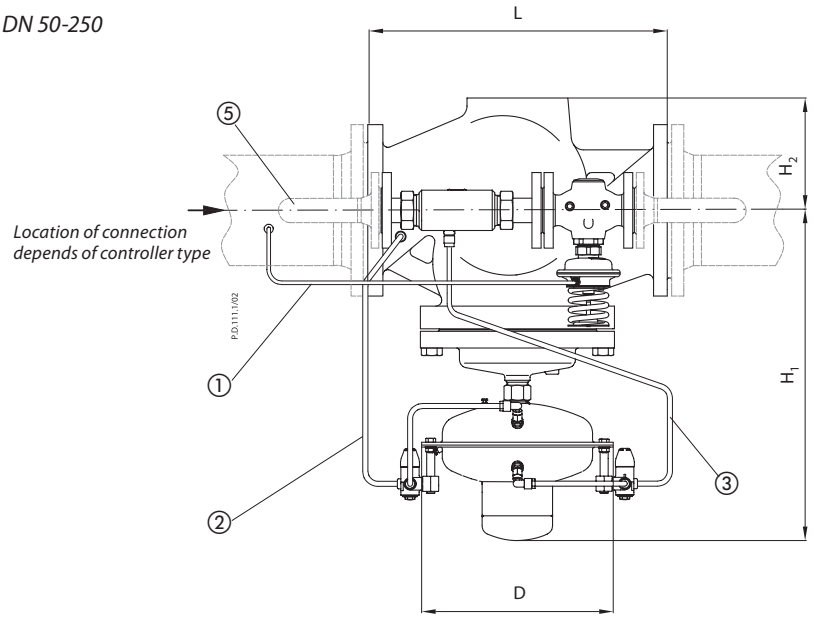
Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-1)

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.

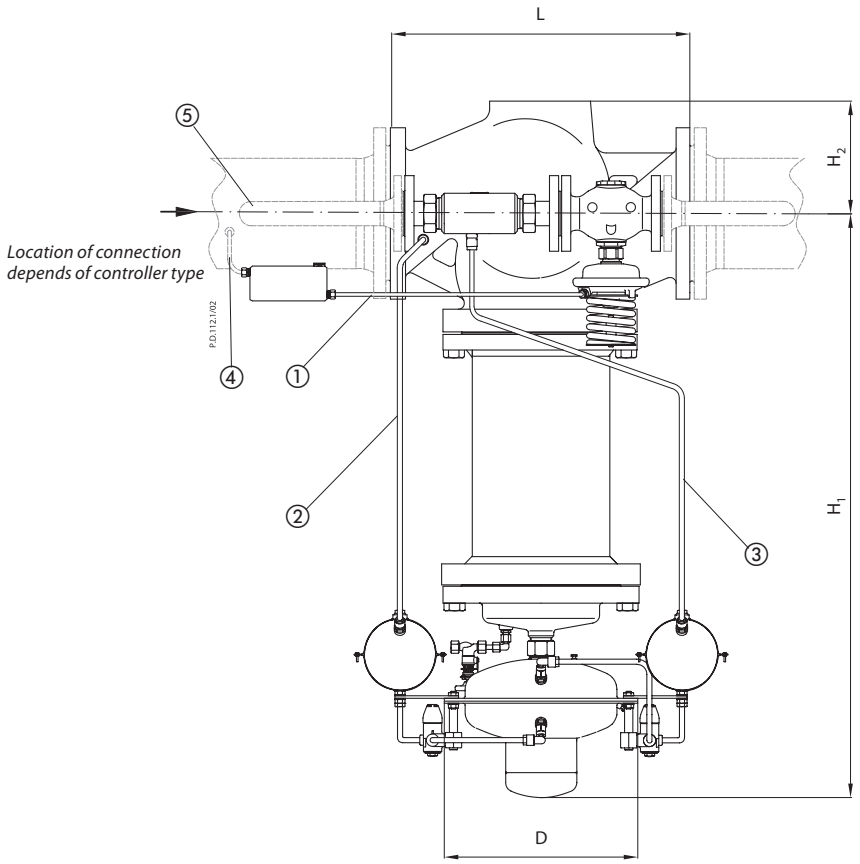
T_{max} 150 DN 50-250



DN		50	65	80	100	125	150	200	250
L	mm	230	290	310	350	400	480	600	730
H_1		390	425	425	530	530	619	647	697
H_2		82	95	95	125	125	179	237	257
D		263	263	263	263	263	380	380	380

Dimensions *(Continuous)*

T_{max} 200 DN 150-250

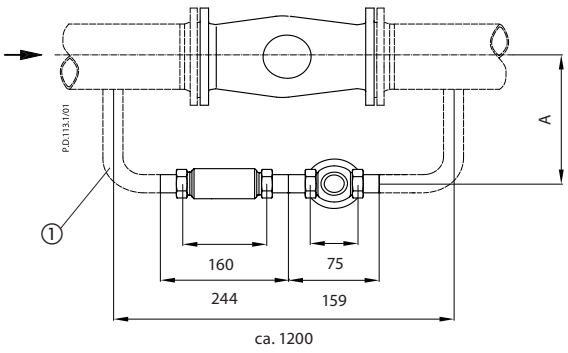


DN		150	200	250
L	mm	480	600	730
H_2		169	234	254
H_1		916	1162	1494
D		380	380	380

Impulse tubes	T_{max} (200 °C)
①	Cu Ø 6 × 1
②	SS Ø 10 × 0.8
③	Cu Ø 10 × 1
④	SS Ø 6 × 1

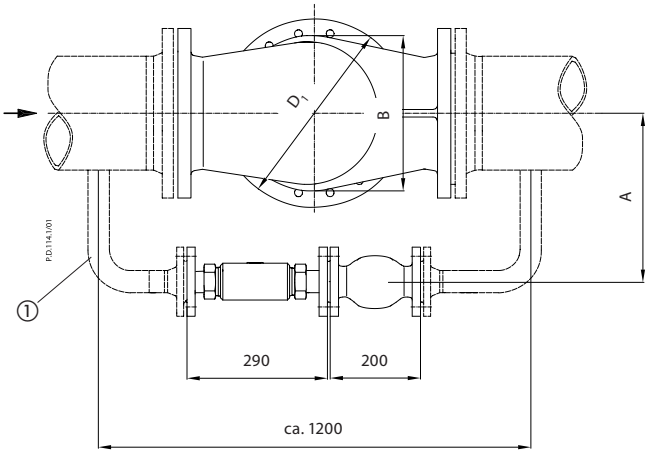
Dimensions *(Continuous)*

T_{max} 150 °C DN 50-125



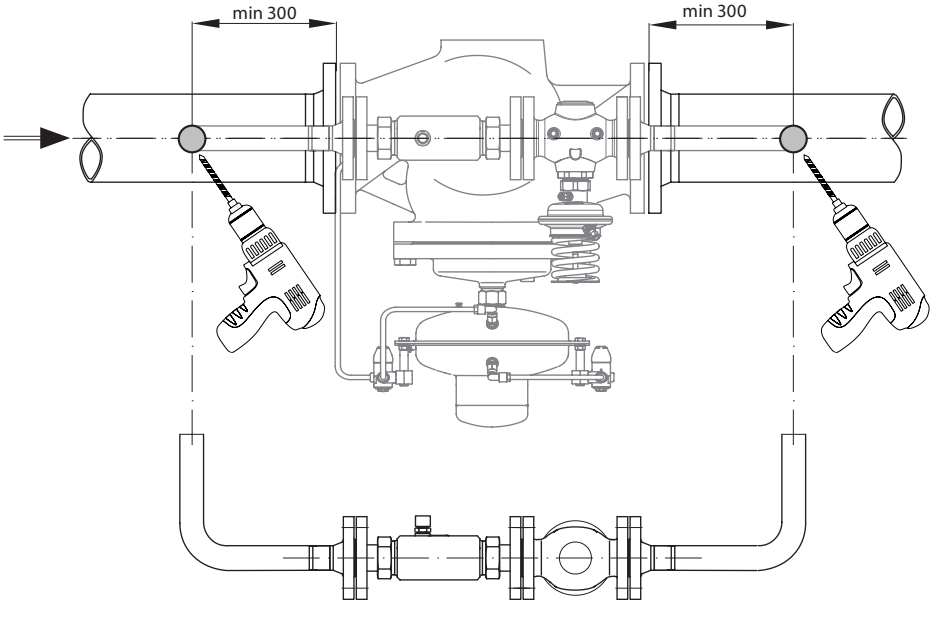
DN		50	65	80	100	125
A	mm	290	290	290	290	290

T_{max} 150°C DN 150-250



DN		150	200	250
D_1	mm	320	385	500
A		320	350	410
B		310	336	412

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



Throttle valve

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.

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 completly defined and strongly depends on application conditions and could significantly vary from application to application.

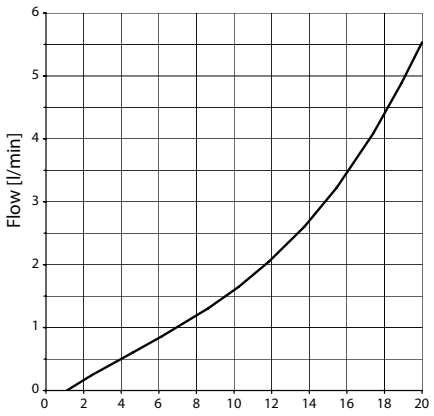
In general:
- by opening of the valve (clockwise) PCV's reaction time increases
- by valve closing (counterclockwise) PCV's reaction time decreases

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

Throttle valve is delivered from factory in completly open position.

Main data:
- DN 4
- used for Ø10 mm impulse tube

Flow diagram



(1 revolution of spindle equals to 1 mm stroke)

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