ENGINEERING
TOMORROW

Data sheet

Differential pressure controller (PN 25)
AVP - return and flow mounting, adjustable setting

Description

AVP(-F) is a self-acting differential pressure controller primarily for use in district heating systems. The controller closes on rising differential pressure.

The controller has a control valve, an actuator with one control diaphragm and handle for differential pressure setting (fixed setting version (available on special request) is without handle).

Main data:
- DN 15-50
- k_{VS} 0.4-25 m^3/h
- PN 25
- Setting range (AVP): 0.2-1.0 bar / 0.3-2.0 bar
- Fixed setting (AVP-F) [1]: 0.2 bar / 0.5 bar
- Temperature:
  -Circulation water / glycolic water up to 30%: 2 … 150 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange

[1] *On special request*

Ordering

Example 1:
Differential pressure controller; return mounting; DN 15; k_{VS} 1.6; PN 25; setting range 0.2-1.0 bar; T_{max} 150 °C; ext. thread

- *1× AVP DN 15 controller Code No:* ***003H6283***
- *1× Impulse tube set AV, R ⅛ Code No:* ***003H6852***

Option:
- *1× Weld-on tailpieces Code No:* ***003H6908***

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator. External impulse tube (AV) must be ordered separately.

AVP Controller (return mounting)

Picture	DN (mm)	k_{VS} (m^3/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	0.2-1.0	**003H6281**	0.3-2.0	**003H6291**
		1.0				**003H6282**		**003H6292**
		1.6				**003H6283**		**003H6293**
		2.5				**003H6284**		**003H6294**
		4.0				**003H6285**		**003H6295**
	20	6.3		G 1 A		**003H6286**		**003H6296**
	25	8.0		G 1¼ A		**003H6287**		**003H6297**
	32	12.5		G 1¾ A		**003H6288**		-
	40	16		G 2 A		**003H6289**		-
	50	20		G 2½ A		**003H6290**		-
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6345**		**003H6351**
	20	6.3				**003H6346**		**003H6352**
	25	8.0				**003H6347**		**003H6353**
	32	12.5				**003H6348**		**003H6354**
	40	20				**003H6349**		**003H6355**
	50	25				**003H6350**		**003H6356**

Note: *other controllers available on special request.*

Ordering *(continued)*

*Example 2 - **AVP** controller without predefined impulse tube:*

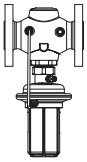
Differential pressure controller; flow mounting; DN 15; k_{VS} 4.0; PN 25; setting range 0.2-1.0 bar; T_{max} 150°C; flange

- *1× AVP DN 15 controller Code No: **003H6369***
- *2× Impulse tube set AV, R ⅛ Code No: **003H6852***

Option:
- *1× Weld-on tailpieces Code No: **003H6908***

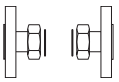
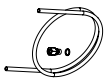
The controller will be delivered completely assembled, without impulse tube between valve and actuator. External impulse tubes (AV) must be ordered separately.

AVP Controller (flow mounting)

Picture	DN (mm)	k_{VS} (m^3/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	0.2-1.0	**003H6313**	0.3-2.0	**003H6323**
		1.0				**003H6314**		**003H6324**
		1.6				**003H6315**		**003H6325**
		2.5				**003H6316**		**003H6326**
		4.0				**003H6317**		**003H6327**
	20	6.3		G 1 A		**003H6318**		**003H6328**
	25	8.0		G 1¼ A		**003H6319**		**003H6329**
	15	4.0	Flanges PN 25, acc. to EN 1092-2			**003H6369** [1]		**003H6375** [1]
	20	6.3				**003H6370** [1]		**003H6376** [1]
	25	8.0				**003H6371** [1]		**003H6377** [1]
	32	12.5				**003H6372**		**003H6378**
	40	20				**003H6373**		**003H6379**
	50	25				**003H6374**		**003H6380**

Note: other controllers available on special request.
[1] Controller is without predefined impulse tube (see ordering example 2)

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003H6908**
		20			**003H6909**
		25			**003H6910**
		32			**003H6911**
		40			**003H6912**
		50			**003H6913**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003H6902**
		20		R ¾	**003H6903**
		25		R 1	**003H6904**
		32		R 1¼	**003H6905**
		40		R 1½	**065B2004**
		50		R 2	**065B2005**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**
	Impulse tube set AV	Description: - 1× copper tube Ø6 × 1 × 1500 mm - 1× compression fitting [1] for imp. tube connection to pipe Ø6 × 1 mm		R ⅛	**003H6852**
				R ⅜	**003H6853**
				R ½	**003H6854**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ⅛				**003H6857**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ⅜				**003H6858**
	[1] 10 compression fittings for imp. tube connection to pipe, Ø6 × 1 mm R ½				**003H6859**
	[1] 10 compression fittings for imp. tube connection to actuator, Ø6 × 1 mm G ⅛				**003H6931**
	Shut off valve Ø6 mm				**003H0276**

[1] *Compression fitting consists of a nipple, compression ring and nut.*

Service kits

Picture	Type designation	DN (mm)	k_{VS} (m^3/h)	Code No.	
				AVP return	AVP flow
	Valve insert	15	1.6	**003H6863**	**003H6871**
			2.5	**003H6864**	**003H6872**
			4.0	**003H6865**	**003H6873**
		20	6.3	**003H6866**	**003H6874**
		25	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**

Technical data

Valve

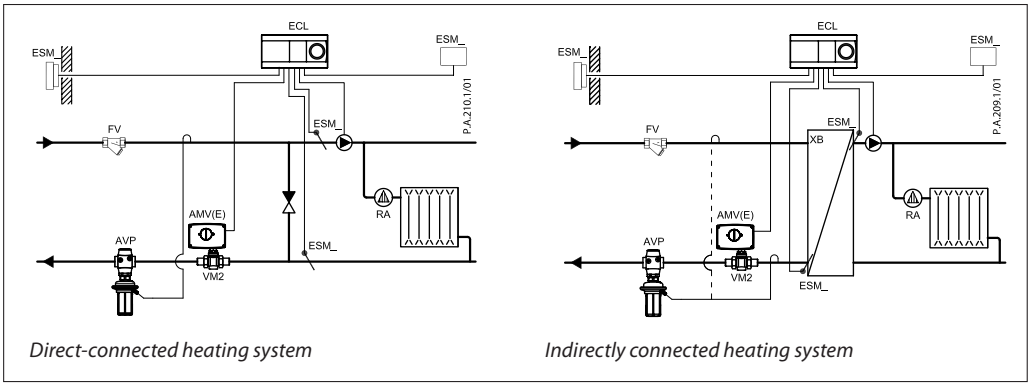
Nominal diameter		**DN**	**15**					**20**	**25**	**32**	**40**	**50**
k_{VS} value		m^3/h	0.4	1.0	1.6	2.5	4.0	6.3	8.0	12.5	20	25
Cavitation factor z			≥ 0.6						≥ 0.55		≥ 0.5	
Leakage acc. to standard IEC 534		% of k_{VS}	≤ 0.02							≤ 0.05		
Nominal pressure		PN	25									
Max. differential pressure		bar	20							16		
Medium			Circulation water / glycolic water up to 30%									
Medium pH			Min. 7, max. 10									
Medium temperature		°C	2 … 150									
Connections	valve		Extternal thread									
			-				Flange					
	tailpieces		Weld-on and external thread									
			Flange							-		
Materials												
Valve body	thread		Red bronze CuSn5ZnPb (Rg5)							Ductile iron EN-GJS-400-18-LT (GGG 40.3)		
	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									

AVP Actuator

Type			**AVP, AVP-F** [1]	
Actuator size		cm^2	54	
Nominal pressure		PN	25	
Diff. pressure setting ranges and spring colours		bar	0.2-1.0	0.3-2.0
			yellow	red
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 Ø6 × 1 mm	

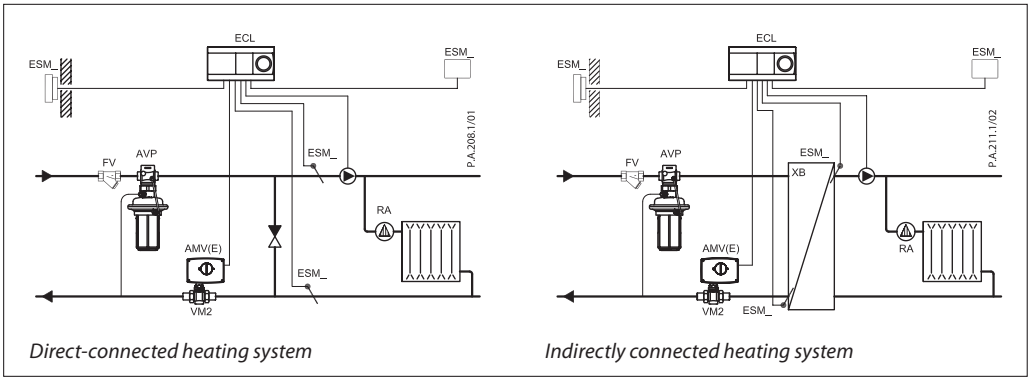
[1] *On special request.*

Application principles
- Return mounting



Direct-connected heating system *Indirectly connected heating system*

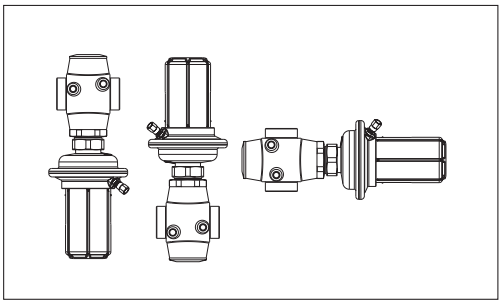
- Flow mounting



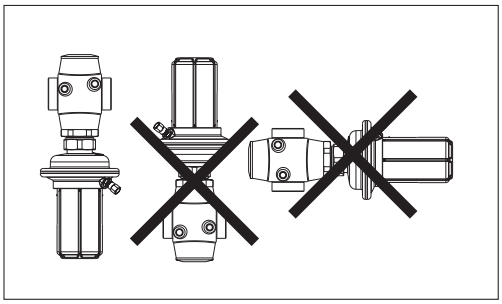
Direct-connected heating system *Indirectly connected heating system*

Installation positions

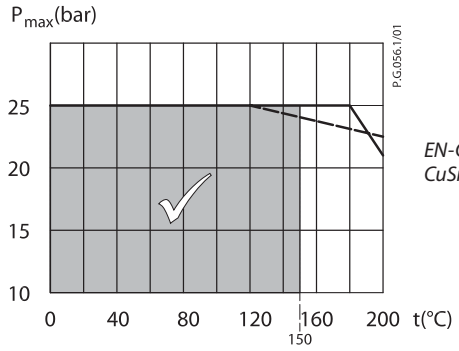
Up to medium temperature of 100 °C the controllers can be installed in any position.



For higher temperatures the controllers have to be installed in horizontal pipes only, with a pressure actuator oriented downwards.



Pressure temperature diagram



EN-GJS-400-18-LT (GGG 40.3) PN 25
CuSn5ZnPb (Rg5) PN 25

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

Sizing

- Directly connected heating system

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating system requires differential pressure of 0.3 bar (30 kPa).

Given data:
Q_{max} = 1.2 m³/h (1200 l/h)
Δp_{min} = 0.7 bar (70 kPa)
*$\Delta p_{circuit}$ = 0.1 bar (10 kPa)
Δp_{MCV} = 0.3 bar (30 kPa) selected

*Remark
$\Delta p_{circuit}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AVP.

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{MCV}$
$\Delta p_{set\ value}$ = 0.3 bar (30 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{MCV} = 0.7 - 0.3$
Δp_{AVP} = 0.4 bar (40 kPa)

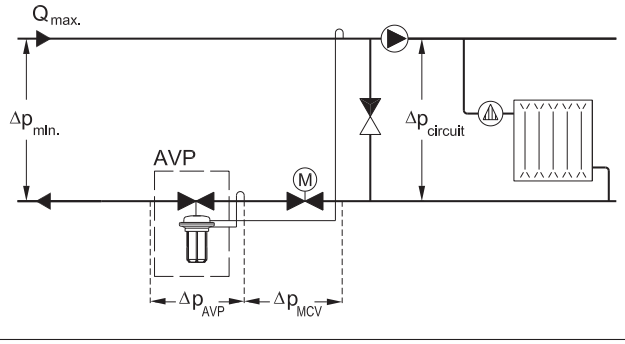
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

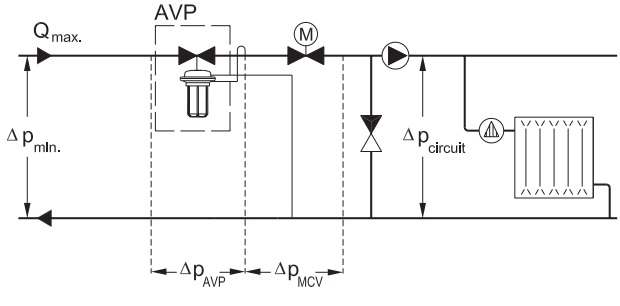
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1,2}{\sqrt{0,4}}$$

k_v = 1.9 m³/h

Solution:
The example selects AVP DN 15, k_{VS} value 2.5, with differential pressure setting range 0.2-1.0 bar.





Sizing *(continuous)*

- Indirectly connected heating system

Example 2
Motorised control valve (MCV) for indirectly connected heating system requires differential pressure of 0.4 (40 kPa) bar.

Given data:
Q_{max} = 1.25 m³/h (1250 l/h)
Δp_{min} = 1.0 bar (100 kPa)
$\Delta p_{exchanger}$ = 0.05 bar (5 kPa)
Δp_{MCV} = 0.4 bar (40 kPa) selected

The differential pressure set value is:
$\Delta p_{set\ value} = \Delta p_{exchanger} + \Delta p_{MCV} = 0.05 + 0.4$
$\Delta p_{set\ value}$ = 0.45 bar (45 kPa)

The total pressure loss across the controller is:
$\Delta p_{AVP} = \Delta p_{min} - \Delta p_{exchanger} - \Delta p_{MCV} = 1.0 - 0.05 - 0.4$
Δp_{AVP} = 0.55 bar (55 kPa)

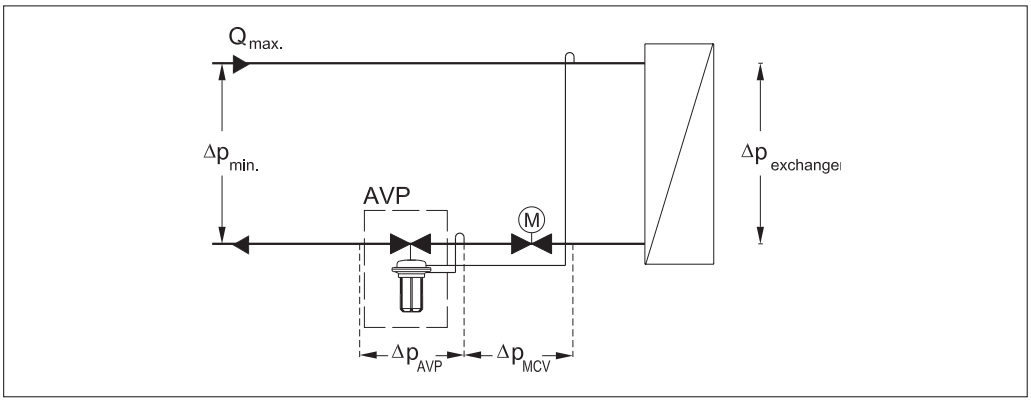
Possible pipe pressure losses in tubes, shut-off fittings, heatmeters, etc. are not included.

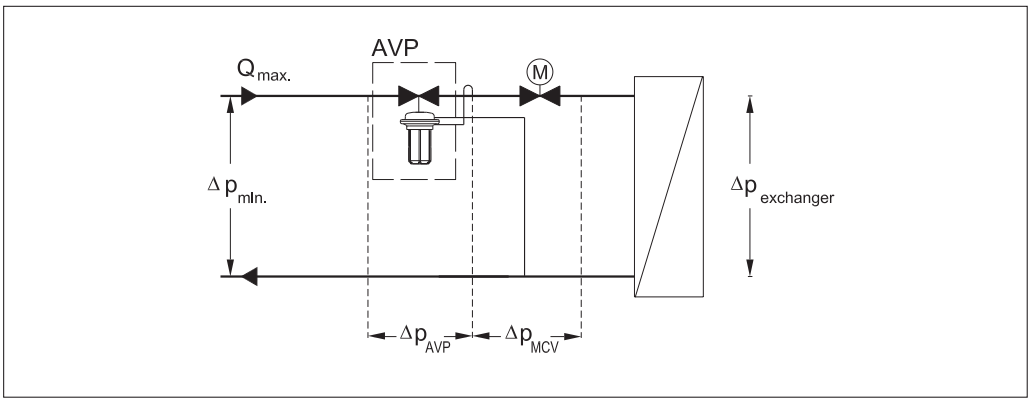
k_v value is calculated according to formula:

$$k_v = \frac{Q_{max}}{\sqrt{\Delta p_{AVP}}} = \frac{1{,}25}{\sqrt{0{,}55}}$$

k_v = 1.7 m³/h

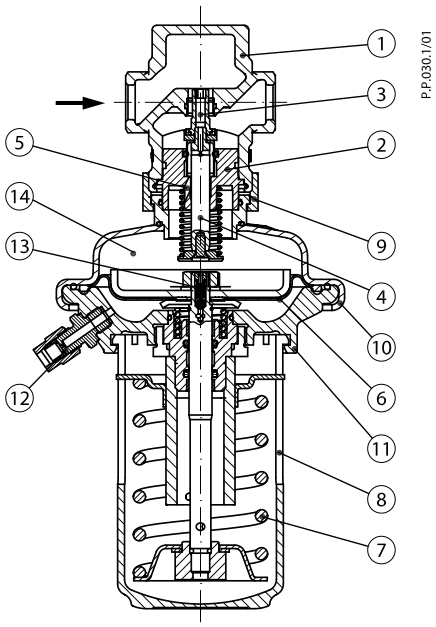
Solution:
The example selects AVP DN 15, k_{VS} value 2.5, with differential pressure setting range 0.2-1.0 bar.





Design

1. Valve body
2. Valve insert
3. Pressure relieved valve cone
4. Valve stem
5. Control drain
6. Control diaphragm for diff. pressure control
7. Setting spring for diff. pressure control
8. Handle for diff. pressure setting, prepared for sealing
9. Union nut
10. Upper casing of diaphragm
11. Lower casing of diaphragm
12. Compression fitting for impulse tube
13. Excess pressure safety valve
14. Actuator



Function

Pressure changes from flow and return pipes are being transferred through the impulse tubes and/or control drain in the actuator stem to the actuator chambers and act on control diaphragm for diff. pressure control. The diff. pressure is controlled by means of setting spring for diff. pressure control. Control valve closes on rising differential pressure and opens on falling differential pressure to maintain constant differential pressure.

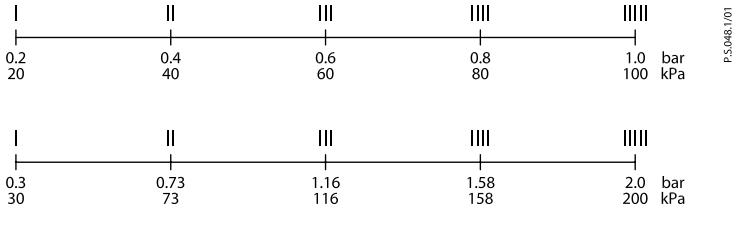
Controller is equipped with excess pressure safety valve, which protects control diaphragm for diff. pressure control from too high differential pressure (not implemented at AVP-F flow mounting version).

Settings

Differential pressure setting
Differential pressure setting (valid for AVP controller only) is being done by the adjustment of the setting spring for diff. pressure control. The adjustment can be done by means of handle for diff. pressure setting and/or pressure indicators.

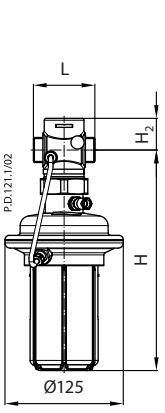
Adjustment diagram

Relation between scale figures and differential pressure. Values given are approximate.

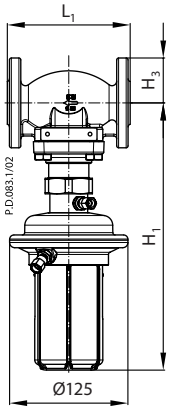


Data sheet **Differential pressure controller (PN 25) AVP**

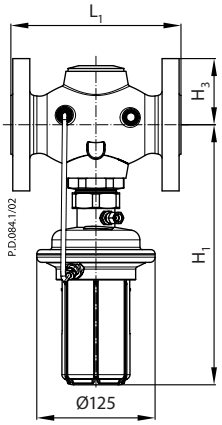
Dimensions



DN 15-50



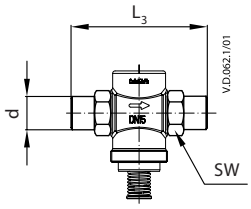
DN 15-25

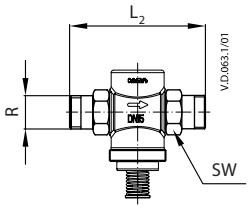


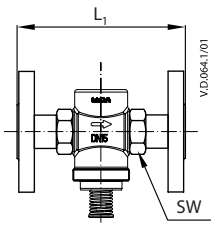
DN 32-50

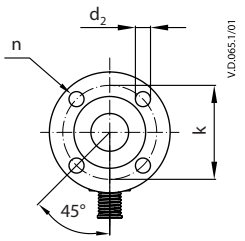
DN		15		20		25		32		40		50	
		flow	return	flow	return	flow	return	flow	return	flow	return	flow	return
L	mm	65		70		75		-	100	-	110	-	130
L_1		130		150		160		180		200		230	
H		233	220	233	220	233	220	-	275	-	275	-	275
H_1		285	269	285	269	285	269	275	261	275	261	275	261
H_2		34		34		37		-	62	-	62	-	62
H_3		47		52		57		70		75		82	
Weight (thread)	kg	3.5		3.5		3.7		-	5.8	-	5.9	-	6.6
Weight (flange)		6.1		6.8		7.4		10.2		11.7		13.9	

Note: *Other flange dimensions - see table for tailpieces.*





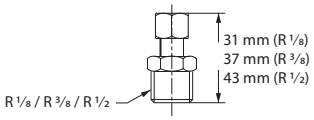




DN	R [1]	SW	d	L_1 [2]	L_2	L_3	k	d_2	n
		mm							
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	200	204	110	18	4
50	2	82 (G 2½A)	60	-	244	234	125	18	4

[1] *Conical ext. thread acc. to EN 10226-1*
[2] *Flanges PN 25, acc. to EN 1092-2*

Compression fittings



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