



Pressure flow controllers

AVQ (PN 25)

Return and flow mounting

Description

AVQ is a self-acting flow controller primarily for use in district heating systems. The controller closes when set max. flow is exceeded.

The controller has a control valve with adjustable flow restrictor and an actuator with one control diaphragm.

Features & benefits

- Automatically limits flow to prevent exceeding set maximum levels.
- Adjustable flow restrictor allows precise system flow control.
- Suitable for water and glycolic systems up to 150 °C.

Ordering

Product code numbers

AVQ Controller

Type	Diameter [mm]	Kvs values [m³/h]	Connection types	Connection size	Code number
AVQ	15	1.60	External Thread	G 3/4 A	003H6722
AVQ	15	2.50	External Thread	G 3/4 A	003H6723
AVQ	15	4.00	External Thread	G 3/4 A	003H6724
AVQ	20	6.30	External Thread	G 1 A	003H6725
AVQ	25	8.00	External Thread	G 1 1/4 A	003H6726
AVQ	32	12.50	External Thread	G 1 3/4 A	003H6727
AVQ	40	16.00	External Thread	G 2 A	003H6728
AVQ	50	20.00	External Thread	G 2 1/2 A	003H6729
AVQ	32	12.50	Flange		003H6730
AVQ	40	20.00	Flange		003H6731
AVQ	50	25.00	Flange		003H6732

Example:

Flow controller; DN 15; k_{vs} 1.6; PN 25; flow restrictor Δp 0.2 bar; T_{max} 150 °C; ext. thread

- 1× AVQ DN 15 controller

Code No: **003H6722**

Option:

- 1× Weld-on tailpieces

Code No: **003H6908**

The controller will be delivered completely assembled, inclusive impulse tube between valve and actuator.

Accessories code numbers



003H6905

**Thread tailpieces, PN 25,
DN 32, G 1 3/4; Rp 1 1/4,
External Thread**

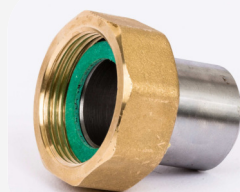
Tailpiece ext.th R1 1/4 PN25
DN32 (G13/4)



003H6911

**Weld-on tailpieces, PN 25,
DN 32, G 1 3/4**

Tailpiece weld-on PN25 DN32
(G13/4)



003H6908

**Weld-on tailpieces, PN 25,
DN 15, G 3/4**

Tailpiece weld-on PN25 DN15
(G3/4)



003H6915

**Flange tailpieces, PN 25,
DN 15, G 3/4**

Tailpiece flange PN25 DN15
(G3/4)



003H6902

**Thread tailpieces, PN 25,
DN 15, R 1/2; G 3/4,
External Thread**

Tailpiece ext.thr R1/2 PN25
(G3/4)



003H6917

**Flange tailpieces, PN 25,
DN 25, G 1 1/4**

Tailpiece flange PN25 DN25
(G11/4)



003H6910

**Weld-on tailpieces, PN 25,
DN 25, G 1 1/4**

Tailpiece weld-on PN25 DN25
(G11/4)



003H6904

**Thread tailpieces, PN 25,
DN 25, R 1; G 1 1/4,
External Thread**

Tailpiece ext.thr R1 PN25 DN25
(G11/4)



003H6903

**Thread tailpieces, PN 25,
DN 20, R 3/4; G 1, External
Thread**

Tailpiece ext.thr R3/4 PN25
DN20 (G1)



003H6916

**Flange tailpieces, PN 25,
DN 20, G 1**

Tailpiece flange PN25 DN20
(G1)



003H6909

**Weld-on tailpieces, PN 25,
DN 20, G 1**

Tailpiece weld-on PN25 DN20
(G1)



065B2004

**Thread tailpieces, PN 25,
DN 40, R 1 1/2, External
Thread**

TAILPIECE WITH EXT. THR. VM2
DN40



003H6912

Weld-on tailpieces, PN 25, DN 40, G 2

Tailpiece weld-on PN25 DN40 (G2)



003H6913

Weld-on tailpieces, PN 25, DN 50, G 2 1/2

Tailpiece weld-on PN25 DN50 (G2 1/2)



065B2005

Thread tailpieces, PN 25, DN 50, R 2, External Thread

TAILPIECE WITH EXT. THR. VM2 DN50

Spare parts code numbers

003H6868

Valve Inserts, For product type: AV(P)QM (T), PN 25, DN 32

Valve ins. PN25 DN32,40,50 VG-return VQM



003H6841

Actuators and adjustment parts, For product type: AVP-F, AVQ, AVQM, Mounting version: Return

Actuator PN25 AVP-F return, AVQ, AVQM



003H6865

Valve Inserts, For product type: AV(P)QM (T), PN 25, DN 15, 4 m³/h

Valve ins. PN25 15/4,0 20/4,0 VG-ret VQM



003H6867

Valve Inserts, For product type: AV(P)QM (T), PN 25, DN 25, 8 m³/h

Valve ins. PN25 25/8 32/10 VG-return VQM



003H6863

Valve Inserts, For product type: AV(P)QM (T), PN 25, DN 15, 1.6 m³/h

Valve insert PN25 15/1,6 VG-return VQM



003H6864

Valve Inserts, For product type: AV(P)QM (T), PN 25, DN 15, 2.5 m³/h

Valve insert PN25 15/2,5 VG-return VQM



003H6866

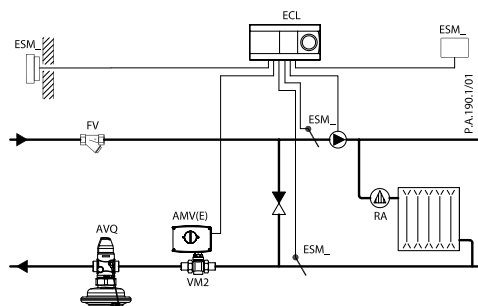
Valve Inserts, For product type: AV(P)QM (T), PN 25, DN 20, 6.3 m³/h

Valve ins. PN25 20/6,3 25/6,3 VG-ret VQM

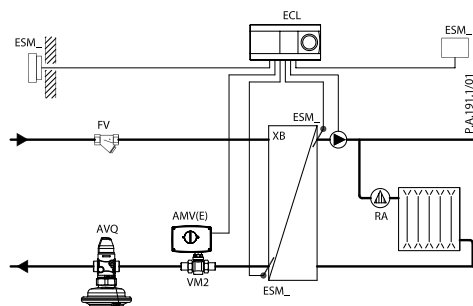
Overview

Application examples

Return mounting

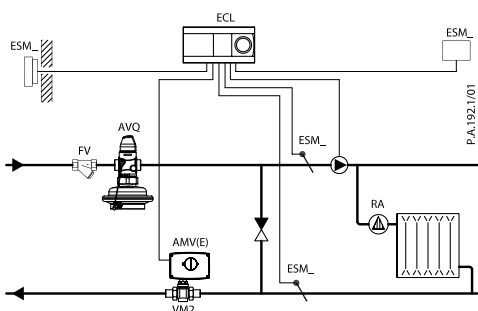


Direct-connected heating system

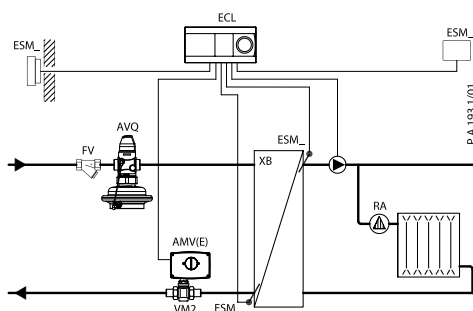


Indirectly connected heating system

Flow mounting



Direct-connected heating system



Indirectly connected heating system

Functions

Flow volume causes pressure drop across the adjustable flow restrictor. Resulting pressures 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 flow control. The flow restrictor diff. pressure is controlled and limited by means of built-in spring for flow control. Control valve closes on rising differential pressure and opens on falling differential pressure to control max flow.

Settings

Flow setting

Flow setting is being done by the adjustment of the flow restrictor position. The adjustment can be performed on the basis of flow adjustment diagram (see relevant instructions) and/or by the means of heat meter.

Product details

General data

Technical data

Valve

Parameter	Unit	Values							
Nominal diameter	DN	15	15	15	20	25	32	40	50
k_{VS} value	m ³ /h	1.6	2.5	4.0	6.3	8.0	12.5	16/20 ⁴⁾	20/25 ⁴⁾
Range of max. flow setting from at $\Delta p_b^{1)}$ = 0.2 bar	m ³ /h	0.03	0.07	0.07	0.16	0.2	0.4	0.8	0.8
Range of max. flow setting to at $\Delta p_b^{1)}$ = 0.2 bar	m ³ /h	0.86	1.4	2.2	3.0	3.5	8.0	10	12
Range of max. flow setting or to ³⁾ at $\Delta p_b^{1)}$ = 0.2 bar	m ³ /h	0.9	1.6	2.4	3.5	4.5	10	12	15
Cavitation factor z		≥ 0.6	≥ 0.6	≥ 0.6	≥ 0.6	≥ 0.55	≥ 0.55	≥ 0.5	≥ 0.5
Leakage acc. to standard IEC 534	% of k_{VS}	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.05	≤ 0.05	≤ 0.05
Nominal pressure	PN	25	25	25	25	25	25	25	25
Min. differential pressure	bar	see remark ²⁾							
Max. differential pressure		20	20	20	20	20	16	16	16
Medium		Circulation water / glycolic water up to 30%							
Medium pH		Min. 7, max. 10							
Medium temperature	°C	2 ... 150							
Connections, valve		External thread					External thread and flange		
Connections, tailpieces		Weld-on, external thread, and flange					Flange		

¹⁾ Δp_b - differential pressure over flow restrictor

²⁾ Depends on the flow rate and valve k_{VS} ;

For $Q_{set} = Q_{max}$ -> $\Delta p_{min} \geq 0.5$ bar; For $Q_{set} < Q_{max}$ -> $\Delta p_{min} = \left(\frac{Q}{k_{VS}}\right)^2 + \Delta p_b$

³⁾ Higher max flow are achieved at higher differential pressures over AVQ controller. In general at $\Delta p > 1-1.5$ bar

⁴⁾ Flange valve body



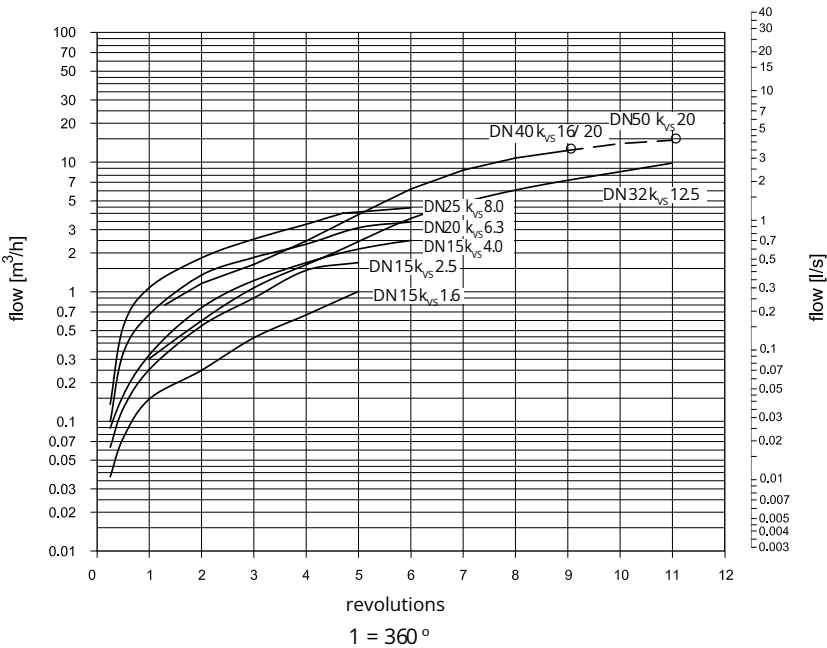
Actuator

Type	AVQ
Actuator size (cm ²)	54
Nominal pressure, PN	25
Flow restrictor diff. pressure (bar)	0.2

Flow diagram

Sizing and setting diagram

Relation between actual flow and number of revolutions on flow restrictor. Values given are approximate.



Flow can be adjusted by turning flow restrictor screw counter-clockwise as shown in this diagram. Water flow shown at differential pressure across flow restrictor 0.2 bar (20 kPa) and across the controller from 0.5 bar (50 kPa) to 16/20 bar (1600/2000 kPa).

Remark: Controllers DN 40 and DN 50 have the same curve up to 9 revolutions.

Note: For max flow setting on the controller diagrams from Instructions should be used.

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) and flow less than 600 l/h.

Given data:

$$Q_{\max} = 0.6 \text{ m}^3/\text{h} \text{ (600 l/h)}$$

$$\Delta p_{\min} = 0.9 \text{ bar (90 kPa)}$$

$$\Delta p_{\text{circuit}}^{1)} = 0.1 \text{ bar (10 kPa)}$$

$$\Delta p_{\text{MCV}} = 0.3 \text{ bar (30 kPa) selected}$$

$$\Delta p_b^{2)} = 0.2 \text{ bar (20 kPa)}$$

Remark:

¹⁾ $\Delta p_{\text{circuit}}$ corresponds to the required pump pressure in the heating circuit and is not to be considered when sizing the AVQ.

²⁾ Δp_b is differential pressure over flow restrictor.

The total (available) pressure loss across the controller is:

$$\Delta p_{\text{AVQ,A}} = \Delta p_{\min} - \Delta p_{\text{MCV}} = 0.9 - 0.3$$

$$\Delta p_{\text{AVQ,A}} = 0.6 \text{ bar (60 kPa)}$$

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

Select controller from flow diagram with the smallest possible k_{VS} value considering available flow ranges.

$$k_{VS} = 1.6 \text{ m}^3/\text{h}$$

The min. required differential pressure across the selected controller is calculated from the formula:

$$\Delta p_{\text{AVQ,MIN}} = \left(\frac{Q_{\max}}{k_{VS}} \right)^2 + \Delta p_b = \left(\frac{0.6}{1.6} \right)^2 + 0.2$$

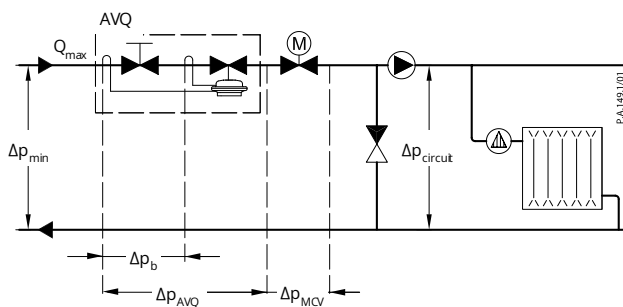
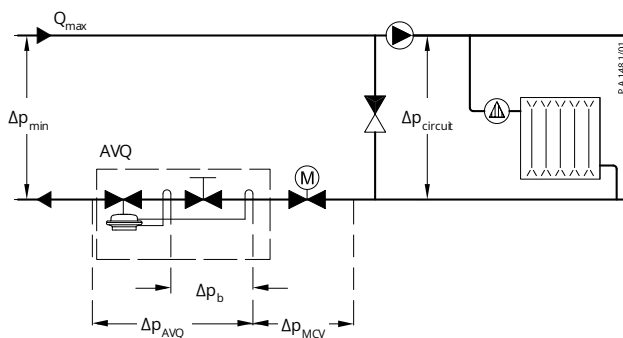
$$\Delta p_{\text{AVQ,MIN}} = 0.34 \text{ bar (34 kPa)}$$

$$\Delta p_{\text{AVQ,A}} > \Delta p_{\text{AVQ,MIN}}$$

$$0.6 \text{ bar} > 0.34 \text{ bar}$$

Solution:

The example selects AVQ DN 15; k_{VS} value 1.6; flow setting range 0.03-0.9 m³/h.



Indirectly connected heating system

Example 2:

Motorised control valve (MCV) for indirectly connected heating system requires differential pressure of 0.3 (30 kPa) bar and flow less than 1900 l/h.

Given data:

$$\begin{aligned} Q_{\max} &= 1.9 \text{ m}^3/\text{h} \text{ (1900 l/h)} \\ \Delta p_{\min} &= 1.1 \text{ bar (110 kPa)} \\ \Delta p_{\text{exchanger}} &= 0.1 \text{ bar (10 kPa)} \\ \Delta p_{\text{MCV}} &= 0.3 \text{ bar (30 kPa) selected} \\ \Delta p_b^{1)} &= 0.2 \text{ bar (20 kPa)} \end{aligned}$$

Remark:

¹⁾ Δp_b is differential pressure over flow restrictor

The total (available) pressure loss across the controller is:

$$\begin{aligned} \Delta p_{\text{AVQ,A}} &= \Delta p_{\min} - \Delta p_{\text{exchanger}} - \Delta p_{\text{MCV}} = 1.1 - 0.1 - 0.3 \\ \Delta p_{\text{AVQ,A}} &= 0.7 \text{ bar (70 kPa)} \end{aligned}$$

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

Select controller from flow diagram with the smallest possible k_{VS} value considering available flow ranges.

$$k_{VS} = 4.0 \text{ m}^3/\text{h}$$

The min. required differential pressure across the selected controller is calculated from the formula:

$$\Delta p_{\text{AVQ,MIN}} = \left(\frac{Q_{\max}}{k_{VS}} \right)^2 + \Delta p_b = \left(\frac{1.9}{4.0} \right)^2 + 0.2$$

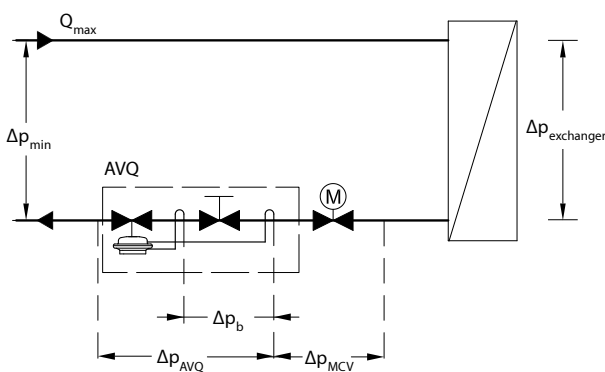
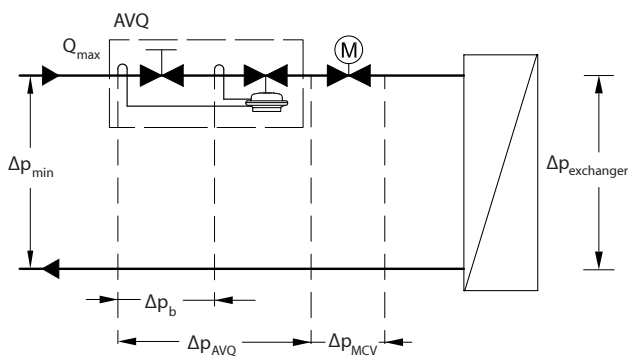
$$\Delta p_{\text{AVQ,MIN}} = 0.43 \text{ bar (43 kPa)}$$

$$\Delta p_{\text{AVQ,A}} > \Delta p_{\text{AVQ,MIN}}$$

$$0.7 \text{ bar} > 0.43 \text{ bar}$$

Solution:

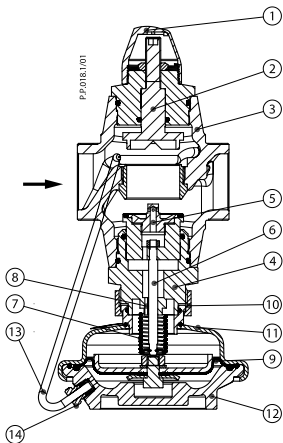
The example selects AVQ; DN 15; k_{VS} value 4.0; flow setting range 0.07-2.4 m³/h.





Design

- 1 Cover
- 2 Adjustable flow restrictor
- 3 Valve body
- 4 Valve insert
- 5 Pressure-relieved valve cone
- 6 Valve stem
- 7 Built-in spring for flow rate control
- 8 Control drain
- 9 Control diaphragm
- 10 Union nut
- 11 Upper casing of diaphragm
- 12 Lower casing of diaphragm
- 13 Impulse tube
- 14 Compression fitting for impulse tube



Materials

Valve

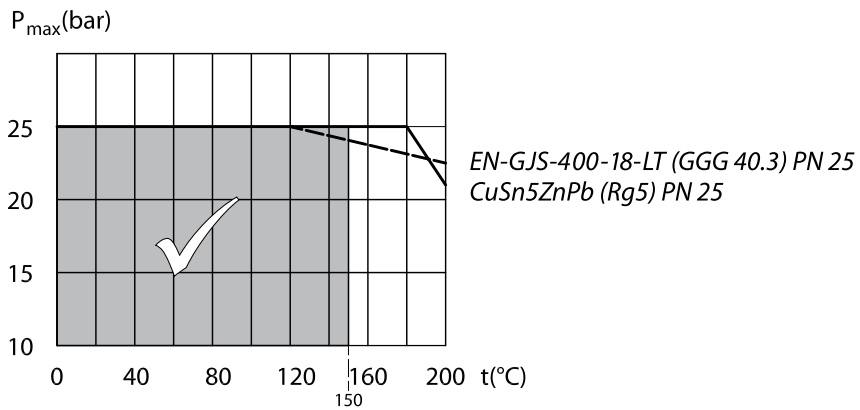
Nominal diameter, DN	15, 20, 25	32, 40, 50
Valve body, thread	Red bronze CuSn5ZnPb (Rg5)	Ductile iron EN-GJS-400-18-LT (GGG 40.3)
Valve body, flange	-	Ductile iron EN-GJS-400-18-LT (GGG 40.3)
Valve seat	Stainless steel, mat. No. 1.4571	Stainless steel, mat. No. 1.4571
Valve cone	Dezincing free brass CuZn36Pb2As	Dezincing free brass CuZn36Pb2As
Sealing	EPDM	EPDM
Pressure relieve system	Piston	Piston

Actuator

Actuator housing: Upper casing of diaphragm	Stainless steel, mat. No.1.4301
Actuator housing: Lower casing of diaphragm	Dezincing free brass CuZn36Pb2As
Diaphragm	EPDM
Impulse tube	Copper tube Ø 6 × 1 mm

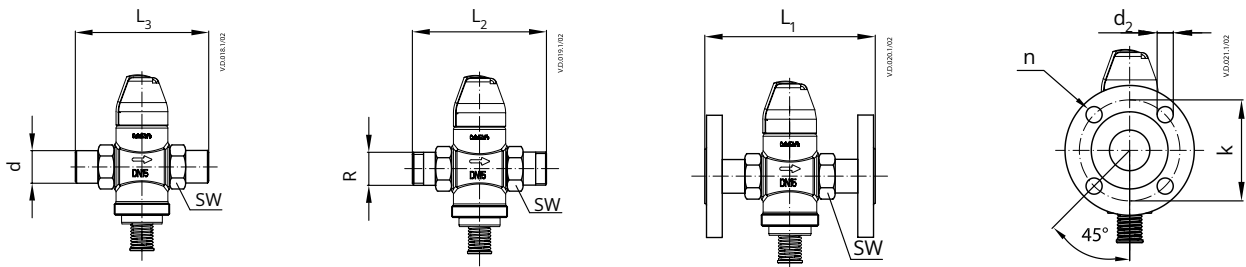
Performance and environmental conditions

Pressure temperature diagram



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

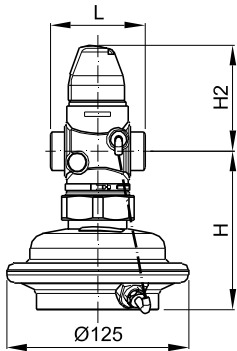
Dimensions



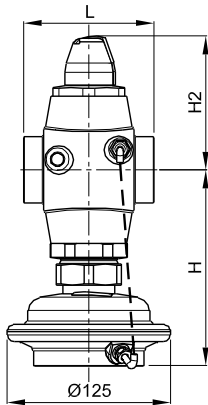
DN	R ¹⁾	SW (mm)	d (mm)	L ₁ ²⁾ (mm)	L ₂ (mm)	L ₃ (mm)	k (mm)	d ₂ (mm)	n
15	½	32 (G ¾A)	21	130	120	139	65	14	4
20	¾	41 (G 1A)	26	150	131	154	75	14	4
25	1	50 (G 1¼A)	33	160	145	159	85	14	4
32	1¼	63 (G 1¾A)	42	-	177	184	100	18	4
40	1 ½	70 (G 2A)	47	-	200	204	110	18	4
50	2	82 (G 2½A)	60	-	244	234	125	18	4

¹⁾ Conical ext. thread acc. to EN 10226-1

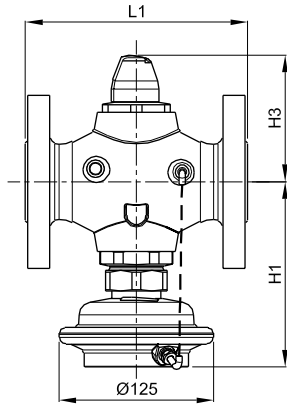
²⁾ Flanges PN 25, acc. to EN 1092-2



DN 15-25



DN 32-50



DN 32-50

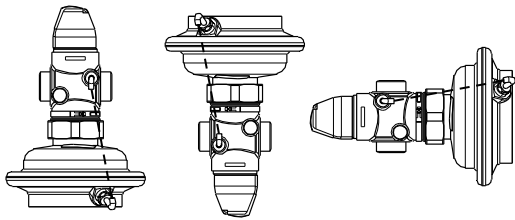
DN	15	20	25	32	40	50
L (mm)	65	70	75	100	110	130
L1 (mm)	-	-	-	180	200	230
H (mm)	109	109	109	150	150	150
H1 (mm)	-	-	-	150	150	150
H2 (mm)	73	73	76	103	103	103
H3 (mm)	-	-	-	103	103	103
Weight, thread (kg)	2.7	2.7	2.9	5.3	5.5	6.1
Weight, flange (kg)	-	-	-	9.8	11.4	13.5

Note: other flange dimensions-see table for tailpieces.

Installation

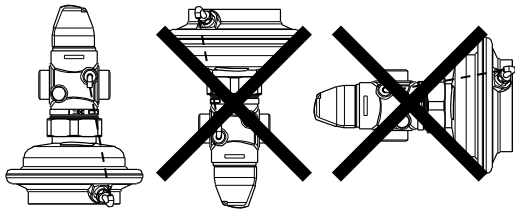
Installation positions

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.



Electrical actuator

Note! Installation positions for electrical actuators AMV(E) have to be observed as well. Please see relevant Data Sheet.



Certificates, declarations and approvals

The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
EAC Declaration	EAC KZ 7100841.13.12.02339	EAC - Eurasian Customs Union	MD
UA Declaration	Danfoss UA 10.01.23 Heat Control Valves	Danfoss	
Export Control Declaration	Actuators pressure flow and temperature	Danfoss	
EU Declaration	PL08_230530EN0858104_EU declaration of conformity_rev7_Self-acting Controllers.docx.pdf	Danfoss	Pressure

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