ENGINEERING
TOMORROW

Data sheet

Flow controller with integrated control valve, AVQML

Description

AVQML is a self-acting flow controller with integrated control valve primarily for use in district heating systems or in secondary district heating systems as well. The controller closes when set max. flow is exceeded.

In combination with Danfoss electrical actuators AMV(E) can be controlled by ECL electronic controllers.
AVQML has a control valve with adjustable flow restrictor, connection neck for electrical actuator, and an actuator with one control diaphragm.

Controllers are used together with Danfoss electrical actuators or with self-acting thermostat:
- AMV 150
- AMV(E) 10
- AMV(E) 13 with spring return function
- QTL thermostat

Main data:
- DN 15-20
- Nominal Flow range: 0.8-1.9 m³/h
- PN 25
- Temperature:
  - Circulation water / glycolic water up to 30%: 2 … 110 °C
- Connections:
  - Ext. thread

Ordering

Example:
Flow controller with integrated control valve AVQML, DN 15, PN 25, Q_{nom} 0.8 m³/h, T_{max} 110 °C, ext. thread

- *1× AVQML DN 15 controller*
  Code No.: ***003L3615***

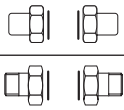
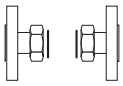
Option:
- *1× Weld-on tailpieces*
  Code No.: ***003Z0226***

Electrical actuator AMV(E) and thermostat QTL must be ordered separately.

AVQML Controller

Picture	DN (mm)	Connection		Code No,
	15	Cylindr, ext, thread acc, to ISO 228/1	G ¾ A	**003L3615**
	15 HF			**003L3616**
	20		G 1 A	**003L3617**
	20 HF			**003L3618**

Accessories

Picture	Type designation	DN	Connection		Code No.
	Weld-on tailpieces	15	-		**003Z0226**
		20	-		**003Z0227**
	External thread tailpieces	15	Conical ext. thread acc. to EN 10226-1	R ½	**003Z0232**
		20		R ¾	**003Z0233**
	Flange tailpieces	15	Flange PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**

Technical data

Valve (thread version)

Nominal diameter		**DN**	**15**	**15 HF**	**20**	**20 HF**
k_{vs} value [1]		m^3/h	2.7	4.1	4.7	8.5
Flow range	Q_{nom}	m^3/h	0.8	1.3	1.25	1.9
Available Δp required for Q_{nom} [2]		bar	0.27	0.28	0.25	0.23
Δp CV		bar	0.18			
Stroke		mm	4 for all DN's			
Control valve authority			1 (100 %) in the range of flow setting			
Rangeability for all DN's			>100:1			
Control characteristic			Linear			
Leakage acc. to standard IEC 534			IEC 60534-4:2007 class IV (0.01%) [3]			
Nominal pressure		PN	25			
Min. differential pressure		bar	see remark [2]			
Max. differential pressure		bar	8			
Medium			Circulation water / glycolic water up to 30%			
Medium pH			Min, 7, max, 10			
Medium temperature		°C	2 … 110			
Connections			External thread			
Materials						
Valve body	Valve bodies		DZR Brass			
Materials in the medium	Membranes and O-rings		EPDM			
	Shutter guide		PPSU			
	Shutter		DZR Brass			
	Springs		W.Nr.1.4310			
	Spring support		PPSU			
	Cone (Cv)		PPSU			
	Seat (Cv)		DZR Brass			
Materials out of medium	Plastic parts		ABS			

[1] *The k_{vs} values are intended to be used only in the formula number [2]).*

[2] *For flows smaller than Q_{nom} ->* $\Delta p_{min} = \left(\frac{Q}{k_{vs}}\right)^2 + \Delta p_{CV}$

[3] *the mentioned leakage accuracy is valid in combination with actuators AMV 150, AMV(E) 10 and AMV(E) 13.*

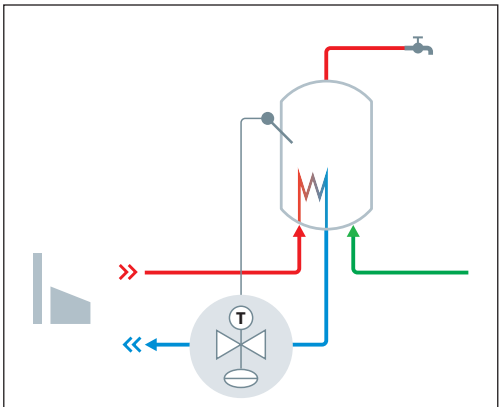
Note:
dp - differential pressure controller
Cv - Control valve part

Application principles

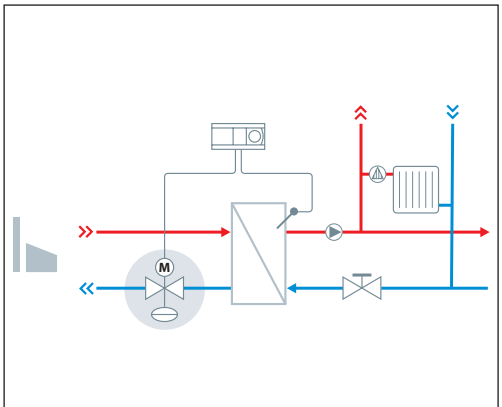
Direct connected heating systems – with mixing loop

- DHW with storage tank
- Indirect connected heating systems

Examples of application drawings:



DHW with storage tank



Indirect connected heating systems

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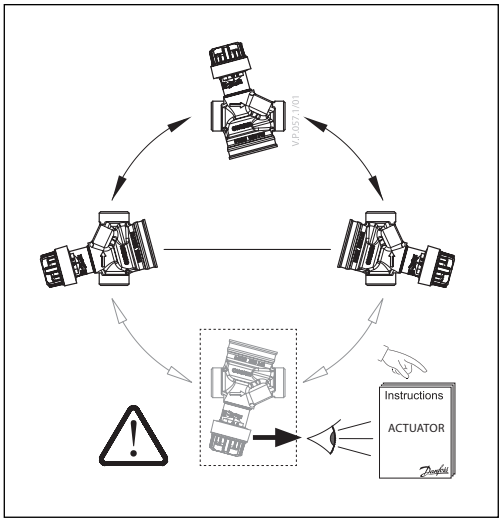
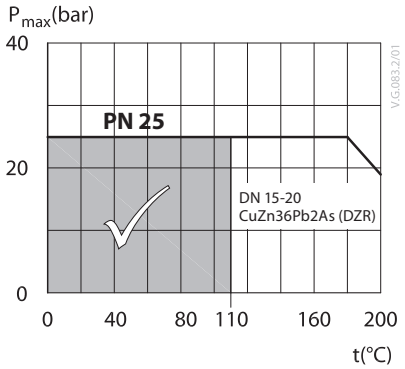
Installation positions

The controllers can be installed in all positions. In case of mounted with an actuator please refer to the actuator's instructions.

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



Pressure temperature diagram



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

Flow table 1, 2

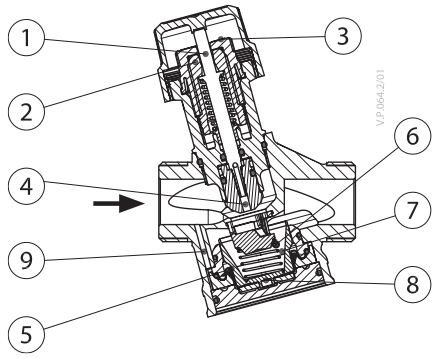
Setting	DN 15			DN 15 HF			DN 20			DN 20 HF		
	L/h	L/s	GPM	L/h	L/s	GPM	L/h	L/s	GPM	L/h	L/s	GPM
10%	80	0.022	0.35	130	0.036	0.57	125	0.035	0.55	190	0.053	0.84
15%	120	0.033	0.53	195	0.054	0.86	188	0.052	0.83	285	0.079	1.25
20%	160	0.044	0.70	260	0.072	1.14	250	0.069	1.10	380	0.106	1.67
25%	200	0.056	0.88	325	0.090	1.43	313	0.087	1.38	475	0.132	2.09
30%	240	0.067	1.06	390	0.108	1.72	375	0.104	1.65	570	0.158	2.51
35%	280	0.078	1.23	455	0.126	2.00	438	0.122	1.93	665	0.185	2.93
40%	320	0.089	1.41	520	0.144	2.29	500	0.139	2.20	760	0.211	3.35
45%	360	0.100	1.59	585	0.163	2.58	563	0.156	2.48	855	0.238	3.76
50%	400	0.111	1.76	650	0.181	2.86	625	0.174	2.75	950	0.264	4.18
55%	440	0.122	1.94	715	0.199	3.15	688	0.191	3.03	1045	0.290	4.60
60%	480	0.133	2.11	780	0.217	3.43	750	0.208	3.30	1140	0.317	5.02
65%	520	0.144	2.29	845	0.235	3.72	813	0.226	3.58	1235	0.343	5.44
70%	560	0.156	2.47	910	0.253	4.01	875	0.243	3.85	1330	0.369	5.86
75%	600	0.167	2.64	975	0.271	4.29	938	0.261	4.13	1425	0.396	6.27
80%	640	0.178	2.82	1040	0.289	4.58	1000	0.278	4.40	1520	0.422	6.69
85%	680	0.189	2.99	1105	0.307	4.87	1063	0.295	4.68	1615	0.449	7.11
90%	720	0.200	3.17	1170	0.325	5.15	1125	0.313	4.95	1710	0.475	7.53
95%	760	0.211	3.35	1235	0.343	5.44	1188	0.330	5.23	1805	0.501	7.95
100%	800	0.222	3.52	1300	0.361	5.72	1250	0.347	5.50	1900	0.528	8.37

1: the values are indicative. For accurate commissioning readouts from the flow meter should be utilized.

2: For accurate commissioning, it is recommended to perform it after the system is completely de-aired.

Design

1. Spindle
2. Stuffing box
3. Pointer
4. Control valve's cone
5. Membrane
6. Differential pressure controller spring
7. Shutter
8. Membrane plate
9. Internal impulse tube



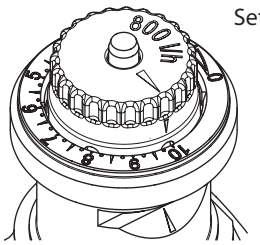
Function:
The AVQML valve consists of two parts:
1. Differential pressure controller
2. Control valve

1. Differential pressure controller DPC
The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference Δp_{Cv} (p1-p2) on the membrane is balanced with the force of the spring. Whenever the differential pressure across the control valve changes (due to a change in available pressure, or movement of the control valve) the differential pressure controller is displaced to a new position which brings a new equilibrium and therefore keeps the differential pressure at a constant level.

2. Control valve CV
The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the K_v value. The percentage marked on the scale equals the percentage of 100 % flow marked on the pointer. Setting is done by turning the setting knob to the desired position.

Presetting

The calculated flow can be adjusted easily without using special tools.
The change of presetting (factory setting is 100% (10) follow steps below:
1. Remove the blue protective cap or the mounted actuator
2. Turn the pointer (clockwise to decrease) to the new setting
3. Clockwise turning would decrease the flow value while counter clock wise would increase it.



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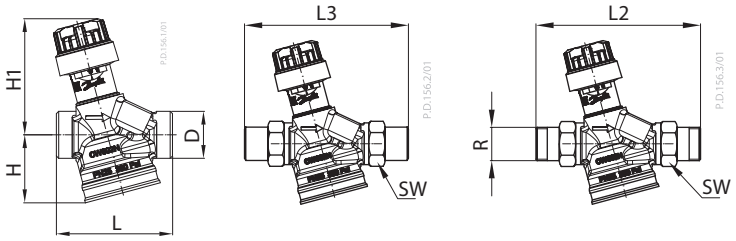
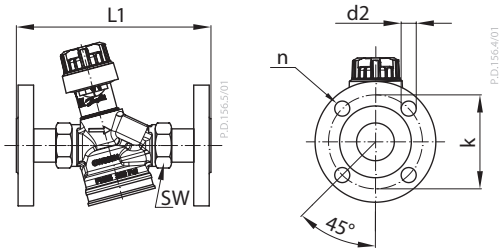
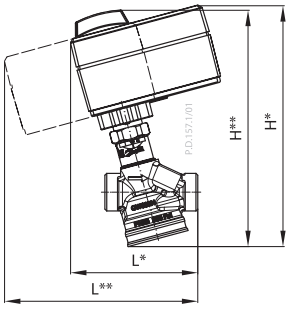
Dimensions



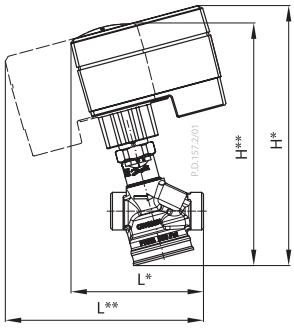


DN		15	20
SW	mm	30 (G ¾A)	37 (G 1A)
d		21	26
R [1]		½	¾
L		65	82
L1 [2]		130	160
L2		114	141
L3		130	160
H		38	44
H1		66	67
D (ISO 228/1)		G ¾ A	G 1 A
k		65	75
d_2		14	14
n		4	4
Valve weight	kg	0.49	0.66

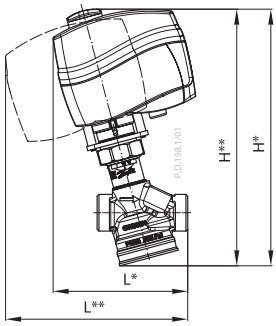
[1] *EN 10226-1*
[2] *EN 1092-2*



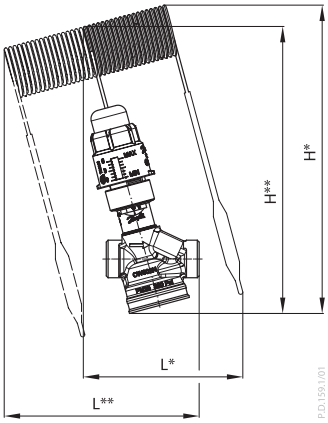
AMV(E) 10 + AVQML



AMV(E) 13 + AVQML



AMV 150 + AVQML



QTL + AVQML

DN			15	20
L*	AMV(E) 10	mm	101	111
	AMV(E) 13		105	115
	AMV 150		96	107
	QTL		110	110
L**	AMV(E) 10		159	169
	AMV(E) 13		162	173
	AMV 150		130	140
	QTL		136	147
H*	AMV(E) 10		195	202
	AMV(E) 13		209	216
	AMV 150		182	189
	QTL		216	223
H**	AMV(E) 10		191	197
	AMV(E) 13		194	201
	AMV 150		182	189
	QTL		201	208

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