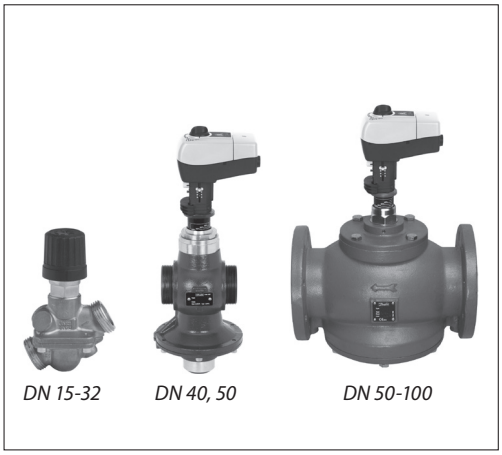
Data sheet

Flow controller with integrated control valve (PN 16)

AHQM - return and flow mounting

Description



AHQM 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.

The controllers have 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:

- DN 15-32 with
  - AMV(E) 10
  - AMV(E) 13 with spring return function
  - AMV(E) 130, AMV(E) 140
  - AMV(E) 130H, AMV(E) 140H with manual operation
- DN 40-100 with
  - AMV(E) 435
  - AMV(E) 438 SD spring return function (spring down)

AHQM, DN 15-32 combined with AMV(E) 13 has been approved according to DIN EN 14597.

Main data:

- DN 15-100
- k_{VS} 1,0-90 m^3/h
- Flow range 0,035-38 m^3/h
- PN 16
- Flow restrictor Δp_b:
  - 0,12 bar for DN 15-20
  - 0,14 bar for DN 25-32
  - 0,2 bar for DN 40, 50
  - 0,3 bar for DN 65-100
- Temperature:
  - Circulation water / glycolic water up to 30%: 2 … 120 °C
- Connections:
  - Ext. thread (weld-on, thread and flange tailpieces)
  - Flange

Ordering

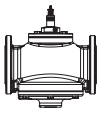
Example AHQM controller:
Flow controller with integrated control valve, DN 15, kVS 1,6; PN 16; flow restrictor Δp 0,12 bar; T_{max} 120 °C; ext. thread

- *1× AHQM DN 15 controller*
  Code No.: ***003L3594***

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

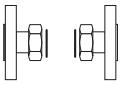
Electrical actuator AMV(E) must be ordered separately.

AHQM Controller

Picture	DN (mm)	k_{VS} (m^3/h)	Connection		Code No,
	15	1,0	Cylindr, ext, thread acc, to ISO 228/1	G ¾ A	**003L3592**
		1,25			**003L3593**
		1,6			**003L3594**
	20	2,5		G 1 A	**003L3595**
	25	4,0		G 1¼ A	**003L3596**
	32	6,3		G 1¾ A	**003L3597**
	40	12,5		G 2 A	**003L3601**
	50	20		G 2½ A	**003L3602**
	50	20	Flange EN 1092-2		**003L3603**
	65	50			**003L3604**
	80	63			**003L3605**
	100	90			**003L3606**

Ordering *(continuous)*

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	**065F6061**
		50		R 2	**065F6062**
	Flange tailpieces	15	Flanges PN 25, acc. to EN 1092-2		**003H6915**
		20			**003H6916**
		25			**003H6917**

Technical data

Valve (thread version)

Nominal diameter		DN	15			20	25	32	40	50
k_{VS} value		m³/h	1,0	1,25	1,6	2,5	4,0	6,3	12,5	20
Flow range	Q_{min}		0,035	0,11	0,2	0,25	0,43	0,65	1,5	2,5
	Q_{nom} [1]		0,43	0,7	1,0	1,2	2,2	3,4	7,5	12,5
Stroke		mm	5,5			5			10	
Control ratio			> 1:30		> 1:50		> 1:100		> 1:200	
Control characteristic			Linear							
Leakage acc. to standard IEC 534			≤ 0,05 % of k_{VS}							
Nominal pressure		PN	16							
Min. differential pressure		bar	see remark [2]							
Max. differential pressure			4							
Medium			Circulation water / glycolic water up to 30%							
Medium pH			Min, 7, max, 10							
Medium temperature		°C	2 … 120							
Connections			External thread							
Materials										
Valve body			DZR CW602N (CuZn36Pb2As)						Grey cast iron EN-GJL-250 (GG25)	
Valve seat DP, CV									St. steel, mat.No.1.4404	
Valve cone DP									St. steel, mat.No.1.4404	
Valve cone CV									DZR CW602N (CuZn36Pb2As)	
Sealing DP			EPDM						EPDM	
Sealing CV									Metal	

[1] *At differential pressure across the controller $\Delta p_{AHQM} \geq 0,5$ bar*

[2] *Depends on the flow rate and valve k_{VS} ;* $\Delta p_{min} = \left(\frac{Q_{nom}}{k_{vs}}\right)^2 + \Delta p_b$ [3]

[3] *Depends on DN*

Note:
DP - diff. pressure controller, CV - control valve

Actuator

For valve	DN	15	20	25	32	40	50
Actuator size	cm²	8,5	13	20	32	64	
Nominal pressure	PN	16					
Flow restrictor diff. pressure Δp_b	bar	0,12		0,14		0,2	
Materials							
Housing*		DZR CW602N (CuZn36Pb2As)				Grey cast iron EN-GJL-250 (GG25)	
Diaphragm		EPDM					
Impulse tube		-					

* *Actuator housing is part of valve body.*

Technical data *(continuous)*

AHQM (flange version)

Nominal diameter		DN	50	65	80	100
k_{VS} value		m³/h	20	50	63	90
Flow range	Q_{min}		2,5	4,0	5,6	7,6
	Q_{nom} 1)		12,5	20	28	38
Stroke		mm	10	15		
Control ratio			> 1:200	> 1:30		
Control characteristic			Linear			
Leakage acc. to standard IEC 534			≤ 0,05 % of k_{VS}			
Nominal pressure		PN	16			
Min. differential pressure		bar	see remark 2)			
Max. differential pressure			4			
Medium			Circulation water / glycolic water up to 30 %			
Medium pH			Min. 7, max. 10			
Medium temperature		°C	2 ... 120			
Connections			Flange			
Materials						
Valve body			Grey cast iron EN-GJL-250 (GG25)			
Valve seat DP, CV			St. steel, mat. No.1.4404	St. steel, mat.No.1.4305		
Valve cone DP						
Valve cone CV			DZR CW602N (CuZn36Pb2As)			
Sealing DP			EPDM			
Sealing CV			Metal			

1) *At differential pressure across the controller $\Delta p_{AHQM} \geq 0,5$ bar*
2) *Depends on the flow rate and valve k_{VS} ;* $\Delta p_{min} = \left(\frac{Q_{nom}}{k_{vs}}\right)^2 + \Delta p_b$
3) *Depends on DN*

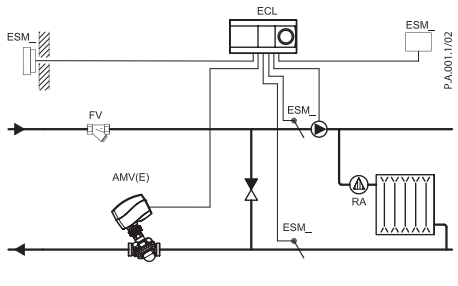
Note:
DP - diff. pressure controller, CV - control valve

Actuator

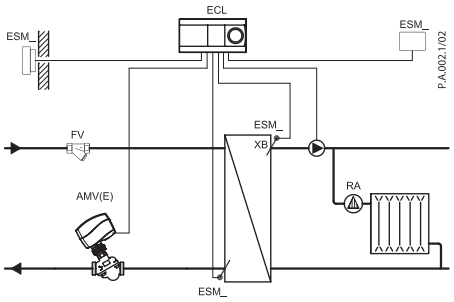
For valve	DN	50	65	80	100
Actuator size	cm²	64	143	169	227
Nominal pressure	PN	16			
Flow restrictor diff. pressure Δp_b	bar	0,2	0,3		
Materials					
Housing		Grey cast iron EN-GJL-250 (GG25)			
Diaphragm		EPDM			
Impulse tube		-			

Application principles

- Return mounting

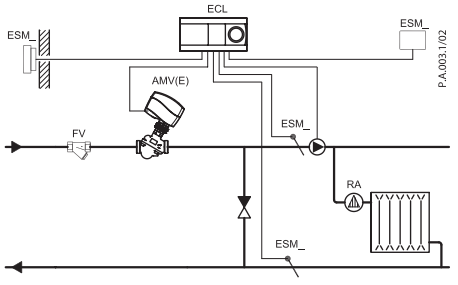


Direct-connected heating system

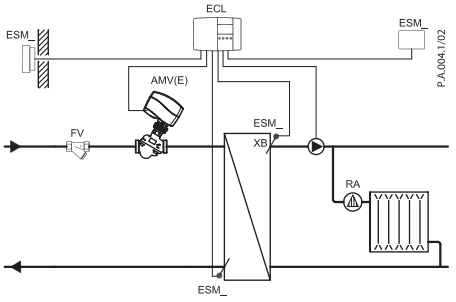


Indirectly connected heating system

- Flow mounting



Direct-connected heating system



Indirectly connected heating system

Installation positions

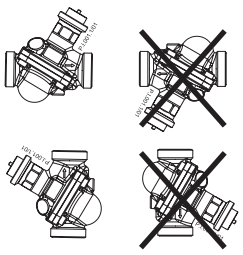
DN 15-32
The controllers can be installed in horizontal or vertical pipes with (connection neck for) electrical actuator oriented upwards.

DN 40-80
The controllers can be installed with (connection neck for) electrical actuator oriented horizontal or upwards.

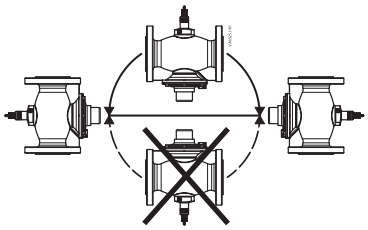
DN 100
The controllers can be installed with (connection neck for) electrical actuator oriented upwards.

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

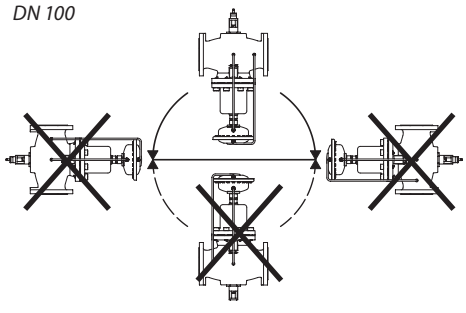
DN 15-32



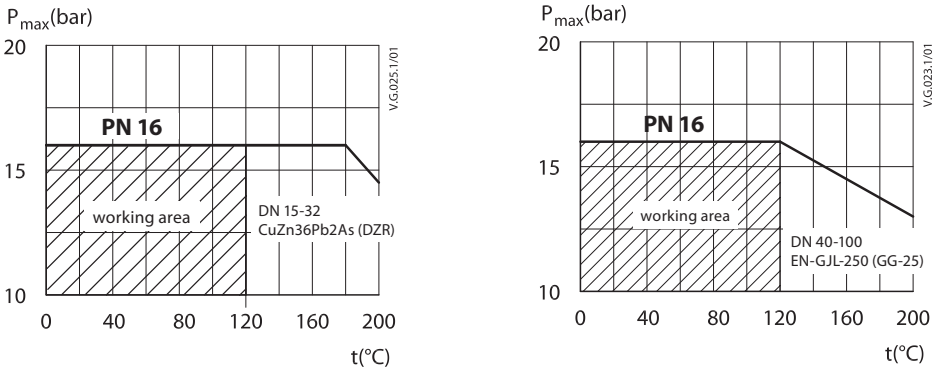
DN 40-80



DN 100



Pressure temperature diagram

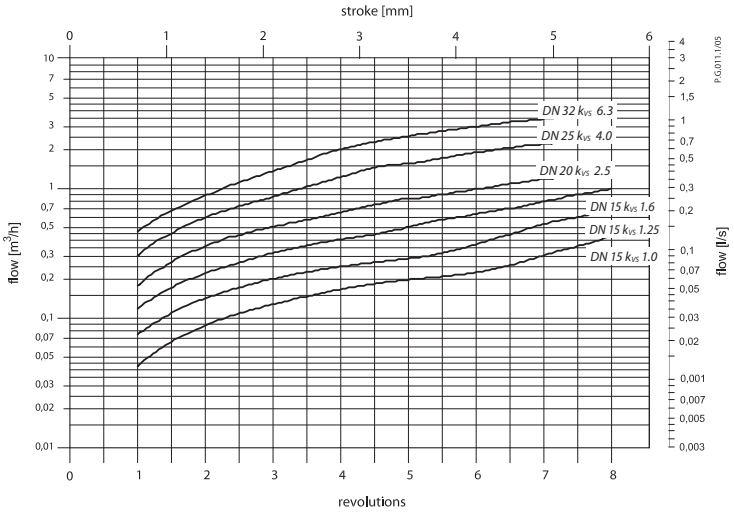


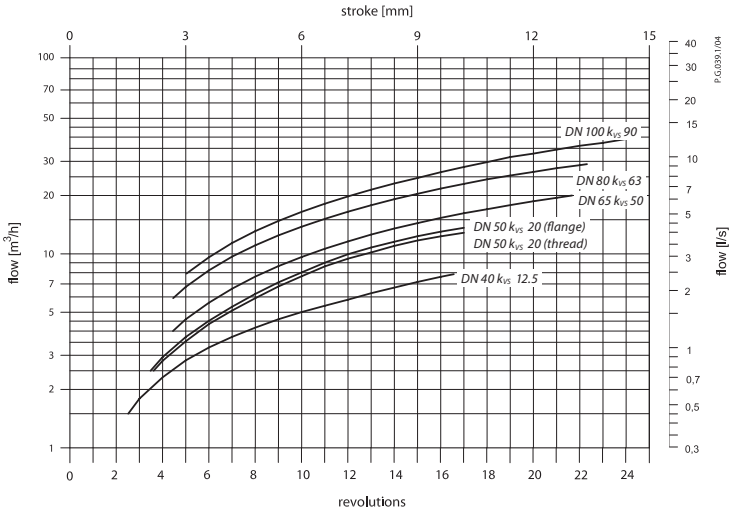
Maximum allowed operating pressure as a function of medium temperature (according to EN 1092-2 and EN 1092-3).

Flow diagram

Sizing and setting diagram

Relation between actual flow and number of revolutions on flow restictor. 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 the controller from 0,5 bar (50 kPa) to 4 bar (400 kPa).

Sizing

- *Directly connected heating system*

Example 1
Motorised control valve (MCV) for mixing circuit in direct-connected heating systems requires differential pressure of 0,12 bar (12 kPa) and flow less than 600 l/h.

Given data:
Q_{max} = 0,6 m³/h (600 l/h)
Δp_{min} = 0,8 bar (80 kPa)
*$\Delta p_{circuit}$ = 0,1 bar (10 kPa)
Δp_{MCV} = 0,12 bar (12 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 AHQM.

The total (available) pressure loss across the controller is:
$\Delta p_{AHQM,A} = \Delta p_{min}$
$\Delta p_{AHQM,A}$ = 0,8 bar (80 kPa)

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

Select controller from flow diagram, page 5, with the smallest possible k_{VS} value considering available flow ranges.

k_{VS} = 1,6 m³/h

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

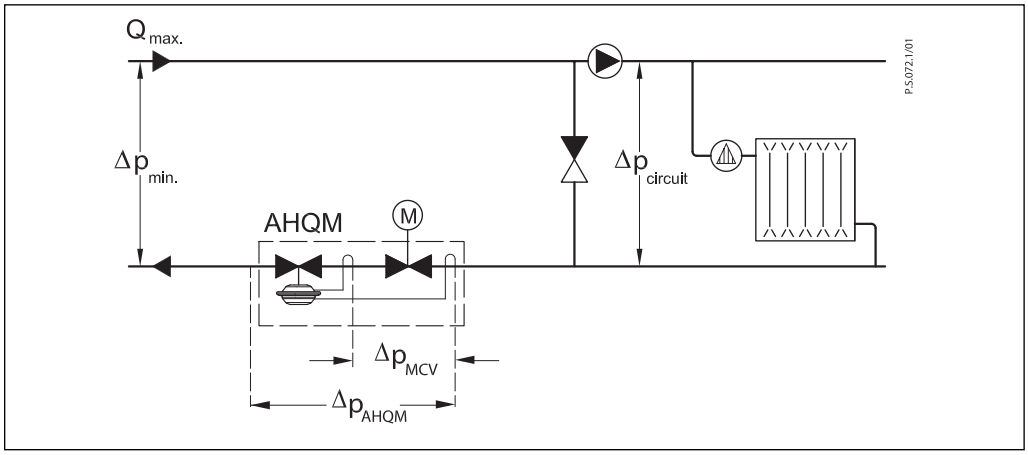
$$\Delta p_{AHQM,MIN} = \left(\frac{Q_{max.}}{k_{vs}}\right)^2 + \Delta p_{MCV} = \left(\frac{0,6}{1,6}\right)^2 + 0,12$$

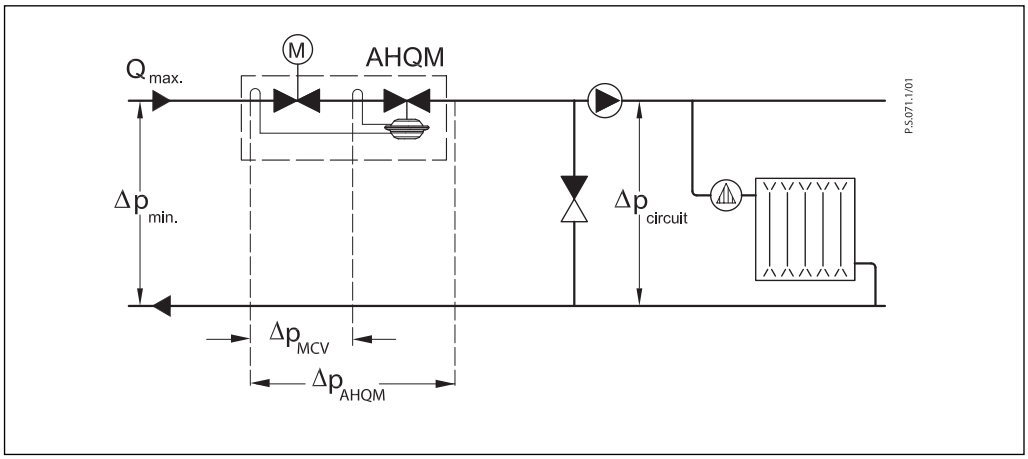
$\Delta p_{AHQM,MIN}$ = 0,26 bar (26 kPa)

$\Delta p_{AHQM,A} > \Delta p_{AHQM,MIN}$

0,8 bar > 0,26 bar

Solution:
The example selects AHQM DN 15; k_{VS} value 1,6; flow setting range 0,06-0,79 m³/h.





Sizing *(continuous)*

- *Indirectly connected heating system*

Example 2
Motorised control valve (MCV) for indirectly connected heating system control requires differential pressure of 0,14 (14 kPa) bar and flow less than 1500 l/h.

Given data:
Q_{max} = 1,5 m³/h (1500 l/h)
Δp_{min} = 0,8 bar (80 kPa)
$\Delta p_{exchanger}$ = 0,1 bar (10 kPa)
Δp_{MCV} = 0,14 bar (14 kPa) selected

The total (available) pressure loss across the controller is:
$\Delta p_{AHQM,A} = \Delta p_{min} - \Delta p_{exchanger} = 0,8 - 0,1$

$\Delta p_{AHQM,A}$ = 0,7 bar (70 kPa)

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

Select controller from flow diagram, page 5, with the smallest possible k_{VS} value considering available flow ranges.

k_{VS} = 4,0 m³/h

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

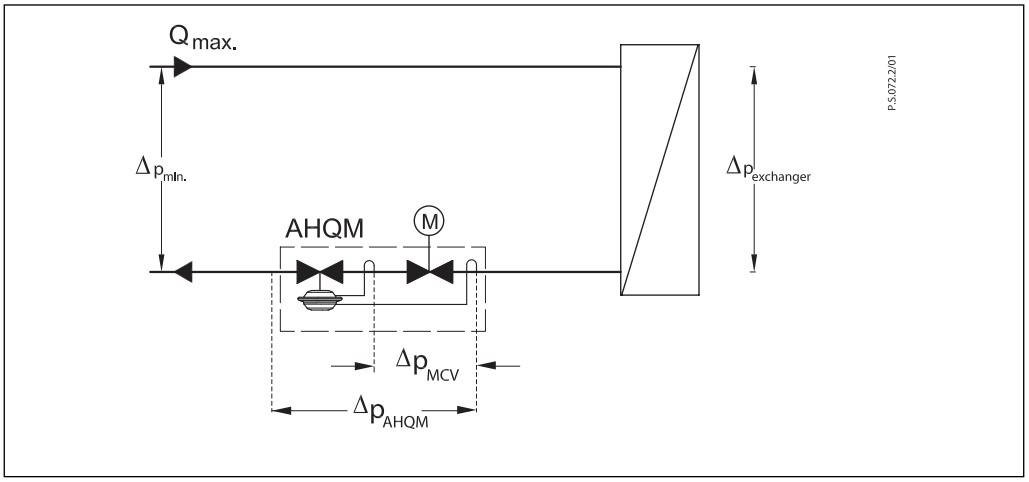
$$\Delta p_{AHQM,MIN} = \left(\frac{Q_{max.}}{k_{vs}}\right)^2 + \Delta p_{MCV} = \left(\frac{1,5}{4,0}\right)^2 + 0,14$$

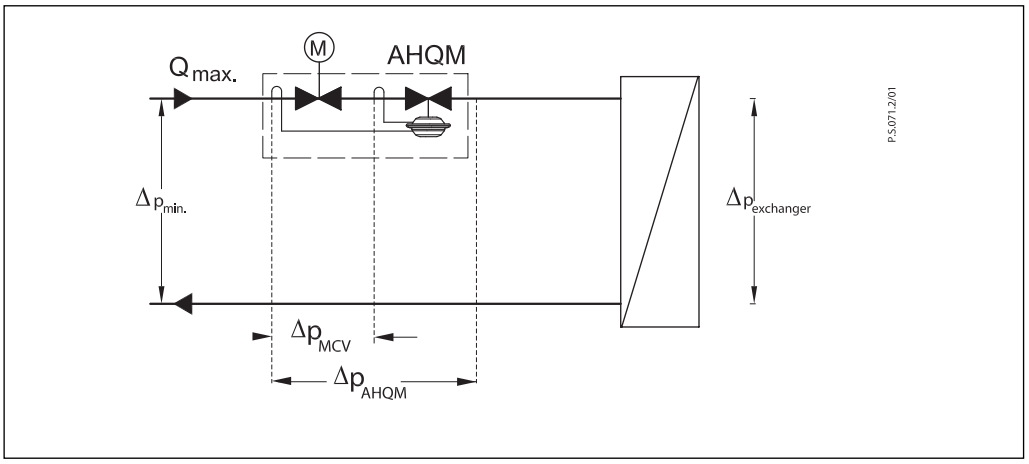
$\Delta p_{AHQM,MIN}$ = 0,28 bar (28 kPa)

$\Delta p_{AHQM,A} > \Delta p_{AHQM,MIN}$

0,7 bar > 0,28 bar

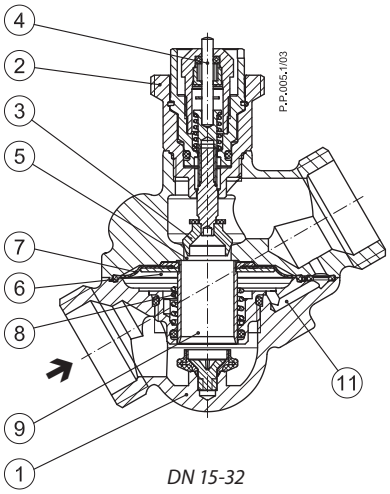
Solution:
The example selects AHQM DN 25, k_{VS} value 4.0, flow setting range 0,13-2,13 m³/h.



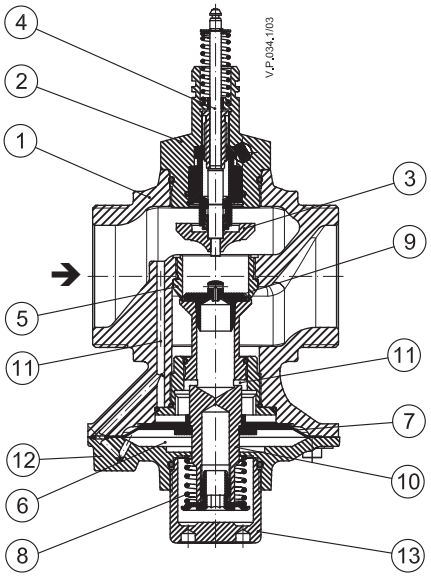


Design

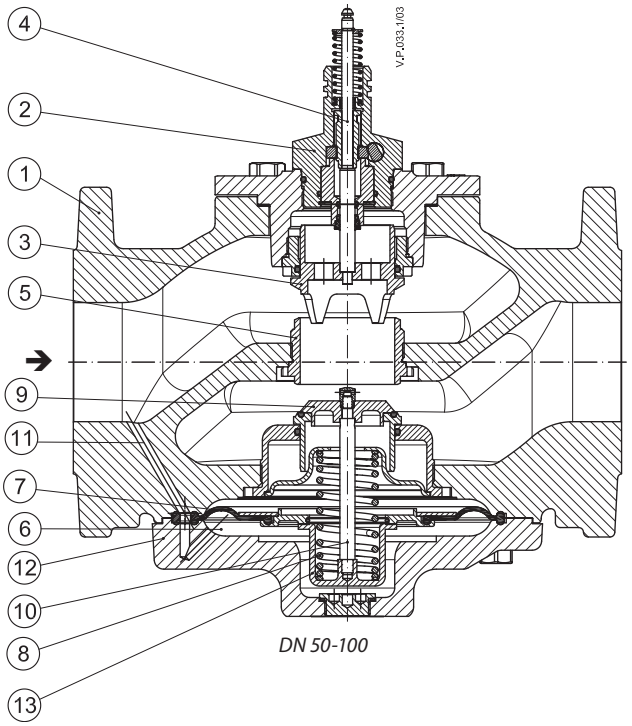
1. Valve body
2. Control valve insert
3. Adjustable flow restrictor
4. Control valve stem
5. Valve seat
6. Differential pressure actuator
7. Control diaphragm
8. Built-in spring for flow rate control
9. Pressure relieved valve cone
10. Valve stem
11. Control drain
12. Control diaphragm cover
13. Spring cover



DN 15-32



DN 40, 50



DN 50-100

Function

Flow controller with integrated control valve
Flow volume causes the pressure drop across the adjustable flow restrictor. Resulting pressures are being transferred through external impulse tubes or control drains within valve body to the actuator chambers and act on control diaphragm. The flow restrictor diff. pressure is controlled and limited by means of built-in spring for flow rate control.

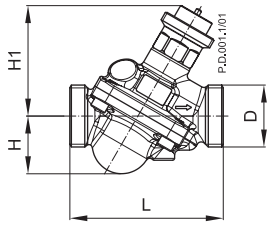
Additionally the electrical actuator will operate from zero to set max. flow according to the load.

Settings

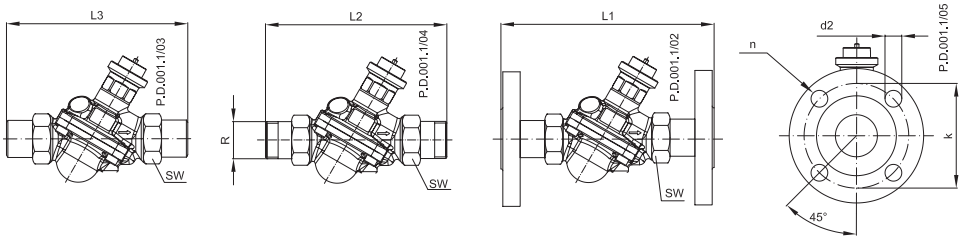
Flow setting
Flow setting is being done by the adjustment of the flow restrictor position. The adjustment can be performed on the basis of flow adjustment diagram (see relevant instructions) and/or by the means of heat meter.

Dimensions

DN 15-32



DN		15	20	25	32
L	mm	65	82	104	130
H		24	31	39	49
H1		57	59	72	84
D (ISO 228/1)		G ¾A	G 1A	G 1¼A	G 1¾A
Valve weight	kg	0,51	0,67	1,47	2,23



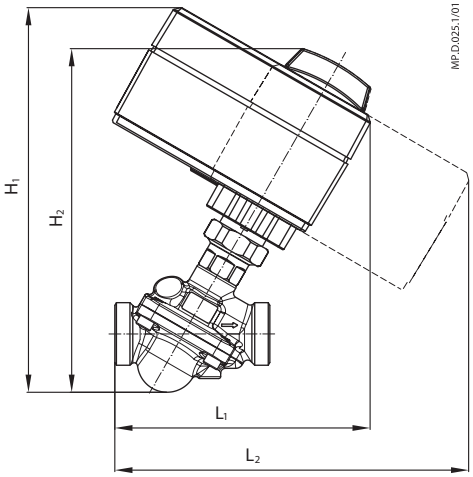
DN		15	20	25	32
SW	mm	32 (G ¾A)	41 (G 1A)	50 (G 1¼A)	63 (G 1¾A)
d		21	26	33	42
R [1]		½	¾	1	1 ¼
L1 [2]		130	150	160	-
L2		131	144	160	177
L3		139	154	159	184
k		65	75	85	-
d_2		14	14	14	-
n		4	4	4	-

[1] *Conical ext. thread acc. to EN 10226-1*

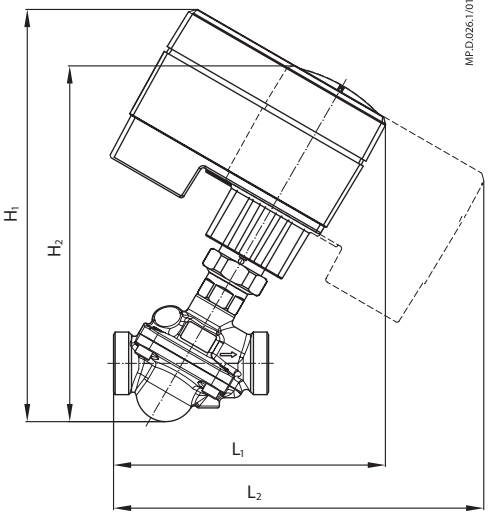
[2] *Flanges PN 25, acc. to EN 1092-2*

Dimensions *(continuous)*

DN 15-32

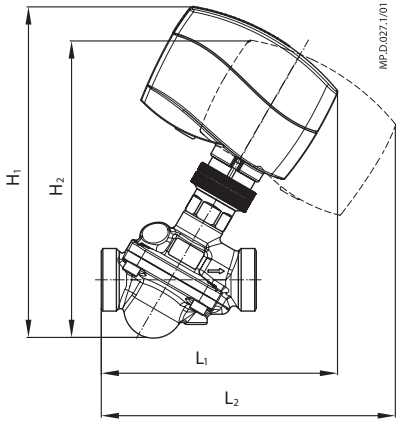


AMV(E) 10 + AHQM



AMV(E) 13 + AHQM

DN			15	20	25	32
L_1	AMV(E) 10	mm	137	137	153	172
	AMV(E) 13		147	147	164	183
L_2	AMV(E) 10		178	186	204	224
	AMV(E) 13		188	196	214	234
H_1	AMV(E) 10		195	201	223	245
	AMV(E) 13		210	216	238	260
H_2	AMV(E) 10		174	184	202	222
	AMV(E) 13		180	190	208	228

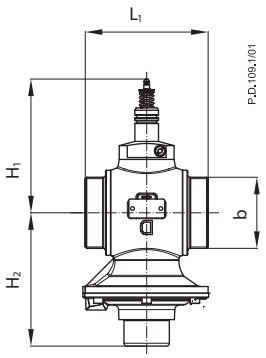


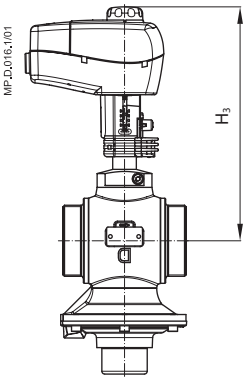
AMV(E) 130(H)/140(H) + AHQM

DN		15	20	25	32
L_1	mm	118	125	141	160
L_2		148	156	174	194
H_1		168	178	196	216
H_2		152	162	180	200

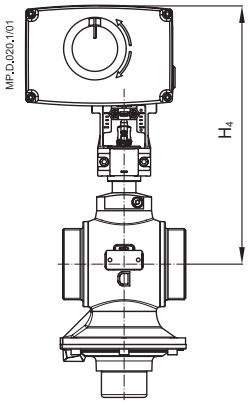
Dimensions *(continuous)*

DN 40, 50



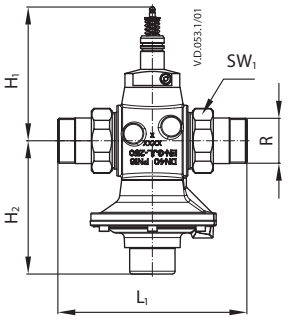


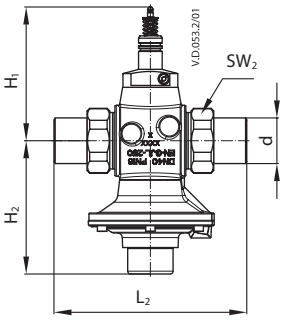
AMV(E) 435 + AHQM



AMV(E) 438 SD + AHQM

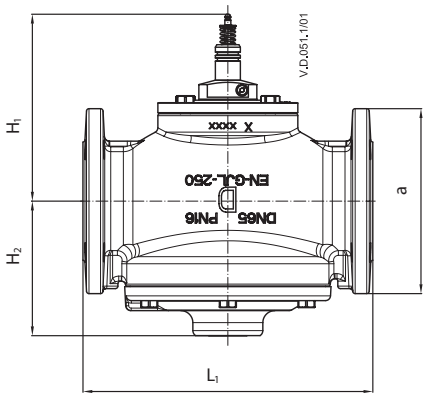
DN	L_1	H_1	H_2	H_3	H_4	b	Valve weight
	mm					ISO 228/1	(kg)
40	110	141.5	141	247.5	272.5	G 2	5.4
50	130	141.5	141	247.5	272.5	G 2½	6.2

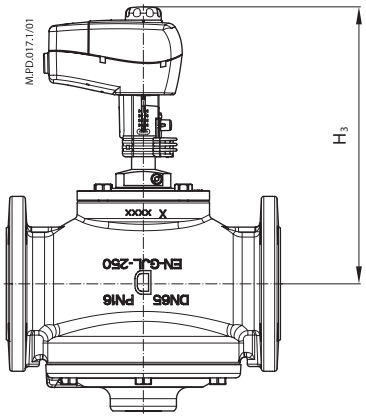




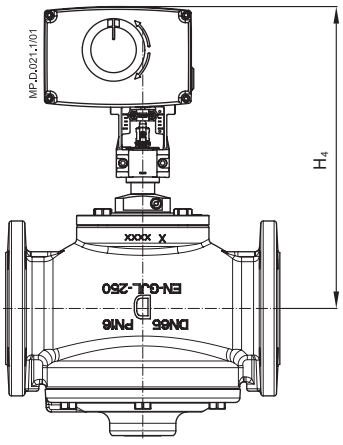
DN		40	50
R		1½	2
SW_1	mm	64	80
SW_2		70	82
d		48.3	60.3
L_1		200	244
L_2		204	234
H_1		141.5	141
H_2		141.5	141

DN 50-100





AMV(E) 435 + AHQM



AMV(E) 438 SD + AHQM

DN	L_1	H_1	H_2	H_3	H_4	a	Valve weight
	mm					(EN 1092-2)	(kg)
50	230	141.5	141	247.5	272.5	165	12.7
65	290	187	132	293	318	185	31.0
80	310	190	139.5	296	321	200	37.5
100	350	202	152	308	333	220	51.0

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