Data sheet

Pressure independent balancing and control valve AB-QM DN 10 - 150

AB-QM valve equipped with an actuator is a control valve with full authority and automatic balancing function - flow limiter. Typical applications are: Temperature control and permanent automatic balancing on terminal units (chillers air-handling units, fan coils, induction units, chilled seilings, plate heat exchangers, ..).

Description

Benefits:

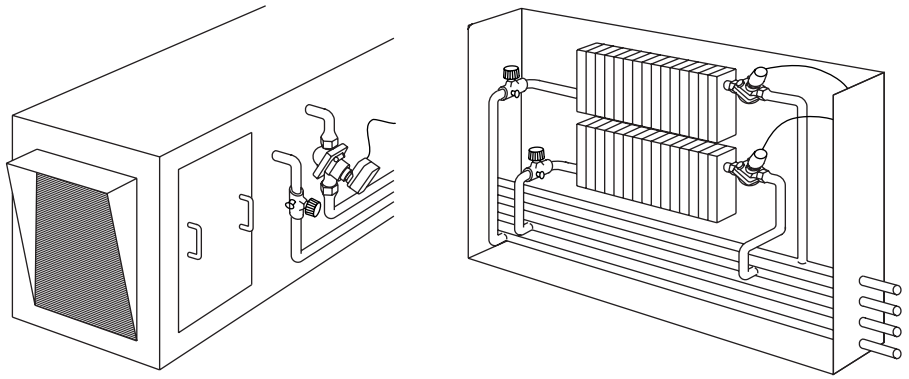
- Exact and pressure independent flow limitation allows no overflows at partial conditions to keep temperature difference over terminal unit as high as designed
- The AB-QM is able to control the temperature at low loads and is equally stable all through the range. All changes in the available differential pressure are corrected by the pressure controller. Therefore, less disturbances for temperature control and therefore less movements from actuator.
- AB-QM offers full flexibility of flow adjustment – AB-QM valves can be set to a precise design value even when the system is up and running so no need for draining the system or use of flow charts or calculations – they allow full control over the real conditions in the system.
- Due to the membrane design the valves are not susceptible to blockage.
- Always the right flow, so no complaints from end-users
- Exact flow limitation at any load condition prevents excessive energy consumption that occurs when static balancing method is used in variable flow system.
- Because the AB valve covers two functions – Balancing & Control - the installation costs are halved.
- Measuring nipples allow optimisation of the pump's energy consumption.
- 100% built in control valve authority allows lower pump head than traditional setup, thus minimizing energy consumption.
- Because of the automatic flow limiting function, commissioning costs are minimal. Easy adjustability allows late change of design flows without high costs.
- "Plug and Play" even when installation is not yet completely finished. For example when some floors are already occupied while construction is still going on at other floors, the occupied floors are already fully functional and balanced.

Description
(continuous)

Simplifications

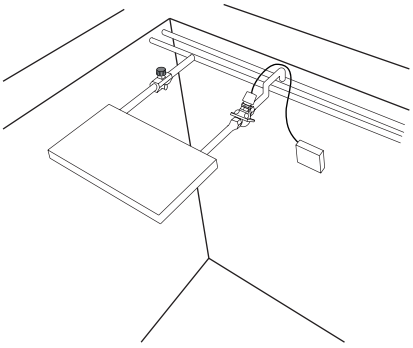
- Flow limitation is achieved by setting the valve to required flow - Set & Forget.
- Flow is the only parameter to be considered when designing, so easy and fast valve selection.
- Maximal flow setting of AB-QM corresponds with the maximal flow-speed through that pipe dimension according to international standards.
- Easy trouble shooting
- Linear to be converted to equalpercentage by selected actuators.
- No authority calculation. Commissioning is a matter of adjusting the valve without using specialised equipment or highly educated staff.
- Compact design allows instalment where only limited space is available, for example in stand alone fan-coil units.

Applications - variable flow systems



Air handling unit (AHU) / fan coil (FCU)

An AB-QM with an actuator can be used as a combined flow limiter and control valve with full authority for an AHU (Air Handling Unit). The AB-QM ensures the required flow on every AHU and simplifies the hydronic balancing of the system. Because of the integrated differential pressure controller the control valve always has 100% authority which means that partial load in the system has no influence on temperature regulation as it will have with normal control valves. By installing AB-QM the whole system is divided in independent control loop zones not influencing each other. The flow setting is very simple. Just set the required flow for the AHU direct at the AB-QM. There is no special method needed for balancing the whole systems. This means a lot of savings in working hours. Not to forget the combination of several functions in one valve body means less valves and installation work. For temperature control AB-QM can be equipped with different actuators (on/off, 3-point, 0 -10Volt) as required.

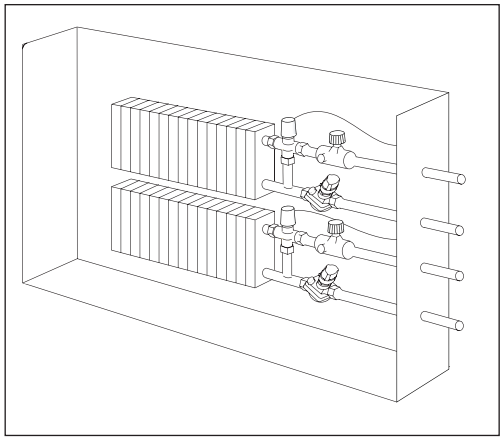


Chilled ceiling

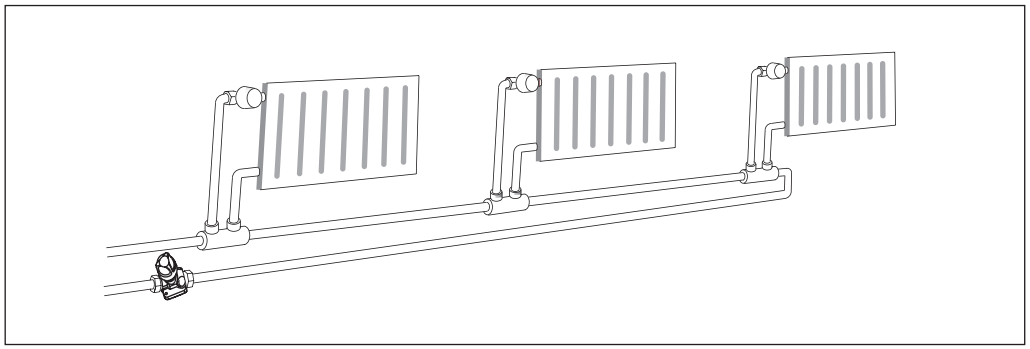
AB-QM in systems with chilled ceilings are used to achieve the required flow in the system and to control the temperature (prevent condensation). An AB-QM is installed at every chilled ceiling limiting the flow.

The integrated control valve is used for temperature control by mounting an actuator. Different types of actuators can be used.

Applications
- constant flow systems



The flow can be set directly at the AB-QM. Alternatively the system can be changed into a system with variable flow because AB-QM is also able to work as a control valve with full authority which means no problems with partial load.



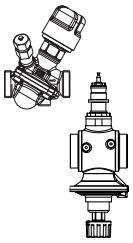
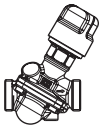
In a one pipe heating system the AB-QM can be installed as an automatic flow limiter in every riser. The AB-QM limits the flow to the set value, thus automatically achieving hydronic balance in the system.

There are numerous applications in which AB-QM can be used. In principle every time you need an automatic flow limiter or a control valve with full authority it can be used. For example systems with heating/cooling with concrete core activation.

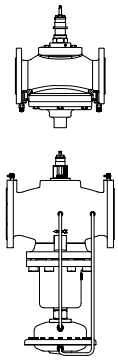
Note: For more application examples please contact your local Danfoss organization.

Ordering

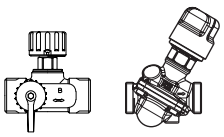
AB-QM threaded version

Picture	DN	$Q_{max.}$ (l/h)	Ext. thread (ISO 228/1)	Code No.	AB-QM	Ext. thread (ISO 228/1)	Code No.
	10 LF	150	G ½	**003Z0261**		G ½	**003Z0251**
	10	275		**003Z0211**			**003Z0201**
	15 LF	275	G ¾	**003Z0262**		G ¾	**003Z0252**
	15	450		**003Z0212**			**003Z0202**
	20	900	G 1	**003Z0213**		G 1	**003Z0203**
	25	1.700	G 1 ¼	**003Z0214**		G 1 ¼	**003Z0204**
	32	3.200	G 1 ½	**003Z0215**		G 1 ½	**003Z0205**
	40	7.500	G 2	**003Z0700**	*AB-QM (DN 10 - 32) can not be upgraded to AB-QM with nipples!*		
	50	12.500	G 2 ½	**003Z0710**			

AB-QM flanged version

Picture	DN	$Q_{max.}$ (l/h)	Flange connection	Code No.
	50	12.500	PN 16	**003Z0711**
	65	20.000		**003Z0702**
	80	28.000		**003Z0703**
	100	38.000		**003Z0704**
	125	90.000		**003Z0705**
	150	145.000		**003Z0706**

Set-pack *(one MSV-M and one AB-QM without nipples)*

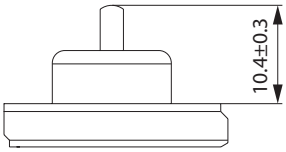
Picture	DN	$Q_{max.}$ (l/h)	External thread (ISO 228/1)	Code No.
	10	275	G ½ A	**003Z0241***
	15	450	G ¾ A	**003Z0242**
	20	900	G 1 A	**003Z0243**
	25	1.700	G 1 ¼ A	**003Z0244**
	32	3.200	G 1 ½ A	**003Z0245**

** Includes MSV-M DN15 with external thread G ¾A*

Ordering *(continuous)*

Accessories & spare parts

Type	Comments		Code No.
	To pipe	To valve	
Union connection (1 pcs.) 	R 3/8	DN 10	**003Z0231**
	R 1/2	DN 15	**003Z0232**
	R 3/4	DN 20	**003Z0233**
	R 1	DN 25	**003Z0234**
	R 1 1/4	DN 32	**003Z0235**
	R 1 1/2	DN 40	**003Z0279**
	R 2	DN 50	**003Z0278**
Tailpiece welding (1 pcs.) 	Weld.	DN 15	**003Z0226**
		DN 20	**003Z0227**
		DN 25	**003Z0228**
		DN 32	**003Z0229**
		DN 40	**003Z0270**
		DN 50	**003Z0276**
Tailpieces for soldering (2 nuts, 2 gaskets, 2 soldering nipples	12x1 mm	DN 10	**065Z7016**
	15x1 mm	DN 15	**065Z7017**
Locking ring		DN 10 - 32	**003Z0236**
Shut-off & protection piece (max. closing pressure 16 bar)			**003Z0230**
Shut-off - plastic (max. closing pressure 1 bar)			**003Z0240**
Handle AB-QM (for details refer to instructions)		DN 40 - 100	**003Z0695**
		DN 125-150	**003Z0696**



Closing point (measure) for DN 10 - DN 32

Combinations AB-QM with electrical actuators

Valve type	Stroke (mm)	TWA-Z [2]	AMI 140	ABNM-Z	AMV 110 NL AME 110 NL [3]	AME 15 QM	AME 55 QM
		Recommended ordering code numbers (for details refer to data sheets for these actuators)					
		082F1226 NC, 230 V	**082H8048** AMI 140 24 V, 12 s/mm, 2-point control	**082F1094** Thermal actuator 24 V (0 - 10 V) **082F1072** Adapter for AB-QM (M30 × 1.5)	**082H8056** AMV 110 NL 24 V, 24 s/mm, 3-point control **082H8057** AME 110 NL 24 V, 24 s/mm, 0 - 10 V	**082H3075** AME 15 QM 24 V, 11 s/mm, 0 - 10 V	**082H3078** AME 55 QM 24 V, 8 s/mm, 0 - 10 V
DN 10-20	2.25	✓	✓	✓	✓	-	-
DN 25, 32	4.50	✓ [1]	✓	✓ [1]	✓	-	-
DN 40, 50	10	-	-	-	-	✓	-
DN 65-100	15	-	-	-	-	✓	-
DN 125	25	-	-	-	-	-	✓
DN 150	25	-	-	-	-	-	✓

[1] *up to 60 % of Q_{max}*
[2] *Please be aware that only this type of TWA actuator is to be used with AB-QM*
[3] *Minimum recommended AB-QM setting is 20 %*

Operational pressure for all AB-QM valves is 4 bar.
Closing pressure for all actuators is 6 bar.

Note: For all available actuators for AB-QM please contact your local Danfoss organization.

Technical data

***AB-QM** (thread version)*

Nominal diameter		**DN**	**10 Low Flow**	**10**	**15 Low Flow**	**15**	**20**	**25**	**32**	**40**	**50**
Flow range	Q_{min} (20%) [3]	l/h	30	55	55	90	180	340	640	1.500	-
	Q_{min} (40%) [3]		-	-	-	-	-	-	-	-	5.000
	Q_{max} (100%)		150	275	275	450	900	1.700	3.200	7.500	12.500
Diff. pressure [1]		kPa	16-400					20-400		30-400	
Pressure stage		PN	16								
Control range			Acc. to standard IEC 534 control range goes to infinity as Cv characteristic is linear.								
Control valve's characteristic			Linear (could be converted by actuator to equal percentage)								
Leakage acc. to standard IEC 534			No visible leakage (at 100N)							max.0.05% of k_v at 500N	
For shut off function			Acc. to ISO 5208 class A - no visible leakage								
Flow medium			Water and water mixtures with secondary coolants (like glycols) [2] for closed heating and cooling systems								
Medium temperature		°C	–10 ... +120								
Stroke		mm	2.25					4.5		10	
Connection	ext. thread (ISO 228/1)		G ½"	G ½"	G ¾"	G ¾"	G 1"	G 1¼"	G 1½"	G 2"	G 2½"
	actuator		M30 × 1.5							Danfoss standard	
Materials in the water											
Valve bodies			Brass (CuZn40Pb2 - CW 617N)							Grey iron EN-GJL-250(GG25)	
Membranes and O - rings			EPDM								
Springs			W.Nr. 1.4568, W.Nr. 1.4310								
Cone (Pc)			W.Nr. 1.4305							CuZn40Pb3 - CW 614N, W.Nr. 1.4305	
Seat (Pc)			EPDM							W.Nr. 1.4305	
Cone (Cv)			CuZn40Pb3 - CW 614N								
Seat (Cv)			CuZn40Pb2 - CW 617N							W.Nr. 1.4305	
Screw			Stainless Steel (A2)								
Flat gasket			NBR								
Sealing agent (only for valves with measuring nipples)			Dimethacrylate Ester								
Materials out of the water											
Plastic parts			POM							-	
Insert parts and outer screws			CuZn39Pb3 - CW 614N; W.Nr. 1.4310; W.Nr. 1.4401							-	

[1] Δp = (P1-P3) min~max
[2] according suitability and usage especially in not oxygen tight systems please mind the instructions given by the coolant producer
[3] Flow limitations below Q_{min} is possible. Regardless of the flow limitations valve can modulate till 0 % of the settings.
Pc - pressure controller part
Cv - Control valve part

Technical data *(continuous)*

***AB-QM** (flange version)*

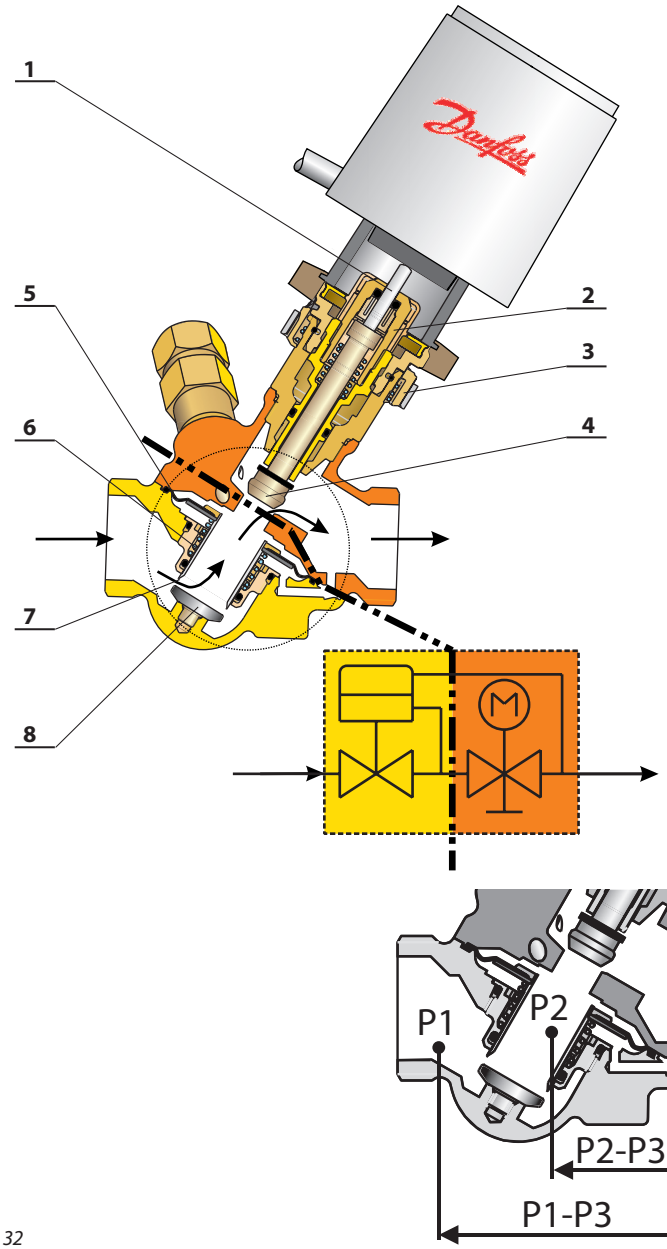
Nominal diameter		**DN**	**50**	**65**	**80**	**100**	**125**	**150**
Flow range	Q_{min} (40%) [2]	l/h	5.000	8.000	11.200	15.200	36.000	58.000
	Q_{max} (100%)		12.500	20.000	28.000	38.000	90.000	145.000
Diff. pressure [1]		kPa	30 - 400					
Pressure stage		PN	16					
Control range			Acc. to standard IEC 534 control range goes to infinity as Cv characteristic is linear.					
Control valve's characteristic			Linear (could be converted by actuator to equal percentage)					
Leakage acc. to standard IEC 534			max.0.05% of k_v at 500N				max.0.01% of k_v at 650N	max. 0.01% of k_v at 1000N
For shut off function			Acc. to ISO 5208 class A - no visible leakage				-	
Flow medium			Water and water mixtures with secondary coolants (like glycols) [3] for closed heating and cooling systems					
Medium temperature		°C	–10 ... +120					
Stroke		mm	10	15			25	25
Connection	flange		PN 16					
	actuator		Danfoss standard					
Materials in the water								
Valve bodies			Grey iron EN-GJL-250(GG25)					
Membranes/ Bellow			EPDM				W.Nr.1.4571	EPDM
O - rings			EPDM					
Springs			W.Nr. 1.4568, W.Nr. 1.4310				W.Nr.1.4401	W.Nr.1.4310
Cone (Pc)			CuZn40Pb3 - CW 614N, W.Nr. 1.4305				W.Nr.1.4404NC	W.Nr.1.4021
Seat (Pc)			W.Nr. 1.4305				W.Nr.1.4027	
Cone (Cv)			CuZn40Pb3 - CW 614N				W.Nr.1.4404NC	W.Nr.1.4021
Seat (Cv)			W.Nr. 1.4305				W.Nr.1.4027	
Screw			Stainless Steel (A2)				W.Nr.1.1181	
Flat gasket			NBR				Graphite gasket	Non asbestos

[1] Δp = (P1-P3) min~max
[2] Flow limitations below Q_{min} is possible. Regardless of the flow limitations valve can modulate till 0 % of the settings.
[3] according suitability and usage especially in not oxygen tight systems please mind the instructions given by the coolant producer

Pc - pressure controller part
Cv - Control valve part

Design

1 Spindle
2 Stuffing box
3 Plastic ring
4 Control valve's cone
5 Membrane
6 Main spring
7 Hollow cone (pressure controller)
8 Vulcanized seat (pressure controller)



AB-QM DN 10 - 32

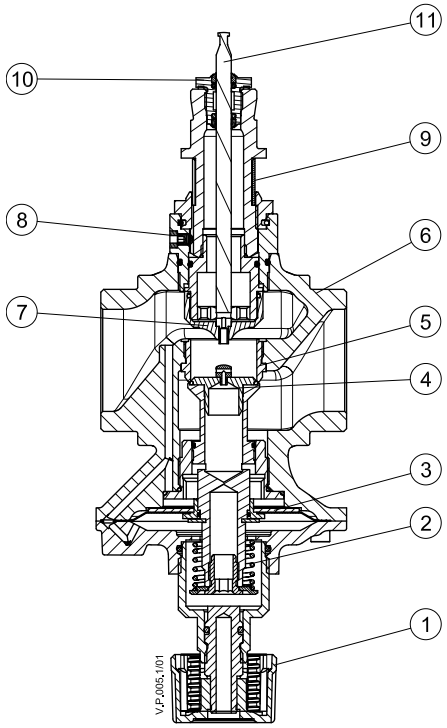
Function:
The AB-QM valve consists of two parts:
1. Differential pressure controller
2. Control valve

1. Differential pressure controller DPC
The differential pressure controller maintains a constant differential pressure across the control valve. The pressure difference Δp_{Cv} (p2-p3) 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 hollow cone is displaced to a new position which brings a new equilibrium and therefore keeps the differential pressure at a constant level.

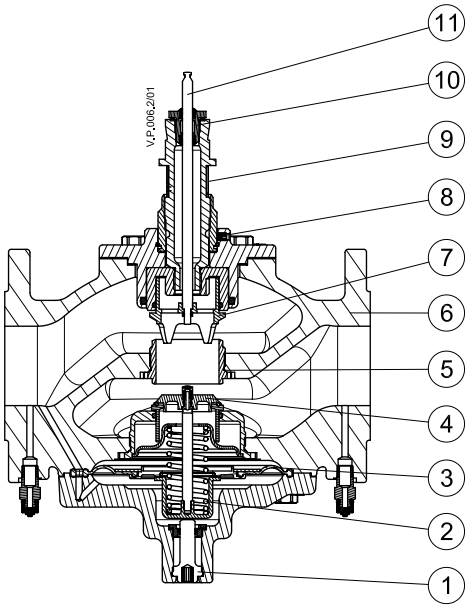
2. Control valve Cv
The control valve has a linear characteristic. It features a stroke limitation function that allows adjustment of the Kv value. The percentage marked on the scale equals the percentage of 100% flow marked on the pointer. Changing the stroke limitation is done by lifting the blocking mechanism and turning the top of the valve to the desired position, showed on the scale as a percentage. A blocking mechanism automatically prevents unwanted changing of the setting.

Design *(continuous)*

1. Shut off screw
2. Main spring
3. Membrane
4. DP cone
5. Seat
6. Valve body
7. Control valves cone
8. Locking screw
9. Scale
10. Stuffing box
11. Spindle



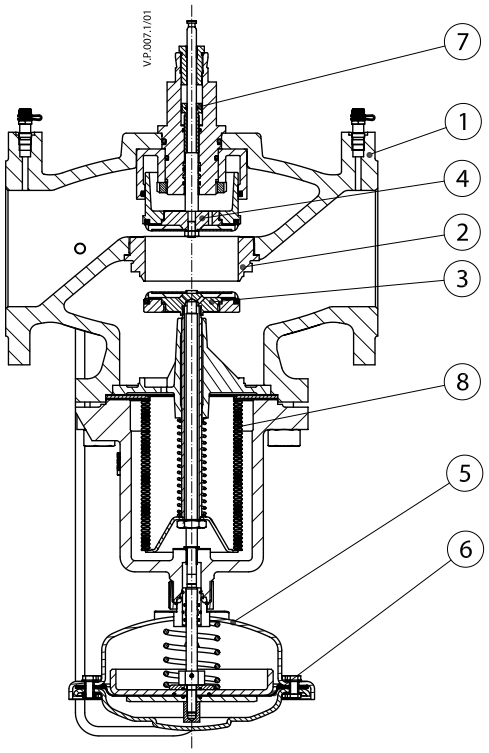
AB-QM DN 40, 50



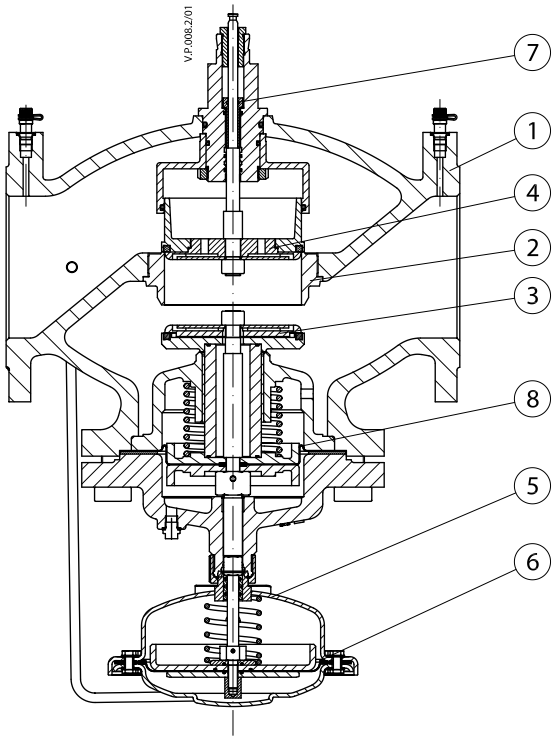
AB-QM DN 50-100

Design *(continuous)*

1. Valve body
2. Valve seat
3. DPC cone
4. CV cone
5. Controller casting
6. Rolling diaphragm
7. Adjusting screw
8. Bellow for pressure relief on DPC cone

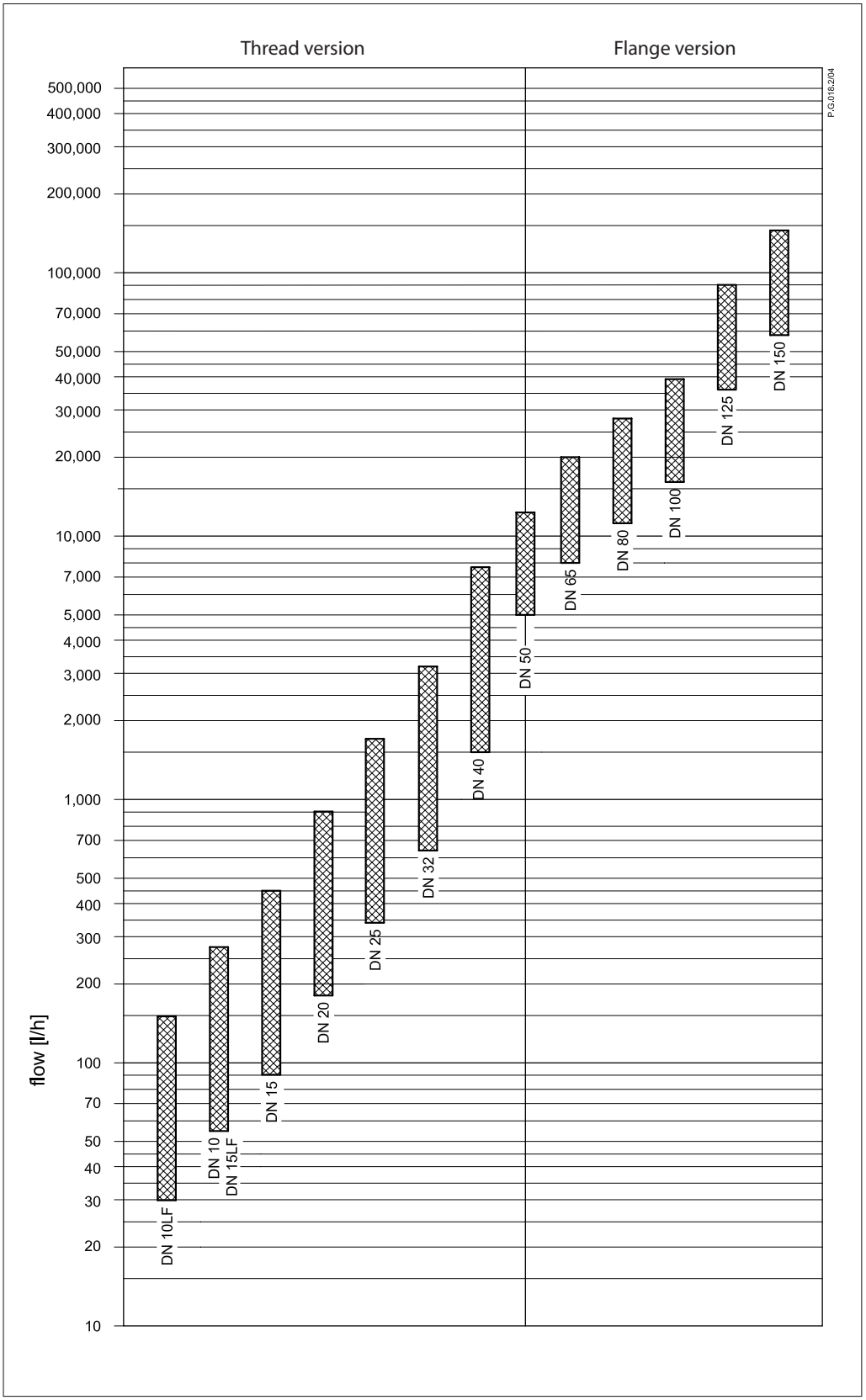


AB-QM DN 125



AB-QM DN 150

Sizing


Thread version
Flange version
P-G.018.2/04
flow [l/h]
500,000
400,000
300,000
200,000
100,000
70,000
50,000
40,000
30,000
20,000
10,000
7,000
5,000
4,000
3,000
2,000
1,000
700
500
400
300
200
100
70
50
40
30
20
10
DN 10LF
DN 10
DN 15LF
DN 15
DN 20
DN 25
DN 32
DN 40
DN 50
DN 65
DN 80
DN 100
DN 125
DN 150

Sizing *(continuous)*

Example 1: Variable flow system

Given:
Cool requirement per unit : 1000 W
Flow temperature in the system: 6 °C
Return temperature in the system: 12 °C

Required - ***control and balancing valves:***
AB-QM and actuators type for BMS system.
Solution:
Flow in the system: Q (l/h)
$Q = 0.86 \times 1000 / (12 - 6) = 143$ l/h

Selected:
AB-QM DN 10 mm with $Q_{max} = 275$ l/h
presetting on 143/275 = 0.52 = 52 % of maximum opening.
Actuators: AMV 110NL - 24 V
Remarks:
required minimum differential pressure across the AB-QM DN 10: 16 kPa.

Example 2: Constant flow system

Given:
Cool requirement per unit : 4000 W
Flow temperature in the system : 6 °C
Return temperature in the system : 12 °C

Required - ***automatic flow limiter:***
AB-QM and presetting.

Solution:
Flow in the system : Q (l/h)
$Q = 0.86 \times 4000 / (12 - 6) = 573$ l/h

Selected:
AB-QM DN 20 mm with $Q_{max} = 900$ l/h
presetting on 573/900 = 0.64 = 64 % of maximum opening.

Remarks:
required minimum differential pressure across the AB-QM DN 20: 16 kPa.

Example 3: Sizing AB-QM according pipe dimension

Given:
Flow in system 1.4 m^3/h (1400 l/h = 0.38l/s), pipe dimension DN 25 mm

Required - ***automatic flow limiter:***
AB-QM and presetting.

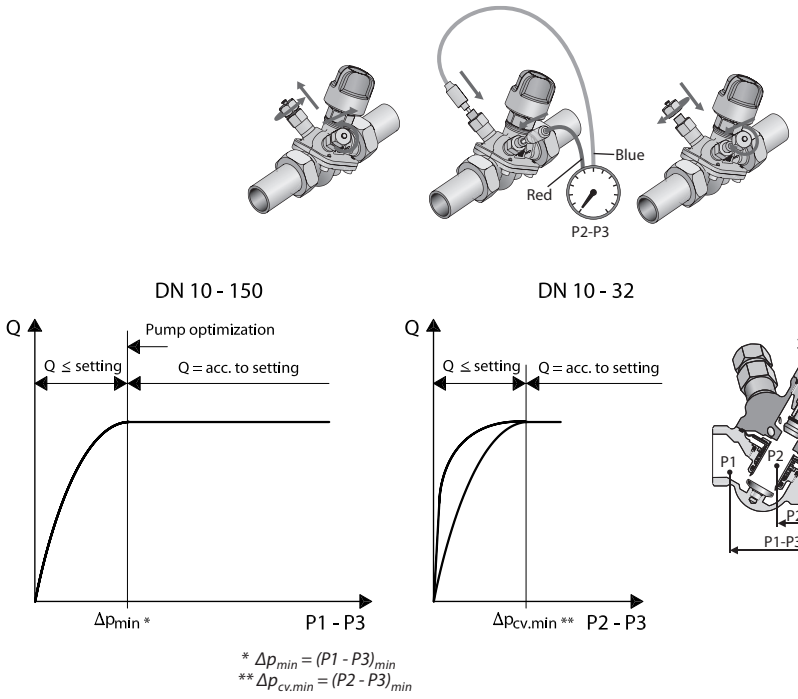
Solution:
In this case we can selected AB-QM DN 25 mm with $Q_{max} = 1700$ l/h

In this case it will be recommended to check the maximum velocity in the pipe. For this we calculate velocity in the pipe for condition:
DN 25 mm – Di 27.2 mm

Dimension and condition acceptable, veloscity below 1.0 m/s.

Preseting on the valve AB-QM DN 25 mm
1400/1700 = 0.82 = 82 % of maximum opening.
Remarks:
required minimum differential pressure across the AB-QM DN 25: 20 kPa.

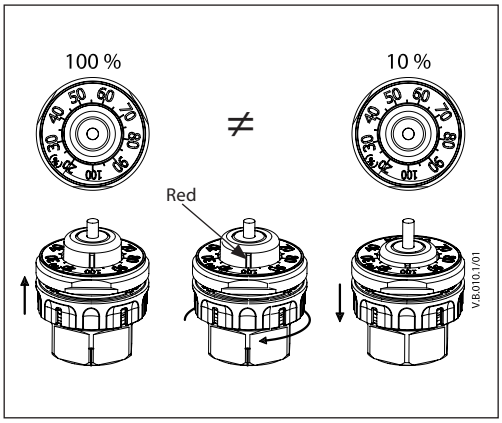
Pump optimising / Trouble shooting



The AB-QM (DN 10-32) features measuring nipples that allow measuring of the pressure difference Δp_{cv}(p2-p3) across the control valve while AB-QM (DN 40-150) measuring is done between p1 to p3. If the pressure difference exceeds certain value it means the differential pressure controller is operational and the flow limitation is achieved. The measuring function can be used to verify if enough pressure difference is available and thus verify the flow.

It can also be used to optimize the pump head. The pump head can be decreased until no more than the minimal required pressure is available on the most critical valve (in terms of hydronic). This optimal point is to be found when proportionality between pump head and measured differential pressure cease to exist. Verifying the pressure can be done by using for example Danfoss PFM device (for more details please refer to AB-QM Tech Note).

Presetting (DN 10-32)



The calculated flow can be adjusted easily without using special tools.
To change the presetting:

- Remove the blue protective cap or the mounted actuator.
- Raise the grey plastic ring and turn to the new presetting.
- Release the white plastic ring and the presetting is locked.

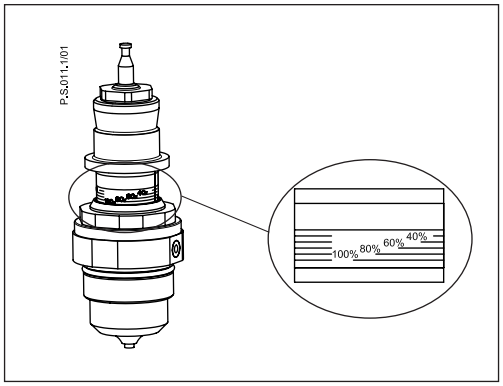
The presetting scale indicates a values from 100% flow to 0% closed.
Counter clock wise turning would increase the flow value while clock wise would decrease it.

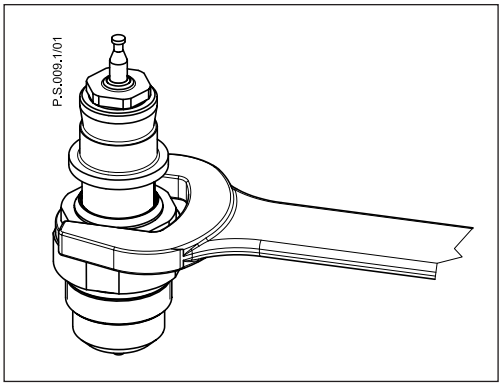
When valve is set to 80% or more the red ring (below "DN max flow " sign) becomes visible.

If the valve is a DN 15 then the max flow = 450 l/h =100% presetting. To set a flow of 270 l/h you have to set: 270/450 = 60%.

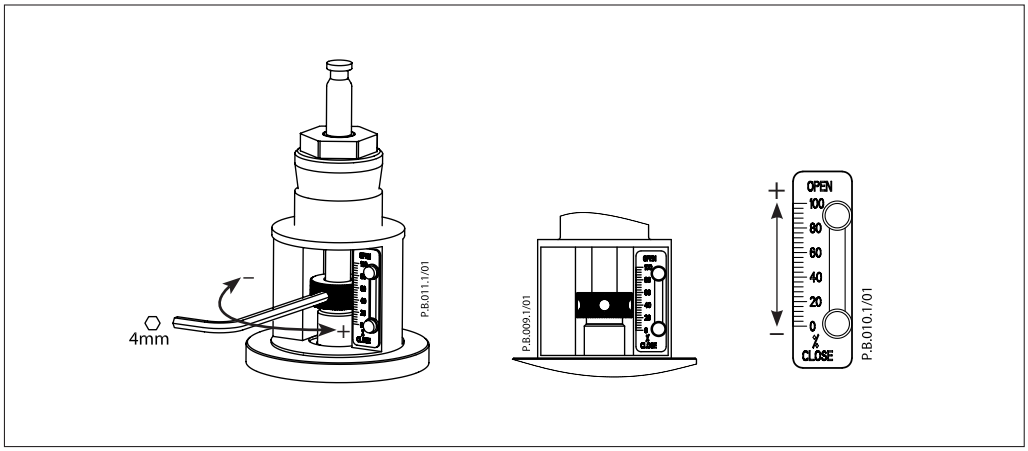
Danfoss recomends a presetting/flow from 20% to 100%. Factory presetting is 100%.

Presetting (continuous)
DN 40-100





DN 125-150



Service

DN 10-32
For the service shut off function, it is recommended to install the valve in the supply water pipe.

The valve features a service function that allows changing of the "stuffing box (code 065F0006)" under water pressure.

Valves are equipped with plastic shut-off mechanism that is to be used for isolating function up to 1 bar differential pressure. When closing against higher differential pressure please use accessory - shut-off & protection piece (003Z0230) or set the value to 0%.

Unwanted change of the setting is provided by locking ring (code 003Z0236) which is inserted in the groove below the scale. The locking ring would not allow one to lift the grey plastic ring thus no change of the setting is possible.

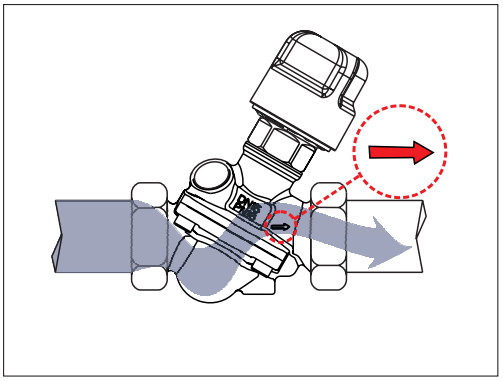
DN 40-100
For the service shut off function there is no pipe side installation recommendation.

Valves are equipped with manual shut-off for isolating function up to 16 bar.

Installing

AB-QM valve is mono-directional meaning that the valve operates when arrow on the valve body is aligned with flow direction. When this rule is disobeyed the valve acts like variable orifice that cause water hammer at sudden closing when available pressure has increased or valve have been set to lower value.

In case when system condition allows backflows it is strongly recommended to use backflow preventer in order to avoid possible water hammer that can damage the valve as well as other elements in the system.



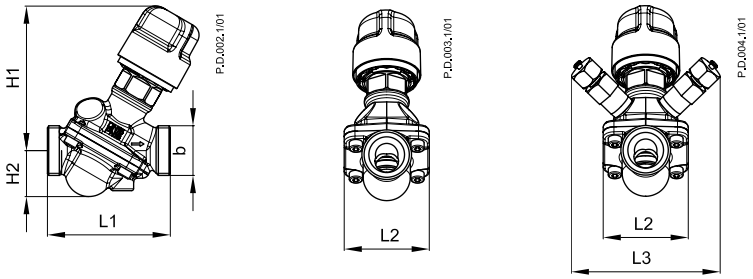
Tender text

1. The pressure independent balancing and control valve should be comprised of a linear control valve and an integrated membrane based pressure controller.
2. The pressure independent balancing and control valve should be available in the range from DN10 - 150.
3. The valve could be used as an automatic flow limiter.
4. The valve should have a mechanism to adjust the flow steeples from 100 to 0 % of the maximum flow.
5. Minimum possible setting for modulating actuator should be 30 l/h.
6. At minimum setting 30 l/h modulation till 0 % of the flow should be possible.
7. Shut off service function should be possible with setting mechanism.
8. The adjustment should be performed without a tool for dimensions up to DN 32 or a standard tool for valves bigger than DN 32.
9. The setting, which can be locked, should be visible from the top for valves DN 32 and from a side for DN 40 - 150.
10. The control valve stuffing box should be serviceable under pressure for valves up to DN 32.
11. The valves should have a shut-off function (positive), separate from the setting mechanism, for valves DN 40 - 100.
12. The leakage rate should be: no visible leakage at force of the thermal actuator (90 N) for valves up to DN 32, for valves up to DN 100 0.05 % k_v at 500 N, for valve DN 125 0,01 % k_v at 650N and 0,01 % k_v for DN 150 at 1000 N. Maximum operating pressure should be 400 kPa, closing pressure ability for all actuators should be 600 kPa.
13. The authority of the pressure independent control valve should be 1 at all settings (control valve characteristic is not changed).
14. Control valve should have flow – control signal as linear characteristic at all settings. Control ratio of the pressure independent balancing and control valve should be higher than 1:300 **(Supplier of the valve should provide lab test results [1])**.
15. Control valve should have a possibility to change linear characteristic to equal percentage characteristic at all settings by actuator setting.
16. Minimum starting differential pressure for flow limitation should be 16 kPa for valves up to DN 20, 20 kPa valves up to DN 32 and 30 kPa for valves up to DN 150 **(Supplier of the valve should provide lab test results [1])**. Nominal pressure rating 16 bar (PN20 on request), maximal test pressure 25 bar.
17. Measuring points for pump optimization and flow verification should be available for DN 10 - 150.

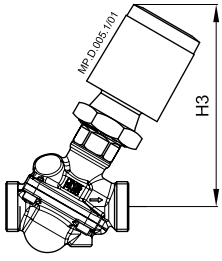
Nominal diameter:	_____	
Connection:	_____	
Adjustment range from - to	_____	m^3/h
Produced by:	Danfoss	
Type:	AB-QM	
Ordering no.:	003Z ____	

[1] *Since there is no standard for testing procedure, Danfoss recommends verification by independent lab to compare control and flow limitation function of different PIBCVs at the same basis.*

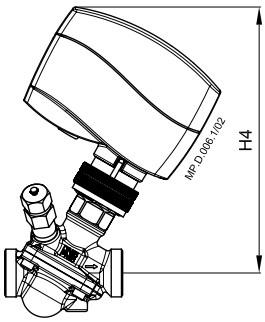
Dimensions



AB-QM DN 10 - 32



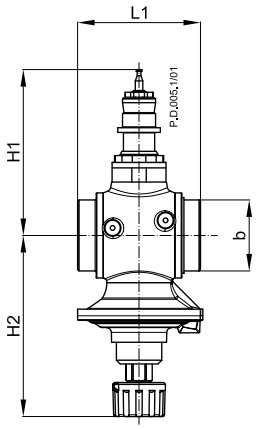
TWA-Z + AB-QM
ABNM + AB-QM



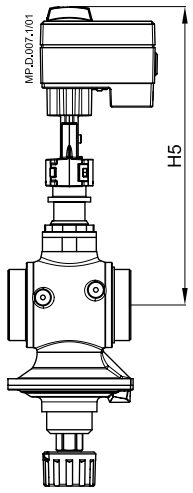
AMV (E) 110 NL + AB-QM
AMI 140 + AB-QM

Type	L1 mm	L2 mm	L3 mm	H1 mm	H2 mm	H3 mm	H4 mm	b ISO 228/1	Weight kg
AB-QM DN 10	53	36	79	73	20	105	140	G ½	0.38
AB-QM DN 15	65	45	79	75	25	110	145	G ¾	0.48
AB-QM DN 20	82	56	79	77	33	115	150	G 1	0.65
AB-QM DN 25	104	71	79	88	42	130	165	G 1 ¼	1.45
AB-QM DN 32	130	90	79	102	50	145	180	G 1 ½	2.21

Dimensions *(continuous)*

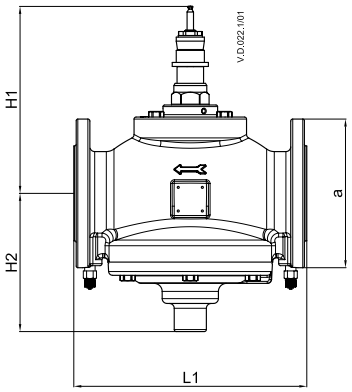


AB-QM DN 40, DN 50

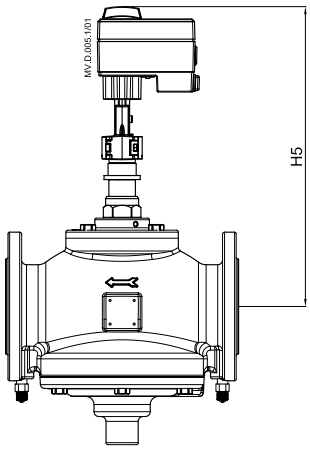


AME 15 QM + AB-QM

Type	L1 mm	H1 mm	H2 mm	H5 mm	b ISO 228/1	Weight kg
AB-QM DN 40	110	192	174	315	G 2	6.9
AB-QM DN 50	130	192	174	315	G 2 ½	7.8



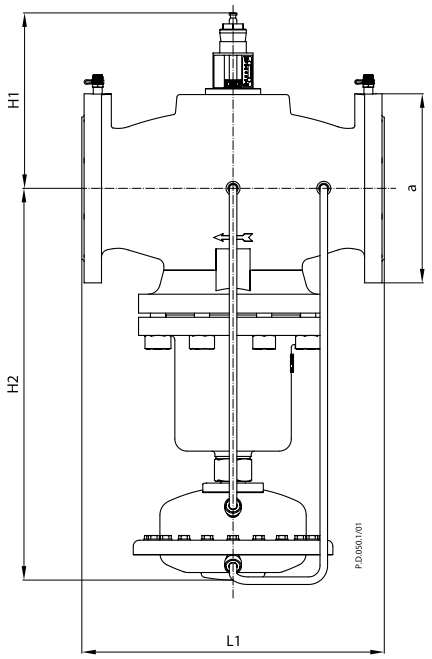
AB-QM DN 50-100



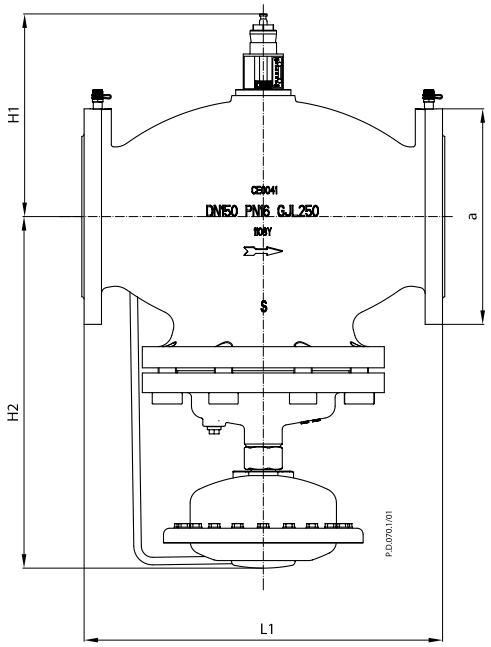
AME 15 QM + AB-QM

Type	L1 mm	H1 mm	H2 mm	H5 mm	a (EN 1092-2)	Weight kg
AB-QM DN 50	230	192	174	315	165	14.2
AB-QM DN 65	290	233	172	373	185	38.0
AB-QM DN 80	310	236	177	376	200	45.0
AB-QM DN 100	350	249	187	389	220	57.0

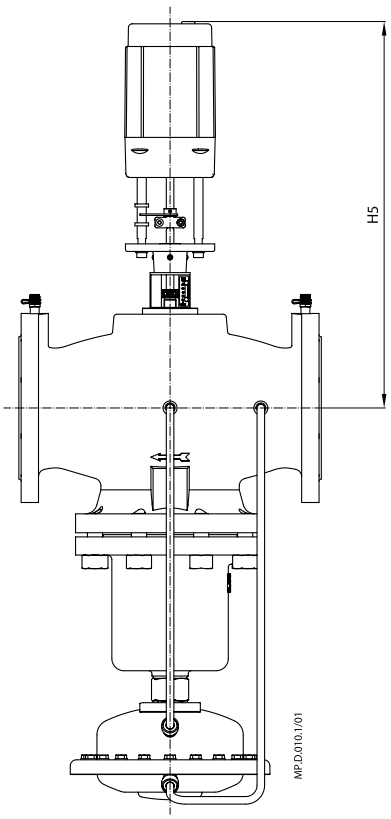
Dimensions *(continuous)*



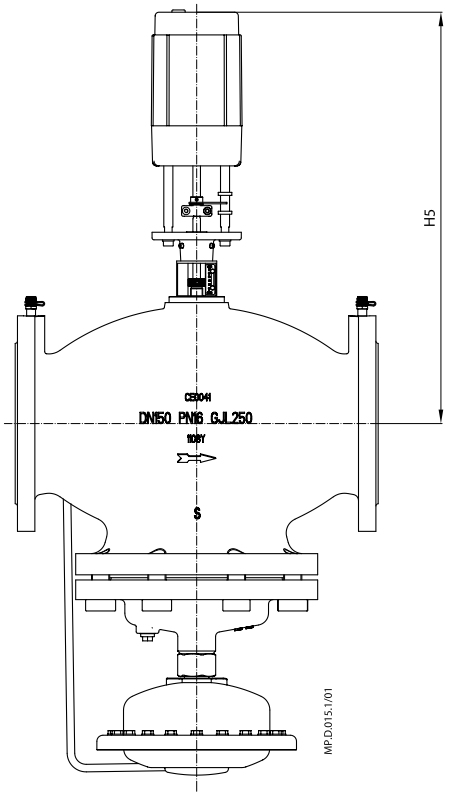
AB-QM DN 125



AB-QM DN 150



AME 55 QM + AB-QM DN 125



AME 55 QM + AB-QM DN 150

Type	L1 mm	H1 mm	H2 mm	H5 mm	a (EN 1092-2)	Weight kg
AB-QM DN 125	400	232	518	507	250	85.3
AB-QM DN 150	480	268	465	518	285	138