

## Data sheet

# Combined automatic balancing valve

## AB-PM – valve DN 15-25, PN 16

### Description



AB-PM is a combined automatic balancing valve. It features three function in compact valve body:

1. Differential pressure controller
2. Control valve with linear characteristic
3. Flow limiter

#### Benefits:

- Reliable heating system resulting in:
  - proper heat distribution even at partial loads
  - noise free operation based on stable low  $\Delta p$  over thermostatic radiator valves even in installation where higher pump head is needed
- Lower heating cost
- Better indoor temperature control
- Faster in simpler installation with less installation space needed

### Ordering

AB-PM valve (including 1,5 m impulse tube and imp. tube adapter)

Picture	DN	Ext. thread (ISO 228/1)	Code No.
	15	G 3/4 A	003Z1402
	15 HP		003Z1412
	20	G 1 A	003Z1403
	20 HP		003Z1413
	25	G 1 1/4 A	003Z1404
	25 HP		003Z1414

#### Actuator

Type	Power supply	Cable length	Code No.
TWA-Z NO <sup>1)</sup>	24 V AC	1,2 m	082F1260
	230 V AC		082F1264
TWA-Z NC <sup>1)</sup>	24 V AC	1,2 m	082F1262
	230 V AC		082F1266
ABN A5 NO	24 V AC	not included	082F1151
	230 V AC		082F1153
ABN A5 NC	24 V AC		082F1150
	230 V AC		082F1152

<sup>1)</sup> up to 60 % of  $Q_{max}$  on AB-PM DN 25

#### Room controller

Type	Power supply	Remark	Code No.
RC-T2	230 V AC	Thermostat 2-pipe	193B0913

### Accessories

Type	To pipe	To valve	Code No.
Tailpiece threaded (1 pcs.)	R 1/2	DN 15	003Z0232
	R 3/4	DN 20	003Z0233
	R 1	DN 25	003Z0234
Tailpiece welding (1 pcs.)		DN 15	003Z0226
		DN 20	003Z0227
		DN 25	003Z0228
Tailpiece for soldering (2 nuts, 2 gaskets, 2 soldering plugs)		DN 15	003Z7017
<sup>1)</sup> Stroke limiter			003Z1237

<sup>1)</sup> Stroke limiter ensures min. 20% opening of AB-PM when TWA-Z is closed.

### Spare parts

Type	Remark	Code No.
Impulse tube adapter	3/8" - 1/16"	003L5042
	3/4" - 1/16"	003Z0109
	1/4" - 1/16"	003L8151
Impulse tube with O-rings	1,5 m	003L8152
	2,5 m	003Z0690
Shut-off knob (red)		003Z0250

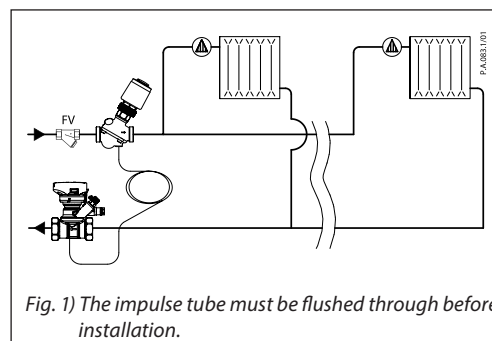
Technical data

Nominal diameter		DN	15	15 HP	20	20 HP	25	25 HP
Q <sub>nom</sub> (at 100% setting)		l/h	300		600		1200	
Upper limit of pressure controller at zero flow		kPa	22	35	22	35	22	35
Differential pressure			16-400	30-400	16-400	30-400	16-400	30-400
Nominal maximal pressure		bar	16 (PN16)					
Control valves characteristic			Linear					
Shut-off leakage rate			Acc. to ISO 5208 class A - no visible leakage					
Medium temperature		°C	-10 ... 120					
CV stroke		mm	2,25				4,5	
Connection	Ext. thread ISO 228/1		G ¾ A		G 1 A		G 1¼ A	
	Actuator		M 30 x 1,5					
<b>Materials in water</b>								
Valve body			DZR Brass (CuZn36Pb2As - CW 602N)					
Membrane and O-ring			EPDM					
Spring			W.Nr. 1.4568, W.Nr. 1.4310					
Cone (PC)			W.Nr. 1.4305					
Seat (PC)			EPDM					
Cone (CV)			CuZn40Pb3 - CW 614N					
Seat (CV)			DZR Brass (CuZn36Pb2As - CW 602N)					
Flat gasket			NBR					
Screw			Stainless Steel (A2)					
Sealing agent			Dimethacrylate Ester					
<b>Materials out of the water</b>								
Plastic parts			PA					
Insert parts and outer screws			CuZn39Pb3 - CW 614N; W.Nr. 1.4310; W.Nr. 1.4401					

Mounting

AB-PM should be mounted in flow in the direction of the arrow on the valve body. The impulse tube should be installed between AB-PM and 1/16" - 3/8" adapter that is supplied together with AB-PM.

Alternatively, impulse tube can be connected to ASV partner valve, such as ASV-BD. With it, additional service functions such as flow verification, shut-off, etc are available.

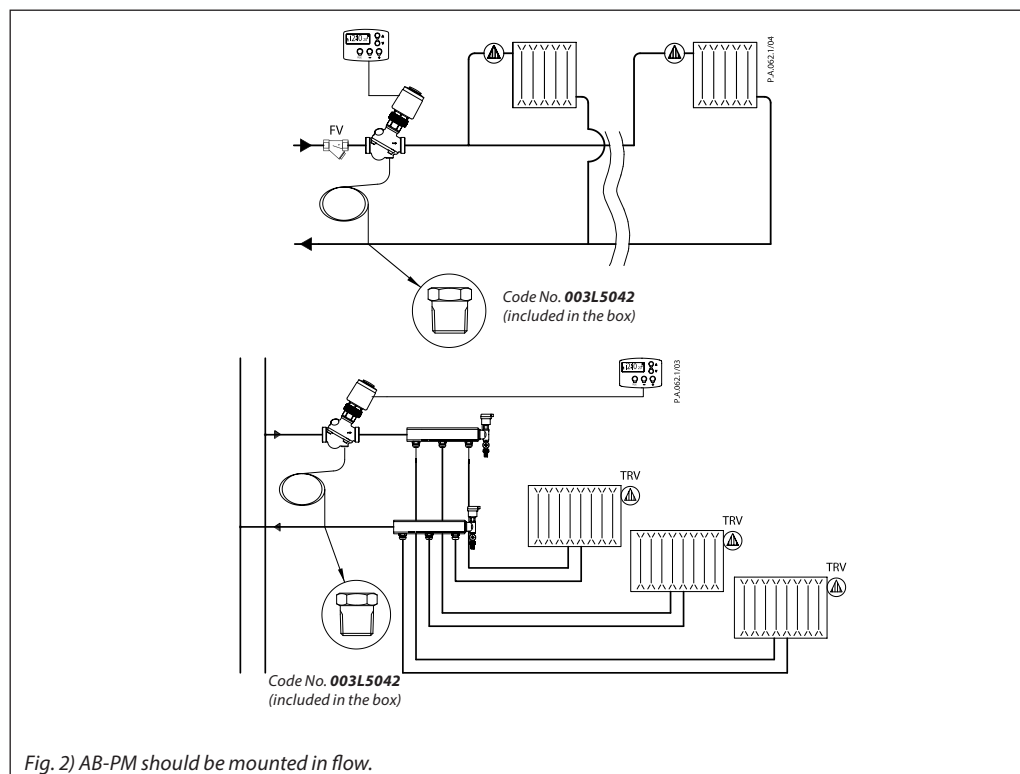


Applications

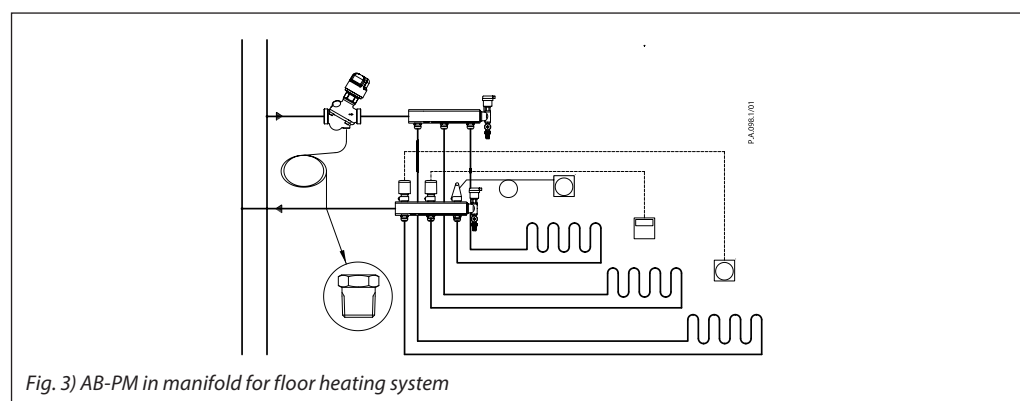
AB-PM is designed to be used in heating residential application. It can be used both in radiator or floor heating systems. Because it offers 3 functions in one, small valve body, it is ideal for small spaces such as manifold cabinets, etc.

The AB-PM HP high pressure version are designed to fit the higher requirement of  $\Delta p$  in larger floor heating installations.

AB-PM is focused to systems with horizontal piping loops and individual flat connections: AB-PM provides proper balance even at partial loads and limitation of maximal flow is simple and fast. In addition, programmable zone control (night setback or holiday mode) is available by using On/Off actuator, connected to a room controller.



<sup>1)</sup> For each room only one control element (TRV or room controller) is to be used in order to ensure best indoor temperature control performance.



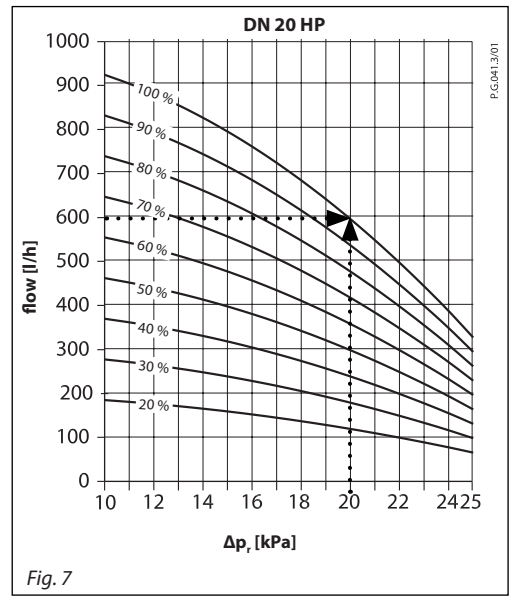
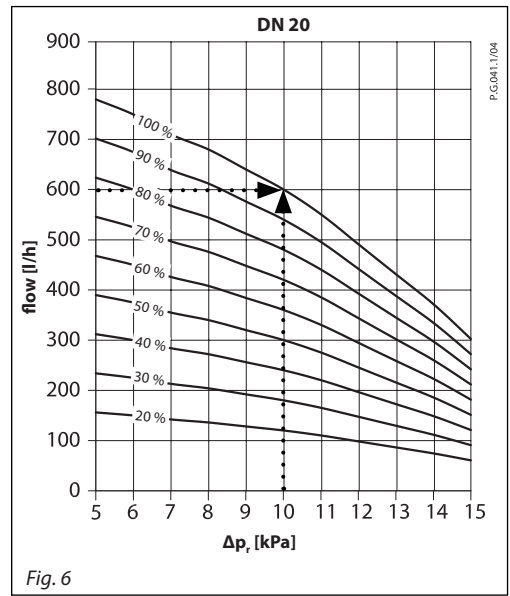
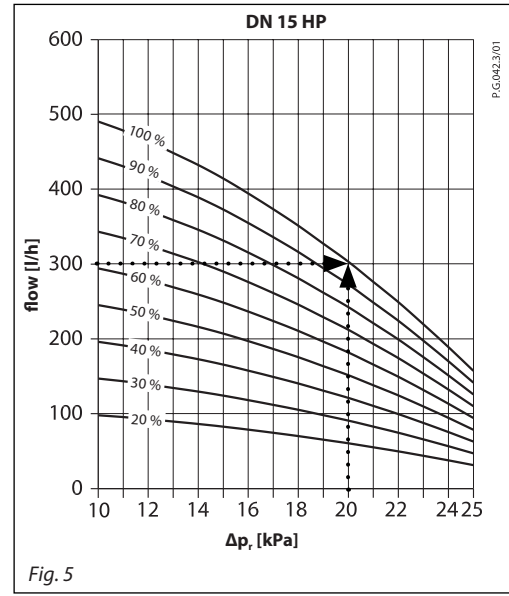
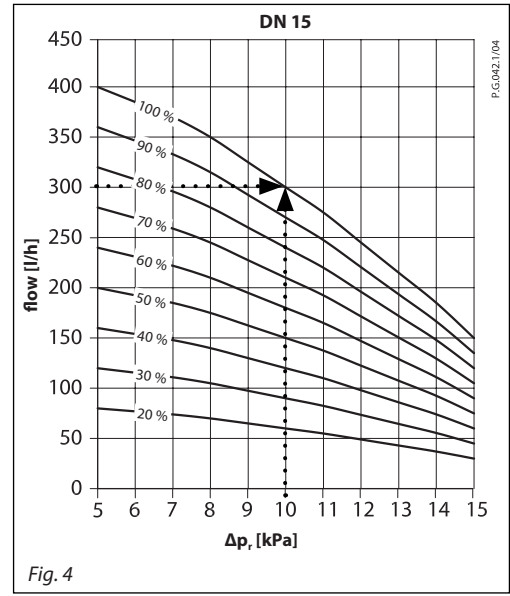
Sizing

AB-PM is to be sized based on needed flow (Q) and needed differential pressure drop for the loop ( $\Delta p_r$ ). Max flow data are presented in table 1.

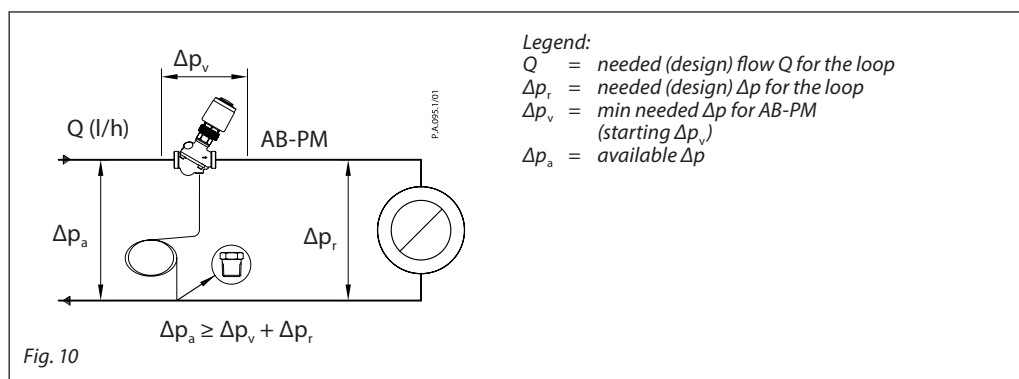
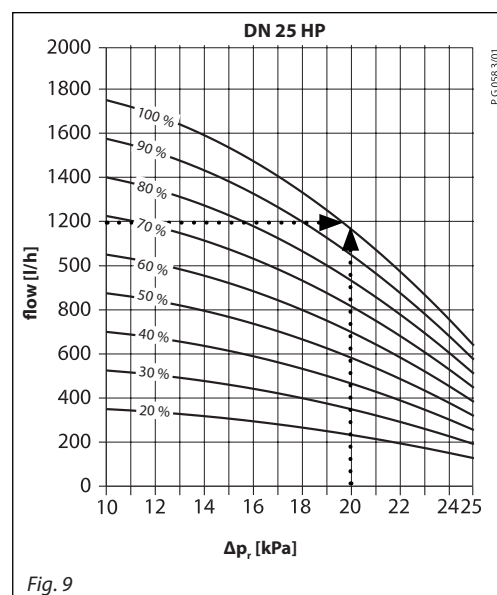
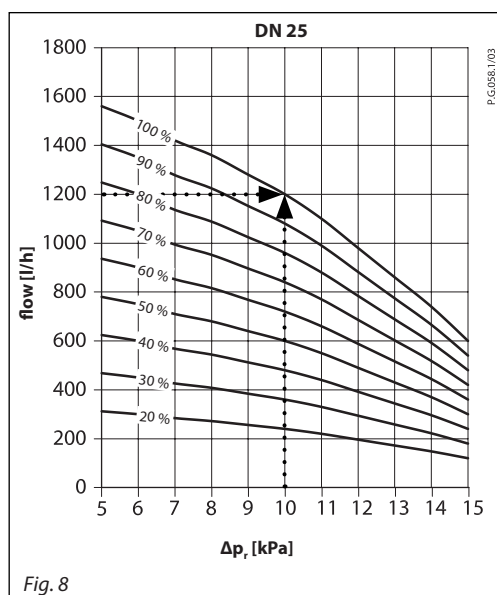
For any other Q and  $\Delta p_r$  needed, AB-PM size and setting can be identified based on Fig. 4, 5 and 6. Alternatively table 2, 3 and 4 can be used for AB-PM sizing as well. Q is proportional to the setting on AB-PM while upper limit differential pressure ( $\Delta p_r$ ) is kept the same.

Table 1

Type at 100% setting	DN	15		15 HP		20		20 HP		25		25 HP	
Q max.	l/h	300	400	300	490	600	780	600	915	1200	1600	1200	1800
Maximum pressure drop available for system at max flow		10	5	20	10	10	5	20	10	10	5	20	10
Upper limit of pressure controller at zero flow	kPa	22		35		22		35		22		35	
Starting $\Delta p_v$		16		30		16		30		16		30	



Sizing (continuous)



Example

Given:  
 Design flow trough radiators loop: 420 l/h  
 Pressure drop trough the loop at design flow: 10 kPa

Solution:  
 AB-PM DN 20 is selected. Set to 70 % (= 420/600), AB-PM will control differential pressure of 10 kPa when design flow is achieved. It will at any loads including keep it under 22 kPa at zero load, while limiting the flow to radiator system to 420 l/h.

Table 1 AB-PM DN 15 setting

DN 15	flow [l/h] - average								
$\Delta p_r$ [kPa]	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
5	80	120	160	200	240	280	320	360	400
6	77	116	154	193	231	270	308	347	385
7	74	111	148	185	222	259	296	333	370
8	70	105	140	175	210	245	280	315	350
9	65	98	130	163	195	228	260	293	325
10	60	90	120	150	180	210	240	270	300
$Q_{max}$ at $\Delta T$ 20 °C	7,0 kW								
...									
15	30	45	60	75	90	105	120	135	150

Table 2 AB-PM DN 15 HP setting

DN 15 HP	flow [l/h] - average								
$\Delta p_r$ [kPa]	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
10	100	145	195	245	295	345	390	440	490
...									
15	85	125	165	210	250	290	330	375	415
16	80	120	160	200	235	275	315	355	395
17	75	115	150	190	225	265	300	340	375
18	70	105	140	175	210	245	280	315	350
19	65	100	130	165	195	225	260	295	325
20	60	90	120	150	180	210	240	270	300
$Q_{max}$ at $\Delta T$ 20 °C	7,0 kW								
21	55	85	110	140	165	195	220	250	275
22	50	75	100	125	150	175	200	225	250
23	45	65	90	110	130	155	175	200	220
24	40	55	75	95	115	135	150	170	190
25	30	50	65	80	95	110	130	145	160

Sizing (continuous)

Table 3 AB-PM DN 20 setting

DN 20	flow [l/h] - average								
$\Delta p_r$ [kPa]	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
5	155	235	310	390	470	545	625	700	780
6	150	225	300	375	450	525	600	675	750
7	140	215	285	355	425	495	570	640	710
8	135	205	270	340	410	475	545	610	680
9	130	190	255	320	385	450	510	575	640
10	120	180	240	300	360	420	480	540	600
$Q_{max}$ at $\Delta T 20^\circ C$	13,9 kW								
...									
15	60	90	120	150	180	210	240	270	300

Table 4 AB-PM DN 20 HP setting

DN 20 HP	flow [l/h] - average								
$\Delta p_r$ [kPa]	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
10	185	275	370	460	550	645	735	830	920
...									
15	160	235	315	395	475	555	630	710	790
16	150	225	300	380	455	530	605	680	755
17	145	215	290	360	430	505	575	650	720
18	135	205	270	340	410	475	545	610	680
19	130	190	255	320	385	450	510	575	640
20	120	180	240	300	360	420	480	540	600
$Q_{max}$ at $\Delta T 20^\circ C$	13,9 kW								
21	110	165	220	275	325	380	435	490	545
22	100	150	200	250	295	345	395	445	495
23	45	65	90	110	130	155	175	200	220
24	40	55	75	95	115	135	150	170	190
25	30	50	65	80	95	110	130	145	160

Table 5 AB-PM DN 25 setting

DN 25	flow [l/h] - average								
$\Delta p_r$ [kPa]	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
5	310	470	625	780	935	1090	1250	1405	1560
6	300	450	600	750	900	1050	1200	1350	1500
7	285	425	570	710	850	995	1135	1280	1420
8	270	410	545	680	815	950	1090	1225	1360
9	255	385	510	640	770	895	1025	1150	1280
10	240	360	480	600	720	840	960	1080	1200
$Q_{max}$ at $\Delta T 20^\circ C$	27,9 kW								
...									
15	120	180	240	300	360	420	480	540	600

Table 6 AB-PM DN 25 HP setting

DN 25 HP	flow [l/h] - average								
$\Delta p_r$ [kPa]	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
10	350	525	700	875	1050	1225	1400	1575	1750
...									
15	305	460	615	770	920	1075	1230	1380	1535
16	295	445	590	740	885	1035	1180	1330	1475
17	280	420	560	705	845	985	1125	1265	1405
18	265	400	530	665	800	930	1065	1195	1330
19	250	375	500	625	750	875	1000	1125	1250
20	240	360	480	600	720	840	960	1080	1200
$Q_{max}$ at $\Delta T 20^\circ C$	27,9 kW								
21	215	320	430	535	640	750	855	965	1070
22	195	290	390	485	580	680	775	875	970
23	175	260	345	435	520	605	690	780	865
24	150	225	300	380	455	530	605	680	755
25	130	190	255	320	385	450	510	575	640

Design

1. Spindle
2. Stuffing box
3. Pointer
4. Control valve's cone
5. Membrane
6. Main spring
7. Hollow cone (pressure controller)
8. Vulcanized seat (pressure controller)
9. Impulse tube

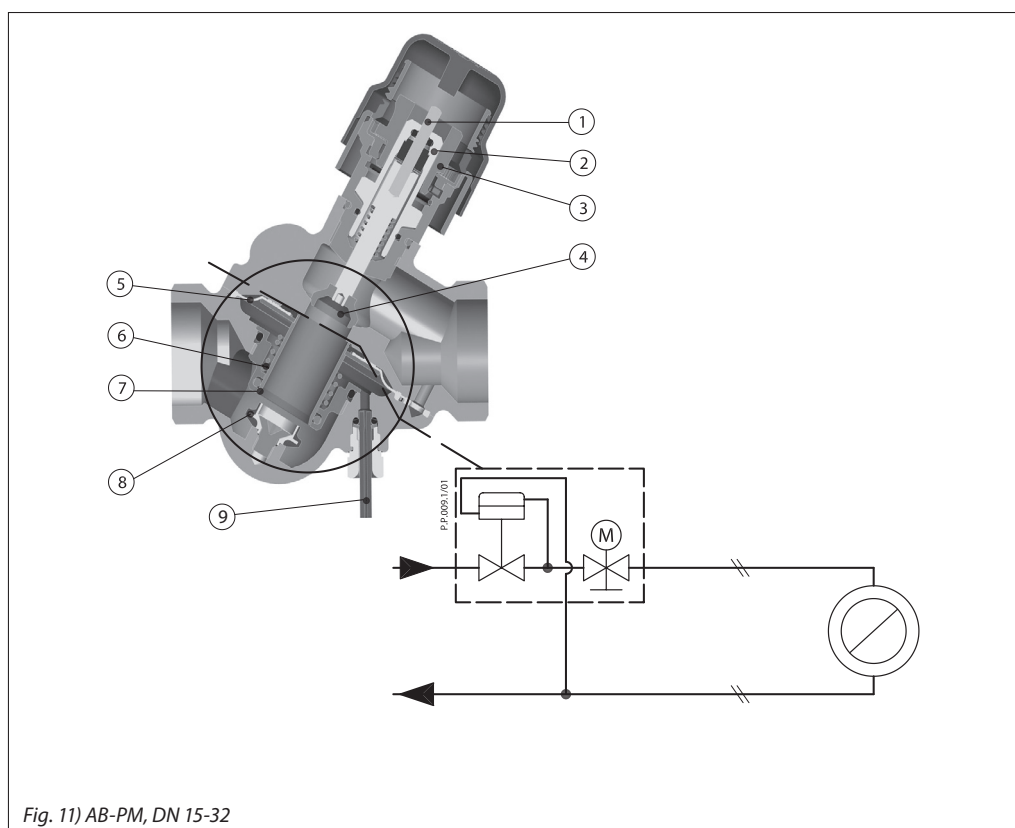


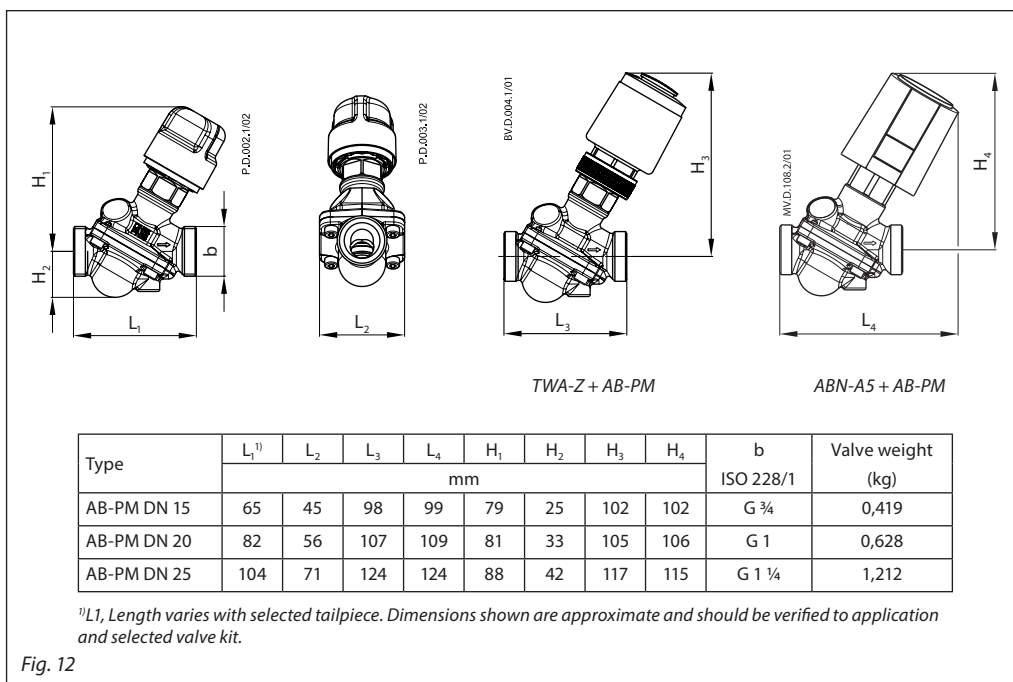
Fig. 11) AB-PM, DN 15-32

AB-PM is a combined automatic balancing valve. It is working as  $\Delta p$  controller, flow limiter and zone controller. Higher pressure acts on the upper side of the control diaphragm (5) while via an impulse tube (9) lower pressure in the return pipe acts on the lower side of the diaphragm. When available pressure increases at partial loads, the membrane closes and thus keeps stable  $\Delta p$  inside the controlled loop.  $\Delta p$  controller keeps constant differential pressure on the controlled loop including the control part of AB-PM (similar as if ASV-I would be integrated into ASV-P).

The control part of AB-PM is working as a flow limiter. This enables to set both the design flow as well as needed  $\Delta p$ . The flow rate is defined by presetting AB-PM, based on pressure demand of the loop.

With actuator mounted on the valve, AB-PM can be used as zone valve. When connected to the room controller with time programs, functions such as night setback, holiday mode, etc become available.

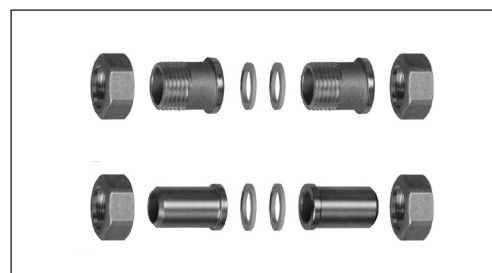
Dimensions



Fittings

For valves with external thread Danfoss offers threaded or welded tailpieces as accessory.

Materials:  
 Nut .....brass  
 Tailpiece welding .....steel  
 Tailpiece threaded .....brass



DN	Welded		Threaded	
	To pipe	L (mm)	Weld.con.	Sold.con.
	L (mm)			
15	R ½	27,5	37	22
20	R ¾	30,5	42	X
25	R 1	35	42	