



Combined automatic balancing valve ART. 6540

Description



Art.6540 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 Δp 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

Art.6540 valve (including 1.5 m impulse tube and imp. tube adapter)

Picture	DN	Ext. thread (ISO 228/1)	Code No.
	15	G ¾ A	6510638
	20	G 1 A	6510639
	25	G 1¼ A	6510640

Art.9566 Actuator

Type	Power supply	Cable length	Code No.
Normally Closed ¹⁾	230 V AC	1.2 m	4500574

¹⁾ up to 60 % of Q_{max} on Art. 6540 DN 25

Technical data

Nominal diameter		DN	15	20	25
Q_{nom} (at 100% setting)	l/h		300	600	1200
Max. pressure at zero load			35	35	35
Max. differential pressure (Δp_a)	kPa		400		
Min. differential pressure (Δp_a)			28	28	28
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 × 1.5		
Materials in water					
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		
Materials out of the water					
Plastic parts			PA		
Insert parts and outer screws			CuZn39Pb3 - CW 614N; W.Nr. 1.4310; W.Nr. 1.4401		



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Mounting

Art.6540 should be mounted in flow in the direction of the arrow on the valve body. The impulse tube should be installed between Art 6540 and 3/8" adapter that is supplied together with the valve.

Alternatively, impulse tube can be connected to Art.6539 partner valve. With it, additional service functions such as flow verification, shut-off, etc are available.

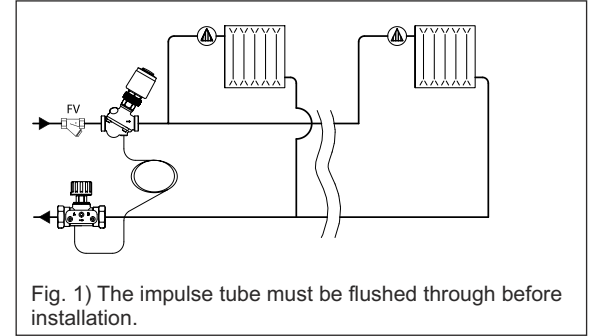


Fig. 1) The impulse tube must be flushed through before installation.

Applications

Art. 6540 is designed to be used in heating residential application. It can be used both in radiator or floor heating systems. The valve offers 3 functions in one valve, and with its small valve body it is ideal for small spaces such as manifold cabinets etc.

Art.6540 is focused to systems with horizontal piping loops and individual flat connections: Art.6540 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 ¹⁾.

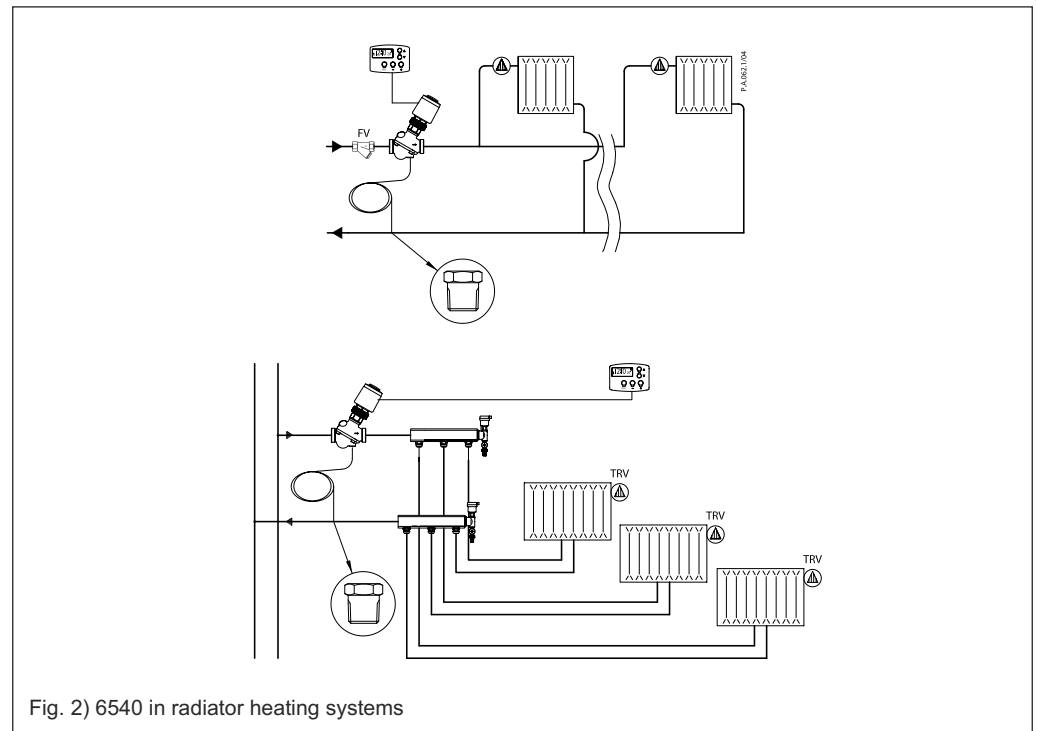


Fig. 2) 6540 in radiator heating systems

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

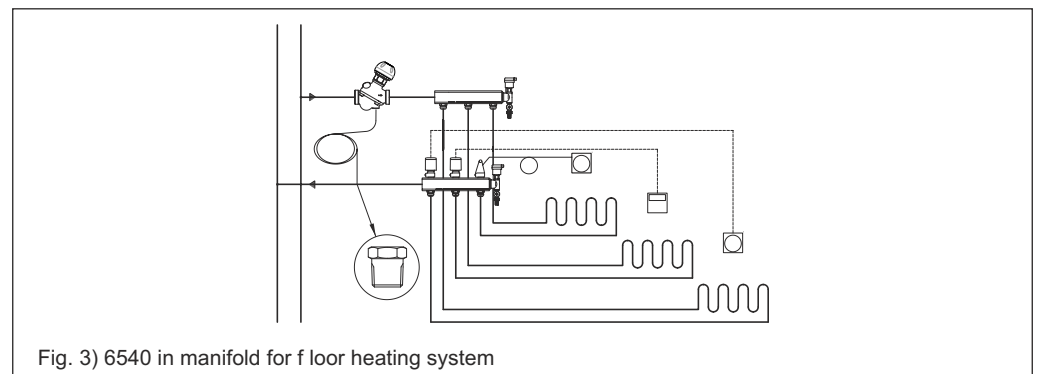
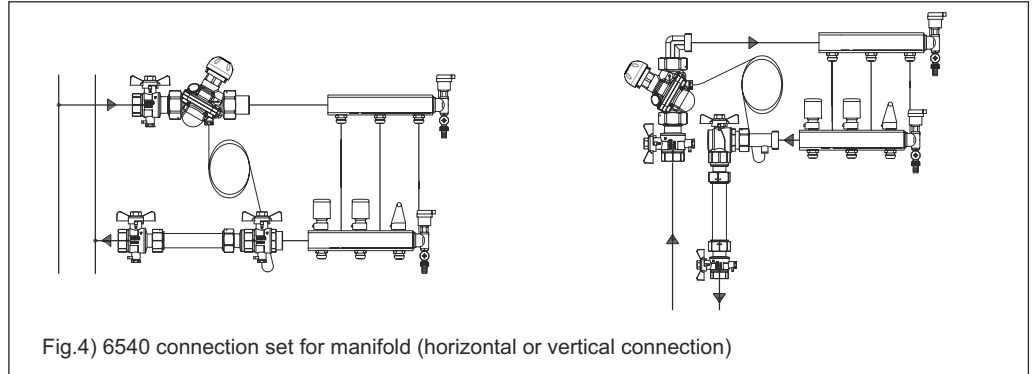


Fig. 3) 6540 in manifold for floor heating system



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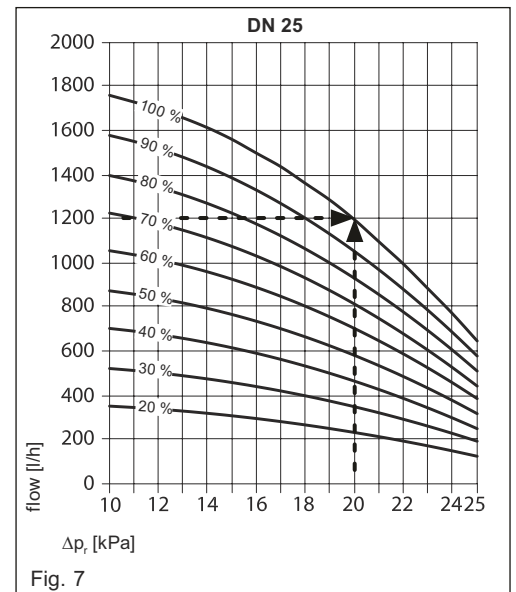
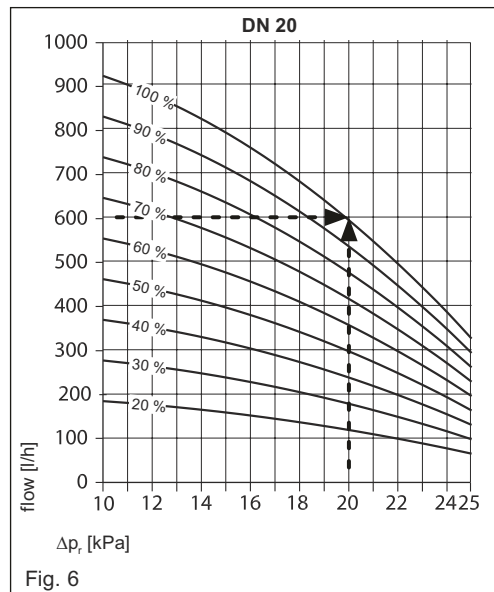
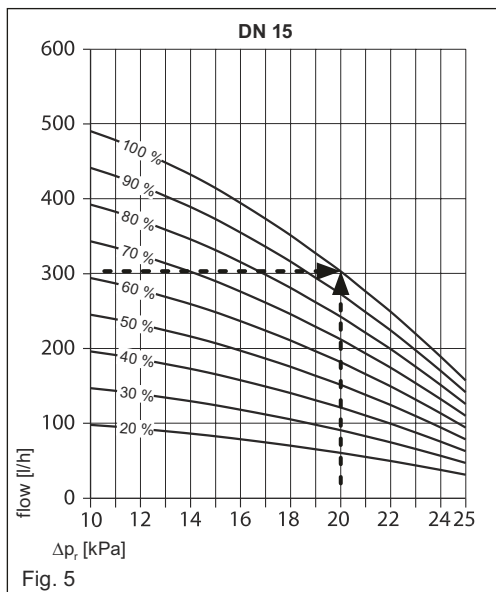
Sizing

Art.6540 balancing valve is to be sized based on needed flow (Q) and needed differential pressure drop for the loop (Δp_r). Max flow data are presented in table 1.

For any other Q and Δp_r needed, Art. 6540 size and setting can be identified based on Fig. 5-7. Alternatively table 2-4 can be used for Art. 6540 sizing as well. Q is proportional to the setting on valve while upper limit differential pressure (Δp_r) is kept the same.

Table 1

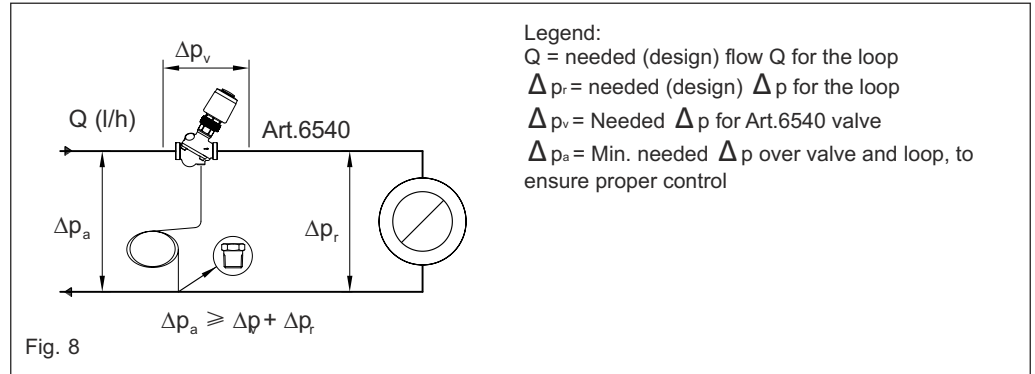
Type at 100% setting	DN	15		20		25	
Q max.	l/h	300	490	600	915	1200	1800
Maximum pressure drop available for system at max flow	kPa	20	10	20	10	20	10
Max. pressure at zero load		35		35		35	
Min. differential pressure (Δp_d)		28		28		28	
Max. differential pressure (Δp_d)		400		400		400	





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Sizing (continuous)



Example

Given:
 Design flow trough radiators loop: 420 l/h
 Pressure drop trough the loop at design flow: 20 kPa

Solution:
 Art.6540 DN 20 is selected. Set to 70 % (= 420/600), Art.6540 will control differential pressure of 20 kPa when design flow is achieved. It will at any loads including keep it under 35 kPa at zero load, while limiting the flow to radiator system to 420 l/h.

Sizing (continuous)

Table 2 Art.6540 DN 15 setting

DN 15 Δp_r [kPa]	flow [l/h] - average								
	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 ΔT 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

Table 3 Art. 6540 DN 20 setting

DN 20 Δp_r [kPa]	flow [l/h] - average								
	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 ΔT 20 °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	90	130	175	220	265	310	350	395	440
24	75	115	155	195	230	270	310	345	385
25	65	100	130	165	195	225	260	295	325



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Sizing(continuous)

Table 4 Art. 6540 DN 25 setting

DN 25	flow [l/h] - average								
Δp_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 ΔT 20 °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

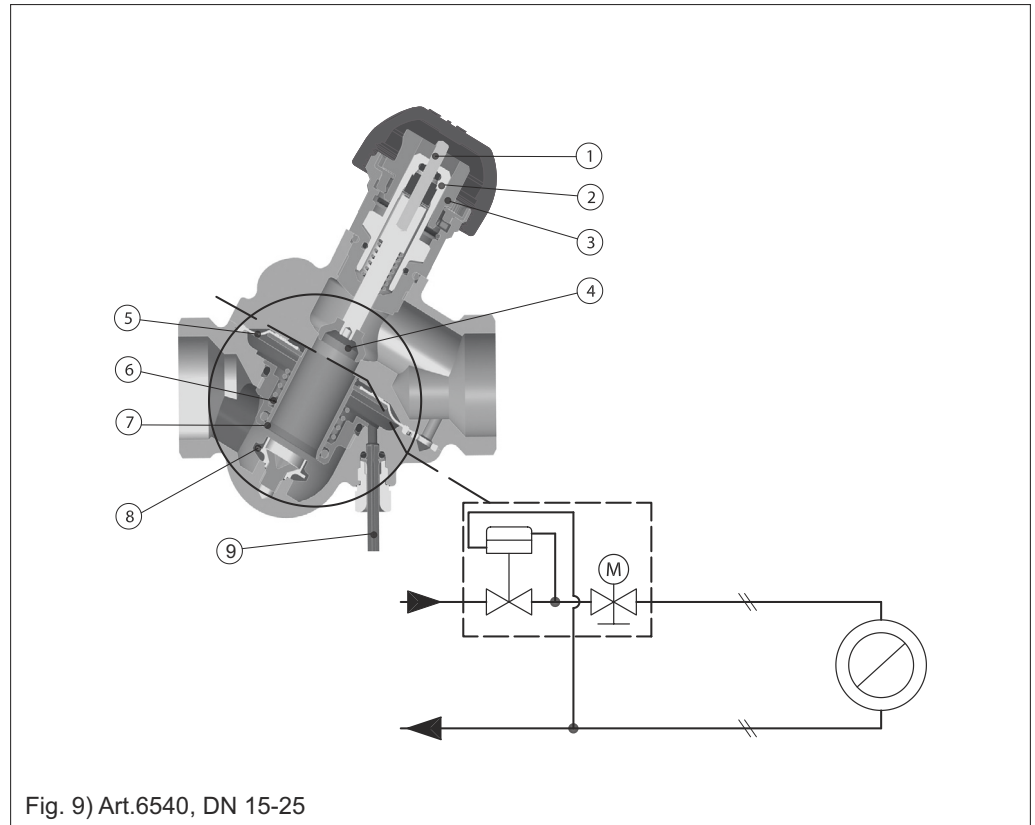


Fig. 9) Art.6540, DN 15-25

Art. 6540 is a combined automatic balancing valve. It is working as Δp 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 Δp inside the controlled loop. Δp controller keeps constant differential pressure on the controlled loop including the control part of Art. 6540.

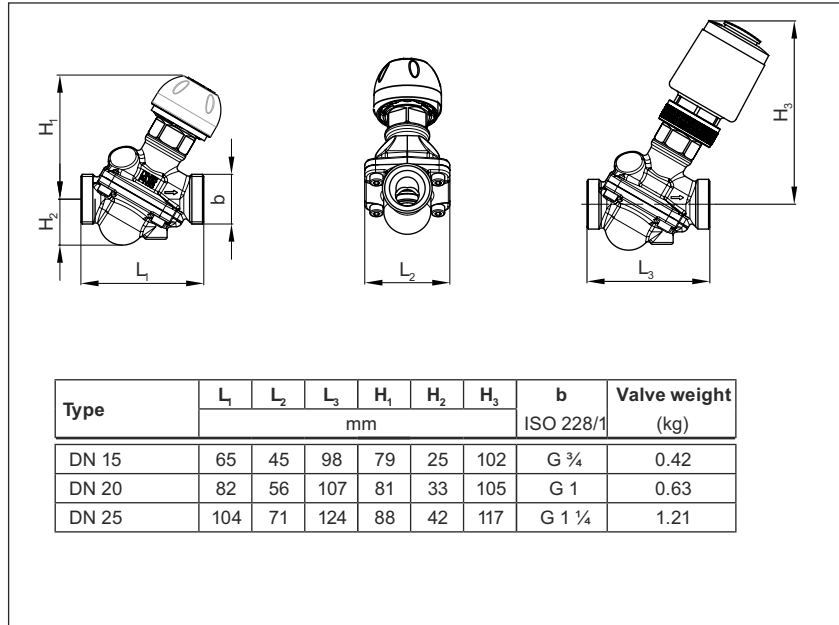
The control part of Art. 6540 is working as a flow limiter. This enables to set both the design flow as well as needed Δp . The flow rate is defined by presetting Art. 6540, based on pressure demand of the loop.

With actuator mounted on the valve, Art. 6540 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.



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Dimensions



Tender text

Art. 6540 - Combined Automatic Balancing Valve

Branch should be balanced with a differential pressure controller for dynamic hydronic balance, with following characteristics:

- a. Pressure class: PN 16
- b. Temperature range: -10 ... +120 °C.
- c. Connection size: DN15-DN25
- d. Connection type: External thread ISO 228/1
- e. Valve body material: DZR brass
- f. Installation: on flow pipe with connection via impulse tube to return pipe.
- g. Δp setting range: 10-25 kPa
 Nom flow at 20 kPa: 300 l/h (DN15), 600 l/h (Dn20) and 1200 l/h (DN25)
 Minimum Δp across valve and loop 28 kPa to ensure proper control
 Max Δp at zero flow: 35 kPa
 Max Δp across the valve: 4 bar