Differential Pressure Regulator

BOA-Control DPR

Type Series Booklet

KSB

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Type Series Booklet BOA-Control DPR

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Control Valves / Measurement Valves

Balancing and Shut-off Valves to DIN/EN

BOA-Control DPR

Main applications

- Hot-water heating systems
- Air-conditioning systems
- Cooling circuits

Fluids handled

- Water
- Water/glycol mixtures (glycol content ≤ 50 %)
- Other fluids on request.

Operating data

Table 1: Operating properties

Characteristic	Value
Nominal pressure	16/25
Nominal size	15 - 100
Max. permissible pressure [bar]	25 (DN 15-25)
	16 (DN 32-100)
Min. permissible temperature [°C]	≥ -10
Max. permissible temperature [°C]	≤ +120
Max. permissible differential pressure [bar]	4

Valve body materials

Table 2: Overview of available materials

Material	Temperature limit	Nominal size
CW602N	≤ 120 °C	DN 15 - 50
EN-GJL-250	≤ 120 °C	DN 65 - 100

Design details

Design

- Continuously adjustable differential pressure regulator
- Straight-way Y-pattern valve
- Internal thread (≤ DN 50) or flanges (≥ DN 65)
- Two self-sealing pressure measurement connection branches for checking differential pressure
- Device for presetting the differential pressure for all nominal sizes

Product benefits

- Materials suitable for all applications in heating or cooling systems
- Pre-defined valve position facilitates easy flushing (DN 15-50).
- Shut-off function provides tight shut-off (DN 15-25).
- Differential pressure continuously adjustable via handwheel featuring several scales (DN 15-25)
- Straightforward commissioning and initial balancing as system section pressures are independent from each other
- Constant pressure conditions ensure minimised flow noises.

Product information

Product information as per Regulation No. 1907/2006 (REACH)

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see https://www.ksb.com/en-global/company/corporate-responsibility/reach.

Product information as per Pressure Equipment Directive 2014/68/EU (PED)

The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Group 2.

Product information as per Pressure Equipment (Safety) Regulations 2016

The valves satisfy the safety requirements of the UK Pressure Equipment (Safety) Regulations 2016 (PER) for fluids in Group 2.

Related documents

Table 3: Information/documents

Document	Reference number
Operating manual	7137.8
Typical tender for BOA-Control DPR (DN 15 - 50)	7137.521
Typical tender for BOA-Control DPR (DN 65 - 100)	7137.522
Type series booklet BOA-Control SBV	7130.5

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Purchase order specifications

Please specify the following information in all enquiries or purchase orders:

1. Type
2. Nominal pressure
3. Nominal size
4. Reference number

Pressure/temperature ratings

Table 4: Test pressure and operating pressure

PN	DN	Shell test	Seat tightness test	Permissible operating pressure[1)]	
		With water			
		Tests P10 and P11 to DIN EN 12266-1	Test P12, leakage rate A to DIN EN 12266-1	-10 to +100 °C	120 °C
		[bar]	[bar]	[bar]	[bar]
25	15-25	37,5	27,5	25	21,7
16	32-100	24	17,6	16	12,7

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1 Static load

Materials

DN 15 - 25

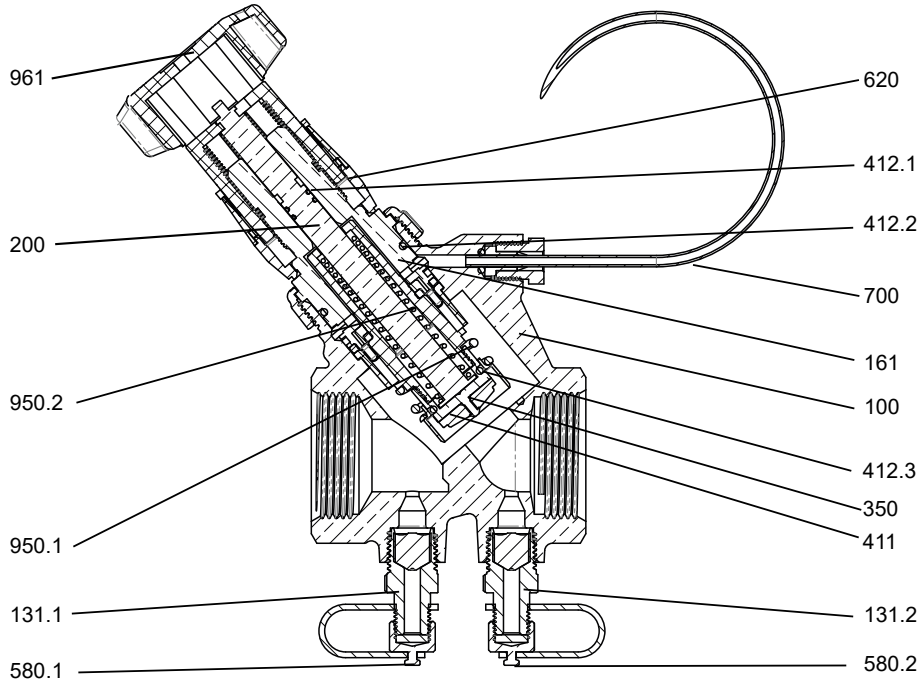

Fig. 1: Sectional drawing DN 15 - 25

Table 5: Overview of available materials DN 15 - 25

Part No.	Description	Material	Note
100	Body	CW602N	-
131.1/.2	Pressure measurement connection branch	CW617N	-
161	Body bonnet	CW602N	-
200	Stem	CW617N	-
350	Valve disc	CW617N	-
411	Sealing element	EPDM Perox 80SH	-
412.1/.2	O-ring	EPDM 70	-
412.3	O-ring	EPDM Perox	-
580.1/.2	Cap	CW617N	Red (580.1), blue (580.2)
620	Position indicator	Glass fibre reinforced plastics	-
700	Piping (capillary tube)	Copper	-
950.1/.2	Spring	AISI302	-
961	Handwheel	Glass fibre reinforced plastics	-

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DN 32 - 50

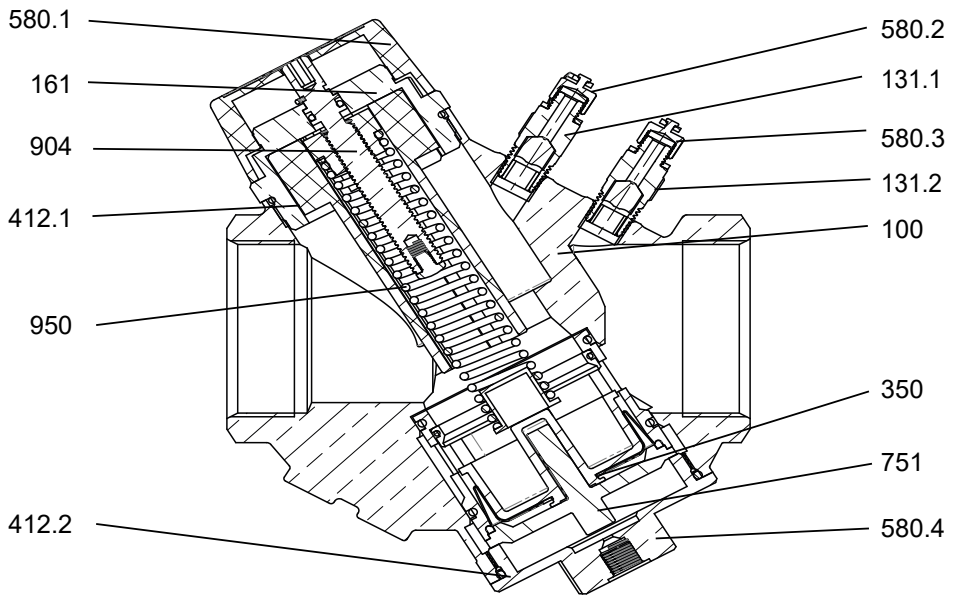

Fig. 2: Sectional drawing DN 32 - 50

Table 6: Overview of available materials DN 32 - 50

Part No.	Description	Material	Note
100	Body	CW602N	-
131.1/.2	Pressure measurement connection branch	CW617N	-
161	Body bonnet	CW602N	-
350	Valve disc	Plastic	-
412.1/.2	O-ring	EPDM 70	-
580.1	Cap	Plastic	-
580.2/.3	Cap	CW617N	Red (580.2), blue (580.3)
580.4	Cap	CW602N	-
751	Inserted piece	Plastic	-
904	Grub screw	Stainless steel	-
950	Spring	AISI302	-

DN 65 - 100

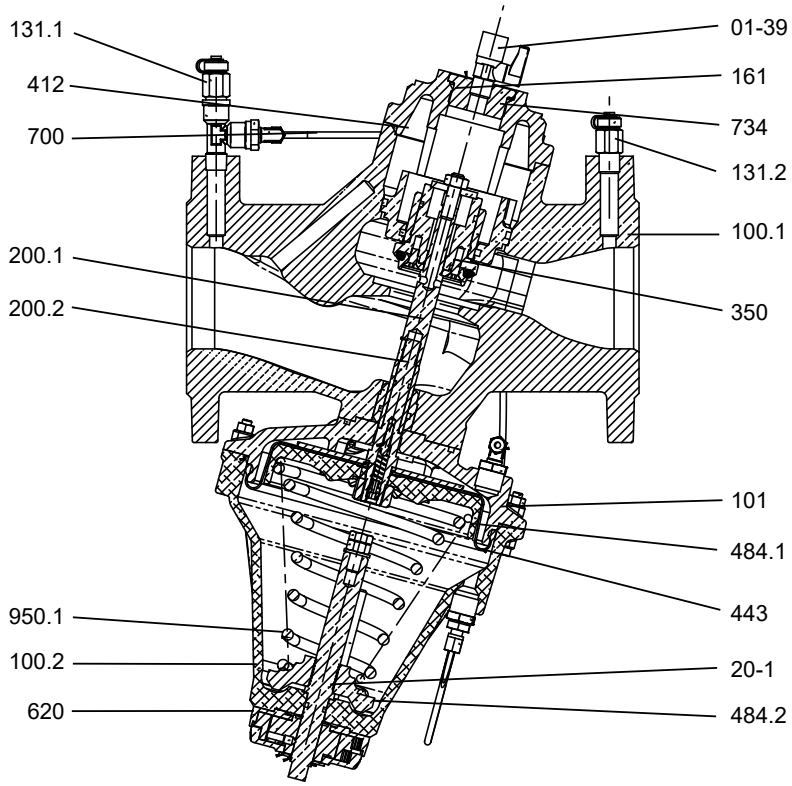

Fig. 3: Sectional drawing DN 65 - 100

Table 7: Overview of available materials DN 65 - 100

Part No.	Description	Material	Note
01-39	Ball valve	CW617N	-
100.1	Body (valve)	EN-GL-250 (5.1301)	-
100.2	Housing (actuator)	G-AlSi4.5MnMg	-
101	Lower housing section (actuator)	G-AlSi4.5MnMg	-
131.1/.2	Pressure measurement connection branch	CW617N	-
161	Body bonnet	EN-GL-250 (5.1301)	-
20-1	Adjusting stem	CW617N	-
200.1/.2	Stem	CW617N	-
350	Valve disc	CW617N	-
412	O-ring	EPDM	-
443	Diaphragm	EPDM	-
484.1	Spring plate	G-AlSi4.5MnMg	-
484.2	Spring plate	CW617N	-
620	Position indicator	Polyamide	-
700	Piping (capillary tube)	Copper	-
734	Screwed union	CW617N	-
950.1	Spring	AISI302	-

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Dimensions and weights

DN 15 - 25

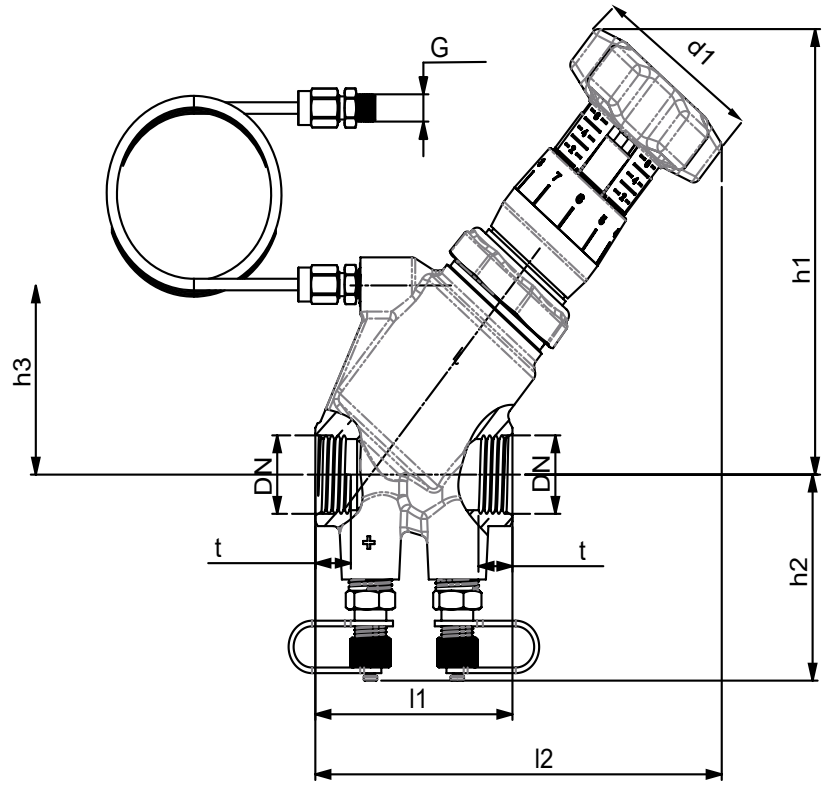

Fig. 4: Dimensions DN 15 - 25

Table 8: Dimensions and weights DN 15 - 25

PN	DN	NPS	d1	h1	h2	l1	l2	t	h3	G	[kg]
		[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[inch]	
25	15	1/2	50	119	55	59	122	12	50	1/8	0,87
	20	3/4	50	119	55	66	124	13	50	1/8	0,90
	25	1	50	119	55	72	131	13,5	50	1/8	1,03

Mating dimensions as per standard

Threaded ends: ISO 228

DN 32 - 50

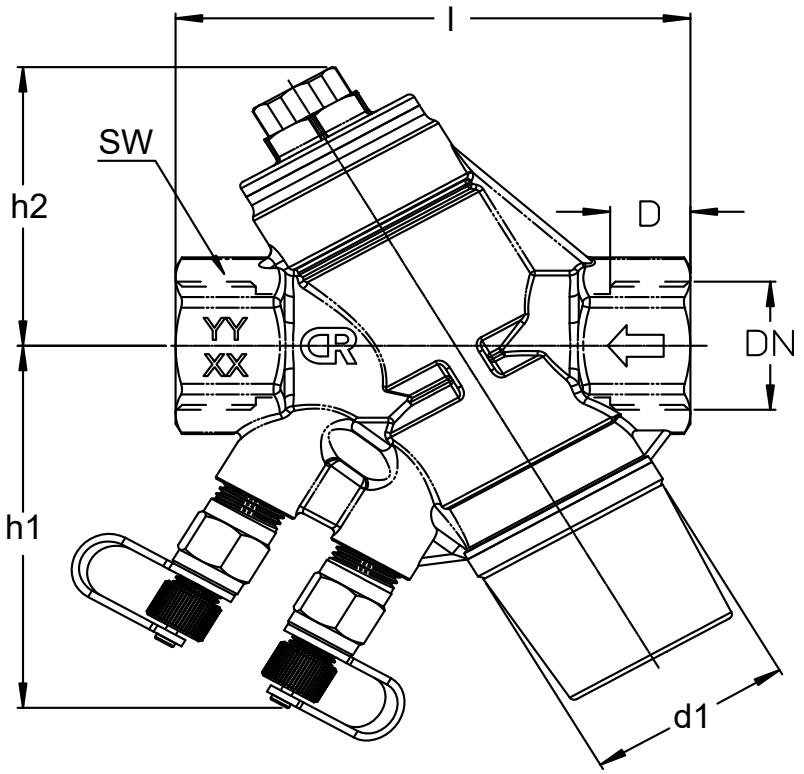

Fig. 5: Dimensions DN 32 - 50

Table 9: Dimensions and weights DN 32 - 50

PN	DN	NPS	d1	h1	h2	l	SW	D	[kg]
		[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
16	32	1 1/4	50	91	74	132	47	17	1,63
	40	1 1/2	65	98	85	144,5	54	17	2,48
	50	2	65	105	90	155	67	20	2,97

Mating dimensions as per standard

Threaded ends: ISO 228

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DN 65 - 100

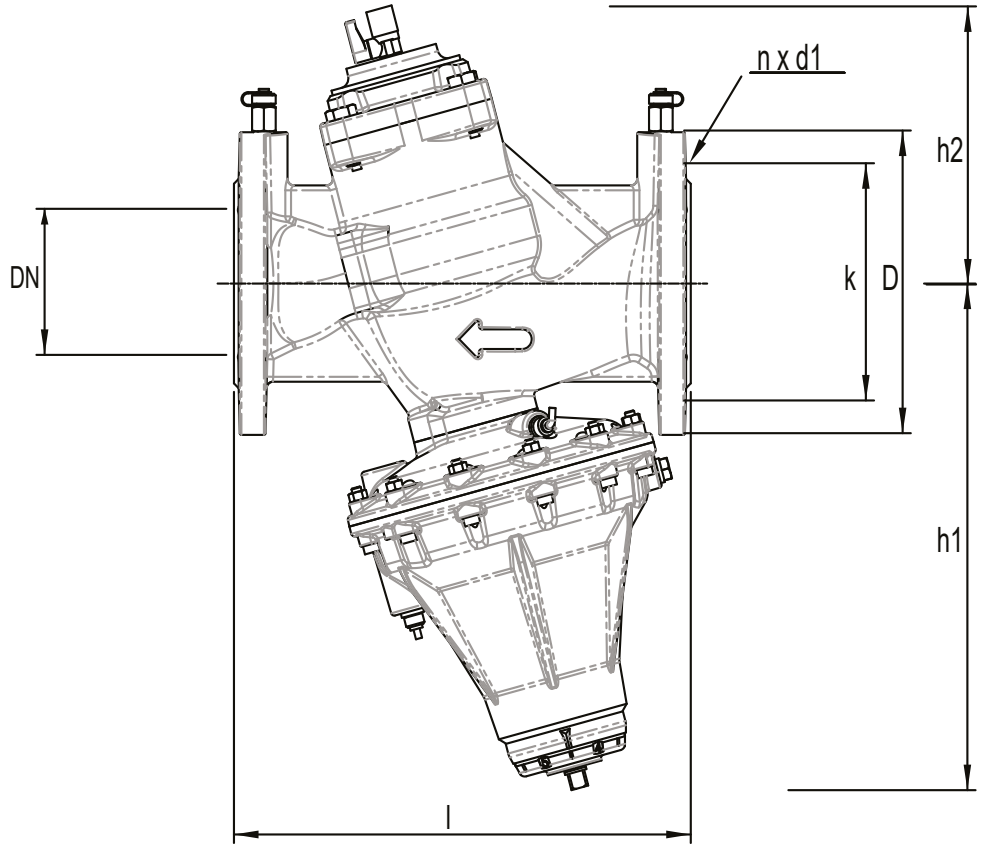


Fig. 6: Dimensions DN 65 - 100

Table 10: Dimensions and weights DN 65 - 100

PN	DN	NPS	h1	h2	l	k	D	n	d1	[kg]
		[inch]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
16	65	$2^1/_2$	310	170	290	145	185	4	18	21,7
	80	3	400	176	310	160	200	8	18	28,1
	100	4	414	191	350	180	220	8	18	33,6

Mating dimensions as per standard

Flanges: DIN EN 1092-2

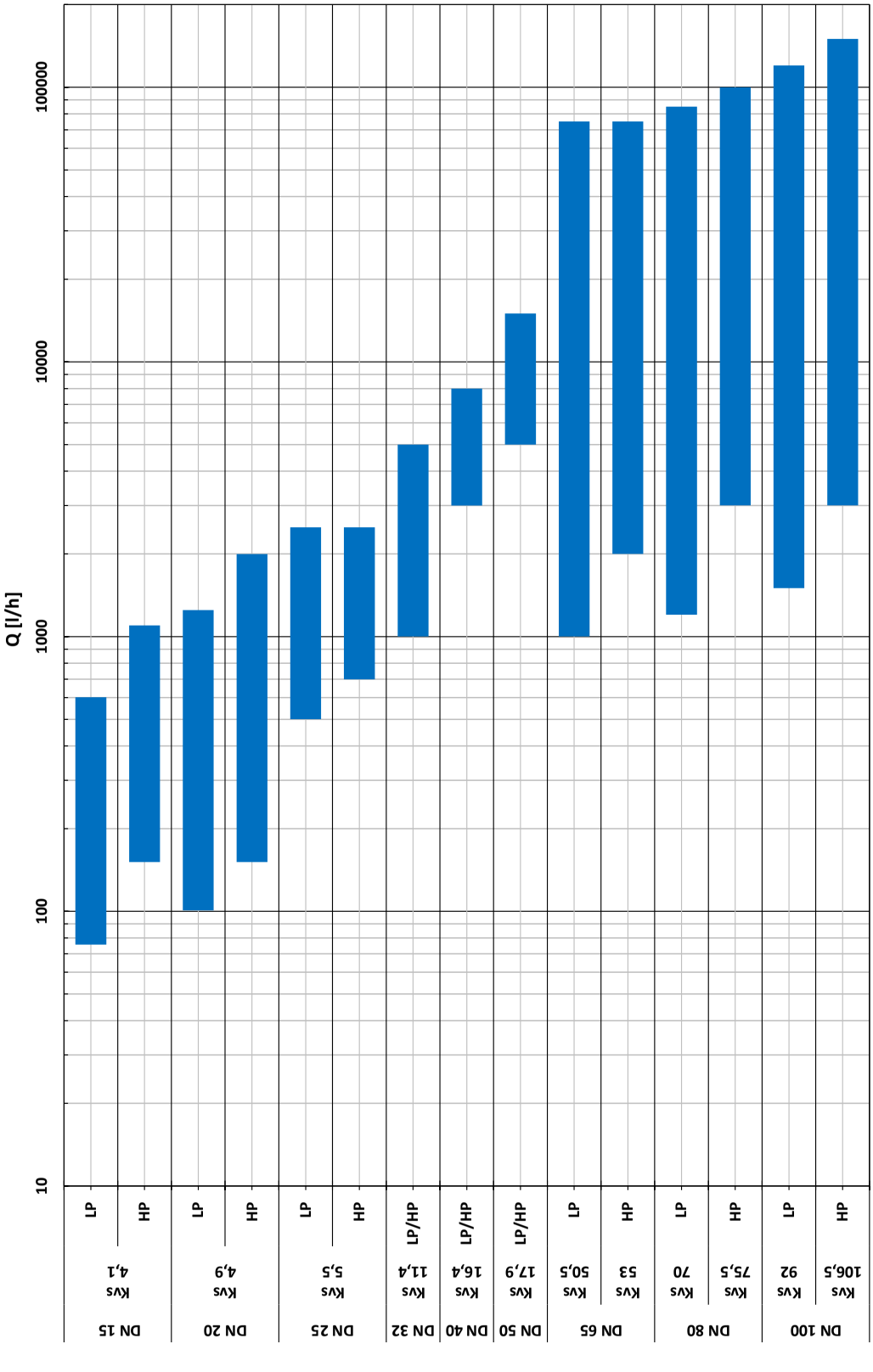
Installation information

The valves are installed in the return line either in a horizontal or vertical position.

Flow through the valves must be in the direction indicated by the flow direction arrow cast on the valve body.

A measuring kit for checking the differential pressure can be hired on request.

Prior to commissioning, the pressure measurement line must always be connected in the supply.



Control range

Fig. 7: Control ranges

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Selection information

Typical applications

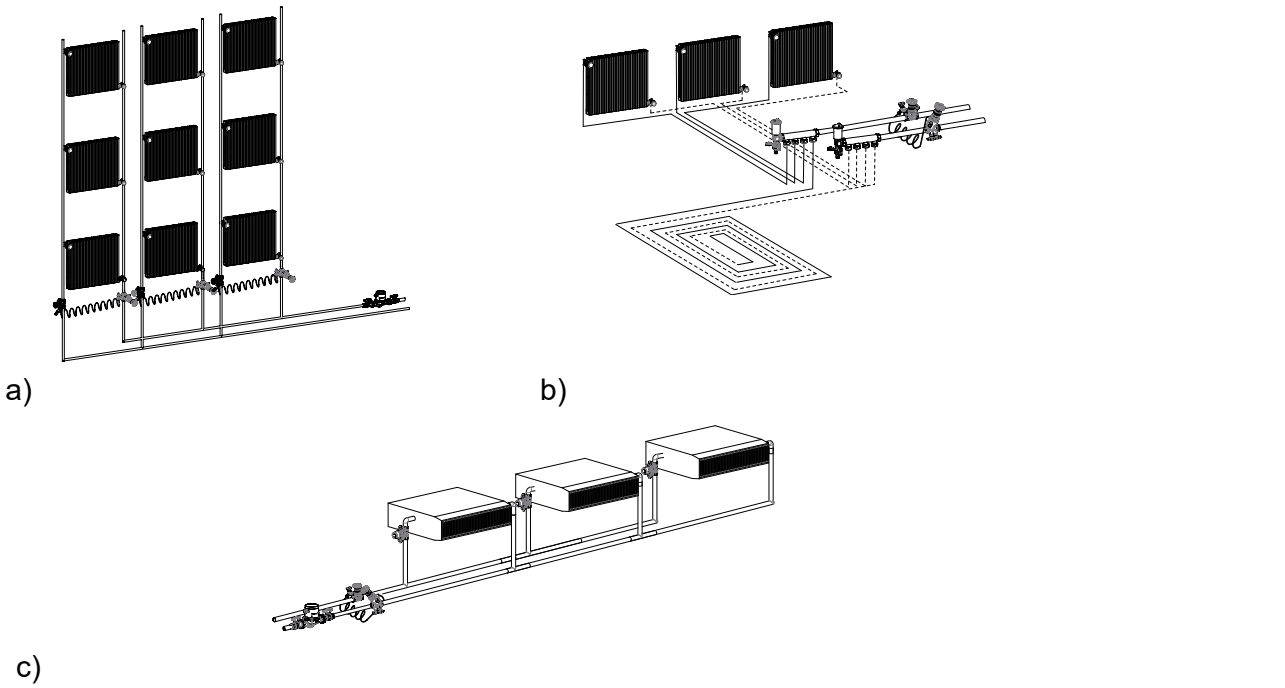

Fig. 8: Typical applications a) Heating distributor b) Underfloor heating/radiator combination c) Fan coils

The valve is suitable for use in a variety of heating and cooling systems. The valve serves to prevent flow noises in the thermostatic valves and to maintain a constant differential pressure in the branches.

A constant differential pressure provides optimum valve authority at the thermostatic valves and precise temperature control, resulting in energy savings.

Use with partner valve

In combination with a partner valve, the valve can be used to set the volume flow rate in the respective branch. Combining the valve with a BOA-Control SBV partner valve will eliminate the need for volume flow rate controlling valves (pre-settable thermostatic valves) to be fitted upstream of every consumer installation. To set the required volume flow rate, the differential pressure can be measured with a differential pressure gauge at the partner valve.

Selecting the valve combination

1. Calculate the total pressure drop of the combination of differential pressure regulator and partner valve.
2. Determine the pressure drop of the partner valve Δp_{SBV}. To minimise energy loss at optimum operating mode, the pressure drop across the differential pressure regulator Δp_{DPR} must be ≤ 10 kPa. The additional pressure remaining after Δp_{SBV} has been deducted is eliminated by the differential pressure regulator. This is the main task of a differential pressure regulator, which is designed to balance pressure fluctuations in the system Δp_a .
3. Calculate the Kv value of the partner valve. The partner valve to be selected has to meet the following requirement: calculated Kv value ≤ 0.8 × Kvs. This will allow the setting to be subsequently adjusted without reaching the valve's limit immediately.
4. Using selection tables and flow characteristics, determine the nominal valve size and presetting for the partner valve. For selection tables, flow characteristics and a selection example refer to the BOA-Control SBV type series booklet.
5. Calculate the design pressure Δp_{set} for presetting the differential pressure regulator.
6. Using selection tables (⇨ Page 15) ,determine permissible nominal valve sizes for the differential pressure regulator.
7. Refer to the characteristic curves or tables for the presettings (⇨ Page 15) of the differential pressure regulator.

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Selection example

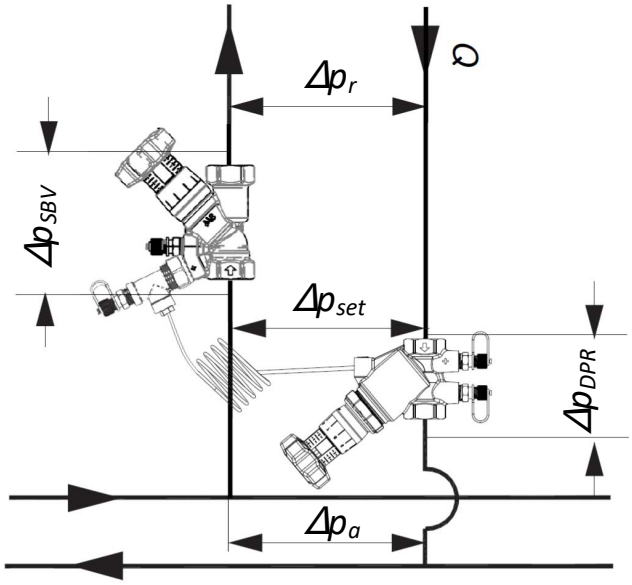

Fig. 9: Simplified heating circuit

Task:

Select the differential pressure regulator and the BOA-Control SBV partner valve on the basis of the heating circuit variables given:

- Required volume flow rate: Q = 1 m³/h = 1000 l/h
- Available branch differential pressure: Δp_a = 35 kPa
- Required differential pressure for pipe section and, e.g., radiators: Δp_r = 13 kPa
- Relative density of water as fluid handled: r = 1

Solution:

Total pressure drop of differential pressure regulator and partner valve:

$\Delta p_{DPR} + \Delta p_{SBV} = \Delta p_a - \Delta p_r$ = 35 kPa - 13 kPa = 22 kPa = 0.22 bar

Based on a pressure drop requirement $\Delta p_{DPR} \leq$ 10 kPa across the differential pressure regulator, a pressure drop Δp_{SBV} = 15 kPa = 0.15 bar is assumed at the partner valve.

Additional pressure remaining in the selection example:
22 kPA - 15 kPa = 7 kPa

Calculating the presetting of the partner valve:

Inserting r = 1 for water as the fluid handled and Δp = 1 bar and Δp_{SBV} = 0.15 bar, the Kv value is calculated as:

$$Kv = Q \cdot \sqrt{\frac{r}{\Delta pSBV}} = 1 \cdot \sqrt{\frac{1}{0{,}15}} = 2{,}58\ m^3/h$$

Requirement for the partner valve: calculated Kv value ≤ 0.8 × Kvs

BOA-Control SBV DN 20 fulfils the above requirements and is preset to approx. 2.5 handwheel turns.

Calculating the presetting of the differential pressure regulator:

Design pressure for presetting the differential pressure regulator:

$\Delta p_{set} = \Delta p_{SBV} + \Delta p_r$ = 15 kPa + 13 kPa = 28 kPA = 0.28 bar

For Δp_{set} = 28 kPa and Q = 1000 l/h a BOA-Control DPR LP (Low Pressure) valve of nominal size DN 20 is selected.

The presetting of 11 handwheel turns is selected on the basis of the valve characteristic:

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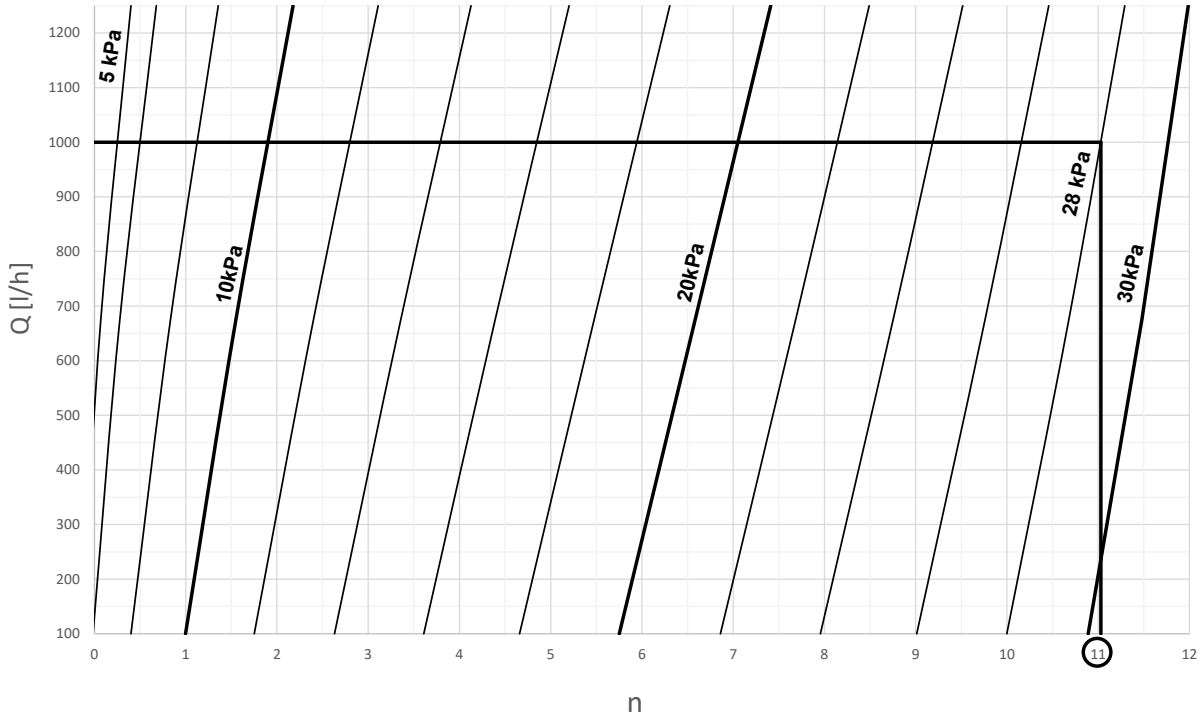


Fig. 10: Selection example of presetting for DN 20LP

Presettings

Table 11: Key

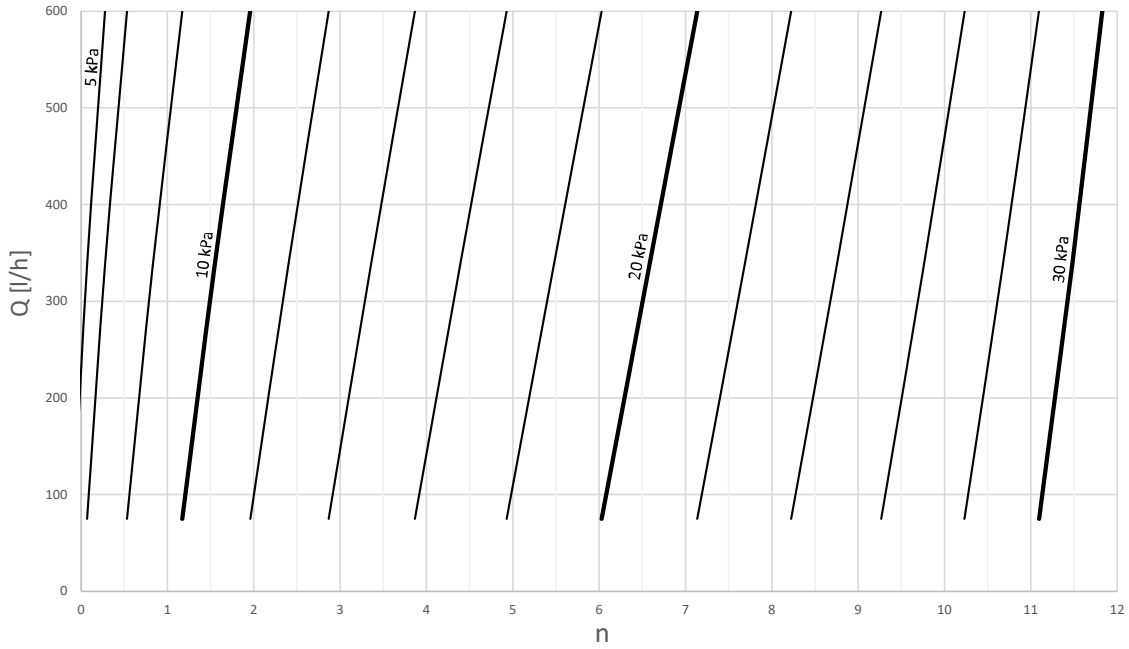
Symbol	Description
Δ p	Differential pressure
n	Presetting as per handwheel scale (DN 15 - 25)
	Turns of Allen key (DN 32 - 50)
Q	Volume flow rate

DN 15, PN 25

LP version

Table 12: Selection table DN 15LP

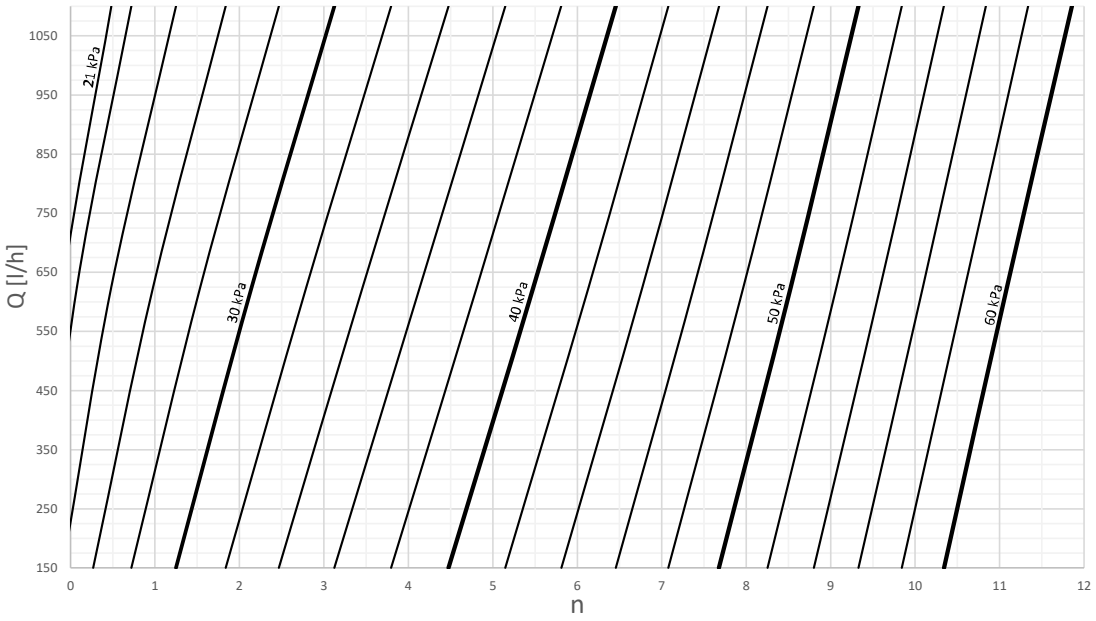
Δ p	Q	Kvs
[kPa]	[l/h]	
5 - 30	75 - 600	4,1



HP version

Table 13: Selection table DN 15HP

Δ p	Q	Kvs
[kPa]	[l/h]	
20 - 60	150 - 1100	4,1

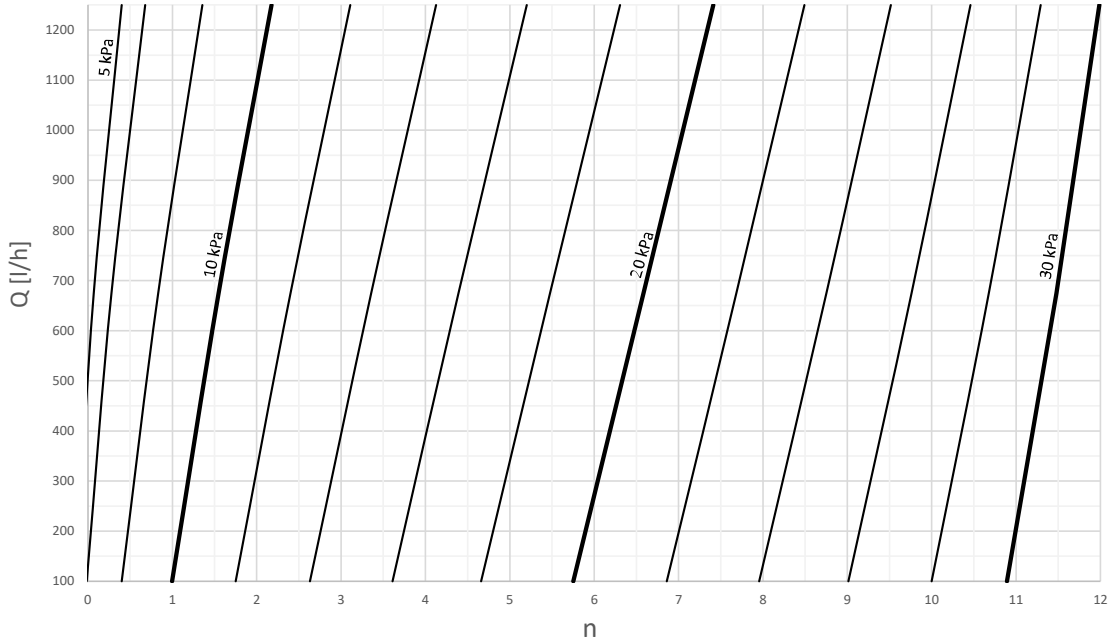


DN 20, PN 25

LP version

Table 14: Selection table DN 20LP

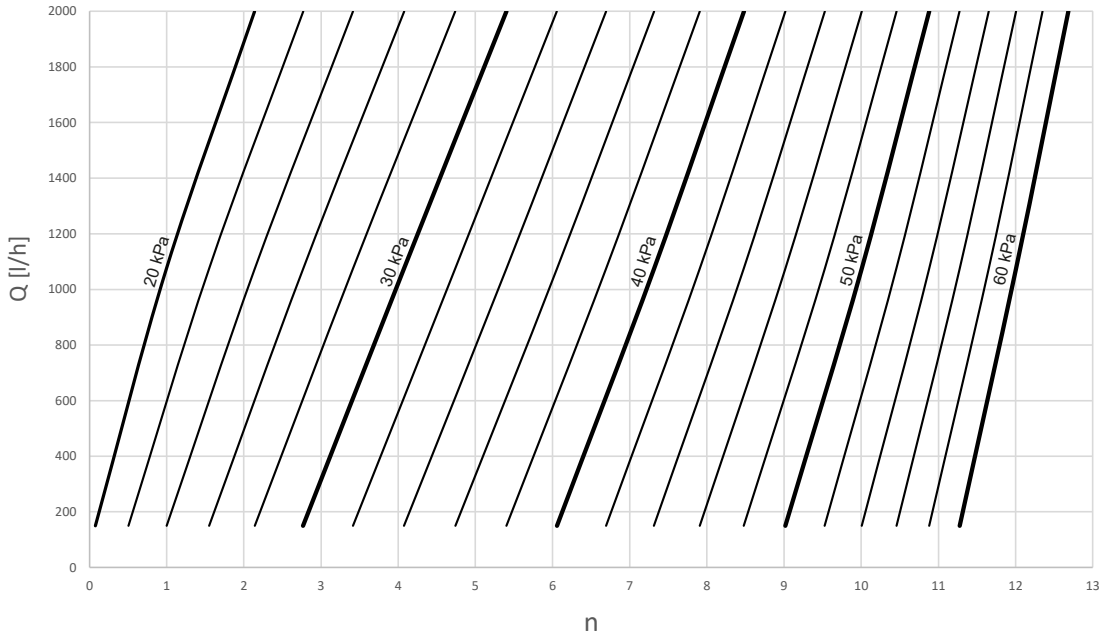
Δ p	Q	Kvs
[kPa]	[l/h]	
5 - 30	100 - 1250	4,9



HP version

Table 15: Selection table DN 20HP

Δ p	Q	Kvs
[kPa]	[l/h]	
20 - 60	150 - 2000	4,9

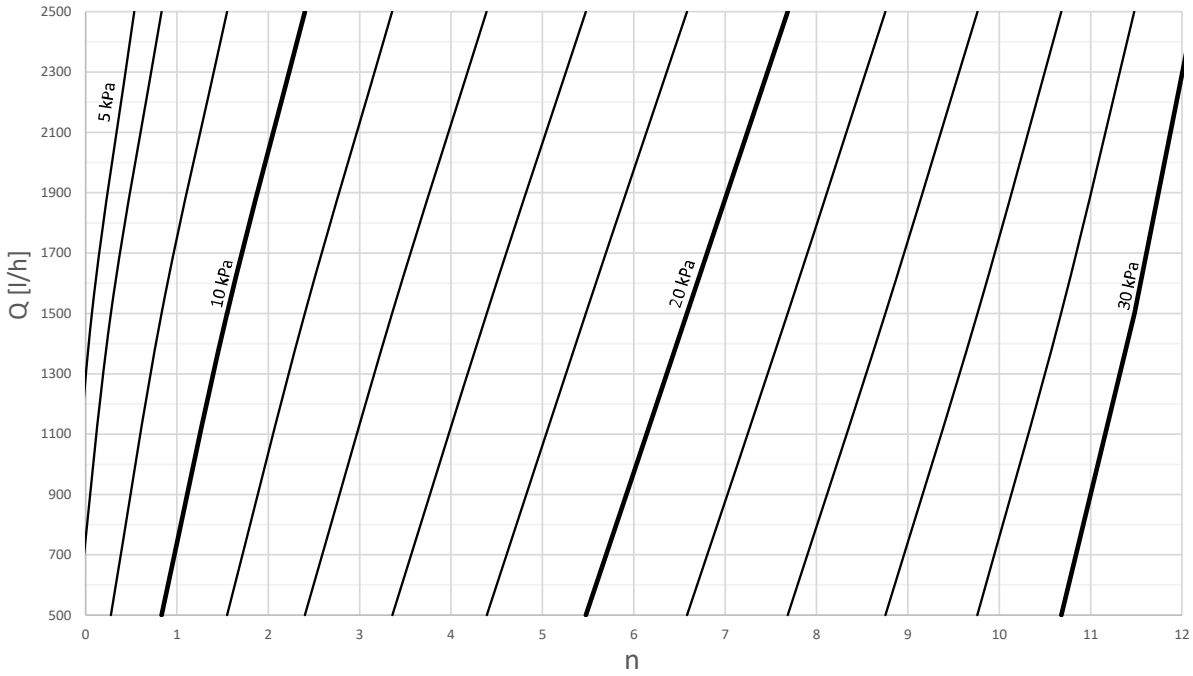


DN 25, PN 25

LP version

Table 16: Selection table DN 25LP

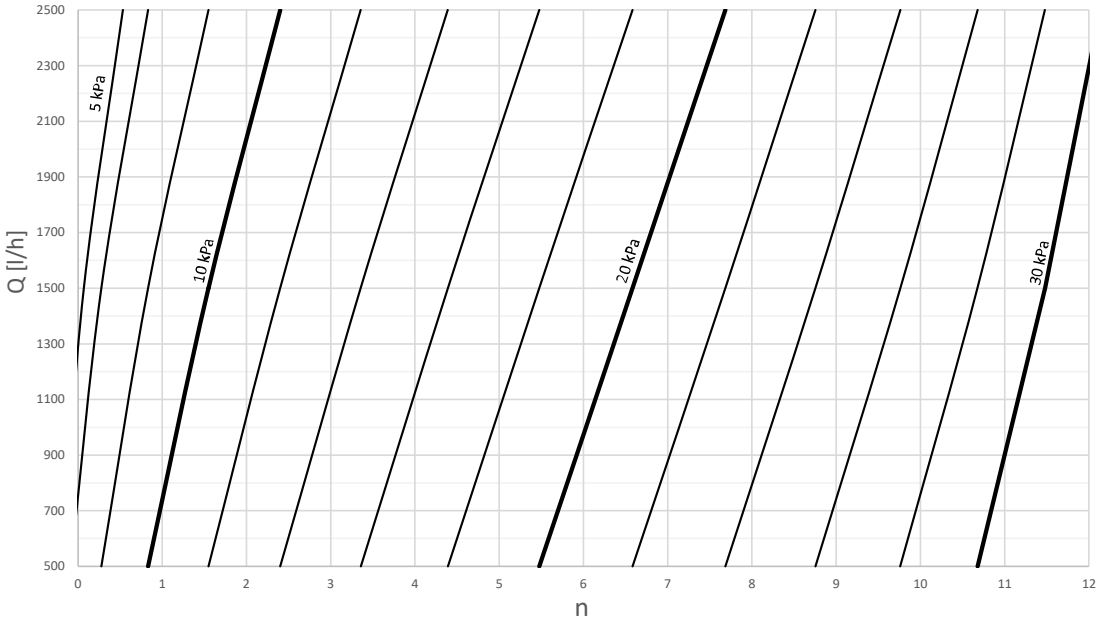
Δ p	Q	Kvs
[kPa]	[l/h]	
5 - 30	500 - 2500	5,0



HP version

Table 17: Selection table DN 25HP

Δ p	Q	Kvs
[kPa]	[l/h]	
20 - 60	700 - 2500	5,0



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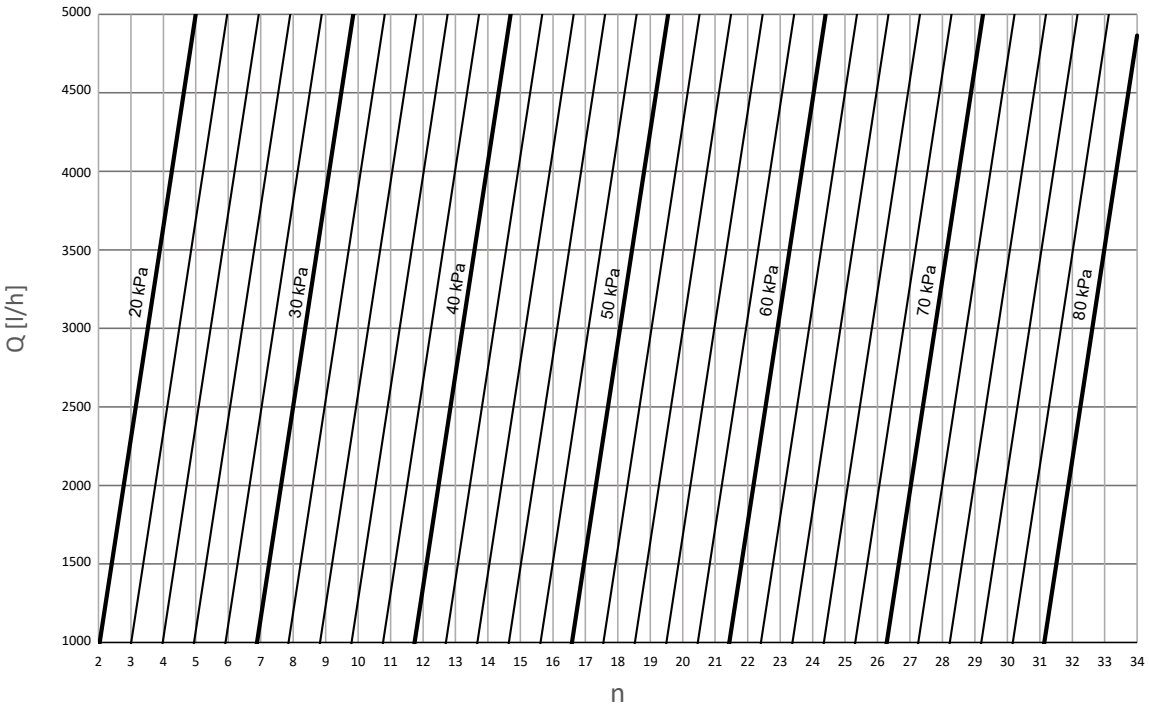
DN 32, PN 16

Table 18: Selection table DN 32

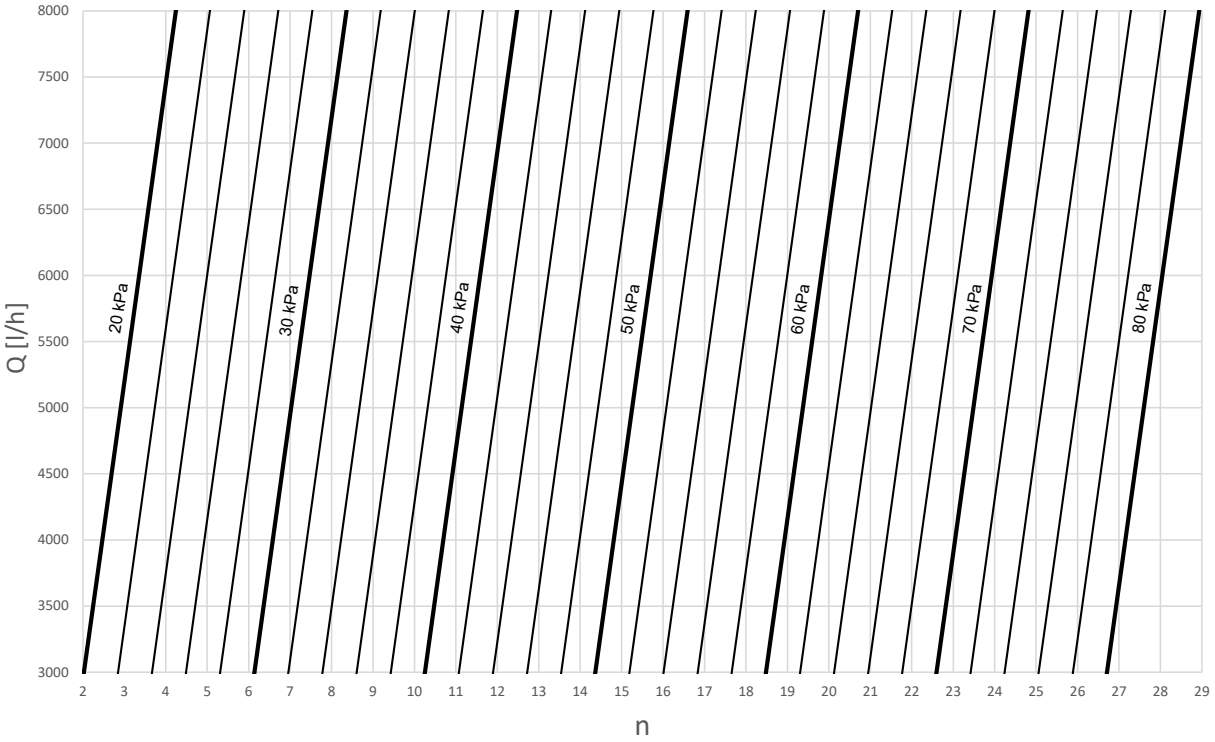
Δ p	Q	Kvs
[kPa]	[l/h]	
20 - 80 kPa	1000 - 5000	11,4



DN 40, PN 16

Table 19: Selection table DN 40

Δ p	Q	Kvs
[kPa]	[l/h]	
20 - 80 kPa	3000 - 8000	16,4



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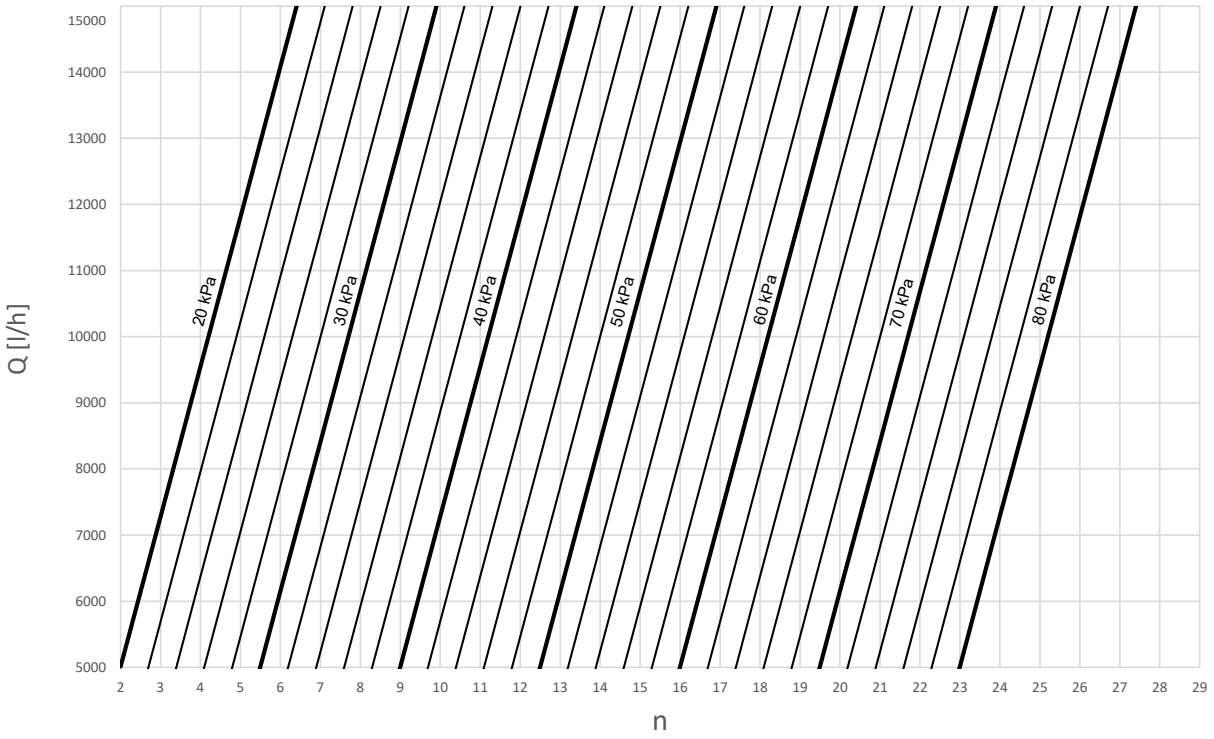
DN 50, PN 16

Table 20: Selection table DN 50

Δ p	Q	Kvs
[kPa]	[l/h]	
20 - 80 kPa	5000 - 15000	17,9



DN 65/DN 80/DN 100, PN 16

Table 21: Selection table DN 65 - 100

DN	Version	Δ p	Q	Kvs
		[kPa]	[m³/h]	
65	LP	20 - 80	1 - 72	50,5
	HP	80 - 160	2 - 77	53
80	LP	20 - 80	1 - 98	70
	HP	80 - 160	2 - 115	75,5
100	LP	20 - 80	1 - 125	92
	HP	80 - 160	5 - 156	106,5

DN 65, PN 16

LP version

Table 22: Presettings DN 65LP

Presetting	Volume flow rate	Differential pressure
	[m³/h]	[kPa]
0,0	1,1	31
	5,5	28
	12,6	21
	18,0	20
	27,2	18
	34,6	12
1,0	1,2	47
	5,5	42
	10,9	38
	20,0	32
	32,7	30
	42,0	28
	51,0	25
	63,0	24
	71,0	25
2,0	2,3	76
	11,9	66
	15,5	60
	20,5	57
	28,5	50
	58,0	42
	70,0	41
2,8	1,9	105
	7,7	100
	12,0	90
	27,3	80
	38,0	75
	49,0	70
	64,0	69
	72,0	68

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HP version

Table 23: Presettings DN 65HP

Presetting	Volume flow rate	Differential pressure
	[m^3/h]	[kPa]
0,0	2,6	105
	8,6	100
	15,7	95
	24,2	90
	40,6	80
	56,0	80
	76,5	72
0,5	3,3	115
	12,0	110
	18,0	110
	28,7	105
	42,0	100
	58,7	92
	73,0	90
1,0	3,3	150
	14,9	135
	20,9	130
	28,2	120
	45,9	118
	54,0	115
	77,0	105
2,0	3,8	180
	8,0	175
	10,7	170
	23,6	162
	35,0	160
	52,0	158
	72,6	145

DN 80, PN 16

LP version

Table 24: Presettings DN 80LP

Presetting	Volume flow rate	Differential pressure
	[m^3/h]	[kPa]
0,0	1,44	36
	6,48	32
	16,2	30
	26,0	29
	45,0	26
	58,0	22
	70,0	20
	80,0	19
1,0	3,96	67
	12,60	52
	17,28	48
	22,0	45
	46,0	44
	61,0	42
	92,0	40
2,0	4,32	85
	10,80	78
	15,84	72
	39,0	66
	64,0	57
	98,0	54
3,0	1,80	88
	6,12	85
	16,92	85
	24,0	82
	44,0	78
	52,0	77
	73,0	70
	95,0	68

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HP version

Table 25: Presettings DN 80HP

Presetting	Volume flow rate	Differential pressure
	[m^3/h]	[kPa]
0,0	5,6	90
	12,3	90
	23,4	90
	57,1	82
	67,5	85
	77,0	85
	99,0	75
1,0	2,5	115
	4,5	110
	11,0	110
	29,0	105
	43,5	100
	77,0	100
	113,0	95
2,0	3,0	140
	12,8	140
	16,3	135
	23,1	135
	41,7	130
	62,8	125
	84,0	125
	115,0	100
2,5	3,9	190
	7,6	175
	15,5	175
	22,6	160
	40,1	155
	59,0	150
	81,0	142
	105,0	138

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DN 100, PN 16

LP version

Table 26: Presettings DN 100LP

Presetting	Volume flow rate	Differential pressure
	[m^3/h]	[kPa]
0,0	1,87	37
	4,97	30
	14,4	27
	20,0	24
	37,0	23
	63,0	18
	108,0	18
1,0	2,38	44
	16,2	40
	21,6	35
	25,0	32
	43,0	30
	59,0	29
	91,0	27
	122,0	27
2,0	2,84	59
	9,00	55
	18,36	53
	27,0	51
	78,0	49
	110,0	42
	125,0	41
3,5	2,74	100
	11,2	91
	19,1	86
	58,0	82
	100,0	72
	122,0	70

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Table 27: Presettings DN100HP

Presetting	Volume flow rate	Differential pressure
	[m^3/h]	[kPa]
0,0	6,12	95
	9,00	90
	14,04	90
	26,0	90
	43,4	90
	79,6	83
	113,0	78
	152,0	72
1,0	5,4	115
	12,6	110
	16,2	110
	48,7	105
	78,0	100
	115,0	92
	156,0	90
2,0	6,73	135
	11,45	122
	16,92	120
	29,4	120
	58,0	113
	82,0	110
	104,0	108
	151,0	100
2,5	6,12	170
	20,16	162
	22,68	160
	33,3	156
	58,0	152
	78,0	145
	126,0	135
	146,0	130

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KSB SE & Co. KGaA
Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)
Tel. +49 6233 86-0
www.ksb.com