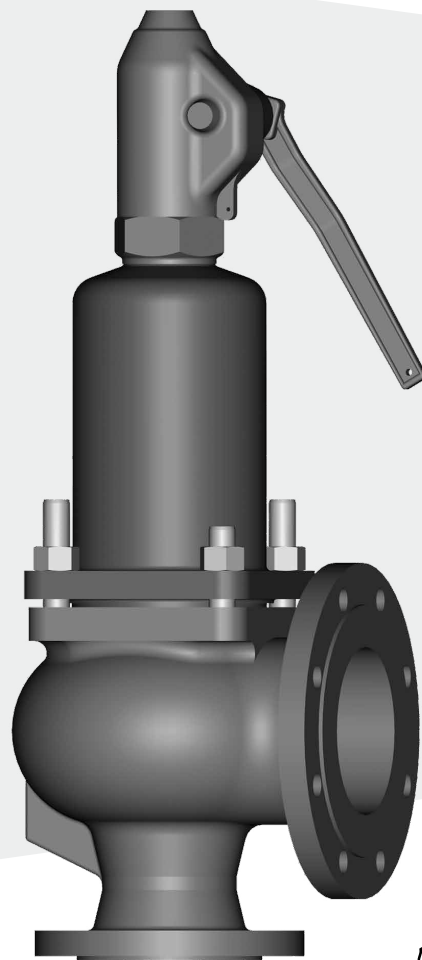


Si 2323/Si 2324/Si 2325



Engineering
GREAT Solutions

**Safety valves for pressure relief in
accordance to PED, DIN/EN and ASME**

Si 2323 / Si 2324 / Si 2325

Features

The regular flow safety valve for high pressures:

- > Solid body design with one-piece inlet nozzle
- > Smooth and stable behaviour thanks to comparatively low lift
- > Body made of steel casting as well as stainless steel, with inner parts mainly of stainless steel
- > Can also be supplied with weld end at inlet

Inlet sizes

DN 15 to DN 50

Inlet pressure rating

PN 63 to PN 400

Set pressures

0.45 bar g up 400 bar g

Temperature range

-200°C to +450°C

Overpressure

Vapours/gases	10%
Liquids	10%

Blowdown

Vapours/gases	10%
Liquids	20%

Allowable built-up back pressure without bellows

15% of the set pressure

Applications

- > For vapours, gases and liquids
- > Power generation
- > Feed water supply up to PN 400
- > Suitable for outlet flange with loading up to PN 100

Approvals and standards

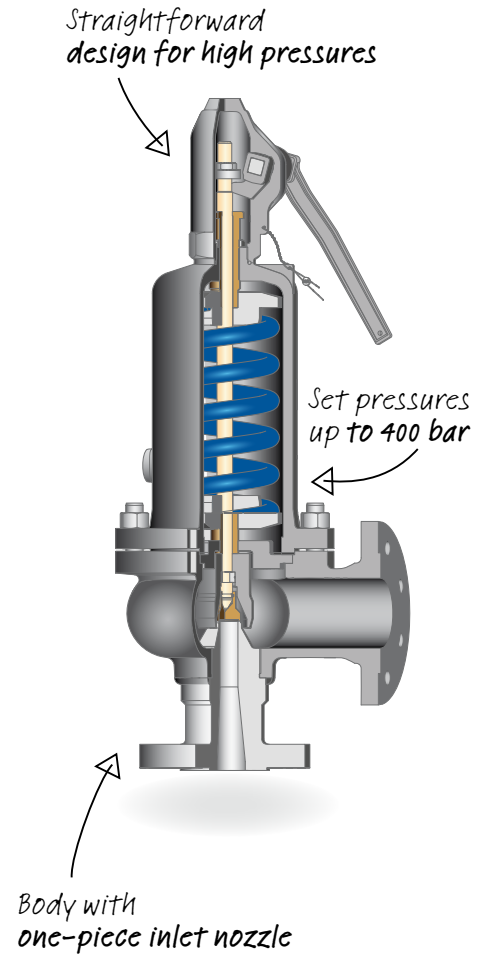
EC type examination

- Pressure Equipment Directive 97/23/EC
- DIN EN ISO 4126-1
- AD2000-Merkblatt A2
- VdTÜV Merkblatt "Sicherheitsventil 100"

VdTÜV type examination acc. to

TÜV.SV.10-209.d₀.D/G/F.α_w.p

IMI Bopp & Reuther will not renew the existing VdTÜV type approvals. The requirements by VdTÜV guidelines and applicable standards are completely considered by the EC type examination.



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Type code

Type code				Ordering example
1	Series	Si 2	DIN/EN regular flow safety valve	Si 2
2	Design	1	Conventional, open bonnet	3
		3	Conventional, closed bonnet	
		4	Bellows, closed bonnet	
		5	Bellows, open bonnet	
3	Characteristic	1	Proportional Flow	2
		2	Regular Flow	
4	Pressure class	3	max. PN 160 (up to 100 bar g)	4
		4	max. PN 250 (up to 250 bar g)	
		5	max. PN 400 (up to 400 bar g)	
5	Cap	G	Gas-tight cap	A
		GB	Gas-tight cap with test gag	
		A	Packed lifting lever	
		AB	Packed lifting lever with test gag	
6	Material code	00	GP240GH / 1.0619	00
		04	GX5CrNiMo19-11-2 / 1.4408	
7	Options	.09	Locking sleeve (government ring)	.22a.60
		.11a	Disc with soft seal EPDM (pressure class 3 only)	
		.14a	Lift indication with inductive proximity switch in the cap	
		.14b	Lift indication with inductive proximity switch in the auxiliary housing	
		.15	Bonnet insulation spacer for high and low temperatures	
		.18	Heating jacket	
		.22a ¹⁾	Weld end at inlet	
		.22b	Weld end at outlet	
		.25	Block body design	
		.28	Oil and grease free	
		.35	With lift restriction ring	
		.38	Vibration damper	
		.59	Stellited disc	
		.60	Stellited seat	

¹⁾ For valves with weld ends, please state the pipe's outer diameter, wall thickness and joint type code in your order. See page 5 for information on standard dimensions.

Type ▶	Si 2324 A 00.22a.60	
Please state ▶	Set pressure	165 bar g
	Fluid temperature	280 °C
	Fluid and state	Water Liquid
	Inlet	DN 25, PN 250, B2
	Outlet	DN 40, PN 40, B1
	Flow diameter	16 mm
	Approval	97 / 23 / EG (CE)

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Coefficient of discharge

Fluid group	Inlet size	Flow diameter	$h/d_0 \geq$	Pressure $p_0 \geq$ [bar g]	$p_b/p_0 \leq$	α_w
Vapours / gases (D / G)	DN 15 to DN 50	12 mm to 32 mm	0.1	0.6	0.62	0.25
Flüssigkeiten (F)	DN 15 to DN 50	12 mm to 32 mm	0.1	0.45	-	0.25

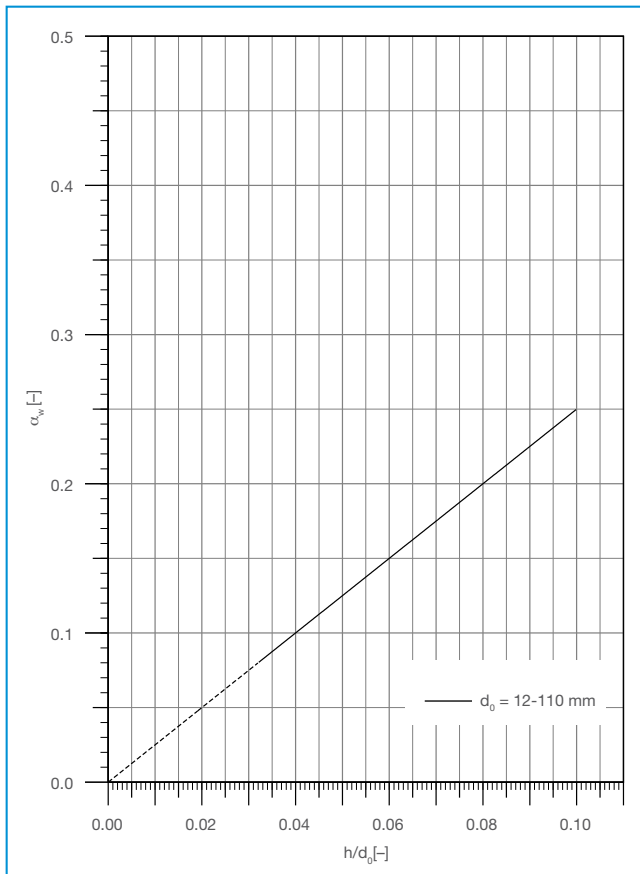
The coefficient of discharge for gases/vapours in a pressure ratio of $p_b/p_0 > 0.62$ is shown in the diagram below.

The capacity of the selected safety valve can be adjusted to the required capacity by reducing the lift, thus reducing undesirable extra performance.

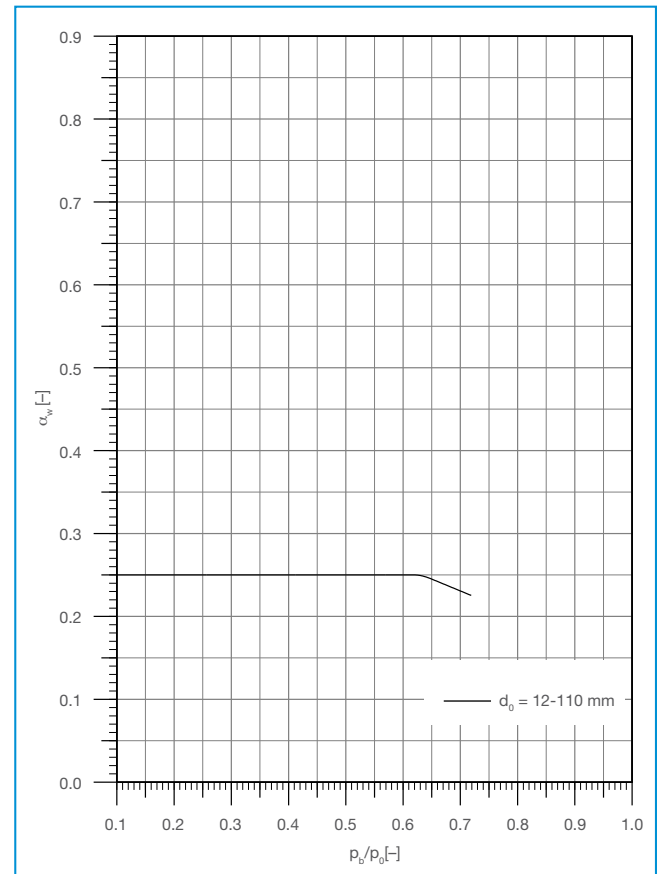
Here the following applies:
 $\alpha_{w(\text{reduced})} = \alpha_w \times q_m/q_{mc}$. The required ratio h/d_0 is shown in the diagram below, and the reduced lift calculated with $h_{(\text{reduced})} = d_0 \times (h/d_0)$.

h = Lift [mm]
 d_0 = Flow diameter of the selected safety valve [mm]
 h/d_0 = Lift / flow diameter ratio
 p_b = Absolute back pressure [bar a]
 p_0 = Absolute relieving pressure [bar a]
 p_b/p_0 = Absolute back pressure / absolute relieving pressure ratio

α_w = Coefficient of discharge acc. to AD 2000-Merkblatt A2
 q_m = Required mass flow [kg/hr]
 q_{mc} = Certified mass flow [kg/hr]



Si 2323/Si 2324/Si 2325 coefficient of discharge α_w depending on h/d_0 for gases and vapours, liquids



Si 2323/Si 2324/Si 2325 coefficient of discharge α_w depending on p_b/p_0 for gases and vapours

Si 2323 / Si 2324 / Si 2325

Weld end (option .22) for series Si 2323, Si 2324 and Si 2325

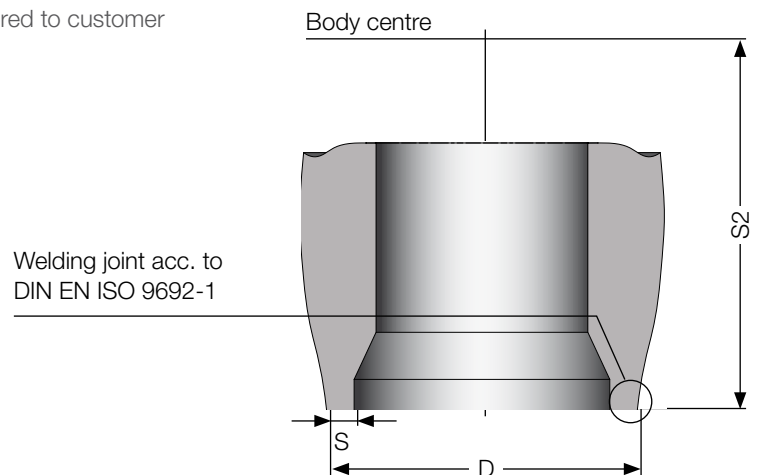
Weld ends are mainly used for applications with high pressure and high temperatures. The following table shows the standard IMI Bopp & Reuther dimensions acc. to DIN EN 12627. This European standard defines the dimensions for weld ends of steel valves that are welded to standardized pipes. The outside diameters and wall thicknesses of the standardized pipes are described in DIN EN 1092-1.

We can vary the shape and dimensions of weld ends upon request.

The centre to face dimensions S2 for safety valves with weld end are as standard identical with the centre to face dimensions of the same type with flange at the inlet. The centre to face dimensions can also be tailored to customer specifications.

Example:

Weld end P 250 GH (1.0460);
33.7 x 3.6 (corresponds to DN 25 PN 100)



Weld end with V-seam for connection to a pipe with wall thickness $4 < S \leq 22$ mm

Specification of the weld end

(must be stated in your order):

1. Material of the inlet nozzle
2. Dimensions of the weld end
 - 2.1 Overall diameter D
 - 2.2 Wall thickness S

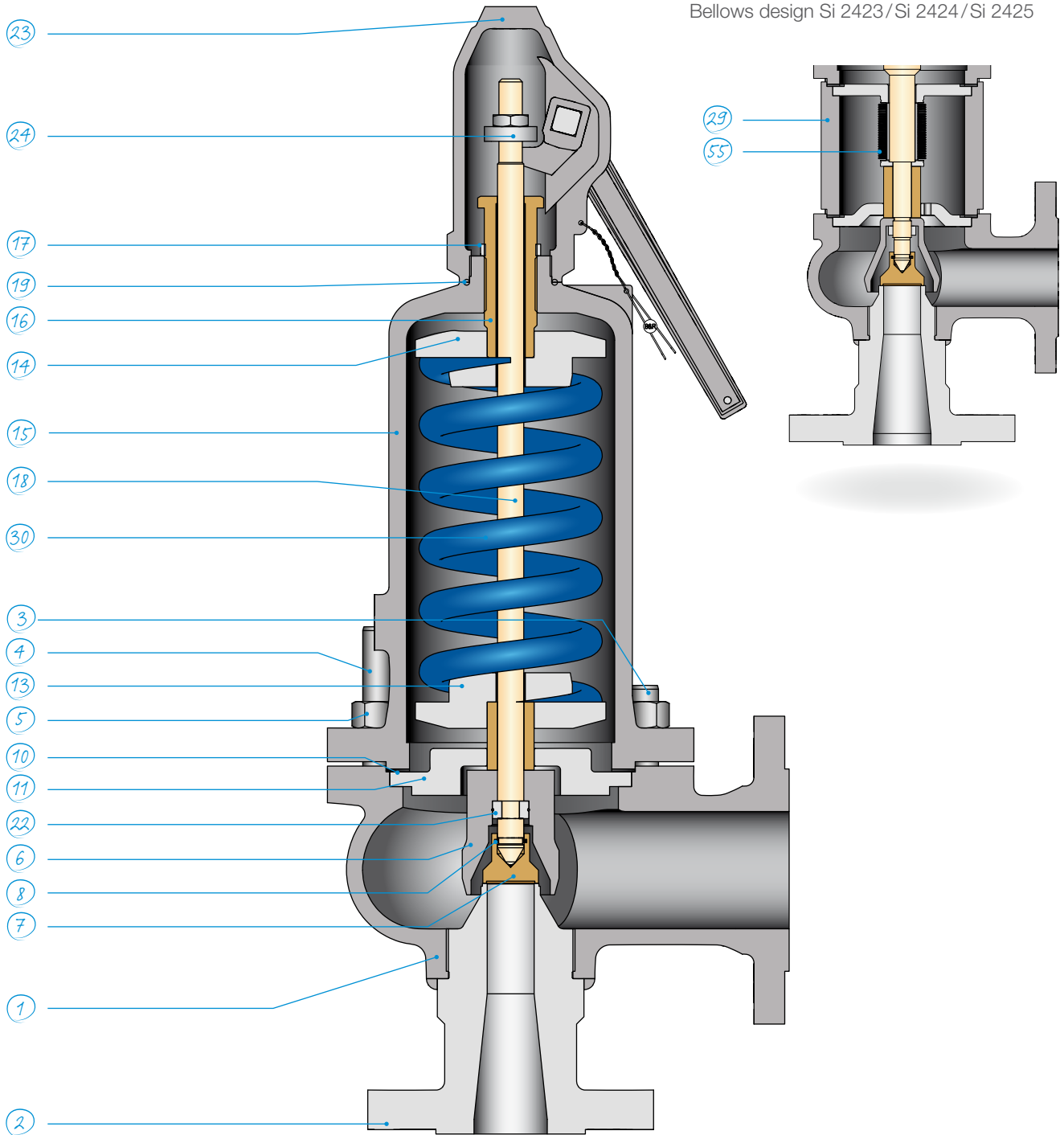
Standard dimensions

DN	ØD [mm] DIN EN 1267	PipeØ [mm] DIN EN 1092-1	Wall thickness S [mm]							
			PN 16	PN 25	PN 40	PN 63	PN 100	PN 160	PN 250	PN 320
15	22	21.3	2.0	2.0	2.0	2.0	3.2	3.2	3.2	3.2
20	28	26.9	2.3	2.3	2.3	2.6	3.2	n. a.	n. a.	n. a.
25	35	33.7	2.6	2.6	2.6	2.6	3.6	3.6	3.6	5.0
32	44	42.4	2.6	2.6	2.6	2.9	3.6	n. a.	n. a.	n. a.
40	50	48.3	2.6	2.6	2.6	2.9	3.6	3.6	5.0	6.3
50	62	60.3	2.9	2.9	2.9	4.0	4.0	4.0	6.3	8.0

n. a. not available

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Material code



Si 2323 / Si 2324 / Si 2325

Material code		00	04
Temperature application range		-10 to +450 °C ¹⁾	-200 °C to +400 °C ²⁾
Part	Name	Spare part	Material
1	Body		GP240GH/1.0619 GX5CrNiMo19-11-2 1.4408
2	Inlet nozzle		1.0460 Seat hard-faced with Stellite 1.4571 Seat hard-faced with Stellite
3	Stud, short		1.7709 A4-70
4	Stud, long		1.7709 A4-70
5	Hexagon nut		04 04
6	Disc holder		5.3106/GGG-40 1.4408
7	Disc	*2,3	1.4122 hardened ³⁾ 1.4571 Seat hard-faced with Stellite
8	Disc retainer		1.4571 1.4571
10	Flat gasket	*1,2,3	1.4401/Graphite 1.4401/Graphite
11	Intermediate cover		1.4122 1.4571
13	Spring washer, bottom		1.0460 1.4571
14	Spring washer, top		1.0460 1.4571
15	Bonnet		GP240GH/1.0619 GX5CrNiMo19-11-2 1.4408
16	Adjusting screw		1.4021 1.4571
17	Locknut		1.7258 1.4571
18	Spindle		1.4021 1.4580
19	Flat gasket	*1,2,3	1.4401/Graphite 1.4401/Graphite
22	Ring (two-parts)		1.4571 1.4571
23 ¹⁾	Lifting lever		1.0619 1.4408
24	Lifting nut		1.4401 1.4401
29	Intermediate spacer		1.0460 1.4571
30	Spring ⁴⁾	*3	1.1200 1.8159 1.4310 1.8159, chem. nickel plated
55	Bellows	*3	1.4571 1.4571

¹⁾ If the specifications in AD 2000-Merkblatt W10 are met, the material can be used at temperatures as low as -85 °C.

²⁾ If the specifications in AD 2000-Merkblatt W10 are met, the material can be used at temperatures as low as -273 °C.

³⁾ Disc material may be upgraded to stellite 1.4571 upon request for safety valves in saturated steam service

⁴⁾ The spring material selection depends on the valve size and set pressure.

Spare parts:
*1 For start-up
*2 For 2 years of operation
*3 After many years of operation

IMI Bopp & Reuther reserve the right to technical changes or selection of higher quality materials without prior notice. The material design can be adapted to customer specifications at any time upon request.

Si 2323

Sizes, pressure ranges and dimensions

Size	DN _E	15	25	32	40	50
	DN _A	20	25	32	40	50
Flow diameter [mm] d ₀		12	16	20	25	32
Flow area [mm ²] A ₀		113	201	314	491	804
Min. set pressure [bar g]	Si 21/ Si 23	0,45	0,45	0,45	0,45	0,45
	Si 24/ Si 25		2,0	2,0	2,0	2,0
Max. set pressure ¹⁾ [bar g]		100	100	100	100	80
Max. back pressure [bar g]		25	25	25	25	25
Inlet flange DIN EN ²⁾		PN 63 - 160		PN 63 - 100	PN 63 - 160	
Outlet flange DIN EN ²⁾		PN 25/40				
Centre to face dimension S1 [mm]		95	100	110	125	145
Centre to face dimension S2 [mm]		95	100	110	125	145
Height H1 [mm]		375	405	475	510	635
Height H2 [mm]		- ³⁾	485	565	620	750
Weight Si 21/23 [kg]		9	10	17	22	34
Weight Si 24/25 [kg]		- ³⁾	13	20	26	38

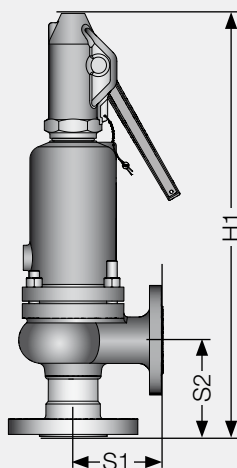
¹⁾ Stated pressures are maximum values corresponding to the spring forces. The component strength may need to be reviewed depending on the material and temperature.

²⁾ Flange from PN 63 acc. to DIN EN 1092-2 flange facing type B2.

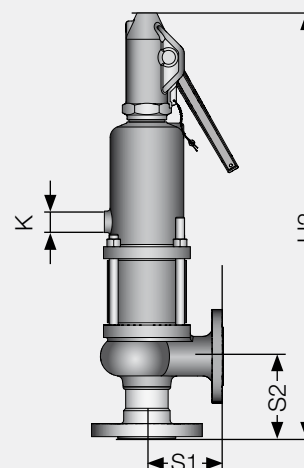
³⁾ For the flow diameter d₀ = 12 mm the bellows design is not available.

Bonnet for bellows design with test connection K for bellows check.
K to DN 40 x 40 – G¹/₄, above G³/₈

Si 2323



Si 2423



Si 2324 / Si 2325

Sizes, pressure ranges and dimensions

Size	Si 2324			Si 2325		
	DN _E	25	40	40	25	25
	DN _A	40	50	65	40	50
Flow diameter [mm] d ₀		16	20	25	12	16
Flow area [mm ²] A ₀		201	314	491	113	201
Min. set pressure [bar g]	Si 21/ Si 23	0.45	0.45	0.45	0.45	0.45
	Si 24/ Si 25	2.0	2.0	2.0	2.0	2.0
Max. set pressure ¹⁾ [bar g]		250	250	250	400	250
Max. back pressure [bar g]		25	25	25	40	25
Inlet flange DIN EN ²⁾		PN 160			PN 160	
		PN 250			PN 250	
					PN 320	
					PN 400	
Outlet flange DIN EN ²⁾		PN 25/40			PN 25/40	
Centre to face dimension S1 [mm]		125	145	155	125	145
Centre to face dimension S2 [mm]		125	145	160	140	145
Height H1 [mm]		510	635	656	525	635
Height H2 [mm]		620	750	800	-	750
Weight Si 21/23 [kg]		17	34	45	25	40
Weight Si 24/25 [kg]		21	38	50	³⁾	44

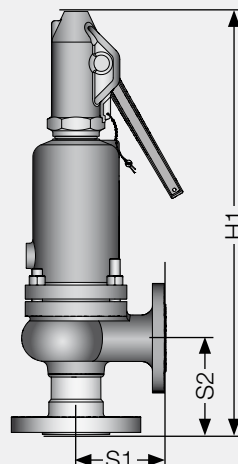
¹⁾ Stated pressures are maximum values corresponding to the spring forces. The component strength may need to be reviewed depending on the material and temperature.

²⁾ Flange from PN 63 acc. to DIN EN 1092-2 flange facing type B2.

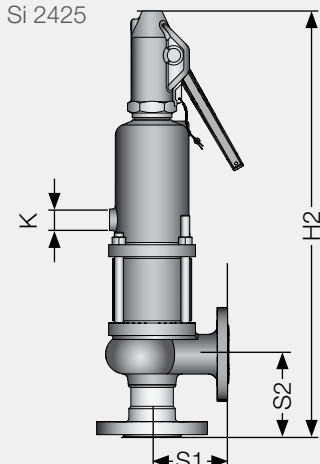
³⁾ For the flow diameter d₀ = 12 mm the bellows design is not available

Bonnet for bellows design with test connection K for bellows check.
K to DN 25 x 40 – G¹/₄, above G³/₈

Si 2324
Si 2325



Si 2424
Si 2425



IMI Bopp & Reuther

Bopp & Reuther Sicherheits-
und Regelarmaturen GmbH
Carl-Reuther-Straße 1
68305 Mannheim
Deutschland

Tel: +49 (0)621 76220-100
Fax: +49 (0)621 76220-120

www.imi-critical.com
imibur.sales@imi-critical.com

IMI Critical Engineering

Lakeside, Solihull Parkway
Birmingham Business Park
Birmingham B37 7XZ
United Kingdom

Tel: +44 (0)121 717 3700
Fax: +44 (0)121 717 3701

www.imi-critical.com



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