Pressure Regulator RB 4000

- High flow accuracy
- Easy maintenance
- Rugged construction for durability
- Balanced valve design eliminates inlet pressure effect
- Low noise
- Approved by the major European gas distribution companies

Pressure Regulator RB 4000

Applications

The RB 4000 pressure regulator is designed for industrial use: gas supply networks, district stations, industries, heating plants and all installations where accurate pressure control, ease of adjustment and fast response are required, such as for burners, industrial ovens, boilers, etc

Description

The RB 4000 regulator is a direct-acting, spring-loaded regulator with an optional integrated safety shut-off device. Its balanced valve design ensures constant outlet pressure when the upstream pressure varies

A built-in pulsation damper allows stable pressure control even at very low flowrates

An optional built-in shutoff valve offers protection for averpressure or over-and-under-pressure. its bypass system eases he shutoff valve re-latching.

Technical features

Inlet pressure	19 bar
Outlet pressure	10 mbar – 2.1 bar (2.5 bar for DN 25)
Accuracy & lock-up pressure	Up to AC5 / up to SG 10
Operating temperature	-20°C to +60°C
Acceptable gases	Natural gas, town gas, propane, butane, air, nitrogen or any non-corrosive gas
Safety devices	Optional built-in safety shut-off valve Over-pressure shut-off (OPSO) and under-pressure shut-off (UPSO)
Options	Integral silencer Monitor version

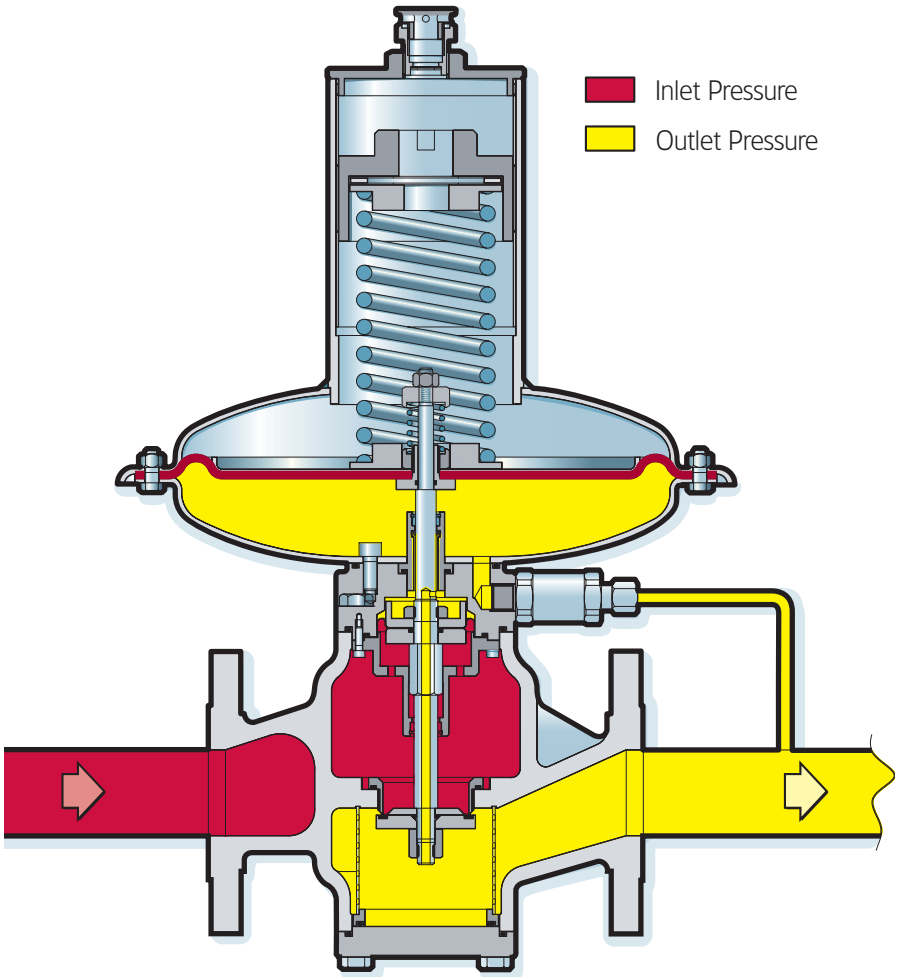
Sizes and Connections

Sizes	DN 25, 40, 50, 50 x 80, 80 and 100
Body lengths	EN 334 face-to-face recommended dimensions
Flanges	Steel: PN16, PN20 , PN25, PN50 Cast iron: PN16, PN20 , PN25

Materials

Body	Spheroidal graphite cas iron ISO 1083 gr 500-7 Steel ASTM A216 WCB
Head	Pressed steel / UNI EN10025
Internal parts	Stainless steel and brass
Seals	Nitrile rubber
Diaphragm	Synthetic rubber with fabric reinforcement

RB 4000 Operational Schematic



Accuracy

Accuracy class (AC), lock-up pressure class SG) and lock-up pressure zone:

- 10 – 20 mbar: AC 5 / SG 30
- 20 – 100 mbar: AC 5 / SG 20
- > 100 mbar: AC 5 / SG 10

The typical lock-up pressure zone is:

$$\frac{Q_{min,pe}}{Q_{max,pe}} = \frac{2.5}{100}$$

Outlet Pressure Range

Spring characteristics:
d : wire diameter
De : external diameter
Lo : height
It : nber of spires

DN 25

Spring Code	Spring Characteristics				Colour	Spring range		
	d (mm)	De (mm)	Lo (mm)	It		4010/11/12 (Ø 360)	4020/21/22 (Ø 220)	4030/31/32 (Ø220/TR)
20567075	3.5	43	200	15.5	Yellow	18 - 27 mbar	•	•
20567076	3.5	43	200	10.75	Red	25 - 33 mbar	•	•
20567662	4.5	43	160	11	White	25 - 55 mbar	•	•
20567663	5.5	43	160	10.5	Lilac	55 - 100 mbar	0.12 - 0.30 bar	•
20567664	6.5	43	160	10.5	Orange	85 - 210 mbar	0.20 - 0.55 bar	•
20567665	7	43	140	10.5	Brown	•	0.30 - 0.65 bar	0.50 - 1.00 bar
20567666	7.5	43	160	10.5	Green	•	0.40 - 0.90 bar	0.60 - 1.35 bar
20567761	8	43	140	9	Black	•	•	1.10 - 1.70 bar
20567762	9	43	140	9	Grey	•	•	1.10 - 2.50 bar

DN 40 / DN 50 / DN 50 x 80

Spring Code	Spring Characteristics				Colour	Spring Range		
	d (mm)	De (mm)	Lo (mm)	It		4010/11/12 (Ø 480)	4020/21/22 (Ø 360)	4030/31/32 (Ø 360/TR)
20568085	4	63	320	15	Orange/Sliver	10 - 14 mbar	•	•
20568086	4	63	320	10.5	Brown/Silver	14 - 19 mbar	•	•
20568087	5	63	320	16.5	Dark Green/Silver	19 - 27 mbar	•	•
20568088	5	63	320	13	Light Green/Silver	25 - 36 mbar	•	•
20568089	5	63	320	9.25	Light Blue/Silver	35 - 48 mbar	•	•
20568090	6.5	63	320	17	Black/Silver	45 - 63 mbar	0.12 - 0.16 bar	•
20568081	6.5	63	270	9.75	Purple/Silver	50 - 85 mbar	0.11 - 0.18 bar	•
20568082	8.5	63	270	15	Yellow	82 - 130 mbar	0.18 - 0.28 bar	•
20568083	8.5	63	270	11.5	Blue/Silver	110 - 140 mbar	0.28 - 0.37 bar	•
20568183	9	63	260	11.5	Blue	120 - 240 mbar	0.27 - 0.45 bar	•
20568182	10	63	260	11.5	Silver	•	0.44 - 0.59 bar	0.60 - 0.88 bar
20568181	11	63	260	11.5	Purple	•	0.48 - 0.69 bar	0.70 - 1.02 bar
20568186	11.5	63	260	11.5	Yellow/Silver	•	0.65 - 0.80 bar	0.80 - 1.22 bar
20568184	12	63	260	10.5	Red/Silver	•	0.80 - 1.10 bar	1.20 - 1.65 bar
20568185	13	63	260	10.5	White/Silver	•	1.00 - 1.30 bar	1.40 - 2.10 bar

DN 80 / DN100

Spring Code	Spring Characteristics				Colour	Spring Range			
	d (mm)	De (mm)	Lo (mm)	It		4010/11/12 (Ø 600)	4020/21/22 (Ø 480)	4030/31/32 (Ø 360)	4030/31/32TR (Ø360TR)
20569590	6	80	350	12.5	Orange	17 - 25 mbar	•	•	•
20569591	6.2	80	350	10	Brown	23 - 30 mbar	•	•	•
20569592	6.5	80	350	10	Dark Green	28 - 37 mbar	•	•	•
20569593	7	80	350	9.5	Light Green	38 - 54 mbar	•	•	•
20569594	8	80	350	11.5	Black	43 - 68 mbar	•	•	•
20569690	9	80	320	10.5	Red	58 - 96 mbar	•	•	•
20569691	9.5	80	320	10	Light Blue	72 - 117 mbar	•	•	•
20569585	11	80	320	10.5	White	94 - 170 mbar	•	•	•
20569586	13	80	320	12.5	Pink	150 - 200 mbar	•	•	•
20568082	8.5	63	270	15	Yellow	•	0.082 - 0.13 bar	•	•
20568083	8.5	63	270	11.5	Blue/Silver	•	0.11 - 0.14 bar	•	•
20568183	9	63	260	11.5	Blue		0.12 - 0.24 bar		
20568182	10	63	260	11.5	Silver	•	0.18 - 0.29 bar	0.44 - 0.59 bar	•
20568181	11	63	260	11.5	Purple	•	0.24 - 0.37 bar	0.48 - 0.69 bar	0.70 - 1.02 bar
20568186	11.5	63	260	11.5	Yellow/Silver	•	0.30 - 0.47 bar	0.65 - 0.80 bar	0.80 - 1.22 bar
20568184	12	63	260	10.5	Red/Silver	•	0.38 - 0.50 bar	0.80 - 1.10 bar	1.20 - 1.65 bar
20568185	13	63	260	10.5	White/Silver	•	•	1.00 - 1.30 bar	1.40 - 2.10 bar

Standard conditions:

- Absolute pressure of 1.013 bar
- Temperature of 15°C

Correction factor for non-natural gas applications:

The flow rates are indicated or a 0.6 specific gravity gas.
To determine the volumetric flow rate for gases other than natural gas, the values in the capacity tables should be multiplied or calculated using the sizing equations with a correction factor.
The table below lists the correction factors for some common gases:

Gas type	*Specific gravity*	*Correction factor*
Air	1.00	0.77
Butane	2.01	0.55
Carbon dioxide (dry)	1.52	0.63
Carbon monoxide (dry)	0.97	0.79
Natural gas	0.60	1.00
Nitrogen	0.97	0.79
Propane	1.53	0.63
Propane-Air mix	1.20	0.71

Specific gravity or relative density
(air = 1, non-dimensional value)

To calculate the correction factor for gases not listed above, the specific gravity (d) of the gas should be taken and used in the following formula:

$$\text{Correction factor} = \sqrt{\frac{0.6}{d}}$$

Where:
Q: volumetric flow rate in m^3/h at standard conditions
P_e: inlet absolute pressure in bar
P_a: outlet absolute pressure in bar

Flow Capacity

The following table gives the maximum flow capacity – in m^3/h at standard conditions – for the different sizes of the RB 4000 regulator. More data are available in the leaflet "RB 4000 Capacity Tables".

Inlet pressure		Outlet Pressure Setting (mbar)							
DN 25		**RB 4010 20 mbar**	**RB4010 50 mbar**	**RB 4010 200 mbar**	**RB 4020 300 mbar**	**RB 4020 600 mbar**	**RN 4020 900 mbar**	**RB 4030 1000 mbar**	**RB4030 2500 mbar**
350	mbar	220	220	160	95	✱	■	■	■
700	mbar	340	320	300	280	140	■	■	■
1.5	bar	440	440	480	500	440	400	360	■
⩾5	bar	440	440	480	500	550	600	600	800
DN 40		**RB 4010 20 mbar**	**RB4010 50 mbar**	**RB 4010 200 mbar**	**RB 4020 150 mbar**	**RB 4020 500 mbar**	**RN 4020 1200 mbar**	**RB 4030 1500 mbar**	**RB4030 2000 mbar**
350	mbar	500	480	340	420	■	■	■	■
700	mbar	700	700	650	700	440	■	■	■
1,5	bar	1100	1100	1100	1200	1000	600	■	■
⩾5	bar	1100	1100	1200	1200	1300	1600	1700	1900
DN 50		**RB 4010 20 mbar**	**RB4010 50 mbar**	**RB 4010 200 mbar**	**RB 4020 150 mbar**	**RB 4020 500 mbar**	**RN 4020 1200 mbar**	**RB 4030 1500 mbar**	**RB4030 2000 mbar**
350	mbar	800	800	550	700	■	■	■	■
700	mbar	1200	1200	1100	1200	700	■	■	■
1.5	bar	1700	1800	1900	1900	1700	1000	■	■
⩾5	bar	1700	1800	1900	1900	2000	2600	2800	3000
DN 80		**RB 4010 20 mbar**	**RB4010 50 mbar**	**RB 4010 200 mbar**	**RB 4020 150 mbar**	**RB 4020 500 mbar**	**RN 4020 600 mbar**	**RB 4030 1200 mbar**	**RB4030TR 2100 mbar**
350	mbar	1600	1600	1000	1100	■	■	■	■
700	mbar	2400	2400	2000	1900	1300	900	■	■
1,5	bar	3600	3800	3400	3200	3000	2800	1800	■
⩾5	bar	4400	4600	4800	4800	5500	5500	6500	7500
DN 100		**RB 4010 20 mbar**	**RB4010 50 mbar**	**RB 4010 200 mbar**	**RB 4020 150 mbar**	**RB 4020 500 mbar**	**RN 4020 600 mbar**	**RB 4030 1200 mbar**	**RB4030TR 2100 mbar**
350	mbar	2200	2000	1400	1400	■	■	■	■
700	mbar	3200	3200	2600	2400	1700	1100	■	■
1,5	bar	4600	5000	4600	4200	4000	3800	2400	■
⩾5	bar	7000	7000	7500	7500	8500	8500	10000	10000

In order to limit the noise emission it is recommended not to exceed a gas velocity of 100 m/s at the regulator outlet.

Fault Capacity

For a 0.6 specific gravity gas; the wide-open orifice flow (Q) may be calculated using the following equations:

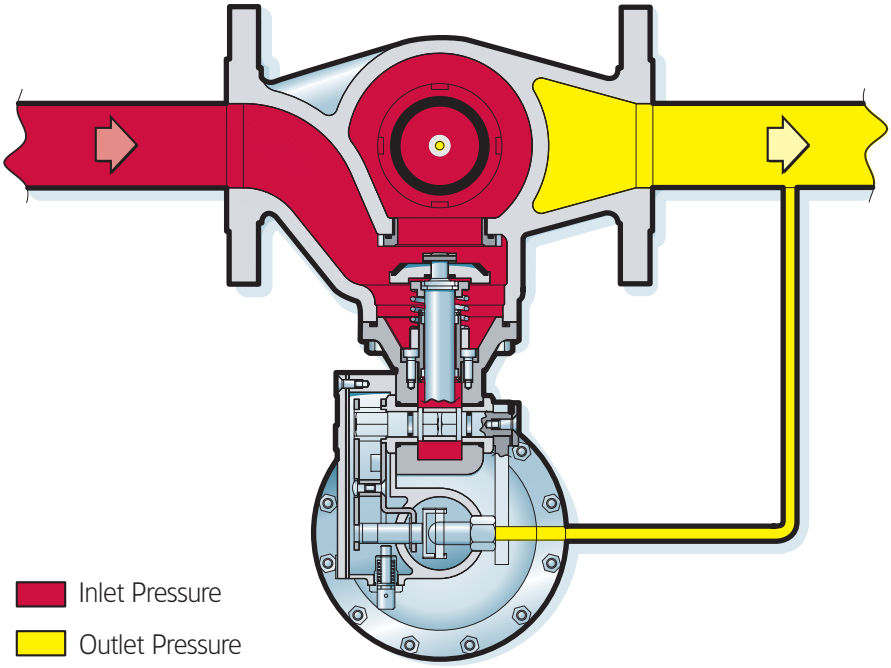
- Sub-critical flow behavior, $Q = K_G\sqrt{P_a\,(P_e - P_a)}$ where $(P_e - P_a) \leqslant 0.5\,P_e$
- Critical flow behavior, $Q = K_G\,\frac{P_e}{2}$ where $(P_e - P_a) > 0.5\,P_e$

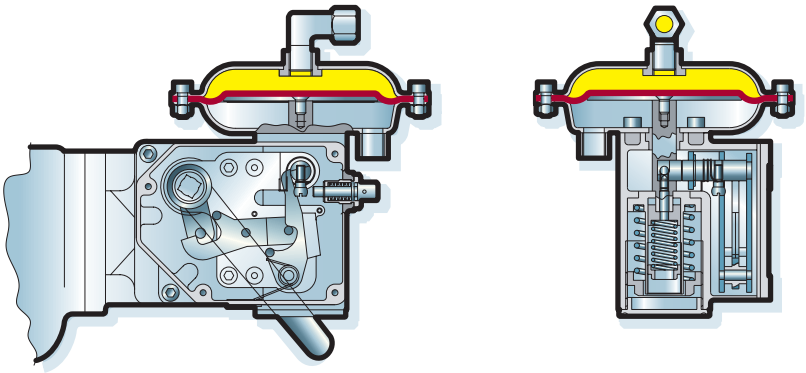
Wide-open flow coefficient K_G

DN	25	40	50	80	100
K_G	450	1200	1900	5000	8000

Note : Without safety shutoff valve nor silencer

SSV 8600 Safety Shutoff Valve





Accuracy class (AG):

- Low pressure: AG 10
- Medium pressure: AG 2.5
- High pressure: AG 1

Minimal difference between regulator and SSV settings (ΔP_W):

- > 15 %, with a minimum difference of 10 mbar to OPSO and 20 mbar to UPSO.

SSV 8600 Safety Shutoff Valve

The RB 4000 Series regulators can be fitted with the SSV 8600 safety shutoff valve for overpressure (OPSO) or combined under- and-over pressure (UPSO/OPSO) protection.

The SSV trip pressure can easily be adjusted independantly of regulator set point.

The following **accessories** ease the use of SSV 8600:

- Manual shut-off button for emergency closing
- Easily accessible lever for relatching the valve
- Built-in bypass for balancing pressure before relatching the safety shutoff valve. This bypass is operated when acting on the relatching lever.

Remote control accessories (optional):

- Valve position indicator (inductive detector or Reed switch)
- Remote triggering by explosion-proof solenoid valve

Set Range

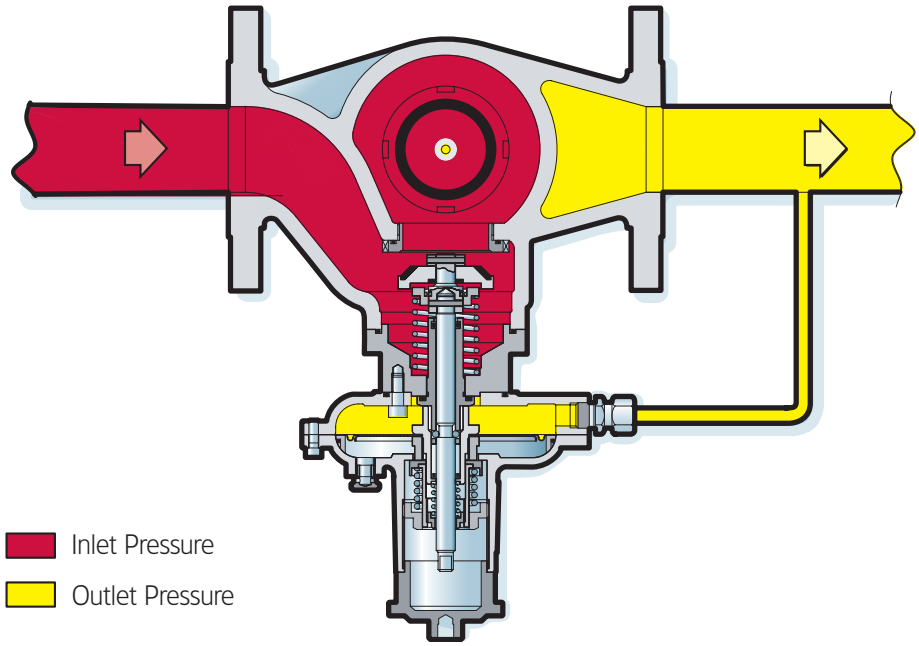
Over-pressure shut-off springs (OPSO)

Spring Code	Spring Characteristics				Colour	Spring Range			
	d	De (mm)	Lo (mm)	lt (mm)		8611/12 (Ø 150)	8621/22 (Ø 150/TR)	8631/8632 (Ø 90)	8641/8642 (Ø90/TR)
20565233	2.2	35	60	7	Yellow	28 - 65 mbar			
20565234	2.5	35	60	7	Red	45 - 100 mbar			
20565330	2.7	35	60	7	White	80 - 160 mbar			
20565331	3	35	60	7	Blue	100 - 250 mbar		0.6 - 1.2 bar	
20565332	3.5	35	60	7	Orange	190 - 350 mbar	0.6 - 1.2 bar	1.0 - 2.0 bar	
20565333	4	35	60	7	Brown	350 - 700 mbar	1.0 - 2.0 bar	1.5 - 3.1 bar	2.3 - 5.1 bar
20565334	4.2	35	60	7	Green	450 - 870 mbar	1.5 - 2.5 bar	2.0 - 3.8 bar	3.1 - 5.8 bar
20565430	4.5	35	60	7	Black	600 - 1050 mbar	1.7 - 2.8 bar	2.5 - 4.8 bar	3.8 - 6.8 bar
20565431	5	35	60	7	Grey	950 - 1400 mbar	2.7 - 4.3 bar	3.9 - 6.3 bar	5.7 - 9.3 bar
20565432	5.5	35	60	7	Yellow	•	•	5.0 - 8.0 bar	9.0 - 13.0 bar
20565134	6	35	60	7	Red	•	•	7.7 - 10.8 bar	12.7 - 15.0 bar

Under-pressure shut-off springs (UPSO)

Spring Code	Spring Characteristics				Colour	Spring Range			
	d (mm)	De (mm)	Lo (mm)	lt		8611/12 (Ø 150)	8621/22 (Ø 150/TR)	8631/8632 (Ø90)	8641/8642 (Ø90/TR)
20561124	1.2	15	40	10	White	5 - 18 mbar	•	•	•
20561221	1.5	15	40	10	Blue	10 - 55 mbar	•	•	•
20561222	1.7	15	40	10	Orange	30 - 75 mbar	0.2 - 0.2 bar	0.3 - 0.4 bar	0.4 - 0.6 bar
20561223	2	15	40	10	Brown	60 - 150 mbar	0.2 - 0.4 bar	0.3 - 0.7 bar	0.5 - 1.1 bar
20561224	2.5	15	40	10	Green	100 - 250 mbar	0.3 - 0.7 bar	0.4- 1.0 bar	0.6 - 1.5 bar

SSV 8500 Safety Shutoff Valve



Accuracy class (AG):

- Low pressure: AG 10
- Medium pressure: AG 2.5
- High pressure: AG 1

Minimal difference between regulator and SSV settings (ΔP_W):

- Standard: 15 % with a minimum difference of 10 mbar to UPSO, 20 mbar to OPSO
- High pressure: 20 % with a minimum difference of 40 mbar to UPSO, 40 mbar to OPSO

SSV 8500 Safety Shutoff Valve

The RB 4000 Series regulators (*) can be fitted with the SSV 8500 safety shutoff valve for overpressure (OPSO) or combined under-and-over pressure (UPSO/OPSO) protection.

(*) with the exception of sizes DN 50 x 80 and DN100.

The SSV trip pressure can easily be adjusted independantly of regulator set point.
The closing plug of the SSV controller is used as pulling tool to relatch the valve.
A built-in bypass, for balancing pressure before relatching the safety shutoff valve, is operated when pulling the valve stem.

Maximum inlet pressure

For higher inlet pressure, the SSV 8500 is fitted with heavier closing spring which gives a positive lock-up even in case of high pressure differential across the valve. The following table indicates the maximum inlet pressure for both executions.

DN	25	40	50	80
Standard	10 bar	10 bar	6 bar	6 bar
Heavy duty	19 bar	19 bar	19 bar	19 bar

Set Range

Over-pressure shut-off springs (OPSO)

Spring Code	Spring Characteristics				Spring Range		
	d mm)	De (mm)	Lo (mm)	It	8511/12 (Ø 150)	8521/22 (Ø 90)	8531/32 (Ø90/TR)
20565225	2	35	50	6	25 49 mbar	0.2 - 0.2 bar	•
20565125	2.5	35	50	6	44 - 120 mbar	0.2 - 0.4 bar	•
20565126	3	35	50	6	95 - 200 mbar	0.5 - 0.9 bar	•
20565127	3.5	35	50	6	200 - 300 mbar	0.9 - 1.8 bar	1.3 - 3.0 bar
20565128	4	35	50	6	•	1.4 - 2.2 bar	2.3 - 4.2 bar
20565129	4.5	35	50	6	•	2.3 - 3.1 bar	3.6 - 5.6 bar

Under-pressure shut-off springs (UPSO)

Spring Code	Spring Characteristics				Spring Range		
	d (mm)	De (mm)	Lo (mm)	It	8512 (Ø 150)	8522 (Ø90)	8532 (Ø90/TR)
20561022	1.2	15	35	7.75	9 - 19 mbar	0.06 - 0.1 bar	•
20560815	1.3	15	35	8	14 - 30 mbar	0.1 - 0.2 bar	0.2 - 0.4 bar
20561023	1.5	15	35	7.75	28 - 60 mbar	0.2 - 0.4 bar	0.3 - 0.6 bar
20561024	1.8	15	35	7.5	60 - 100 mbar	0.4 - 0.7 bar	0.6 - 1.2 bar
20561121	2	15	35	7.25	•	0.6 - 1.1 bar	1.2 - 1.7 bar
20561122	2.2	15	35	7	•	•	1.1 - 2.5 bar

RB 4000 Overall dimensions (in mm)

DN	Actuator	A	B	C	D	I	Weight
		(mm)	(mm)	(mm)	(mm)	(mm)	(kg)
25	Ø 360	183	405	70	360	-	20
25	Ø 220	183	385	70	220	-	13*
40	Ø 480	223	555	90	480	-	39
40	Ø 360	223	530	90	360	-	27*
50	Ø 480	254	565	100	480	-	41
50	Ø 360	254	540	100	360	-	29*
50 x 80	Ø 480	267	565	100	480	-	42
50 x 80	Ø 360	267	540	100	360	-	30*
80	Ø 600	298	710	130	600	-	70
80	Ø 480	298	655	130	480	-	56
80	Ø 360	298	625	130	360	-	49
100	Ø 600	352	730	110	600	101	95
100	Ø 480	352	674	110	480	101	81
100	Ø 360	352	652	110	360	101	74

* Add 4 kg for the **TR version**

Note : Flange holes on DN 100 size are threaded:
on PN16 flanges, M16 thread
on PN20 flanges, 5/8 UNC 2B thread

Vent and sensing lines

- Regulator sensing line: Rp 3/8 with compression fitting DN 12
- Regulator breather line: Rp 3/4

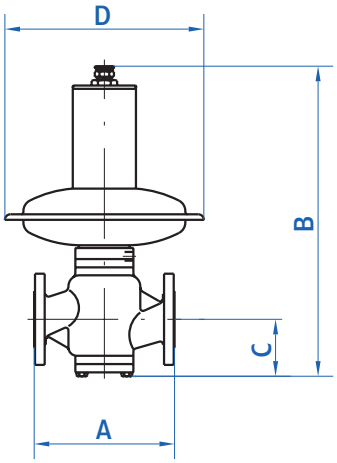
Type designation and options

Regulator

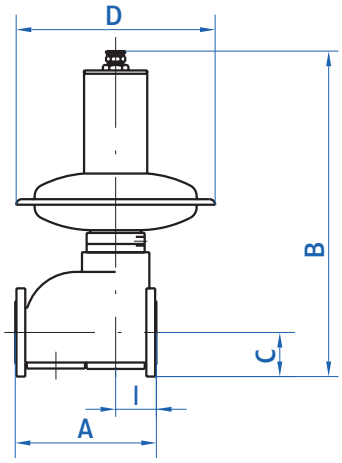
To specify the version of the RB 4000 regulator to be ordered, options and relevant codes should be selected from the table below.

R	B	E	4	0	X	X	DN	X	X	Options
					1					Low pressure (from 10 to 150 mbar)
					2					Medium pressure (from 0.15 to 1 bar)
					3					High pressure (from 1.0 to 2.1 (2.5) bar)
						0				Without safety device
						1				Over-pressure shut-off valve
						2				Over and low-pressure shut-off valve
							TR			Controler size reduction
							25			Orifice (Ø 23 mm)
							40			Orifice (Ø 38 mm)
							50			Orifice (Ø 48 mm)
							50/80			Orifice (Ø 48 mm)
							80			Orifice (Ø 78 mm)
							100			Orifice (Ø 98 mm)
								M		Monitor version
									S	with integral silencer

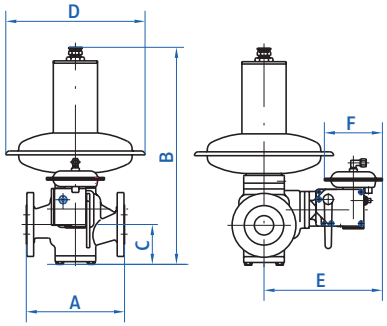
Example: Mod. 4011 DN25 M/S is a 1" regulator with over-pressure shut-off valve, monitor version and silencer.



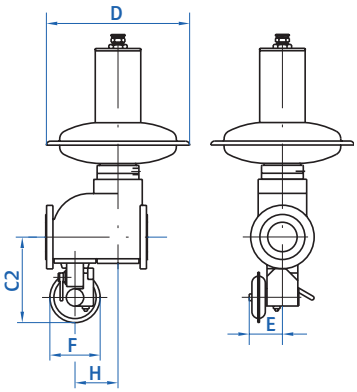
Regulator RB 4000
DN 25, 40, 50 & 80



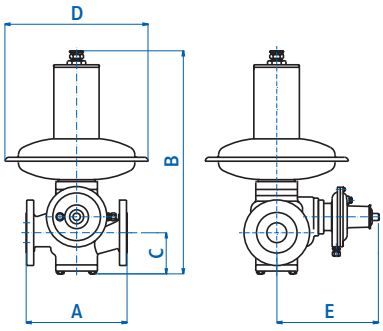
Regulator RB 4000 - DN 100



▶ Regulator RB 4000 and SSV 8600
DN 25, 40, 50 & 80



▶ Regulator RB 4000 and SSV 8600
DN 100



▶ Regulator RB 4000 and SSV 8500

SSV 8600 Safety Shutoff Valve

Overall Dimensions

DN	E	F	E	F	H	C2	Weight add.
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg)
	Actuator Ø 150		Actuator Ø 90				
25	290	150	260	90	-	-	4
40	298	150	268	90	-	-	5
50	306	150	276	90	-	-	7
50 x 80	306	150	276	90	-	-	7
80	362	150	332	90	-	-	9
100	135	150	135	90	149	294	10

Vent and sensing lines

- SSV sensing line:
  Rp 1/4 with compression fitting DN 10
- SSV 8600 breather line: Rp 1/4

Type designation and options

SSV 86	X	X	Versions
	1		ø 150
	2		ø 150/TR
	3		ø 90
	4		ø 90/TR
		1	OPSO
		2	OPSO + UPSO

SSV 8500 Safety Shutoff Valve

Overall Dimensions

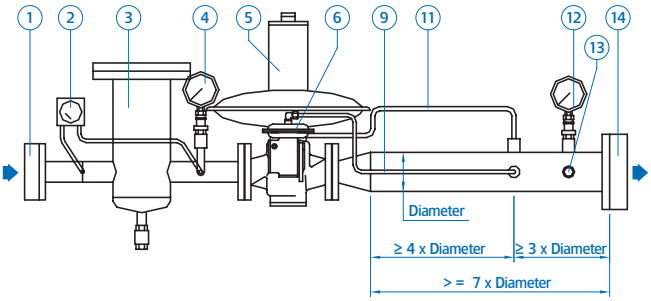
DN	E	Weight add.
	(mm)	(kg)
25	183	2
40	260	3
50	268	5
80	318	7

Type designation and options

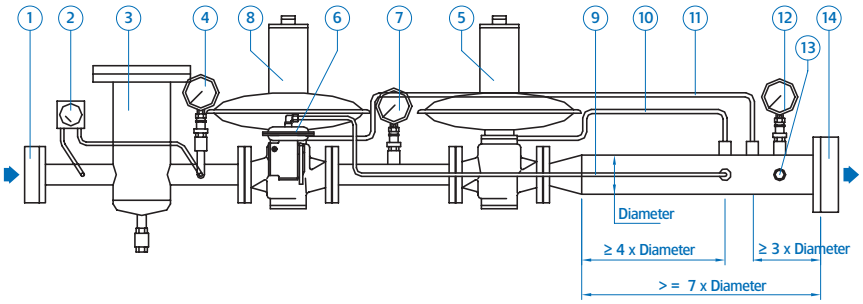
SSV 85	X	X	Versions
	1		ø 150
	2		ø 90
	3		ø 90/TR
		1	OPSO
		2	OPSO + UPSO

Vent and sensing lines

- SSV sensing line:
  Rp 1/4 with compression fitting DN 10
- SSV 8500 breather line: Rp 1/8



▶ Figure 6: Regulator installation



▶ Figure 7: Monitor application

Installation

Item	
1	Upstream valve
2	Differential pressure gauge
3	Strainer / Filter
4	Upstream pressure gauge
5	Regulator
6	Shut-off valve
7	Pressure gauge
8	Monitor Regulator
9	Shut-off valve sensing line
10	Regulator sensing line
11	Monitor regulator sensing line
12	Downstream pressure gauge
13	Discharge vent pipe
14	Downstream valve

Information to be specified when ordering:

- Regulator type code
- SSV type
- Minimum and maximum inlet pressures
- Outlet pressure range
- Outlet pressure setting
- OPCO setting*
- UPCO setting*
- Connection type
- Options

* if requested

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