Tank Blanketing Regulators

Low-Pressure Reducing Regulator
Type BR

Low-Pressure Relief Valve
Type BS

MADE SWISS

Description

Tank blanketing, or padding, is the process and practice of covering a stored commodity, usually a liquid, with a gas. It is the best prevention of and protection against explosions.
If the commodity is volatile or toxic, tank blanketing can prevent it from harming workers, equipment and the environment. When the commodity is a food or other substance, blanketing protects it from oxidation or contamination though exposure to air or moisture.

In most cases, tank blanketing gas is pure, dry nitrogen.
Blanketing can make up the volume of liquid displaced in or out a tank, or it can make up volume caused by thermal changes of the tank's contents, preventing the creation of a vacuum or excess operating pressure.

Highlights

- **Regulating range up to 4000 mbar / 60 psi**
- **Sizes DN15 to DN 100 (1/2" to 4")**
- **Pressure resistance 10 bar**
- **Back pressure resistance up to 4000 mbar/60 psi**
- **Withstands full vacuum**
- **Stainless steel regulators**
- **Nickel alloy Regulators**
- **PVDF regulators**
- **Clean and sterile regulators**
- **Maintenance friendly**
- **ATEX Ex II 2GD IIC**

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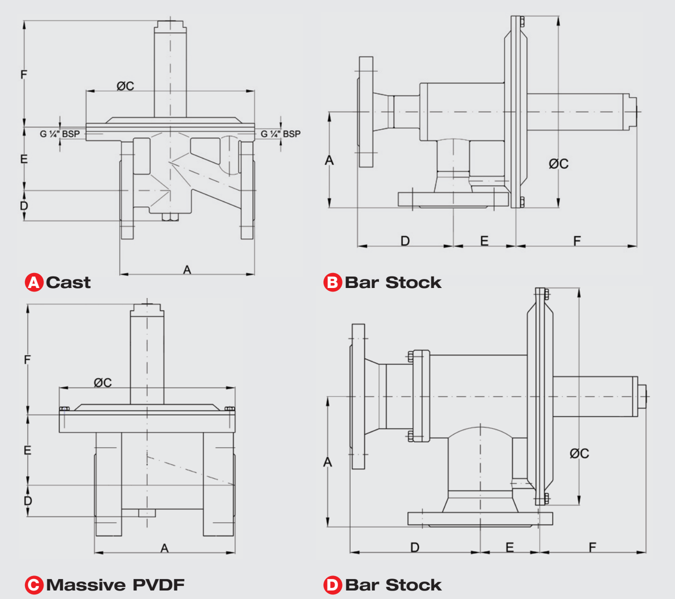
Technical Data Tank Blanketing Regulators



Dimensions in mm

Inline Pattern

Type	Body	A	øC	D	E	F	Weight in kg
BR/BS 15i	Ⓐ	130	160	30	66	125	4.1
BR/BS 25i	Ⓐ	160	200	36	75	125	6.5
BR/BS 50i	Ⓐ	230	300	54	105	148	18
BR/BS 25i	Ⓒ	160	200	41	83	125	6
BR/BS 50i	Ⓒ	230	300	70	145	148	17

Angle Pattern

Type	Body	A	øC	D	E	F	Weight in kg
BR/BS 15e	Ⓑ	100	160	100	65	125	5.9
BR/BS 25e	Ⓑ	100	200	100	65	125	7.1
BR/BS 50e	Ⓑ	180	300	150	70	220	17
BR/BS 80e	Ⓓ	250	440	250	82	320	34
BR/BS 100e	Ⓓ	250	440	250	100	370	42

Flanges according DIN EN 1092-1:2201 PN 10/16 or ANSI 150lbs ASA B16.5-1961

Technical data

Inlet pressure	: 16 bar / 300 psi (10 bar /150 psi for DN 80 / DN 100 and for PVDF regulators)
Back pressure resistance	: 4 bar / 60 psi
Regulating range of springs	: -200 to +600 mbar / -3 to +9 psi
Pilot regulating range	: -200 to +4000 mbar / -3 to +60 psi
Max. vacuum	: Withstands full vacuum
Max. temp. FFKM (Kalrez®)	: -20°C to +160°C / -4°F to +320°F
Max. temp. FPM (Viton®)	: -20°C to +120°C / -4°F to +250°F
Max. temp. PVDF regulator	: -20°C to +130°C / -4°F to +260°F

Tightness / Adjustment

Seat tightness acc. to EN 12266-1, leaking rate A, P12

Flow capacity for adjustment	DN 15 / ½"	: 0.5 Nm3h
	DN 25 / 1"	: 1 Nm3/h
	DN 50 / 2"	: 2 Nm3/h
	DN 80 / 3"	: 5 Nm3/h
	DN 100 / 4"	: 5 Nm3/h

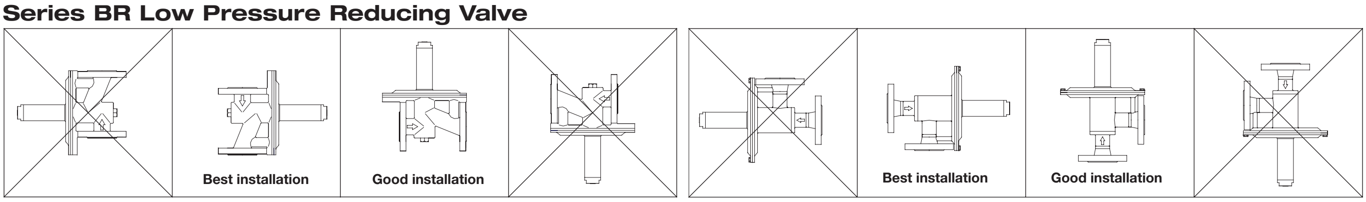
Certificates

According to Pressure Equipment Directive	: PED 97/23/EG
Conformity statement QS 04 ATEX 2006	: Ⓔx II 2GD IIC
Statement of Compliance	: US.FDA 21 CFR
Work Certificate	: EN10204 3.1B

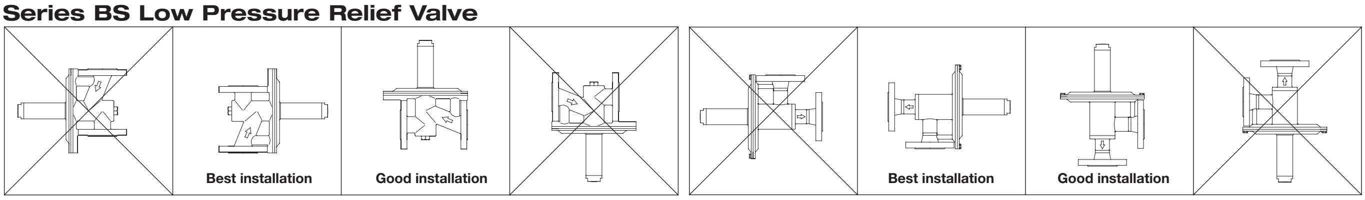
Installation

The recommended mounting for the low-pressure regulators is in a vertical line (see picture "best installation"). Lead sealed regulators are adjusted in this position. When they are mounted in a horizontal line, the set pressure will rise depending to the dimension of the regulator. Pressure regulators with set pressure lower than 10 mbar must be mounted as shown in the picture "best installation".

Series BR Low Pressure Reducing Valve



Series BS Low Pressure Relief Valve



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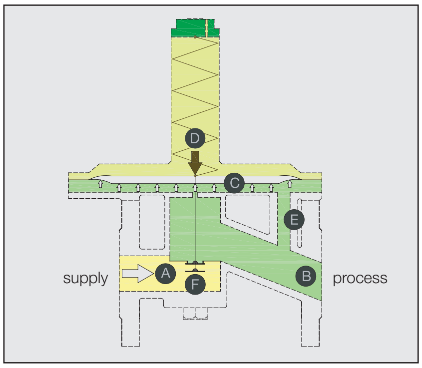
Codification Low Pressure Regulator

1. Function	**2. Connection**	**Spring**	**Sitz O-Ring**
BR Reducer	**D** DIN Flanges PN 16/10	**A** 10 to 50 mbar / 0.15 to 6.75 psi	**K** FFKM (Kalrez® 6375)
BRC Reducer CLEAN	**A** ANSI Flanges 150 lbs	**B** 20 to 150 mbar / 0.3 to 2.25 psi	**V** FPM (Viton®)
BRS Reducer STERIL	**C1** Clamp ISO 1127-1	**C** 50 to 300 mbar / 0.75 to 4.5 psi	**C** FFKM FDA (Kalrez® 6221)
... P Pilot Pressure Design	**C2** Clamp DIN 32676	**H** 100 to 600 mbar / 1.5 to 9 psi	**X** Special
... N Negativ Pressure Design	**C3** Clamp OD / ASME	*(up to DN 50)*	
	C4 Clamp SMS	**L** 0 to 10 mbar / 0 to 0.15 psi	**Diaphragm**
BS Back Pressure Valve	**C5** Food Union DIN 11851		**P** PTFE FDA
BSC Back Pressure Valve CLEAN	**G** BSP thread fem	**D** –10 to –50 mbar / –0.15 to 0.75 psi	**V** FPM
BSS Back Pressure Valve STERIL	**N** NPT thread fem	**E** –30 to –200 mbar / –0.45 to –3 psi	**X** Special
... P Pilot Pressure Design	**X** Special	**T** +10 to –10 mbar / +0.15 to –0.15 psi	
... N Negativ Pressure Design			
		J Without spring (Dome)	
		X Special	
Size	**Seat**		**4. Accessories**
15 DN 15 (1/2”)	**(04,06,10,14,21,32) D** Direct action decoupled	**3. Body**	**V** Pressure gauge fitting
25 DN 25 (1”)	**(06,10,14,21,32) E** Pressure compensated	**S** 316 / 316L (1.4408 / 1.4404)	**M** Pressure gauge Ø63, SS
50 DN 50 (2”)	**(06,10,14,21,32,42,67) R** Direct action coupled	**H** Nickel alloy	**E** External feedback
80 DN 80 (3”)	**(14,21,42,67,82) S** Relief seat	**P** PVDF	**H** Heating jacket
100 DN 100 (4”)		**X** Special	**R** Rain cover
			P Adjusted and leaded
Design		**Trim Parts**	**A** Ex ATEX design
i Inline pattern		**S** 316L (1.4404)	**K** Square guide pin
e Angle pattern		**H** Nickel alloy	**L** Locking screw in stainless steel
		P PVDF	**D** Flow limitation
		X Special	**X** Special

Examples:

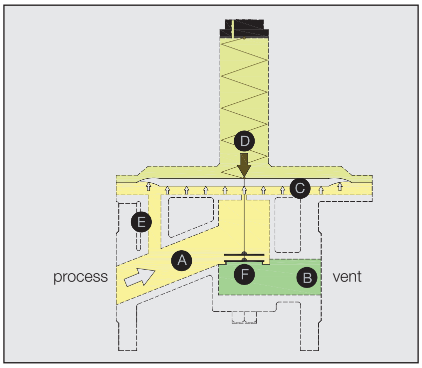
1	2	3	4
BRC25e	**D06RA**	**SSCP**	**VMP**

1. Reducer clean design, size DN 25, angle pattern
2. DIN flanges PN 16, seat diameter 6 mm, direct action, spring range 10 – 50 mbar
3. Body stainless steel, trim parts stainless steel, seat o-ring material FFKM with FDA conformity, diaphragm PTFE virgin
4. With pressure gauge union and pressure gauge, regulator adjusted and lead sealed



Reducing Regulator Function

Spring-loaded pressure reducing regulators are “relative pressure regulators”, designed to keep the process pressure “B” at a constant level. The nominal pressure is set by means of the setscrew, located at the spring housing. When at rest, the regulator remains in an open position. When the pressure “A” rises, pressure is released through the open valve seat “F” to the process side of the valve and through the internal feedback bore “E” underneath the diaphragm. This will continue, until the diaphragm force “C” exceeds the spring force “D”, while the process pressure “B” rises. The diaphragm is lifted and the vale seat “F” closes. In the event that the process pressure “B” drops below the pre adjusted nominal pressure, the spring force “D” presses the diaphragm downwards, so that the valve seat “F” opens and admits gas until pressure equalization is reached again.



Relief Valve Function

Spring-loaded relief valves are “relative pressure regulators”, designed to keep the process pressure “A” at a constant level. The nominal pressure is set by means of the setscrew, located at the spring housing. When at rest, the regulator remains in a closed position. When the process pressure “A” increases, pressure is released through the internal feedback bore “E” underneath the diaphragm. If the diaphragm force “C” exceeds the spring force “D” the valve seat “F” opens and the over pressure is discharged to the vent side “B”. If the process pressure “A” drops, the diaphragm force “C” is lower compared to the spring force “D” and the valve seat “F” closes. The pressure in the vent line can be atmospheric or vacuum. With vacuum in the vent line the flow capacity of the regulator is increased.

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Performance Data Low Pressure Reducing Valves

Inlet pressure P1 in bar	0.5	1	2	4	6	10	Seat Ø	Kv	DN
Set pressure P2 10 to 250 mbar	8.5	12	20	29	49	85	4 mm	0.6	15 (1/2")
	19.5	28	45	59	85		6 mm	1	
	33	45	77	85			10 mm	2	
Inlet pressure P1 in psi	**7.5**	**15**	**30**	**60**	**90**	**150**	**Seat Ø**	**Kv**	**DN**
Set pressure P2 0.15 to 3 psi	8.5	12	20	29	49	85	4 mm	0.6	15 (1/2")
	19.5	28	45	59	85		6 mm	1	
	33	45	77	85			10 mm	2	

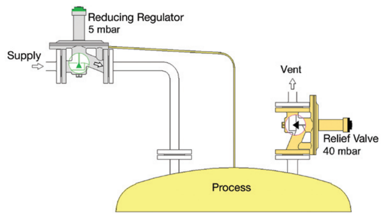
Inlet pressure P1 in bar	0.5	1	2	4	6	10	Seat Ø	Kv	DN
Set pressure P2 10 to 250 mbar	172	228	380	630	855	1565	21 mm	12	80 (3")
	430	575	945	1590	1950		32 mm	26	
	665	885	1470	1950			42 mm	40	
Inlet pressure P1 in psi	**7.5**	**15**	**30**	**60**	**90**	**150**	**Seat Ø**	**Kv**	**DN**
Set pressure P2 0.15 to 3 psi	172	228	380	630	855	1565	21 mm	12	80 (3")
	430	575	945	1590	1950		32 mm	26	
	665	885	1470	1950			42 mm	40	

Inlet pressure P1 in bar	0.5	1	2	4	6	10	Seat Ø	Kv	DN
Set pressure P2 10 to 250 mbar	9	13	22	32	55	100	4 mm	0.7	25 (1")
	22	31	43	65	105	192	6 mm	1.2	
	46	65	110	200	250		10 mm	3	
	90	125	200	250			14 mm	5	
Inlet pressure P1 in psi	**7.5**	**15**	**30**	**60**	**90**	**150**	**Seat Ø**	**Kv**	**DN**
Set pressure P2 0.15 to 3 psi	9	13	22	32	55	100	4 mm	0.7	25 (1")
	22	31	43	65	105	192	6 mm	1.2	
	46	65	110	200	250		10 mm	3	
	90	125	200	250			14 mm	5	

Inlet pressure P1 in bar	0.5	1	2	4	6	10	Seat d	Kv	DN
Set pressure P2 10 to 250 mbar	430	575	945	1590	2160	3000	32 mm	26	100 (4")
	665	885	1470	2440	3000		42 mm	40	
	1150	1480	2465	3000			67 mm	80	
Inlet pressure P1 in psi	**7.5**	**15**	**30**	**60**	**90**	**150**	**Seat Ø**	**Kv**	**DN**
Set pressure P2 0.15 to 3 psi	430	575	945	1590	2160	3000	32 mm	26	100 (4")
	665	885	1470	2440	3000		42 mm	40	
	1150	1480	2465	3000			67 mm	80	

Inlet pressure P1 in bar	0.5	1	2	4	6	10	Seat Ø	Kv	DN
Set pressure P2 10 to 250 mbar	46	65	110	200	280	510	10 mm	3	50 (2")
	94	125	208	345	470	850	14 mm	5.5	
	172	228	380	630	850		21 mm	12	
	430	600	850				32 mm	26	
Inlet pressure P1 in psi	**7.5**	**15**	**30**	**60**	**90**	**150**	**Seat Ø**	**Kv**	**DN**
Set pressure P2 0.15 to 3 psi	46	65	110	200	280	510	10 mm	3	50 (2")
	94	125	208	345	470	850	14 mm	5.5	
	172	228	380	630	850		21 mm	12	
	430	600	850				32 mm	26	

External Feedback Line

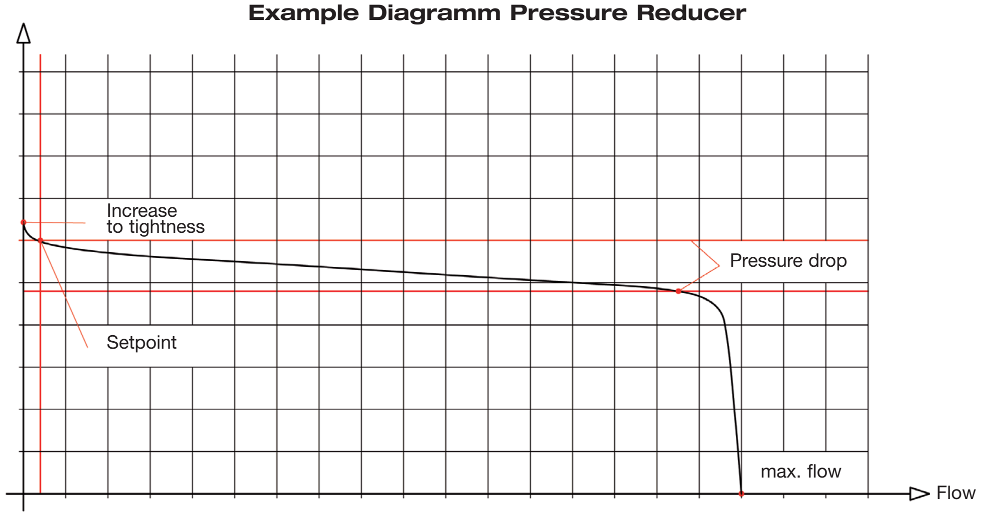


For set pressures lower than 10 mbar or when the pressure drop behind the pressure reducing valve exceeds the set pressure, the reducing valve must be equipped with a external feedback line (external feedback registration). This is also recommended for high flow capacities.

Velocity = <30m/s | Velocity = >30 m/s to 100 m/s | Flow velocity exceeds 100 m/s in piping | All flow rates in Nm³/h (Air)

In the reducing valve, the pressure decrease with increasing flow and after a defined point the flow is too high and the pressure drop down. This phenomenon of P2 dropping below setpoint as flow increases called „Droop“. This drop is the amount of deviation from setpoint at a given flow, expressed as a percentage of setpoint. This curve is important to a user because it indicates regulating capacity.

Example Diagramm Pressure Reducer



Low Pressure Reducing Valves:

DN 15/25/50
Type BR15i
Type BR25i
Type BR50i

DN 25/50
Type BR25e
Type BR50e

DN 25/50
Type BR25i
Type BR50i

DN 80/100
Type BR 80e
Type BR100e

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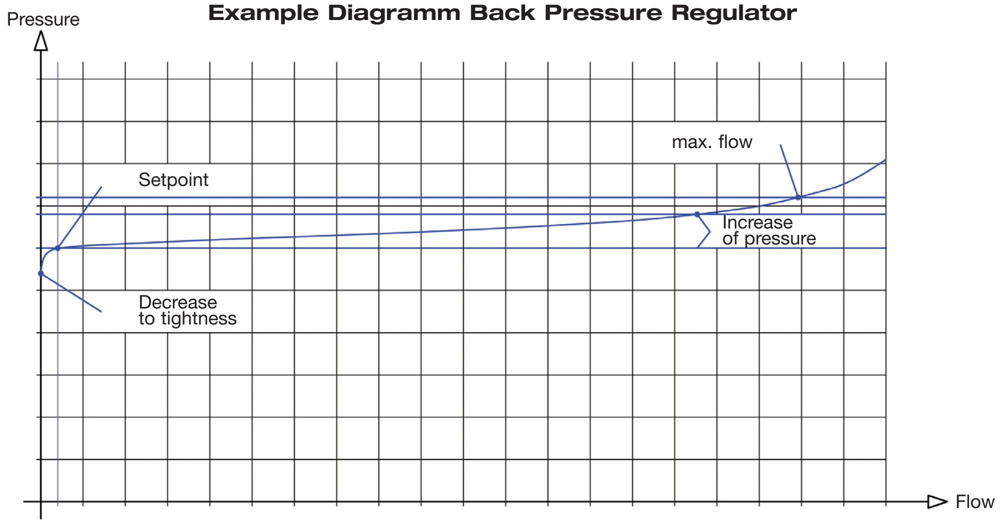
Performance Data Low Pressure Relief Valves

Set pressure P1 in psi / P2	0.15	0.3	0.75	1.5	3	6	Seat Ø	Kv	DN
Atmospheric	10.5	14.5	21	30	46	55	14 mm	4	**15**
–0.15 psi depression	12.5	17	23	32	47	56			
Atmospheric	22	34	47	65	100	125	21 mm	9.5	**25**
–0.15 psi depression	34	40	50	68	102	126			
Atmospheric	105	140	210	300	460	560	42 mm	40	**50**
–0.15 psi depression	140	165	230	315	470	565			
Atmospheric	210	280	420	600	920	1120	67 mm	80	**80**
–0.15 psi depression	280	330	460	630	940	1130			
Atmospheric	390	530	785	1130	1720	2100	82 mm	150	**100**
–0.15 psi depression	530	630	865	1220	1765	2120			

flow velocity <30m/s   flow velocity >30 m/s to 70 m/s   All flow rates in Nm³/h (Air)

In the back pressure valve, the pressure increase with increasing flow. As system pressure increases, the relief valve opens wider. This allows more fluid to escape and protects the system. The increase in pressure above the relief setpoint that is required to produce more flow through the the relief valve.

Example Diagramm Back Pressure Regulator



Low Pressure Relief Valves:

DN 15/25/50
Type BS15i
Type BS25i
Type BS50i

DN 25/50
Type BS25e
Type BS50e

DN 25/50
Type BS25i
Type BS50i

DN 80/100
Type BS 80e
Type BS100e

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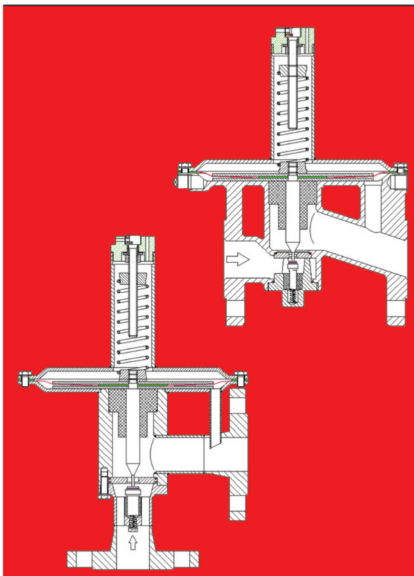
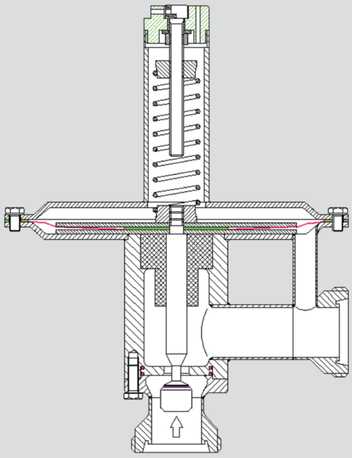
Design Features



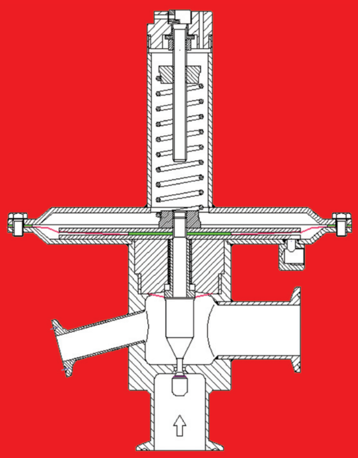
Standard Design

Application	For processes in the chemical-pharmaceutical industries, without substandard requirement.
Example of uses	Protection against explosion. Prevention of building an explosive mixture of gas by exchanging the atmospheric air with an inert gas.
Design	Inline- and angle pattern
Surface	Without special treatment
Complete drain	No



Clean Design

Application	For procedures in the pharmaceutical industries and food production with increased requirements concerning surface treatment, dead space and cleaning.
Example of uses	Protection against oxidation. The replacement of the atmospheric air by an inert gas prevents the building of an oxidizing ambiance.
Design	Angle pattern
Internal space	Rounded edges, minimized dead space
Surface	Roughness for areas in contact with media < Ra 0.8 µm, internal and external electropolishing as option.
Complete drain	Yes



Sterile Design

Application	Duties in the pharmaceutical industries and biotecnical with extremely high degree requirements to sterility.
Example of uses	All processes and procedures in sterile quality.
Design	Angle pattern
Internal space	Separated process- and control space, no dead space.
Surface	Areas in contact with media < Ra 0.6 µm and electropolished, external electropolishing as option.
Complete drain	Yes
CIP connection	On demand

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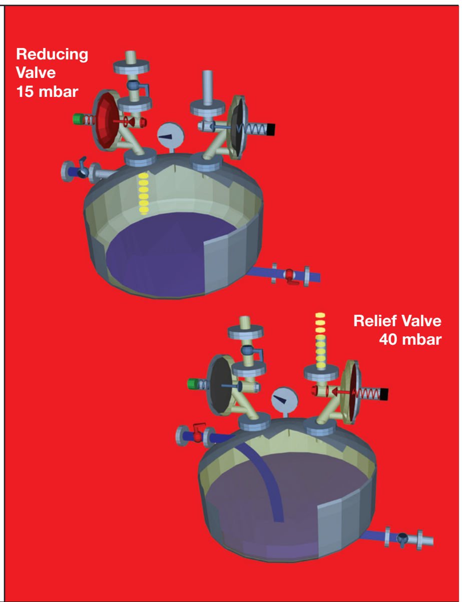
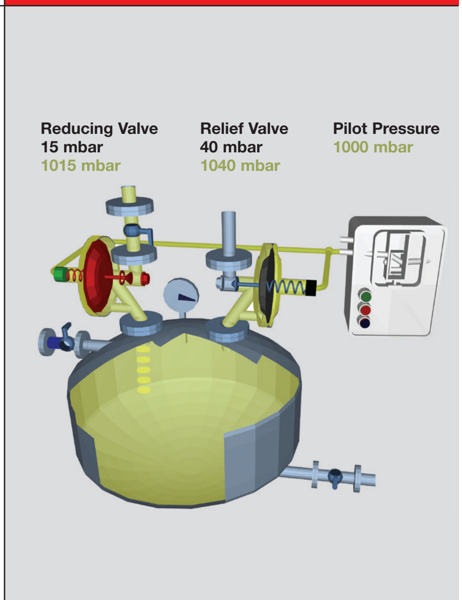
Tank Blanketing Systems

Where does blanketing take place? In all areas where in batch processes products or liquids are being handled, stored and covered with an inert atmosphere (mainly N2). How is blanketing accomplished? For optimum performance there are two pressure regulators required. A pressure reducing valve for entering the gas (inhale) and a relief valve for the discharging gas (exhale). Blanketing normally takes place in the pressure range from 10 to 50 mbar. We recommend to operate the regulators adjusted and sealed, e. g. reducing valve at 15 mbar, relief valve at 40 mbar. The two function points should be as far apart as possible to obtain a wide pressure spread without the consumption of gas. As a minimum pressure spread we recommend 8 mbar. In order to avoid the entry of oxygen into the vessel (for solvents), overpressure is necessary. In the event that no gas discharge is wanted (handling of toxic products) negative pressure must be kept.



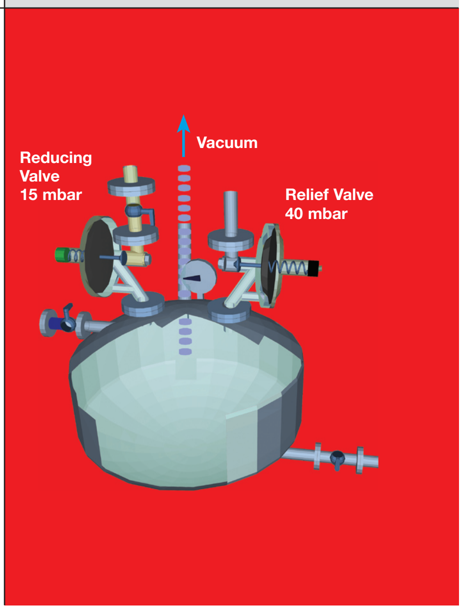
Inerting With Overpressure / Pneumatic Transfer

Inerting means the exchange of the standard atmosphere with a non-active (inert) gas atmosphere. Behind the diaphragm of spring loaded pressure regulators atmospheric pressure exists. If the space behind the diaphragm is sealed off and charged with a pilot pressure, the regulator will no longer use atmosphere as reference point but the pilot pressure (Pilot pressure design). The exchange of the gases is accelerated. If the reactor is inert, the pilot pressure is disabled and the low pressure regulators operate automatically in the blanketing mode (see blanketing systems). Beside blanketing, this design permits different other functions such as: Inerting with overpressure, pneumatic transfer of products, blow through, blocking.



Inerting With Vacuum

If the reactor withstands vacuum, inerting can be accomplished with negative pressure. With a vacuum pump, 80 % of the standard atmosphere is sucked off, the remaining pressure is 200 mbar abs. As a result, just 20 % oxygen molecules remain in the vessel. Afterwards, the reduced volume is replaced with Nitrogen back to the pressure of 1000 mbar abs through the reducer. This dilution of the remaining oxygen (app. 1:5 per inerting cycle) is being continued until the rest oxygen content is below the predetermined value. If the reactor is inert, production can start. The low pressure regulators operate automatically in the blanketing mode (see blanketing systems).



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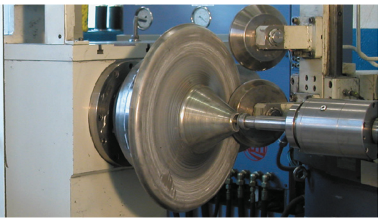
Quality commitment "Made in Switzerland"

For more than 50 years, the Swiss quality logo "Made in Switzerland" stands for precision and Top quality. The ZÜRCHER-TECHNIK pressure Regulators have been developed and are being manufactured in Switzerland. We do believe in the manufacturing location Switzerland, its competitive and know-how leadership.



The Zürcher-Technik pressure regulator knowledge, experience and know-how is a result of more than 30 years pressure regulator production and marketing.

Zürcher-Technik develops, designs and produces pressure regulators in Switzerland for global marketing and distribution.

The high demands and needs by the chemical-pharmaceutical industry have led to the development of precise, corrosion resistant and FDA conforming pressure regulators. Special attention hereby was given to the range of blanketing applications (mixers, tanks, centrifuges, containers, etc.)

Zürcher-Technik welcomes competition and is happy to meet their challenge. Our mission statement: In the long run, a company's survival and well being depends on its capability to come up with more innovative solutions than its competitors. Quality of our service, highest level or product reliability, dependable performance and customer satisfaction represent the key portion of our daily challenge.

Our Product Range in Medium Pressure Regulators

Pressure regulators for medium pressures up to 40 bar. The standard design are in use for all industrial applications. The sanitary design regulators are suitable for a variety of applications in the food & beverage, pharmaceutical and biotechnology industries. A typical use of those regulators is the pressure regulation of clean steam.

All data in this literature are subject to change without notice.

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