

Self-operated Pressure Regulators Series 2357

for special applications



Pressure Build-up Regulator Type 2357-3

Application

Pressure regulators for cryogenic gases as well as other liquids, gases and vapors · Operating pressures up to **40 bar** · Set point ranges **2 bar to 40 bar** · Temperature range **-196 °C to +200 °C** · Suitable for oxygen service



Industrial gases such as argon, nitrogen and oxygen, are stored in liquified condition at extremely low temperatures and at a constant pressure in thermally insulated containers. Suitable pipelines transport the medium to the consumer. The extreme operating conditions (pressures up to 40 bar and temperatures down to -196 °C) require the use of special valves.

The Type 2357-3 Pressure Regulators are especially designed for the use in cryogenic service.

Special features

- Low-maintenance proportional regulators, requiring no auxiliary energy
- Wide set point range and easy set point adjustment
- Rugged design and small overall height
- Suitable for oxygen service
- Preferable use in the gas state

Versions

The pressure regulators consist of a valve with three ports A, B and C, a spring-loaded operating bellows with set point adjuster and a tubular plug.

Pressure build-up regulator with safety function

– Direction of flow from port A to port B · Closing

The pressure at port B acts on the operating bellows. When the downstream pressure rises, the pressure build-up plug closes the valve.

Safety function: The tubular plug in the pressure build-up regulator operates like a safety valve and relieves the pressure chamber at port A when the pressure exceeds the set point by 5 bar. The difference in pressure at the bellows between the inside pressure at port C and outside pressure at port A creates a positioning force. This force opens the plug, opposing the force of the closing spring. As a result, the pressures are equalized and the pressure chamber upstream of port A is relieved of pressure.

Pressure relief valve

– Direction of flow from port B to port C · Opening

When no pressure is applied, the passage from port B to C is closed. The tubular plug does not open the valve until the pressure becomes 0.5 bar higher than the set point (pressure build-up) to relieve the pressure chamber downstream of port B of pressure.

Port C can be additionally equipped with a non-return unit.



Fig. 1 · Type 2357-3 Pressure Build-up Regulator with non-return unit, ports A and B with soldering nipples (standard version)

Accessories

Ports A and B: Connecting parts: Soldering nipple with ball-type bushing (for pipes with 28 mm Ø)

Port C: Connecting parts: Soldering nipple with ball-type bushing (for pipes with 18 mm Ø, without non-return unit)

Non-return unit: Connecting parts: Soldering nipple with ball-type bushing (for pipes with 28 mm Ø) for mounting on the non-return unit

Other accessories are listed in TV-SK 17010 EN.

Special version

- All wetted parts made of CrNiMo steel
- Regulator used in the liquid state



Principle of operation

The process medium flows from port A to port B in the Type 2357-3 Pressure Regulator used as a build-up pressure regulator with safety function.

The valve is open when no pressure is applied. The pressure downstream of the valve is transmitted to the operating bellows (4). The positioning force produced by this pressure moves the pressure build-up plug (1), which is firmly attached to the plug sleeve, depending on the spring force adjustable at the set point adjuster (6). The valve closes when the pressure downstream of the valve has assumed the adjusted set point.

Functioning as pressure build-up regulators, the regulator also operates as a safety valve for the pressure chamber upstream of port A. When the pressure rises above the set point by approx. 5 bar, the positioning force overcomes the force of the closing spring (8), causing the pressure build-up plug (1) to open and the pressure is relieved to ports B and C.

Functioning as a pressure relief valve, the medium flows from port B to C. The tubular plug seals off the operating bellows when there is no pressure drop across port B and C. The pressure at port B acts on the operating bellows (4). The positioning force produced by this pressure opposes the adjustable spring force of the set point spring (5) and opens the tubular plug (2) when the pressure rises above the set point by approx. 0.5 bar. The pressures are equalized and the medium escapes through the inside of the tubular plug over port C.

As a pressure relief valve, the regulator can be optionally equipped with a non-return unit (10). It prevents the medium from flowing back to port C and allows maintenance work to be performed on the regulator without having to empty the container first.

Installation

– Port C pointing upward

Used as

– **Build-up pressure regulator with safety function:**

Direction of flow from port A to port B

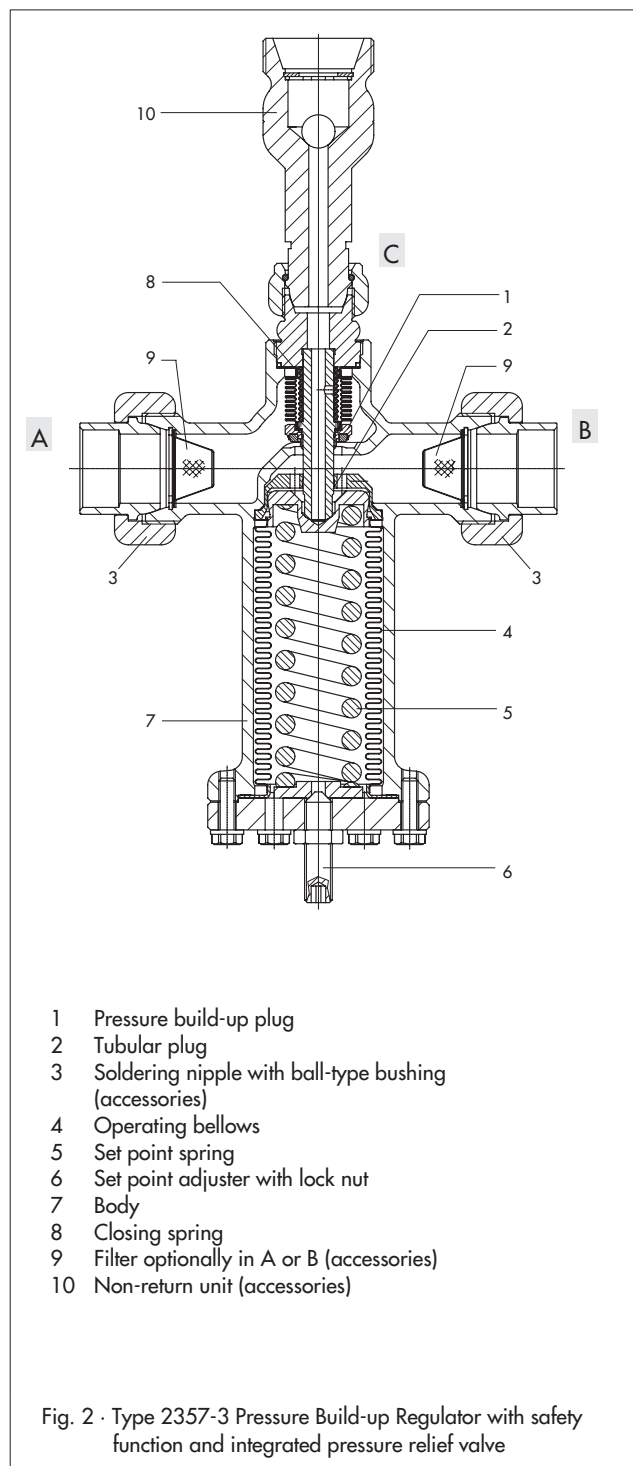
– **Pressure relief valve:**

Direction of flow from port B to port C

Refer to EB 2559 EN for more details.

EC type examination

An EC type examination according to the Pressure Equipment Directive 97/23/EC, Module B has been performed on the regulators.



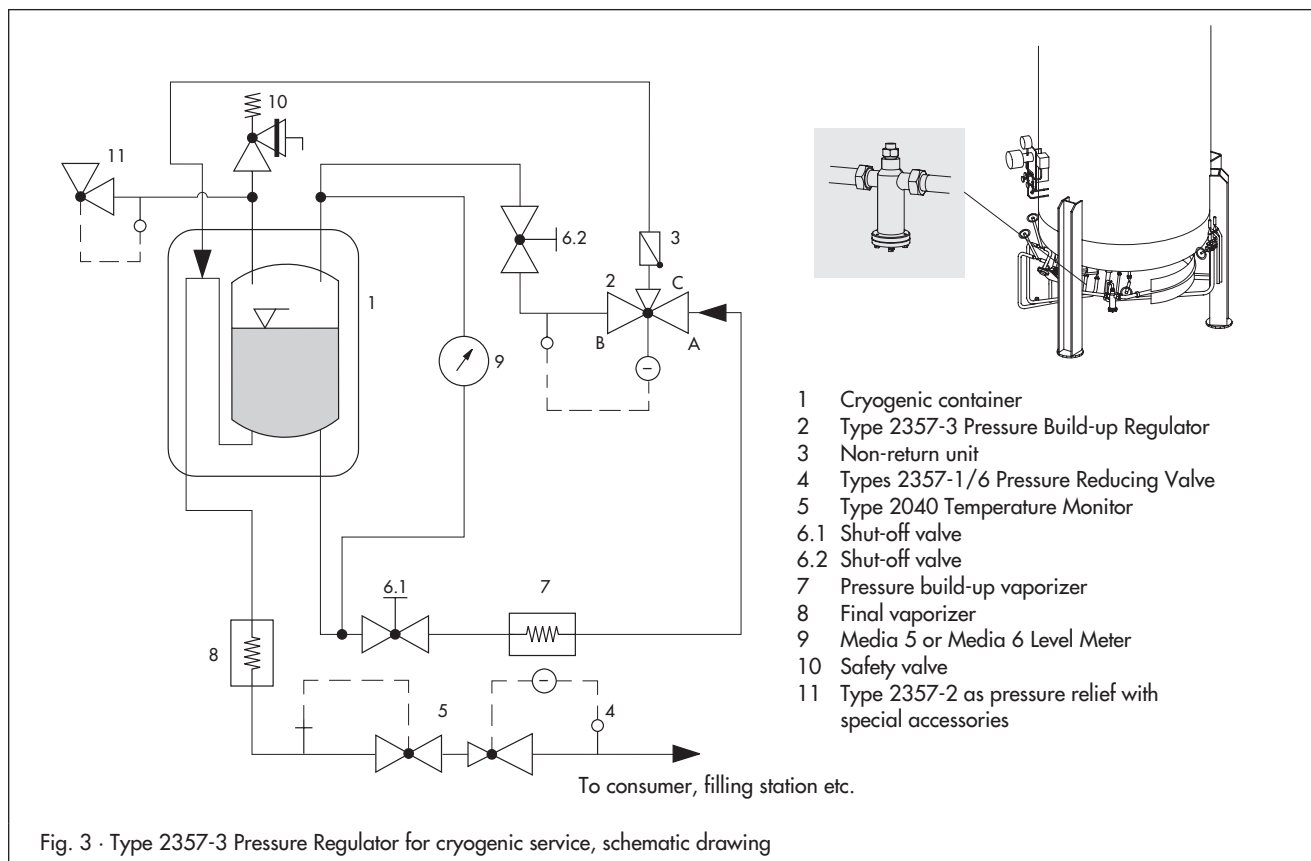
- 1 Pressure build-up plug
- 2 Tubular plug
- 3 Soldering nipple with ball-type bushing (accessories)
- 4 Operating bellows
- 5 Set point spring
- 6 Set point adjuster with lock nut
- 7 Body
- 8 Closing spring
- 9 Filter optionally in A or B (accessories)
- 10 Non-return unit (accessories)

Fig. 2 · Type 2357-3 Pressure Build-up Regulator with safety function and integrated pressure relief valve

Table 1 · Technical data · All pressures in bar (gauge)

Type	2357-3	
	Process medium in the gas state	2357-3 Process medium in the liquid state (special version)
K _{VS} coefficient	3.2	
Set point ranges	2 to 10 bar · 8 to 26 bar · 25 to 40 bar	
Permissible operating pressure	40 bar	
Safety function	5 bar above the set point	12 bar above the set point
Pressure relief function	0.5 bar above the set point	
Temperature range	-196 °C to +200 °C	
Weight, approx.	3.5 kg	

Typical application (schematic drawing)



Description of typical application shown above

Pressure regulator functioning as a pressure build-up regulator with safety function

When tapping the liquified cryogenic gas, the gas pressure in the insulated container causes the medium to be transferred to the vaporizer (8). The gas pressure in the container drops below the adjusted operating pressure. The Type 2357-3 Regulator opens and allows the liquified gas to flow into the pressure build-up vaporizer (7). The gas pressure increases and equals the operating pressure again. The regulator (2) closes.

After closing the shut-off valve (6.1), the liquid remaining in the pipeline between shut-off valve and regulator (2) vaporizes, causing the pressure to increase. The plug of the pressure build-up regulator (2) acts as safety valve by opening the valve (upstream pressure at port A) to B and C when the set point is exceeded by approx. 5 bar to equalize the pressures. The pressure chamber is relieved of pressure as a result.

The following applies for the special version:

To discharge small quantities of gas, the Type 2357-2 Excess Pressure Valve (11) can be used with special accessories. The safety valve does not react when just the gas volume must be discharged due to heat leak.

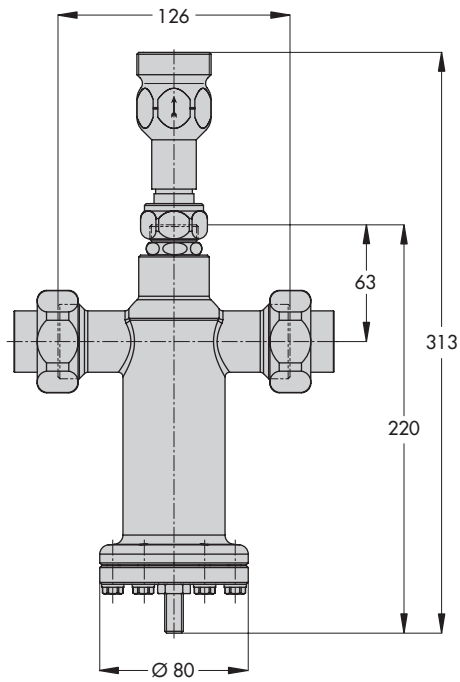
Pressure regulator functioning as a pressure relief valve

The Type 2357-3 Regulator (2) functions as a pressure relief valve when the process medium flows from port B to C. The valve opens when the operating pressure is approx. 0.5 bar higher than the set point adjusted. The process medium is drained over port C into the consumer pipeline back to the plant.

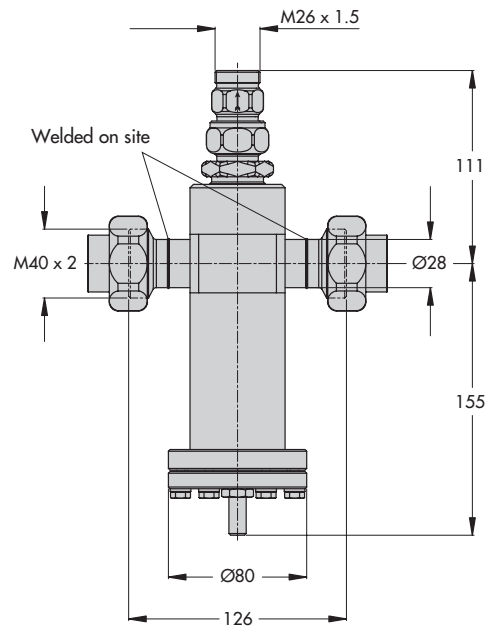
Table 2 · Materials · Material no. according to DIN EN

Type	2357-3	
Body	CC754S-GM (brass)	1.4404
Tubular plug	1.4301	
Plug	1.4301 · PTFE soft sealing	
Operating bellows	1.4571	
Set point spring	Stainless steel (1.4310)	
Body gasket	PTFE	
Ports	A and B	M40 x 2
	C	M26 x 1.5 male thread
Non-return unit	M40 x 2	M26 x 1.5

Dimensions in mm



Type 2357-3 · Standard version



Type 2357-3 · CrNi steel version

Fig. 4 · Dimensions

Ordering text

Pressure Build-up Regulator **Type 2357-3**

Set point range ... bar

Optionally, accessories ...

Optionally, special version ...

Specifications subject to change without notice.



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