

Self-operated Pressure Regulators

for special applications



Type 2357-11 Pressure Regulator

Pressure build-up regulator · Valve opens when the upstream pressure drops

Pressure reducing valve · Valve closes when the downstream pressure rises

Type 2357-21 Excess Pressure Valve · Valve opens when the upstream pressure rises

Application

Pressure regulators for **cryogenic gases** and **liquids** as well as other **liquids, gases and vapors** · Operating pressures up to **63 bar** · Set point ranges from **1 to 40 bar** · Temperatures from **-200 to +200 °C** · Oxygen clean according to international standards and guidelines



Industrial gases (such as argon, nitrogen and oxygen) are stored in a liquefied condition at extremely low temperatures and at a constant pressure in thermally insulated tanks. Pipes transport the medium to the consumer. The extreme operating conditions (pressures up to 50 bar and temperatures down to -200 °C) make it necessary to use special valves.

The Series 2357 Pressure Regulators are especially designed for the conditions in cryogenic service. These regulators can also be used for gases, liquids and vapors under other operating conditions.

Special features

- Low-maintenance proportional regulators requiring no auxiliary energy
- Wide set point range and convenient set point adjustment
- Rugged design and low overall height
- Cleaned and packed for oxygen service ¹⁾

Versions

The pressure regulators consist of a valve body, operating diaphragm and set point adjuster.

Type 2357-11 Pressure Build-up Regulator with safety function

The upstream pressure is transmitted to the operating diaphragm. The valve opens when the upstream pressure falls below the adjusted set point. Direction of flow from port B to port A.

Safety function: the plug in the pressure build-up regulator operates like a safety valve and relieves the pressure chamber. The pressure acts from below against the plug surface. The valve opens to equalize the pressures.

Type 2371-11 Pressure Reducing Valve

The valve regulates the downstream pressure to the adjusted set point. The valve closes when the downstream pressure rises. Direction of flow from port A to port B.

¹⁾ The regulators are not approved for oxygen service according to EIGA 13/02/E due to the use of thin-walled components made of CrNi steel



Fig. 1: Type 2357-11 Pressure Regulator/Type 2357-21 Excess Pressure Valve

Type 2357-21 Excess Pressure Valve

The valve regulates the upstream pressure to the set point adjusted at the set point adjuster. The valve opens when the pressure increases until the set point is reached. Direction of flow from port B to port A.

The valve opens when the pressure increases until the set point is reached. The regulator is additionally equipped with an integrated non-return unit that prevents the medium from flowing back.

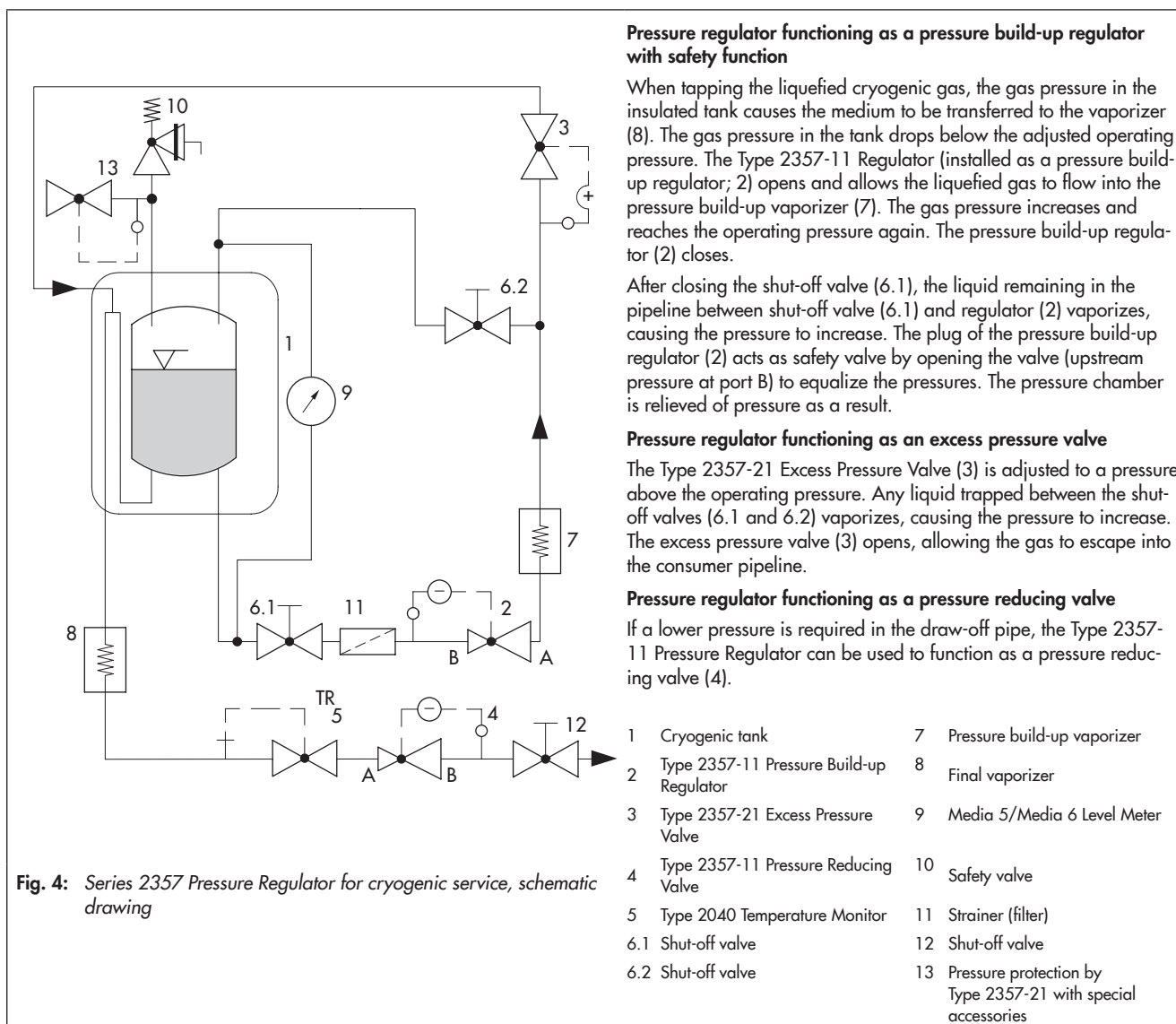


Table 1: Technical data · All pressures in bar (gauge)

Type	2357-11	2357-21
K_{VS} coefficient	0.8	1.25
Set point ranges ¹⁾ in bar	1 to 8 5 to 25 8 to 40	
Permissible operating pressure	63 bar ²⁾	
Safety function for Type 2357-11	5 bar above the set point	
Max. permissible differential pressure Δp	Type 2357-11 Pressure Reducing Valve: Gases 30 bar · Liquids 6 bar Type 2357-21 Excess Pressure Valve: 3 bar (>3 bar only with special accessories)	
Temperature range	-200 to +200 °C	

¹⁾ Other set point ranges on request · ²⁾ For oxygen: $p_{max} = 40$ bar

Table 2: Materials · Material numbers according to DIN EN

Type	2357-11	2357-21
Body	1.4408	
Spring housing	1.4408	
Plug	1.4404	
Operating diaphragm	CuBe with composite diaphragms made of 1.4404	
Set point springs	Stainless steel (1.4310)	
Body gasket	PTFE	

Flow capacity of the regulator dependent on the liquid column in the cryogenic tank

The value table and the mass flow diagram show the flow capacity for the media nitrogen (N₂), oxygen (O₂), argon (Ar), carbon dioxide (CO₂) and natural gas (LNG).

The specifications apply to the **Type 2357-11** Pressure Build-up Regulator installed in the liquid phase of the pressure build-up control loop; as shown in Fig. 4 (**sample application**).

The maximum flow capacity [kg/h] of the regulator arises from the liquid level of the medium in the tank and can be determined from the graph.

The data in the graph are based on theoretical calculations which do not take factors, such as pressure losses in the pipeline, into account. Therefore, the real flow capacity may deviate from the calculated value.

Table 3: Mass flow dependent on the liquid column in the cryogenic tank

Filling level [m]	Mass flow rate [kg/h]				
	N ₂	O ₂	Ar	CO ₂	LNG
1	248	351	427	359	130
3	379	537	653	550	199
5	475	673	819	689	249
7	555	785	956	805	291
9	624	884	1,076	906	328
11	687	973	1,184	996	361
14	771	1,093	1,329	1,119	405
17	848	1,201	1,460	1,230	445
20	918	1,300	1,580	1,331	482

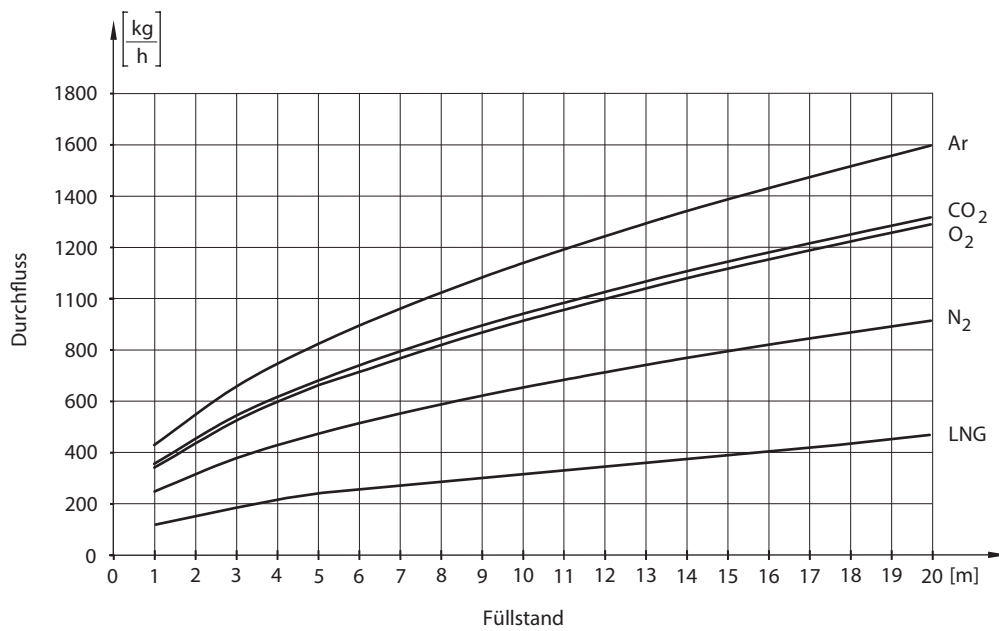
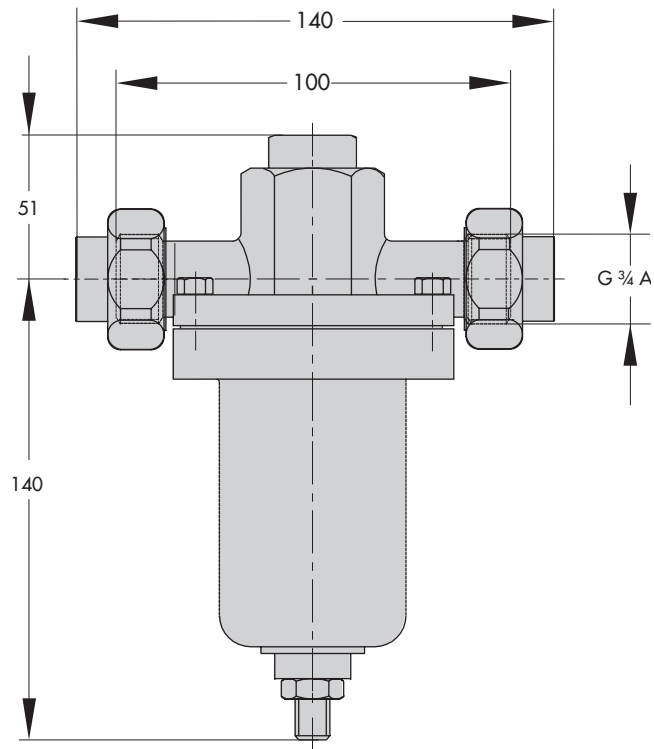


Fig. 5: Mass flow dependent on the liquid column in the cryogenic tank

Dimensions in mm and weights



Type 2357-11 Pressure Regulator/Type 2357-21 Excess Pressure Valve with welding ends (accessories) · Weight approx. 4 kg

Fig. 6: Dimensions and weights

Ordering text

Type 2357-11 and Type 2357-21 Pressure Regulators

Set point range ... bar

Optionally, accessories ...

Special version ...

Specifications subject to change without notice



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2018-06-21 · English