

# Self-operated Pressure Regulators

SAMSON

Type 2357-1 Pressure Reducing Valve

Types 2357-2 Excess Pressure Valve



Type 2357-1 Pressure Reducing Valve



Type 2357-2 Excess Pressure Valve

## Mounting and Operating Instructions

**EB 2557 EN**

Edition March 2018



## Definition of signal words



### **DANGER!**

*Hazardous situations which, if not avoided, will result in death or serious injury*



### **WARNING!**

*Hazardous situations which, if not avoided, could result in death or serious injury*



### **NOTICE**

*Property damage message or malfunction*



### **Note:**

*Additional information*



### **Tip:**

*Recommended action*

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### 1 General safety instructions

- The regulators are to be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger.
- All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be strictly observed.
- According to these mounting and operating instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- The regulators comply with the requirements of the European Pressure Equipment Directive 97/23/EC. The declaration of conformity issued for a regulator bearing the CE marking includes information on the applied conformity assessment procedure. The declaration of conformity is available on request.
- To ensure appropriate use, only use the regulator in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the regulator at the ordering stage.
- The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors.
- Any hazards that could be caused in the regulator by the process medium, operating pressure or by moving parts are to be prevented by taking appropriate precautions.
- Proper transport, storage, installation, operation and maintenance are assumed.

## 2 Process medium and scope of application

Pressure regulators for cryogenic gases and liquids as well as other liquids, gases and vapors. Oxygen clean according to international standards and guidelines.

Operating pressures up to 50 bar, with set points from 0.2 to 40 bar. Temperature range from -196 to +200 °C.

The regulators are designed to keep the pressure constant to the adjusted set point, especially in cryogenic plants.



### **WARNING!**

*Risk of injury and property damage due to high pressure in the plant!*

*A suitable overpressure protection must be installed on site in the plant section.*

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### 2.1 Transportation and storage

The regulators must be carefully handled, transported and stored. Protect the regulators against adverse influences, such as dust, dirt or moisture before they are installed.

In the delivered state, the pressure regulators are packed to be free of oil and grease for oxygen service. To avoid contamination, do not open the packaging until immediately before installation.

### 3 Design and principle of operation

See Fig. 1 on page 7.

#### Type 2357-1 (globe valve)

##### Pressure build-up regulator

Direction of flow from port B to port A. The pressure upstream of the valve (port B) is transmitted to the operating diaphragm. The valve closes when the upstream pressure increases and opens when the upstream pressure decreases.

The pressure build-up regulator operates as a safety valve and relieves the pressure chamber upstream of the inlet of pressure when the pressure exceeds the set point by 5 bar. After overcoming the force of the top plug spring (16), the valve opens to equalize the pressures.

##### Pressure reducing valve

Direction of flow from port A to port B. The valve is open when no pressure is applied.

The pressure downstream of the valve (port B) is transmitted to the operating diaphragm (3). The positioning force produced moves the valve plug (2.1) depending on the spring force adjustable at the set point adjuster (10). The valve closes when the pressure downstream of the valve (port B) rises.

#### Type 2357-2 (angle valve)

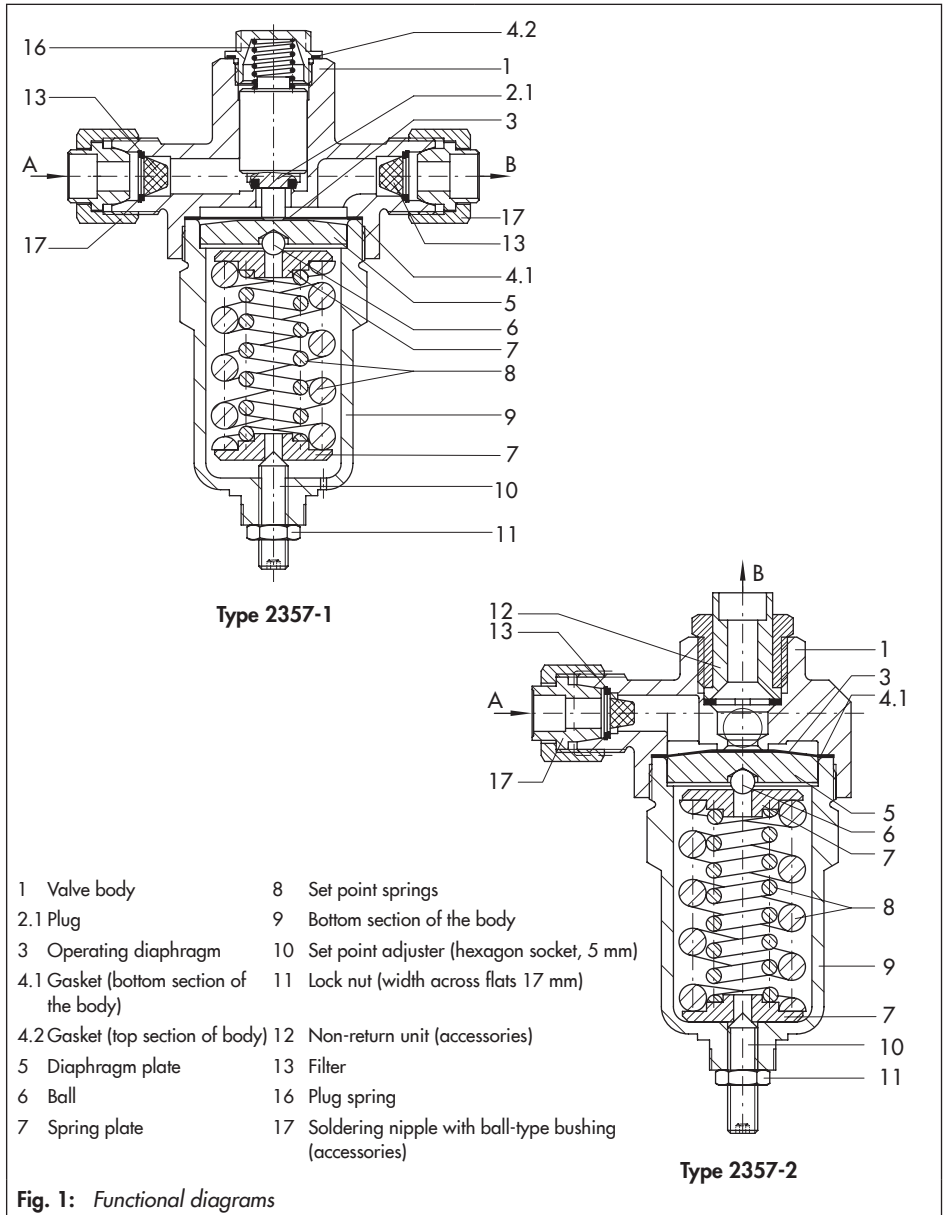
##### Excess pressure valve

Direction of flow always from port A to port B. The valve is closed when no pressure is applied. The pressure at port A is transmitted internally to the operating diaphragm (3). The positioning force produced opposes the adjustable spring force. The valve opens when the pressure increases until the set point is reached.

The regulator can be optionally equipped with a non-return unit (12), which prevents the medium from flowing back through the valve.

##### EC type examination

An EC type examination according to the Pressure Equipment Directive 97/23/EC, Module B has been performed on the regulators (PN 50 version).



## 4 Installation

In the delivered state, the regulators are packed to be free of oil and grease for oxygen service.



### **WARNING!**

*Use of oil and grease in oxygen atmospheres!*

*Risk of explosion!*

*Make sure that the regulator is absolutely clean and free of oil and grease on installing it.*

Flush and clean the pipeline thoroughly before installing the regulator.

- Make sure the regulator is installed free of stress.
- Install a strainer upstream of the regulator.

Otherwise, impurities in the pipeline may impair the proper functioning of the valve, above all the tight shut-off.

### 4.1 Mounting position

Install the pressure regulator with the actuator housing suspended downward in horizontal pipelines.



Observe the flow direction.

- In **pressure build-up regulators** with safety function from **B** to **A**
- In **pressure reducing valves** from **A** to **B**
- In **excess pressure valves** with non-return unit from **A** to **B**. Port B must face upward.

The ports are marked.

Required spare parts and accessories are listed in Data Sheet ► T 2570

### 4.2 Shut-off valves

We recommend installing a hand-operated shut-off valve both upstream and downstream of the regulator. This allows the plant to be shut down for cleaning and maintenance, and when the plant is not used for longer periods of time.

Install a pressure gauge at a suitable point to monitor the pressures prevailing in the plant.

## 5 Operation

See Fig. 1 on page 7.

### 5.1 Start-up

First start up the regulator after mounting all parts.

### 5.2 Set point adjustment

Each pressure regulator are delivered with the set point listed in Table 1 already adjusted.

Turn the set point adjuster (10) using Allen key (size 5 mm) to change the default set point.



Provided a pressure gauge has been installed at a suitable point in the plant, the required set point can be directly adjusted while monitoring the pressure reading at the gauge.

When a pressure gauge is not installed, adjust the set point using the adjustment diagram Fig. 2.

To increase the set point, turn the set point adjuster into the body (⤵) and out of the body (⤴) to reduce it.

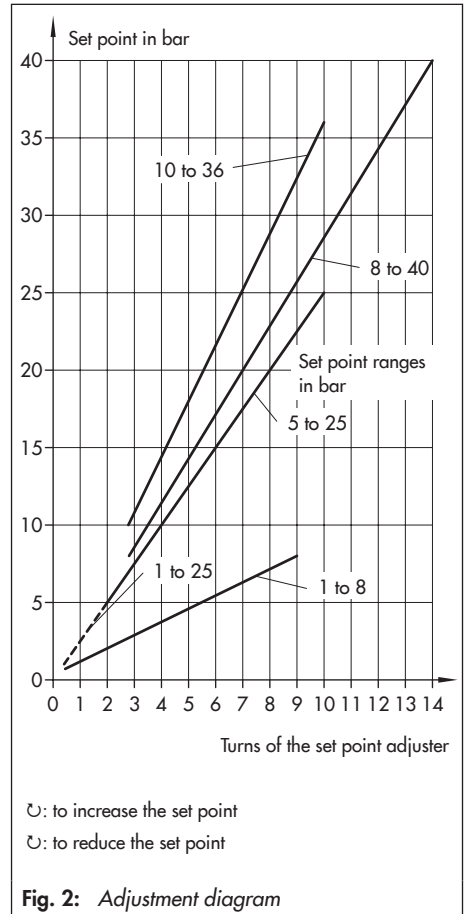
**NOTICE!**  
 Set point adjuster screwed too tight!  
 The regulator is blocked and the medium flow through it is restricted. Pressure regulation is no longer possible!  
 Only screw the set point adjuster up to the point where the spring tension can still be felt!

**How to proceed:**

1. Loosen the lock nut (11, size 17 mm) to allow the set point adjuster to move freely.
2. Determine the difference between the fixed set point (Table 1) and the required set point. Turn the set point adjuster (10) the required amount of turns as specified in Fig. 2.

Based on the default setting, any subsequent change to the set point can be also be made by determining the required number of turns using the specifications listed in Table 1.

3. Lock the setting with the lock nut (11).



**Fig. 2:** Adjustment diagram

**Table 1:** *Set point adjustment*

Nominal pressure	PN 40			PN 50				
Set point range	0.2 to 3 bar	1 to 25 bar	10 to 36 bar	0.2 to 2.5 bar	1 to 8 bar	5 to 25 bar	8 to 40 bar	
Set point adjusted at the factory (approx.)	2357-1	1 bar	12 bar	20 bar	1 bar	3 bar	12 bar	25 bar
	2357-2	1 bar	13 bar	21 bar	1 bar	4 bar	13 bar	26 bar
Set point change per turn	0.4 bar	2.5 bar	3.5 bar	0.4 bar	1 bar	2.5 bar	3.5 bar	

### 5.3 Decommissioning

Close first the shut-off valve on the upstream side of the valve and then on the downstream side of the valve.

## 6 Maintenance

The regulators do not require any maintenance. Nevertheless, they are subject to natural wear, particularly at the seat, plug and operating diaphragm.

Depending on the operating conditions, check the regulator at regular intervals to avoid possible malfunctions.



**WARNING!**

*Process medium can escape uncontrolled on dismantling the regulator. Risk of cold burns!*

*Allow the regulator to defrost before depressurizing and draining it and remove it from the pipeline.*

Check the filters in ports A and B for dirt and, if necessary, clean them.

If faults or malfunctions cannot be remedied, contact SAMSON (see section 7).

## 6.1 Changing the set point range

The set point ranges adjusted in the factory can be changed by changing the set point springs (8) and operating diaphragm (3) (see ► T 2570 EN · Spare parts and accessories).

### How to proceed:

1. Loosen lock nut (11) and relieve the tension from the set point springs (8) by turning the set point adjuster (10) counterclockwise.
2. Place the lower section of the body (9) into a vise, but do not clamp it. Preferably use a box wrench (size 55 mm). Unscrew the body (1) using an open-end wrench (size 36 mm) and remove all parts from the lower section of the body. Be careful not to damage the operating diaphragms (3).
3. Place set point spring(s) for the required set point range, spring plates (7), ball (6) and diaphragm plate (5) into the lower section of the body.
4. Place the required number of diaphragms onto the diaphragm plate. Replace the PTFE gasket (4.1) of the valve body, if required.
5. Carefully place the body onto the lower section of the body.

### Tightening torque

PN 40:	approx. 180 Nm
PN 50:	approx. 250 Nm

## 7 Customer service

If malfunctions or defects occur, contact the SAMSON After-sales Service Department for support.

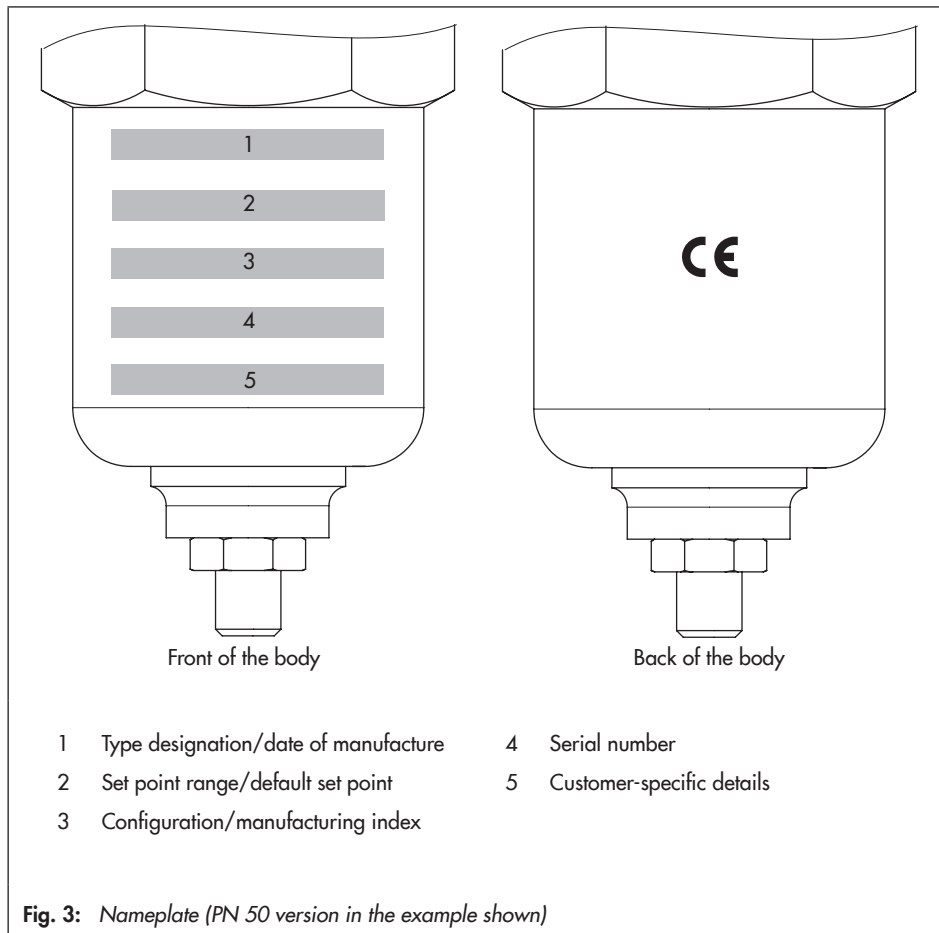
The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on the SAMSON website (► [www.samson.de](http://www.samson.de)), in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

Please send your inquiries to: [service@samson.de](mailto:service@samson.de)

To assist diagnosis and in case of an unclear mounting situation, specify the following details (see section 8):

- Type designation and  $K_{VS}$  coefficient
- Model number with index
- Upstream and downstream pressure
- Temperature and process medium
- Min. and max. flow rate
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, pressure gauge, etc.)

## 8 Nameplate



**Note:**

Depending on the version (Type 2537-1 or Type 2537-2) and pressure rating, how the specifications are listed on the front and back of the body may vary.

## 9 Technical data

Type	2357-1		2357-2	
K <sub>VS</sub> coefficient	0.25	0.8	1.25	0.4
Set point ranges <sup>1)</sup> in bar	1 to 25 10 to 36	1 to 8 5 to 25 8 to 40		1 to 25 10 to 36
Nominal pressure	PN 40	PN 50		PN 40
Max. permissible operating pressure	50 bar			
Max. perm. differential pressure $\Delta p$	Gases: 30 bar · Liquids: 6 bar			
Type 2357-1	3 bar (> 3 bar only with special accessories)			
Type 2357-2				
Safety function for Type 2357-1	5 bar above the set point			
Temperature range	-196 to +200 °C			

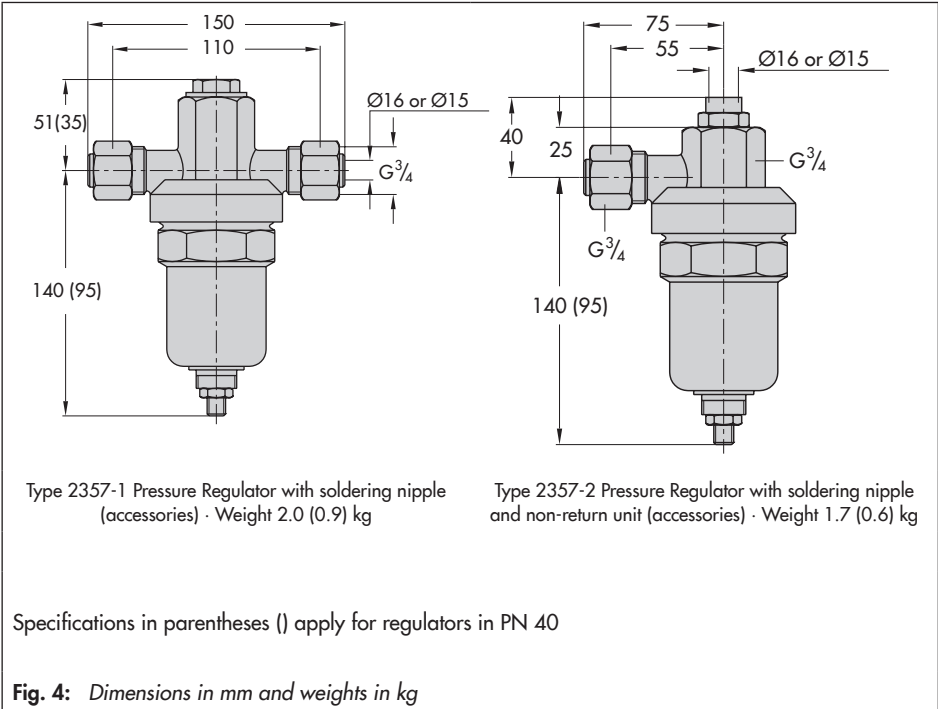
<sup>1)</sup> Further set point ranges on request



**Note:**

More details on the regulator accessories can be found in the Data Sheet  
 ► T 2570 · Spare parts and accessories

## 10 Dimensions







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