

# Self-operated Pressure Regulators

## Type 2357-3 Pressure Build-up Regulator

SAMSON



Type 2357-3 with non-return unit at port C · Ports A and B with soldering nipple with ball-type bushing

Translation of original instructions

## Mounting and Operating Instructions

**EB 2559 EN**

Edition October 2016

CE

## Note on these mounting and operating instructions

These mounting and operating instructions assist you in mounting and operating the device safely. The instructions are binding for handling SAMSON devices.

- For the safe and proper use of these instructions, read them carefully and keep them for later reference.
- If you have any questions about these instructions, contact SAMSON's After-sales Service Department (aftersaleservice@samson.de).



The mounting and operating instructions for the devices are included in the scope of delivery. The latest documentation is available on our website ([www.samson.de](http://www.samson.de)) > Product documentation. You can enter the document number or type number in the [Find:] field to look for a document.



### **WARNING!**

*Damage to health relating to REACH Regulation.*

*If a SAMSON device contains a substance which is listed as being a substance of very high concern on the candidate list of the REACH Regulation, this circumstance is indicated on the SAMSON delivery note.*

*Information on safe use of the part affected,  
see ► <http://www.samson.de/reach-en.html>*

## Definition of signal words



### **DANGER!**

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



### **NOTICE**

*Property damage message or malfunction*



### **WARNING!**

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



### **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 2014/68/EU. The EU 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.

Operating pressures up to 40 bar · Set point ranges from 2 to 40 bar · Temperatures from -196 to +200 °C · Oxygen clean according to international standards and guidelines

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

The regulator functions as a pressure build-up regulator with safety function (direction of flow from A to B, closing) or as an excess pressure valve (direction of flow from B to C, opening).



### **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 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.

The regulator consists of a valve with three ports (A, B and C), a spring-loaded operating bellows (3) with set point adjuster (10) and a tubular plug (2.2).

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 diaphragm (3). The positioning force produced by this pressure moves the pressure build-up plug (2.1), which is firmly attached to the plug sleeve, depending on the spring force adjustable at the set point adjuster (10). The valve closes as soon as the pressure downstream of the regulator has assumed the adjusted set point.

Functioning as a pressure build-up regulator, 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 (16), causing the pressure build-up plug (2.1) to open and the pressure is relieved to ports B and C.

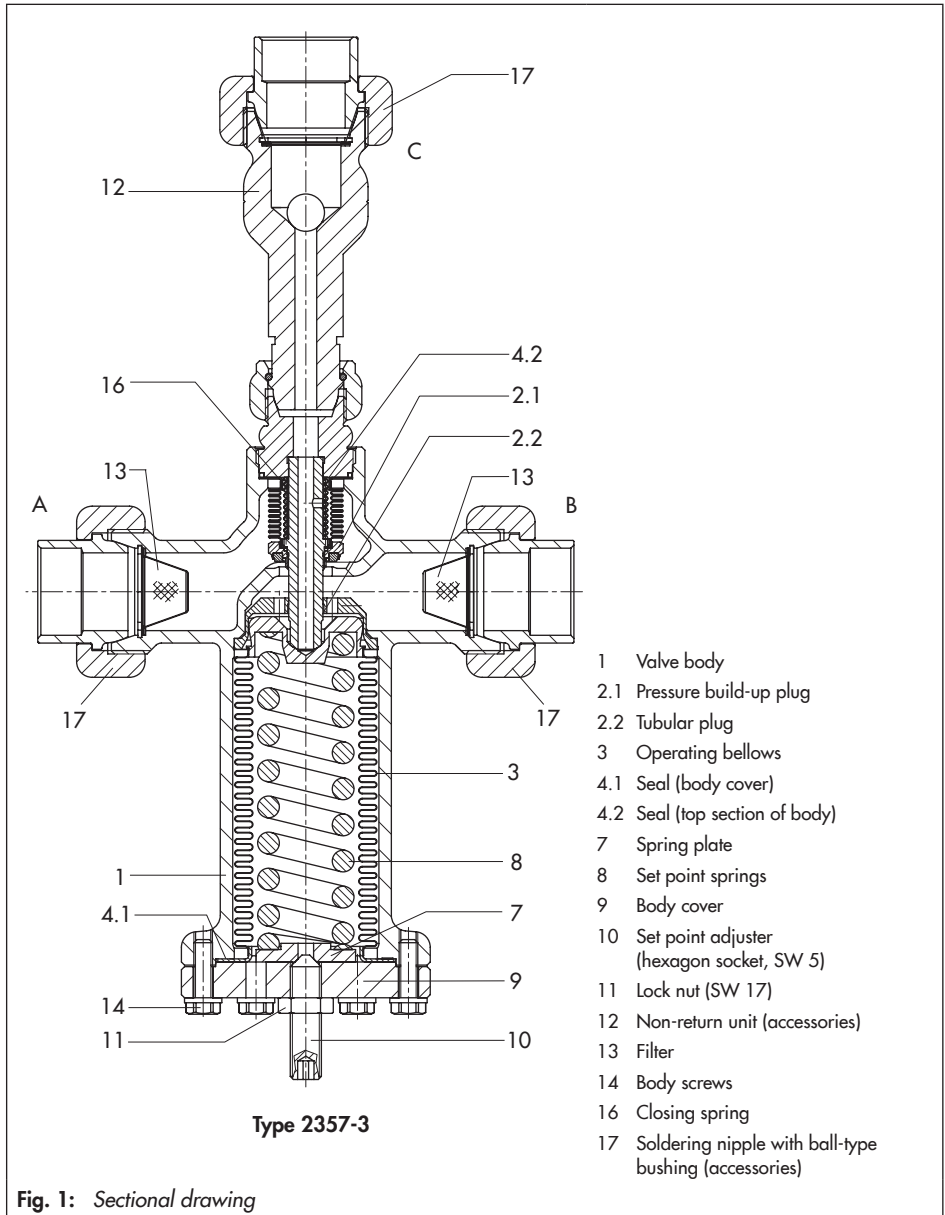
Functioning as an excess pressure valve, the medium flows from port B to C. The tubular plug seals off the operating bellows when there is no pressure drop across port B and C. The pressure at port B acts on the oper-

ating bellows (3). The positioning force produced by this pressure opposes the spring force of the set point spring (8) and opens the tubular plug (2.2) 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 an excess pressure valve, the regulator can be optionally equipped with a non-return unit (12). 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 tank first.

#### EC type examination

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



## 4 Installation

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



### **WARNING!**

*Explosion hazard due to the use of oil and grease in oxygen atmospheres! 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.

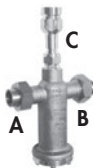
- Make sure the regulator is installed free of stress.
- Install a strainer upstream of the regulator.

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 (with port C facing upward) in horizontal pipelines.

Observe the flow direction.



**Pressure build-up regulator** with safety function

- Direction of flow from port **A** to port **B**

**Excess pressure valve:**

- Direction of flow from port **B** to port **C**

The ports **A** and **B** are marked on the body.

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.

### 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 (width across flats 5) 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.

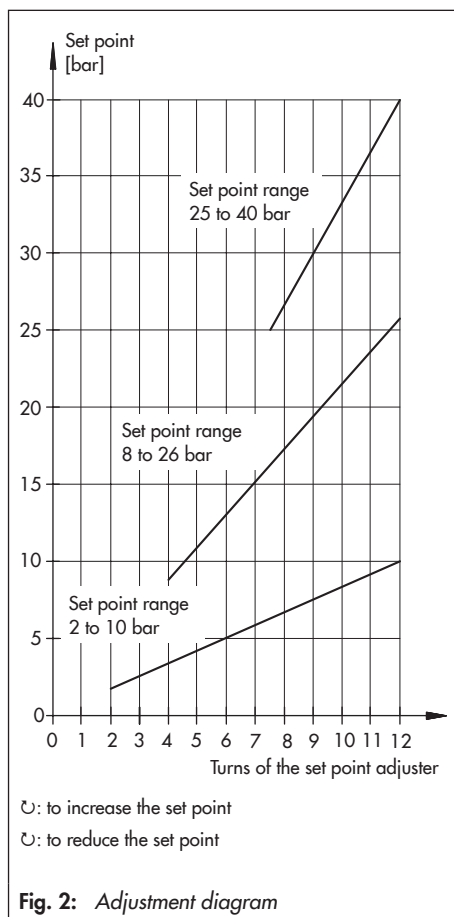
**NOTICE!**  
 Set point adjuster screwed too tight!  
 The regulator is blocked and the medium flow through it is restricted. Pressure regulation is no longer possible!  
 Only screw the set point adjuster up to the point where the spring tension can still be felt!

**How to proceed:**

1. Loosen the lock nut (11, width across flats 17) 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)



**Table 1: Set point adjustment**

Set point range	2 to 10 bar	8 to 26 bar	25 to 40 bar
Adjusted to ...	10 bar	10 bar	25 bar
Set point change per turn	0.8 bar	1.5 bar	3.2 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 bellows.

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

We recommend removing the regulator from the pipeline before making any technical changes to it.



#### **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 bellows (3) (see ► T 2570 · 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, width across flats SW 5) counterclockwise (↺).
2. Undo and remove the screws (14, width across flats 10). Remove the body cover (9), seal (4.1) and spring plate (7). Take out the set point springs (8) and operating bellows (3).
3. Insert new set point springs (8) for the required set point range together with the operating bellows (3) into the valve body (1).
4. Replace the seal (4.1), spring plate (7) and body cover (9). Fasten using screws (14, width across flats 10).
5. Turn the set point adjuster (10) clockwise (↻) up to the point where the springs tension can be slightly felt.

## 7 Customer service

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

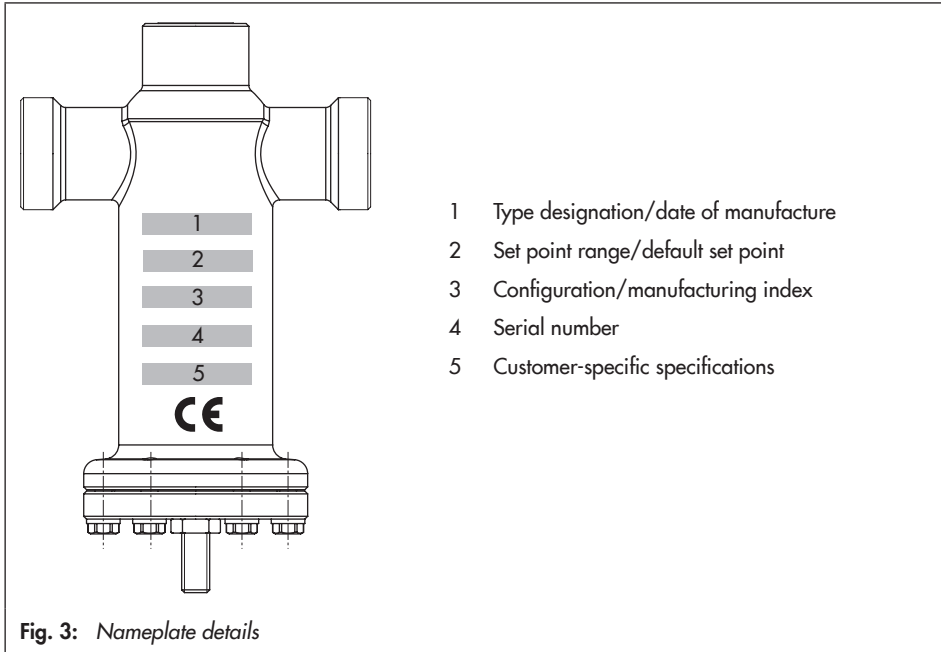
The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on the SAMSON website (▶ [www.samson.de](http://www.samson.de)), in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

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

To assist diagnosis, specify the following details (see section 8):

- Type designation with index
- $K_{VS}$  coefficient
- Upstream and downstream pressure
- Customer-specific details
- 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



## 9 Technical data

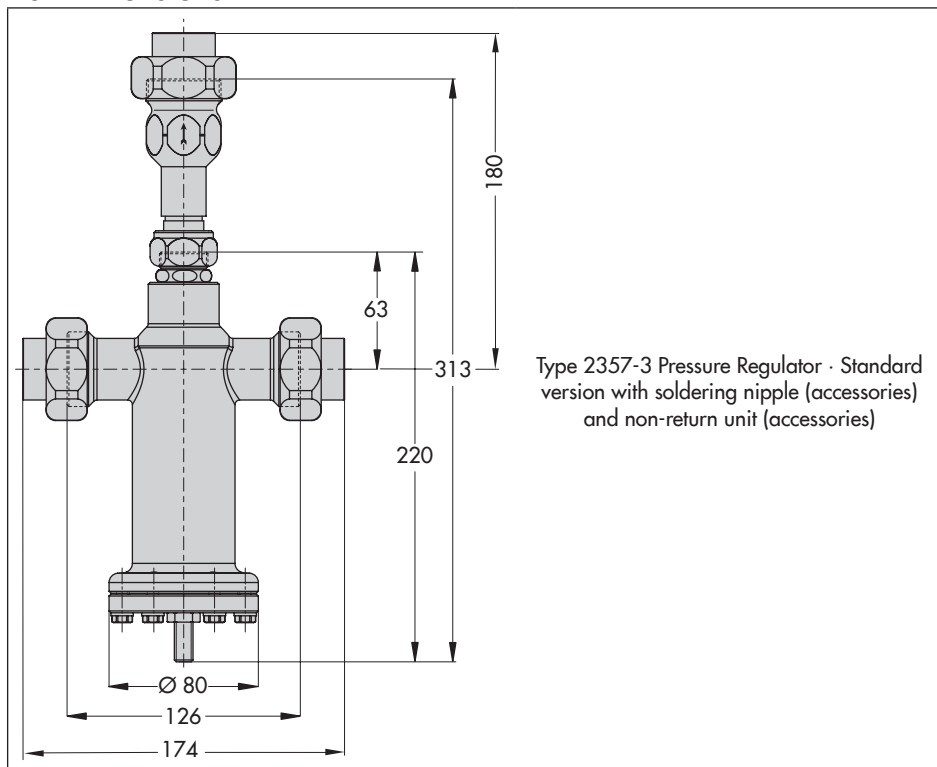
Type	2357-3	2357-3
	– Process medium in the gas state –	
Nominal pressure	PN 40	
Max. permissible operating pressure	40 bar	
$K_{VS}$ coefficient	3.2	
Set point ranges	2 to 10 bar · 8 to 26 bar · 25 to 40 bar	
Safety function	5 bar above the set point	12 bar above the set point
Excess pressure function	0.5 bar above the set point	
Temperature range	–196 to +200 °C	
Weight, approx.	3.5 kg	
Compliance	<b>CE · ENEC</b>	



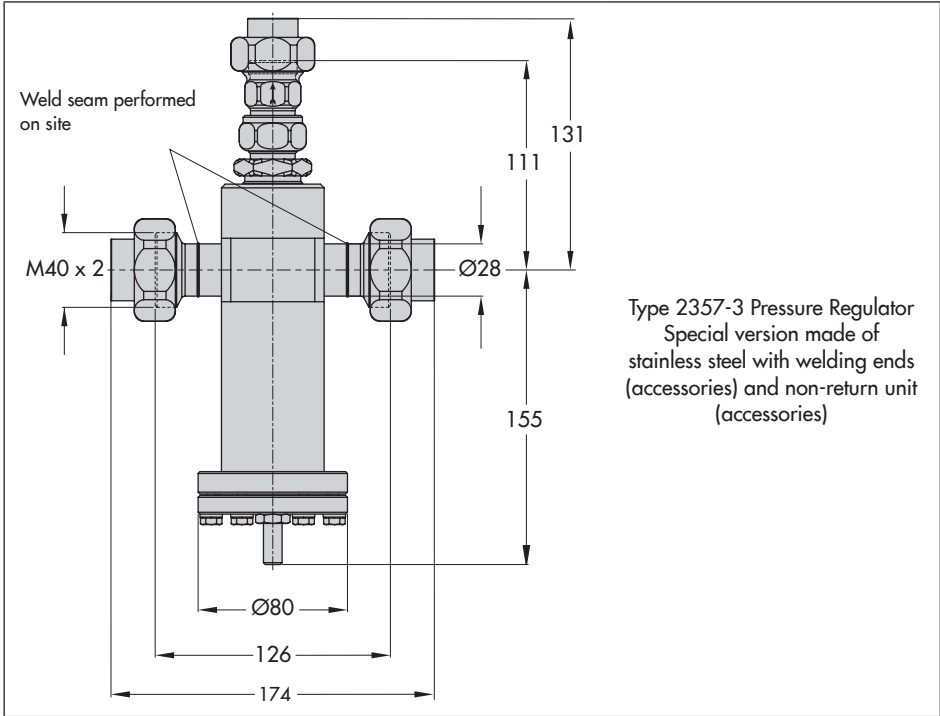
**Note:**

More details on regulator accessories can be found in Data Sheet ► T 2570

## 10 Dimensions



## Dimensions







SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
samson@samson.de · www.samson.de

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