MOUNTING AND
OPERATING INSTRUCTIONS

EB 2538 EN

Translation of original instructions



Type 2404-1 Pressure Reducing Valve for small set point ranges

Self-operated Pressure Regulators

Edition June 2025

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. The images shown in these instructions are for illustration purposes only. The actual product may vary.

➔ 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 (aftersalesservice@samsongroup.com).

Documents relating to the device, such as the mounting and operating instructions, are available on our website at ***www.samsongroup.com*** **>** ***DOWNLOADS*** **>** ***Documentation***.

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 regulator is 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 parties 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. Devices with a CE marking have an EU declaration of conformity, which includes information about the applied conformity assessment procedure.
- This declaration of conformity can be provided 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

The Type 2404-1 Pressure Reducing Valve is used to control the flow of gases (inert gases) within the temperature range –20 to +90 °C/–5 to +195 °F.

It regulates the supply pressure of the inert gas within a very narrow mbar or psi range to a constant low pressure, creating a constant blanketing of the product inside the tank.

⚠ WARNING

The Type 2404-1 Pressure Reducing Valve is not a safety valve.

- Risk of uncontrolled excess pressure in the plant.
- Risk of bursting
- If necessary, a suitable overpressure protection must be installed on site in the plant section.

3 Transportation and storage

The regulator must be carefully handled, transported and stored. Protect the regulator against adverse influences, such as dirt, moisture or frost, during storage and transportation.

When regulators are too heavy to be lifted by hand, fasten the lifting sling at a suitable place on the valve body support on the main valve or at the two transport eyelets of the pilot valve.

⚠ WARNING

Do not attach lifting slings or supports to mounting parts, such as control line, pilot valve etc.

- The valve can fall or mounting parts may be damaged.
- Securely fasten slings or supports to the body of the main valve and secure against slipping.

4 Design and principle of operation

See Fig. 1 on page 7.

The following components of the regulators interact to regulate the pressure of the inert gas.

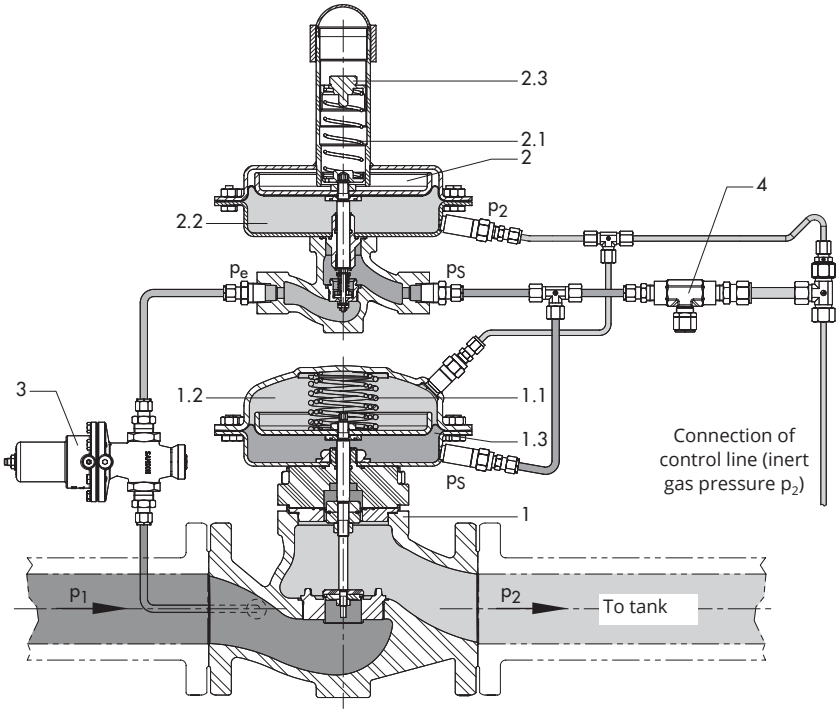
The input pressure regulator (3) is delivered ready-adjusted. It reduces the supply pressure p_1 to the input pressure p_e for the pilot valve (2) to approx. 1 bar (15 psi) positive pressure, ensuring precise pressure control even at varying upstream pressures. The pilot valve governs the control pressure p_S for the main valve (1) and corrects the set point pressure $p_{set\ point}$.

The needle valve (4) is delivered ready-adjusted and lead-sealed.

If the pressure in the tank drops slightly below the set point pressure (e.g. due to the product being withdrawn from the tank), the pilot valve (2) is opened by the preloaded set point spring (2.1). As a result, the control pressure p_S acting on the actuator diaphragm (1.3) of the main valve (1) increases. The main valve opens, causing the inert gas to flow into the tank until the inert gas blanket is re-established or the set point pressure is reached again.

When the pressure in the tank increases constantly (e.g. during filling), the pressure in the actuator chamber (1.2/2.2) of the pilot valve and main valve increases. The pilot valve (2) closes when the pressure increases above the pressure set point $p_{set\ point}$. The control pressure p_S does not have any effect in this case. The main valve is closed by the actuator springs (1.1) and the increased inert gas pressure p_2.

The minimum required differential pressure Δp_{min} at the regulator to allow it to function properly is 1 bar (15 psi).



1	Main valve
1.1	Actuator springs
1.2	Actuator chamber (main valve)
1.3	Actuator diaphragm (main valve)
2	Pilot valve
2.1	Set point springs
2.2	Actuator chamber (pilot valve)
2.3	Set point adjuster (adjusting screw A/F 27/11/8“)
3	Input pressure regulator (fixed setting)
4	Needle valve (lead-sealed setting)
p_1	Upstream pressure (inert gas network)
p_2	Downstream pressure (inert gas pressure/blanketing gas pressure)
p_S	Control pressure
p_e	Input pressure (pilot valve)
$p_{set\ point}$	Pressure set point

Fig. 1: *Design and principle of operation*

5 Installation

Install the regulator in such a way that it is still easily accessible after the plant is completed to facilitate maintenance or revision work.

Allow enough space for set point adjustment (2.3) at the pilot valve (2) using a socket wrench.

➔ Before installing the regulator in the pipeline, clean the pipeline thoroughly to remove any foreign particles in the plant which could affect the regulator's proper functioning.

➔ The plant must be designed and the pipelines installed in such a way that the regulator can be mounted and operated without any tension. If necessary, support the pipeline near the connecting flanges. Do not attach these supports directly to the main valve or to any of its components.

➔ Connect the control line to the tank. The connection is designed for a pipe diameter of ½".

5.1 Mounting position

Install the regulator supplied in the ready-to-install state into the horizontal pipeline on site.

The following points must be observed:



– The direction of flow must match the direction indicated by the arrow on the body.
– Install the valve assembly with the pilot valve pointing up
– Make sure sufficient space is available for a socket wrench to adjust the set point at the pilot valve.

5.2 Strainers

SAMSON recommends installing a strainer (e.g. Type 2 NI) depending on the application and required purity of the inert gas.

i ***Note***

A strainer is not essential for the regulator to function properly.

Install the strainer upstream of the regulator. The direction of flow must correspond to the arrow on the body. The filter element must be installed to hang downwards when the strainer is installed in a horizontal pipeline. Remember to leave enough space to remove the filter element.

5.3 Shut-off valve

Install a hand-operated shut-off valve both upstream of the strainer 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.

5.4 Pressure gauges

Install a pressure gauge both upstream and downstream of the regulator to monitor the pressures prevailing in the plant. Do not directly mount the required pressure instruments to the regulator. The corresponding connections must be made available on site in the plant.

6 Operation

See Fig. 1 on page 7.

6.1 Start-up

Do not start up the regulator until all parts have been mounted. Proceed as follows:

➔ Apply the inert gas network pressure p_1 to the input pressure regulator (3) or main valve (1).

➔ Apply the downstream pressure p_2 to the control line (open the valve in the control line, if necessary).

– As a general rule: open shut-off valves slowly. Avoid pressure surges. Open the shut-off valves first on the upstream pressure side. Afterwards, open all the valves on the consumer side (downstream of the regulator).

➔ If the regulator has not been delivered with a ready-adjusted set point, adjust the set point.

6.2 Adjusting the set point

Adjust the set point by tensioning the set point springs (2.1) at the set point adjuster (2.3) (adjusting screw) on the pilot valve (2).

The pilot valve governs internally the control pressure p_S for the main valve and regulates the pressure to the required pressure set point $p_{set\ point}$.

i Note

While the set point is being adjusted, at least 5 to 10 % of the maximum flow rate expected in the operating state must flow through the regulator.

Adjust the required pressure set point while the plant (consumer) is open by turning the adjusting screw (2.3) SW 27/1⅛". See Fig. 2.

i Note

Do not unscrew the adjusting screw completely on turning it counterclockwise (↺).

Do not screw the adjusting screw too tightly on turning it clockwise (↻). Otherwise the travel will be restricted or the valve will remain stuck in the open position.

Monitor the set point pressure to be adjusted at the pressure gauge on the downstream pressure side.

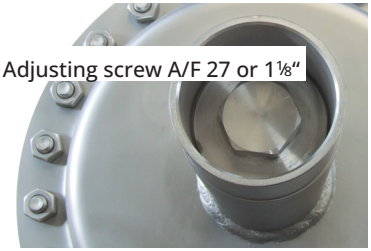
➔ Remove the cap.

➔ Use a socket wrench (A/F 27 or 1⅛") to turn the adjusting screw.

➔ Turn clockwise (↻): to increase the set point.

➔ Turn counterclockwise (↺): to reduce the set point.

➔ First set the minimum set point by turning the adjusting screw counterclockwise.



2.3 Adjusting screw A/F 27 or 1⅛"

Fig. 2: *Pilot valve, view from above onto the adjusting screw for set point adjustment*

➔ When the pressure reducing valve starts to regulate (monitor pressure gauge reading), adjust the set point by slowly turning the screw clockwise.

When the pressure reaches the adjusted set point, the pilot valve closes, causing the main valve (1) to close as well.

➔ Remount the cap.

6.3 Decommissioning

First slowly close the shut-off valves on the network pressure side (upstream of the regulator). Afterwards, close the shut-off valve downstream of the regulator.

Shut-off or disconnect the supply pressure p.

7 Maintenance and troubleshooting

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

As a result, it is necessary to check the proper functioning of the regulator at defined intervals depending on the operating conditions to detect and remove possible malfunctions.

⚠ WARNING

Before performing any work on the regulator, make sure the relevant plant section has been depressurized and, depending on the process medium, drained as well. We recommend removing the regulator from the pipeline.
On installing or removing the regulator, remember that the pipeline may still contain some process medium.
Risk of injury due to process medium escaping possibly under pressure.
When used at high temperatures, allow the plant section to cool down to ambient temperature.
Disconnect or shut off the control line to prevent the risk posed by moving regulator parts.

8 Disposal



SAMSON is a producer registered in Europe, agency in charge ▶ https://www.ewrn.org/national-registers/national-registers.
WEEE reg. no.:
DE 62194439/FR 025665

➔ Observe local, national and international refuse regulations.

➔ Do not dispose of components, lubricants and hazardous substances together with your other household waste.

i *Note*

SAMSON can provide you with a recycling passport according to PAS 1049 on request. Simply e-mail us at aftersalesservice@samsongroup.com giving details of your company address.

Tip

On request, SAMSON can appoint a service provider to dismantle and recycle the product as part of a distributor take-back scheme.

9 After-sales service

Contact SAMSON's After-sales Service for support concerning service or repair work or when malfunctions or defects arise.

E-mail

You can reach our after-sales service at aftersalesservice@samsongroup.com.

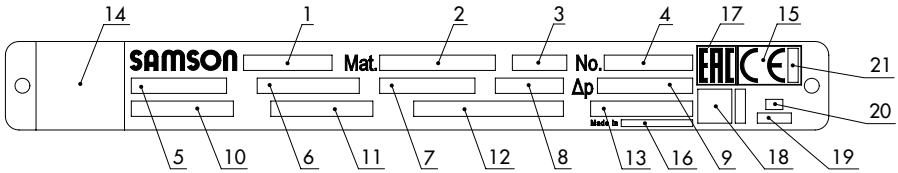
Addresses of SAMSON AG and its subsidiaries

The addresses of SAMSON AG, its subsidiaries, representatives and service facilities worldwide can be found on our website (▶ www.samsongroup.com) in all SAMSON product catalogs or on the back of these Mounting and Operating Instructions.

To assist diagnosis and in case of an unclear mounting situation, specify the following details (so far as possible):

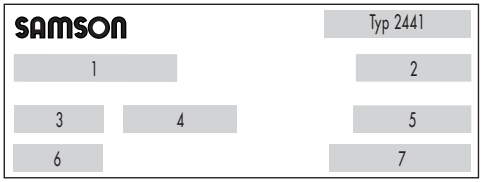
- Type and nominal size of the main valve, pilot valve and input pressure regulator (see Chapter 10).
- Configuration ID (Var.-ID). See Chapter 10.
- Upstream pressure p_1 and downstream pressure p_2
- Temperature and process medium
- Min. and max. flow rate
- Is a strainer installed?
- Installation drawing showing the exact location of the regulator and all the additionally installed components (shut-off valves, pressure gauge etc.)

10 Nameplate



Type 2406 functioning as main valve · Type 2405 functioning as pilot valve

1	P_{max} actuator (max. perm. operating pressure at the actuator)
2	Material number/configuration ID
3	Type
4	Production number
5	K_{VS}/C_V
6	Set point range
7	Nominal size
8	Pressure rating
9	Perm. differential pressure (across the valve)
10	Perm. temperature
11	Body material
12	Serial number
13	Unassigned
14	DataMatrix code
15	CE marking
16	Country of origin
17	EAC, if applicable
18	UKCA, if applicable
19	Year of manufacture
20	Month of manufacture
21	ID of the certification body



Type 2441 Input Pressure Regulator

1	Configuration ID (Var.-ID)
2	Order number or date
3	K_{VS}/C_V coefficient
4	Valve size/thread size
5	Max. permissible temperature
6	Set point range
7	Max. perm. differential pressure Δp

Fig. 3: *Nameplates*

11 Technical data

Table 1: *Type 2404-1 Pressure Reducing Valve*

Type 2406 as main valve, balanced by a diaphragm							
Nominal size [4]	**NPS 1/ DN 25**	**NPS 1½/ DN 40**	**NPS 2/ DN 50**	**NPS 2½/ DN 65**	**NPS 3/ DN 80**	**NPS 4/ DN 100**	**NPS 6/ DN 150**
Pressure rating	Class 125, 150 and 300/PN 16 to 40						
C_V coefficients	9.4	23	37	60	94	145	450
K_{VS} coefficients	8	20	32	50	80	125	380
Reduced C_V coefficient	–	9.4		23 · 37	37 · 60	60	–
Reduced K_{VS} coefficient	–	8.0		20 · 32	32 · 50	50	–
C_V with flow divider [1]	–	–		30 · 45	30 · 70	45 · 110	335
K_{VS} with flow divider [1]	–	–		25 · 38	25 · 60	38 · 95	285
Set point ranges	0.045 to 0.15 psi · 0.075 to 0.45 psi · 0.35 to 1.5 psi 3 to 10 mbar · 5 to 30 mbar · 25 to 100 mbar						
Actuator area	50 in²/320 cm²						
Leakage class according to ANSI/ FCI 70-2 or IEC 60534-4	Soft seal, minimum Class IV						
Max. permissible differential pressure	175 psi/12 bar [2]						
Min. differential pressure Δp_{min}	15 psi/1 bar						
Perm. temperature	–5 to +195 °F/–20 to +90 °C [3]						
Conformity	CE						

1) Reduced C_V/K_{VS} coefficients with flow divider on request
2) Higher pressures on request
3) Max. 175 °F (80 °C) for EPDM and NBR versions
4) DN 32 and DN 125 available on request

12 Dimensions

See Fig. 4 on page 16.

Table 2: *Dimensions for DN 25 to 50/NPS 1 to 2*

Type 2404-1	DIN / ANSI	DN 25 / NPS 1	DN 32 / –	DN 40 / NPS 1½	DN 50 / NPS 2
L1	Class 150	184 mm/7.25“	–	222 mm/8.75“	254 mm/10“
	Class 300	197 mm/7.75“	–	235 mm/9.25“	267 mm/10.5“
L1	PN 16/40	160 mm/6.3“	180 mm/7.1“	200 mm/7.9“	230 mm/9.1“
L2		350 mm/13.8“			
ØD	3 to 10 mbar/ 0.045 to 0.15 psi	380 mm/13.8“, A = 100 in²/640 cm²			
	5 to 30 mbar/ 0.075 to 0.45 psi	285 mm/11.2“, A = 50 in²/320 cm²			
	25 to 100 mbar/ 0.35 to 1.5 psi	285 mm/11.2“, A = 50 in²/320 cm²			
H		540 mm/21.3“	575 mm/22.6“	575 mm/22.6“	575 mm/22.6“
H1		165 mm/6.5“	165 mm/6.5“	165 mm/6.5“	165 mm/6.5“
H3		55 mm/2.2“	72 mm/2.8“	72 mm/2.8“	72 mm/2.8“
B		215 mm/8.5“	225 mm/8.6“	235 mm/9.25“	245 mm/9.6“
Weight, approx.		55 lb/25 kg	64 lb/29 kg	71 lb/32 kg	77 lb/35 kg

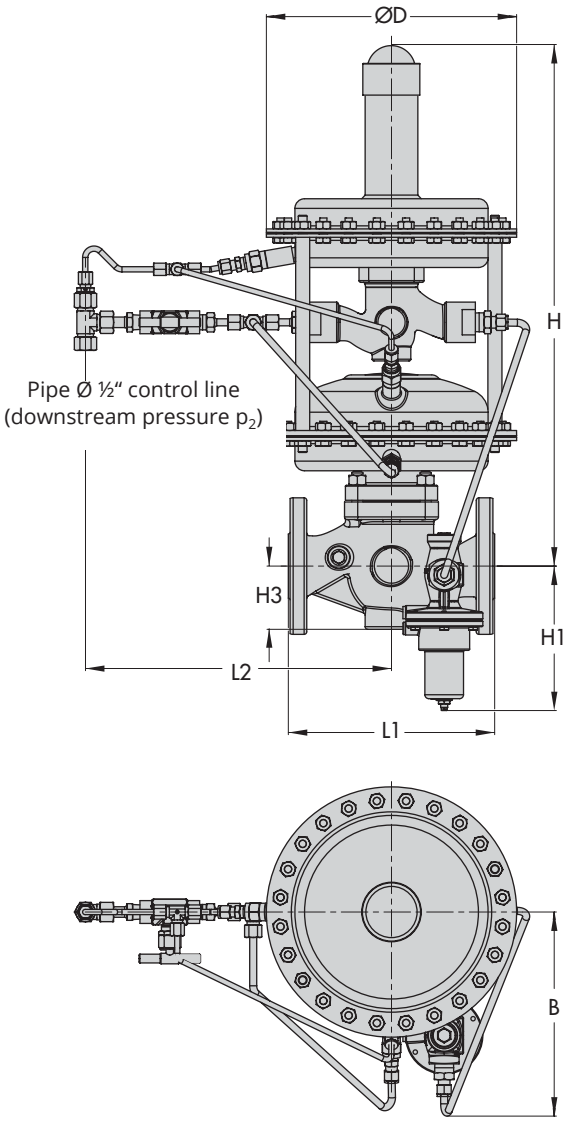


Fig. 4: *Dimensional drawing*

Dimensions (continued), see Fig. 4 on page 16

Table 3: *Dimensions for DN 65 to 150/NPS 2½ to 6*

Type 2404-1 DIN / ANSI		DN 65 NPS 2½	DN 80 NPS 3	DN 100 NPS 4	DN 125 –	DN 150 NPS 6
L1	Class 150	276 mm/ 10.9“	298 mm/ 11.7“	352 mm/ 13.8“	–	451 mm/ 17.8“
	Class 300	292 mm/ 11.5“	318 mm/ 12.5“	368 mm/ 14.5“	–	473 mm/ 18.6“
L1	PN 16/40	290 mm/ 11.4“	310 mm/ 12.2“	350 mm/ 13.8“	400 mm/ 15.75“	480 mm/ 18.9“
L2		350 mm/13.8“				
ØD	3 to 10 mbar 0.045 to 0.15 psi	380 mm/13.8“, A = 100 in²/640 cm²				
	5 to 30 mbar 0.075 to 0.45 psi	285 mm/11.2“, A = 50 in²/320 cm²				
	25 to 100 mbar 0.35 to 1.5 psi	285 mm/11.2“, A = 50 in²/320 cm²				
H		605 mm/ 23.8“	615 mm/ 24.2“	640 mm/ 25.2“	695 mm/ 27.4“	720 mm/ 28.3“
H1		165 mm/ 6.5“	155 mm/ 6.1“	155 mm/ 6.1“	155 mm/ 6.1“	155 mm/ 6.1“
H3		98 mm/ 3.8“	100 mm/ 3.9“	120 mm/ 4.7“	145 mm/ 5.7“	175 mm/ 6.9“
B		260 mm/ 10.2“	275 mm/ 10.8“	280 mm/ 11“		330 mm/ 13“
Weight, approx.		132 lb/ 60 kg	146 lb/ 66 kg	165 lb/ 75 kg		309 lb/ 140 kg

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