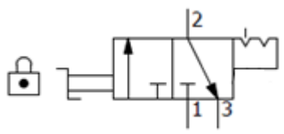
ORIGINAL INSTRUCTIONS

Instruction Manual

Pressure Relief 3 Port Valve with Locking Holes (Single Action)

Series VHS30-X2155





The intended use of this valve is to release residual pressure by switching the valve by hand.

Validated according to ISO 13849, see section 2.

Refer to product catalogues for additional information.

1 Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “Caution”, “Warning” or “Danger”.
They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) [*1)], and other safety regulations.

[*1)] ISO 4414: Pneumatic fluid power - - General rules relating to systems.
ISO 4413: Hydraulic fluid power - - General rules relating to systems.
IEC 60204-1: Safety of machinery - - Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots -Safety. etc.

This manual contains essential information for the protection of users and others from possible injury and/or equipment damage.

- Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use.
- Keep this manual in a safe place for future reference.
- To ensure safety of personnel and equipment the safety instructions in this manual must be observed, along with other relevant safety practices.

⚠ **Caution**	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
⚠ **Warning**	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
⚠ **Danger**	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

⚠ Warning

- **The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**
- Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

1 Safety Instructions - continued

- **Only personnel with appropriate training should operate machinery and equipment.**
  The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
- **Do not service or attempt to remove product and machinery/equipment until safety is confirmed.**
  1) The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
  2) When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
  3) Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
- **Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**
  1) Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
  2) Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustions and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specification described in the product catalogue.
  3) An application which could have negative effects on people, property, or animals requiring special safety analysis outside the scope of ISO 13849 described in this document.
  4) Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.
- **Always ensure compliance with relevant safety laws and standards.**
- All electrical work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.

⚠ Caution

- **The product is provided for use in manufacturing industries.**
  The product herein described is basically provided for peaceful use in manufacturing industries.
  If considering using the product in other industries consult SMC beforehand and exchange specifications or a contract if necessary.
  If anything is unclear, contact your nearest sales branch.

2 Specifications

2.1 Specifications

Model	VHS30-02B-X2155	VHS30-03B-X2155	VHS30-02C-X2155	VHS30-03C-X2155
Fluid	Air			
Min. air quality	5 µm filtration			
Ambient and fluid temperature	-5 to +60 °C (No freezing)			
Proof pressure	1.5 MPa			
Min. operating pressure	0.1 MPa			
Max. operating pressure	1.0 MPa			
Minimum operating frequency	1 cycle/30 days			
Maximum operating frequency	5 cycles /min			
Vibration and impact resistance	Refer to section 3.2			
Handle switching angle	90°			
Paint colour (Standard)	Handle: Red Body: White			
Weight [Note 2)]	629 g	611 g	848 g	830 g
Flow	See Table 2			
Lubrication	Not required (Refer to 3.4)			

2 Specifications – continued

Standards	Complies with the basic and well-tried safety principles of EN ISO 13849-2:2012
B_{10}	22,000 cycles [Note 1)]
B_{10d}	44,000 cycles [Note 1)]

Table 1

Notes:
Note 1) Under SMC test conditions. The B_{10} figure is estimated from SMC life tests. The B_{10D} figure is derived from B_{10} using the assumption in EN ISO 13849-1:2015 Annex C. Contact SMC for details.
Note 2) Add 9g for silencer.

2.2 Flow characteristics

Model	Port size		IN → OUT			OUT → EXH		
	IN, OUT	EXH	C [dm³/(s·bar)]	b	Cv	C [dm³/(s·bar)]	b	Cv
VHS30 – X2155	1/4	1/4	6.4	0.45	1.7	6.2	0.38	1.7
	3/8		8.3	0.41	2.3	7.0	0.41	1.9

Table 2

2.3 Valve material

Body	Stainless steel
Bonnet	
Bottom body	
Bonnet plate	
Parallel pin	
Screw	
Handle	Aluminium
	Stainless steel

Table 3

⚠ Caution

Special products might have specifications different from those shown in this section. Contact SMC for specific drawings. These drawings will give the appropriate specification details and compliance with the safety principles of ISO 13849, if applicable.

3 Installation

3.1 Installation

⚠ Warning

- Do not install the product unless the safety instructions have been read and understood.
- Confirm the symbols “1” and “2” before the valve is connected. The port marked “1” is the air inlet and the port marked “2” is the outlet. Pressurization is only possible via the inlet port “1”. Reverse connection may cause malfunction. The port symbols and corresponding piping types are shown in the table below.

Port symbol	Piping type
1	Inlet
2	Outlet
3	Exhaust

Table 4

⚠ Caution

- The valve must be switched to each position instantly and securely. Stopping the knob between the extreme positions may cause malfunction.
- Do not remove the mounting screws from the bonnet. This may cause malfunction.

3.2 Environment

⚠ Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact. Check the product specifications.
- Do not mount in a location exposed to radiant heat.
- Consult SMC if the ambient environment does not permit leakage.

3 Installation – continued

- Employ suitable protective measures in locations where there is contact with water droplets, oil, or welding spatter.
- Install a silencer into port (3) to prevent the ingress of dust if there is a lot of dust in the atmosphere. If dust enters the valve via port (3), it may cause air leakage.

3.3 Piping

⚠ Warning

- Before piping make sure to clean up chips, cutting oil, dust etc.
- When installing piping or fittings, ensure sealant material does not enter inside the port. When using seal tape, leave 1.5 to 2 threads exposed on the end of the pipe/fitting.
- Tighten fittings to the specified tightening torque.

Connection thread	Tightening torque [N·m]
1/4	12 to 14
3/8	22 to 24

Table 5

3.4 Lubrication

⚠ Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, use turbine oil Class 1 (no additive), ISO VG32. Once lubricant is used in the system, lubrication must be continued because the original lubricant applied during manufacturing will be washed away.

3.5 Design and selection

⚠ Warning

- Please consult with SMC in cases where the ambient environment does not permit leakage or if fluid other than air is used.
- Do not apply negative pressure. It may result in malfunction
- Do not supply air pressure from ports other than the 1(P) port.
  The valve will malfunction when air pressure is supplied from other ports.
- In some cases, mineral oil grease used for internal parts and sealant may be carried to the output side.
  Please contact SMC if this causes any inconvenience in use.

3.6 Air Supply

⚠ Warning

- Use clean air. Do not use compressed air which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as this can cause damage or malfunction.
- Install an air dryer or after cooler on the upstream side of the pressure release 3 port valve because air containing excessive drainage may cause malfunction.
- Do not apply negative pressure. It may result in malfunction.

⚠ Caution

- Install an air filter of 5 µm or less filtration on the inlet side.
- Install a mist separator on the inlet side to remove carbon powder from the compressor or other equipment. An excessive amount of carbon dust ingress via the inlet may cause the valve to malfunction.

3.7 Built-in Silencer (Option) [Bronze sintered metal element]

⚠ Caution

- Products made of bronze may contain uneven colour due to the oxidization process of the atmosphere.
  However, this oxidization process occurs in the limited range of less than 1 µm of thickness and is so thin as to not affect the product characteristics.
  The uneven colour occurs depending on the storage duration before utilization (stock as a product, stock in customer)
  * If this is a problem, please contact SMC so that SMC can pre-treat them with nickel plating.

3 Installation – continued

3.8 Assembly of optional parts

3.8.1 Silencer assembly

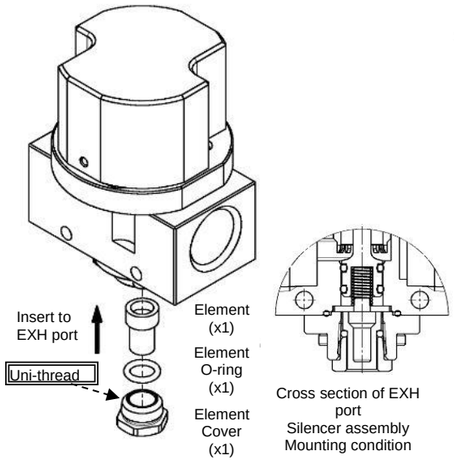


Figure 1

1) Mounting of the element
   After inserting the element O-ring to the element, insert the element to EXH port.
2) Tightening of the screw of the element cover
   Mount the element cover to the female thread of EXH port.

* The male thread of the element cover is Uni-thread. It is applicable to all thread types of Rc/G/NPT.

4 Settings

4.1 Single action

Turn the handle anti-clockwise, by aligning the flow direction indicator arrow with the port, to supply air to the valve.
Turn the handle clockwise, with the flow direction indicator arrow in a perpendicular position to the port, to exhaust the air.

4.2 Padlock mounting

⚠ Caution

Padlock mounting can be used to manually override the ability to switch the valve position and keep the valve locked in exhaust mode. Be aware of use, as wrong manipulations can be possible, leading to system not being able to be supplied if locked.

4.3 Built-in Silencer (Option) [Bronze Sintered Metal Element]

⚠ Caution

- **Products made of bronze may contain uneven colour due to the oxidization process of the atmosphere.**
  However, this oxidization process occurs in the limited range of less than 1 µm of thickness and is so thin as to not affect the product characteristics.
  The uneven colour occurs depending on the storage duration before utilization (stock as a product, stock in customers).

* If this is a problem, please contact SMC, so that SMC can pre-treat them with nickel plating.

5 How to Order

VHS 30 – [ ] [##] [B] – [ ] – [ ] – X2155

Single action

Thread type

Nil	Rc
F	G
N	NPT

Port size

02	1/4
03	3/8

Handle material

B	Aluminum
C	Stainless steel

Options

Nil	–
S	Built-in silencer (EXH port)

Semi-standard

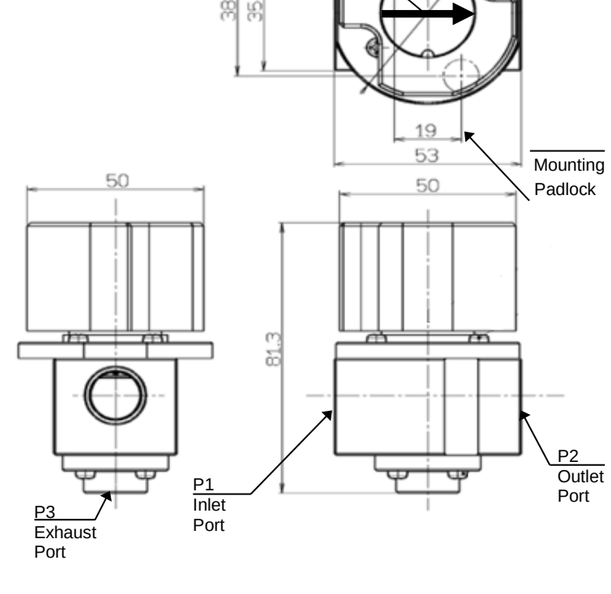
Nil	–
R	Flow direction: right to left
Z Note 1)	psi as unit displayed on label

Note 1) Only for NPT thread.

* When specifying more than one option, please list alphabetically.
Note) Option "-S": silencer is assembled for shipping.

✧: Validated product to EN ISO 13849.

6 Outline Dimensions (mm)



7 Maintenance

7.1 General Maintenance

⚠ Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous. Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

8 Limitations of Use

8.1 Limited warranty and Disclaimer/Compliance Requirements

- **The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product**.
- **Limited warranty and Disclaimer**
  1) The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first[(1)]. Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
  2) For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
  This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
  3) Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.
  [(1)] Vacuum pads are excluded from this 1 year warranty.
  A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

- **Compliance Requirements**
  1) The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
  2) The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

- **SMC products are not intended for use as instruments for legal metrology.**
  Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country.
  Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

8 Limitations of Use – continued

⚠ Warning

Any use in an ISO 13849 system must be within the specified limits and application conditions. The user is responsible for the specification, design, implementation, validation and maintenance of the safety system (SRP/CS).

9 Contacts

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