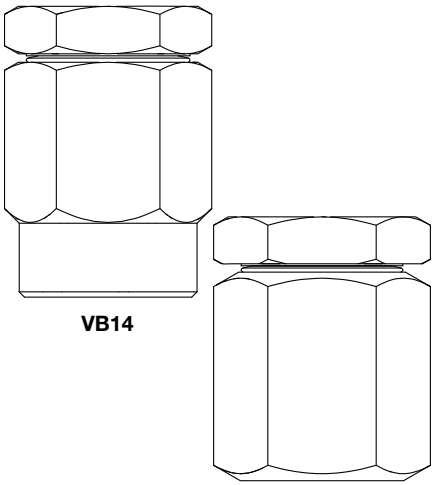
IM-P019-05
ST Issue 3

VB14 and VB21 Vacuum Breakers

Installation and Maintenance Instructions



VB14

VB21

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The products listed below comply with the requirements of the European Pressure Equipment Directive 97/23/EC. It should be noted that products rated as 'SEP' are required by the Directive not to carry the CE mark. The products fall within the following Pressure Equipment Directive categories:

Product	Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
VB14 and VB21	-	SEP	-	SEP

i) These products have been specifically designed for use on steam, air or water/ condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.

ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.

iii) Determine the correct installation situation and direction of fluid flow.

iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.

v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?
Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.
Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.
Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 400°C (752°F).
Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

1.17 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

2. General product information

2.1 General description

The **VB14** is a small purpose designed vacuum breaker manufactured in brass for general purpose applications on condensing vapour (steam) or liquid systems on pressures up to 14 bar g (203 psi g).

The **VB21** is a small purpose designed vacuum breaker manufactured in stainless steel for general purpose applications on condensing vapour (steam) or liquid systems for pressures up to 21 barg (304 psi g).

Standards

This product fully complies with the requirements of the European Pressure Equipment Directive 97/23/EC.

Certification

This product is available with a manufacturers Typical Test Report. **Note:** All certification / inspection requirements must be stated at the time of order placement.

Note: For further data regarding these products see the following Technical Information Sheet, TI-P019-02.

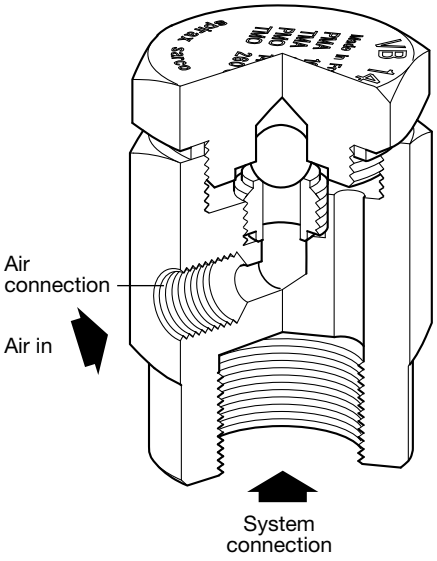


Fig. 1 VB14

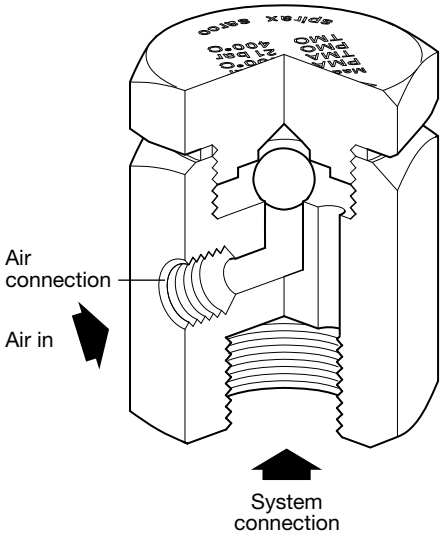


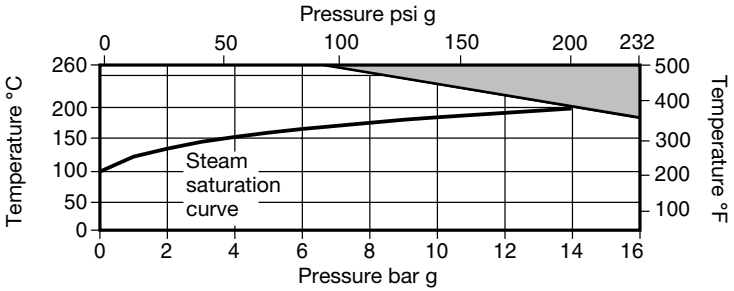
Fig. 2 VB21

2.2 Sizes and pipe connections

VB14 and VB21	**½"** (system connection) screwed BSP or NPT
	⅛" (air inlet connection) screwed BSP or NPT

2.3 Pressure / temperature limits

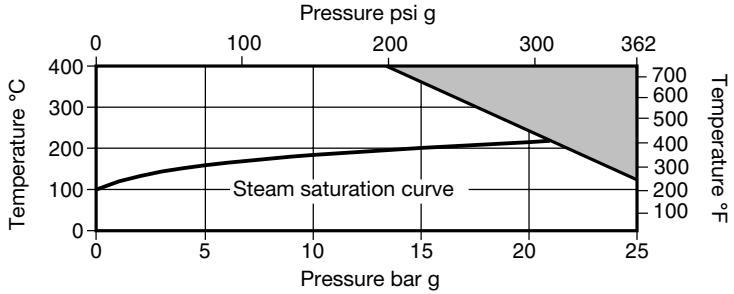
VB14



The product **must not** be used in this region.

Body design conditions	PN16	
PMA Maximum allowable pressure	16 bar g @ 180°C	(232 psi g @ 356°F)
TMA Maximum allowable temperature	260°C @ 7 bar g	(500°F @ 101 psi g)
Minimum allowable temperature	-196°C	(-321°F)
PMO Maximum operating pressure for saturated steam service	14 bar g	(203 psi g)
TMO maximum operating temperature	260°C @ 7 bar g	(500°F @ 101 psi g)
Minimum operating temperature	0°C	(32°F)
Designed for a maximum cold hydraulic test pressure of:	24 bar g	(348 psi g)

VB21



The product **must not** be used in this region.

Body design conditions	PN25	
PMA Maximum allowable pressure	25 bar g @ 120°C	(362 psi g @ 248°F)
TMA Maximum allowable temperature	400°C @ 13 bar g	752°F @ 188 psi g)
Minimum allowable temperature	-48°C	(-54°F)
PMO Maximum operating pressure for saturated steam service	21 bar g	(304 psi g)
TMO maximum operating temperature	400°C @ 13 bar g	(752°F @ 188 psi g)
Minimum operating temperature	0°C	(32°F)
Designed for a maximum cold hydraulic test pressure of:	38 bar g	(551 psi g)

3. Installation

Note: Before actioning any installation observe the 'Safety information' in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

3.1 Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.

3.2 Determine the correct installation situation and the direction of fluid flow.

3.3 Remove protective covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

3.4 Always install in a vertical position with the system connection of the bottom.

Note: As the equipment is to discharge to atmosphere ensure it is to a safe place, the discharging fluid may be at a temperature of 100°C (212°F).

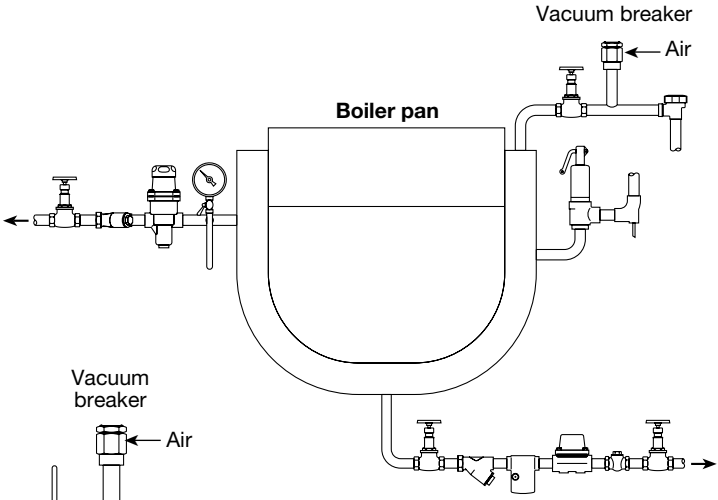


Fig. 3

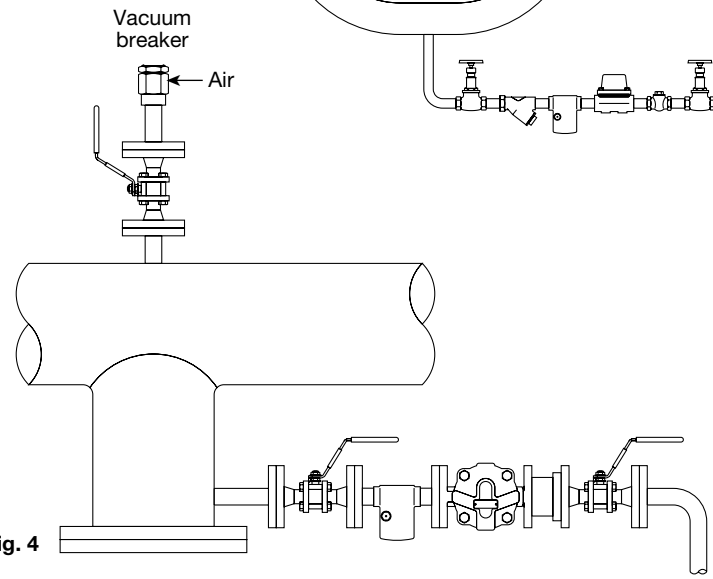


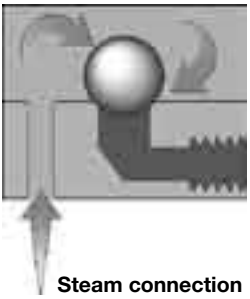
Fig. 4

4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

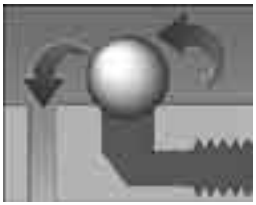
5. Operation

The VB14 and VB21 protect steam plant and process equipment against vacuum and at the same time allow condensate to drain effectively from pipework and storage vessels. The valves have a Kv of 0.52 and require a differential pressure of 4.6 mm Hg to open.



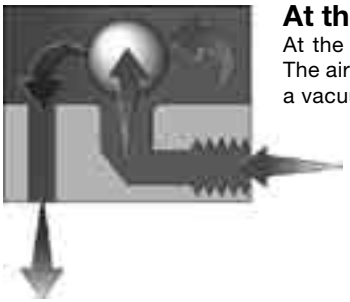
Normal operation

The precision ground stainless steel valve is held firmly on its seat during normal operating conditions ensuring a tight shut-off.



Cooling

During cooling, steam begins to condense resulting in a reduction of pressure. The valve remains on its upper seat until the pressure in the upper chamber falls below the air inlet pressure (usually atmospheric pressure).



At the point of vacuum

At the point of vacuum, the valve will instantly lift of its seat. The air is then drawn in through the upper chamber preventing a vacuum being formed.

6. Maintenance

Note: Before actioning any maintenance program observe the 'Safety information' in Section 1.

The VB14 and VB21 are non-maintainable products. In the event of failure the complete unit should be replaced.

7. Spare parts

There are no spare parts available.

How to order a new product

Example: 1 off Spirax Sarco VB14 vacuum breaker having ½" screwed BSP connections.