

# Separators for Steam, Air and Gas Systems

## Types S1, S2, S3 Cast Iron Separators S4A Fabricated Steel Separators

### 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.

- i) The products have been specifically designed for use on steam, air or water/condensate. 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 in excess of 300°C (572°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.

### 1.16 Returning products

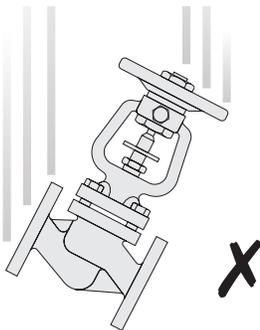
Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental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

### 1.17 Working safely with cast iron products on steam

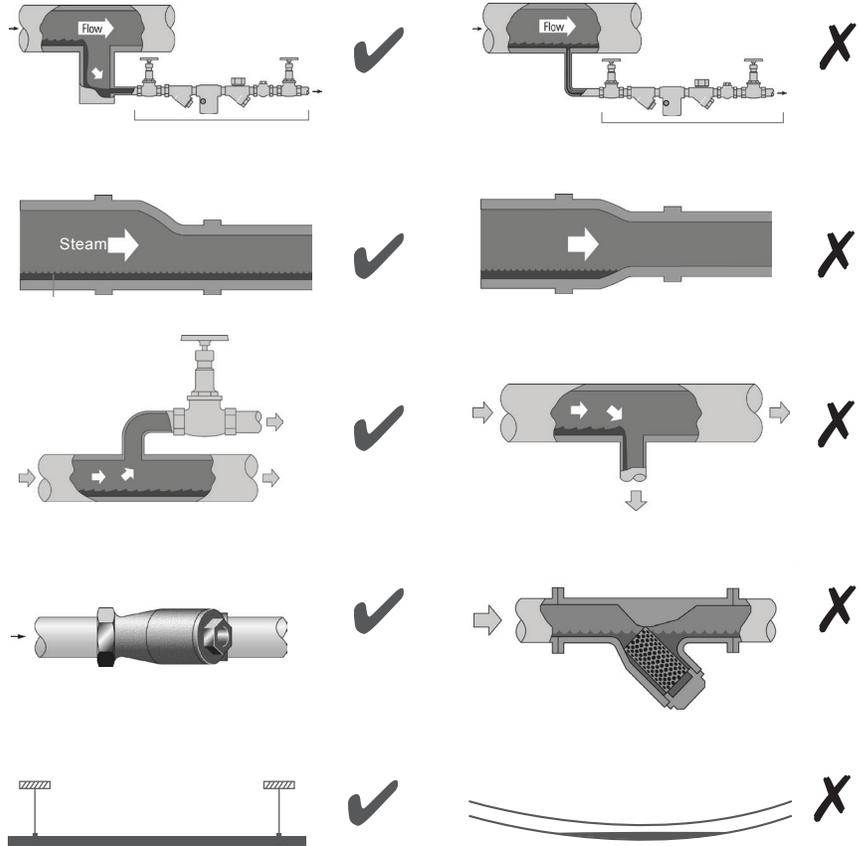
Cast iron products are commonly found on steam and condensate systems. If installed correctly using good steam engineering practices, it is perfectly safe. However, because of its mechanical properties, it is less forgiving compared to other materials such as SG iron or carbon steel. The following are the good engineering practices required to prevent waterhammer and ensure safe working conditions on a steam system.

### Safe Handling

Cast Iron is a brittle material. If the product is dropped during installation and there is any risk of damage the product should not be used unless it is fully inspected and pressure tested by the manufacturer.



### Steam Mains - Do's and Dont's:



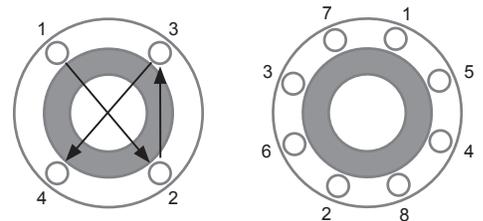
### Prevention of tensile stressing

Pipe misalignment:

Installing products or re-assembling after maintenance:



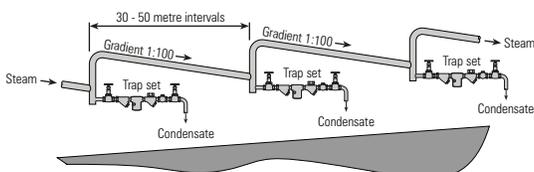
Do not over tighten.  
Use correct torque figures.



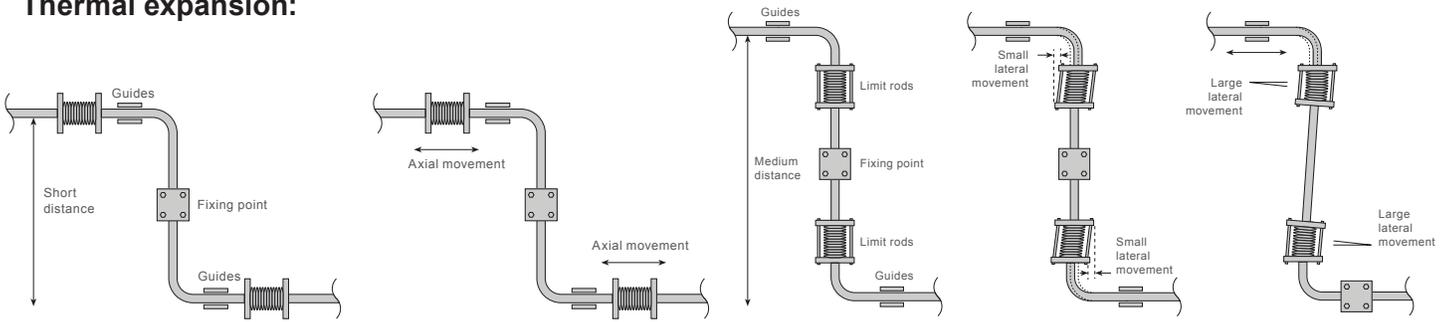
Flange bolts should be gradually tightened across diameters to ensure even load and alignment.

### Prevention of water hammer

Steam trapping on steam mains:



## Thermal expansion:



## Description

Moisture separators are used to improve the quality of steam or compressed air either within the distribution system or on the supply inlet to equipment. Removal of moisture is by a series of baffles on which the suspended water droplets impinge and fall out by gravity to the drain, which must be piped to a trap. The Model S1, S2, and S3 are cast iron construction. The Model S4A is of fabricated steel construction in accordance with Section VIII, Division I of the ASME Boiler and Pressure Vessel Code.

## Limiting Conditions

Model	PMO	TMO
S1	200 psig	388°F
S2, S3	145 psig	363°F
1/2" to 2" S4A	600 psig	650°F
2-1/2" to 6" S4A ANSI 150 lb	150 psig	650°F
2-1/2" to 6" S4A ANSI 300 lb	300 psig	650°F
2-1/2" to 6" S4A ANSI 600 lb*	600 psig	650°F

\*optional

**PMO** - Maximum Operating Pressure

**TMO** - Maximum Operating Temperature.

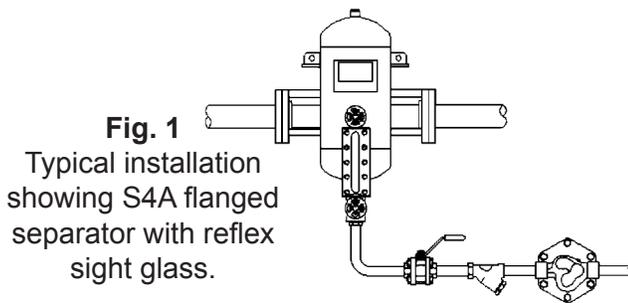
## Operation

The separator's simple, robust design requires no maintenance other than periodic vessel inspection. Trap and strainer should be maintained in accordance with recommended procedures for each product.

## Installation

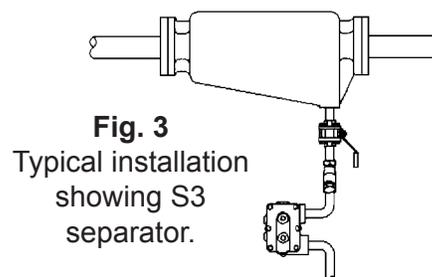
A separator is required for proper removal of moisture from steam, air and gas systems. Locate separator as close to equipment to be protected as possible. Install in a horizontal pipeline with flow direction to match arrow located on separator with drainport at bottom for vertical downline discharge. Proper drainage to be provided through use of a Spirax Sarco steam trap or liquid drain trap and Y strainer as outlined below. Proper pipework support and provision for thermal expansion should be used consistent with good engineering practice. 2-1/2" and larger sized S4A provide built in pipe supports for ease of installation.

Recommended steam hook-up as shown in Fig. 1, 2 and 3 using a float and thermostatic steam trap, Y strainer and isolation valve. Figure 4 provides proper installation for compressed air or gas systems with liquid drain trap and pressure balance line.



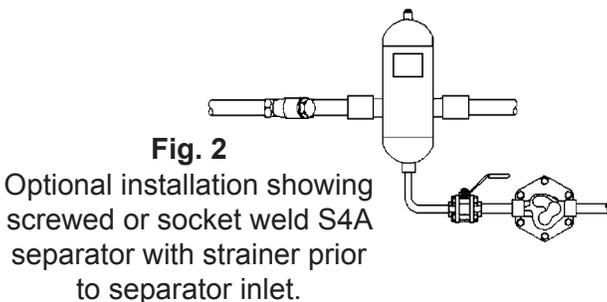
**Fig. 1**

Typical installation showing S4A flanged separator with reflex sight glass.



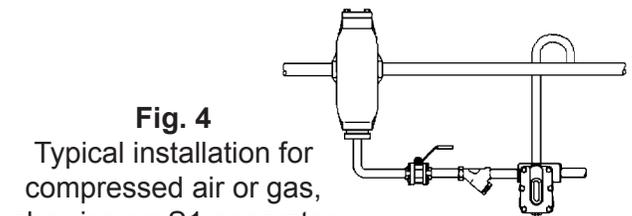
**Fig. 3**

Typical installation showing S3 separator.



**Fig. 2**

Optional installation showing screwed or socket weld S4A separator with strainer prior to separator inlet.



**Fig. 4**

Typical installation for compressed air or gas, showing an S1 separator with liquid drain trap and pressure balance line.

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For any additional information you may require, contact: Spirax Sarco Applications Engineering Department  
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