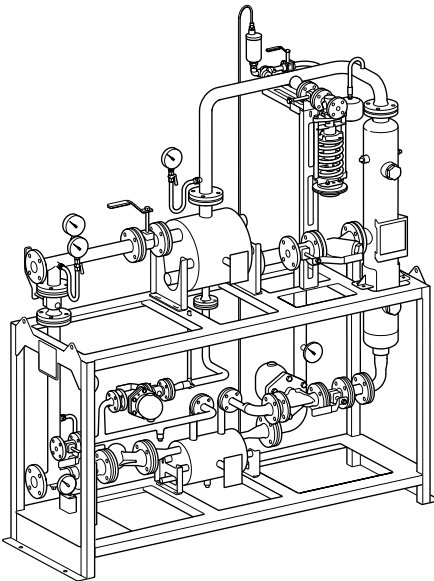


Spirax FREME
Flash Recovery Energy Management Equipment
Installation and Maintenance Instructions



- 1. Safety information*
- 2. General product information*
- 3. Installation*
- 4. Commissioning*
- 5. Maintenance*

1. Safety information

Note: This document refers only to the mechanical installation and commissioning of the Spirax FREME unit and should be used in conjunction with the relevant IMIs for the other system components and supplementary safety information for all the system components.

Warning

Your attention is drawn to Safety Information Leaflet IM-GCM-10, as well as to any National or Regional regulations that are in place.

This product is designed and constructed to withstand the forces encountered during normal use.

Use of the product for any purpose other than its intended use could cause damage to the product and may cause injury or fatality to personnel. Before any installation or maintenance procedure, always ensure that all primary steam and condensate return lines and secondary water lines are isolated. Ensure any residual internal pressure in the system or connecting pipeworks are carefully relieved.

1.1 Intended use

Referring to the Installation and Maintenance Instructions and Name-plate check that the product is suitable for the intended use/application. The product described below complies with the requirements of the European Pressure Equipment Directive 97/23/EC and carries the (CE) mark when so required.

| Product | Maximum allowable operating limits | | | Fluid |
|-----------------|------------------------------------|----------|-------------|--------------------|
| | Connection | Pressure | Temperature | |
| Spirax FREME | Primary side | 14 barg | 198°C | Steam & Condensate |
| | Secondary side | 25 barg | 170°C | Water |

- i) The product has been specifically designed for use on the fluid(s) shown above. The product's 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.

Allow hot parts to cool before commencing work, to avoid the risk of burns.

Always wear appropriate safety clothing before carrying out any installation or maintenance work.

1.13 Lifting (fig.1)

The Spirax FREME unit should be lifted by suitable lifting gear, from the base, or lifting lugs provided (see item 17, Figure 1), placed in position and securely bolted to the floor. Please Note:

- On no account is the FREME unit to be lifted by any other part, other than the base or lifting lugs.
- Sufficient space should be provided in its location to allow access for maintenance.
- The FR-1 unit occupies a maximum of 3.7 m³ space (Maximum footprint of 2.2 x 2.1 mm).
- The FR-2 occupies a maximum of 6.5 m³ space (Maximum footprint of 2.6 x 2.5 mm).
- The FR-3 occupies a maximum of 6.5 m³ space (Maximum footprint of 2.6 x 2.5 mm).

— 2. General product information —

2.1 General information

The Spirax FREME packaged flash steam and condensate recovery energy management system recovers the useful energy from condensate and transfers it back into the boiler feedwater.

The system recovers flash steam and heat energy from the condensate providing two streams, each of which is fed to dedicated heat exchangers, which transfer the heat energy directly into the pump discharge side of the boiler feedwater. Heat can be recovered raising the feedwater temperature above 100°C without causing any operational problems and minimum backpressure. A high proportion of this energy would otherwise have been lost.

Spirax FREME systems can be sized for any feedwater flowrate up to 15000 kg/h and are supplied fully assembled and pressure tested, ready for installation.

The Spirax FREME unit consists of the following core items (Figure 1):

- A** Flash steam and condensate cooling fully welded plate & shell heat exchangers.
- B** Flash vessel.
- C** Float traps for condensate removal.
- D** Direct acting below sealed excess pressure valve.
- E** Ancillaries.

Note: For additional information about any particular product used in the construction of this unit see the relevant Technical Information Sheet.

2.2 Identification

The unit is available in the following package options:
FR-1, FR-2 and FR-3

E = Ancillary equipment that has not been specifically highlighted.

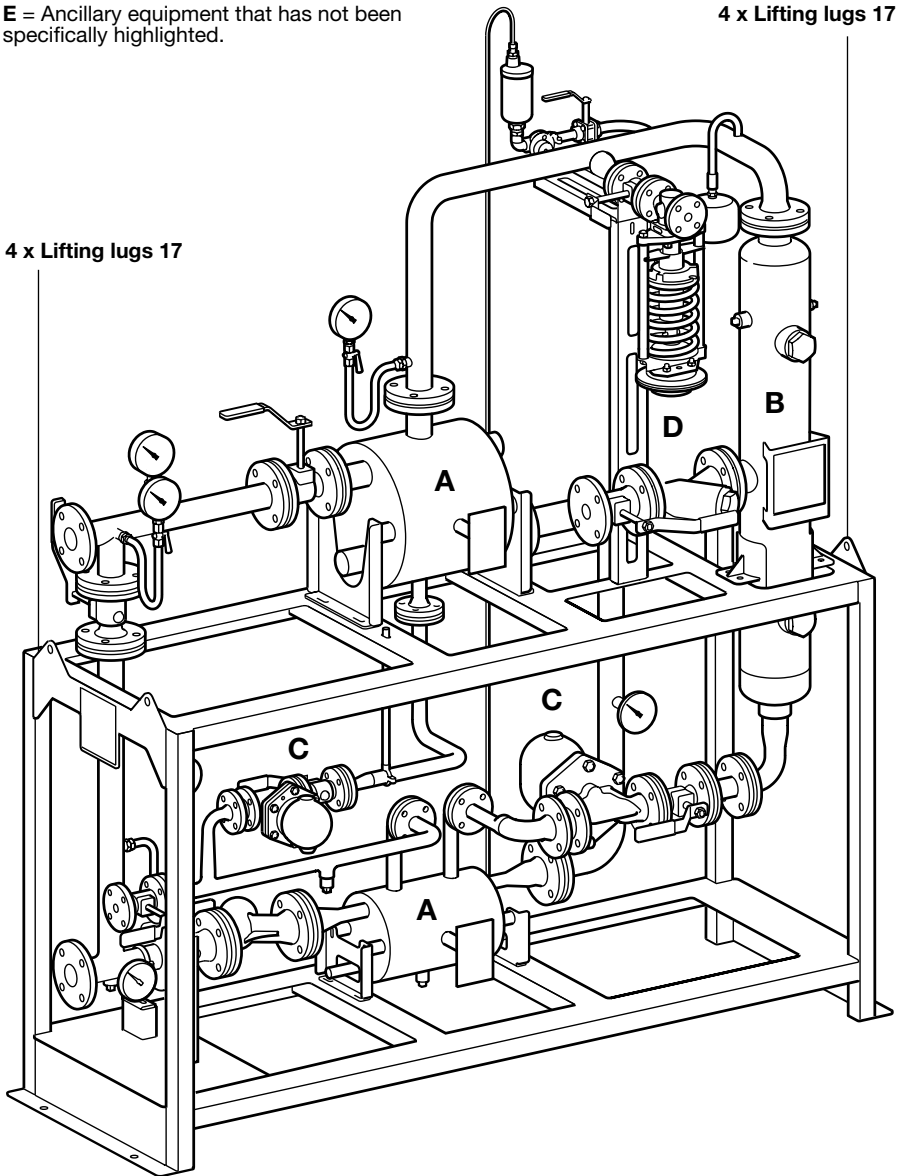


Fig. 1 Spirax Freme Flash Recovery Energy Management Equipment

3. Installation

Warning: Before proceeding with any installation or maintenance work read Section 1, Safety information.

3.1 Firstly check that the unit and all its equipment has arrived as ordered and has not been damaged whilst in transit.

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

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

3.4 Installation - Position the unit on the floor and bolt it down, ensuring that sufficient space is left for maintenance.

3.5 Piping connections - It should be ensured that all connecting pipework is stress free and adequately supported.

The condensate supply should always be maintained at the specified design pressure and temperature for the unit. The Spirax FREME must not operate above the maximum pressures and temperatures indicated on the name-plate attached to the unit. The installation of an appropriately sized safety valve, to protect any lower pressured equipment is strongly recommended.

Spirax Sarco supplies a range of traps, strainers, separators, safety valves and pressure reducing equipment.

4. Commissioning

We recommend the service and support of a Spirax Sarco Commissioning Engineer. Details of this service can be found by contacting Spirax Sarco.

Note: In most new installations, dirt collects in the condensate line during construction of the piping systems. **It is essential that the unit is flushed prior to commissioning.**

Commissioning procedure (see Figure 2):

- Shut the condensate inlet valve (1) upstream of the flash vessel.
- Shut the feedwater bypass valve (9).
- Open all condensate drain valves (10 and 16).
- Open feedwater isolating valves (11 and 8).
- Check for water circulation through the Spirax FREME.
- If the circulation is okay, slowly open the main condensate inlet valve (1).
- Check the outlet water temperatures are within the acceptable values.
- Check operation of steam traps (14 and 15).

Important – DEP excess pressure valve setting (5), if fitted:

Setting the desired upstream pressure - The valve is supplied 'unset' with the spring adjuster at its lowest adjustment position. The upstream pressure may be set against either a dead end condition or flowing condition, depending on the requirements of the application, taking into account the effect of proportional offset. Details of setting can be found in the separate Installation and Maintenance Instructions, IM-S12-10, for the DEP Excess Pressure Valve.

The Spirax FREME unit is now ready for service.

| Item | Description |
|----------------------------|-----------------------|
| 1, 6, 8, 9, 10, 11, and 16 | Ball valve |
| 2 and 12 | Strainer |
| 3 | Flash vessel |
| 4 | Air vent assembly |
| 5 | Excess pressure valve |
| 7 and 13 | Heat exchangers |
| 14 and 15 | Steam traps |
| 17 | Lifting lugs |

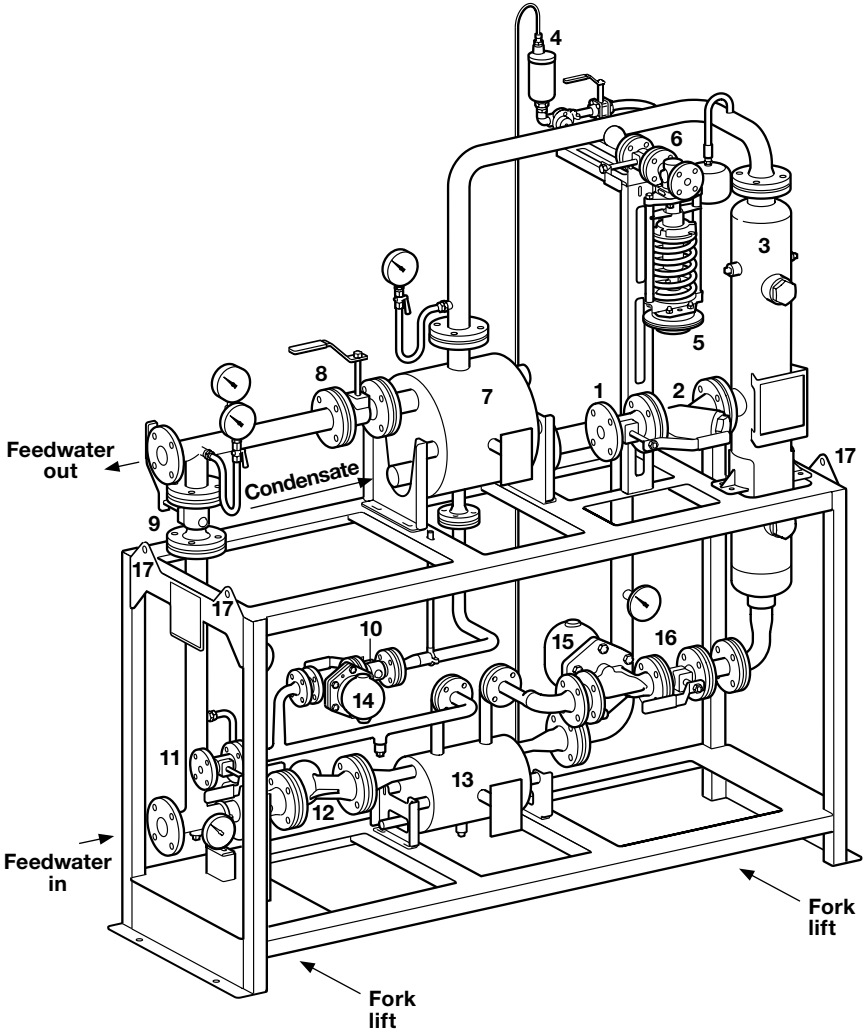


Fig.2 Spirax Freme Flash Recovery Energy Management Equipment

5. Maintenance

General

For maintenance of the individual components that comprise the system, please see the product specific IMI's (Installation and Maintenance Instructions) supplied with the unit.

Scale formulation

Within open systems, where there is continual make-up water, there is a risk of scale formation.

The extent of the scale will depend largely upon the water quality, which varies greatly from area to area. A test, conducted by a water treatment specialist, is recommended to determine the local quality and whether problems are foreseen.

After extended service, the heat exchangers require cleaning. Regular chemical cleaning should be considered to remove scale. $\frac{3}{4}$ " ports are available on the inlet and outlet piping of the heat exchangers allow easy connection for 'Clean in Place' apparatus. Safe operation of this product can be guaranteed only if it is properly installed, commissioned, used and maintained by qualified personnel 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.