4. Installation

Important - safety note

Please read Section 1.12 regarding the safe lifting of this product before actioning any installation or maintenance procedure.
Before any installation or maintenance procedure, always ensure that all steam or condensate lines are isolated.
Ensure any residual internal pressure in the product or connecting lines is carefully relieved. Also ensure any hot parts have cooled to prevent risk of injury from burns. Always wear appropriate safety clothing before carrying out any installation or maintenance work.

Note: If pumping a potentially explosive media, the motive supply media must be an inert gas with no oxygen present.



Warning 1
Consideration of Condensate Temperature Increase

In situations where the temperature of the motive steam is considerably higher than that of the condensate, it is important that the design of the system located downstream of the pump adequately addresses this temperature difference.



Warning 2
Control of Motive Pressure and Risk Assessment

It is essential to implement reliable and effective control of the motive pressure supplied to the pump. This control is necessary to ensure that the temperatures within the system do not exceed the maximum allowable temperature limits specified for the equipment.



Warning 3
Steam Backflow Risk and Upstream Device Rating

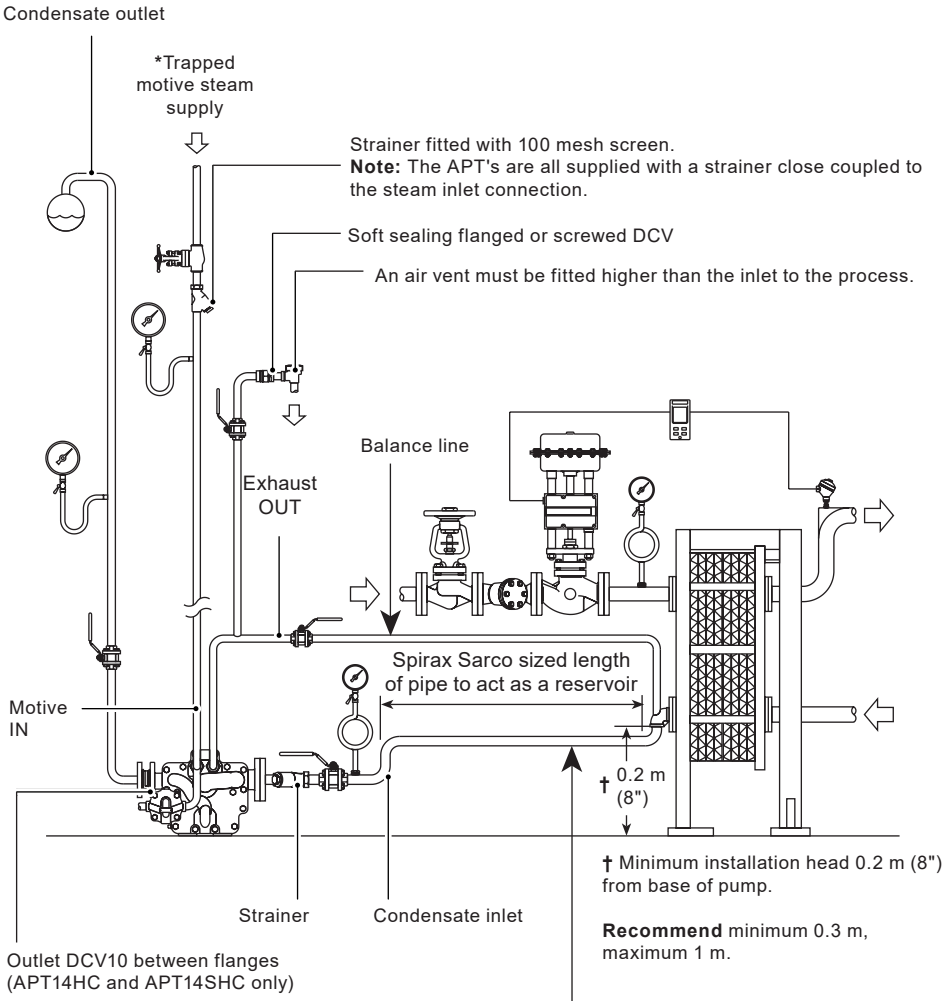
There is a risk of steam backflow through the balance line in systems utilising the APT14 pump. To mitigate this risk, it is strongly advised that the device situated upstream of the pump is specified to withstand the temperature of the steam employed as motive steam. This precaution is particularly crucial in installations where a second steam line—be it superheated or saturated steam—is introduced to the system.



Warning 4
Specification of Sight Glass

When specifying a sight glass for the system, it is imperative that the component is capable of withstanding the maximum temperature gradient that the pump may encounter during operation. This temperature gradient is defined as the difference between the highest possible steam temperature and the temperature of the coldest condensate present in the system.
It is the responsibility of the user to conduct an appropriate level of risk assessment for the application. This assessment should ensure that all necessary precautions are in place and that the system operates within safe parameters at all times.

Fig. 11



It is recommended that the reservoir be installed at least 1 pipe diameter below the process outlet, but as high as possible above the APT14, APT14HC or APT14SHC inlet (up to 1 metre (40")).

4.1 Inlet piping

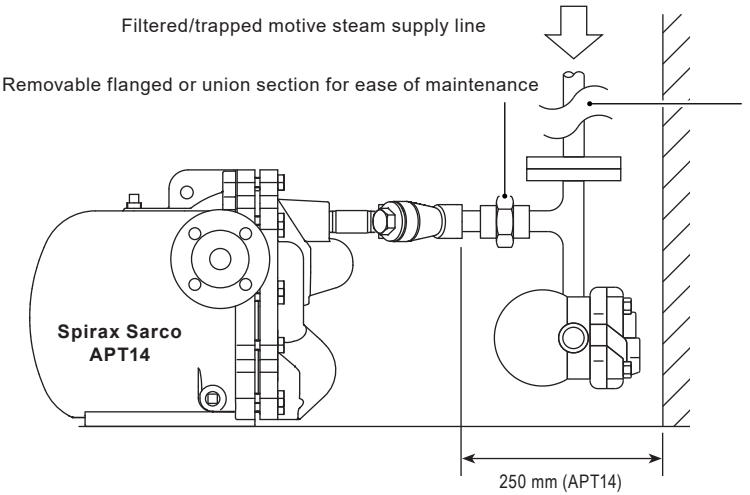
To prevent condensate backing up into the equipment being drained, it is recommended that the inlet pipework is sufficiently sized to accumulate condensate during the pump's discharge cycle. Generally a length and diameter of pipe to accommodate the following condensate capacity will be sufficient: 4 litres (1.1 gallons) for an APT14 or 8 litres (1.76 gallons) for an APT14HC and APT14SHC. It is recommended this condensate reservoir is situated at least 1 pipe diameter below the process outlet but as high as possible above the APT inlet (up to 1 metre (40")). It is essential that a Spirax Sarco Y-type strainer is fitted at the condensate inlet of the APT14, APT14HC and APT14SHC, as shown in Figure 12.

4.2 Recommended installation head

An installation head of at least 0.3 m (12 ins) from the base of the unit is recommended. Minimum 0.2 m (8") with reduced capacity; Maximum 1 m (40"). **Note**: During cold start-up conditions, it is possible for hydraulic pulsing of the inlet check valve to occur. It is advisable in this case to install a throttling isolation valve to reduce the filling pressure.

4.3 Connections **(refer to the installation diagram, Figure 12)**

The APT's have four connection ports. The DN40 (1½") - APT14 or DN50 (2") - APT14HC and APT14SHC port should be connected to the outlet of the equipment being drained. The DN25 (1") - APT14 or DN40 (1½") APT14HC and APT14SHC port should be connected to the condensate return line. Flow arrows indicate the correct direction of flow. The DN15 (½") port marked (S) should be connected to a trapped motive steam supply. *** It is important to ensure this line is drained of condensate at all times using a Spirax Sarco steam trap and filtered using a 100 mesh strainer as fitted (see Figure 11).** The screwed DN15 (½") port marked (E) should be balanced back as close as possible to the condensate outlet of the equipment. This balance line must always be connected to the top of the condensate pipe, as shown in Figure 11. **Note:** If a thermal cut out device has been installed to protect the heat exchanger from excess temperature, then it is important this is mounted upstream of the steam control valve and the take-off point for the motive steam supply to the APT14, APT14HC or APT14SHC.



Ensure this steam line is correctly drained of condensate at all times using a Spirax Sarco steam trap plus the 100 mesh strainer as fitted to the pump to prevent debris entering the pump mechanism.

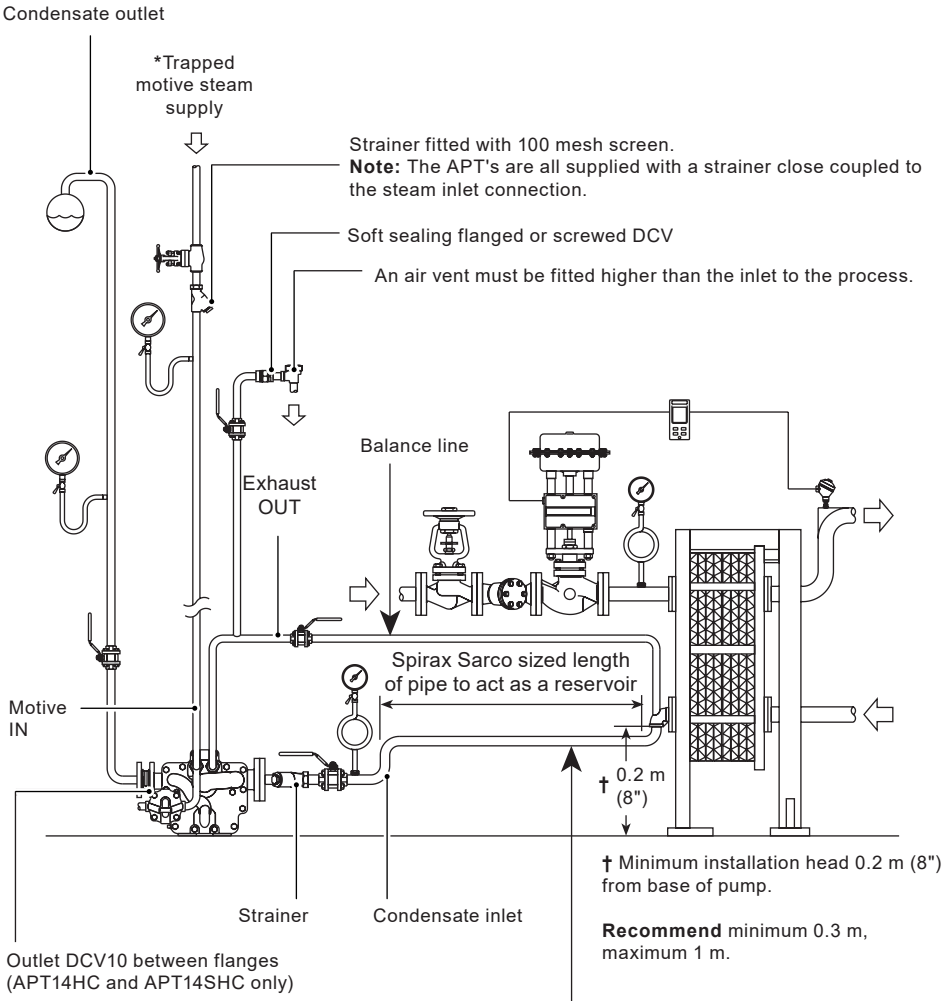
Fig. 12
Suggested coupling of motive supply and exhaust lines

4.4 Outlet piping

It is important for the outlet piping to be correctly sized to prevent excessive backpressure on the APT14, APT14HC or APT14SHC. This pipework should be sized to take into account the effects of flash steam at the heat exchangers full load operating conditions and any other equipment being discharged into the return line.

Note: A separate Spirax Sarco DN40 DCV10 check valve must be fitted to the outlet flange of the pump body and the connecting pipework flange - APT14HC and APT14SHC only. Ensure the DCV10 is mounted centrally between the flanges with the directional flow arrow pointing in the direction of fluid flow. A gasket should be used both sides of the disc check valve. For all other maintenance and technical information see IM-P601-32.

Fig. 13



It is recommended that the reservoir be installed at least 1 pipe diameter below the process outlet, but as high as possible above the APT14, APT14HC or APT14SHC inlet (up to 1 metre (40")).

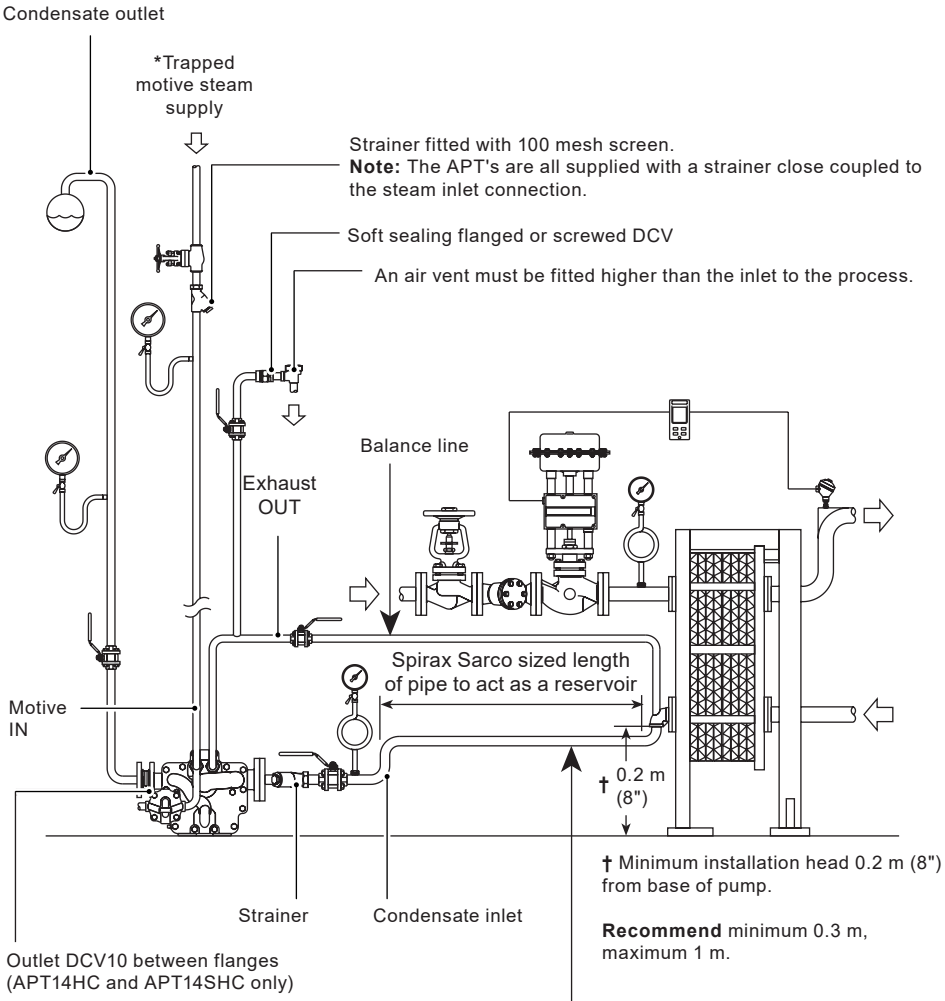
4.5 Pressure gauges

It is recommended that system pressure gauges are fitted to the motive supply, condensate inlet and condensate outlet as shown in Figure 14.

4.6 Control of motive supply pressure

Although the APT is able to utilise motive pressures up to 13.8 bar g (200 psi g), it is highly recommended that the motive pressure does not exceed 3 to 4 bar g (44 to 58 psi g) above the backpressure applied to the pump. When specifying a pressure reducing valve to reduce the motive supply pressure, the effects of pulsating flow on the pressure reducing valve must be considered. Contact Spirax Sarco for details of recommended installation if required. The motive supply must be drained by a suitable steam trap to ensure the motive steam is dry. See Figure 14.

Fig. 14



It is recommended that the reservoir be installed at least 1 pipe diameter below the process outlet, but as high as possible above the APT14, APT14HC or APT14SHC inlet (up to 1 metre (40")).

4.6.1 Fail safe condition of motive supply.

When the APT14 is used to remove condensate from temperature controlled plant such as heat exchangers, it is recommended that the motive supply to the APT is taken from a point downstream of a fail safe high limit control valve, see Figure 15.

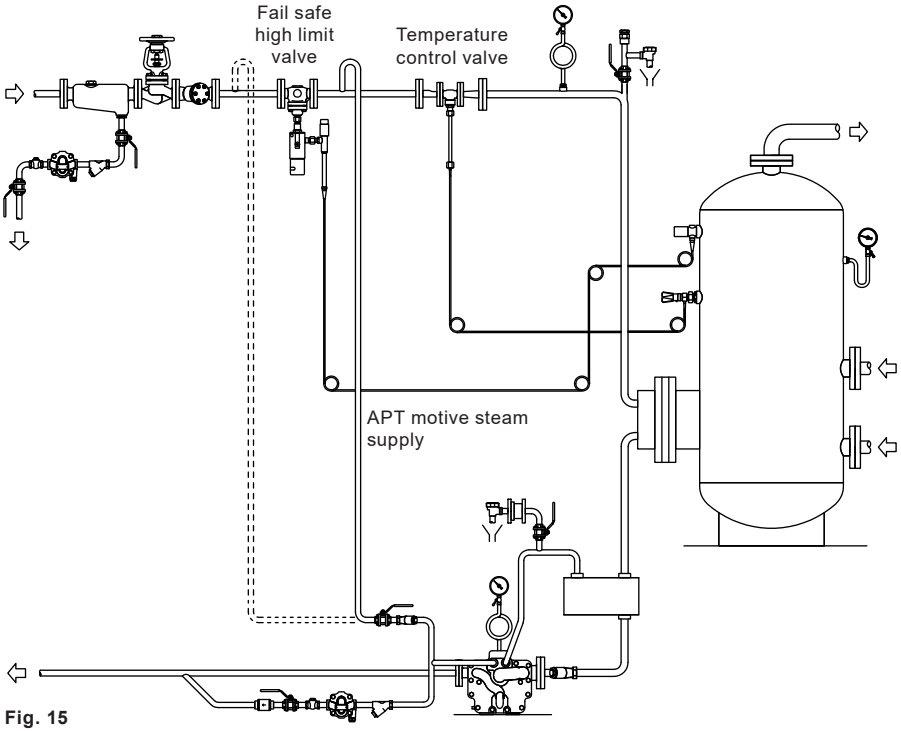


Fig. 15

5. Commissioning

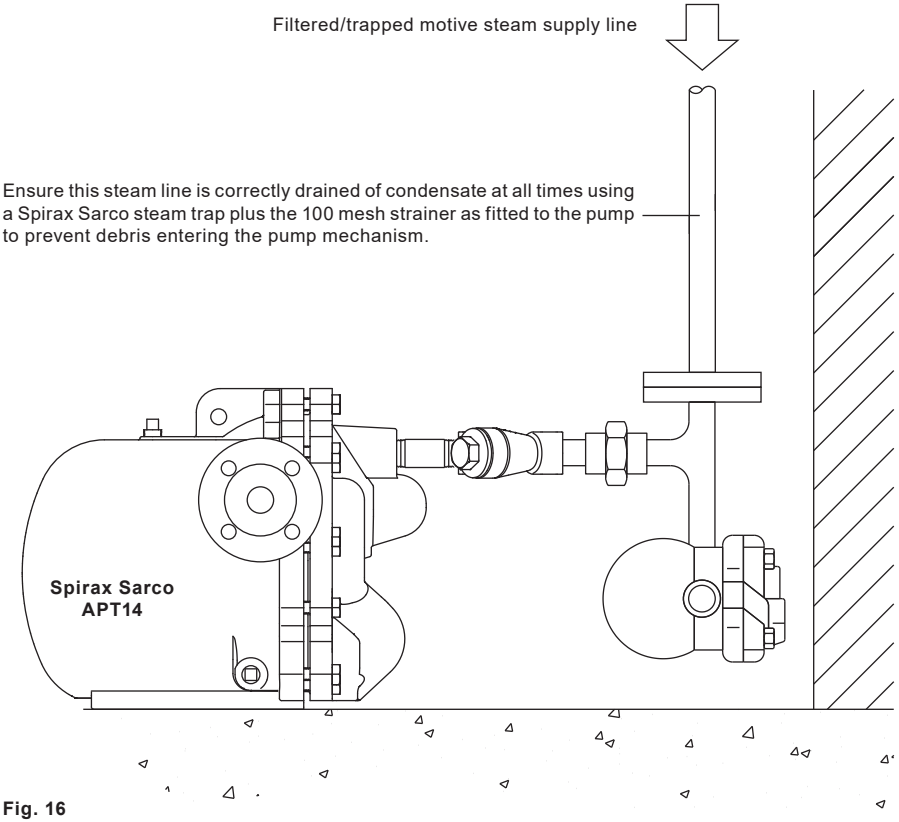


Fig. 16

5.1 After ensuring the inlet and outlet pipe connections and motive/exhaust connections are coupled in accordance with Figures 15 and 16, slowly open the motive steam inlet line to supply pressure to the APT14, APT14HC or APT14SHC. Ensure the exhaust/balance line is open and not restricted in any way.

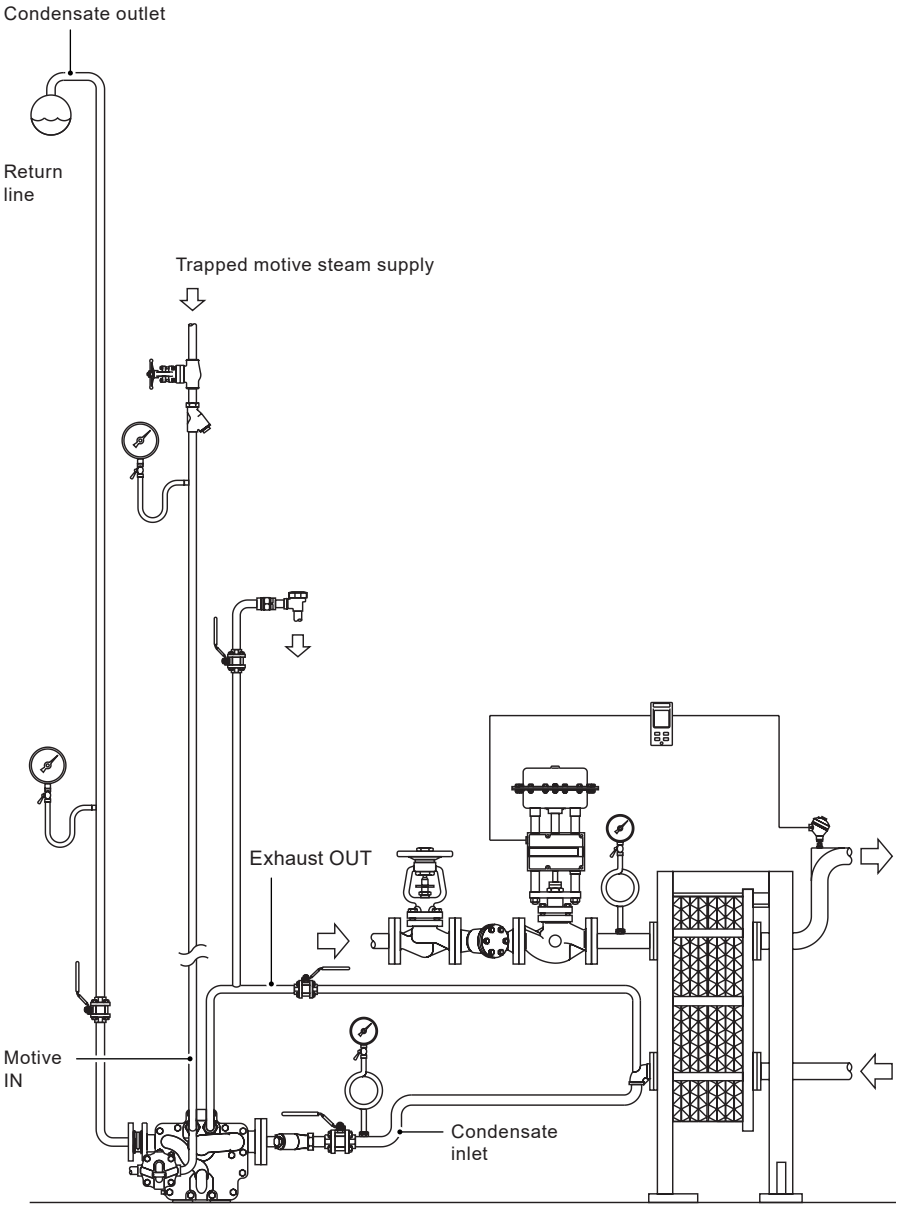
5.2 Slowly open the isolation valves in the condensate inlet and discharge lines, allowing condensate to fill the body of the APT14, APT14HC or APT14SHC.

5.3 The APT14, APT14HC or APT14SHC is now ready to operate.

5.4 When the process plant is operational, the APT14, APT14HC or APT14SHC will discharge condensate under all pressure conditions into the return line.

5.5 If any irregularities are observed, recheck the installation according to the recommendations in Section 4. If the unit fails to operate, then consult the fault finding guide Section 9.

Fig. 17 APT14HC shown



6. Maintenance

6.1 Mechanisms inspection and repair (Important - safety note)

Please read Section 1.12 regarding the safe lifting of this product before actioning any installation or maintenance procedure.
Before any installation or maintenance procedure, always ensure that all steam or condensate lines are isolated.
Ensure any residual internal pressure in the product or connecting lines is carefully relieved. Also ensure any hot parts have cooled to prevent risk of injury from burns.
Always wear appropriate safety clothing before carrying out any installation or maintenance work.
When dismantling this product, care should be taken to prevent injury from the snap action mechanism. Always handle with care.
The APT14, APT14HC and APT14SHC should be inspected periodically, intervals dependant on application. Contact Spirax Sarco for details.

6.2 Removal and fitting of cover assembly

Please ensure the safety recommendations are observed before commencing with any maintenance of this product.

6.3 To remove the cover assembly

1. Disconnect all connections to the cover. Remove the cover bolts using the correct size socket, then carefully slide the cover assembly away from the body (a minimum withdrawal distance of 250 mm for the APT14 or 275 mm for the APT14HC and APT14SHC will be needed). Lift the cover assembly to a bench or other convenient working surface and clamp securely, avoiding contact with the gasket face.
2. Visually inspect the mechanism for obvious damage. Check that it is free of dirt and scale and operates freely when the floats are moved up and down.
3. Inspect the spring assembly for damage. Make sure the valves slide freely and the spring loaded exhaust valve moves on its guide.
4. Inspect the floats to ensure they are undamaged. Check they pivot smoothly on the pump and trap levers and they are not waterlogged.
5. Ensure the inlet swing check valve is free to move and the sealing faces of both the seat and the flap are clean and undamaged. (If the seat is badly scored or damaged a new cover assembly may be required).
6. Check the two stage trap module to ensure both the 1st and 2nd stage valves are free from dirt and debris. Ensure they slide open and close smoothly.
7. It is not possible to visually check the outlet check valve without removing the trap module (refer to Section 8 of this manual for correct removal and fitting of this part - APT14 only).
8. If any of the parts appear damaged or fail to work correctly, then refer to Sections 8 and 9 of this manual for correct removal and fitting instructions.

6.4 If a new cover assembly is to be fitted

1. Ensure the gasket face in the body is clean and free from debris. Carefully slide the new cover assembly into the existing body, whilst ensuring the new gasket (item 2) is carefully aligned with the gasket faces and no parts of it are trapped or pinched outside the sealing areas. To ensure accurate alignment of the cover and body, it is recommended the lower part of the cover's gasket seal is located into the body first. The top part of the seal can then be easily aligned.
2. Refit the cover bolts ensuring they are sequentially tightened in opposing pairs, gradually increasing torque to 63 ± 5 N m (46.5 ± 4 lbf ft).

Bolt size	Socket size	Tightening torque
M12 x 45	19 mm A/F	63 ± 5 N m (46.5 ± 4 lbf ft)

3. Carefully reconnect the motive steam supply and the exhaust lines to the connections marked (S) and (E), then follow the start-up procedure in **Section 5 'Commissioning'** to bring the APT14, APT14HC or APT14SHC back into operation.
4. Make sure that the Spirax Sarco motive supply strainer (with 100 mesh screen) is reinstated to the motive supply connection (item 28, Figure 3, page 13).

6.5 Spare parts

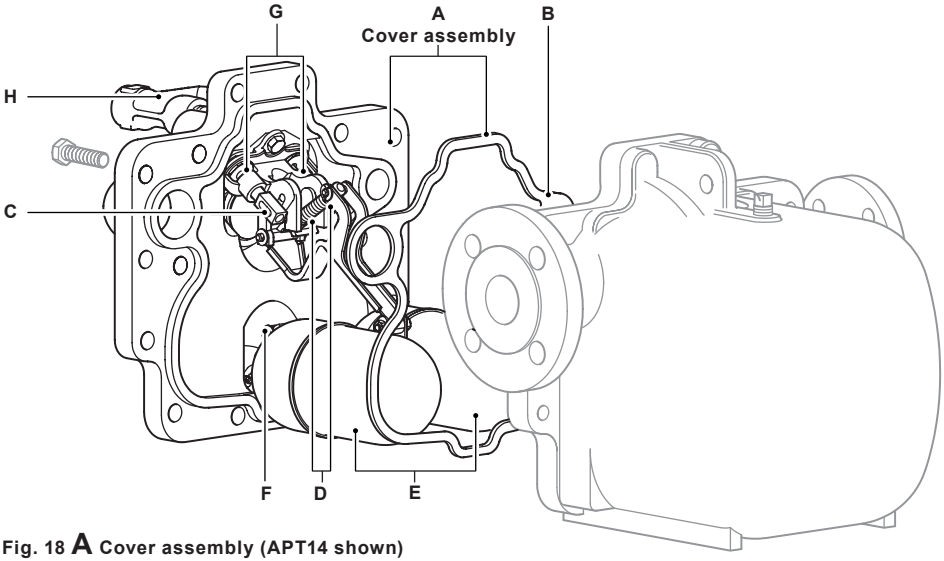


Fig. 18 A Cover assembly (APT14 shown)

Available spares

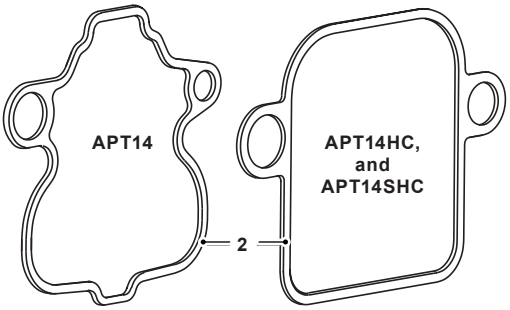
A	Cover assembly (**A - G** inclusive)	**1, 2, 5-25**

Note: Refer to Figure 3, page 13 for component number details. For customer convenience, spares are supplied in kits to ensure all the appropriate replacement parts are available.

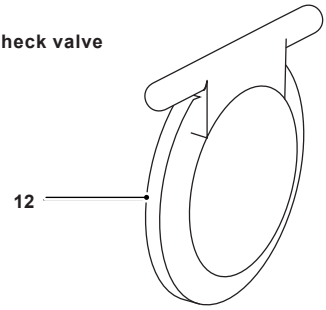
6.5 Spare parts (continued)

B	Cover gasket	**2**
C	Inlet check valve	**2, 12**
D	Spring and actuator arm	**2, 14, 24**
E	Floats	**2, 5, 6, 7**

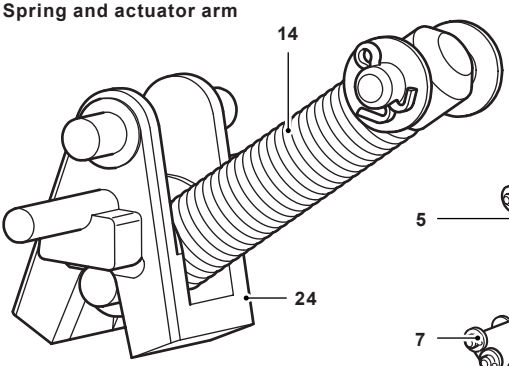
B
Cover gasket



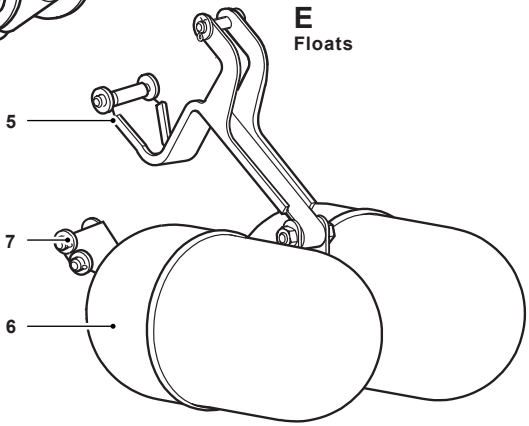
C
Inlet check valve



D
Spring and actuator arm



E
Floats



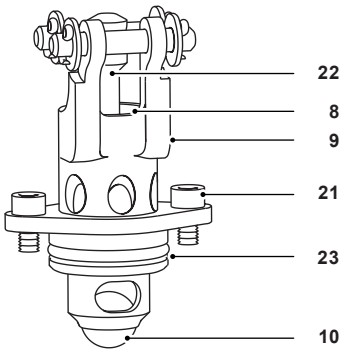
Available spares (continued)

F	Trap and outlet check valve mechanism	**2, 8, 9, 10** (APT14 only)**, 21, 22, 23**

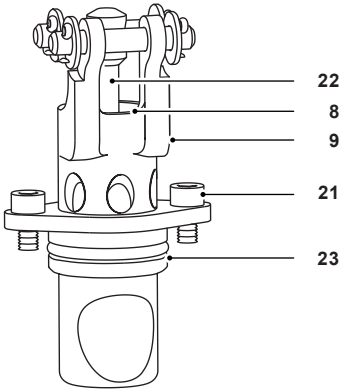
F

Trap and outlet check valve mechanism
Note: Item **10** is not included for the APT14HC and APT14SHC

APT14



APT14HC and APT14SHC

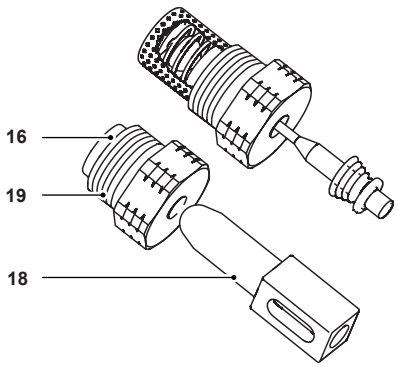


Available spares (continued)

G	Inlet/exhaust valve and seat kit	**2, 16, 17, 18, 19, 27**

G
Inlet/exhaust valve and seat kit

APT14



APT14HC and APT14SHC

