

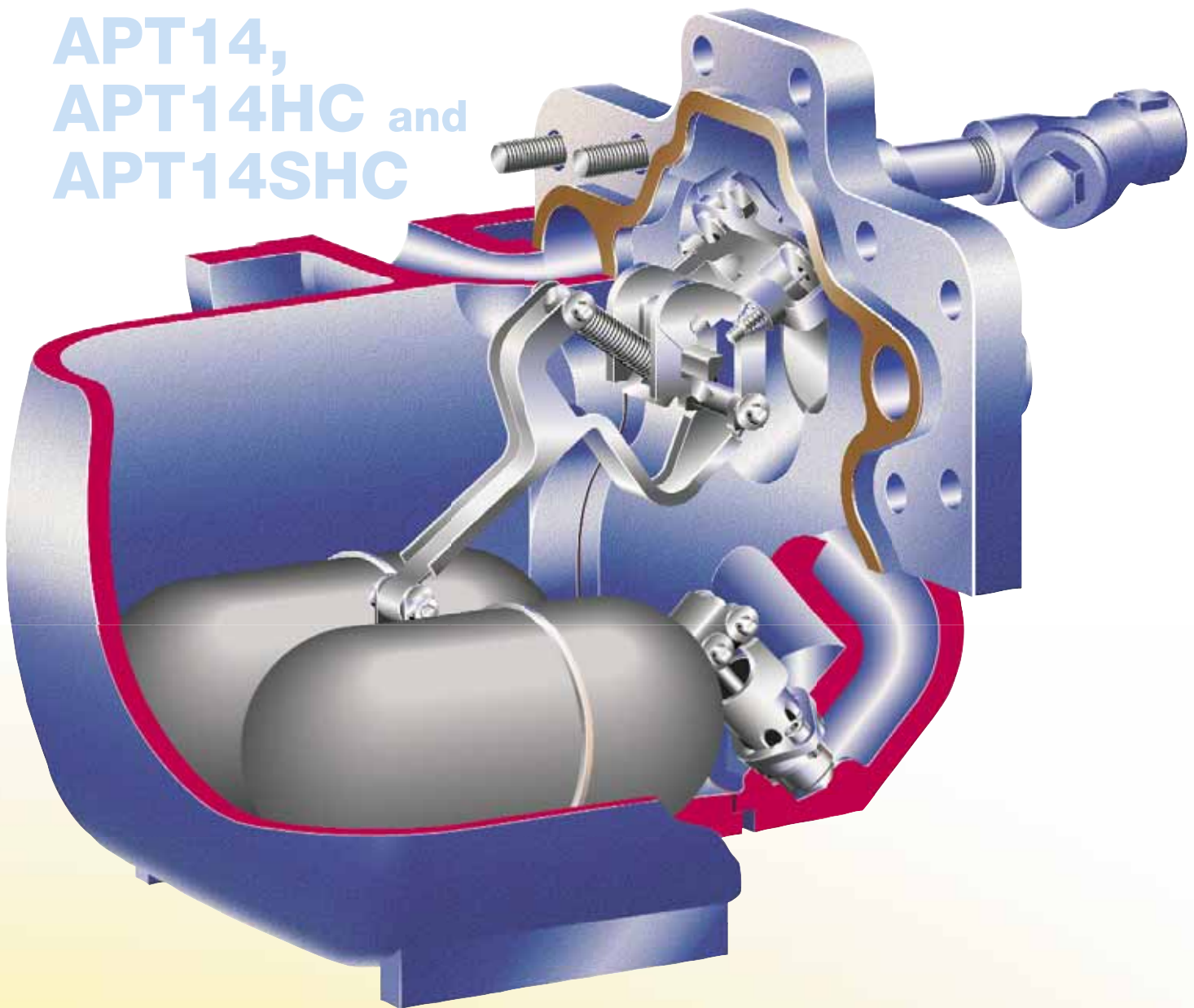
# APT10 and APT14

for effective condensate drainage and removal



# An innovative solution for effective heat

## APT14, APT14HC and APT14SHC



- Compact design which contains all the equipment needed to drain or remove condensate for all load conditions.  
**Innovative patent applied for low profile mechanism.**
- Mechanisms operate with as little as 200 mm installation head from the base of the pump.
- **APT10, APT14** and **APT14HC** - SG iron DIN EN JS 1025 (EN GJS 400-18LT) and ASTM A395 body and cover 3.1 certifiable.  
**APT14SHC** - Carbon steel EN 1.0619+N and ASTM A216 WCB body and cover 3.1 certifiable.  
The APT range is designed in accordance with DIN and ASME standards.  
**Optional** - The body and cover are available with an electroless nickel plate (ENP) finish. (Not APT14SHC)
- All stainless steel internals, with low profile robust stainless steel floats.
- High integrity trapped cover gasket.
- High capacity two stage trap module plus precision ball outlet check valve.  
The HC and SHC versions have a separate outlet disc check valve.
- Low resistance swing type inlet check valve.
- Positive snap action pump mechanism with replaceable valves and seats.
- Available connections: **APT10-4.5** and **APT14 (not HC and SHC)** screwed BSP / NPT connections, with ½" screwed BSP or NPT motive fluid connections. The **APT14, APT14HC** and **APT14SHC** flanged PN16, ANSI 150, JIS/KS 10, with ½" screwed BSP or NPT motive fluid connections.

# exchanger drainage

## APT - Automatic pump trap

For over 50 years, Spirax Sarco has been involved with the design and manufacture of products for efficient condensate management. We have now developed a range of compact, condensate drainage systems in simple-to-install products.

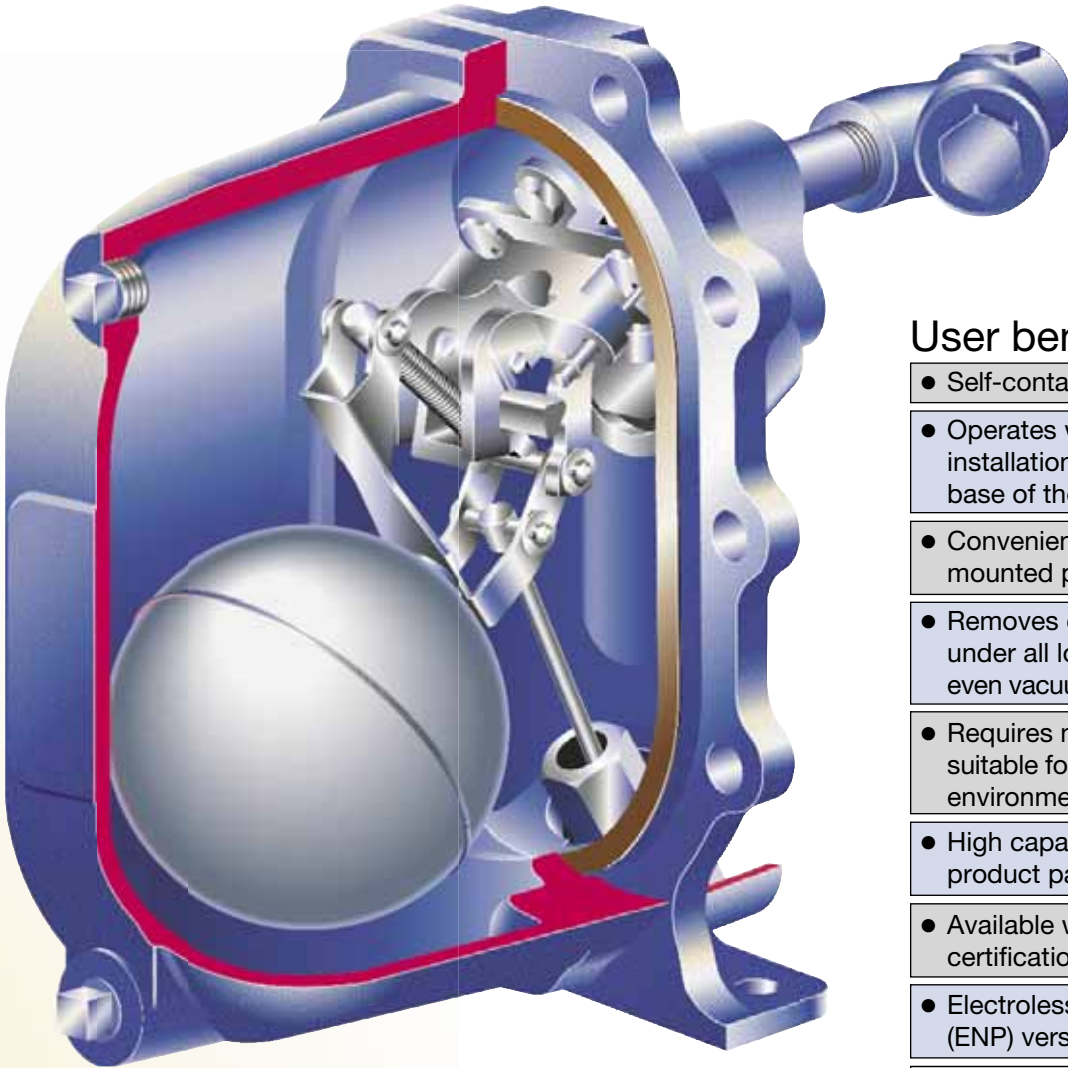
The APT has been designed to remove condensate from steam heat exchangers and process plant under all operating conditions, and forms an integral part of the condensate removal process. It is available in two easy-to-specify options:

**APT10-4.5** - for loads up to 1 500 kg/h; and

**APT14** or **APT14HC** and **APT14SHC** - for loads up to 9 000 kg/h.

### Compactness is the key

The APT's are unique, from their compact size to their approved patent applied mechanisms. No other pressure operated pumps or traps in the world can offer all of the benefits shown on these pages.



# APT10-4.5

### User benefits

- Self-contained compact unit.
- Operates with 0.2 m installation head from the base of the pump.
- Convenient installation to low mounted process equipment.
- Removes condensate under all load conditions, even vacuum.
- Requires no electrical power - suitable for hazardous environments.
- High capacity in one simple product package.
- Available with EN 10204 3.1 certification as standard.
- Electroless nickel plated (ENP) versions available.
- Approval to ATEX.
- Spirax Sarco's guarantee of worldwide technical support, knowledge and service.

# The working cycle of the

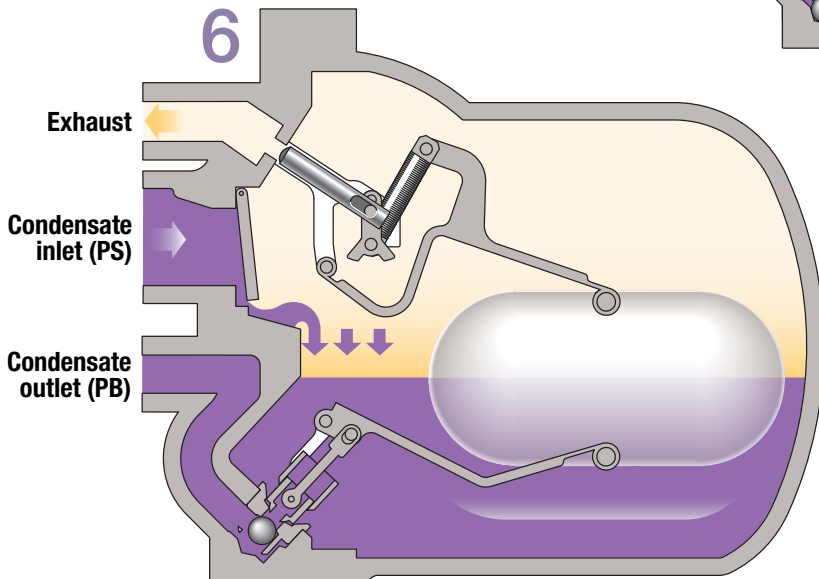
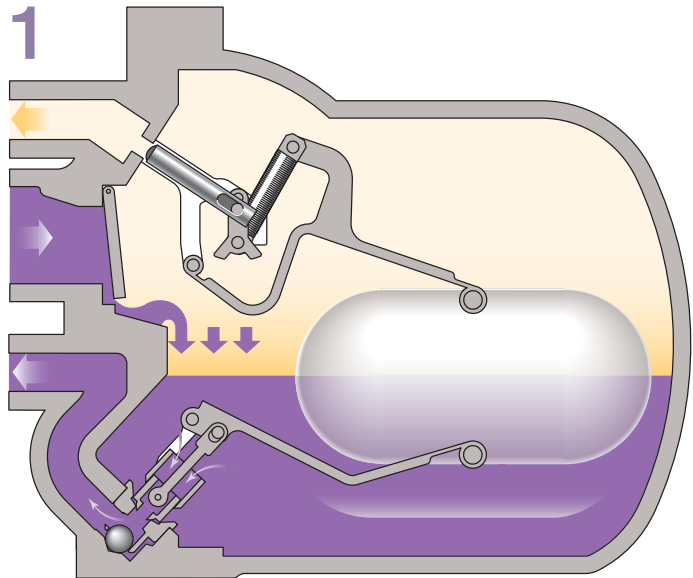
**1** The APT10-4.5, APT14, APT14HC and APT14SHC automatic pump traps operate on a positive displacement principle. Condensate enters the body through the inlet swing check valve causing the float to rise.

The float is connected to the trap mechanism via a multi-link pivot.

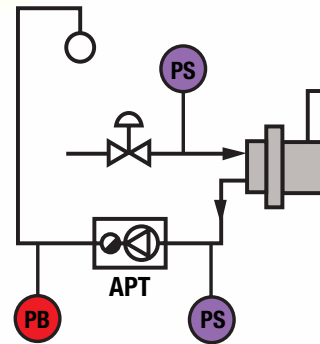
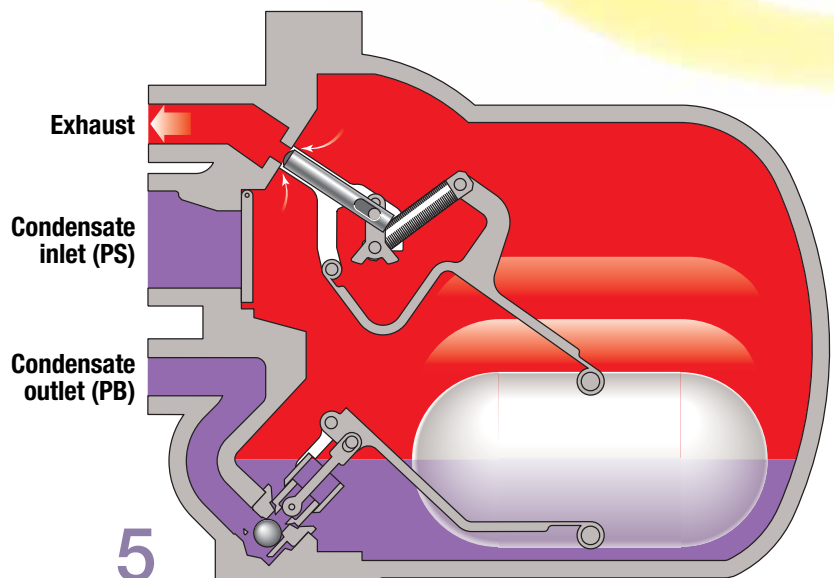
If the upstream system pressure PS is sufficient to overcome the backpressure PB (see below), the build up of condensate will be discharged through the opening two stage trap mechanism.

In this way, the float will automatically modulate according to the rate of condensate entering the APT, controlling the rate of opening and closure of the trap.

**6** As the pressure inside the APT equalises with the condensate inlet pressure through the open exhaust valve, condensate re-enters via the inlet swing check valve. At the same time, the outlet ball check valve or the disc check valve (HC) ensures no condensate can drain back into the main chamber and the trapping or pumping cycle begins again.

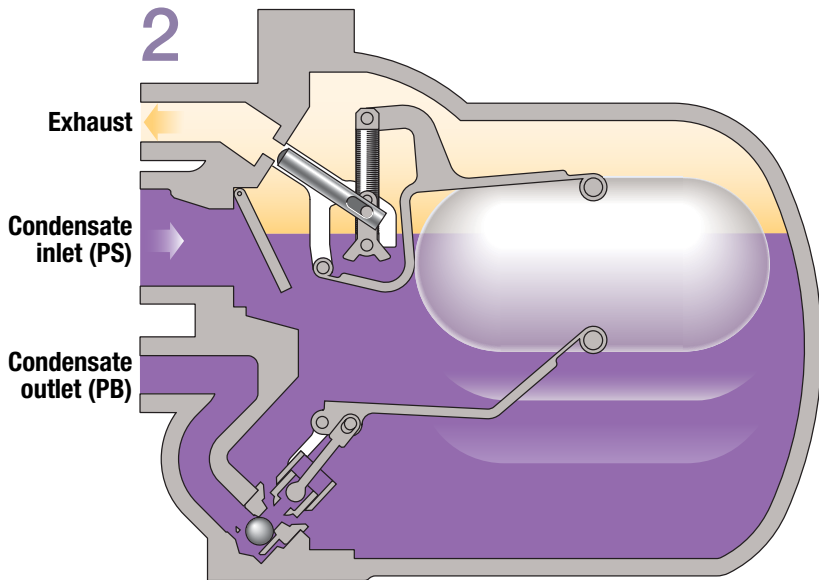


**5** As the condensate level falls within the main chamber, the float re-engages the change over linkage, causing the motive inlet to close and the exhaust valve to open.

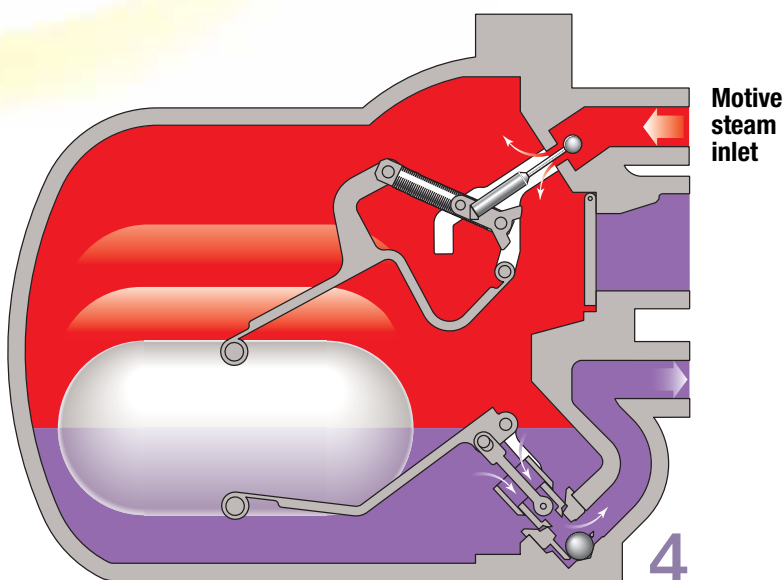
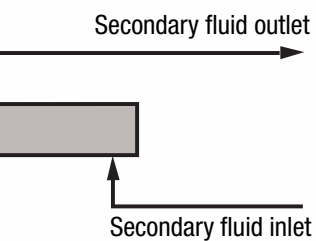
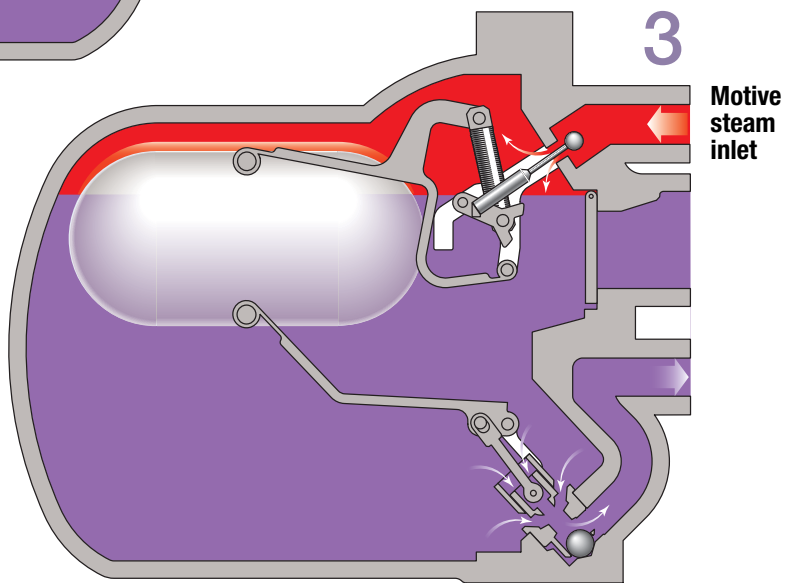


# the APT10-4.5 and APT14

**2** With some temperature controlled equipment, it is possible for the system pressure PS to be lower than the backpressure at PB. If this occurs a standard trap will stall allowing the condensate to flood the equipment being drained.



**3** However, with the APT, the condensate simply fills the main chamber - lifting the float until the changeover linkage is engaged, opening the motive inlet and closing the exhaust valve.



**4** The snap action mechanism ensures a rapid change from the trapping mode to the active pumping mode. With the motive inlet valve open, the pressure in the APT increases above the total back pressure and the condensate is forced out through the trap seat into the plant's return system.

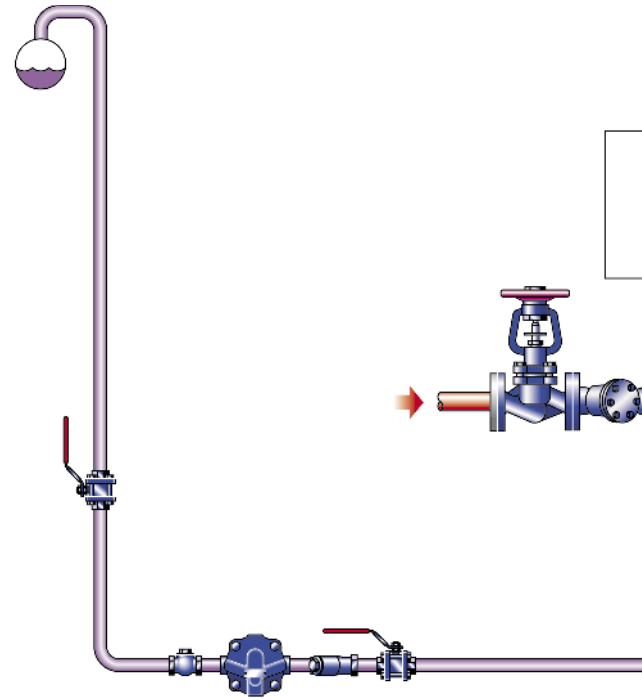
# Effective condensate drainage and removal is

## Condensate recovery

Most condensate recovery is carried out using steam traps, which use differential pressure to discharge condensate back to the boiler house. If a higher backpressure exists in the return lines or they are simply mounted in an elevated position, then a steam trap will stall allowing condensate to flood back to the process.

## Condensate removal

When the steam trap has stalled, an additional motive force is needed to actively remove the condensate from the process. Active condensate removal provides stable operating conditions, giving improved efficiency and prolonged equipment life.



# The APT provides a total solution

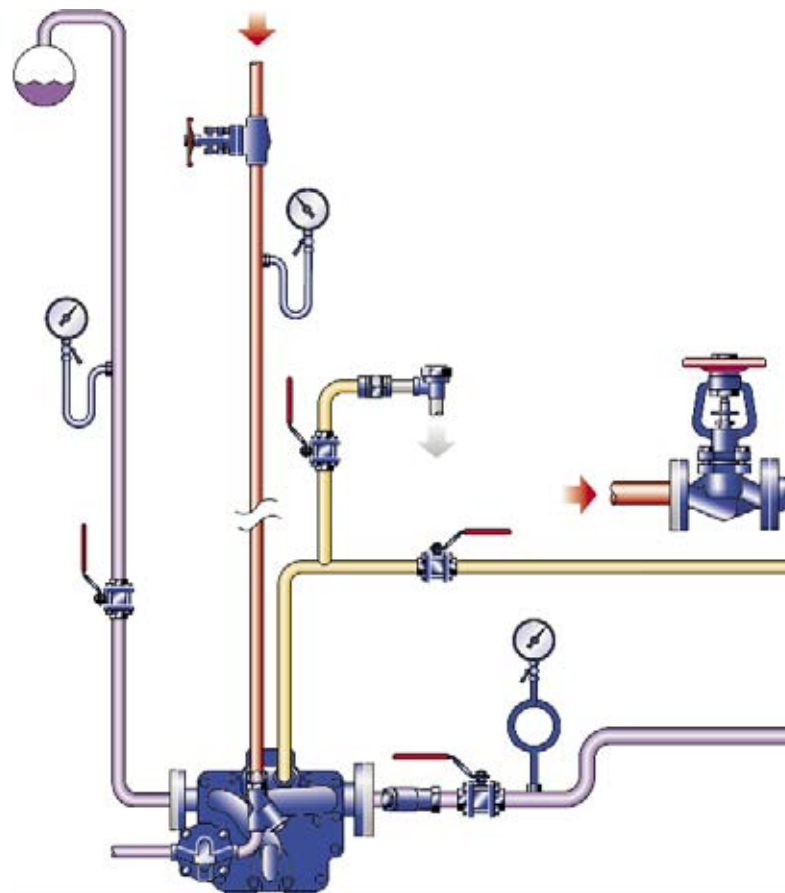
Spirax Sarco's unique and innovative solution to condensate drainage and removal problems comes complete in a simple and compact package.

APT's provide unrivalled control of steam utilising equipment, offering dual benefits of process efficiency and extended plant life.

Simple to size, convenient to install, an APT forms an integral part of process and heating equipment drainage. These compact, fully automatic pump traps will ensure process plant or equipment remains totally drained of condensate under all operating conditions - even vacuum - optimising thermal efficiency of the heat exchange interface.

## Efficient

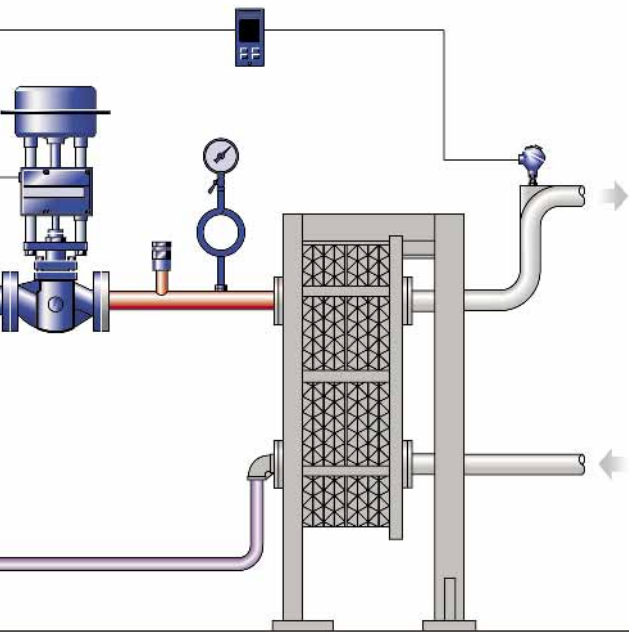
As the APT is designed for closed loop or sealed applications, there is no escape of steam to the plant room and no energy loss from flash steam, in fact, even the steam used for the motive supply is recycled back into the system.



Optimum plant efficiency

Effective condensate drainage and removal

# s essential for efficient steam plant operation



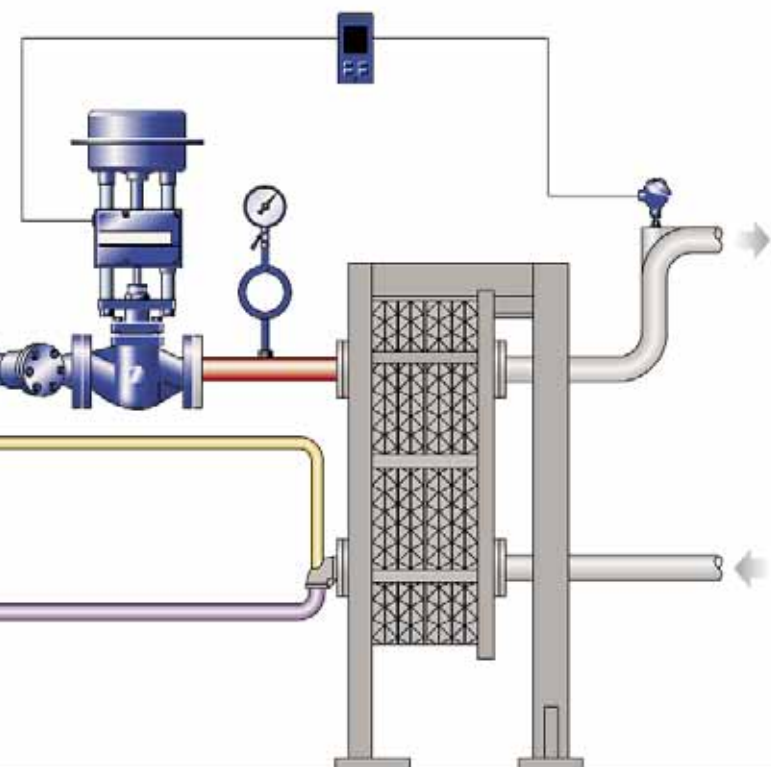
## Problems

These can be some of the problems with simply trapping a heat exchanger:

- Poor heat transfer
- Irregular temperature control
- Corrosion
- Noise and waterhammer
- Tube failure
- High maintenance costs

All too often these problems have remained unsolved because no fully engineered compact system was available.

# tion in one compact product



## Solution

These products are specifically designed to automatically recover and remove condensate as soon as it forms.

They provide the unique opportunity to solve all condensate handling problems.

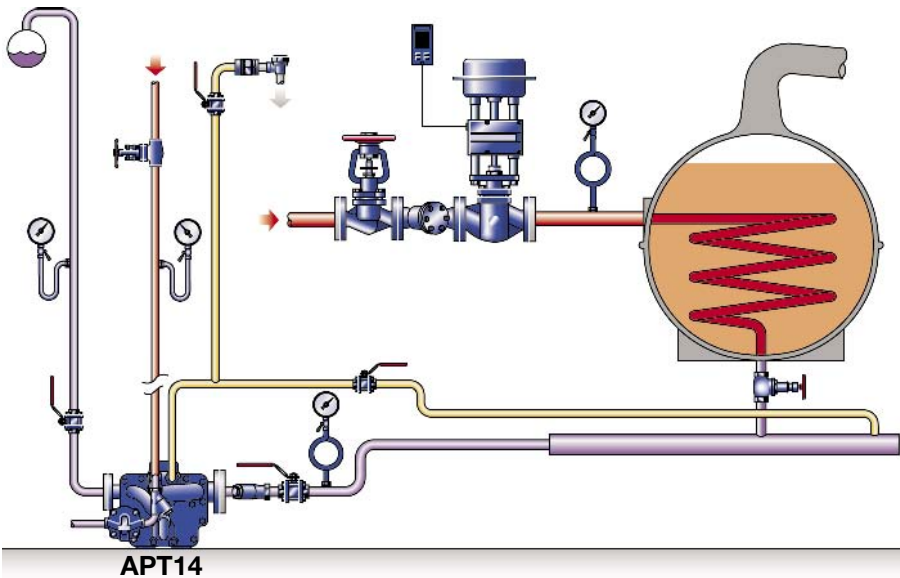
## The result

The APT will ensure your equipment operates as efficiently as possible - lowering energy consumption of the plant and allowing the process to run at optimum conditions - resulting in:

- Reduced costs.
- Increased productivity.
- Reduced downtime.
- Quieter equipment operation.

y reduces running costs.  
removal is crucial for peak performance.

# Typical applications



## Condensate removal from process vessels and heat exchangers

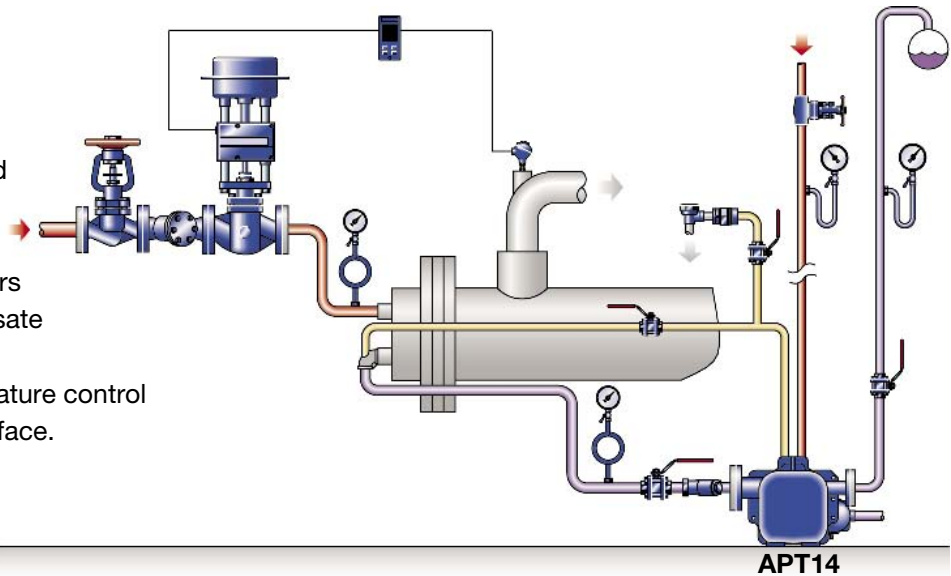
Designed for closed or sealed systems especially where space is limited. Removal of condensate under all pressure conditions ensures stable operating temperatures of the heat exchange interface. Tube corrosion, noise and waterhammer are all avoided - extending equipment life.

## Condensate removal from tube heat exchangers. (Closed system) -

the APT is simply connected to the outlet of tube heat exchanger.

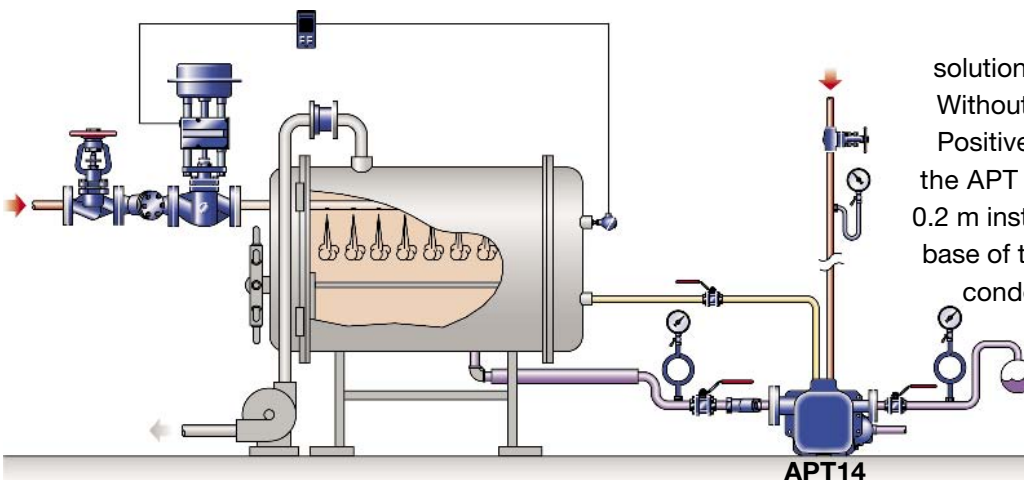
No need for vacuum breakers

- the APT will drain condensate under all load conditions
- giving exceptional temperature control at the heat exchange interface.



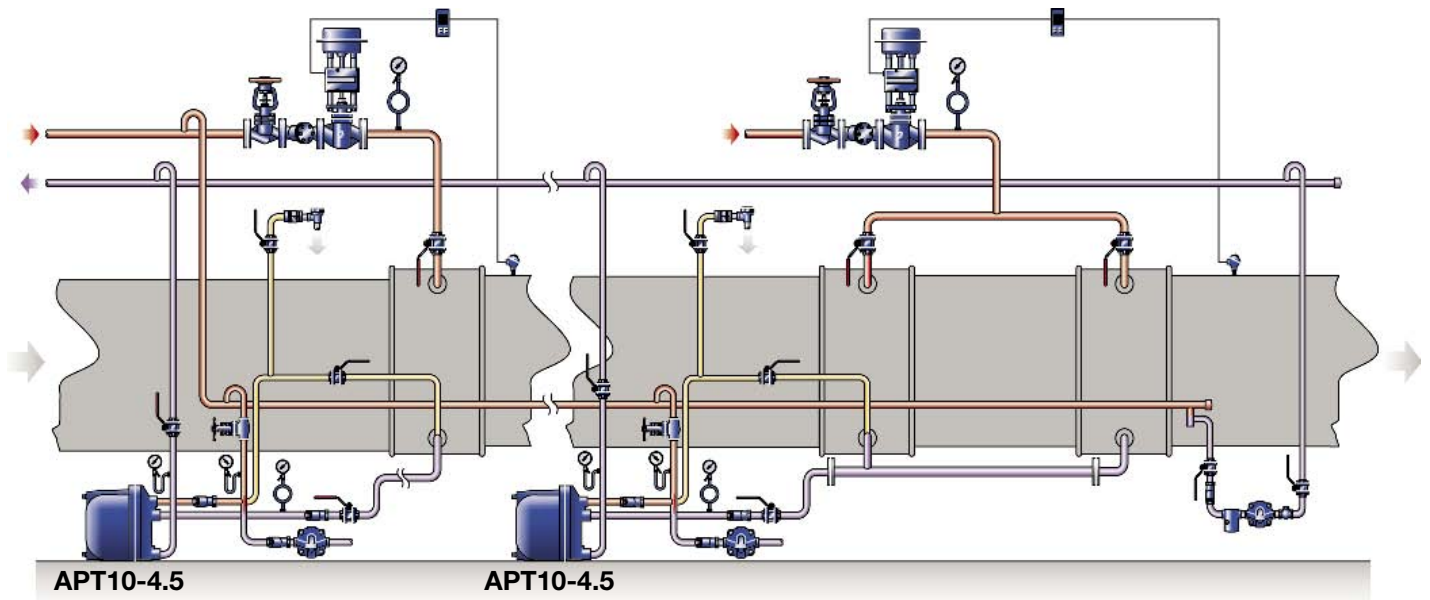
## Condensate removal from vacuum equipment (Closed system) -

Simple and efficient solution to a difficult problem. Without the need for high Net Positive Suction Head NPSH, the APT will operate with only 0.2 m installation head from the base of the pump, and remove condensate from a vacuum vessel, discharging it to either high or low level condensate return lines.\*



\* Please note: These are typical applications only and some components have been omitted for clarity. Contact Spirax Sarco for full installation details.



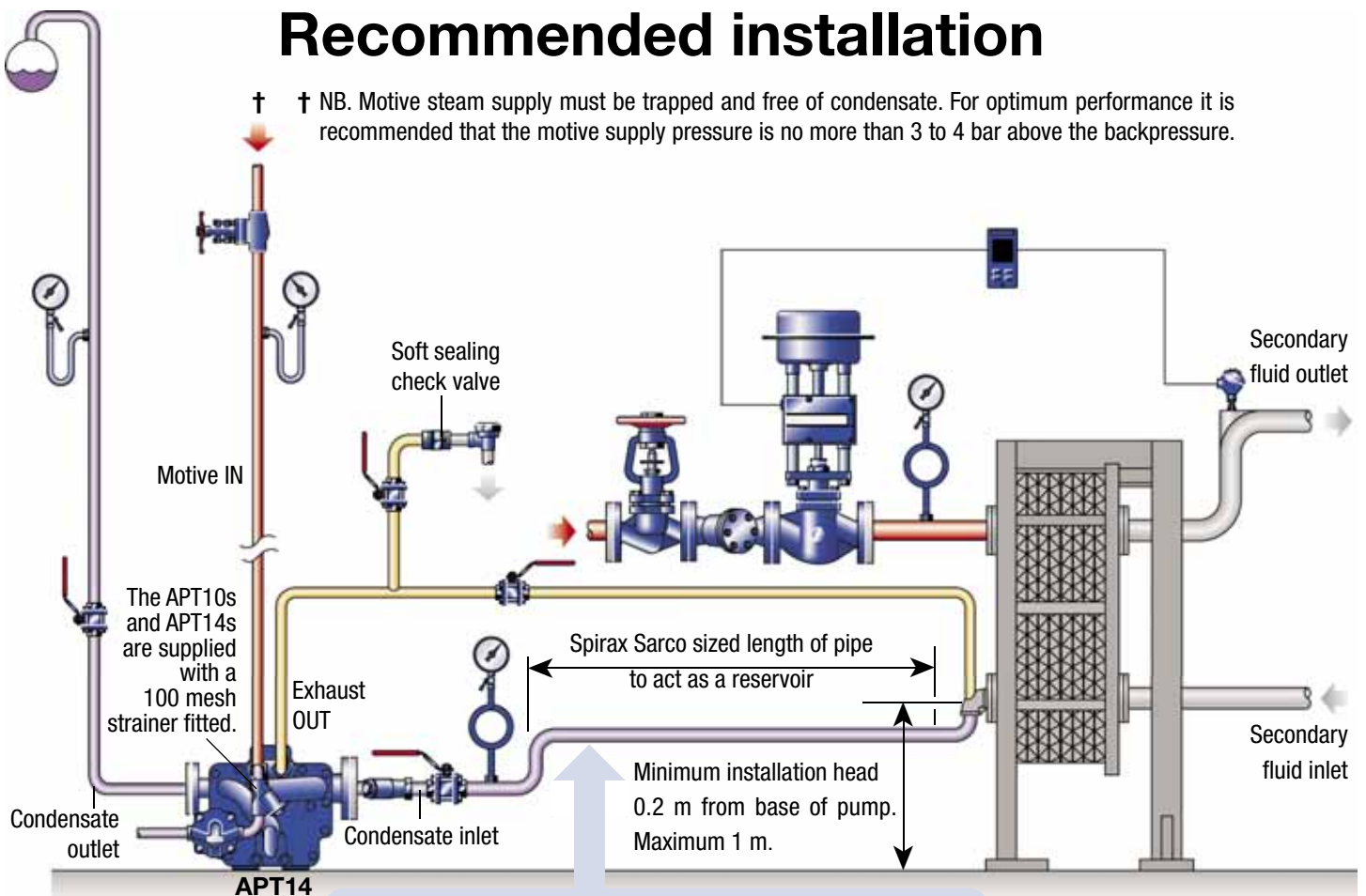


**Condensate removal from multi-heater applications  
(Closed system) -**

The APT can be used in single or multi-heater installations supplied by one control valve - as long as the total connected load is within the APT's capacity. Heater batteries are particularly prone to corrosion and freezing due to condensate retention. The APT provides the complete solution to traditional Air Handling Unit problems, and is ideal for any installation where head room is at a premium.

## Recommended installation

† † NB. Motive steam supply must be trapped and free of condensate. For optimum performance it is recommended that the motive supply pressure is no more than 3 to 4 bar above the backpressure.



It is recommended that the reservoir is installed at least 1 pipe diameter below the process outlet, but as high as possible above the APT inlet.

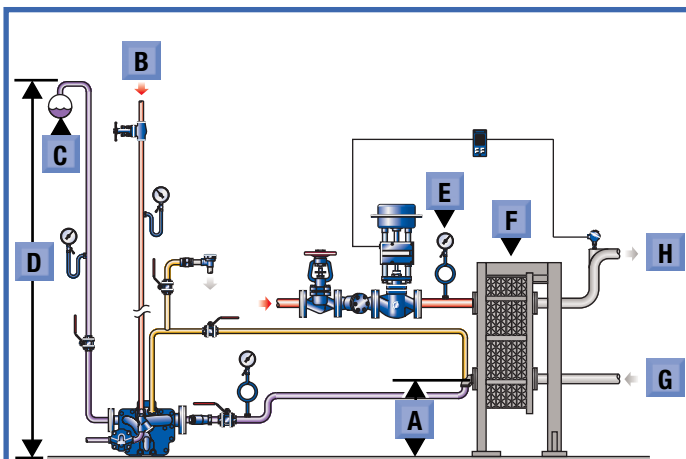
# How to size the APT . . . . Simply contact your Spirax Sarco

**Spirax Sarco will ensure that the APT is accurately matched to your process and will provide you with a detailed sizing chart, tailored to your specific application.**

Providing the information below is known, we can even provide you with confirmation over the telephone and fax you your specific chart.

Alternatively arrange a visit for your local Spirax Sarco representative who can provide detailed APT sizing information for all your specific needs.

***To help us size an APT for your application, up to 9 000 kg/h, simply provide us with the following information:-***



- |          |                                                                                                                            |                      |              |
|----------|----------------------------------------------------------------------------------------------------------------------------|----------------------|--------------|
| <b>A</b> | Installation head available from the base of the pump to the centreline of the heat exchanger / process condensate outlet. | <input type="text"/> | <b>m</b>     |
| <b>B</b> | Motive steam pressure available to power the pump trap.                                                                    | <input type="text"/> | <b>bar g</b> |
| <b>C</b> | Pressure in the condensate return system.                                                                                  | <input type="text"/> | <b>bar g</b> |
| <b>D</b> | Height of condensate return from floor level.                                                                              | <input type="text"/> | <b>m</b>     |
| <b>E</b> | Heat exchanger full load operating pressure.                                                                               | <input type="text"/> | <b>bar g</b> |
| <b>F</b> | Maximum steam load on the heat exchanger.                                                                                  | <input type="text"/> | <b>kg/h</b>  |
| <b>G</b> | Minimum secondary fluid temperature.                                                                                       | <input type="text"/> | <b>°C</b>    |
| <b>H</b> | Maximum controlled temperature of secondary fluid.                                                                         | <input type="text"/> | <b>°C</b>    |



agent who can size an APT, for your specific needs.



## Range and options

Automatic pump trap	Type	APT10-4.5	APT14 and APT14HC	APT14SHC
Body material		SG iron EN JS 1025 or ASTM A395	SG iron EN JS 1025 or ASTM A395	Carbon steel EN 1.0619+N or ASTM A216 WCB
Body design rating		PN10	PN16/ASME (ANSI) 150	PN16/ASME (ANSI) 150
Nominal size		DN20 (¾")	DN25 (1")	DN40 (1½")
Inlet / outlet connections	APT10-4.5 and APT14	Inlet / outlet DN20 (¾")	Inlet DN40 (1½") / outlet DN25 (1")	-
	APT14HC and APT14SHC	-	Inlet DN50 / outlet DN40	Inlet DN50 / outlet DN40
Motive fluid connections	Screwed	BSP, NPT	BSP, NPT	-
	Flanged	-	PN16, ANSI 150, JIS / KS 10	PN16, ANSI 150, JIS / KS 10
Motive fluid connections	Screwed	Motive inlet / exhaust DN15 (½")	Motive inlet / exhaust DN15 (½")	Motive inlet / exhaust DN15 (½")
		BSP, NPT	BSP, NPT	BSP, NPT
Self-contained stainless steel pump mechanism		Minimum installation head from base of the pump 0.2 m		
Self-contained stainless steel trap mechanism		Float operated single stage	Float operated twin stage	Float operated twin stage
Self-contained stainless steel check valves	APT10-4.5 and APT14	Inlet - swing check valve, outlet - ball check valve	Inlet - swing check valve, outlet - ball check valve	-
	APT14HC and APT14SHC	-	Inlet - swing check valve, outlet - external disc check valve	Inlet - swing check valve, outlet - external disc check valve
Maximum operating pressure		4.5 bar g	13.8 bar g	13.8 bar g
Maximum backpressure		4.0 bar g	5.0 bar g	5.0 bar g
Maximum operating temperature		155°C	198°C	198°C

## Nominal capacities

Automatic pump trap	Type	APT10-4.5	APT14	APT14HC	APT14SHC
Pump discharge / cycle		2.1 litres	5.0 litres	8.0 litres	8.0 litres
Maximum trapping capacity		1 500 kg/h	4 000 kg/h	9 000 kg/h	9 000 kg/h
Maximum pumping capacity		575 kg/h	1 100 kg/h	2 800 kg/h	2 800 kg/h
Reference conditions	• Total backpressure	2.5 bar g	1.0 bar g	1.0 bar g	1.0 bar g
	• Motive pressure	4.5 bar g	5.0 bar g	5.0 bar g	5.0 bar g
	• Installation head	1.0 m	1 m	1 m	1 m

Some of the products may not be available in certain markets.

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