

# Condensate recovery solutions

Reduce your operating costs through the effective management of condensate



*First for Steam Solutions*

EXPERTISE | SOLUTIONS | SUSTAINABILITY

**spirax**  
**sarco**

# Spirax Sarco's range of condensate recovery solutions are specifically designed to efficiently remove and recover condensate under all operating conditions

## Lower operating costs through efficient condensate management

In today's energy conscious environment, condensate has become a valuable resource that can be used to significantly improve steam plant efficiency.

Returning the highest possible percentage of condensate back to the boiler offers an exceptional return on investment by helping to cut energy and maintenance costs. Even recovering small quantities, such as the discharge from a single steam trap will, over time, result in a significant saving.

## Why should condensate be removed from your process equipment?

Removing condensate from your heat exchange and process equipment not only improves efficiency, it will also provide more stable operating conditions and prolong equipment life.

Efficient condensate removal prevents:

- Unstable temperature control
- Product quality problems
- Excessive corrosion of heating surfaces
- Waterhammer
- Noisy operation
- Equipment damage

Utilising a Spirax Sarco condensate recovery system to effectively collect hot condensate from the steam and return it to the boiler house can pay for itself within a short period of time.

## How can returning condensate save you money?

Returning hot condensate to the boiler reduces the costs associated with water treatment and make-up water:

### Lower make-up water costs

When condensate leaves the steam trap, it still contains approximately 25% of the original heat energy that was within the steam before condensing. If this hot condensate is not recovered and returned to the boiler, the boiler would need to be continually fed with cold make-up water.

### Lower chemical costs

Reducing the amount of fresh water make-up that enters the boiler also substantially lowers the amount of water treatment required - again lowering operating costs.

### Compliance with environmental effluent standards

Restrictions and environmental regulations on the quality of the water returned to the public sewer, apply in most countries and effluent charges and fines may be imposed by water suppliers for non-compliance. Therefore higher costs are imposed if condensate is drained into a sewer rather than being returned to the boiler.

### Boiler feedwater quality

Since condensate is distilled water, which contains almost no total dissolved solids, returning more condensate to the feedtank reduces the need for blowdown. This reduces the concentration of dissolved solids in the boiler water, which in turn, lowers the amount of energy lost from the boiler through boiler blowdown.



## Mechanical fluid pumps - The sustainable solution to energy cost control

Spirax Sarco offer a complete range of mechanical fluid pumps specifically designed to remove and recover condensate under all operating conditions, optimising plant efficiency and product quality throughout your plant.

Mechanical fluid pumps are typically installed with a receiver vented to the atmosphere – in what is usually termed an ‘open’ system - where condensate is collected from multiple steam traps and is pumped to the boiler feedwater tank.

Mechanical fluid pumps are best used where multiple condensate sources are present and where it is practical to install a vent pipe.

Material		SG Iron	Stainless steel	Steel		
Model		MFP14	MFP14SS	MFP14S	PTF4	PTF-HP
Body design rating		PN16	PN16	PN16	ASME 150	ASME 150
Inlet	Outlet					
1" (DN25)	1" (DN25)	•				
1 ½" (DN40)	1 ½" (DN40)	•				
2" (DN50)	2" (DN50)	•	•	•		
3" (DN80)	2" (DN50)	•				•
4" (DN100)	4" (DN100)				•	
PMO Maximum operating pressure		13.8 bar g	10.9 bar g	13.8 bar g	13.8 bar g	20.7 bar g
TMO Maximum operating temperature		198 °C	188 °C	198 °C	198 °C	343 °C
Maximum pump discharge/cycle		Max 19.3 litres	12.8 litres	12.8 litres	102 litres	60.6 litres
Maximum nominal capacity (at 8 bar g operating pressure and 1 bar g backpressure)		Maximum 5500 kg/h	Maximum 3300 kg/h	Maximum 3300 kg/h	Maximum 21000 kg/h	Maximum 8000 kg/h

Note: Pump capacities are only for comparison between pump models. Please refer to product specific technical information sheets (TI's) for the full capacities of each model.

## Features and benefits of mechanical fluid pumps

- **No electrical supply required** - each pump is a self-contained unit which uses steam or other non-volatile pressurised gas as its motive power, so there are no electric motors or level switches, which makes installation easier. **Ideal for humid, wet or remote areas**
- **No cavitation** - able to pump high temperature fluids without cavitation, reducing plant maintenance problems
- **Fully automatic and self-regulating** - only operates when needed with no sensors or controls required
- **Lower maintenance costs**- no mechanical seals or packing glands to leak
- **Low running costs** - motive power supplied is typically steam. Maximum steam consumption is typically less than 20 kg/h
- **Electronic pump monitoring** - easy to calculate the volume of pumped fluid\*
- **Optional insulation jacket** - prevents heat loss
- **Packaged units available** - fully assembled, tested unit that is delivered to site ready to connected to your system
- **Intrinsically safe** -  versions available for use in hazardous environments



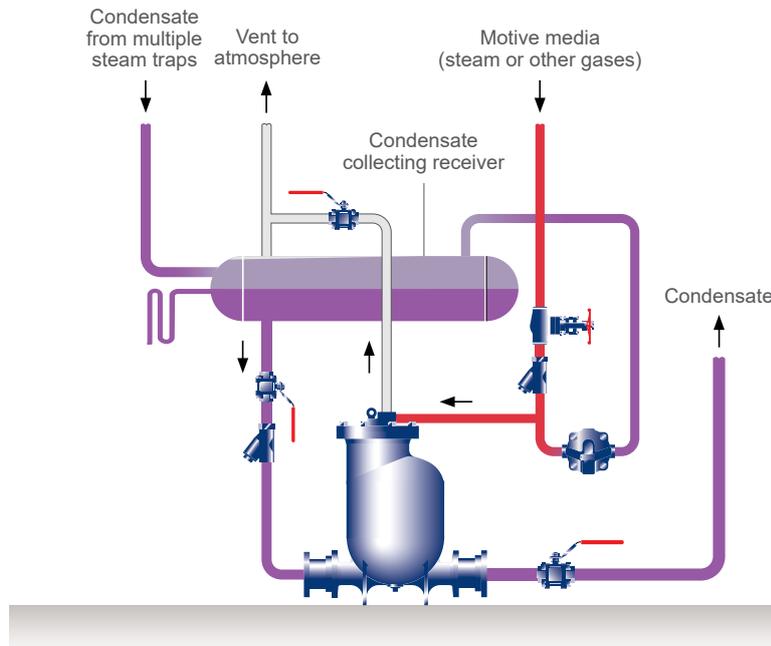
Disc check valves can be supplied as an optional extra

\*not suitable for use where intrinsic safety required.

## Mechanical fluid pumps - Typical applications

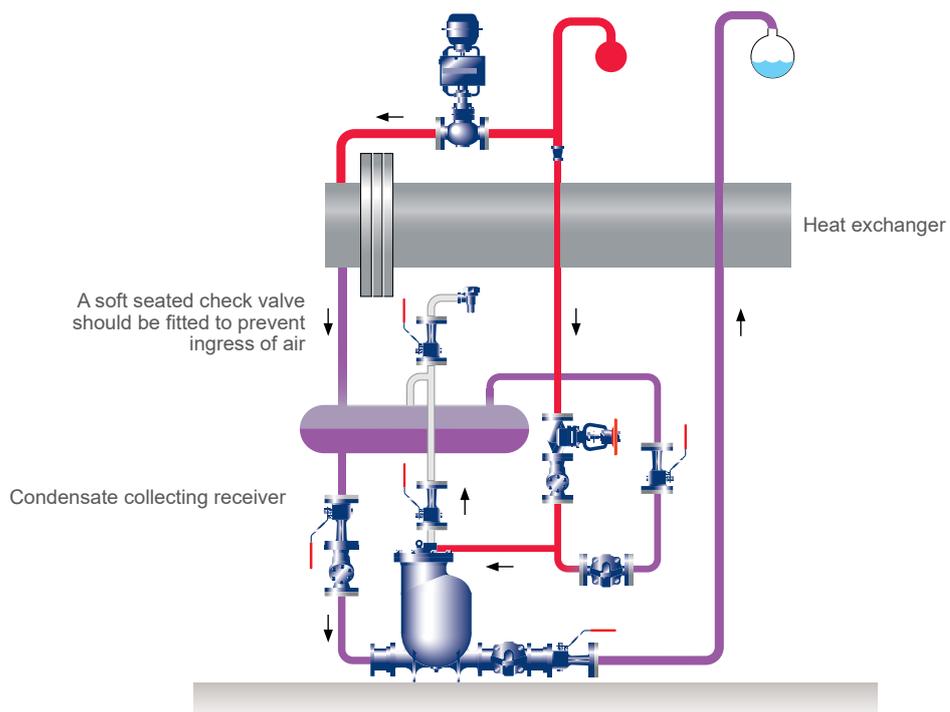
### Condensate recovery (open system)

Pumping high temperature condensate without cavitation or mechanical seal problems. Provides maximum heat energy recovery.



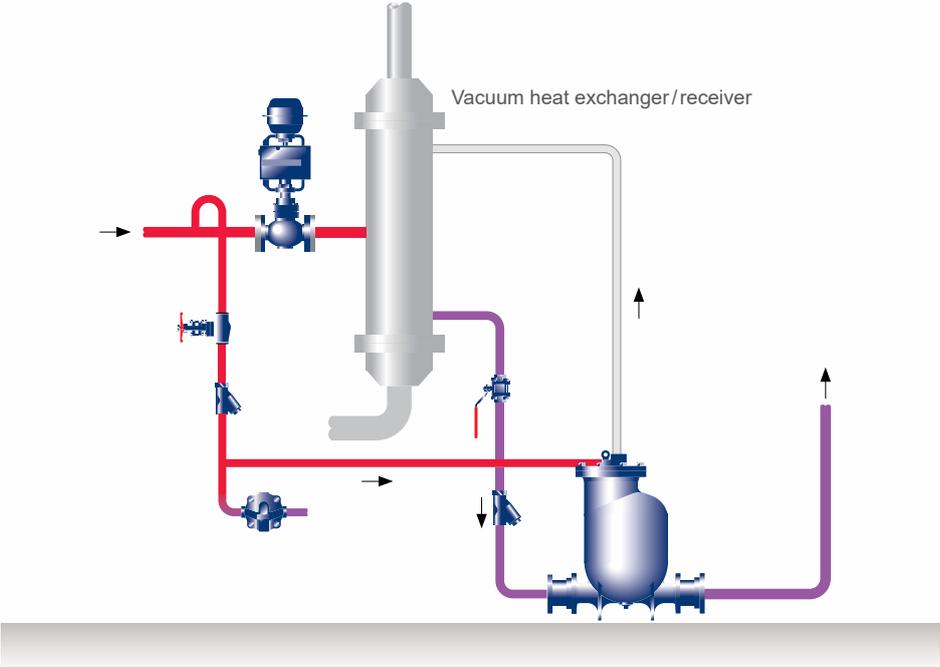
### Condensate removal from process vessels and heat exchangers (pump / trap combination, closed system)

Removal of condensate under all pressure conditions ensures stable temperatures. It also prevents bottom end tube corrosion and potential waterhammer and freezing.



**Condensate removal from vacuum equipment**

Simple and efficient solution to a difficult problem without the need for expensive electrical pumps and sensors.



## PTF4 - for high capacity applications

The Pivotrol® PTF4 high-capacity pump is capable of pumping up to 40,000 lb/hr in rapid-cycling process environments and under elevated pressure and temperature conditions. Designed as a solution to excessive maintenance and energy consumption common with high-capacity condensate pumps used in large commercial and industrial facilities, the PTF4 offers higher performance than conventional technology, yet in a smaller package.



### Features and benefits of the PTF4

- **Low filling head** - Easy to install in confined environments
- **Pump mechanism** replaces old technology of pins and linkages with virtually wear and friction free pivots - increased service life and reduced maintenance costs
- **Lifetime warranty** on spring as standard - Inconel® compression spring for peace of mind
- **PowerPivot® technology** utilises carbide materials, which provide extreme hardness and resistance to wear - increased service life and reduced maintenance costs
- **Maximum operating pressure of 200 psig (13.8 barg)** - high motive pressure increases pumps capacity rating
- **Option to install cycle counter** - allows energy returned to the boiler house to be monitored
- **Integral hydraulic paddle** - reduces high impact forces on the mechanism, motive and exhaust valves during operation increasing service life.



## Automatic pump traps - Mechanical fluid pump and steam trap units combined

Spirax Sarco's range of automatic pump traps have been designed to help you achieve optimum performance from all types of temperature controlled process equipment, by removing condensate under all operating conditions.

Automatic pump traps are typically used to drain a single piece of heat transfer equipment, such as a heat exchanger, which usually involves fitting a small condensate collecting receiver between the equipment and the pump-trap. Since the receiver is not vented, this is most often referred to as a closed system.

The equipment is drained under all operating conditions, so it will not be susceptible to waterlogging or stall. The condensate is usually recovered and returned to the boiler feedwater tank.

Automatic pump traps should be used when the operation of temperature controls on plant equipment such as heat exchangers can create a 'stall' condition, whereby insufficient differential pressure is available for effective condensate discharge.



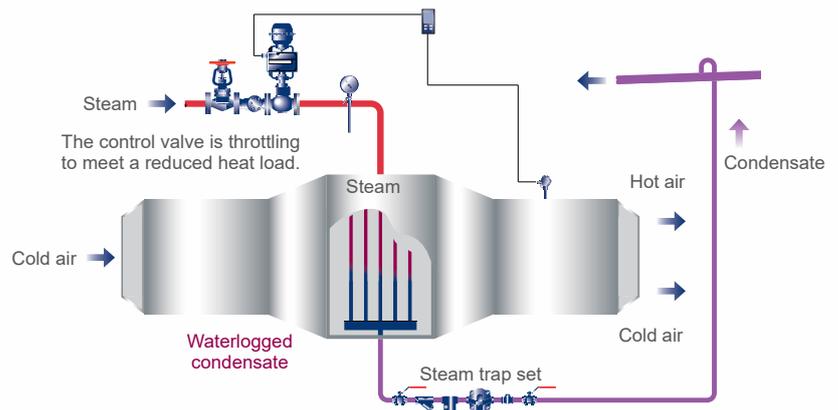
## Why is it essential to drain the system properly?

### Problem: an air heater suffering the effects of stall

Under stall conditions, partial or complete waterlogging may occur leading to:

- Temperature fluctuation - reduced heat output/reduced product quality.
- Corrosion of heating surfaces - damage to heat exchanger.
- Waterhammer noise and damage - mechanical stress on heat exchanger and pipework.

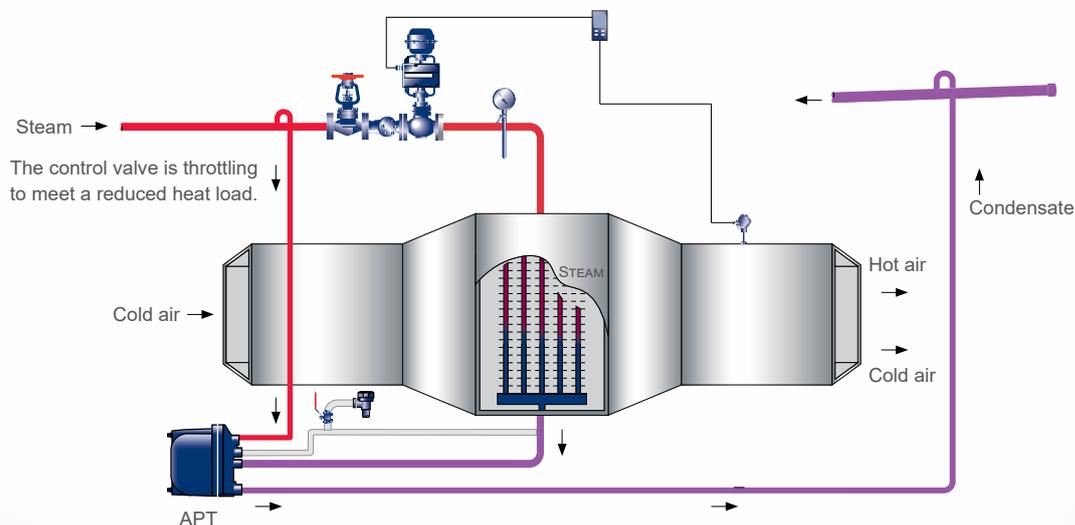
The ultimate effect of stall is increased maintenance and shorter service life of the heat exchanger and associated equipment. This increases overall running costs.



### Solution: an air heater battery with APT installed

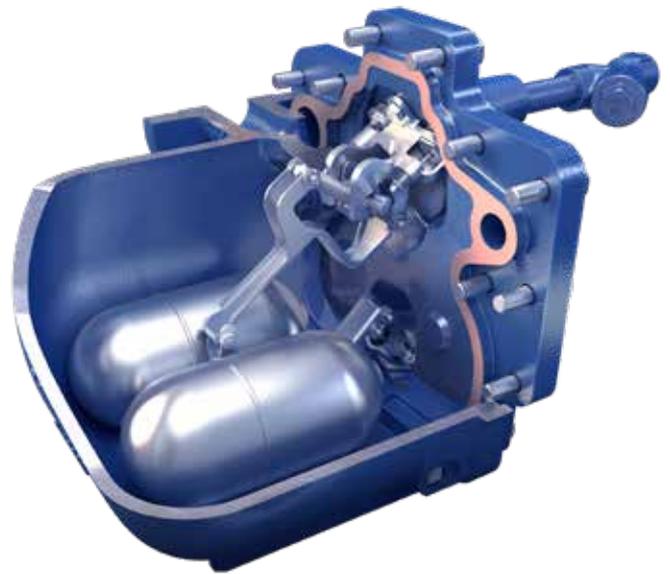
By installation of an APT into your application these issues will be eliminated. The APT automatically reacts when a rise in condensate is detected, ensuring the application can continue to operate efficiently and effectively:

- When the steam pressure is sufficient to overcome the total backpressure (including static lift) the pump function will be inactive. The trap will modulate to match the load and allow smooth condensate discharge.
- When the upstream steam pressure falls below the total backpressure, the pump will automatically detect a rise in condensate level and discharge the condensate utilising the motive supply, thus preventing waterlogging of the steam space.



## Features and benefits of Automatic pump traps:

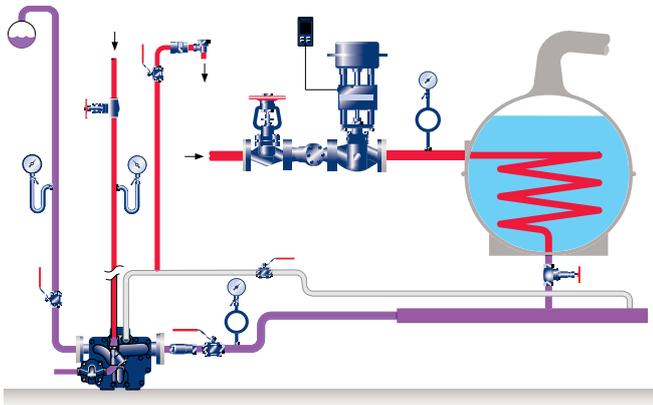
- **Compact design** which contains all the equipment needed to drain or remove condensate for all load conditions including vacuum (innovative patent applied for low profile mechanism).
- **Minimal installation space required** - The mechanism operates with as little as 200 mm installation head from the base of the pump.
- **Requires no electrical power**, therefore suitable for hazardous environments
- **Fully automatic and self-regulating** - only operates when needed - No sensors or controls required.
- **Packaged units are available** - fully assembled, tested packaged units can be delivered to site ready for connection to your system.



Material		SG Iron			Steel
Pump type		APT10-4.5	APT14	APT14HC	APT14SHC
Body design rating		PN10	PN16/ASME 150	PN16 / ASME 150	PN16 / ASME 150
Size	Inlet	Outlet			
	¾" (DN20)	¾" (DN20)	•		
	1½" (DN40)	1" (DN25)		•	
	2" (DN50)	1½" (DN40)			•
PMO Maximum operating pressure		4.5 bar g	13.8 bar g	13.8 bar g	13.8 bar g
TMO Maximum operating temperature		155 °C	198 °C	198 °C	198 °C
Maximum pump discharge / cycle		2.1 litres	5.0 litres	8.0 litres	8.0 litres
Maximum trapping capacity (at 4.5 bar differential pressure)		1000 kg/h	3000 kg/h	7000 kg/h	7000 kg/h
Maximum pumping capacity (at 4.5 bar g motive pressure and 2.5 bar g backpressure)		330 kg/h	620 kg/h	1000 kg/h	1000 kg/h

Note: Pump capacities are only for comparison between pump models. Please refer to product specific technical information sheets (TI's) for the full capacities of each model.

# Automatic pump traps - Typical installation



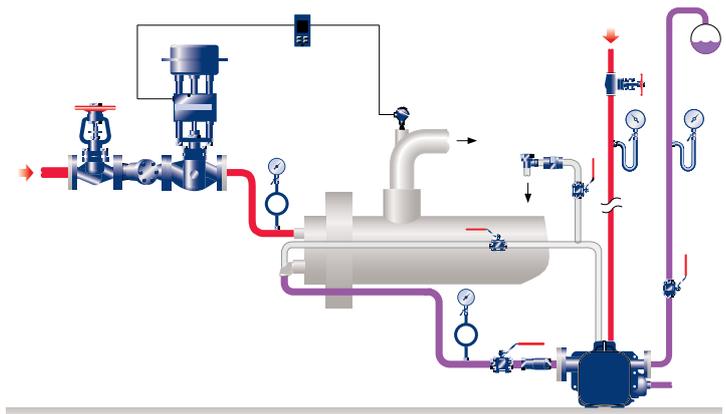
## Condensate removal from process vessels and heat exchangers

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)

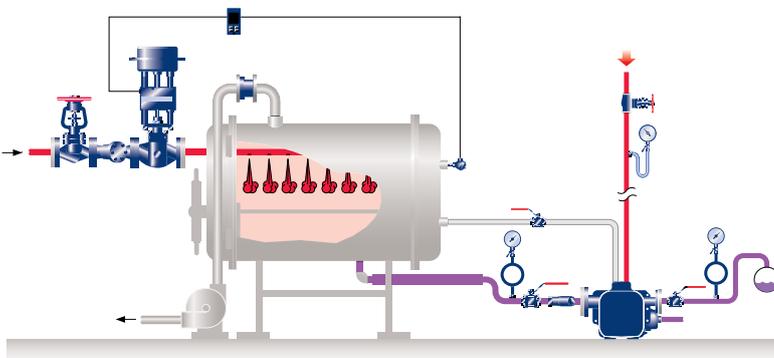
The APT is simply connected to the outlet of tube heat exchanger. Generally vacuum breakers are not required provided that equipment is suitably rated for operation under full vacuum conditions

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.



## Packaged pumping units

Our packaged pumping units (PPU's) are made to fit directly into your system with minimal interruption to your process. As the package is pre-assembled, installation is fast and easy, ensuring you receive the benefits associated with efficient condensate removal sooner.

We provide PPU's in a range of sizes and connections, and we can help advise you select the most suitable unit for you application.

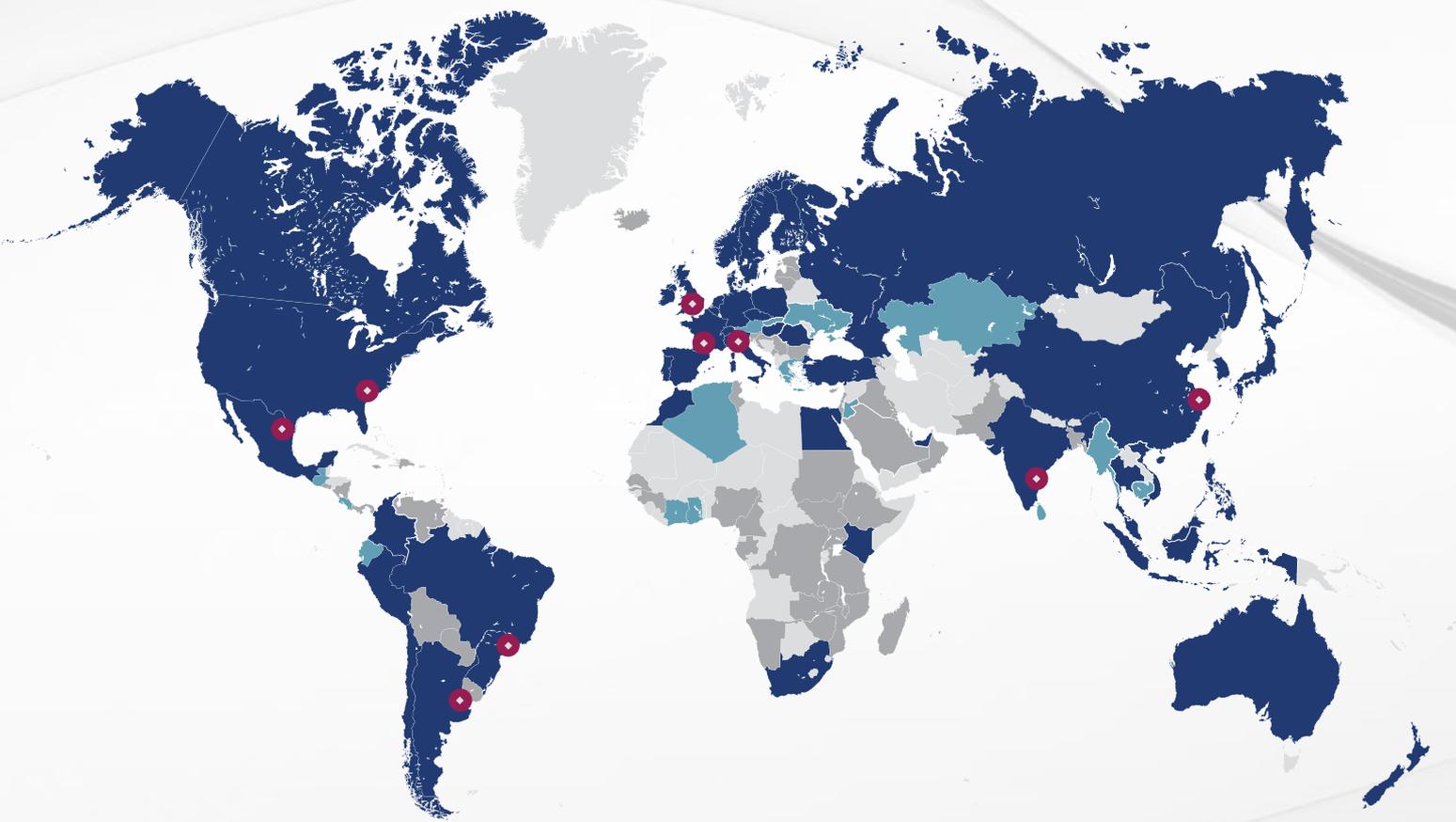


MFP14 pump package unit

## Features and benefits of Packaged pumps:

- Complete package, ready to use - Quick to install so shorter plant down-time
- Both PN and ANSI external connections - Convenient and flexible to install
- Hydro-tested assembly to 24 bar g - Certified safe operation
- Modernised design, modular construction - Upgraded quality, functionality
- Increased capacity - Standard solution for systems with large condensate return.





Operating Companies

Manufacturing Sites

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