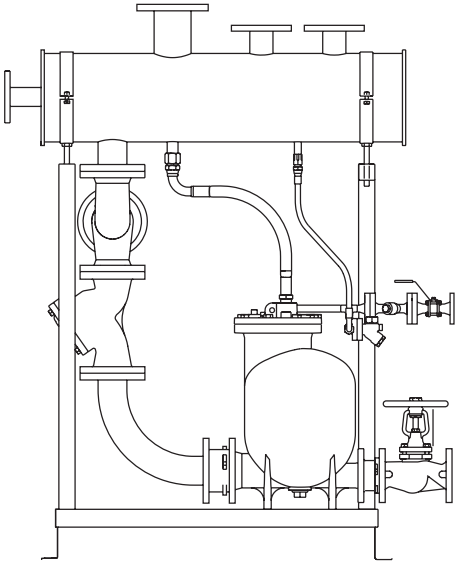
IM-P744-01-EN-ISS2
CMGT

Steam-Powered
Condensate-Return Station

FPS Station



EN
English

Original Installation Instructions
850925-01

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1 Safety information

Safe operation of this product can only be guaranteed if it is 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. The product listed below fully complies with the requirements of the Pressure Equipment Directive 2014/68/EU (PED), and carries the CE mark when so required. The product falls within the following Pressure Equipment Directive categories:

Product		Group 2 Gases	Group 2 Liquids
FPS Station Single and Duplex	DN25	2	SEP
	DN40	2	SEP
	DN50	2	SEP
	DN80 x DN50	2	SEP

i) **The product has been specifically designed for use on steam, air or water/condensate which is in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, GESTRA 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) **GESTRA 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 pretective 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.

Hazardous environment around the product 1.5

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. The system must not be used in potentially explosive atmospheres.

The system 1.6

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.

Pressure systems 1.7

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.

Temperature 1.8

Allow time for temperature to normalise after isolation to avoid danger of burns.

Tools and consumables 1.9

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine GESTRA replacement parts.

Protective clothing 1.10

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.

Permits to work 1.11

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.

Handling 1.12

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. These 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 GESTRA 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.

Description 2.1

The GESTRA FPS Stations (Steam-Powered Condensate-Return Stations) are plug-in systems specifically designed to collect and pump hot condensate; commonly returned for use as boiler feedwater.
The FPS Station is available with either single or duplex pumps, mounted on a single base plate, that can be used for duty only or duty/stand-by applications.
Operated by steam, the FPS Station can be tailored to suit a wide range of condensate handling applications.
The standard pump is manufactured from SG iron, although cast steel and stainless steel versions are available on request.

Please note: Versions suitable for use with compressed air as the motive power and or other combinations are available as bespoke items. For further details contact your local GESTRA office or representative.

Optional extras

A pump insulation jacket is available at extra cost - Please contact GESTRA.

Standards

The FPS Station fully complies with the requirements of the Pressure Equipment Directive 2014/68/EU (PED) and carries the CE mark when so required.

All welding is in accordance with the requirements of the Pressure Equipment Directive 2014/68/EU (PED).

Certification

This product is available with a declaration of conformity. For other certification requirements contact GESTRA.
Note: All certification/inspection requirements must be stated at the time of order placement. Retrospective certification/inspection may not be possible.

Capacities 2.2

Unit size	Approximate maximum capacities kg/h (with 4M lift). See separate data sheet for full capacity details.	
	Single FPS Station	Duplex FPS Station
DN25 (1")	1300	
DN40 (1½")	2000	4000
DN50 (2")	4000	8000
DN80 x DN50 (3" x 2")	6000	12000

Note: Triplex size (with capacity up to 18000kg/hr) as well as stations with ANSI/ASME flanged connections can be offered as special order (ETO).

2.3 Pressure/temperature limits

Body design condition			PN16
Maximum receiver operating pressure			0.5 bar g
Maximum motive inlet pressure (steam)		FPS Station	13.8 bar g
		FPS Station S	
		FPS Station SS	
PMA	Maximum allowable pressure	FPS Station	16 bar g @ 120 °C
		FPS Station S	16 bar g @120 °C
		FPS Station SS	16 bar g @ 93 °C
TMA	Maximum allowable temperature	FPS Station	300 °C @ 12.8 bar g
		FPS Station S	300 °C @ 10.8 bar g
		FPS Station SS	300 °C @ 9.3 bar g
Minimum allowable temperature			0 °C
PMO	Maximum operating pressure	FPS Station	13.8 bar g @ 198 °C
		FPS Station S	13.8 bar g @ 198 °C
		FPS Station SS	10.96 bar g @ 188 °C
TMO	Maximum operating temperature	FPS Station	198 °C @ 13.8 bar g
		FPS Station S	198 °C @ 13.8 bar g
		FPS Station SS	188 °C @ 10.96 bar g
Minimum operating temperature **Note:** For lower operating temperatures consult GESTRA			0 °C
Designed for a maximum cold hydraulic test pressure of:			24 bar g

Sizes and pipe connections - Single FPS Station

Single FPS Station (see Section 3 regarding installation, location and commissioning)

Pump unit size	Pipe connection	V (Con out)	W (Motive)	X (Overflow)	Y (Vent)	Z (Inlet)
DN25 (1")	PN16	DN25	DN15	DN50 PN16	DN80	DN40
	ASME 150	1" ASME 150	½" ASME 150	2" ASME 150	3" ASME 150	1½" ASME 150
DN40 (1½")	PN16	DN40	DN15	DN50 PN16	DN100	DN40
	ASME 150	1½" ASME 150	½" ASME 150	2" ASME 150	4" ASME 150	1½" ASME 150
DN50 (2")	PN16	DN50	DN15	DN50 PN16	DN150	DN65
	ASME 150	2" ASME 150	½" ASME 150	2" ASME 150	6" ASME 150	2½" ASME 150
DN80 x DN50* (3" x 2")	PN16	DN50	DN15	DN50 PN16	DN150	DN65
	ASME 150	2" ASME 150	½" ASME 150	2" ASME 150	6" ASME 150	2½" ASME 150

*Pump unit has an inlet size of DN80, and an outlet size of DN50.

Note: ASME flanged versions are available as special order (ETO).

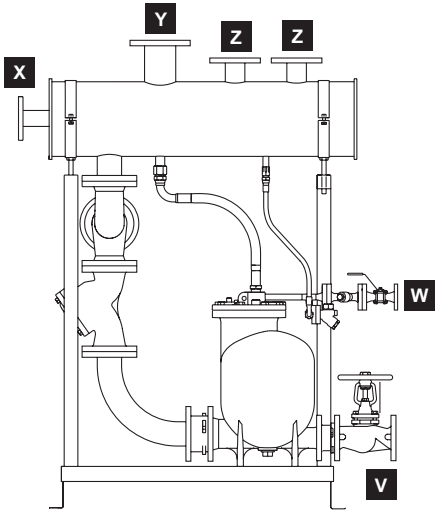

Fig. 1 Single FPS Station

2.5 Sizes and pipe connections - Duplex FPS Station

Pump unit size	Pipe connection	V (Con out)	W (Motive)	X (Overflow)	Y (Vent)	Z (Inlet)
DN40 (1½")	PN16	DN40	DN15	DN50	DN150	DN50
	ASME 150	1½" ASME 150	½" ASME 150	2" ASME 150	6" ASME 150	2" ASME 150
DN50 (2")	PN16	DN50	DN15	DN50	DN200	DN65
	ASME 150	2" ASME 150	½" ASME 150	2" ASME 150	8" ASME 150	2½" ASME 150
DN80 x DN50 (3" x 2")	PN16	DN50	DN15	DN50	DN200	DN80
	ASME 150	2" ASME 150	½" ASME 150	2" ASME 150	8" ASME 150	3" ASME 150

Note: ASME flanged versions are available as special order (ETO).

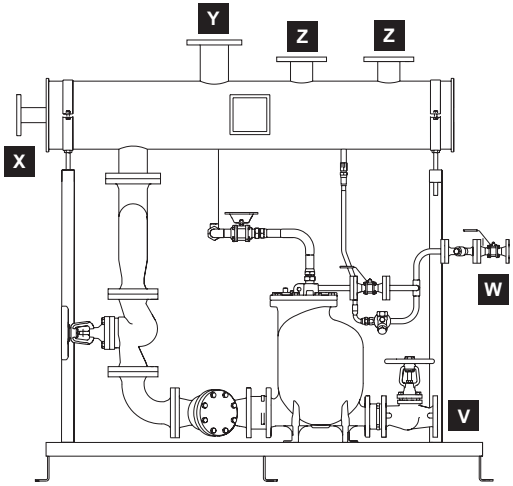

Fig. 2 Duplex FPS Station

Installation 3.1

Safety notes:

Before actioning any installation observe the 'Safety information' in Section 1.
Important note: Please acknowledge the safe lifting points indicated on Figure 4.

Location 3.2

The FPS Station should be located in a suitable position e.g. against a wall where the vent can be easily piped to atmosphere. It is recommended that reasonable clearance is maintained around the unit for ease of access.

1. **Note:** The receiver vent (**Y**) must be piped unreduced and unrestricted to a safe atmospheric discharge point. The line should be vertical, if possible. If horizontal runs must be used, the line should be pitched so that it is self draining to the receiver. A suitably sized vent head should be fitted to the top of the vent pipe to ensure safe discharge of flash steam. Refer to Table 1 below for the recommended receiver vent pipe sizing.

Table 1. Recommended receiver vent pipe sizing

Pump size		Receiver vent diameter
DN25	**1"**	80 mm 3"
DN40	**1½"**	100 mm 4"
DN50	**2"**	150 mm 6"
DN80 x DN50	**3" x 2"**	150 mm 6"

The recommended receiver vent size is based on:

- A maximum flash velocity in the receiver of 20 m/s.
- A maximum vent velocity of of 30 m/s.
- A maximum unrestricted vent pipe length of 10 m.
- A maximum condensate inlet pressure (discharge from steam traps) of 10 bar g.

2. Connect the condensate outlet (**V**) of the FPS Station to the condensate return line.

3. Connect the condensate inlets (**Z**) to the process/equipment being drained.

4. Connect a 'U' bend water seal to the overflow point (**X**) and ensure that it is connected to a safe discharge point. Ensure a suitable amount of water is filled into the 'U' bend before commissioning the station. The 'U' bend water seal, during normal operation, is self-filling and prevents 'flash steam' discharging from the overflow. It is recommended the 'U' bend is at least 305 mm (12") deep.

   Always connect the overflow to a safe discharge point, remembering that any condensate that discharges may be hot. Care should be taken to ensure that hot condensate being discharged to drain does not infringe local temperature or environmental regulations.

5. Connect the operating medium (steam) to the motive supply inlet (**W**).

6. **The FPS Station is now ready to be commissioned (see Section 3.3).**

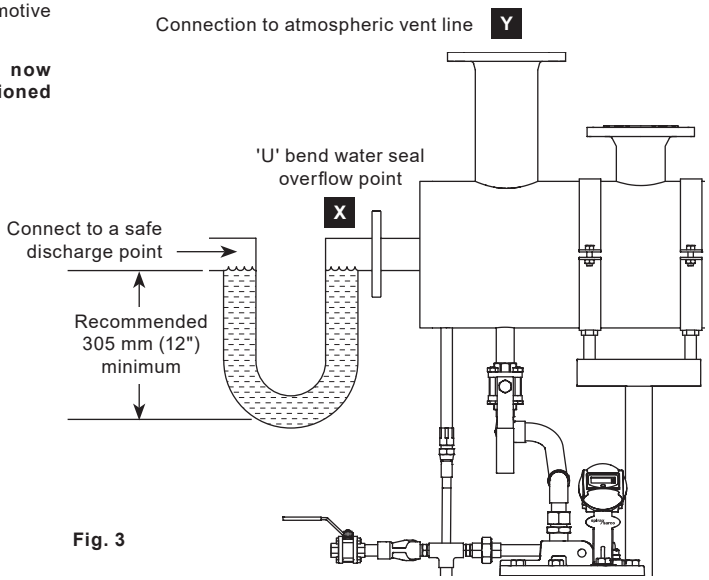

Fig. 3

3.3 Commissioning

1. Slowly open the steam motive supply isolating valve (item **7**) to provide pressure to the FPS Station. Check that the motive drain trap (item **9** where fitted) is operational.

2. Open any isolation valves between the process being drained and the FPS Station at point (**Z**).

3. Open the inlet isolation valve (item **5**) and the condensate outlet isolation valve (item **5**) in the condensate return line (point **V**).

4. Condensate should now start to flow into the main receiver (item **1**) and into the pump (item **3**) when the plant is operational.

5. Check all flanged/screwed connections for any leakage.

6. Observe operation for any abnormalities. The pump (item **3**) should cycle periodically (minimum cycle time is 8 seconds) with an audible exhaust at the end of the pumping cycle.
   This can be used to monitor the operation of the unit and meter the volume of condensate pumped. If any irregularities are observed, recheck Sections 3.1 and 3.2 for proper arrangement.
   Consult GESTRA if necessary.

7. **The system is now operational.**

Materials

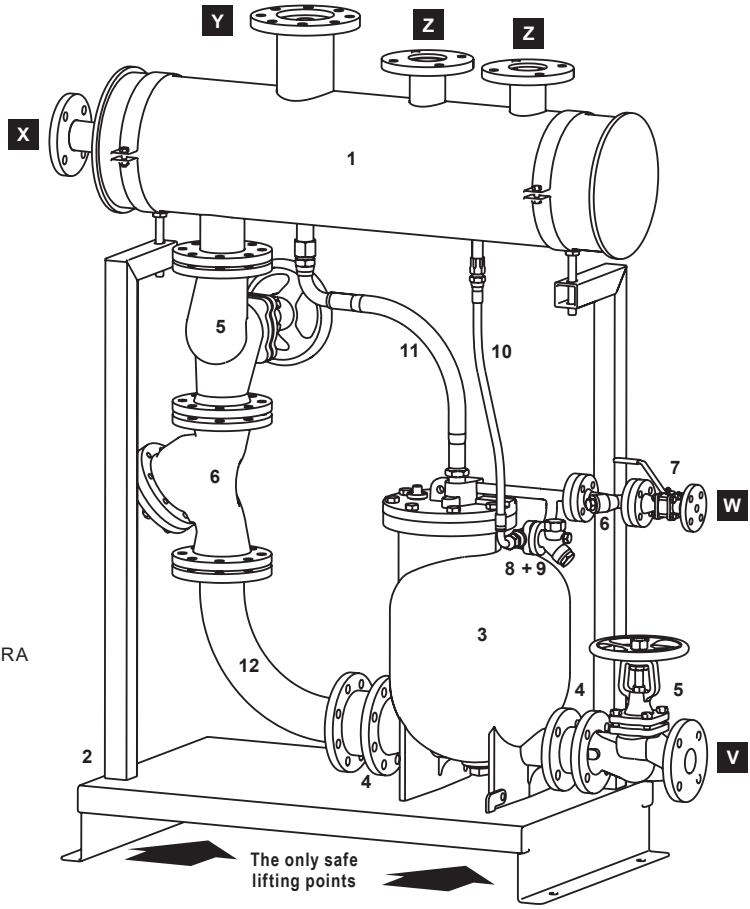

Fig. 4

Spare parts

Please contact GESTRA for available ancillary spares.

No	Part	Material
1	Receiver	Mild steel
2	Base plate and frame	Mild steel
3	Pump	SG iron
4	DCV10 check valve	Stainless steel
5	BSA2T isolation valve	SG iron
6	Fig 37 strainer	SG iron
7	M10S2 RB ball valve straight handle	Carbon steel

No	Part	Material
8	PC10 Quick-fit connector	Stainless steel
9	UTD30L thermodynamic steam trap	Stainless steel
10	Steam inlet drain trap flexible hose	Mild steel/ stainless steel
11	Exhaust flexible hose	Mild steel/ stainless steel
12	Pipework	Mild steel

4 Duplex FPS Station installation and commissioning

4.1 Installation

Safety notes:

Before actioning any installation observe the 'Safety information' in Section 1.
Important note: Please acknowledge the safe lifting points indicated on Figure 6.

4.2 Location

The FPS Station should be located in a suitable position e.g. against a wall where the vent can be easily piped to atmosphere. It is recommended that reasonable clearance is maintained around the unit for ease of access.

1. **Note:** The receiver vent (**Y**) must be piped unreduced and unrestricted to a safe atmospheric discharge point. The line should be vertical, if possible. If horizontal runs must be used, the line should be pitched so that it is self draining to the receiver. A suitably sized vent head should be fitted to the top of the vent pipe to ensure safe discharge of flash steam. Refer to Table 1 below for the recommended receiver vent pipe sizing.

Table 1. Recommended receiver vent pipe sizing

Pump size		Reciever vent diameter	
DN40	**1½"**	150 mm	6"
DN50	**2"**	200 mm	8"
DN80 x DN50	**3" x 2"**	200 mm	8"

The recommended receiver vent size is based on:

- A maximum flash velocity in the receiver of 20 m/s.
- A maximum vent velocity of of 30 m/s.
- A maximum unrestricted vent pipe length of 10 m.
- A maximum condensate inlet pressure (discharge from steam traps) of 10 bar g.

2. Connect the condensate outlets (**V**) of the FPS Station to the condensate return line.
3. Connect the condensate inlets (**Z**) to the process/ equipment being drained.
4. Connect a 'U' bend water seal to the overflow point (**X**) and ensure that it is connected to a safe discharge point. Ensure a suitable amount of water is filled into the 'U' bend before commissioning the station. The 'U' bend water seal, during normal operation, is self-filling and prevents 'flash steam' discharging from the overflow. It is recommended the 'U' bend is at least 305 mm (12") deep. **Always connect the overflow to a safe discharge point.**
5. Connect the operating medium (steam) to the motive supply inlet **(W)**.
6. **The FPS Station is now ready to be commissioned (see Section 4.3).**

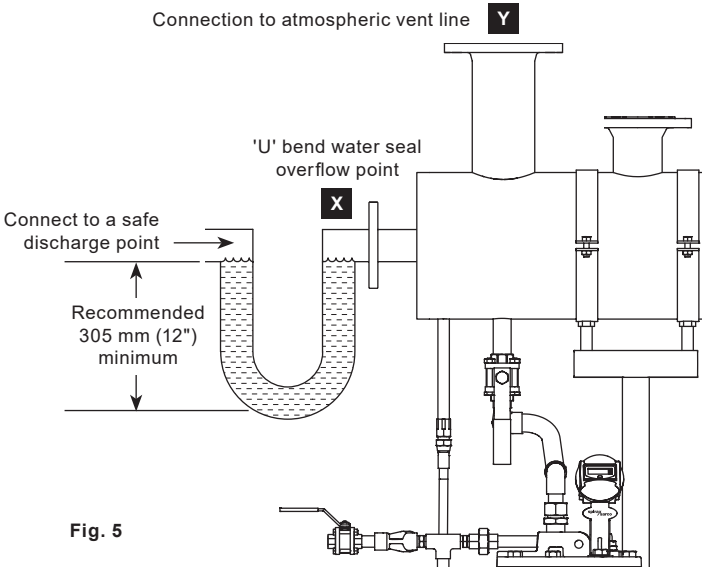
Connection to atmospheric vent line
Y
'U' bend water seal
overflow point
X
Connect to a safe
discharge point
Recommended
305 mm (12")
minimum

Fig. 5

4.3 Commissioning

1. Slowly open the steam motive supply and exhaust isolating valves (item **7**) to provide pressure to the FPS Station. Check that the motive trap (item **9** where fitted) is operational.
2. Open any isolation valves between the process being drained and the FPS Station at points (**Z**).
3. Open the inlet isolation valve (item **5**) and the condensate outlet isolation valve (item **5**) in the condensate return line (point **V**).
4. Condensate should now start to flow into the main receiver (item **1**) and into the pump (item **3**) when the plant is operational.
5. Check all flanged/screwed connections for any leakage.
6. Observe operation for any abnormalities. The pump (item **3**) should cycle periodically (minimum cycle time is 8 seconds) with an audible exhaust at the end of the pumping cycle.
   This can be used to monitor the operation of the unit and meter the volume of condensate pumped. If any irregularities are observed, recheck Sections 4.1 and 4.2 for proper arrangement.
   Consult GESTRA if necessary.
7. **The system is now operational.**

4.4 Materials

No	Part	Material
1	Receiver	Mild steel
2	Base plate and frame	Mild steel
3	Pump	SG iron
4	DCV10 check valve	Stainless steel
5	BSA2T Isolation valve	SG iron
6	Fig 37 strainer	SG iron
7	M10S2 RB ball valve oval/straight handles	Carbon steel
8	PC10 Quick-fit connector	Stainless steel
9	UTD30L thermodynamic steam trap	Stainless steel
10	Steam inlet drain trap flexible hose	Mild steel/stainless steel
11	Exhaust flexible hose	Mild steel/stainless steel
12	Pipework	Mild steel
13	DCV41 check valve	Stainless steel

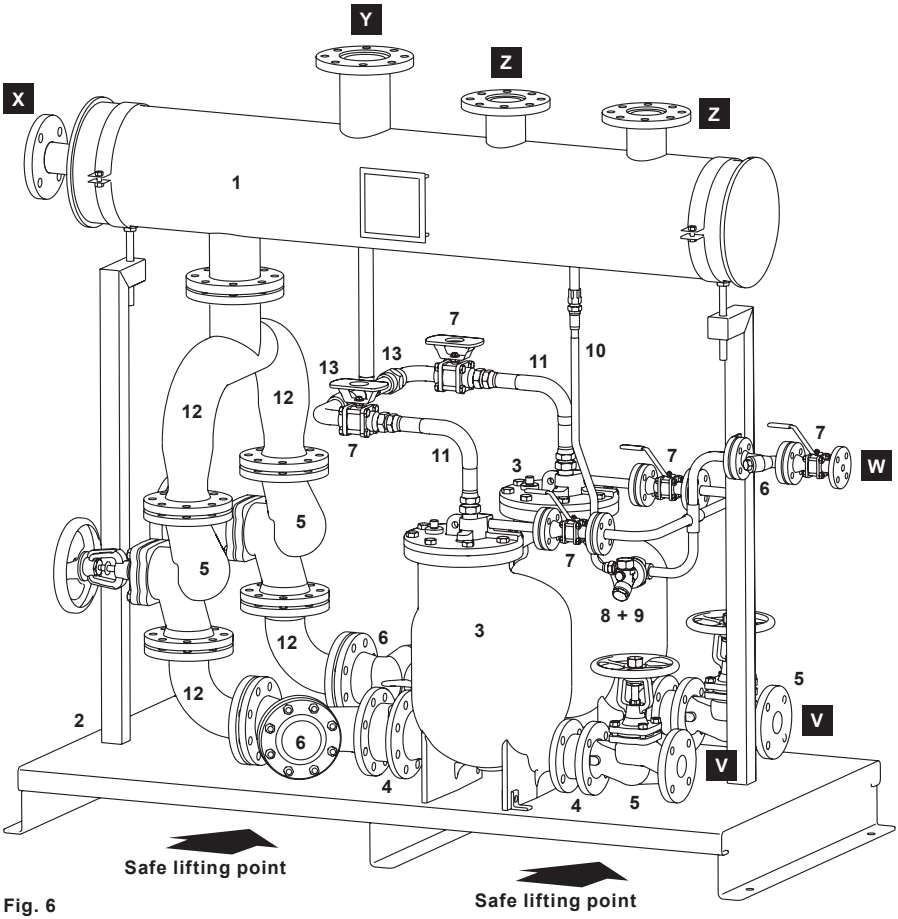

Fig. 6

Spare parts

Please contact GESTRA for available ancillary spares

5 Maintenance

Mechanism inspection and repair

Safety notes:

Before actioning any maintenance programme observe the 'safety information' in Section 1.

Always use suitable lifting gear and that the correct lifting points are adhered to. Ensure the FPS Station is safely secured.

When dismantling the pump, care should be taken to prevent personal injury from the strong snap mechanism.

Always handle with care.

For full maintenance instructions, on each component of the station, contact GESTRA.

Spare parts

For availability of spare parts contact GESTRA.

Caution

Installation and troubleshooting should be performed by qualified personnel. Before disconnecting any connections to the FPS Station, every effort should be made to ensure that any internal pressure has been relieved and that the motive supply line is isolated to prevent inadvertent discharge of the pump. Verify that all hot parts have cooled to prevent risk of injury from burns.

Always wear the appropriate safety clothing.

Quick reference trouble-shooting guide

Symptom	Cause	Check and cure
FPS Station fails to operate.	Motive supply valve (item **7**) closed.	Open valves to supply motive pressure to pump.
	Condensate inlet valve (item **5**) closed.	Open all valves, including those fitted to points (**Y**) and (**Z**) to allow condensate to reach pump.
	Condensate discharge valve (item **5**) closed.	Open all valves to allow freedischarge from pump to condensate return line.
	Motive pressure insufficient to overcome backpressure.	Check motive pressure and static backpressure. Ensure motive pressure is higher than the static backpressure to give a differential pressure between 2 and 4 bar g.
	Restricted vent.	Ensure that vent line is unrestricted and self draining to the receiver.
	Blocked condensate inlet or motive supply strainer.	Remove screen from item **6** and clean or replace.
'U' bend water seal is broken and flash steam is discharging.	'U' bend water seal empty.	Re-prime 'U' bend with water, see Section 3. If flash steam discharges again from point **X** this could indicate a blocked vent line (**Y**). (Observe Safety note.)
	Receiver pressurised above 0.03 bar (0.4 psi).	Verify vent line is open and unrestricted.
Large amount of flash steam vent line (Y).	Motive steam trap failed open (steam operated versions only).	Inspect - repair or replace as necessary.
	Motive inlet valve and exhaust valve of the pump (item **3**) is leaking.	Inspect pump (observe safety note) repair or replace motive inlet and exhaust valves as necessary.

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