AUTOMATIC PUMP AND STEAM TRAP
APST
DN 40 – DN 50

DESCRIPTION

The ADCAMAT APST (Automatic Pump and Steam Trap) is specially recommended where a stall condition may occur due to poor steam trap condensate discharge, caused by temporary insufficient differential pressure.
The equipment has the features of a float steam trap combined with a pressure operated pump in the same unit.
Whenever the steam trap function is not enough to drain the condensate, the pump function is activated (using external steam pressure), before water logging may occur, lifting the condensate to the condensate return system, avoiding water hammer and consequent noise and equipment damage, corrosion, unstable temperature control, etc.

MAIN FEATURES

No electric requirements.
No NPSH issues.
Operation under vacuum conditions.
Closed loop system, no motive or flash steam is lost.

OPTIONS: Stainless steel construction.
Level gauge.

USE: Drain and lift condensate from heat exchangers (among others).

AVAILABLE MODELS: ADCAMAT APST-S – Carbon steel construction.
ADCAMAT APST-SS – Stainless steel construction.
(Carbon steel version is sandblasted, metalized and black painted).

SIZES: DN 40 x 40; DN 50 x 50; 11/2 x 11/2”; 2” x 2”.

CONNECTIONS: Flanged EN1092-1 PN16.
Female threaded ISO 7 Rp (Threaded flanges).
Others on request.

INSTALLATION: Horizontal installation.
See IMI - Installation and maintenance instructions.

MOTIVE GAS: Steam.

BODY LIMITING CONDITIONS *				
APST-S		APST-SS		RELATED TEMP.
	ALLOW. PRESS.		ALLOW. PRESS.	
PN16	16 bar	PN16	16 bar	50 ºC
	14 bar		16 bar	100 ºC
	13 bar		13 bar	195 ºC
	12 bar		12 bar	250 ºC
ANSI 150 lb	16 bar	ANSI 150 lb	16 bar	50 ºC
	13 bar		13 bar	195 ºC

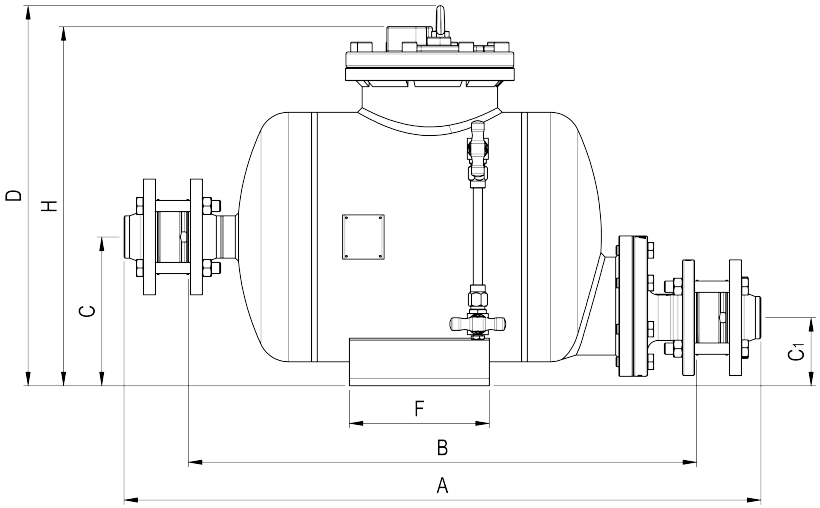
Min. operating temp.: -10 ºC; Design code: AD-Merkblatt.
* Rating according to EN 1092-1:2018.

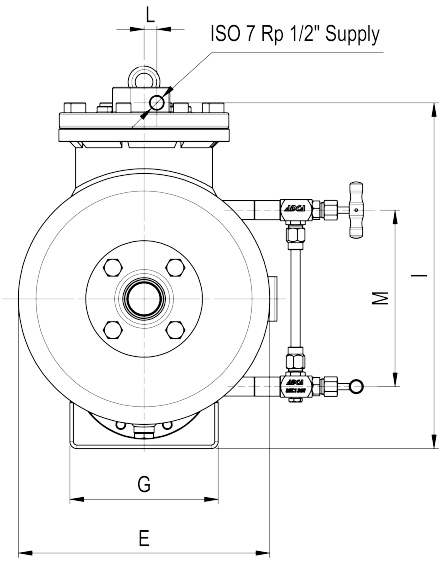
LIMITING CONDITIONS	
Minimum density	0,80 kg/L
Maximum viscosity	5 ºEngler
Maximum motive pressure	10 bar
Minimum motive pressure	0,5 bar
Pump discharge per cycle	22 L

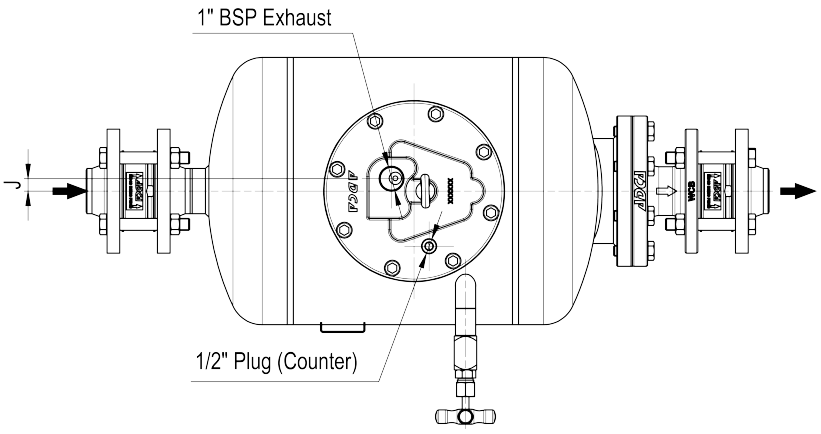
CE MARKING – GROUP 2 (PED – European Directive)	
PN16	Category
All sizes	2 (CE marked)

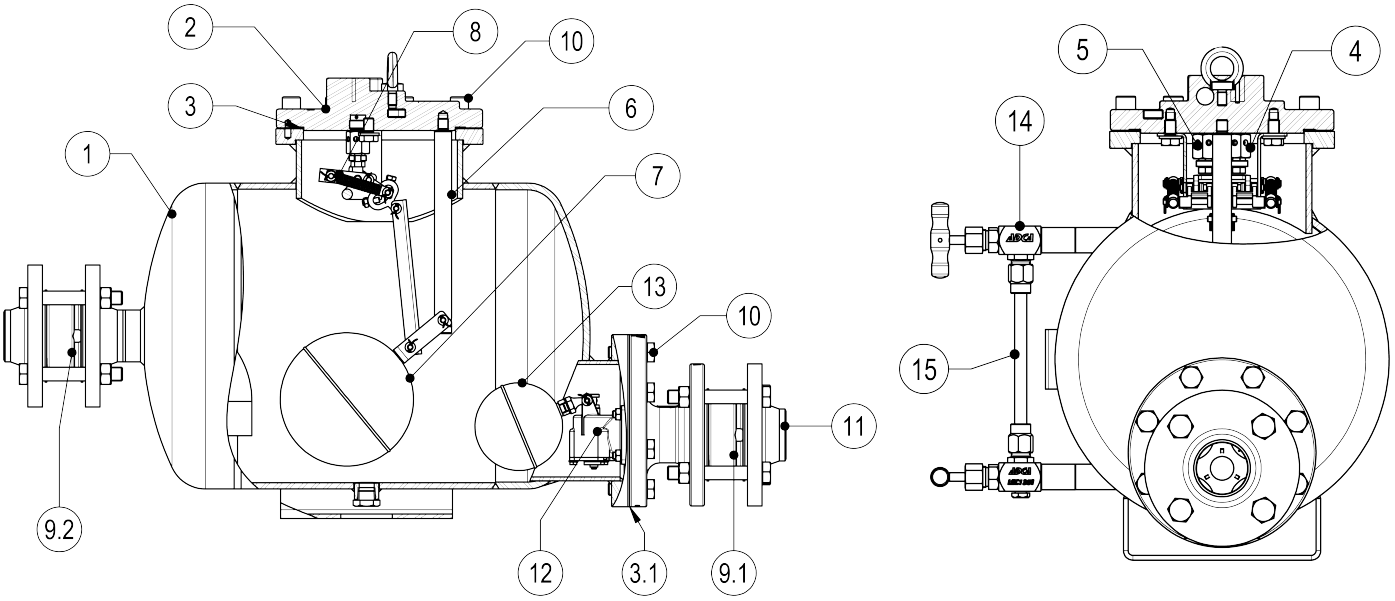
DIMENSIONS (mm)															
SIZE DN	**A ***	**B**	**C**	**C1**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**L**	**M**	**WGT. (kg)**	**VOL. (L)**
40 X 40	883	721	212	97	542	356	200	210	512	490	17	18	250	81	45
50 X 50	910	726	212	97	542	356	200	210	512	490	17	18	250	84	45

* A – with welding neck EN 1092-1 flanges. Dimensions are different if threaded flanges are requested.









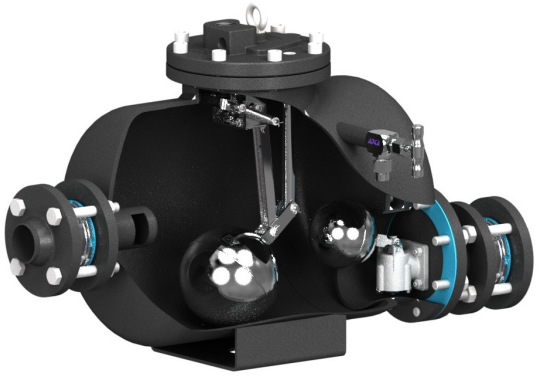
MATERIALS			
POS. Nº	**DESIGNATION**	**APST-S**	**APST-SS**
1	Pump body	P265GH / 1.0425 ; P235GH / 1.0345 ; S235JR / 1.0038	AISI 316 / 1.4401; AISI 316L / 1.4404
2	Cover	GJS-400-15 / 0.7040	CF8M / 1.4408
3	* Cover gasket	Non asbestos	Non asbestos
3.1	* Outlet cover gasket	Non asbestos	Non asbestos
4	* Inlet valve / Seat assembly	Stainless steel	Stainless steel
5	* Exhaust valve / Seat assembly	Stainless steel	Stainless steel
6	Internal mechanism	Stainless steel	Stainless steel
7	*Float	Stainless steel	Stainless steel
8	* Spring assembly (2 pieces)	Inconel	Inconel
9.1	* RD40 outlet check valve	CF8M / 1.4408	CF8M / 1.4408
9.2	* RD40 Inlet check valve	CF8M / 1.4408	CF8M / 1.4408
10	Bolts	Steel 8.8	A2-70
11	** PN16 EN 1092-1 flanges	P250GH / 1.0460	AISI 316 / 1.4401
12	* Float trap mechanism	Stainless steel	Stainless steel
13	* Steam trap float	Stainless steel	Stainless steel
14	Level gauge cocks	Bronze / Stainless steel	Stainless steel
15	Tube glass	Borosilicate	Borosilicate

* Available spare parts.

** Welding neck EN 1092-1:2018 flanges. Threaded flanges on request.

APST PUMP CAPACITY			
MOTIVE PRESSURE (bar)	TOTAL LIFT (bar)	FLOW RATE (kg/h) Installation with 300 mm filling head above the pump cover	
		DN 40 x 40	DN 50 x 50
1	0,35	820	2290
2		1050	3130
3		1100	3530
4		1150	3810
5		1210	3880
6		1250	3910
8		1290	3960
10		1300	3970
2	1	800	2520
3		940	2960
4		1080	3130
5		1110	3170
6		1140	3220
8		1180	3250
10		1200	3290
3	2	790	2440
4		900	2590
5		1000	2800
6		1140	2830
8		1200	2850
10		1220	2870
4	3	750	2330
5		860	2510
6		910	2530
8		970	2560
10		980	2620
5	4	730	2250
6		840	2430
8		920	2470
10		940	2510
6	5	710	2050
8		770	2150
10		880	2190
7	6	730	1850
8		790	1910
10		880	2120

Table 1 - Capacities based on liquid specific gravity 0,9 – 1,0.



CAPACITY MULTIPLYING FACTORS FOR OTHER FILLING HEADS				
Pump size	Filling head (mm)			
	150	300	600	900
All	0,7	1	1,2	1,35

Filling heads measured from the bottom of the receiver to the top of the cover mechanism. Consult factory for receiver sizing.

APST STEAM TRAP FLOW RATE CAPACITY (kg/h)											
MODEL	SIZE DN	DIFFERENTIAL PRESSURE (bar)									
		0,1	0,3	0,5	0,7	1	1,5	2	4,5	7	10
APST-10	40 x 40	900	1500	1900	2300	2700	3100	3600	5000	6900	8100
APST-10	50 x 50	1800	3000	3900	4450	5000	6100	7100	10000	13750	16000
APST-4,5	50 x 50	2400	5900	7550	9050	11000	14000	15500	22500	–	–

Important: motive pressure should not exceed the maximum rated differential pressure at any circumstances.
e.g. In the case of the APST-10, the motive pressure must be ≤ 10 barg. In the case of the APST-4,5, the motive pressure must be ≤ 4,5 barg.
Lower steam trap discharge capacity available on request.

SIZING AND INSTALLATION

SIZING OF THE SYSTEM

The discharge capacity of the pump is a function of:

1.Condensate load (kg/h).

2.The pressure of the motive fluid - steam (barg)

3.The total lift or back pressure the pump will have to overcome. This includes the change in fluid level elevation after the pump (0.0981 bar/m of lift), plus pressure in the return piping, plus the pressure drop in bar caused by pipe friction, plus any other system component pressure drop the pump exhaust will have to overcome (barg).

5.Maximum steam pressure on the process equipment (heat exchanger, for example) (barg).

6.Minimum temperature of the medium to be heated (ºC).

7.Controlled temperature of the medium to be heated (ºC).

Calculation methods: see IS 9.085 E.

RECEIVER

A receiver is recommended to temporarily hold the liquid and prevent any flooding of the equipment, while the pump is performing a pumping cycle. A length of pipe of large diameter can be used.

INSTALLATION – Closed loop system

Fig.1 shows a typical installation example of an ADCAMAT APST applied to a large capacity skid mounted ADCATHERM PWHU (Packaged Water Heating Unit).

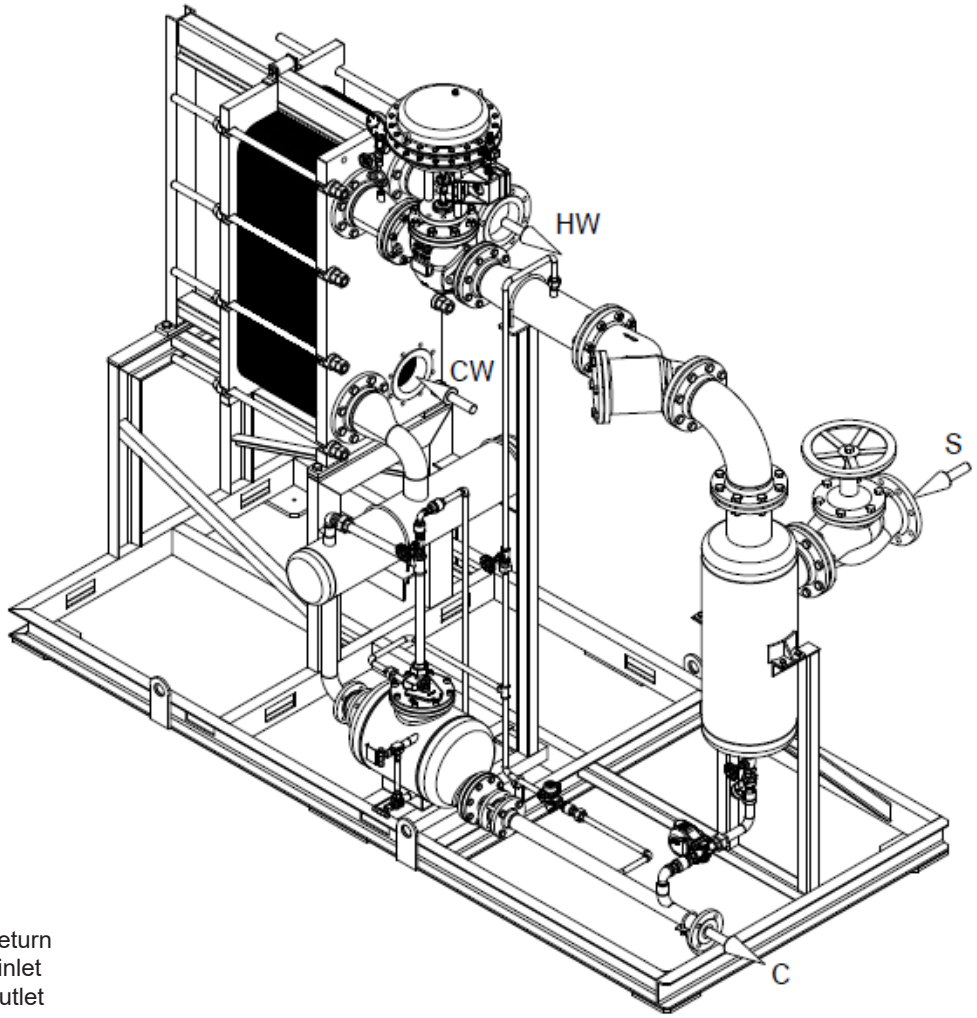
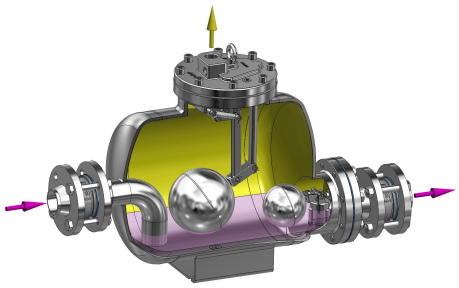


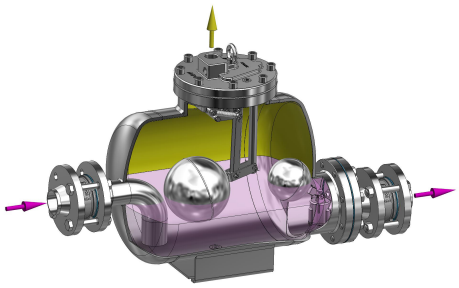
Fig.1

S – Steam inlet
C – Condensate return
CW – Cold water inlet
HW – Hot water outlet

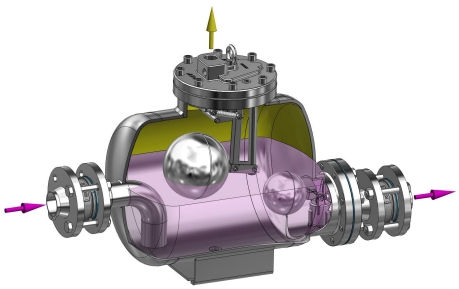
OPERATION



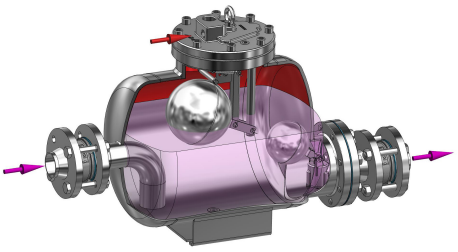
1. In the first instance, the float trap mechanism and the pump steam intake valve are closed, while the vent valve is open. As condensate flows into the body through the inlet check valve, the APST can operate in a closed loop application, in one of two ways.



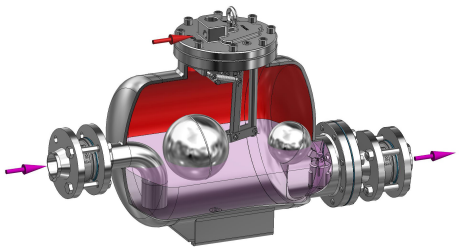
2. If the inlet pressure is greater than the back pressure the APST works as a steam trap, continuously discharging condensate by differential pressure through the steam trap mechanism. At this point the steam intake valve remains closed and the vent valve open.



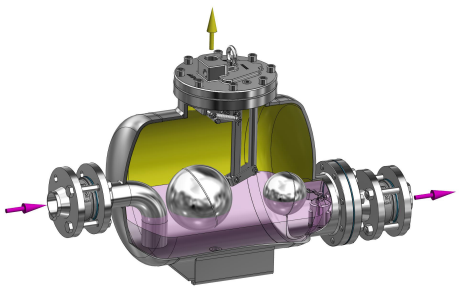
3. As soon as, e.g., the equipment's control valve starts to modulate, the steam pressure will decrease. The lower differential pressure decreases the APST's steam trap mechanism ability to discharge causing the condensate level to rise inside the body. Vacuum may even occur at this stage.



4. If this situation would persist, the condensate would eventually flood the equipment, causing problems. However, by using an APST at this stage, and as the pump's float reaches its highest position, the snap action pump mechanism actuates, closing the vent valve and opening the steam intake valve. Steam will then replace the necessary positive pressure to pump out the condensate.



5. The APST float starts to fall as the condensate level inside the body drops and is discharged to the return system. When the float reaches its lowest position, the snap action pump mechanism resets.



6. As the motive steam valve closes and the vent valve opens, equalizing the body pressure with the upstream pressure, the condensate is allowed to flow once again into the APST. The cycle then repeats itself and, with enough differential pressure, the system resumes as a steam trap or, otherwise, as a pump.