

ADCAMAT PRESSURE OPERATED PUMP PPO14

DESCRIPTION

The ADCAMat PPO14 (Pressure Operated Pump), fabricated in carbon steel (stainless steel on request), is recommended in the transfer of high temperature liquids such as condensate, oils and other liquids to a higher elevation or pressure.

The pump starts when there is something to pump and stops when there isn't.

Under certain conditions, it can drain a closed vessel under vacuum or pressure.

The pump can be operated by steam, compressed air or gas and can be used for lifting any kind of non-corrosive liquids.



OPERATION

Liquid flows by gravity into the pump through an inlet check valve lifting a float which, at the upper limit of its stroke, opens the supply valve, allowing steam or compressed air to enter the pump's body. Pressure in the pump builds up until it's just sufficient to overcome back pressure.

The pressurized liquid opens the outlet check valve and discharge begins. When the float reaches the minimum lower level, it closes the steam or compressed air supply valve and opens the vent, allowing the liquid to fill the pump again.

As the amount of liquid discharged at each stroke is known, the total volume that flows during a given period of time can be calculated by counting the number of cycles during that period. For that purpose, a special counter is available which screws into a tapped connection on the top cover of the pump. This counter records the number of pumping strokes, thus enabling the pump to function as a reliable flow meter.

MAIN FEATURES: No electric requirements.

OPTIONS: Level gauge.
Stroke counter.

USE: To lift condensate or hot and cold liquids.

AVAILABLE MODELS: ADCAMat PPO14S – carbon steel.
ADCAMat PPO14SS – stainless steel.
(Carbon steel version is sandblasted, metallized and black painted).

SIZES: DN 25; DN 40; DN 50.

CONNECTIONS: Flanged EN 1092-1 PN 16.
Female threaded ISO 7 Rp (threaded flanges).
Others on request.

INSTALLATION: Horizontal installation.
See IMI – Installation and Maintenance Instructions.

MOTIVE GAS: Steam or compressed air.

LIMITING CONDITIONS

Minimum density	0,80 kg/L
Maximum viscosity	5 °Engler
Maximum motive pressure	10 bar
Minimum motive pressure	0,5 bar
Pump discharge per cycle – DN 25 to 50	16 L

BODY LIMITING CONDITIONS *

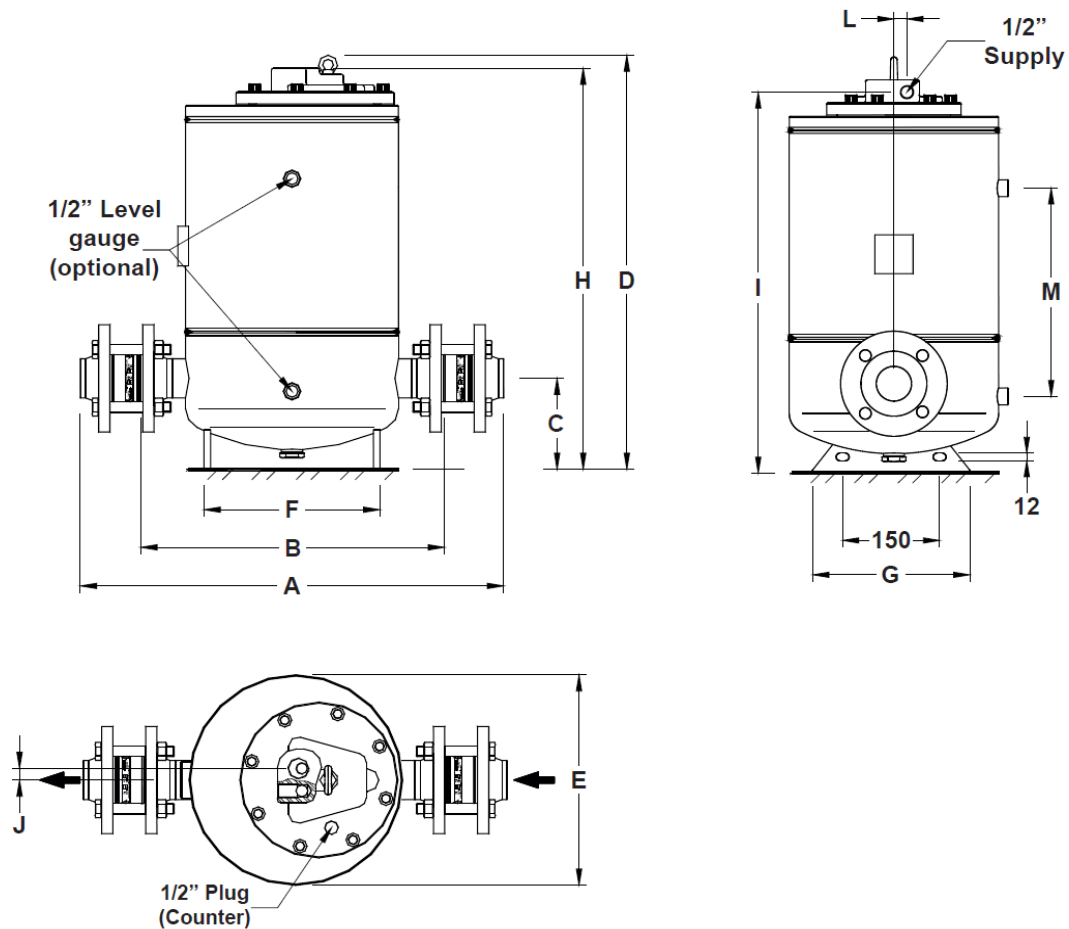
PPO14S			PPO14SS		
	ALLOW. PRESS.	RELAT. TEMP.		ALLOW. PRESS.	RELAT. TEMP.
PN 16	16 bar	50 °C	PN 16	16 bar	50 °C
	14 bar	100 °C		15 bar	100 °C
	13 bar	195 °C		12,7 bar	200 °C
	12 bar	250 °C		12 bar	250 °C
CLASS 150	16 bar	50 °C	CLASS 150	15,3 bar	50 °C
	14 bar	100 °C		13,3 bar	100 °C
	13 bar	195 °C		11,1 bar	200 °C
	12 bar	250 °C		10,2 bar	250 °C

Min. operating temp.: -10 °C; Design code: ASME VII.

* Rating according to EN 1092-1:2018.

CE MARKING – GROUP 2 (PED – European Directive)

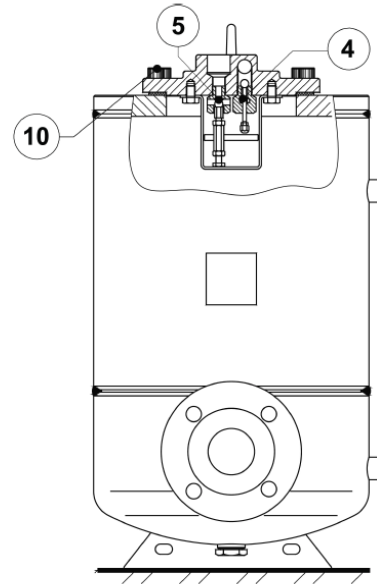
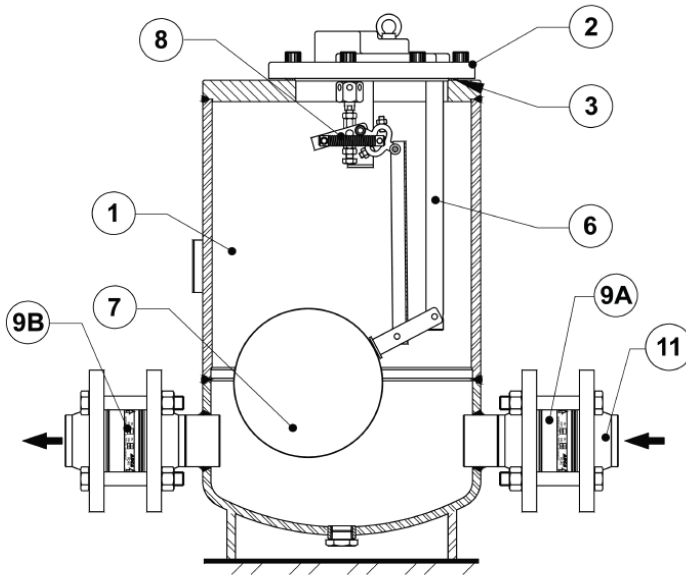
PN 16	Category
All sizes	2 (CE marked)



DIMENSIONS (mm)

SIZE	A *	B	C	D	E	F	G	H	I	J	L	M	WGT. (kg)	VOL. (L)
DN 25	578	444	140	640	323	268	250	617	598	17	18	327	75	32,2
DN 40	615	454	140	640	323	268	250	617	598	17	18	327	72	32,3
DN 50	644	460	140	640	323	268	250	617	598	17	18	327	66	32,5

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



MATERIALS

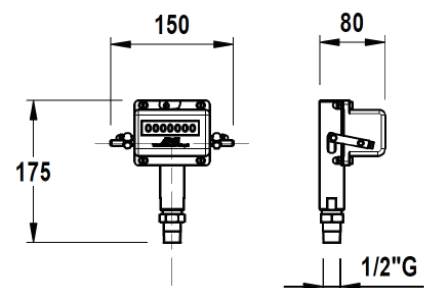
POS. N°	DESIGNATION	PPO14S	PPO14SS
1	Pump body	P265GH / 1.0425 ; P235GH / 1.0345 ; S235JR / 1.0038	AISI 316 / 1.4401; AISI 304 / 1.4301
2	Cover	GJS-400-15 / 0.7040	AISI 316 / 1.4401; AISI 304 / 1.4301
3	* Cover gasket	Non asbestos	Non asbestos
4	* Inlet valve / Seat assembly	Stainless steel	Stainless 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	Stainless steel A2-70
11	** PN 16 EN 1092-1 flanges	P250GH / 1.0460	AISI 316 / 1.4401

* Available spare parts.

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

STROKE COUNTER

Available on request, it can be screwed directly into the top cover of the pump or above the pump, through a 1/2" size pipe for easier reading (max. 1 m).



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 operating medium (steam, compressed air or other gases).
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).
4. Filling head available (300 mm is recommended).

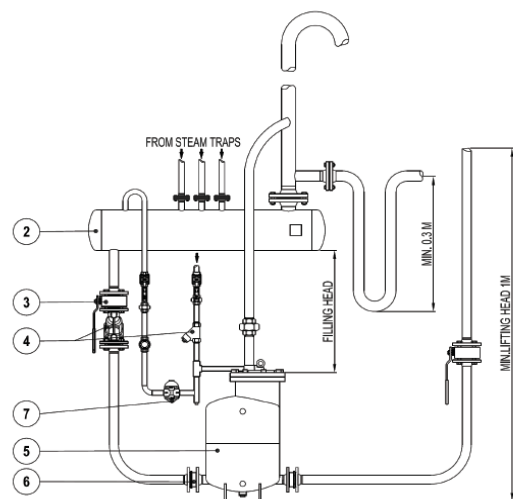


Fig.1

INSTALLATION

Fig.1 shows a typical installation example of an ADCAMAT automatic pump. For further details and instructions, please contact manufacturer.

MATERIALS			
POS.	DESIGNATION	POS.	DESIGNATION
2	Receiver	5	Pump
3	Ball valve	6	RD40 disc check valve
4	Strainer	7	Steam trap

Table 1

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.

SUGGESTED RECEIVER			
PUMP SIZE	25	40	50
Pipe size with 1 m lenght	6"	6"	8"

Table 2

CAPACITY CORRECTION FACTOR FOR GASES OTHER THAN STEAM					
% Backpress. vs Motive press. (BP/MP)	10%	30%	50%	70%	90%
Correction factor	1,04	1,08	1,12	1,18	1,28

Table 3

CAPACITY MULTIPLYING FACTORS FOR OTHER FILLING HEADS				
PUMP SIZE	FILLING HEAD (mm)			
	150	300	600	900
DN 25	0,7	1	1,2	1,35
DN 40	0,7	1	1,2	1,35
DN 50	0,7	1	1,2	1,35

Table 4

FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER				
MOTIVE PRESSURE (bar)	TOTAL LIFT (bar)	DN 25 x 25	DN 40 x 40	DN 50 x 50
1	0,35	840	1490	2320
2		1030	1520	3160
3		1140	1640	3560
4		1180	1680	3840
5		1240	1740	3910
6		1270	1760	3940
8		1300	2200	3990
10		1310	2205	4000
2	1	805	1560	2550
3		940	1790	2990
4		1080	1930	3160
5		1110	2010	3200
6		1140	2090	3250
8		1180	2190	3280
10		1190	2200	3320
3	2	780	1495	2470
4		900	1690	2620
5		1000	1820	2830
6		1040	1910	2860
8		1100	2010	2880
10	3	1110	2060	2900
4		740	1400	2360
5		860	1545	2540
6		910	1675	2560
8		970	1805	2590
10	4	980	1850	2650
5		720	1335	2280
6		820	1480	2460
8		910	1675	2500
10	5	930	1760	2540
6		680	1290	2080
8		740	1530	2180
10	6	810	1630	2220
7		660	1230	1880
8		730	1370	1940
10		820	1490	2150

Table 5 (based on liquid specific gravity 0,9 – 1,0).

Example:

Condensate load	1800 kg/h
Filling head	150 mm
Motive fluid	Compressed air
Available pressure	8 bar
Vertical lift after pump	6 m
Return piping pressure	1,5 bar
Piping friction pressure drop	Negligible

Correction for filling Head:

With 150 mm filling head the correction factor from Table 4 is 0,7. The corrected capacity is:
 2590 kg/h x 0,7 = 1813 kg/h.

Calculations:

Total back pressure: 1,5 bar + (6 m x 0,0981) = 2,09 bar.
 Pump choice, assuming steam as motive fluid, at a pressure of 8 bar and a back pressure of 3 bar: the DN 50 pump has a capacity of 2590 kg/h, according to Table 5, so it is the one we should select.

Correction for air as a motive fluid:

The % back pressure 2,09 bar / 8 bar = 30%
 The correction factor from table 3, is 1,08.
 The corrected capacity is 1813 kg/h x 1,08 = 1958 kg/h,
 and so, the DN 50 pump is still recommended.

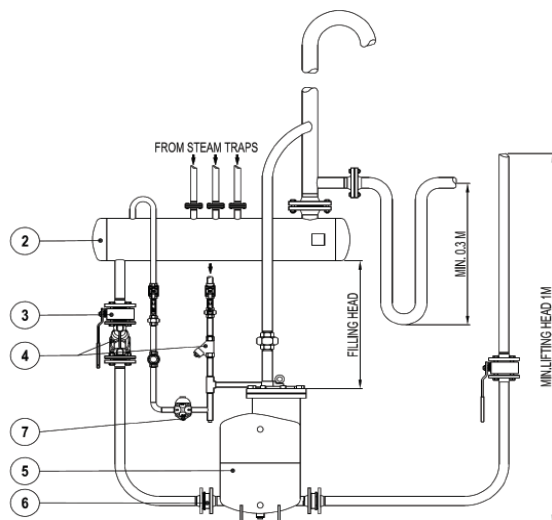
TYPICAL APPLICATIONS

Condensate recovery - open system

The pump removes high temperature condensate without cavitation problems.

WARNING: Vent line must be unrestricted and self draining to the receiver.

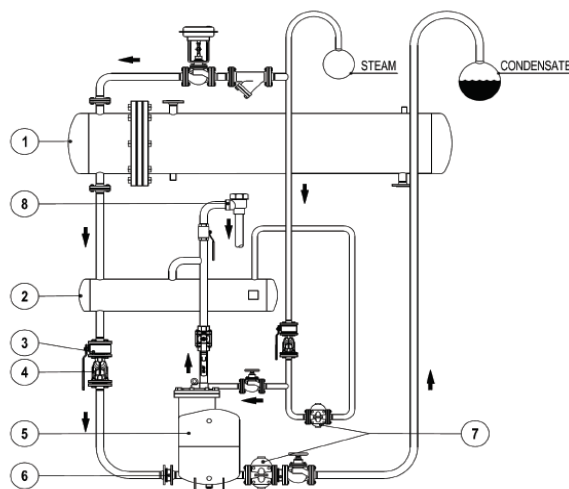
MATERIALS			
POS.	DESIGNATION	POS.	DESIGNATION
1	Heat exchanger	5	POPS pump
2	Receiver	6	RD40 disc check valve
3	Ball valve	7	Steam trap
4	Strainer	8	Air vent



Removal of condensate under pressure with POP-LC pump and steam trap combination

When the steam pressure is sufficient to overcome back pressure, the trap operates.

If the pressure decreases, then the pressure operated pump starts to work, removing the condensate by pumping through the float steam trap.



Drainage of a single unit under vacuum (max. 0,2 bar abs)

Head H1 must range between 1 and 2 m. The lift H must be as minimum as possible, but never less than 1 m (otherwise a siphon is required, as shown in H2).

Use steam as operating medium (max. pressure 2 – 3 bar).

