

ADCAMAT PRESSURE OPERATED PUMP POP-LC

DESCRIPTION

The ADCAMAT POP-LC (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.

Pump mechanism can be installed in any position rotating 360°, only limited by the flange holes.

OPTIONS: Level gauge.
Stroke counter.

USE: To lift condensate or hot and cold liquids.

AVAILABLE MODELS:

ADCAMAT POP-LCS - low capacity, carbon steel construction.
ADCAMAT POP-LCSS - low capacity, stainless steel construction.
(carbon steel version is sandblasted, metallized and black painted).

SIZES: DN 25 LC; DN 40 LC; DN 40 x 25 LC.

CONNECTIONS: Flanged EN 1092-1 PN 16.
Flanged ASME B16.5 Class 150.
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.

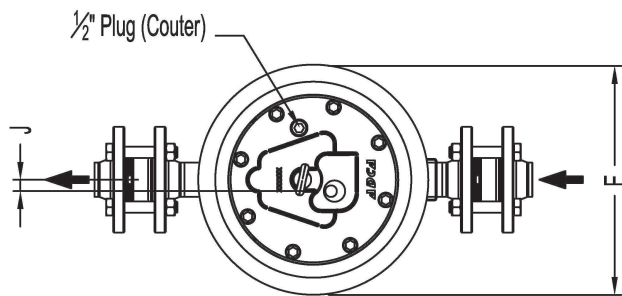
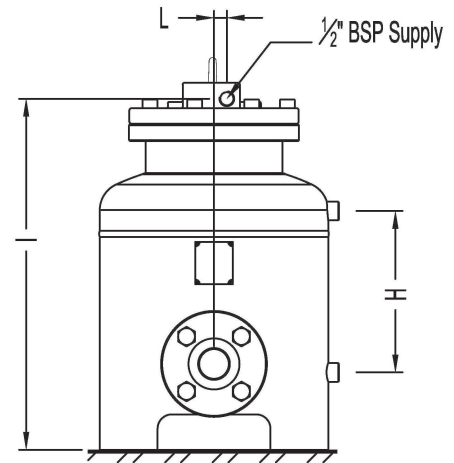
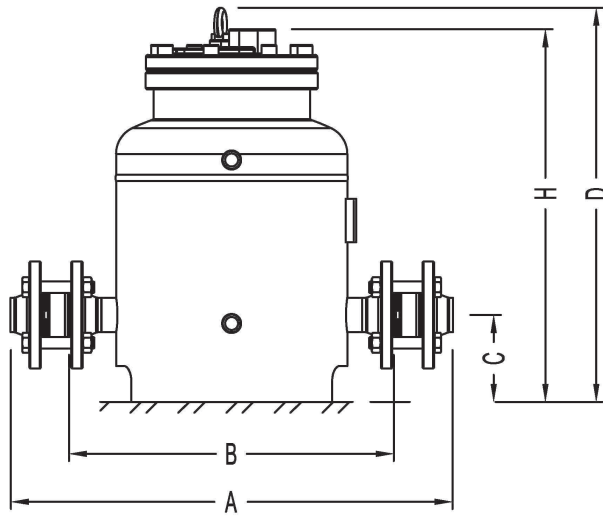
LIMITING CONDITIONS	
Minimum density	0,80 kg/L
Maximum viscosity	5 °Engler
Maximum motive pressure	10 bar
Minimum motive pressure	0,5 bar
Pump discharge per cycle	11,2 L

BODY LIMITING CONDITIONS *					
POP-LCS			POP-LCSS		
	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.

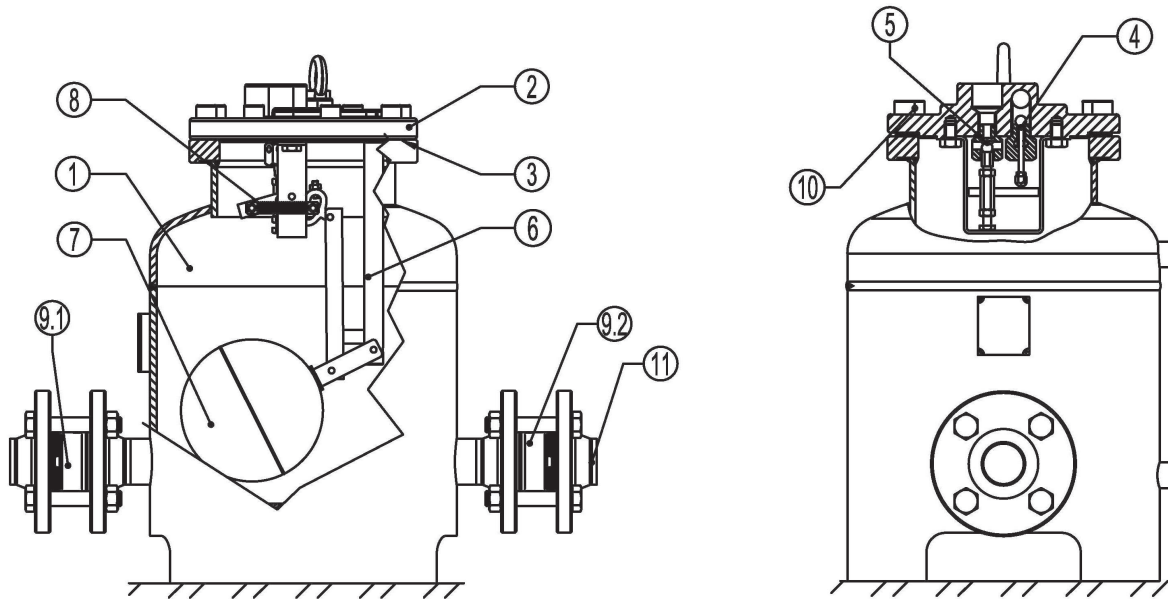
* Rating according to EN 1092-1:2018.

CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	Category
All sizes	2 (CE marked)



DIMENSIONS (mm)												
SIZE	A *	B	C	D	E	H	I	J	L	M	WEIGHT (kg)	VOL. (L)
DN 25	578	444	122	552	323	522	500	17	18	229	60	25,7
DN 40	615	454	122	552	323	522	500	17	18	229	61	25,7
DN 40 x 25	597	449	122	552	323	522	500	17	18	229	60	25,7

* With welding neck EN 1092-1 flanges. Dimensions are different if threaded flanges are requested.



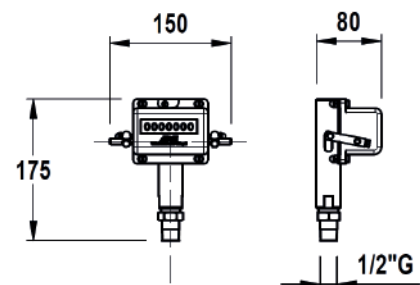
MATERIALS			
POS. N°	DESIGNATION	POP-LCS	POP-LCSS
1	Pump body	P265GH / 1.0425 ; P235GH / 1.0345 ; S235JR / 1.0038	AISI 316 / 1.4401; AISI 316L / 1.4404
2	Cover	GJS-400-15 / 0.7040	CF8M / 1.4408
3	* Cover gasket	Non asbestos	Non asbestos
4	* Inlet valve / Seat assembly	Stainless steel	Stainless steel
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).

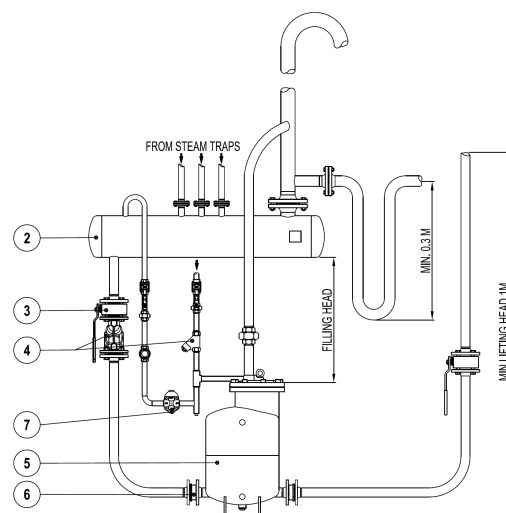


Fig.1

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	DN 25	DN 40
Pipe size with 1 m length	6"	6"

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
All	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 40 x 25	
1	0,35	820	1260	
2		1050	1540	
3		1100	1750	
4		1150	1860	
5		1210	1970	
6		1250	2160	
8		1290	2180	
10		1300	2195	
2		1	800	1200
3			940	1430
4	1080		1590	
5	1110		1660	
6	1140		1730	
8	1180		1820	
10	1200		1880	
3	2		790	1100
4		900	1520	
5		1000	1580	
6		1140	1690	
8		1200	1785	
10		1220	1820	
4	3	750	1000	
5		860	1310	
6		910	1450	
8		970	1540	
10		980	1580	
5	4	730	960	
6		840	1310	
8		920	1410	
10		940	1500	
6	5	710	890	
8		770	1040	
10		880	1150	
7	6	730	840	
8		790	980	
10		880	1090	

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

Example:

Condensate load	950 kg/h
Filling head	150 mm
Motive fluid	Compressed air
Available pressure	8 bar
Vertical lift after pump	10 m
Return piping pressure	1,2 bar
Piping friction pressure drop	Negligible

Calculations:

Total back pressure: $1,2 \text{ bar} + (10 \text{ m} \times 0,0981) = 2,181 \text{ bar}$.
 Pump choice, assuming steam as motive fluid, at a pressure of 8 bar and a back pressure of 3 bar: the DN 40 pump has a capacity of 1540 kg/h, according to Table 5, so it is the one we should select.

Correction for filling Head:

With 150 mm filling head the correction factor from Table 4 is 0,7. The corrected capacity is:
 $1540 \text{ kg/h} \times 0,7 = 1078 \text{ kg/h}$.

Correction for air as a motive fluid:

The % back pressure $2,181 \text{ bar} / 8 \text{ bar} = 27\%$
 The correction factor from table 3, is 1,08.
 The corrected capacity is $1078 \text{ kg/h} \times 1,08 = 1164,2 \text{ kg/h}$,
 and so, the DN 40 pump is still recommended.

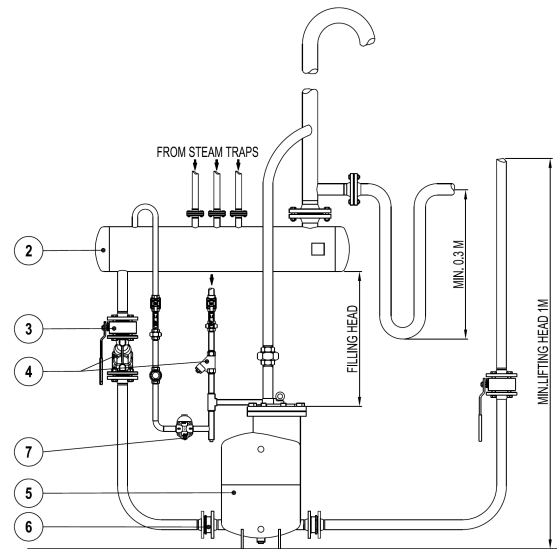
TYPICAL APPLICATIONS

Condensate recovery - open system

The pump removes high temperature condensate without cavitation problems.

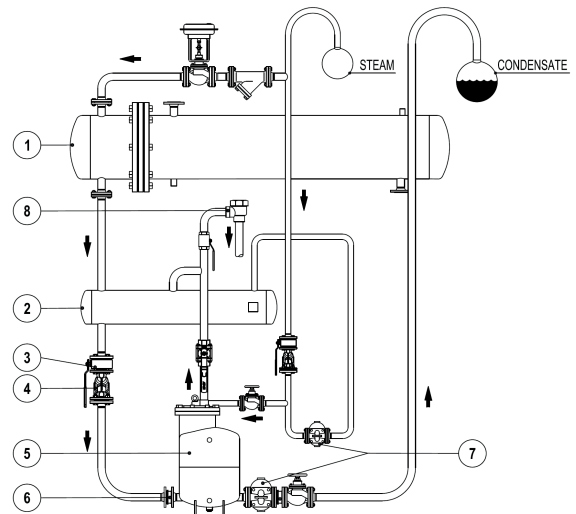
WARNING: Vent line must be unrestricted and self draining to the receiver.

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).

