PRESSURE OPERATED PUMP
POP-LC

The ADCAMat POP-LC low capacity pressure operated pump is recommended in the transfer of steam condensate, oils and other non-hazardous liquids compatible with the construction, to a higher elevation or pressure.
Under certain conditions, it can drain a closed vessel under vacuum or pressure.The pump can be operated using steam, compressed air or other gases, and is manufactured in carbon steel or stainless steel.

OPERATION

Liquid flows by gravity into the pump through an inlet check valve, lifting the float. At this point, the motive fluid intake valve is closed while the vent valve is open. As the float reaches its highest position the motive fluid intake valve opens and the vent valve closes, allowing the motive fluid to enter the pump body. The pressure in the pump builds up just enough to overcome backpressure.
The pressurized liquid opens the outlet check valve and the discharge starts. The liquid discharged may be quantified through a special counter, enabling the pump to function as a reliable flow meter.
When the float reaches its lower position the motive fluid intake valve closes and the vent valve opens allowing the liquid to fill the pump once again, repeating the cycle.

MAIN FEATURES

Compact design.
Hardened stainless steel wear parts.
High-endurance inconel springs.
Low filling head to minimize installation space.
No electric requirements or NPSH issues.
Suitable for hazardous environments.
Low running costs.
Pump mechanism with 360º rotation (limited to flange bolt holes).

OPTIONS: Level gauge.
Stroke counter.

USE: To lift steam condensate and other liquids compatible with the construction.

AVAILABLE MODELS: POP-LCS – carbon steel.
POP-LCSS – stainless steel.

SIZES: 1" x 1", 11/2" x 1", 11/2" x 11/2".
DN 25 x 25, DN 40 x 25 and DN 40 x 40.

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. An example is shown in Fig. 1. See IMI – Installation and maintenance instructions.

MOTIVE MEDIUM: Saturated steam, compressed air, nitrogen and other gases.

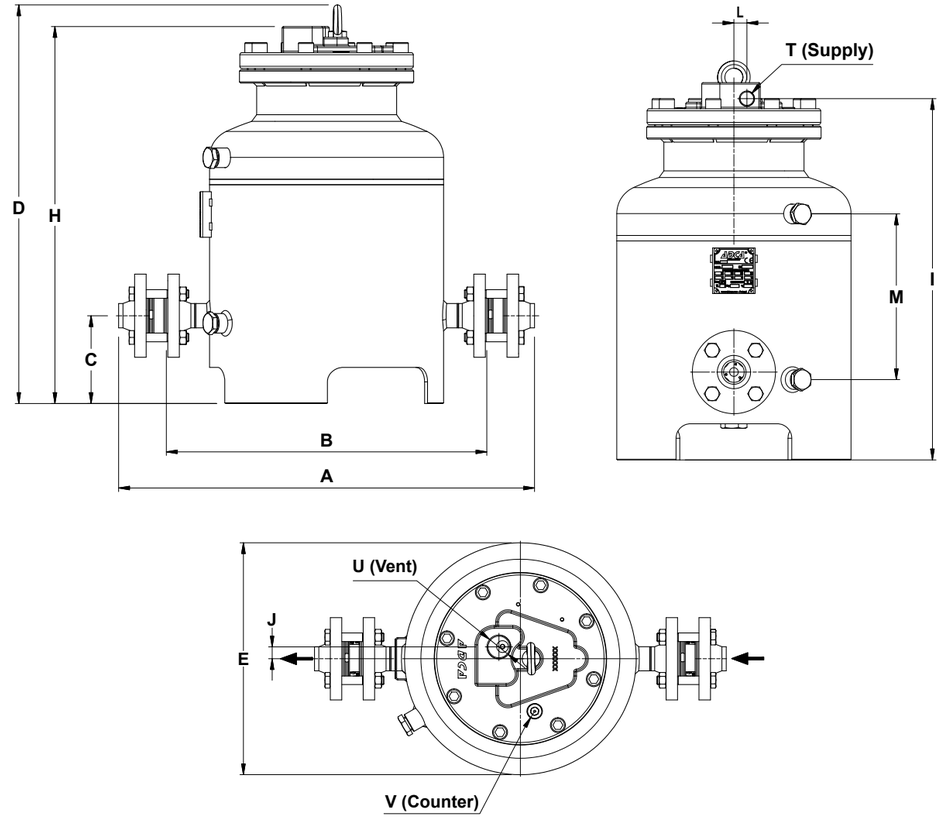
BODY LIMITING CONDITIONS *

POP-LCS			POP-LCSS		
	ALLOW. PRESS.	RELAT. TEMP.		ALLOW. PRESS.	RELAT. TEMP.
PN 16	16 bar	50 ºC	PN 16	16 bar	50 ºC
	14 bar	100 ºC		15 bar	100 ºC
	13 bar	195 ºC		12,7 bar	200 ºC
	12 bar	250 ºC		12 bar	250 ºC
CLASS 150	16 bar	50 ºC	CLASS 150	15,3 bar	50 ºC
	14 bar	100 ºC		13,3 bar	100 ºC
	13 bar	195 ºC		11,1 bar	200 ºC
	12 bar	250 ºC		10,2 bar	250 ºC

* Rating according to EN 1092-1:2018.

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

LIMITING CONDITIONS	
Liquid specific gravity	0,8 to 1
Maximum viscosity	5 ºEngler
Maximum motive inlet pressure	10 bar
Minimum motive inlet pressure	0,5 bar
Maximum operating temperature	185 ºC
Minimum operating temperature *	0 ºC
Pump discharge per cycle	11,2 L



DIMENSIONS (mm)

SIZE	A *	B *	C	D	E	H	I	J	L	M	T **	U **	V **	WGT. (kg)	VOL. (L)
1" x 1" DN 25 x 25	578	444	122	552	323	522	500	17	18	229	1/2"	1"	1/2"	60	25,7
11/2" x 1" DN 40 x 25	597	449	122	552	323	522	500	17	18	229	1/2"	1"	1/2"	60	25,7
11/2" x 11/2" DN 40 x 40	615	454	122	552	323	522	500	17	18	229	1/2"	1"	1/2"	61	25,7

* With EN 1092-1 welding neck flanges. Dimensions may differ if ASME B16.5 flanges or ISO 7 Rp female threaded flanges are requested. Consult the manufacturer.
** As standard, in versions manufactured with EN 1092-1 PN 16 flanges, these connections are female threaded ISO 7 Rp. In versions with ASME B16.5 flanges, these connections are female threaded NPT.

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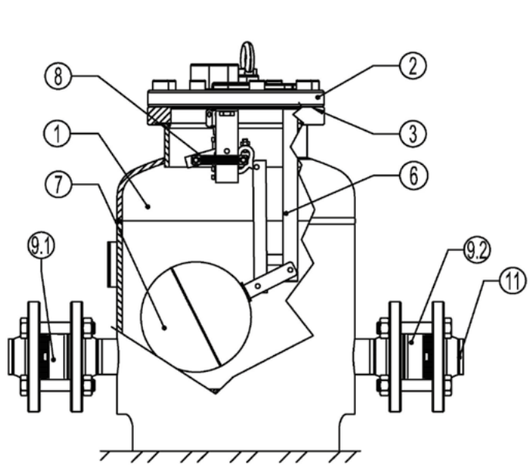
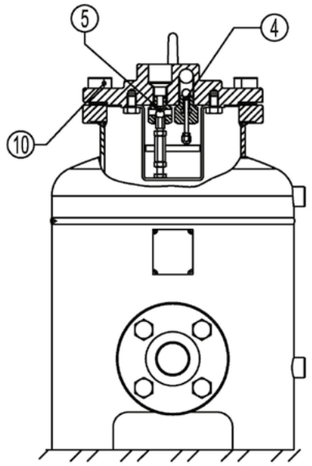




MATERIALS			
POS. Nº	**DESIGNATION**	**POP-LCS**	**POP-LCSS**
1	Pump body	P265GH / 1.0425; P235GH / 1.0345; S235JR / 1.0038	AISI 316 / 1.4401; AISI 316L / 1.4404
2	Cover	GJS-400-15 / 0.7040	CF8M / 1.4408
3	* Cover gasket	Stainless steel / Graphite	Stainless steel / Graphite
4	* Intake valve/seat assembly	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 pcs.)	Inconel	Inconel
9.1	* Outlet check valve	CF8M / 1.4408	CF8M / 1.4408
9.2	* Inlet check valve	CF8M / 1.4408	CF8M / 1.4408
10	Bolts	Steel 8.8	Stainless steel A2-70
11	Counter flanges	P250GH / 1.0460	AISI 316 / 1.4401

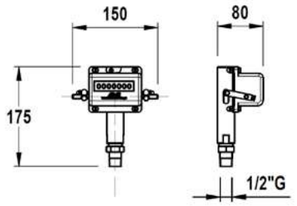
* Available spare parts.

STROKE COUNTER

A stroke counter can be screwed onto a respective female threaded connection on the pump cover. Mechanical and digital versions are available. The mechanical version requires that the following conditions are met.

LIMITING CONDITIONS *	
Minimum motive pressure (steam)	6 bar
Minimum motive pressure (compressed air and nitrogen)	5 bar
Minimum system backpressure (steam)	700 mbar *
Minimum system backpressure (compressed air and nitrogen)	700 mbar *

* The pump outlet check valve can be supplied with a stronger spring to simulate increased system backpressure. Consult manufacturer.



The digital version is composed of sensor and remote stroke counter. The device can be tailor made to meet customer requirements and is not dependent on the process condition. The standard unit is battery powered, features an LCD display and optional volt-free output connection for remote monitorization. Consult manufacturer.

SIZING

To accurately size a pressure operated pump, the following information must be provided:

1. The condensate load (kg/h).

2. The operating medium (steam, compressed air or other gases) and its pressure.

3. The total lift or backpressure in bar 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 caused by pipe friction and other system components.

4. Available filling head (see Fig. 1) in mm or any other dimension that allows its determination.

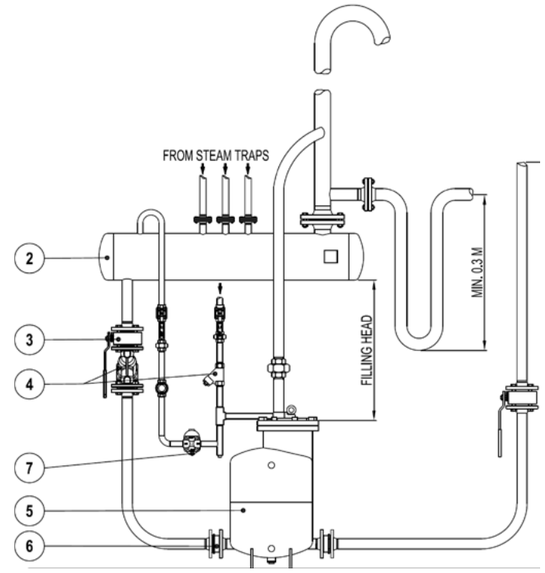


Fig. 1

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
2	Receiver	**5**	Pump
3	Ball valve	**6**	Disc check valve
4	Y strainer	**7**	Steam trap

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

Table 1

CAPACITY CORRECTION FACTORS FOR FILLING HEADS OTHER THAN 300 mm				
PUMP SIZE	**FILLING HEAD (mm)**			
	150	**300**	**600**	**900**
1" x 1" DN 25 x 25	0,7	1	1,2	1,35
11/2" x 1" DN 40 x 25	0,7	1	1,2	1,35
11/2" x 1/12" DN 40 x 40	0,7	1	1,2	1,35

Table 2

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 definable length of large diameter pipe can be used.
Suggested receiver sizes are shown in Table 3.

RECEIVER			
PUMP SIZE	**1" x 1" DN 25 x 25**	**11/2" x 1" DN 40 x 25**	**11/2" x 11/2" DN 40 x 40**
Pipe size with 1 m lenght	6"		

Table 3

FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER			
MOTIVE PRESSURE (bar)	**TOTAL LIFT (bar)**	**1" x 1" DN 25 x 25**	**11/2" x 1" and 11/2" x 11/2" DN 40 x 25 and DN 40 x 40**
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 4 (based on liquid specific gravity of 0,9 to 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

Filling head correction:
With 150 mm filling head the correction factor from Table 2 is 0,7. The corrected capacity is thus 1540 kg/h x 0,7 = 1078 kg/h.

Calculations:
Total backpressure: 1,2 bar + (10 m x 0,0981) = 2,181 bar.
Assuming steam as motive medium at a pressure of 8 bar and a total backpressure of 3 bar, then according to Table 4 a DN 40 pump, with a capacity of 1540 kg/h, is the recommended size.

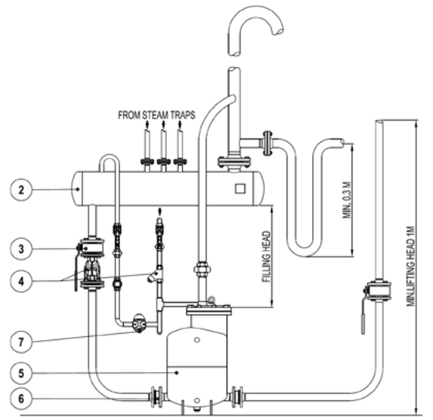
Correction for air as a motive medium:
The % backpressure is 2,181 bar / 8 bar = 27%.
The correction factor from Table 1 is 1,08.
The corrected capacity is thus 1078 kg/h x 1,08 = 1164,2 kg/h, and so, a DN 40 pump is still the recommended size.

TYPICAL APPLICATIONS

CONDENSATE RECOVERY IN A OPEN LOOP SYSTEM

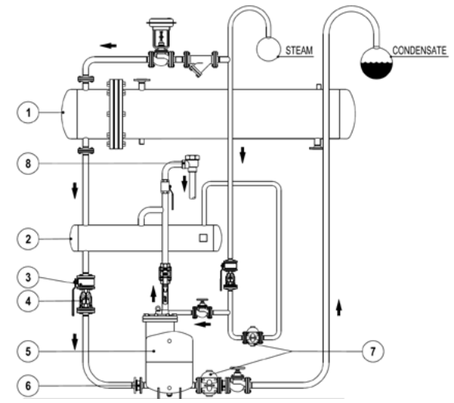
The pump transfers high temperature condensate without cavitation problems.
The vent line must be unrestricted and self draining to the receiver.

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
1	Heat exchanger	**5**	Pump
2	Receiver	**6**	Disc check valve
3	Ball valve	**7**	Steam trap
4	Y strainer	**8**	Air vent



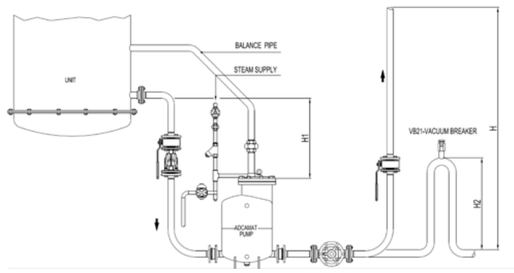
REMOVAL OF CONDENSATE UNDER PRESSURE WITH PUMP AND STEAM TRAP COMBINATION

The pump is installed in a closed loop with its vent connected to a pressurized reciever.
When steam pressure is sufficient to overcome backpressure, the steam trap operates. As soon as, e.g., the equipment's control valve starts to modulate, the steam pressure will decrease (even vacuum can occur). The lower differential pressure decreases the steam trap ability to discharge, causing the condensate level to rise inside the body of the pump. Once the pump float reaches its higher position, the intake valve opens and steam replaces the necessary positive pressure to pump out the condensate.



DRAINAGE OF A SINGLE UNIT UNDER VACUUM

This configuration works with units operating with a minimum absolute pressure of 0,2 bar.
For proper operation the filling head (H1) must range between 1 and 2 meters. The lift (H) must be as minimum as possible, but never less than 1 meter, otherwise a siphon with hight (H2) is required.
Steam must be used as motive medium, and its maximum pressure should not exceed 3 bar.



PRESSURE OPERATED PUMP
POP
(1" x 1" to 3" x 2" – DN 25 x 25 to DN 80 x 50)

DESCRIPTION

The ADCAMat POP pressure operated pump is recommended in the transfer of steam condensate, oils and other non-hazardous liquids compatible with the construction, to a higher elevation or pressure. Under certain conditions, it can drain a closed vessel under vacuum or pressure. The pump can be operated using steam, compressed air or other gases, and is manufactured in carbon steel or stainless steel.

OPERATION

Liquid flows by gravity into the pump through an inlet check valve, lifting the float. At this point, the motive fluid intake valve is closed while the vent valve is open. As the float reaches its highest position the motive fluid intake valve opens and the vent valve closes, allowing the motive fluid to enter the pump body. The pressure in the pump builds up just enough to overcome backpressure.
The pressurized liquid opens the outlet check valve and the discharge starts. The liquid discharged may be quantified through a special counter, enabling the pump to function as a reliable flow meter.
When the float reaches its lower position the motive fluid intake valve closes and the vent valve opens allowing the liquid to fill the pump once again, repeating the cycle.

MAIN FEATURES

Hardened stainless steel wear parts.
High-endurance inconel springs.
Low filling head to minimize installation space.
No electric requirements or NPSH issues.
Suitable for hazardous environments.
Low running costs.

OPTIONS: Level gauge.
Stroke counters.

USE: To lift steam condensate and other liquids compatible with the construction.

AVAILABLE MODELS: POPS – carbon steel.
POPSS – stainless steel.

SIZES: 1" x 1", 11/2" x 11/2", 2" x 2" and 3" x 2".
DN 25 x 25, DN 40 x 40, DN 50 x 50 and DN 80 x 50.

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. An example is shown in Fig. 1. See IMI – Installation and maintenance instructions.

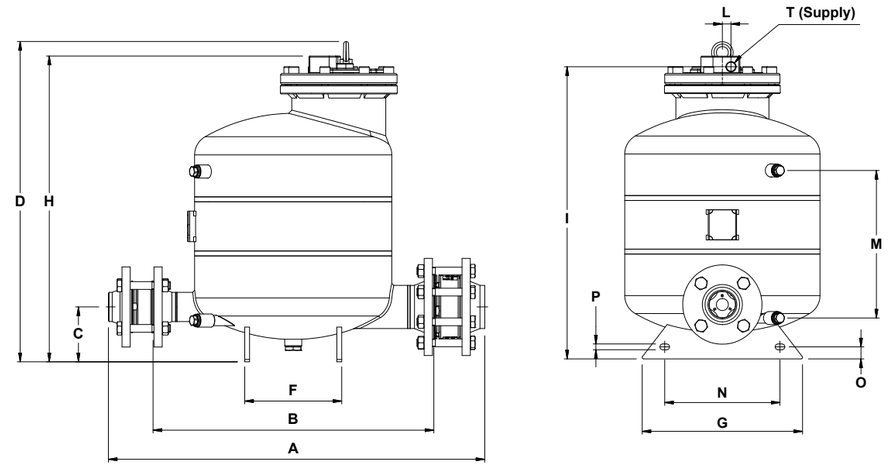
MOTIVE MEDIUM: Saturated steam, compressed air, nitrogen and other gases.

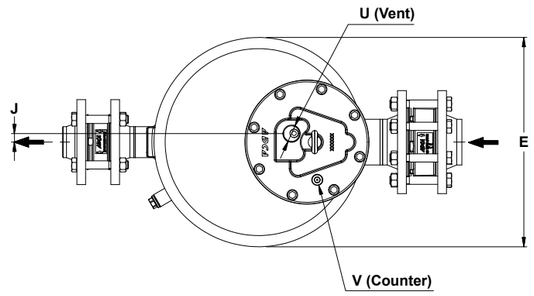
BODY LIMITING CONDITIONS *					
POPS			POPSS		
	ALLOW. PRESS.	RELAT. TEMP.		ALLOW. PRESS.	RELAT. TEMP.
PN 16	16 bar	50 ºC	PN 16	16 bar	50 ºC
	14 bar	100 ºC		15 bar	100 ºC
	13 bar	195 ºC		12,7 bar	200 ºC
	12 bar	250 ºC		12 bar	250 ºC
CLASS 150	16 bar	50 ºC	CLASS 150	15,3 bar	50 ºC
	14 bar	100 ºC		13,3 bar	100 ºC
	13 bar	195 ºC		11,1 bar	200 ºC
	12 bar	250 ºC		10,2 bar	250 ºC

* Rating according to EN 1092-1:2018.

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

LIMITING CONDITIONS	
Liquid specific gravity	0,8 to 1
Maximum viscosity	5 ºEngler
Maximum motive inlet pressure	10 bar
Minimum motive inlet pressure	0,5 bar
Maximum operating temperature	185 ºC
Minimum operating temperature	0 ºC
Pump discharge per cycle	16 L
Pump discharge per cycle (3" x 2" – DN 80 x 50)	25 L





DIMENSIONS (mm)																			
SIZE	A *	B *	C	D	E	F	G	H	I	J	L	M	N	O	P	T **	U **	V **	WGT. (kg)	VOL. (L)
1" x 1" DN 25 x 25	578	444	100	640	323	160	244	617	598	17	18	327	150	25	12	1/2"	1"	1/2"	71	31,7
11/2" x 11/2" DN 40 x 40	615	454	100	640	323	160	244	617	598	17	18	327	150	25	12	1/2"	1"	1/2"	72,8	31.8
2" x 2" DN 50 x 50	644	460	100	640	323	160	244	617	598	17	18	327	150	25	12	1/2"	1"	1/2"	74,5	31,9
3" x 2" DN 80 x 50	776	580	113	650	406	200	334	627	608	17	18	307	240	25	12	1/2"	1"	1/2"	78,5	48,9

* With EN 1092-1 welding neck flanges. Dimensions may differ if ASME B16.5 flanges or ISO 7 Rp female threaded flanges are requested. Consult the manufacturer.
** As standard, in versions manufactured with EN 1092-1 PN 16 flanges, these connections are female threaded ISO 7 Rp. In versions with ASME B16.5 flanges, these connections are female threaded NPT.

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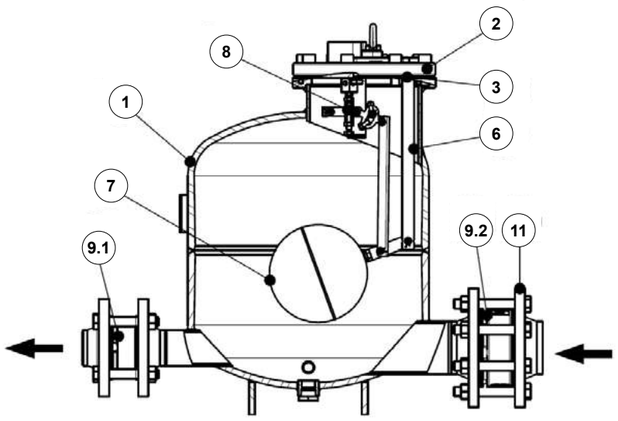
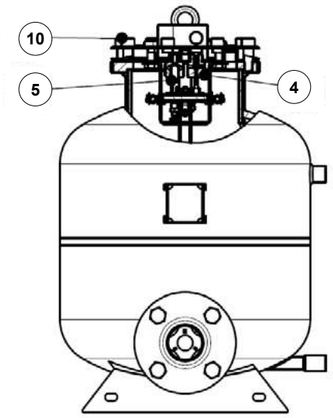




MATERIALS			
POS. Nº	**DESIGNATION**	**POPS**	**POPSS**
1	Pump body	P265GH / 1.0425; P235GH / 1.0345; S235JR / 1.0038	AISI 316 / 1.4401; AISI 304 / 1.4301
2	Cover	GJS-400-15 / 0.7040; A216 WCB / 1.0619	A351 CF8M / 1.4408
3	* Cover gasket	Stainless steel / Graphite	Stainless steel / Graphite
4	* Intake 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 pcs.)	Inconel	Inconel
9.1	* Outlet check valve	A351 CF8M / 1.4408	A351 CF8M / 1.4408
9.2	* Inlet check valve	A351 CF8M / 1.4408	A351 CF8M / 1.4408
10	Bolts	Steel 8.8	Stainless steel A2-70
11	Counter flanges	P250GH / 1.0460	AISI 316 / 1.4401

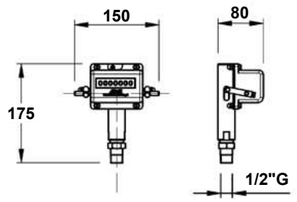
* Available spare parts.

STROKE COUNTER

A stroke counter can be screwed onto a respective female threaded connection on the pump cover. Mechanical and digital versions are available. The mechanical version requires that the following conditions are met.

LIMITING CONDITIONS *	
Minimum motive pressure (steam)	6 bar
Minimum motive pressure (compressed air and nitrogen)	5 bar
Minimum system backpressure (steam)	700 mbar *
Minimum system backpressure (compressed air and nitrogen)	700 mbar *

* The pump outlet check valve can be supplied with a stronger spring to simulate increased system backpressure. Consult manufacturer.



The digital version is composed of sensor and remote stroke counter. The device can be tailor made to meet customer requirements and is not dependent on the process condition. The standard unit is battery powered, features an LCD display and optional volt-free output connection for remote monitorization. Consult manufacturer.

SIZING

To accurately size a pressure operated pump, the following information must be provided:

1. The condensate load (kg/h).

2. The operating medium (steam, compressed air or other gases) and its pressure.

3. The total lift or backpressure in bar 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 caused by pipe friction and other system components.

4. Available filling head (see Fig. 1) in mm or any other dimension that allows its determination.

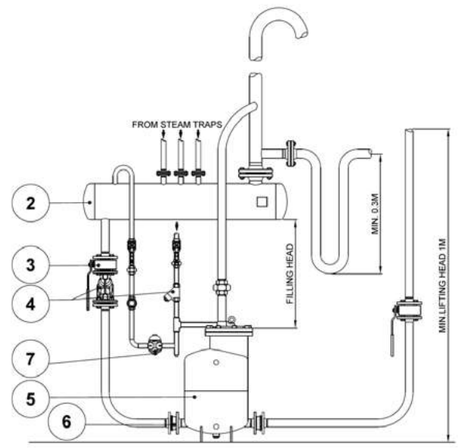


Fig. 1

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
2	Receiver	**5**	Pump
3	Ball valve	**6**	Disc check valve
4	Y strainer	**7**	Steam trap

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

Table 1

CAPACITY CORRECTION FACTORS FOR FILLING HEADS OTHER THAN 300 mm				
PUMP SIZE	**FILLING HEAD (mm)**			
	150	**300**	**600**	**900**
1" x 1" DN 25 x 25	0,7	1	1,2	1,35
11/2" x 11/2" DN 40 x 40	0,7	1	1,2	1,35
2" x 2" DN 50 x 50	0,7	1	1,2	1,35
3" x 2" DN 80 x 50	0,9	1	1,08	1,2

Table 2

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 definable length of large diameter pipe can be used.
Suggested receiver sizes are shown in Table 3.

RECEIVER				
PUMP SIZE	**1" x 1" DN 25 x 25**	**11/2" x 11/2" DN 40 x 40**	**2" x 2" DN 50 x 50**	**3" x 2" DN 80 x 50**
Pipe size with 1 m lenght	6"	6"	8"	10"

Table 3

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FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER					
MOTIVE PRESSURE (bar)	**TOTAL LIFT (bar)**	**1" x 1" DN 25 x 25**	**11/2" x 11/2" DN 40 x 40**	**2" x 2" DN 50 x 50**	**3" x 2" DN 80 x 50**
1	0,35	840	1490	2320	4480
2		1030	1520	3160	5240
3		1140	1640	3560	5640
4		1180	1680	3840	5840
5		1240	1740	3910	5900
6		1270	1760	3940	5980
8		1300	2200	3990	6030
10		1310	2205	4000	6080
2	1	805	1560	2550	4080
3		940	1790	2990	4720
4		1080	1930	3160	5080
5		1110	2010	3200	5280
6		1140	2090	3250	5400
8		1180	2190	3280	5490
10		1190	2200	3320	5560
3	2	780	1495	2470	3510
4		900	1690	2620	3950
5		1000	1820	2830	4230
6		1040	1910	2860	4740
8		1100	2010	2880	4880
10		1110	2060	2900	4960
4	3	740	1400	2360	3480
5		860	1545	2540	3640
6		910	1675	2560	3720
8		970	1805	2590	4050
10		980	1850	2650	4110
5	4	720	1335	2280	2690
6		820	1480	2460	2860
8		910	1675	2500	3190
10		930	1760	2540	3380
6	5	680	1290	2080	2520
8		740	1530	2180	2740
10		810	1630	2220	2860
7	6	660	1230	1880	1940
8		730	1370	1940	2240
10		820	1490	2150	2360

Table 4 (based on liquid specific gravity of 0,9 to 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

Filling head correction:
With 150 mm filling head the correction factor from Table 2 is 0,7. The corrected capacity is thus 2590 kg/h x 0,7 = 1813 kg/h.

Calculations:
Total backpressure: 1,5 bar + (6 m x 0,0981) = 2,09 bar.
Assuming steam as motive medium at a pressure of 8 bar and a total backpressure of 3 bar, then according to Table 4 a DN 50 x 50 pump, with a capacity of 2590 kg/h, is the recommended size.

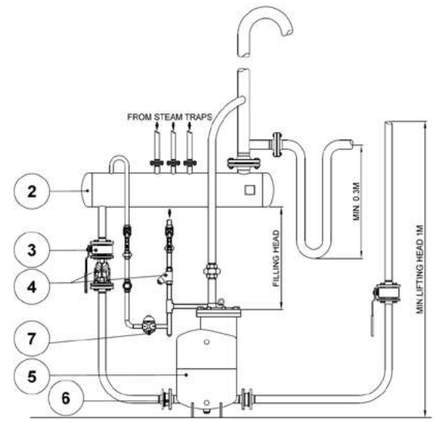
Correction for air as a motive medium:
The % backpressure is 2,09 bar / 8 bar = 30%.
The correction factor from Table 1 is 1,08.
The corrected capacity is thus 1813 kg/h x 1,08 = 1958 kg/h, and so, a DN 50 x 50 pump is still the recommended size.

TYPICAL APPLICATIONS

CONDENSATE RECOVERY IN A OPEN LOOP SYSTEM

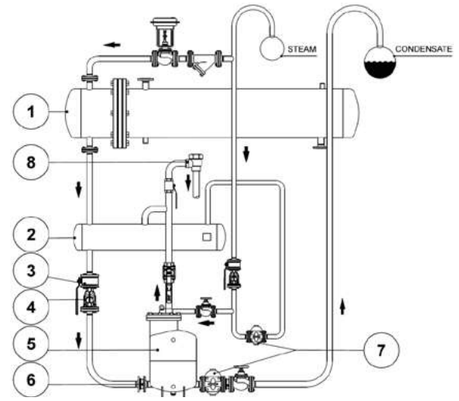
The pump transfers high temperature condensate without cavitation problems.
The vent line must be unrestricted and self draining to the receiver.

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
1	Heat exchanger	**5**	Pump
2	Receiver	**6**	Disc check valve
3	Ball valve	**7**	Steam trap
4	Y strainer	**8**	Air vent



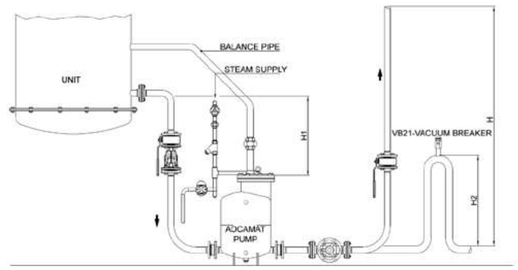
REMOVAL OF CONDENSATE UNDER PRESSURE WITH PUMP AND STEAM TRAP COMBINATION

The pump is installed in a closed loop with its vent connected to a pressurized reciever.
When steam pressure is sufficient to overcome backpressure, the steam trap operates. As soon as, e.g., the equipment's control valve starts to modulate, the steam pressure will decrease (even vacuum can occur). The lower differential pressure decreases the steam trap ability to discharge, causing the condensate level to rise inside the body of the pump. Once the pump float reaches its higher position, the intake valve opens and steam replaces the necessary positive pressure to pump out the condensate.



DRAINAGE OF A SINGLE UNIT UNDER VACUUM

This configuration works with units operating with a minimum absolute pressure of 0,2 bar.
For proper operation the filling head (H1) must range between 1 and 2 meters. The lift (H) must be as minimum as possible, but never less than 1 meter, otherwise a siphon with hight (H2) is required.
Steam must be used as motive medium, and its maximum pressure should not exceed 3 bar.



PRESSURE OPERATED PUMP
PPO14

DESCRIPTION

The ADCAMat PPO14 pressure operated pump is recommended in the transfer of steam condensate, oils and other non-hazardous liquids compatible with the construction, to a higher elevation or pressure.
Under certain conditions, it can drain a closed vessel under vacuum or pressure.
The pump can be operated using steam, compressed air or other gases, and is manufactured in carbon steel or stainless steel.

OPERATION

Liquid flows by gravity into the pump through an inlet check valve, lifting the float. At this point, the motive fluid intake valve is closed while the vent valve is open. As the float reaches its highest position the motive fluid intake valve opens and the vent valve closes, allowing the motive fluid to enter the pump body. The pressure in the pump builds up just enough to overcome backpressure.
The pressurized liquid opens the outlet check valve and the discharge starts. The liquid discharged may be quantified through a special counter, enabling the pump to function as a reliable flow meter.
When the float reaches its lower position the motive fluid intake valve closes and the vent valve opens allowing the liquid to fill the pump once again, repeating the cycle.

MAIN FEATURES

Hardened stainless steel wear parts.
High-endurance inconel springs.
Low filling head to minimize installation space.
No electric requirements or NPSH issues.
Suitable for hazardous environments.
Low running costs.

OPTIONS: Level gauge.
Stroke counters.

USE: To lift steam condensate and other liquids compatible with the construction.

AVAILABLE MODELS: PPO14S – carbon steel.
PPO14SS – stainless steel.

SIZES: 1" x 1", 11/2" x 11/2" and 2" x 2".
DN 25 x 25, DN 40 x 40 and DN 50 x 50.

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. An example is shown in Fig. 1. See IMI – Installation and maintenance instructions.

MOTIVE MEDIUM: Saturated steam, compressed air, nitrogen and other gases.

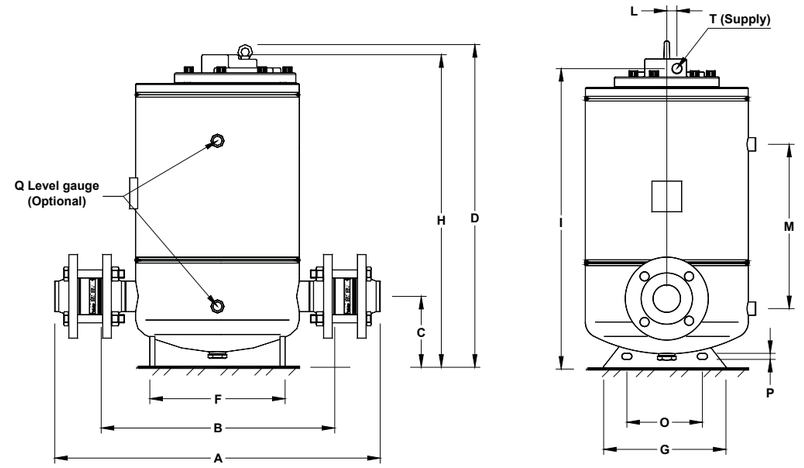
BODY LIMITING CONDITIONS *

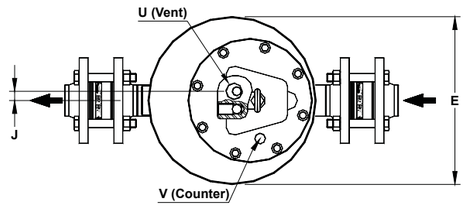
PPO14S			PPO14SS		
	ALLOW. PRESS.	RELAT. TEMP.		ALLOW. PRESS.	RELAT. TEMP.
PN 16	16 bar	50 ºC	PN 16	16 bar	50 ºC
	14 bar	100 ºC		15 bar	100 ºC
	13 bar	195 ºC		12,7 bar	200 ºC
	12 bar	250 ºC		12 bar	250 ºC
CLASS 150	16 bar	50 ºC	CLASS 150	15,3 bar	50 ºC
	14 bar	100 ºC		13,3 bar	100 ºC
	13 bar	195 ºC	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

* Rating according to EN 1092-1:2018.

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

LIMITING CONDITIONS	
Liquid specific gravity	0,8 to 1
Maximum viscosity	5 ºEngler
Maximum motive inlet pressure	10 bar
Minimum motive inlet pressure	0,5 bar
Maximum operating temperature	185 ºC
Minimum operating temperature	0 ºC
Pump discharge per cycle	16 L





DIMENSIONS (mm)

SIZE	A *	B *	C	D	E	F	G	H	I	J	L	M	O	P	Q	T **	U **	V **	WGT. (kg)	VOL. (L)
1" x 1" DN 25 x 25	578	444	140	640	323	268	250	617	598	17	18	327	150	12	1/2"	1/2"	1"	1/2"	75	32,2
11/2" x 11/2" DN 40 x 40	615	454	140	640	323	268	250	617	598	17	18	327	150	12	1/2"	1/2"	1"	1/2"	72	32,3
2" x 2" DN 50 x 50	644	460	140	640	323	268	250	617	598	17	18	327	150	12	1/2"	1/2"	1"	1/2"	66	32,5

* With EN 1092-1 welding neck flanges. Dimensions may differ if ASME B16.5 flanges or ISO 7 Rp female threaded flanges are requested. Consult the manufacturer.
** As standard, in versions manufactured with EN 1092-1 PN 16 flanges, these connections are female threaded ISO 7 Rp. In versions with ASME B16.5 flanges, these connections are female threaded NPT.

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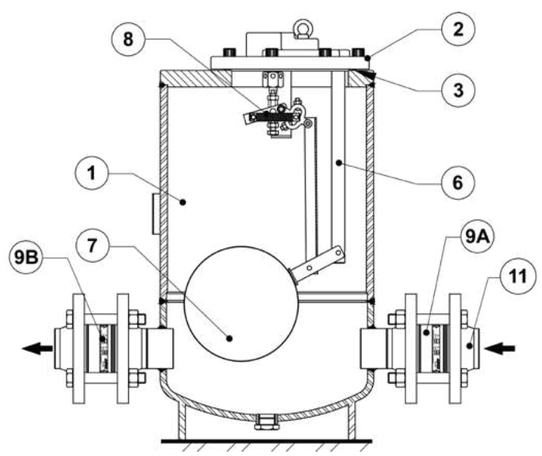
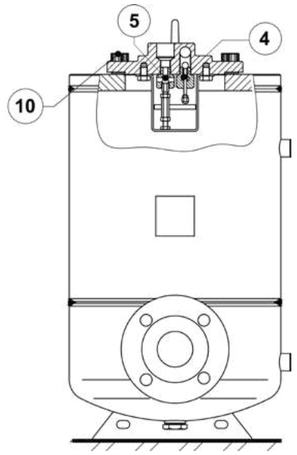
IS 9.102 E 18.09





MATERIALS			
POS. Nº	**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	Stainless steel / Graphite	Stainless steel / Graphite
4	* Intake 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 pcs.)	Inconel	Inconel
9.1	* Outlet check valve	CF8M / 1.4408	CF8M / 1.4408
9.2	* Inlet check valve	CF8M / 1.4408	CF8M / 1.4408
10	Bolts	Steel 8.8	Stainless steel A2-70
11	Counter flanges	P250GH / 1.0460	AISI 316 / 1.4401

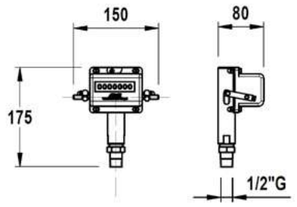
* Available spare parts.

STROKE COUNTER

A stroke counter can be screwed onto a respective female threaded connection on the pump cover. Mechanical and digital versions are available. The mechanical version requires that the following conditions are met.

LIMITING CONDITIONS *	
Minimum motive pressure (steam)	6 bar
Minimum motive pressure (compressed air and nitrogen)	5 bar
Minimum system backpressure (steam)	700 mbar *
Minimum system backpressure (compressed air and nitrogen)	700 mbar *

* The pump outlet check valve can be supplied with a stronger spring to simulate increased system backpressure. Consult manufacturer.



The digital version is composed of sensor and remote stroke counter. The device can be tailor made to meet customer requirements and is not dependent on the process condition. The standard unit is battery powered, features an LCD display and optional volt-free output connection for remote monitorization. Consult manufacturer.

SIZING

To accurately size a pressure operated pump, the following information must be provided:

1. The condensate load (kg/h).

2. The operating medium (steam, compressed air or other gases) and its pressure.

3. The total lift or backpressure in bar 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 caused by pipe friction and other system components.

4. Available filling head (see Fig. 1) in mm or any other dimension that allows its determination.

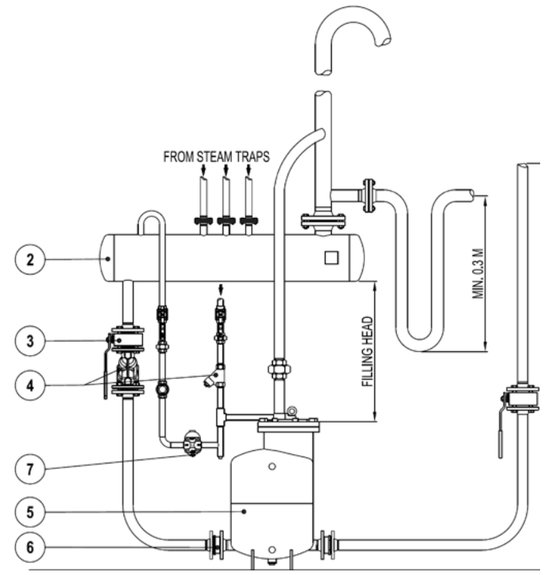


Fig. 1

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
2	Receiver	**5**	Pump
3	Ball valve	**6**	Disc check valve
4	Y strainer	**7**	Steam trap

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

Table 1

CAPACITY CORRECTION FACTORS FOR FILLING HEADS OTHER THAN 300 mm				
PUMP SIZE	**FILLING HEAD (mm)**			
	150	**300**	**600**	**900**
1" x 1" DN 25 x 25	0,7	1	1,2	1,35
11/2" x 11/2" DN 40 x 40	0,7	1	1,2	1,35
2" x 2" DN 50 x 50	0,7	1	1,2	1,35

Table 2

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 definable length of large diameter pipe can be used.
Suggested receiver sizes are shown in Table 3.

RECEIVER			
PUMP SIZE	**1" x 1" DN 25 x 25**	**11/2" x 11/2" DN 40 x 40**	**2" x 2" DN 50 x 50**
Pipe size with 1 m lenght	6”	6”	8”

Table 3

FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER				
MOTIVE PRESSURE (bar)	**TOTAL LIFT (bar)**	**1" x 1" DN 25 x 25**	**11/2" x 11/2" DN 40 x 40**	**2" x 2" 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		1110	2060	2900
4	3	740	1400	2360
5		860	1545	2540
6		910	1675	2560
8		970	1805	2590
10		980	1850	2650
5	4	720	1335	2280
6		820	1480	2460
8		910	1675	2500
10		930	1760	2540
6	5	680	1290	2080
8		740	1530	2180
10		810	1630	2220
7	6	660	1230	1880
8		730	1370	1940
10		820	1490	2150

Table 4 (based on liquid specific gravity of 0,9 to 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

Filling head correction:
With 150 mm filling head the correction factor from Table 2 is 0,7. The corrected capacity is thus 2590 kg/h x 0,7 = 1813 kg/h.

Calculations:
Total backpressure: 1,5 bar + (6 m x 0,0981) = 2,09 bar.
Assuming steam as motive medium at a pressure of 8 bar and a total backpressure of 3 bar, then according to Table 4 a DN 50 x 50 pump, with a capacity of 2590 kg/h, is the recommended size.

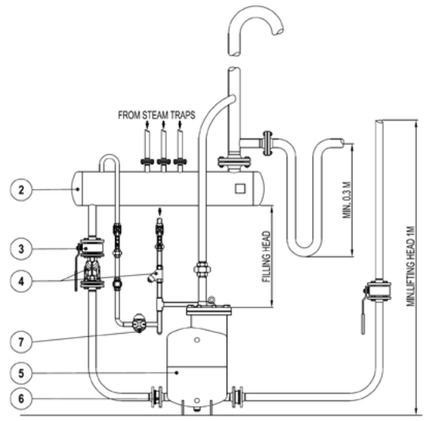
Correction for air as a motive medium:
The % backpressure is 2,09 bar / 8 bar = 30%.
The correction factor from Table 1 is 1,08.
The corrected capacity is thus 1813 kg/h x 1,08 = 1958 kg/h, and so, a DN 50 x 50 pump is still the recommended size.

TYPICAL APPLICATIONS

CONDENSATE RECOVERY IN A OPEN LOOP SYSTEM

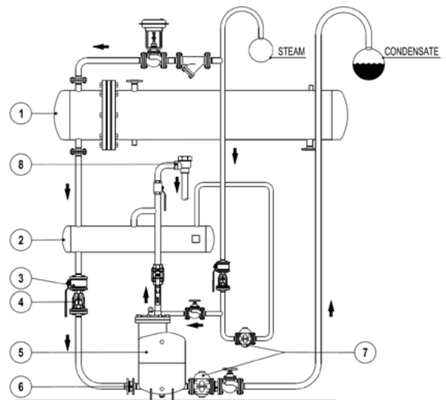
The pump transfers high temperature condensate without cavitation problems.
The vent line must be unrestricted and self draining to the receiver.

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
1	Heat exchanger	**5**	Pump
2	Receiver	**6**	Disc check valve
3	Ball valve	**7**	Steam trap
4	Y strainer	**8**	Air vent



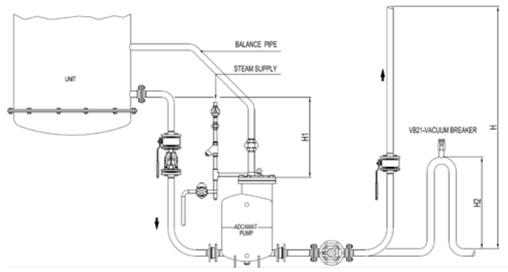
REMOVAL OF CONDENSATE UNDER PRESSURE WITH PUMP AND STEAM TRAP COMBINATION

The pump is installed in a closed loop with its vent connected to a pressurized reciever.
When steam pressure is sufficient to overcome backpressure, the steam trap operates. As soon as, e.g., the equipment's control valve starts to modulate, the steam pressure will decrease (even vacuum can occur). The lower differential pressure decreases the steam trap ability to discharge, causing the condensate level to rise inside the body of the pump. Once the pump float reaches its higher position, the intake valve opens and steam replaces the necessary positive pressure to pump out the condensate.



DRAINAGE OF A SINGLE UNIT UNDER VACUUM

This configuration works with units operating with a minimum absolute pressure of 0,2 bar.
For proper operation the filling head (H1) must range between 1 and 2 meters. The lift (H) must be as minimum as possible, but never less than 1 meter, otherwise a siphon with hight (H2) is required.
Steam must be used as motive medium, and its maximum pressure should not exceed 3 bar.



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IS 9.102 E 18.09

ADCAMAT PACKAGED AUTOMATIC PUMP
(Suitable for steam supply)
POPS-K (Simplex)

DESCRIPTION

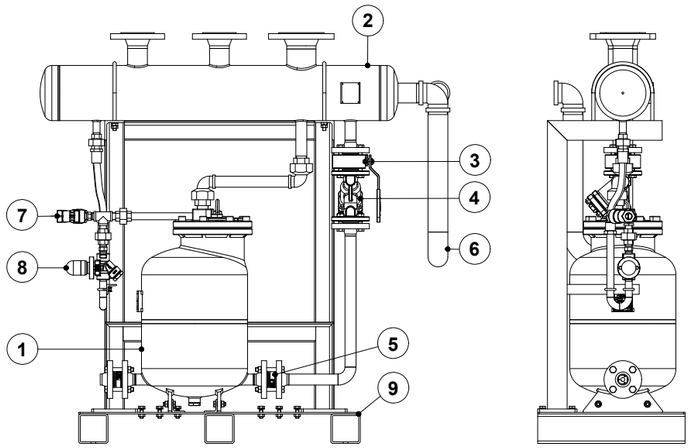
The ADCAMat POPS-K packaged pump units can be used to lift or displace hot condensate and other liquids even in hazardous areas.
The unit is comprised by an ADCAMat POP, a vented receiver and all auxiliary items, compactly mounted on a metal frame, piped and ready for connection.
Packaged units save time, work and site costs. In addition, they ensure that the installation of the pump is correct in every detail.
Two or more units can be connected in parallel to cope with flow rates beyond the capacity of a single pump.
Packaged units for operation with compressed air are also available.
All connections are flanged EN 1092-1 PN 16. Flanged ASME B16.5 Class 150 on request.
Threaded flanges and/or other connection standards available on request.
For operating conditions and pumping capacities, please refer to the information sheet IS 9.101.

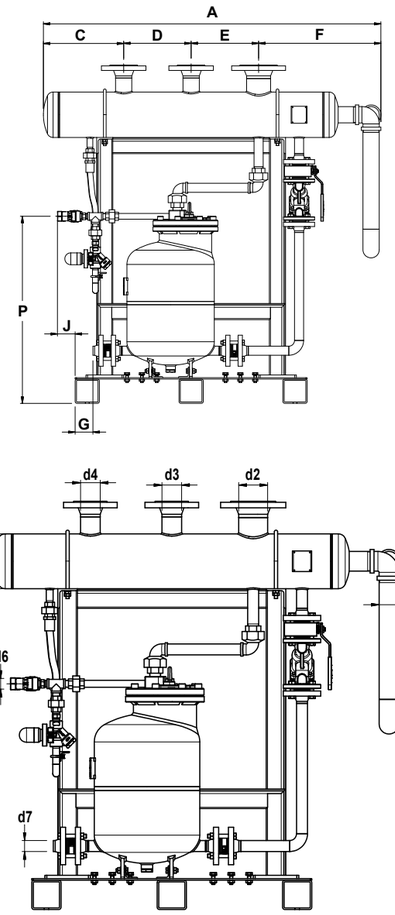
How to order: i.e. ADCAMat POPS-K carbon steel packaged pump, steam operated, flanged PN 16 DN 40.

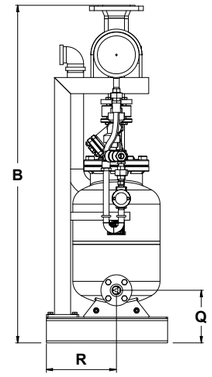
CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	**Category**
All sizes	2 (CE marked)

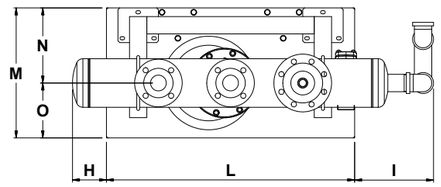
LIMITING CONDITIONS	
Receiver – Maximum operating pressure	0,5 bar
Pump	See IS 9.101

MATERIALS	
POS. Nº	**DESIGNATION**
1	POPS pump
2	Receiver
3	MWS1 wafer ball valve
4	IS16F strainer
5	RD40 disc check valve
6	Overflow
7	IS140 Y strainer
8	UCX41 + UBS20 steam trap
9	Metal frame









CONNECTIONS SIZE							
SIZE	**d1 (mm)**	**d2 ***	**d3 ***	**d4 ***	**d5**	**d6**	**d7 ****
DN 25	168	3" – DN 80	2" – DN 50	2" – DN 50	2"	1/2"	1" – DN 25
DN 40	168	3" – DN 80	2" – DN 50	2" – DN 50	2"	1/2"	11/2" – DN 40
DN 50	220	3" – DN 80	2" – DN 50	2" – DN 50	2"	1/2"	2" – DN 50
DN 80 x 50	273	4" – DN 100	21/2" – DN 65	21/2" – DN 65	2"	1/2"	2" – DN 50

d2 – vent; d3 and d4 – condensate inlets; d5 – overflow.
* Threaded connections on request.
** Welding neck flange. Threaded connections on request.

DIMENSIONS (mm)																	
SIZE	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**
DN 25	1251	1254	298	250	250	454	66	118	274	66	860	450	260	190	693	195	260
DN 40	1251	1254	298	250	250	454	46	118	274	66	860	450	260	190	693	195	260
DN 50	1289	1304	316	250	250	473	32	136	293	72	860	450	260	190	693	195	260
DN 80 x 50	1367	1368	175	330	330	532	13	125	282	3	960	535	309	226	703	208	309

Dimensions subject to change without notice. Consult manufacturer for certified dimensions and weight.

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IS 9.111 E 04.19

ADCAMAT PACKAGED AUTOMATIC PUMP
(Suitable for steam supply)
POPS-KD (Duplex)

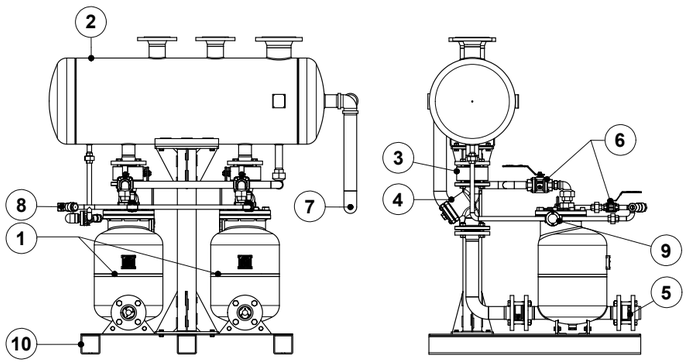
DESCRIPTION

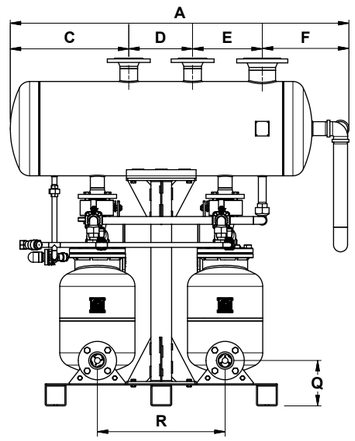
The POPS-K packaged pump units can be used to lift or displace hot condensate and other liquids even in hazardous areas.
A POPS-KD (Duplex) packaged unit is comprised by two ADCAMat pumps in parallel, a vented receiver and all auxiliary items, compactly mounted on a metal frame, piped and ready for connection.
Packaged units save time, work and site costs. In addition, they ensure that the installation of the pump is correct in every detail.
Two or more units can be connected in parallel to cope with flow rates beyond the capacity of a single pump.
Packaged units for operation with compressed air are also available.
All connections are flanged EN 1092-1 PN 16.
Threaded flanges and/or other connection standards available on request.
For operating conditions and pumping capacities, please refer to the information sheet IS 9.101 E.

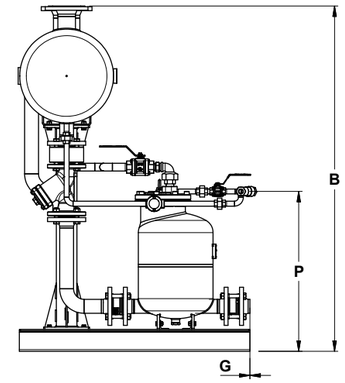
How to order: i.e. ADCAMAT POPS-KD carbon steel packaged pump, steam operated, flanged PN 16 DN 80 x 50.

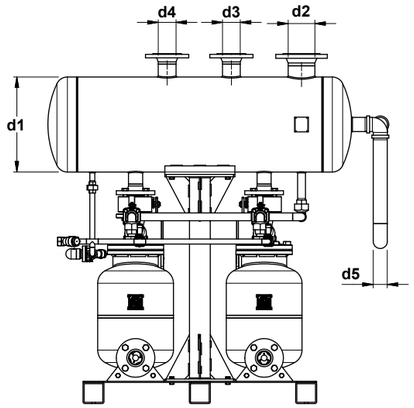
CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	**Category**
All sizes	2 (CE marked)

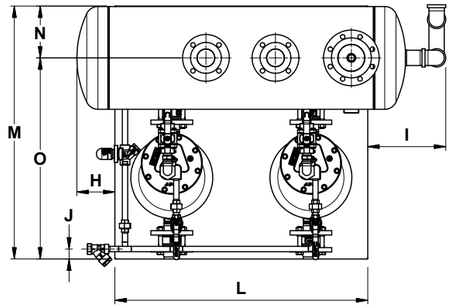
MATERIALS	
POS. Nº	**DESIGNATION**
1	POPS pumps
2	Receiver
3	MWS1 wafer ball valve
4	IS16F strainer
5	RD40 disc check valve
6	M3i ball valves
7	Overflow
8	IS140 Y strainer
9	UCX41 + UBS20 steam trap
10	Metal frame











CONNECTIONS SIZE					
SIZE	**d1 (mm)**	**d2**	**d3**	**d4**	**d5**
2 x DN 50x50	406	DN 100	DN 65	DN 65	2”
2 x DN 80x50	406	DN 150	DN 80	DN 80	2”

d2 – vent; d3 and d4 – condensate inlets; d5 – overflow.

LIMITING CONDITIONS	
Receiver – Max. operating pressure	0,5 bar
Pump	See IS 9.101

DIMENSIONS (mm)																	
SIZE	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**
2 x DN 50x50	1460	1497	510	275	300	374	–	150	309	31	1000	1000	205	795	693	195	550
2 x DN 80x50	1509	1509	555	275	300	378	96	175	303	44	1000	1000	205	795	703	208	550

Dimensions subject to change without notice. Consult manufacturer for certified dimensions and weight.

We reserve the right to change the design and material of this product without notice.
IS 9.112 E 03.19

ADCAMAT PACKAGED AUTOMATIC PUMP
(Suitable for steam supply)
POPS-KT (Triplex)

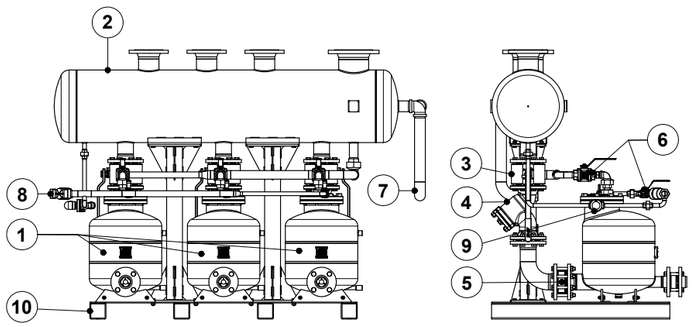
DESCRIPTION

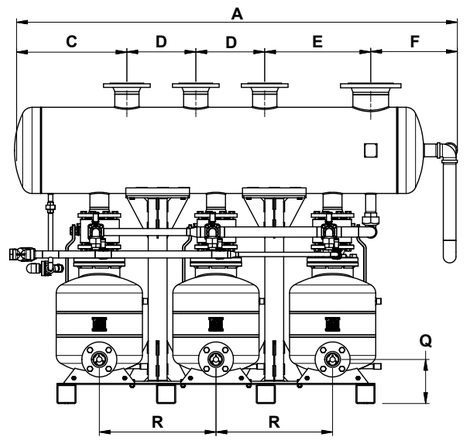
The POPS-K packaged pump units can be used to lift or displace hot condensate and other liquids even in hazardous areas.
A POPS-KT (Triplex) packaged unit is comprised by three Adcamat pumps in parallel, a vented receiver and all auxiliary items, compactly mounted on a metal frame, piped and ready for connection.
Packaged units save time, work and site costs. In addition, they ensure that the installation of the pump is correct in every detail.
Two or more units can be connected in parallel to cope with flow rates beyond the capacity of a single pump.
Packaged units for operation with compressed air are also available.
All connections are flanged EN 1092-1 PN 16.
Threaded flanges and/or other connection standards available on request.
For operating conditions and pumping capacities, please refer to the information sheet IS 9.101 E.

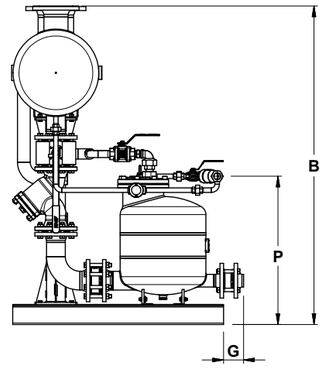
How to order: i.e. ADCAMAT POPS-KD carbon steel packaged pump, steam operated, flanged PN 16 DN 80 x 50.

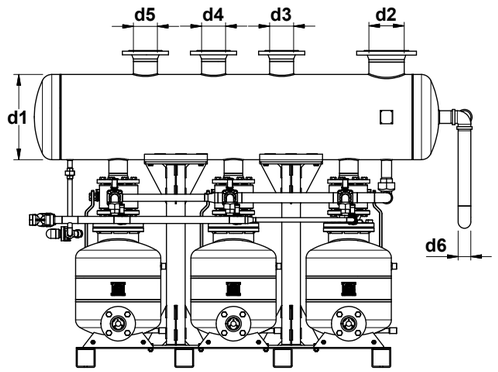
CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	**Category**
All sizes	2 (CE marked)

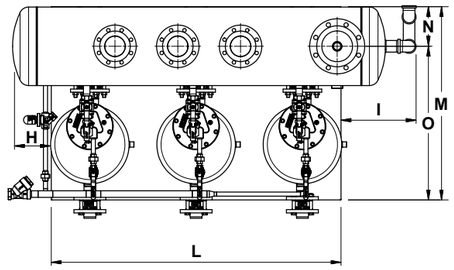
MATERIALS	
POS. Nº	**DESIGNATION**
1	POPS pumps
2	Receiver
3	MWS1 wafer ball valve
4	IS16F strainer
5	RD40 disc check valve
6	M3i ball valves
7	Overflow
8	IS140 Y strainer
9	UCX41 + UBS20 steam trap
10	Metal frame











CONNECTIONS SIZE						
SIZE	**d1 (mm)**	**d2**	**d3**	**d4**	**d5**	**d6**
3 x DN 50x50	406	DN 150	DN 80	DN 80	DN 80	2”
3 x DN 80x50	406	DN 150	DN 100	DN 100	DN 100	2”

d2 – vent; d3, d4 and d5 – condensate inlets; d6 – overflow.

LIMITING CONDITIONS	
Receiver – Max. operating pressure	0,5 bar
Pump	See IS 9.101

DIMENSIONS (mm)																		
SIZE	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**L**	**M**	**N**	**O**	**P**	**Q**	**R**
3 x DN 50x50	2088	1497	530	325	500	408	–	200	388	1500	1000	205	795	693	195	550	550
3 x DN 80x50	2088	1509	530	325	500	408	95	200	388	1500	1000	205	795	709	208	550	550

Dimensions subject to change without notice. Consult manufacturer for certified dimensions and weight.

We reserve the right to change the design and material of this product without notice.
IS 9.113 E 03.19

PRESSURE OPERATED PUMP
POP
(4" x 4" – DN 100 x 100)

DESCRIPTION

The ADCAMat POP pressure operated pump is recommended in the transfer of steam condensate, oils and other non-hazardous liquids compatible with the construction, to a higher elevation or pressure.
Under certain conditions, it can drain a closed vessel under vacuum or pressure.
The pump can be operated using steam, compressed air or other gases, and is manufactured in carbon steel.

OPERATION

Liquid flows by gravity into the pump through an inlet check valve, lifting the float. At this point, the motive fluid intake valve is closed while the vent valve is open. As the float reaches its highest position the motive fluid intake valve opens and the vent valve closes, allowing the motive fluid to enter the pump body. The pressure in the pump builds up just enough to overcome backpressure.
The pressurized liquid opens the outlet check valve and the discharge starts. The liquid discharged may be quantified through a special counter, enabling the pump to function as a reliable flow meter.
When the float reaches its lower position the motive fluid intake valve closes and the vent valve opens allowing the liquid to fill the pump once again, repeating the cycle.

MAIN FEATURES

Hardened stainless steel wear parts.
High-endurance inconel springs.
Low filling head to minimize installation space.
No electric requirements or NPSH issues.
Suitable for hazardous environments.
Low running costs.

OPTIONS: Level gauge.
Stroke counters.

USE: To lift steam condensate and other liquids compatible with the construction.

AVAILABLE MODELS: POPS – carbon steel.

SIZES: 4" x 4"; DN 100 x 100

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. An example is shown in Fig. 1. See IMI – Installation and maintenance instructions.

MOTIVE MEDIUM: Saturated steam, compressed air, nitrogen and other gases.

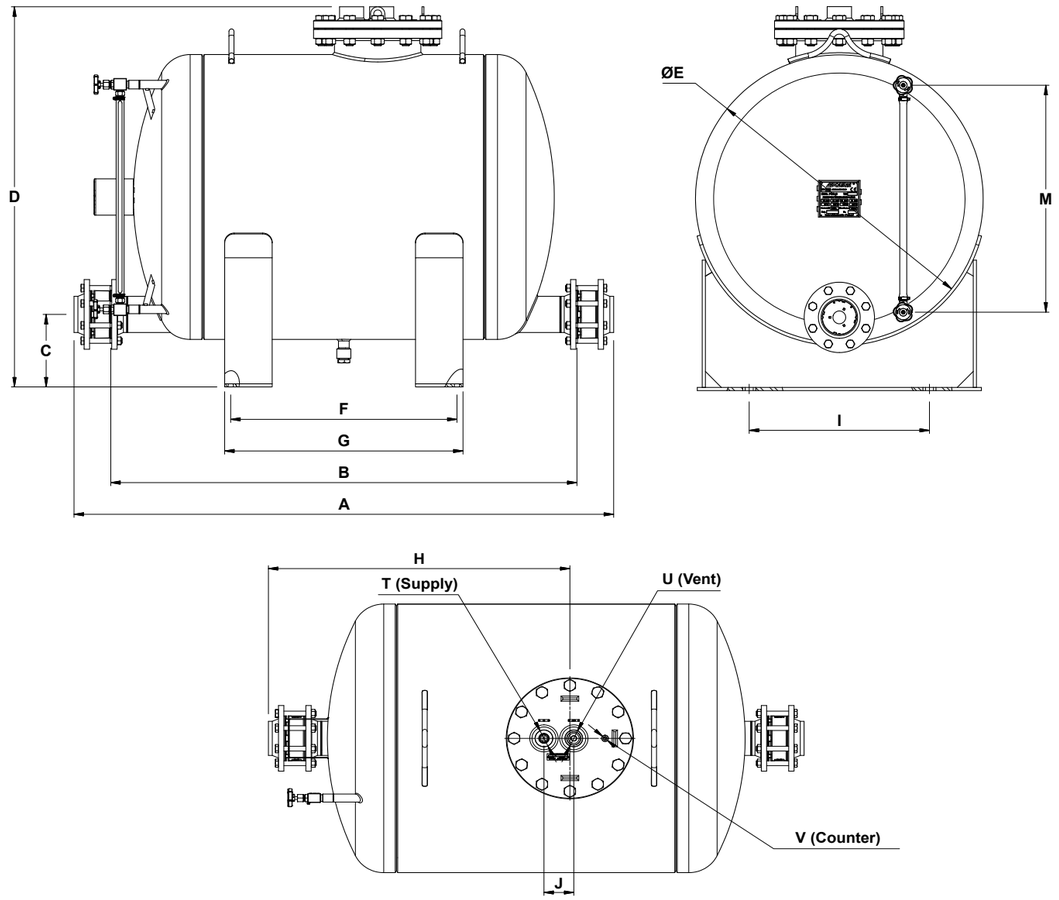
BODY LIMITING CONDITIONS *		
	ALLOWABLE PRESSURE	RELATED TEMPERATURE
PN 16	16 bar	50 ºC
	14 bar	100 ºC
	13 bar	195 ºC
	12 bar	250 ºC
CLASS 150	16 bar	50 ºC
	13 bar	195 ºC

* Rating according to EN 1092-1:2018.

CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	Category
All sizes	4 (CE marked)

LIMITING CONDITIONS	
Liquid specific gravity	0,8 to 1
Maximum viscosity	5 ºEngler
Maximum motive inlet pressure	10 bar
Minimum motive inlet pressure	1 bar
Maximum operating temperature	185 ºC
Minimum operating temperature *	20 ºC
Pump discharge per cycle	325 L

* Lower limits on request.



DIMENSIONS (mm)																
SIZE	A *	B *	C	D	E	F	G	H	I	J	M	T **	U **	V **	WGT. (kg)	VOL. (L)
4" x 4" DN 100 x 100	1705	1473	229	1200	900	715	753	960	564	95	710	2"	2"	1/2"	565	1028

* With EN 1092-1 welding neck flanges. Dimensions may differ if ASME B16.5 flanges or ISO 7 Rp female threaded flanges are requested. Consult the manufacturer.
** As standard, in versions manufactured with EN 1092-1 PN 16 flanges, these connections are female threaded ISO 7 Rp. In versions with ASME B16.5 flanges, these connections are female threaded NPT.

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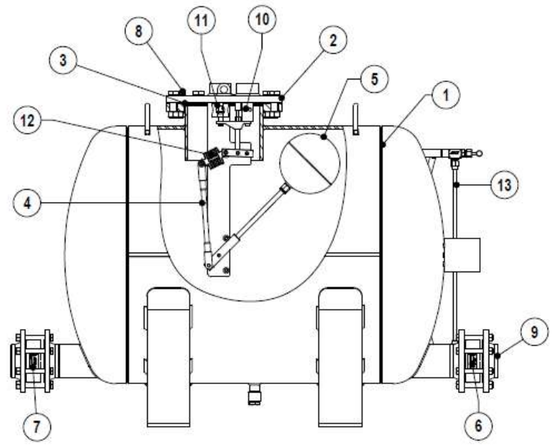
IS 9.120 E 07.19



MATERIALS		
POS. Nº	**DESIGNATION**	**MATERIAL**
1	Pump body	P265GH / 1.0425; P235GH / 1.0345; S235JR / 1.0038
2	Cover	GJS-400-15 / 0.7040
3	* Cover gasket	Stainless steel / Graphite
4	Internal mechanism	Stainless steel
5	* Float	Stainless steel
6	* Outlet check valve	A351 CF8M / 1.4408
7	* Inlet check valve	A351 CF8M / 1.4408
8	Bolts	Steel 8.8
9	Counter flanges	P250GH / 1.0460
10	* Intake valve/seat assembly	Stainless steel
11	* Exhaust valve/seat assembly	Stainless steel
12	* Springs	Inconel
13	** Level gauge cocks / Glass	See IS LGC400.10

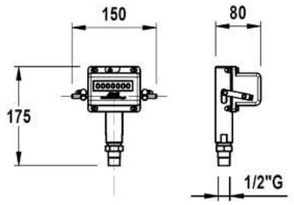
* Available spare parts. ** Optional.

STROKE COUNTER

A stroke counter can be screwed onto a respective female threaded connection on the pump cover. Mechanical and digital versions are available. The mechanical version requires that the following conditions are met.

LIMITING CONDITIONS *	
Minimum motive pressure (steam)	6 bar
Minimum motive pressure (compressed air and nitrogen)	5 bar
Minimum system backpressure (steam)	700 mbar *
Minimum system backpressure (compressed air and nitrogen)	700 mbar *

* The pump outlet check valve can be supplied with a stronger spring to simulate increased system backpressure. Consult manufacturer.



The digital version is composed of sensor and remote stroke counter. The device can be tailor made to meet customer requirements and is not dependent on the process condition. The standard unit is battery powered, features an LCD display and optional volt-free output connection for remote monitorization. Consult manufacturer.

SIZING

To accurately size a pressure operated pump, the following information must be provided:

1. The condensate load (kg/h).

2. The operating medium (steam, compressed air or other gases) and its pressure.

3. The total lift or backpressure in bar 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 caused by pipe friction and other system components.

4. Available filling head (see Fig. 1) in mm or any other dimension that allows its determination.

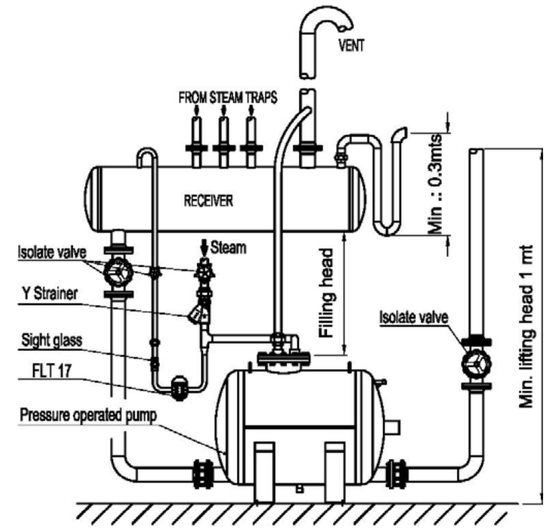


Fig. 1

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 1

CAPACITY CORRECTION FACTORS FOR FILLING HEADS OTHER THAN 300 mm				
PUMP SIZE	**FILLING HEAD (mm)**			
	150	**300**	**600**	**900**
4" x 4" DN 100 x 100	0,7	0,8	1	1,08

Table 2

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 definable length of large diameter pipe can be used.
Suggested receiver sizes are shown in Table 3.

RECEIVER			
PUMP SIZE	**4" x 4" DN 100 x 100**		
Pipe Ø x lenght	406 x 2000	640 x 1500	800 x 1500

Table 3

VALSTEAM ADCA
We reserve the right to change the design and material of this product without notice.
IS 9.120 E 07.19

FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER		
MOTIVE PRESSURE (bar)	**TOTAL LIFT (bar)**	**4" x 4" DN 100 x 100**
1	0,35	13130
1,7		16850
3,5		21900
5		24830
7		26880
10		29800
1,7	1	16630
3,5		20400
5		23050
7		25100
10		29800
2,5	1,5	13210
3,5		15150
5		17280
7		19100
10		21410
3,5	3	11860
4		12300
5		12900
7		13740
10		14980
4,5	4	11700
5		11840
7		12710
10		13760

Table 4 (based on liquid specific gravity of 0,9 to 1,0)

Example

Condensate load	8500 kg/h
Filling head	150 mm
Motive fluid	Compressed air
Available pressure	7 bar
Vertical lift after pump	10 m
Return piping pressure	1,2 bar
Piping friction pressure drop	Negligible

Calculations:
Total back pressure: 1,2 bar + (10 m x 0,0981) = 2,181 bar.
Assuming steam as motive medium at a pressure of 7 bar and a total backpressure of 3 bar, then according to Table 4 a DN 100 x 100 pump, with a capacity of 13740 kg/h, is the recommended size.

Correction for filling head:
With 150 mm filling head the correction factor from Table 2 is 0,7. The corrected capacity is thus 13740 kg/h x 0,7 = 9618 kg/h.

Correction for air as a motive fluid:
The % backpressure is 2,181 bar / 7 bar = 31%.
The correction factor from Table 1, is 1,08.
The corrected capacity is thus 9618 kg/h x 1,08 = 10387,44 kg/h, and so, a DN 100 x 100 pump is still the recommended size.

PRESSURE OPERATED PUMP
PPA14

DESCRIPTION

The ADCAMat PPA14 pressure operated pump is recommended in the transfer of steam condensate, oils and other non-hazardous liquids compatible with the construction, to a higher elevation or pressure.
Under certain conditions, it can drain a closed vessel under vacuum or pressure.
The pump can be operated using steam, compressed air or other gases, and is manufactured in carbon steel or stainless steel.

OPERATION

Liquid flows by gravity into the pump through an inlet check valve, lifting the float. At this point, the motive fluid intake valve is closed while the vent valve is open. As the float reaches its highest position the motive fluid intake valve opens and the vent valve closes, allowing the motive fluid to enter the pump body. The pressure in the pump builds up just enough to overcome backpressure.
The pressurized liquid opens the outlet check valve and the discharge starts. The liquid discharged may be quantified through a special counter, enabling the pump to function as a reliable flow meter.
When the float reaches its lower position the motive fluid intake valve closes and the vent valve opens allowing the liquid to fill the pump once again, repeating the cycle.

MAIN FEATURES

Hardened stainless steel wear parts.
High-endurance inconel springs.
Low filling head to minimize installation space.
No electric requirements or NPSH issues.
Suitable for hazardous environments.
Low running costs.

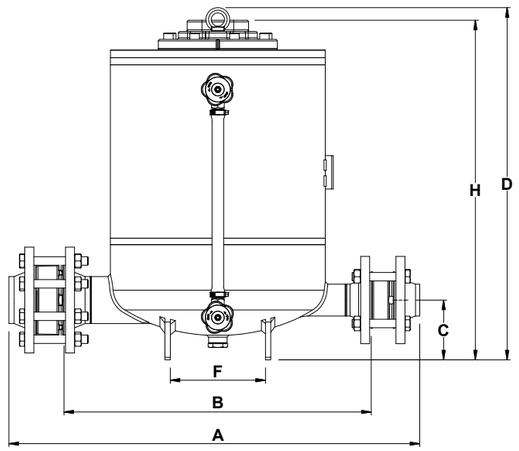
OPTIONS:	Level gauge. Stroke counters. Stainless steel construction.
USE:	To lift steam condensate and other liquids compatible with the construction.
AVAILABLE MODELS:	PPA14 – carbon steel.
SIZES:	3" x 2"; DN 80 x 50.
CONNECTIONS:	Flanged EN 1092-1 PN 16. Flanged ASME B16.5 Class 150. Female threaded ISO 7 Rp (threaded flanges). Others on request.
INSTALLATION:	Horizontal installation. An example is shown in Fig. 1. See IMI – Installation and maintenance instructions.
MOTIVE MEDIUM:	Saturated steam, compressed air, nitrogen and other gases.

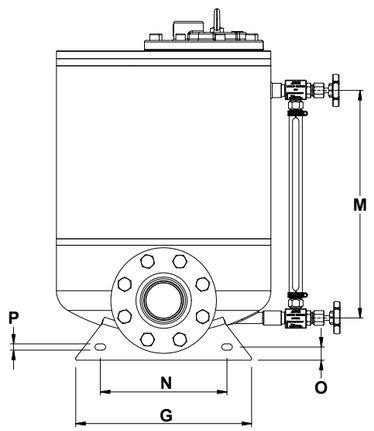
BODY LIMITING CONDITIONS *		
	ALLOWABLE PRESSURE	**RELATED TEMPERATURE**
PN 16	16 bar	50 ºC
	15 bar	100 ºC
	12,7 bar	200 ºC
	12 bar	250 ºC
CLASS 150	16 bar	50 ºC
	12,6 bar	200 ºC

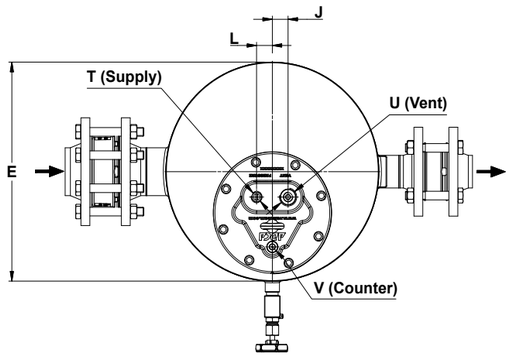
* Rating according to EN 1092-1:2018.

CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	**Category**
DN 80 x 50	3 (CE marked)

LIMITING CONDITIONS	
Liquid specific gravity	0,8 to 1
Maximum viscosity	5 ºEngler
Maximum motive inlet pressure	10 bar
Minimum motive inlet pressure	1 bar
Maximum operating temperature	185 ºC
Minimum operating temperature	0 ºC
Pump discharge per cycle	25 L

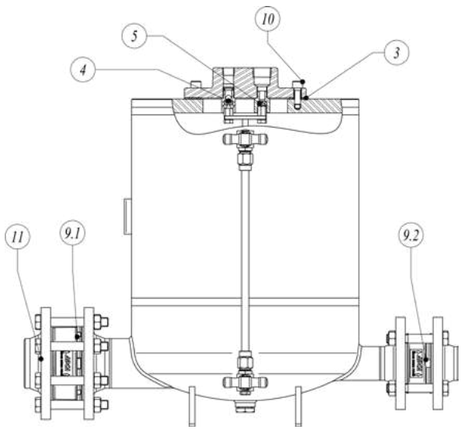


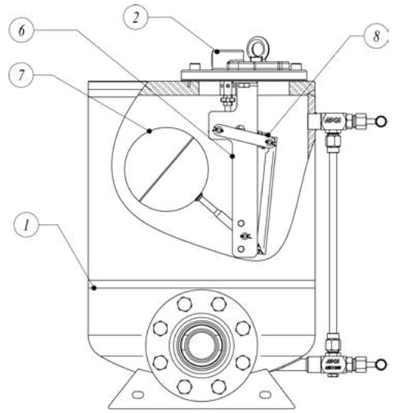




DIMENSIONS (mm)																			
SIZE	A *	B	C	D	E	F	G	H	J	L	M	N	O	P	T **	U **	V **	WGT. (kg)	VOL. (L)
DN 80 x 50	775	580	113	665	406	200	333	642	30	30	435	228	25	12	1/2"	1"	1/2"	123	68

* With EN 1092-1 welding neck flanges. Dimensions may differ if ASME B16.5 flanges or ISO 7 Rp female threaded flanges are requested. Consult the manufacturer.
** As standard, in versions manufactured with EN 1092-1 PN 16 flanges, these connections are female threaded ISO 7 Rp. In versions with ASME B16.5 flanges, these connections are female threaded NPT.





MATERIALS		
POS. Nº	DESIGNATION	MATERIAL
1	Pump body	P265GH / 1.0425; P235GH / 1.0345; S235JR / 1.0038
2	Cover	GJS-400-15 / 0.7040 ; A216 WCB / 1.0619
3	* Cover gasket	Stainless steel / Graphite
4	* Intake valve/seat assembly	Stainless steel
5	* Exhaust valve/seat assembly	Stainless steel
6	Internal mechanism	Stainless steel
7	* Float	Stainless steel
8	* Spring assembly (2 pcs.)	Inconel
9.1	* Outlet check valve	A351 CF8M / 1.4408
9.2	* Inlet check valve	A351 CF8M / 1.4408
10	Bolts	Steel 8.8
11	Counter flanges	P250GH / 1.0460

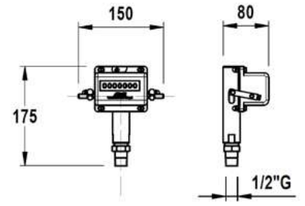
* Available spare parts.

STROKE COUNTER

A stroke counter can be screwed onto a respective female threaded connection on the pump cover. Mechanical and digital versions are available. The mechanical version requires that the following conditions are met.

LIMITING CONDITIONS *	
Minimum motive pressure (steam)	6 bar
Minimum motive pressure (compressed air and nitrogen)	5 bar
Minimum system backpressure (steam)	700 mbar *
Minimum system backpressure (compressed air and nitrogen)	700 mbar *

* The pump outlet check valve can be supplied with a stronger spring to simulate increased system backpressure. Consult manufacturer.



The digital version is composed of sensor and remote stroke counter. The device can be tailor made to meet customer requirements and is not dependent on the process condition. The standard unit is battery powered, features an LCD display and optional volt-free output connection for remote monitorization. Consult manufacturer.

VALSTEAM ADCA
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IS 9.122 E 04.19

SIZING

To accurately size a pressure operated pump, the following information must be provided:

1. The condensate load (kg/h).

2. The operating medium (steam, compressed air or other gases) and its pressure.

3. The total lift or backpressure in bar 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 caused by pipe friction and other system components.

4. Available filling head (see Fig. 1) in mm or any other dimension that allows its determination.

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
2	Receiver	**5**	Pump
3	Ball valve	**6**	Disc check valve
4	Y strainer	**7**	Steam trap

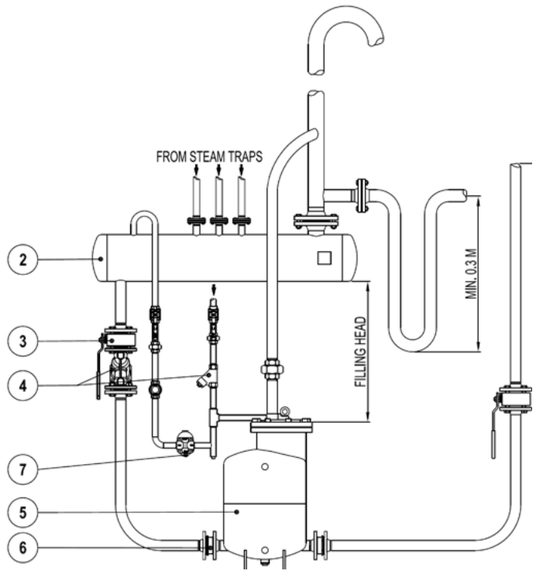

Fig. 1

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

Table 1

CAPACITY CORRECTION FACTORS FOR FILLING HEADS OTHER THAN 300 mm				
PUMP SIZE	**FILLING HEAD (mm)**			
	150	**300**	**600**	**900**
3" x 2" DN 80 x 50	0,9	1	1,08	1,2

Table 2

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 definable length of large diameter pipe can be used.
Suggested receiver sizes are shown in Table 3.

RECEIVER	
PUMP SIZE	**3" x 2" DN 80 x 50**
Pipe Ø x lenght	323 x 1000

Table 3

FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER		
MOTIVE PRESSURE (bar)	**TOTAL LIFT (bar)**	**3" x 2" DN 80 x 50**
1	0,35	3710
1,7		5470
3,5		5820
5		5970
7		6010
10		6290
1,7	1	3570
3,5		5160
5		5360
7		5470
10		5790
2,5	1,5	3435
3,5		4835
5		4980
7		5080
10		5390
3,5	3	2890
4		3440
5		3780
7		4040
10		4430
4,5	4	2505
5		2680
7		2990
10		3385

Table 4 (based on liquid specific gravity of 0,9 to 1,0)

Example

Condensate load	3500 kg/h
Filling head	150 mm
Motive fluid	Compressed air
Available pressure	7 bar
Vertical lift after pump	10 m
Return piping pressure	1,2 bar
Piping friction pressure drop	Negligible

Calculations:
Total backpressure: 1,2 bar + (10 m x 0,0981) = 2,181 bar. Assuming steam as motive medium at a pressure of 7 bar and a total backpressure of 3 bar, then according to Table 4 a DN 80 x 50 pump, with a capacity of 4040 kg/h, is the recommended size.

Filling head correction:
With 150 mm filling head the correction factor from Table 2 is 0,9. The corrected capacity is thus 4040 kg/h x 0,9 = 3636 kg/h.

Correction for air as a motive medium:
The % backpressure is 2,181 bar / 7 bar = 31%.
The correction factor from Table 2 is 1,08.
The corrected capacity is thus 3636 kg/h x 1,08 = 3926,88 kg/h, and so, a DN 80 x 50 pump is still the recommended size.

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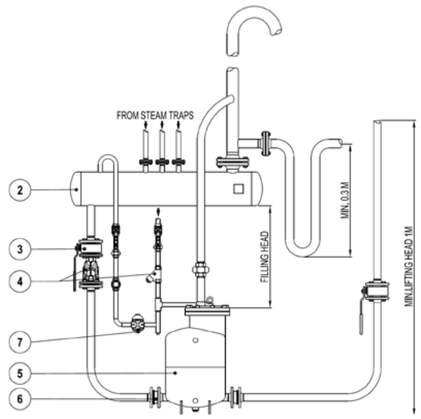
IS 9.122 E 04.19

TYPICAL APPLICATIONS

CONDENSATE RECOVERY IN A OPEN LOOP SYSTEM

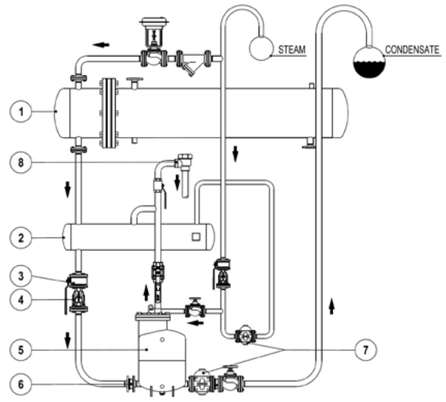
The pump transfers high temperature condensate without cavitation problems.
The vent line must be unrestricted and self draining to the receiver.

MATERIALS			
POS. Nº	**DESIGNATION**	**POS. Nº**	**DESIGNATION**
1	Heat exchanger	**5**	Pump
2	Receiver	**6**	Disc check valve
3	Ball valve	**7**	Steam trap
4	Y strainer	**8**	Air vent



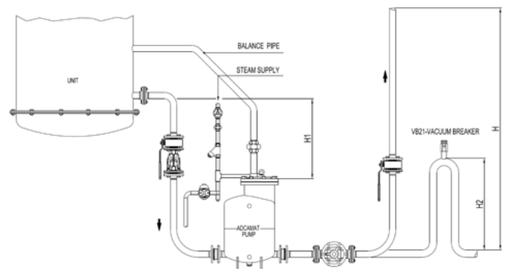
REMOVAL OF CONDENSATE UNDER PRESSURE WITH PUMP AND STEAM TRAP COMBINATION

The pump is installed in a closed loop with its vent connected to a pressurized reciever.
When steam pressure is sufficient to overcome backpressure, the steam trap operates. As soon as, e.g., the equipment's control valve starts to modulate, the steam pressure will decrease (even vacuum can occur). The lower differential pressure decreases the steam trap ability to discharge, causing the condensate level to rise inside the body of the pump. Once the pump float reaches its higher position, the intake valve opens and steam replaces the necessary positive pressure to pump out the condensate.



DRAINAGE OF A SINGLE UNIT UNDER VACUUM

This configuration works with units operating with a minimum absolute pressure of 0,2 bar.
For proper operation the filling head (H1) must range between 1 and 2 meters. The lift (H) must be as minimum as possible, but never less than 1 meter, otherwise a siphon with hight (H2) is required.
Steam must be used as motive medium, and its maximum pressure should not exceed 3 bar.



ADCAMAT PRESSURE OPERATED PUMP PPA312

DESCRIPTION

The ADCAMat PPA312 pressure operated pump is recommended in the transfer of steam condensate, oils and other non-hazardous liquids compatible with the construction, to a higher elevation or pressure.
Under certain conditions, it can drain a closed vessel under vacuum or pressure.
The pump can be operated using steam, compressed air or other gases, and is manufactured in carbon steel or stainless steel.

OPERATION

Liquid flows by gravity into the pump through an inlet check valve, lifting the float. At this point, the motive fluid intake valve is closed while the vent valve is open. As the float reaches its highest position the motive fluid intake valve opens and the vent valve closes, allowing the motive fluid to enter the pump body. The pressure in the pump builds up just enough to overcome backpressure.
The pressurized liquid opens the outlet check valve and the discharge starts. The liquid discharged may be quantified through a special counter, enabling the pump to function as a reliable flow meter.
When the float reaches its lower position the motive fluid intake valve closes and the vent valve opens allowing the liquid to fill the pump once again, repeating the cycle.

MAIN FEATURES

Hardened stainless steel wear parts.
High-endurance inconel springs.
Low filling head to minimize installation space.
No electric requirements or NPSH issues.
Suitable for hazardous environments.
Low running costs.

OPTIONS: Level gauge.
Stroke counters.
Stainless steel construction.

USE: To lift steam condensate and other liquids compatible with the construction.

AVAILABLE MODELS: PPA312 – carbon steel.

SIZES: 2" x 2" and 3" x 2".
DN 50 x 50 and DN 80 x 50.

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. An example is shown in Fig. 1. See IMI – Installation and maintenance instructions.

MOTIVE MEDIUM: Saturated steam, compressed air, nitrogen and other gases.

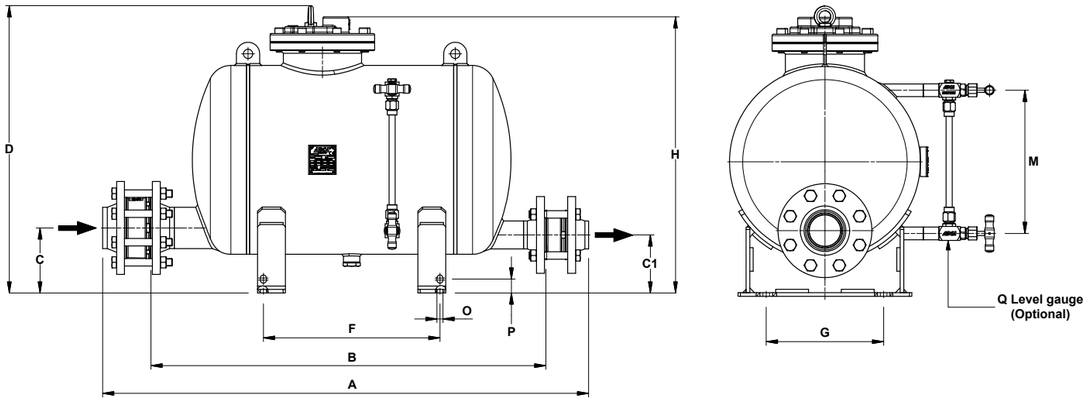
BODY LIMITING CONDITIONS *		
	ALLOWABLE PRESSURE	**RELATED TEMPERATURE**
PN 16	16 bar	50 ºC
	14 bar	100 ºC
	13 bar	195 ºC
	12 bar	250 ºC
CLASS 150	16 bar	50 ºC
	13 bar	195 ºC

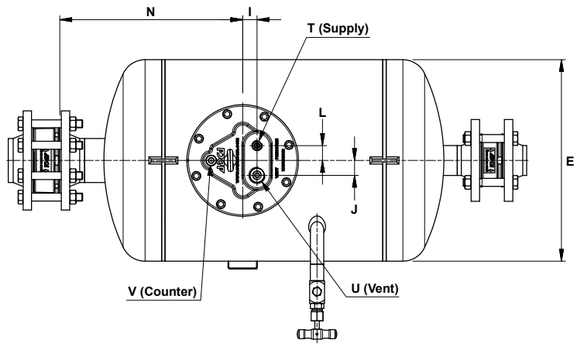
* Rating according to EN 1092-1:2018.

CE MARKING – GROUP 2 (PED – European Directive)	
PN 16	**Category**
All sizes	3 (CE marked)

LIMITING CONDITIONS	
Liquid specific gravity	0,8 to 1
Maximum viscosity	5 ºEngler
Maximum motive inlet pressure	10 bar
Minimum motive inlet pressure	1 bar
Maximum operating temperature	185 ºC
Minimum operating temperature *	20 ºC
Pump discharge per cycle	45 L

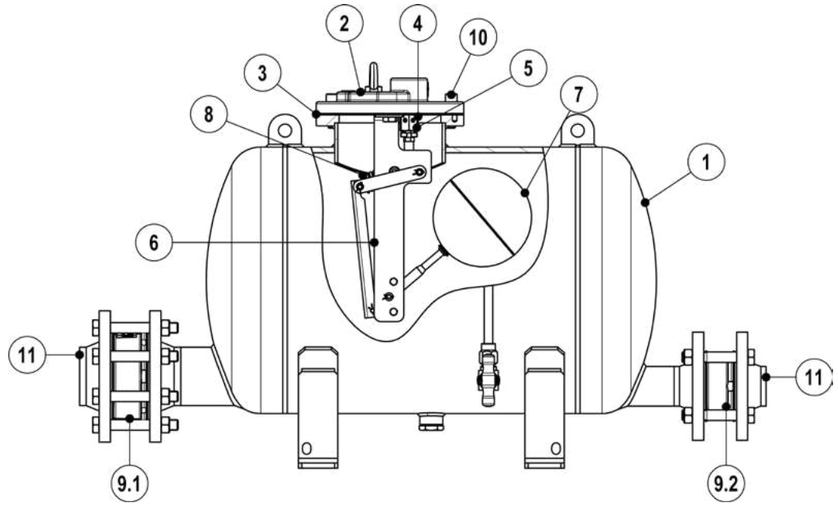
* Lower limits on request.





DIMENSIONS (mm)																					
SIZE	A *	B *	C	C1	D	E	F	G	H	I	J	L	M	N	O	P	Q	T *	U **	V **	WGT. (kg)	VOL. (L)
2" x 2" DN 50 x 50	1020	836	125	125	619	406	380	250	595	29	30	30	305	355	13	30	1/2"	1/2"	1"	1/2"	109	75,5
3" x 2" DN 80 x 50	1046	850	140	125	619	406	380	250	595	29	30	30	305	369	13	30	1/2"	1/2"	1"	1/2"	113	76

* With EN 1092-1 welding neck flanges. Dimensions may differ if ASME B16.5 flanges or ISO 7 Rp female threaded flanges are requested. Consult the manufacturer.
** As standard, in versions manufactured with EN 1092-1 PN 16 flanges, these connections are female threaded ISO 7 Rp. In versions with ASME B16.5 flanges, these connections are female threaded NPT.



MATERIALS		
POS. Nº	DESIGNATION	MATERIAL
1	Pump body	P265GH / 1.0425; P235GH / 1.0345; S235JR / 1.0038
2	Cover	GJS-400-15 / 0.7040
3	* Cover gasket	Stainless steel / Graphite
4	* Intake valve/seat assembly	Stainless steel
5	* Exhaust valve/seat assembly	Stainless steel
6	Internal mechanism	Stainless steel
7	* Float	Stainless steel
8	* Spring assembly (2 pcs.)	Inconel
9.1	* Outlet check valve	A351 CF8M / 1.4408
9.2	* Inlet check valve	A351 CF8M / 1.4408
10	Bolts	Steel 8.8
11	Counter flanges	P250GH / 1.0460

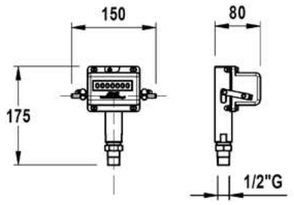
* Available spare parts.

STROKE COUNTER

A stroke counter can be screwed onto a respective female threaded connection on the pump cover. Mechanical and digital versions are available. The mechanical version requires that the following conditions are met.

LIMITING CONDITIONS *	
Minimum motive pressure (steam)	6 bar
Minimum motive pressure (compressed air and nitrogen)	5 bar
Minimum system backpressure (steam)	700 mbar *
Minimum system backpressure (compressed air and nitrogen)	700 mbar *

* The pump outlet check valve can be supplied with a stronger spring to simulate increased system backpressure. Consult manufacturer.



The digital version is composed of sensor and remote stroke counter. The device can be tailor made to meet customer requirements and is not dependent on the process condition. The standard unit is battery powered, features an LCD display and optional volt-free output connection for remote monitorization. Consult manufacturer.

SIZING

To accurately size a pressure operated pump, the following information must be provided:

1. The condensate load (kg/h).

2. The operating medium (steam, compressed air or other gases) and its pressure.

3. The total lift or backpressure in bar 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 caused by pipe friction and other system components.

4. Available filling head (see Fig. 1) in mm or any other dimension that allows its determination.

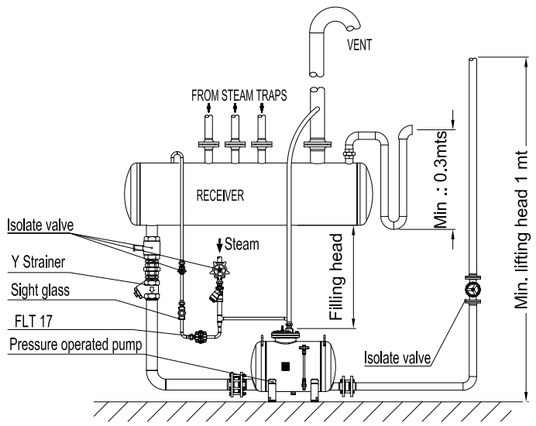


Fig. 1

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

Table 1

CAPACITY CORRECTION FACTORS FOR FILLING HEADS OTHER THAN 300 mm				
PUMP SIZE	**FILLING HEAD (mm)**			
	150	**300**	**600**	**900**
2" x 2" DN 50 x 50	0,9	1	1,08	1,2
3" x 2" DN 80 x 50	0,9	1	1,08	1,2

Table 2

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 definable length of large diameter pipe can be used.
Suggested receiver sizes are shown in Table 3.

RECEIVER		
PUMP SIZE	**2" x 2" DN 50 x 50**	**3" x 2" DN 80 x 50**
Pipe Ø x lenght	323 x 1000	

Table 3

FLOW RATE (kg/h) INSTALLATION WITH 300 mm FILLING HEAD ABOVE THE PUMP COVER			
Motive pressure (bar)	**Total lift (bar)**	**2" x 2" DN 50 x 50**	**3" x 2" DN 80 x 50**
1	0,35	3125	4070
1,7		4625	5980
3,5		4810	6845
5		4905	6935
7		5075	7030
8,5		5250	7520
10		5280	7540
1,7	1	3170	4075
3,5		4350	5800
5		4880	6430
7		4950	6480
8,5		5120	6845
10		5150	6870
2,5	1,5	3210	3670
3,5		3760	4625
5		4585	5660
7		4635	5755
8,5		4680	5895
10		4695	5925
3,5	3	2580	2990
4		2990	3805
5		3440	4440
7		3810	4575
8,5		4260	4665
10		4285	4695
4,5	4	2030	2715
5		2120	2900
7		2900	3215
8,5		2985	3355
10		3000	3385

Table 4 (based on liquid specific gravity 0,9 – 1,0).

Example

Condensate load	3500 kg/h
Filling head	150 mm
Motive fluid	Compressed air
Available pressure	7 bar
Vertical lift after pump	10 m
Return piping pressure	1,2 bar
Piping friction pressure drop	Negligible

Filling head correction:
With 150 mm filling head the correction factor from Table 2 is 0,9. The corrected capacity is thus 4575 kg/h x 0,9 = 4117,5 kg/h.

Calculations:
Total backpressure: 1,2 bar + (10 m x 0,0981) = 2,181 bar.
Assuming steam as motive medium at a pressure of 7 bar and a total backpressure of 3 bar, then according to Table 4 a DN 80 x 50 pump, with a capacity of 4575 kg/h, is the recommended size.

Correction for air as a motive medium:
The % backpressure is 2,181 bar / 7 bar = 31%.
The correction factor from Table 2 is 1,08.
The corrected capacity is thus 4117,5 kg/h x 1,08 = 4446,9 kg/h, and so, a DN 80 x 50 pump is still the recommended size.

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IS 9.124 E 05.18