PPPPU

Pressure Powered Pump Package Unit with IJ and CRM 485R

Description

The Forbes Marshall Pressure Powered Pump Package Unit, PPPPU, is a positive displacement pump unit operated by steam, compressed air or pressurised gas designed to pump hot condensate.

Size and Pipe Connections

Size (DN)	Condensate inlet conn. (A) (DN)	Pump outlet conn. (B) (DN)	Vent conn. (C) (DN)	Empty weight
40	50	50	100	245 kg
50	50	80	100	350 kg
80	80	80	100	395 kg

SIZE : DN40, 50 and 80 pressure powered pump package unit.

Condensate inlet and vent flanged to class 150 / PN16

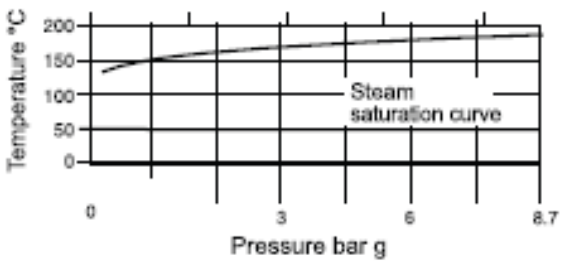
Condensate outlet : use flange provided with pump

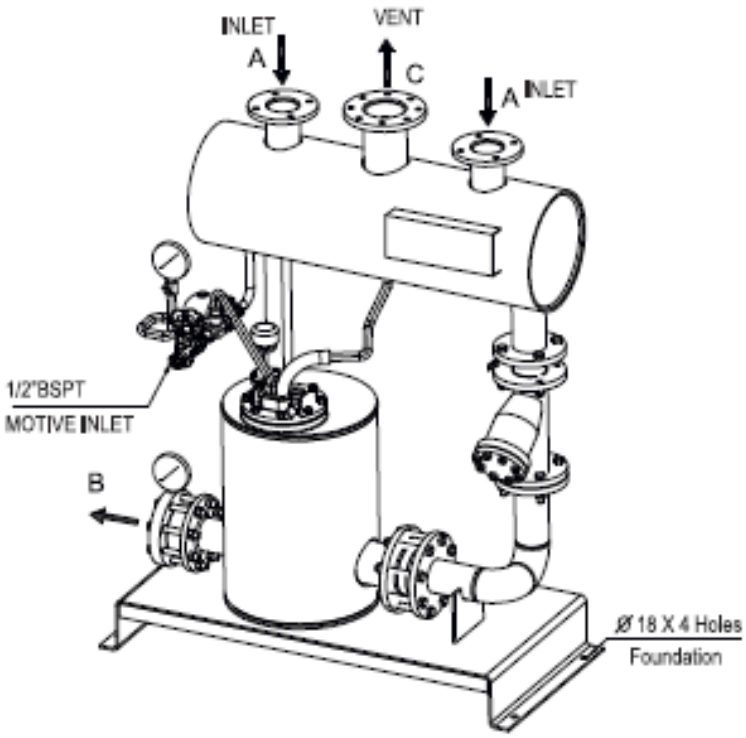
Limiting Conditions

PMA Maximum design pressure	8.7 bar g
TMA Maximum design temperature	220°C
Operating inlet motive pressure	Steam / Compressed Air / Pressurised gas 3 - 8.7 bar g (max)
Pump discharge per cycle	30 kg
Steam consumption	3 Kg of steam per 1000 Kg liquid pumped
Air consumption	22 SCF per 1000 Kg liquid pumped
Minimum operating temperature	0°C
Maximum allowable back pressure	4 bar (g)

Note: For lower operating temperatures consult Forbes Marshall

Operating Range





Standard Accessories

Condensate recovery meter - 485 (CRM485R) and insulation jacket

Note : Refer separate TIS for CRM485R and insulation jacket.

How to Order

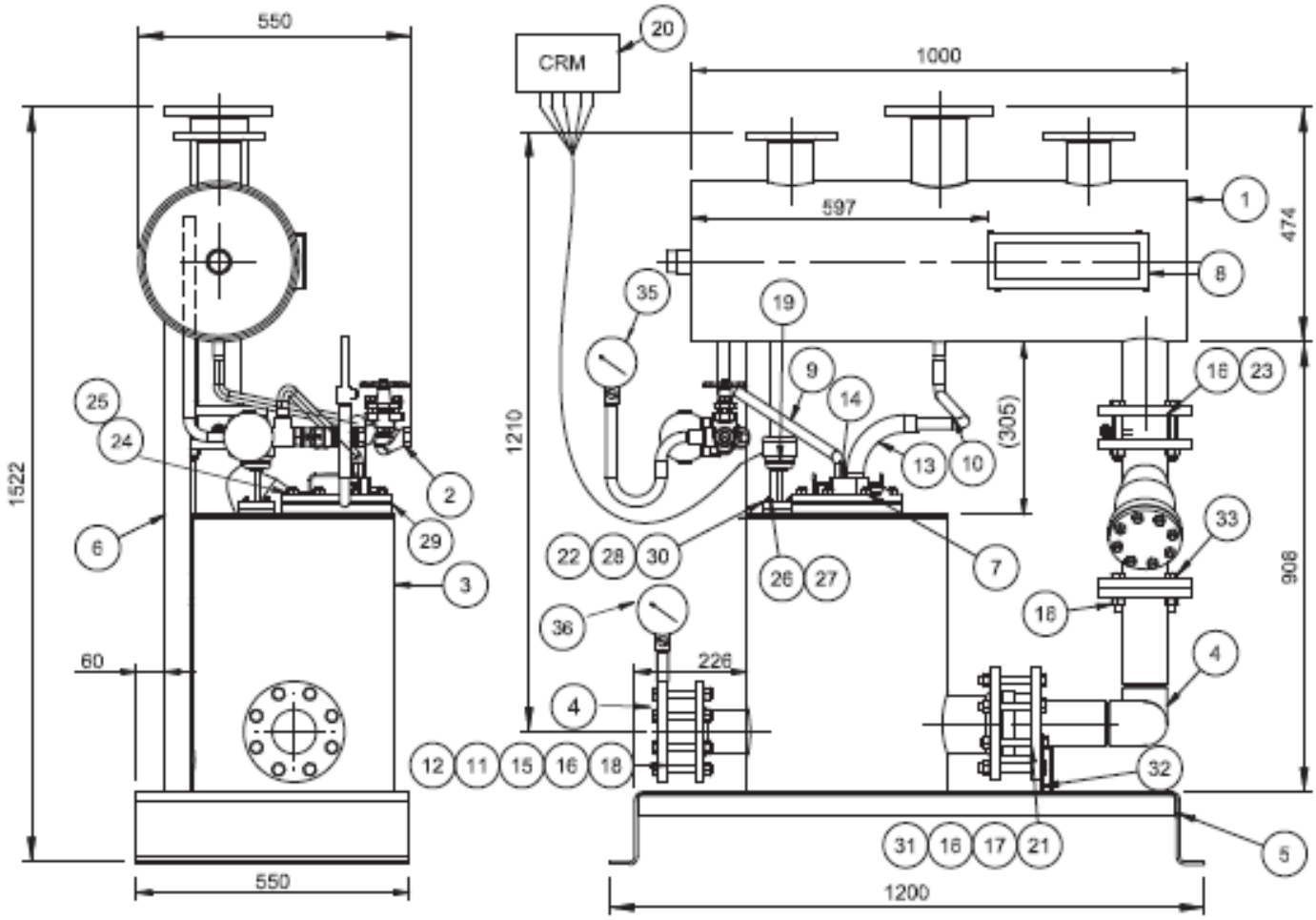
Example : DN40 Pressure Powered Pump Package Unit PPPPU with insulation jacket.

Available Spares

Set of Internals
Gasket Kit (pkt. of 5)
Inlet Valve Kit
Exhaust Valve Kit
Float Assly.
Spring Assly. (pkt. 0f 2)

How to Order Spares

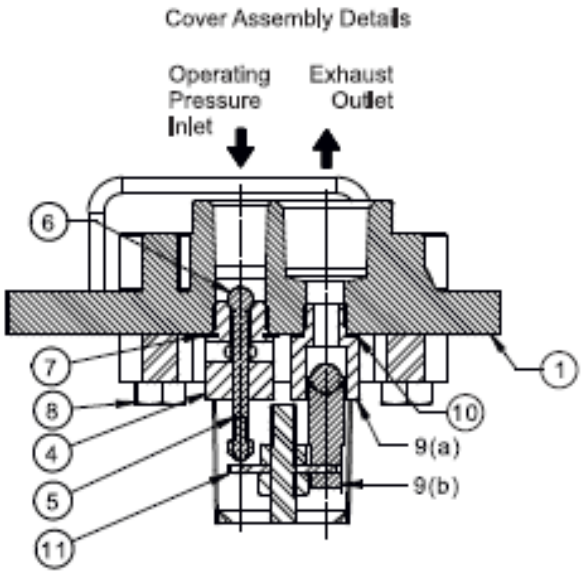
Always order spares by using the description Given in the column headed "Available Spares" of User Manual for this product.

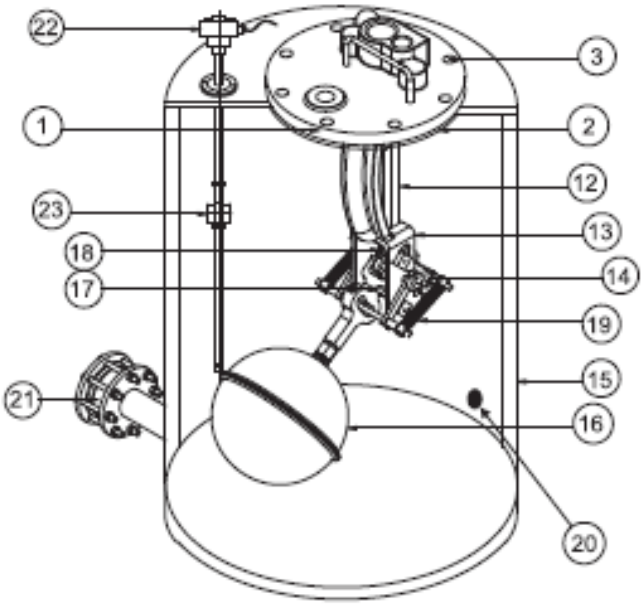


Sr. No.	Description	Material Standard
1	Receiver Pipe	Carbon steel, IS3589
2	Steam Inlet Connection Assembly	Carbon steel
3	Shell Pipe	Carbon steel, IS3589
4	Condensate Inlet Assembly	Carbon steel
5	Frame Assembly	IS2062
6	Support Assembly	Structural steel, IS1061/1062
7	Actuator Mechanism Assembly	Carbon steel
8	Nameplate	Stainless steel, SS304
9	½" Steam Inlet Hose 500 Long	Stainless steel, SS304
10	1" Exhaust Hose 500 Long	Stainless steel, SS304
11	Check Valve Outlet	Stainless steel
12	Table F Flange	Carbon steel, SA516 Gr 70
13	1" BSPT (m) 90 Deg Bend	Carbon steel, A106 GR B
14	½" BSPT Pipe Nipple 100mm Length	------
15	M16 X 120L Hex Head Bolts	Mild Steel
16	M16 Nut	Mild Steel
17	Check Valve Gasket	SS304 Exfoliated Graphite
18	Check Valve Gasket	SS304 Exfoliated Graphite
19	Reed Sensor Assembly	Stainless Steel

Sr. No.	Description	Material Standard
20	Condensate Recovery Meter Unit	
21	Inlet Check Valve	Stainless steel
22	Reed Sensor Flange	IS2062
23	M16 X 110L Hex Head Bolts	Mild Steel
24	Stud M12 X 50L	Carbon Steel EN9
25	Nut M12	Mild Steel
26	Stud M6 X 35L	ASTMA 193 Gr B7
27	Nut M6	SS304
28	Sensor Mounting Flange	IS2062
29	Mechanism Gasket	Asbestos Free AF154
30	Reed Gasket	SS304 Exfoliated Graphite
31	M 16 X 130L Hex Head Bolts	Mild Steel
32	Condensate Line Support	Carbon steel, SA516 Gr 70
33	M16 X 70L Hex Head Bolts	Mild Steel
34*	Ball Valve	Carbon steel
35	Pressure Gauge Steam	------
36	Pressure Gauge Outlet	------
37	Reciever Nozzles	Carbon steel, IS1239
38	Reciever Flanges	Carbon steel, SA516 Gr 70

*** Item not shown**





Material

Sr. No.	Description	Material	Standard
1	Cover	Cast Iron	IS 210 Gr FG 260
2	Cover Gasket	Synthetic Fibre	AF -154
3	Stud and Nut M - 12	Carbon Steel	-
4	Inlet Valve Seat	Stainless Steel	ASTM A276 SS 304
5	Inlet Valve Stem	Stainless Steel	ASTM A276 SS 304
6	Inlet Valve Head	Stainless Steel	AISI 440C
7	Inlet Seat Gasket	Copper	-
8	Exhaust Valve	Stainless Steel	ASTM A276 SS 304
9(a)	Exhaust Valve	Stainless Steel	ASTM A276 SS 304
9(b)	Exhaust Valve Head	Stainless Steel	ASTM A276 SS 304
10	Exhaust Seat Gasket	Copper	-
11	Valve Actuator Disc	Stainless Steel	ASTM A276 SS 304

Sr. No.	Description	Material	Standard
12	Push Rod	Stainless Steel Type 304	ASTM A240
13	Mechanism	Cast Iron	IS 210 FG 260
14	Mechanism Actuator	Stainless Steel	SS 304
15	Body	Carbon Steel	IS 3589
16	Float	Stainless Steel	ASTM A240 SS 304
17	Linkage Mechanism	Stainless Steel	ASTM A351 CF 8
18	Push Rod Actuator	Stainless Steel	ASTM A351 CF 8
19	Spring	Inconel	-
20	Plug 1/2"BSPT	Forged Carbon Steel	ASTM A105
21	Check Valve	Stainless Steel	-
22	Flow-temp Sensor	Stainless Steel	-
23	Sensor Float	Stainless Steel	ASTM A240 SS 304

How to Select and Size

Select the pump size according to the capacity requirement of the application from the inlet, back pressure and filling head conditions given in the table below.

Back pressure (h) = [H X 0.1 bar g] + FP bar g+LP bar g

where H=height to which condensate is to be lifted in mtrs.

FP= Frictional pressure drop of discharge

LP=Line Pressure

Capacity kg/hr.

When installed with recommended filling head above top of pump :- 305 mm. For liquid specific gravity (0.9 to 1)

MOTIVE STEAM				
Pressure (bar g)		Capacity (kg/hr)		
Motive	Back	DN 40	DN 50	DN 80
8.7	1	3295	4655	6165
	2	2980	3765	5090
	3	2730	3605	3925
	4	2405	3100	3495
8	1	3260	4440	5830
	2	2890	3660	4555
	3	2475	2995	3770
	4	2350	2645	2950
7	1	3230	4195	5545
	2	2830	3415	4440
	3	2420	2930	3515
	4	2195	2605	2855
6	1	3115	3775	5210
	2	2800	3270	4290
	3	2325	2700	3425
	4	2095	2195	2720
5	1	3005	3705	5050
	2	2635	3055	4140
	3	2290	2505	3070
4	0.5	3095	3885	5440
	1	2835	3410	4460
	2	2380	2705	3215
3	0.5	2970	3540	4705
	1	2570	2950	3675

Capacity Multiplying Factors for Other Filling Heads

Filling Head (mm)	DN 80
152	0.84
305	10
610	1.08
914	1.20

Capacity multiplying factors for motive gas supplies (other than steam)

% Back Pressure VS Motive Pressure (BP / MP)

10%	20%	30%	40%	50%	60%	70%	80%	90%
1.04	1.06	1.08	1.10	1.12	1.15	1.18	1.23	1.28

MOTIVE AIR				
Pressure (bar g)		Capacity (kg/hr)		
Motive	Back	DN 40	DN 50	DN 80
6	1	3835	5555	7925
	2	3635	4845	6710
	3	3335	4390	5765
	4	3055	3815	4810
5	1	3750	5485	7700
	2	3555	4800	6460
	3	3275	4130	5465
4	0.5	3905	5590	8425
	1	3680	5380	7550
	2	3450	4520	6105
3	0.5	3935	5695	8085
	1	3610	5125	7085

Example

Condensate load	1600 kg/hr.
Steam/air pressure available for operating pump	5.0 bar g
Vertical lift from pump to return piping	9 m
Pressure in return piping (piping friction negligible)	1.72 bar g
Filling head on pump	0.3048 mtrs.

Solution

1 Calculate "h", the total lift or back pressure against which the condensate must be pumped.

= (9mx 0.1) + 1.72 = 2.62 bar g

2 From capacity table with 5.0 bar g operating inlet pressure and 3.0 bar g back pressure choose a DN 40 pump which has a capacity of 2290 kg/hr.

Note from Capacity Factor Charts

A Pump capacity if filling head is 0.610 mtr.

= 1.2 x 2290 = 2748 kg/hr.