

PPPPU-D

Duplex Pressure Powered Pump Package Unit with CRM485R and IJ

Description

The Forbes Marshall Duplex Pressure Powered Pump Package Unit, PPPPU-D, is a duplex positive displacement pump unit operated by steam, compressed air or pressurized gas. The unit is specifically designed to pump hot condensate and liquids of specific gravity 1.0 down to 0.9.

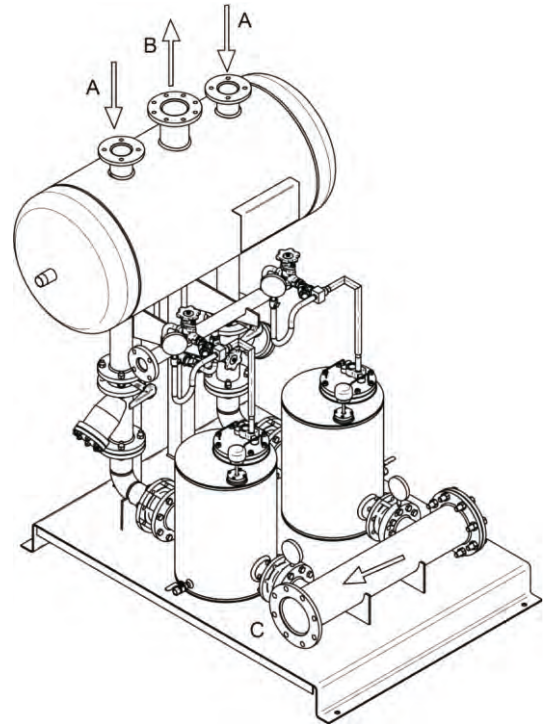
Sizes and Pipe Connections

Model	Condensate inlet conn. (DN) (A)	Condensate outlet conn. (DN) (C)	Vent conn. (DN) (B)	Empty weight
PPPPU-D	80	150	100	670kg

Size : DN80 pressure powered pump package unit.

Condensate inlet and vent flanged to class 150 / PN16

Condensate outlet : use flange provided with pump

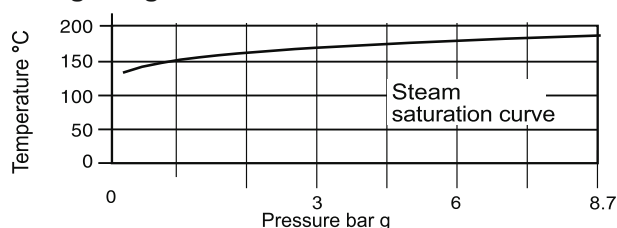


Limiting Conditions

PMA Maximum design pressure	8.7 bar g
TMA Maximum design temperature	220°C
Operating inlet motive pressure	Steam / Compressed Air / Pressurised gas 3 to 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
Max. 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 (IJ-PPPPU-D)

Note : Refer separate TIS for CRM485R & insulation

How to Order

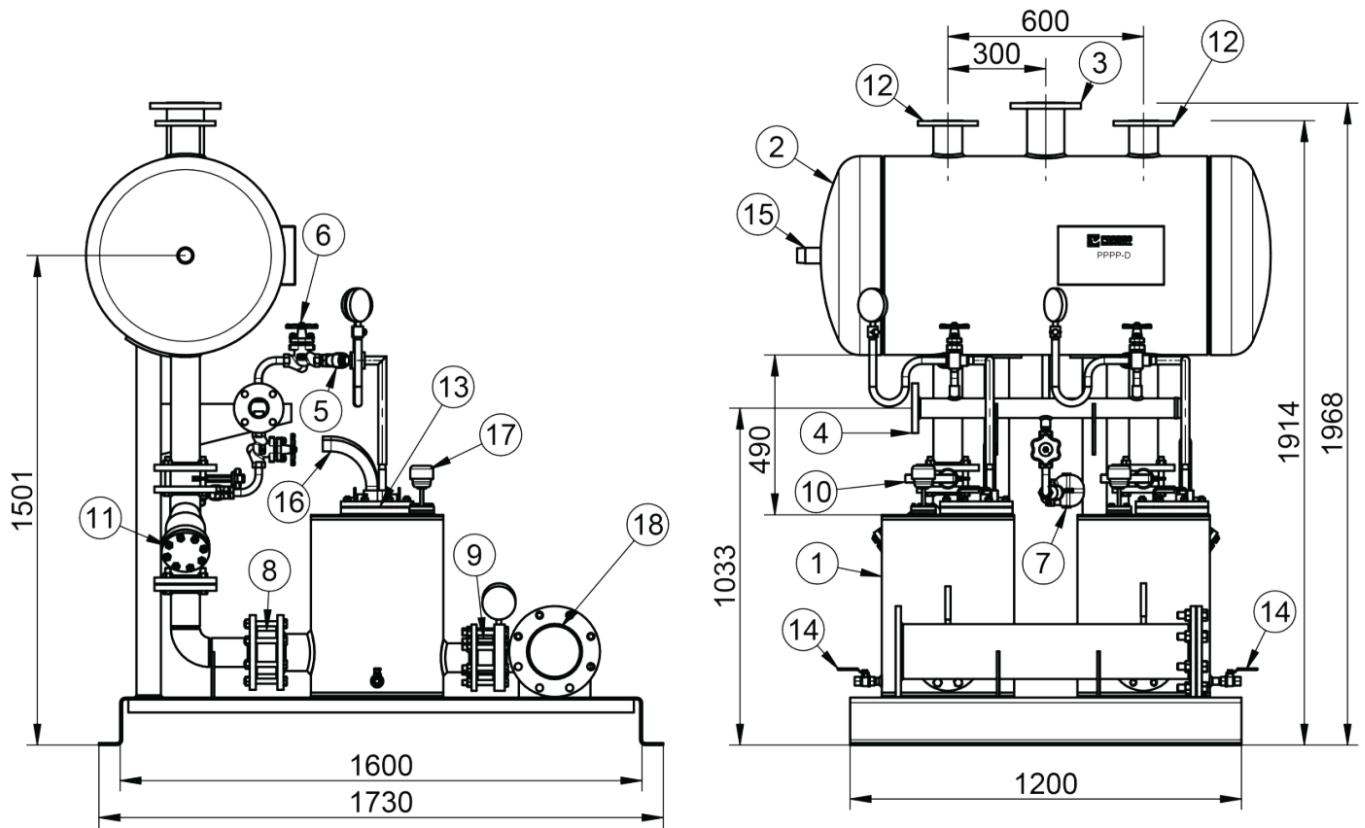
Example : DN80 Duplex Pressure Powered Pump Package Unit PPPPU-D with Insulation Jacket.

Available Spares

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

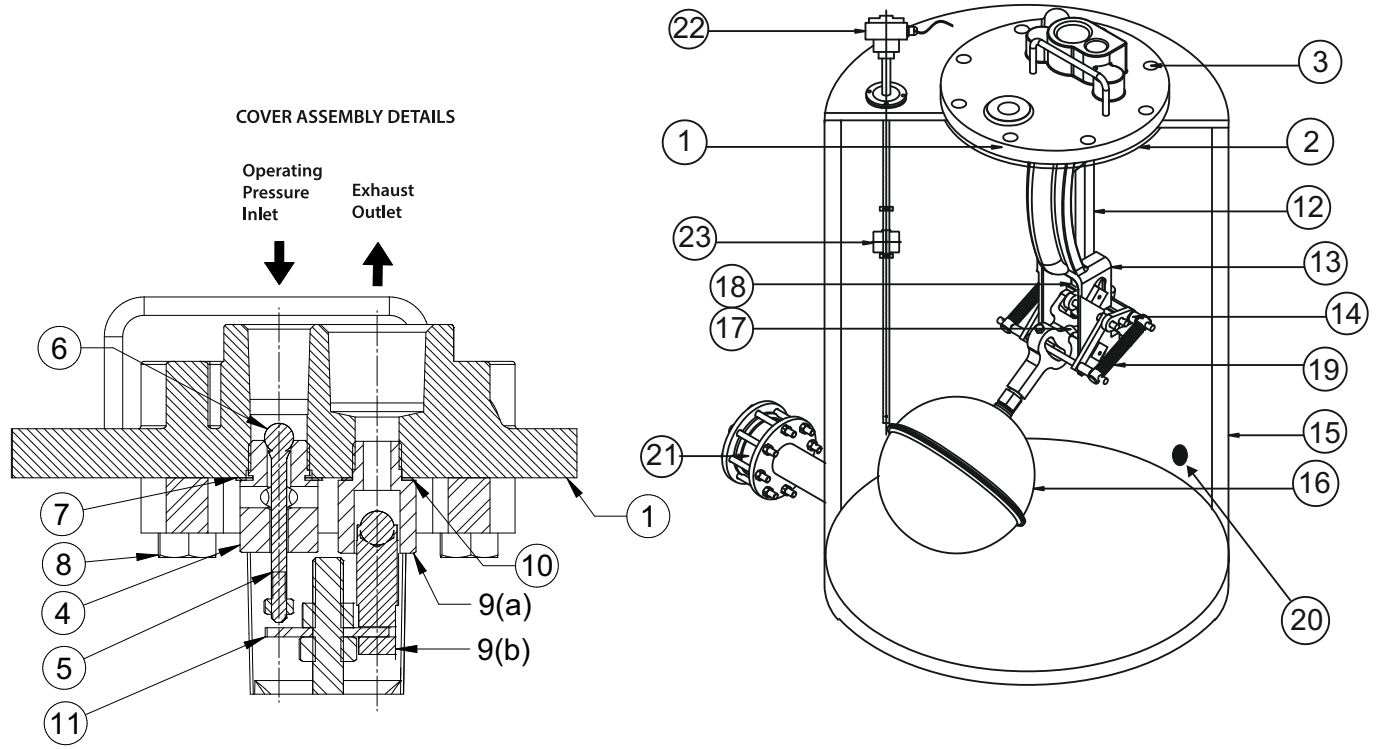
How to Order

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



* Aprox assmby wt - 670 kg

Sr. No.	Part	Material	Standard
1	Shell Assembly	Carbon Steel	IS 3589
2	Receiver Assembly	Carbon Steel	IS 3589
3	Vent Connection DN100 Class 150	Carbon Steel	
4	Steam Inlet Line DN50 Class 150	Carbon Steel	IS 1239 CLASS C
5	Steam Inlet Line Strainer	Cast Iron	IS 210 FG 260
6	Steam Inlet Line Piston Valve	Carbon Steel	ASTM A 105
7	Ball Float Trap	Cast Iron	IS 210 FG 260
8	Disc Check Valve	Stainless Steel	
9	Condensate outlet DN80 Spring Loaded Disc Check Valve	Stainless Steel	
10	DN80 butterfly valve	Cast Iron	
11	DN80 strainer	Cast Iron	IS 210 FG 260
12	Condensate inlet line DN80 class 150	Carbon Steel	
13	Pump shell mechanism assembly	Carbon Steel	IS 3589
14	DN15 Drain line ball valve	Cast Steel	
15	Over flow line	Carbon Steel	IS 1239 Class C
16	DN25 Exhaust Pipe Bend	Carbon Steel	
17	CRM Sensor Assembly	Stainless Steel	
18	Condensate outlet Line DN150 Class 150	Carbon Steel	



Material

Sr. No.	Description	Material	Standard	Sr. No.	Description	Material	Standard
1	Cover	Cast Iron	IS 210 Gr FG 260	12	Push Rod	Stainless Steel	ASTM A240 SS 304
2	Cover Gasket	Synthetic Fibre	AF154	13	Mechanism	Cast Iron	IS 210 FG 260
3	Stud and Nut M - 12	Carbon Steel	-	14	Mechanism Actuator	Stainless Steel	SS304
4	Inlet Valve Seat	Stainless Steel	ASTM A276 SS 304	15	Body	Carbon Steel	IS 3589
5	Inlet Valve Stem	Stainless Steel	ASTM A276 Type 304	16	Float	Stainless Steel	ASTM A240 SS 304
6	Inlet Valve Head	Stainless Steel	AISI 440 C	17	Linkage Mechanism	Stainless Steel	ASTM A351 CF 8
7	Inlet Seat Gasket	Copper	-	18	Push Rod Actuator	Stainless Steel	ASTM A351 CF 8
8	Exhaust Valve	Stainless Steel	ASTM A276 SS 304	19	Spring	Inconel	-
9(a)	Exhaust Valve	Stainless Steel	ASTM A276 SS 304	20	Plug 1/2"BSPT	Forged Steel	ASTM A105
9(b)	Exhaust Valve Head	Stainless Steel	ASTM A276 SS304	21	Check Valve	Stainless Steel	-
10	Exhaust Seat Gasket	Copper	-	22	Flow-temp Sensor	Stainless Steel	-
11	Valve Actuator Disc	Stainless Steel	ASTM A276 SS 304	23	Sensor Float	Stainless Steel	ASTM A240 SS 304

How to Select and Size

From the inlet pressure, back pressure and filling head conditions given below select the pump size which meets the capacity requirements of the applications.

Select optional extras as required.

Back pressure is the lift height (H) in mts x 0.1 plus bar (g) in return line plus downstream piping friction pressure drop in bar (g) at the lesser of six times the actual flow rate or 340 lit / min

Capacity of each pump (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
Motive	Back	(Kg/hr)
8.7	1	12330
	2	10180
	3	7850
	4	6990
8	1	11660
	2	9110
	3	7540
	4	5900
7	1	11090
	2	8880
	3	7030
	4	5710
6	1	10420
	2	8580
	3	6850
	4	5440
5	1	10100
	2	8280
	3	6140
4	0.5	10880
	1	8920
	2	6430
3	0.5	9410
	1	7350

MOTIVE AIR		
Pressure (bar g)		Capacity
Motive	Back	(Kg/hr)
6	1	15850
	2	13420
	3	11530
	4	9620
5	1	15400
	2	12920
	3	10930
4	0.5	16850
	1	15100
3	0.5	16170
	1	14170

Capacity Multiplying Factors for Other Filling Heads

Filling Head MM	DN 80
152	0.84
305	1.0
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

Example

Condensate Load	6000kg/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 mtr.

Solution

- In duplex unit condensate load on each pump =3000kg/hr
- Calculate 'h', the total lift or back pressure against which the condensate must be pumped
 $= (9m \times 0.1) + 1.72$
 $= 2.62 \text{ bar g}$
- From capacity table with 5.0 bar g operating Inlet pressure and 3.0 bar g back pressure, each pump has capacity of 3070 kg/hr
- From this, the duplex unit handles condensate load 6140 kg/hr for given operating conditions.

Note from capacity factor charts

Pump capacity if filling head is 0.610 mtr.
 $= 1.2 \times 1725 = 2070 \text{ kg /hr}$



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