FMPP30 - HP
Forbes Marshall Pressure Powered Pump - High Pressure

Description

The Forbes Marshall Pressure Powered Pump - High Pressure (FMPP30 - HP) is designed to pump hot condensate at high back pressure & with high motive pressure especially for application in oil & petrochemical industries.

Sizes and Pipe Connections

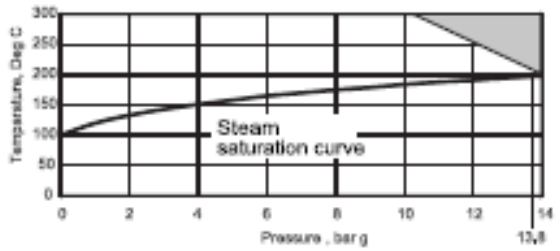
Pump Model	Condensate inlet conn. (A) (DN)	Condensate outlet conn. (B) (DN)	Empty weight (kg)
40FMPP30 - HP	50	50	193
50 FMPP30 - HP	80	80	200
80 FMPP30 - HP	100	80	202

Motive Inlet. (C) - 1/2" NPT (F)
Exhaust. (D) - 1" NPT (F)
Drain (E) - 1/2" NPT (F)
(For Condensate inlet and Outlet use flanges provided with pump (Flanges as per to ASME B16.5 Class 150)

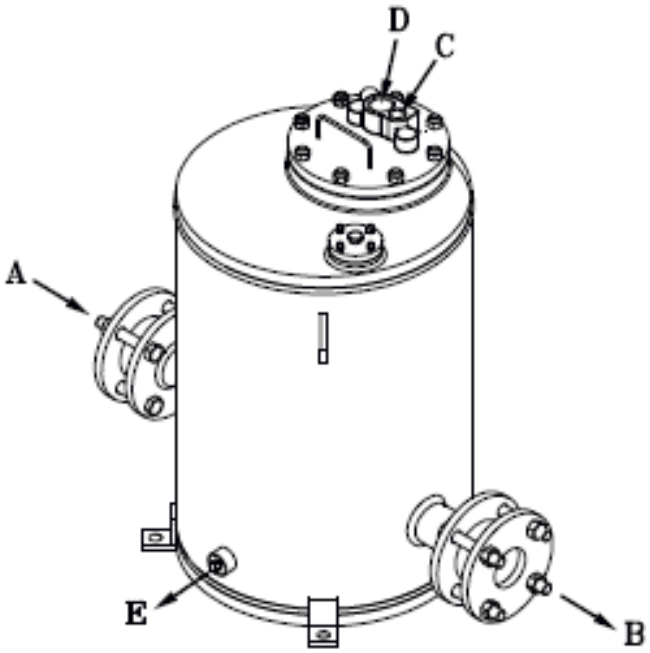
Limiting Conditions

Design Standard	ASME Section VIII Div.1 #150
PMA Maximum design pressure	13.8 bar g
TMA Maximum design temperature	200°C
Operating inlet motive pressure	Steam / Compressed Air / Pressurised gas 3 to 13.8 bar g(max)
Pump discharge per cycle	30 kg
Steam consumption	3.5 kg of steam per 1000 kg liquid pumped
Air consumption	200 SCF per 1000kg liquid pumped
Minimum operating temperature	0°C
Max. Allowable back Pressure	8.5 bar g
Pump Shell Hydrotest Pressure	21 bar g
ASME "U" Code Stamp available on request.	

Operating Range



The product must not be used in this region



Standard Accessories

Condensate Recovery Meter - (CRM485R) and Insulation Jacket

Note : Refer separate TIS for CRM485R and insulation jacket

How to Order

Example : 40FMPP30 - HP Pressure Powered Pump - High Pressure FMPP30 - HP with Insulation Jacket.

Available Spares

Set of Internals
Gasket Kit
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.

PUMP MODEL	A	B
40FMPP30-HP	158	142
50FMPP30-HP	158	142
80FMPP30-HP	138	122

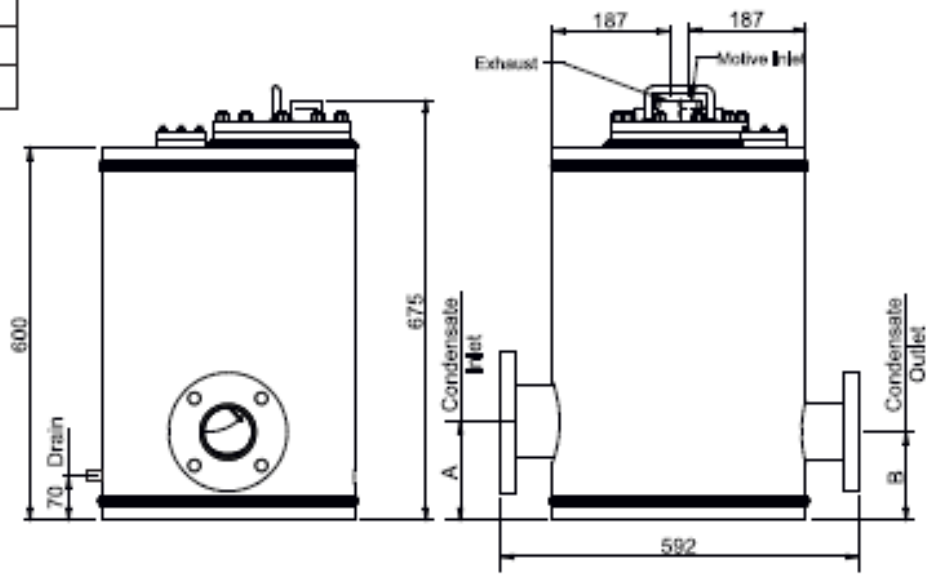


Fig - 1 - Overall Dimensions (mm)

ITEM NO.	PART DESCRIPTION	MATERIAL
1	MAIN SHELL	ASTM/SA A516 GR.70 / ASTM/SA A106 GR.B
2	NOZZLE PIPE	ASTM/SA A106 GR.B
3	SHELL FLAT HEAD TOP	ASTM/SA A516 GR.70 / SA 105
4	SHELL FLAT HEAD BOTTOM	ASTM/SA A516 GR.70 / SA 105
5	SENSOR MOUNTING FLANGE	ASTM/SA A516 GR.70 / SA 105
6/7	MECHANISM STUDS / NUT	ASTM/SA A 193 Gr B7 / ASTM/SA A 194 Gr 2H
8/9	SENSOR FLANGE STUDS / NUT	ASTM/SA A 193 GR B7 / ASTM/SA A 194 Gr 2H
10/11	FLANGE BOLTS/NUTS	ASTM/SA A 193 GR B7 / ASTM/SA A 194 Gr 2H
12	OUTLET FLANGE	ASTM/SA A 516 Gr.70 / SA 105
13	INLET FLANGE	ASTM/SA A 516 Gr.70 / SA 105
14	MECHANISM COVER FLANGE	ASTM/SA A 516 Gr.70 / SA 105
15	PLUG FOR SENSOR PORT	SS304/ASTM/SA A105
16	DRAIN PLUG	ASTM/SA 105

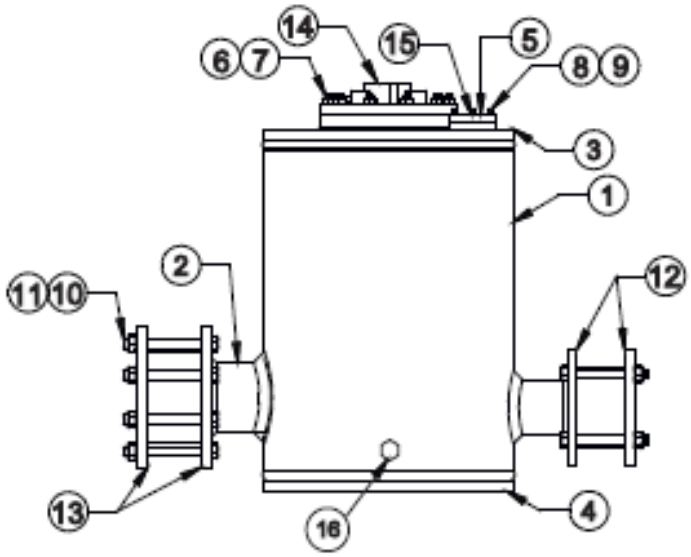
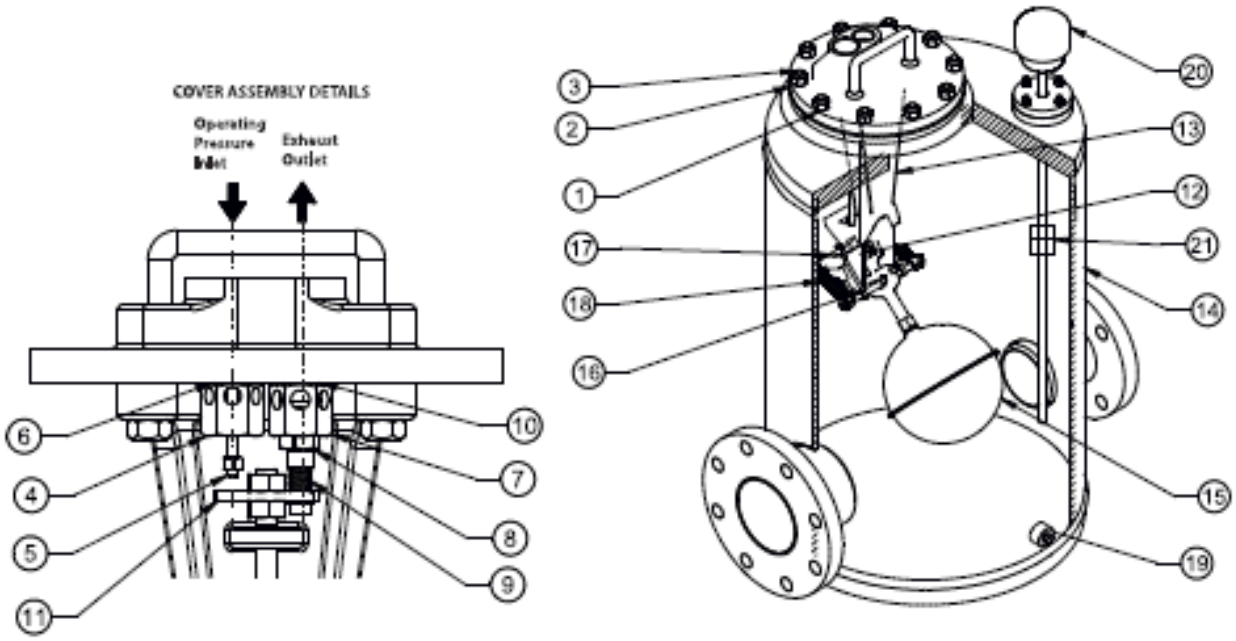


Fig - 2



Material

Sr. No.	Description	Material	Standard
1	Mechanism Cover	Carbon Steel	ASTM/SA A216 Gr. WCB
2	Mechanism Cover Gasket	Non Asbestos Sheet	-
3	Mechanism Stud and Nut	Carbon Steel	ASTM/SA A193 Gr. B7 / SA A194 Gr.2H
4	Inlet Valve Seat	Stainless Steel	ASTM A276 Gr. 304
5	Inlet Valve Stem	Stainless Steel	ASTM A276 Gr. 304
6	Inlet Seat Gasket	Copper	-
7	Exhaust Valve Seat	Stainless Steel	ASTM A276 Gr. 304
8	Exhaust Valve Head	Stainless Steel	ASTM A276 Gr. 431
9	Exhaust Spring	Stainless Steel	SS316
10	Exhaust Seat Gasket	Copper	-
11	Valve Actuator Disc	Stainless Steel	ASTM A276 Gr. 304
12	Push Rod	Stainless Steel	ASTM A276 Gr. 304
13	Mechanism Support	Stainless Steel	ASTM A351 Gr. Cf8
14	Pump Shell Assembly	Carbon Steel	ASTM/SA A516 GR.70 / SA 105 / ASTM/SA A106 GR.B
15	Float	Stainless Steel	ASTM A240 Gr. 304
16	Linkage Mechanism	Stainless Steel	ASTM A351 CF 8
17	Push Rod Actuator	Stainless Steel	ASTM A351 CF 8
18	Spring	Inconel	-
19	Drain Plug	Forged Carbon Steel	ASTM/SA105
20	Flow-temp Sensor (Optional)	Stainless Steel	-
21	Sensor Float (Optional)	Stainless Steel	ASTM A240 Gr. 304

Typical Installation:

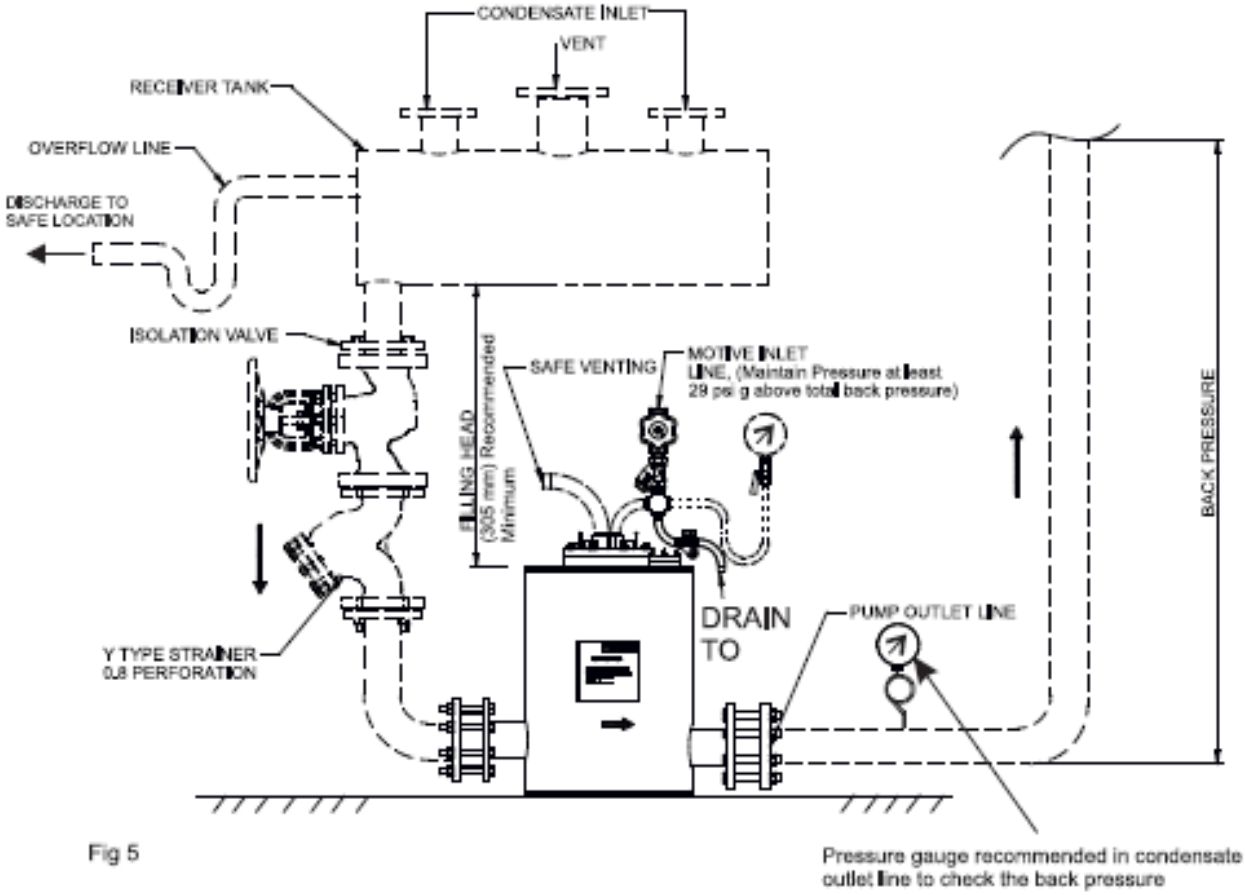


Fig 5

Dotted line indicates customers scope

Caution: Before installation or any maintenance is performed ensure that all condensate ,steam ,air or gas lines are closed to prevent personnel injury.

Recommendation:

It is recommended to install the pump as per the schematic mentioned in above figure.

Products:

1. Isolation Valve : Size should match with the inlet line of FMPP30-HP pump, full bore valve.

2. Strainer Screen : 0.8 perforation or finer

3. Motive inlet : Maintain Motive inlet Pressure at least 29 psi g above total back pressure

4. Recommended Minimum filling head : 305 mm , for other filling heads refer capacity column for details.
5. Exhaust to be safely vented after installing 25NB bend as shown in above figure.

Motive Inlet Line:
It is recommended to install motive inlet line as shown in above figure with isolation valve and 100 mesh strainer .
Pressure gauge to know the motive inlet pressure.

Drain trap on motive line: To ensure dry saturated steam
supply and consistent performance.

Installation:
Install the pump physically below the receiver tank with exhaust connection vented to safe location. FMPP30-HP pump should be installed with the recommended filling head mentioned on the last page.

Over flow piping must be used in the receiver tank as shown above.

Sizing:
For sizing of receiver tank and outlet pipe ,please refer the user manual.

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)

FMPP30 – HP Capacity (motive steam)

40FMPP30 - HP			50FMPP30 - HP			80FMPP30 - HP		
Motive Pr. Bar g	Back Pr. Bar g	Capacity, Kg/h	Motive Pr. Bar g	Back Pr. Bar g	Capacity, Kg/h	Motive Pr. Bar g	Back Pr. Bar g	Capacity, Kg/h
2	0.5	2660	2	0.5	3940	2	0.5	4760
2	1	2015	2	1	2635	2	1	3085
3	0.5	3350	3	0.5	4135	3	0.5	5000
3	1	2700	3	1	3375	3	1	4080
4	0.5	3095	4	0.5	4755	4	0.5	7460
4	1	2870	4	1	3940	4	1	5030
4	2	2375	4	2	2785	4	2	3205
5	0.5	3240	5	0.5	4775	5	0.5	7565
5	1	3051	5	1	4180	5	1	5760
5	2	2555	5	2	3340	5	2	4040
5	3	2115	5	3	2655	5	3	2905
6	0.5	3285	6	0.5	4935	6	0.5	8464
6	1	3149	6	1	4430	6	1	5664
6	2	2790	6	2	3835	6	2	4565
6	3	2395	6	3	3110	6	3	3465
6	4	2015	6	4	2395	6	4	2635
7	0.5	3315	7	0.5	5010	7	0.5	9030
7	1	3150	7	1	4650	7	1	6135
7	2	2795	7	2	3845	7	2	4705
7	3	2480	7	3	3290	7	3	3605
7	4	2160	7	4	2690	7	4	2785
7	5	1905	7	5	2280	7	5	2165
8	0.5	3360	8	0.5	5180	8	0.5	9190
8	1	3255	8	1	4755	8	1	7695
8	2	2985	8	2	4080	8	2	5345
8	3	2805	8	3	3365	8	3	4185
8	4	2285	8	4	2850	8	4	3240
8	5	2035	8	5	2545	8	5	2530
8	6	1940	8	6	2090	8	6	1945
9	0.5	3415	9	0.5	5210	9	0.5	9460
9	1	3285	9	1	4820	9	1	7860
9	2	3015	9	2	4095	9	2	5645
9	3	2825	9	3	3385	9	3	4330
9	4	2340	9	4	2920	9	4	3425
9	5	2070	9	5	2645	9	5	2830
9	6	1940	9	6	2320	9	6	2295
9	7	1630	9	7	1970	9	7	1944
10	0.5	3425	10	0.5	5235	10	0.5	9560
10	1	3295	10	1	4845	10	1	8505
10	2	3045	10	2	4110	10	2	5690
10	3	2855	10	3	3420	10	3	4455
10	4	2375	10	4	2895	10	4	3660
10	5	2120	10	5	2795	10	5	3560
10	6	2015	10	6	2495	10	6	3240
10	7	1875	10	7	2230	10	7	2740
10	8	1625	10	8	1980	10	8	2520
10	8.5	1500	10	8.5	1775	10	8.5	2225
11	0.5	3435	11	0.5	5290	11	0.5	9460
11	1	3360	11	1	4955	11	1	8910
11	2	3085	11	2	4215	11	2	5460
11	3	2750	11	3	3475	11	3	5140
11	4	2410	11	4	3030	11	4	4240
11	5	2210	11	5	2795	11	5	3800
11	6	2115	11	6	2660	11	6	3665
11	7	1885	11	7	2355	11	7	3230
11	8	1735	11	8	2135	11	8	2885
11	8.5	1670	11	8.5	1980	11	8.5	2485
12	0.5	3470	12	0.5	5345	12	0.5	9600
12	1	3360	12	1	4915	12	1	9295
12	2	3115	12	2	4320	12	2	7125
12	3	2855	12	3	3590	12	3	5480

FMPP30 – HP Capacity (motive steam)

40FMPP30 - HP			50FMPP30 - HP			80FMPP30 - HP		
Motive Pr. Bar g	Back Pr. Bar g	Capacity, Kg/h	Motive Pr. Bar g	Back Pr. Bar g	Capacity, Kg/h	Motive Pr. Bar g	Back Pr. Bar g	Capacity, Kg/h
12	4	2460	12	4	3095	12	4	4345
12	5	2235	12	5	2815	12	5	3940
12	6	2120	12	6	2690	12	6	3760
12	7	1895	12	7	2370	12	7	3275
12	8	1780	12	8	2230	12	8	2760
12	8.5	1735	12	8.5	2095	12	8.5	2605
13	0.5	3505	13	0.5	5370	13	0.5	10085
13	1	3390	13	1	4960	13	1	9460
13	2	3125	13	2	4305	13	2	7320
13	3	2885	13	3	3625	13	3	5940
13	4	2485	13	4	3120	13	4	4545
13	5	2270	13	5	2860	13	5	4005
13	6	2125	13	6	2625	13	6	3790
13	7	1925	13	7	2425	13	7	3320
13	8	1830	13	8	2290	13	8	2835
13	8.5	1760	13	8.5	2135	13	8.5	2620
14	0.5	3525	14	0.5	5425	14	0.5	10180
14	1	3400	14	1	5030	14	1	9460
14	2	3135	14	2	4390	14	2	7370
14	3	2895	14	3	3660	14	3	6035
14	4	2490	14	4	3160	14	4	4645
14	5	2280	14	5	2895	14	5	4015
14	6	2130	14	6	2645	14	6	3815
14	7	1930	14	7	2450	14	7	3390
14	8	1840	14	8	2265	14	8	2975
14	8.5	1795	14	8.5	2270	14	8.5	2840

Capacity Multiplying Factors for Other Filling Heads

Filling Head	40FMPP30 - HP	50FMPP30 - HP	80FMPP30 - HP
152	0.7	0.7	0.84
305	1.0	1.0	1.0
610	1.2	1.2	1.08
914	1.35	1.35	1.20

Capacity Multiplying Factors for Motive Gas Supplies

% 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	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.
= (9m x 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 40FMPP30 - HP which has a capacity of 2115 kg/hr.

Note from Capacity Factor Charts

A Pump capacity if filling head is 0.610 mtr.
= 1.2 x 2115 = 2538 kg/hr.