Pump Data

A. Series: MF (Mixed Flow Pump)

B. Applications:

- MF pumps are especially used for pumping of large quantities of liquid with impurities against low and medium heads.
- The field of applications of these pumps includes water works for municipalities covering pumping of drainage water, storm water and supplying water from settling tanks.
- In irrigation and agriculture for lift irrigation, in industry for circulation of hot or cold water, air conditioning plants, power stations, textile mills.
- For screened sewage in sewage disposal systems etc.

C. Applicable Standards:

MF pumps are manufactured as per KBL standard. No any specific standard is applicable for MF pumps.

D. Model:

MF pumps are manufactured in following models:

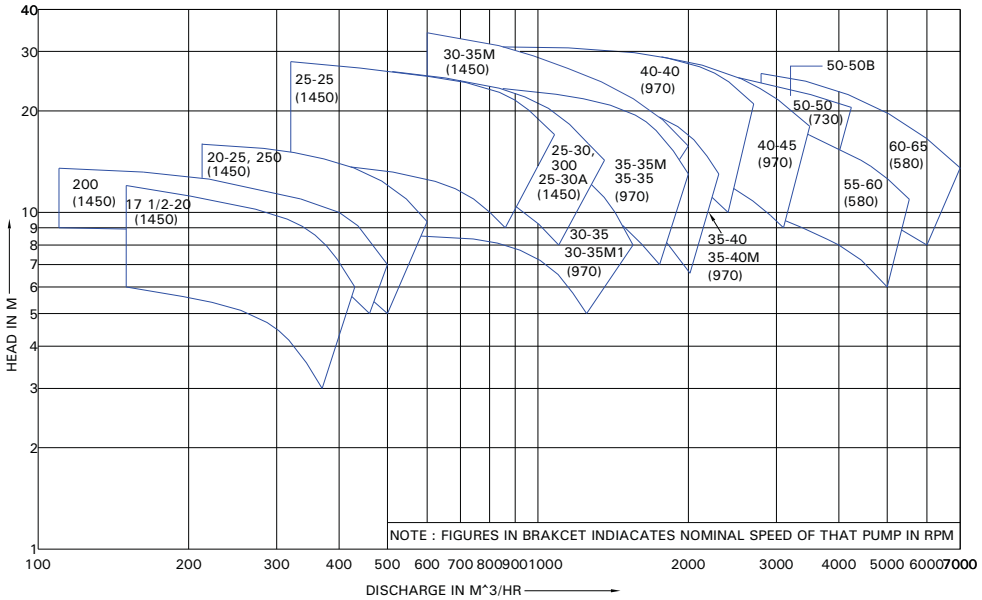
MF 171/2-20	MF 35-35	MF 30-35M (3 full & 3 half vane)
MF 20-25	MF 35-40	MF 30-35M1(3 vane impeller)
MF 250	MF 40-40	MF 35-35M1(3 vane impeller)
MF 25-25	MF 40-45	MF 35-40M (3 vane impeller)
MF 25-30	MF 50-50	MF 55-60E (4 vane enclosed impeller)
MF 300	MF 55-60	MF 50-50B (Back-pull out)
MF 30-35	MF 60-65	MF 25-30A(3 vane impeller)
MF 30-35B (Back-pull out)	MF 200	

Note: Details of MF 200 pump is started from page no 28.

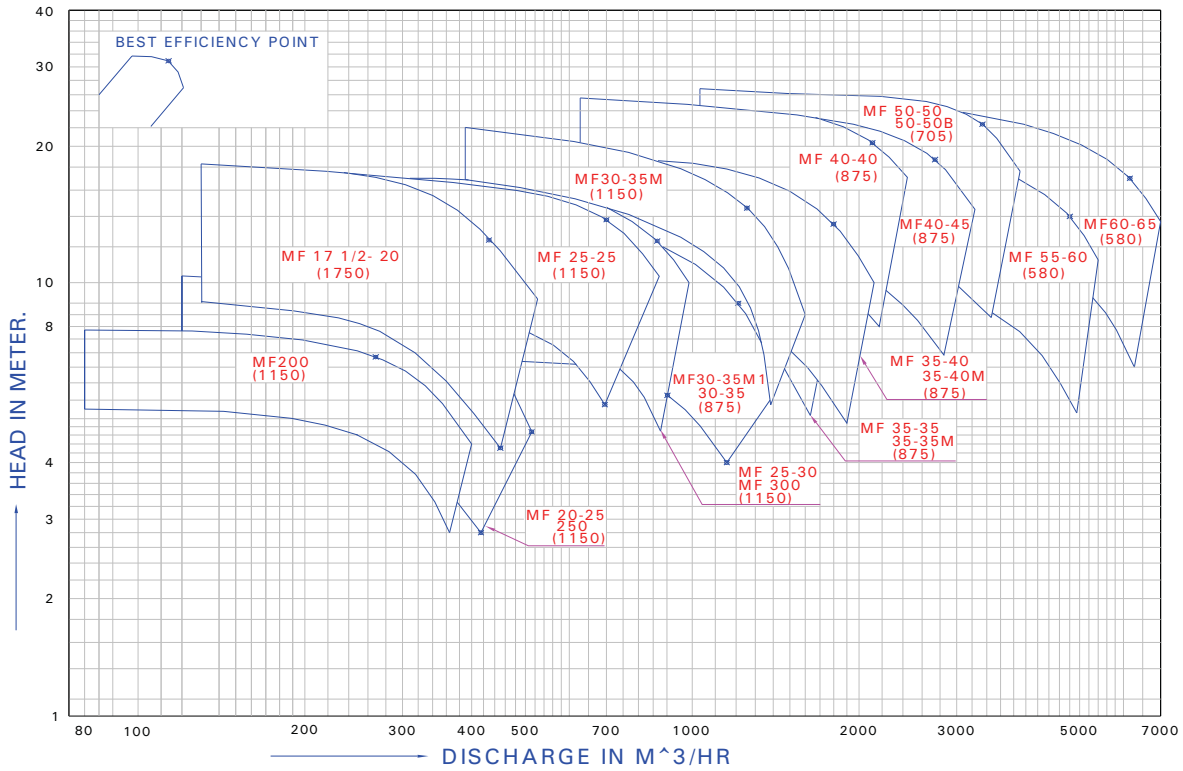
E. Family Curves and Torque speed curve:

Family curve of MF pump for 50 Hz & 60 Hz is given bellow.

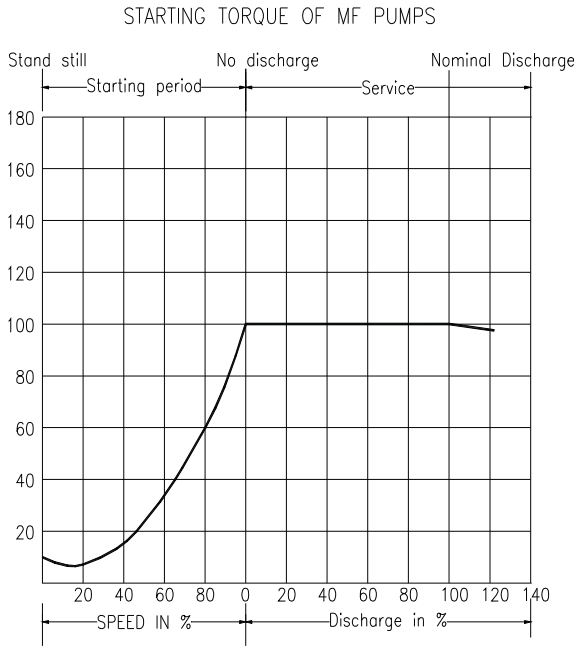
Family Curve for 50Hzs:-



Family Curve for 60Hzs:-



Torque-speed curve for MF pump is given bellow:



F. Iso-Efficiency curves:

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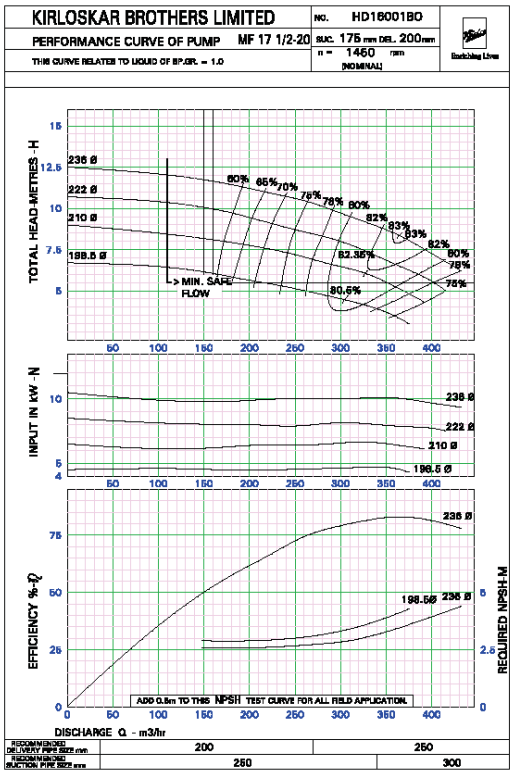
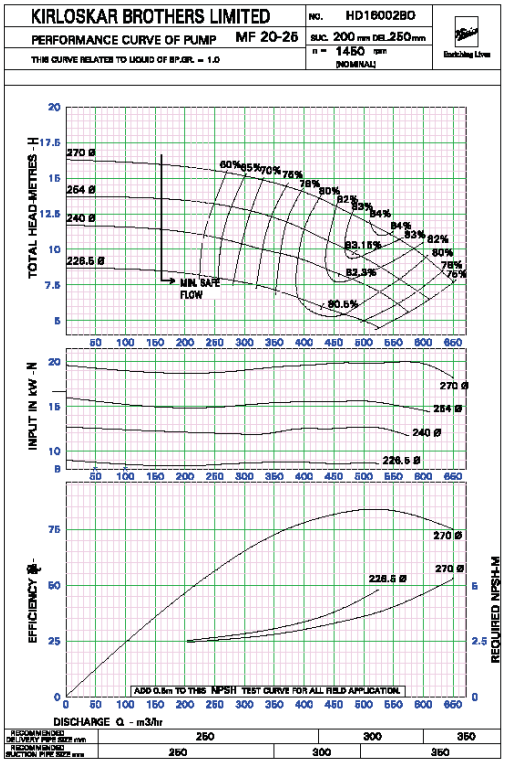
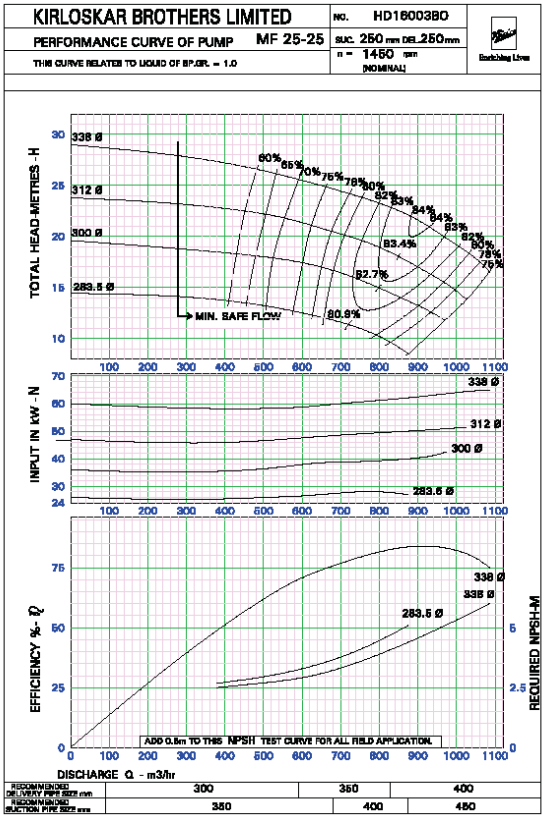
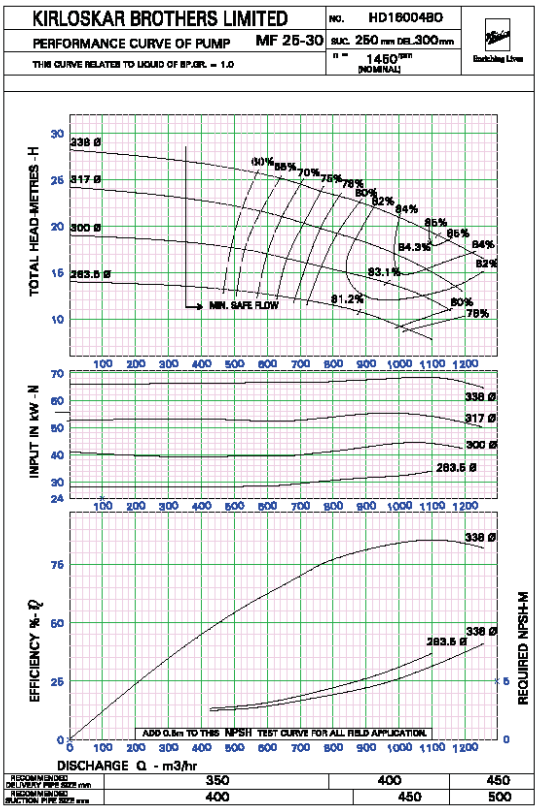
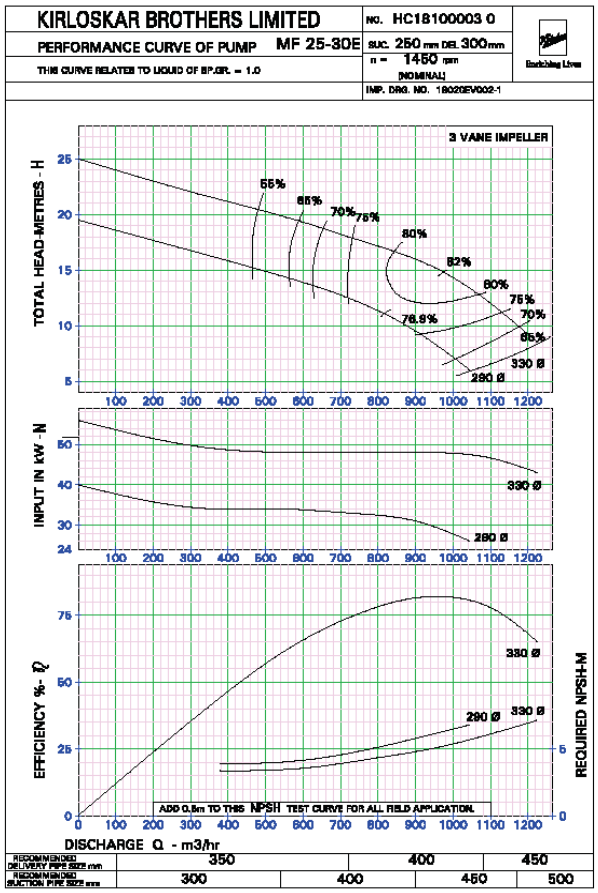
Sr. No.	Description	Curve No
1	MF 17 1-2-20 -1450	HD16001B0-0
2	MF 20-25 - 1450	HD16002B0-0
3	MF 25-25 - 1450	HD16003B0-0
4	MF 25-30 - 1450	HD16004B0-0
5	MF 25-30E -1450	HC18100003-0
6	MF 30-35 - 970	HD16005C0-0
7	MF 35-35 - 970	HD16006C0-0
8	MF 35-40 - 970	HD16007C0-0
9	MF 40-40 - 970	HD16008C0-0
10	MF 40-40E - 970	HC18100004-0
11	MF 40-45 -970	HD16009C0-0
12	MF 50-50 - 730	HD16010D0-0
13	MF 50-50E - 730	HC18100005-0
14	MF 55-60 - 580	HD16011E0-0
15	MF 55-60EV - 590	HD16013AE0-0
16	MF 60-65 - 580	HD16012E0-0

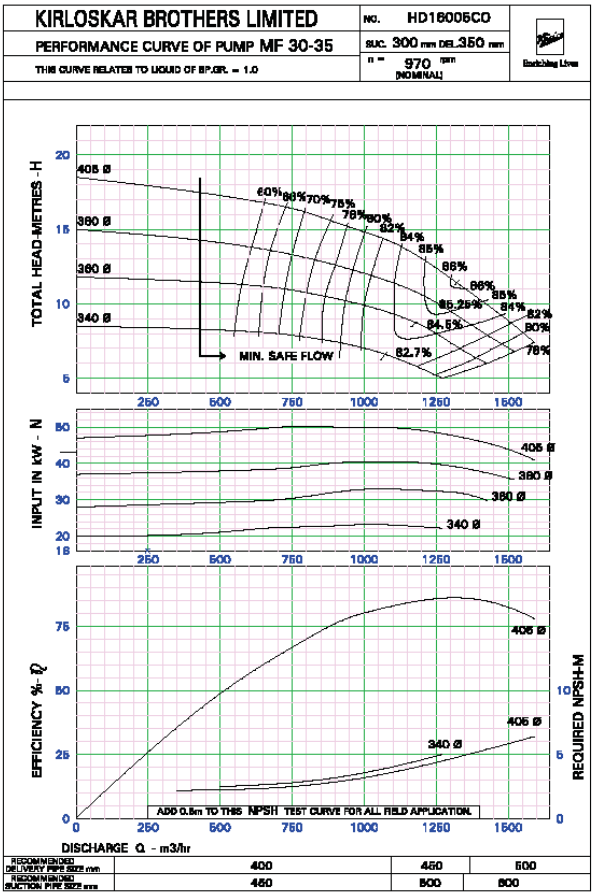

KIRLOSKAR BROTHERS LIMITED
NO. HD16001BO
PERFORMANCE CURVE OF PUMP MF 17 1/2-20
SUC. 175 mm DEL. 200mm
n = 1460 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES -H
INPUT IN kW -N
EFFICIENCY %- η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 200 250
RECOMMENDED SUCTION PIPE SIZE mm 250 300

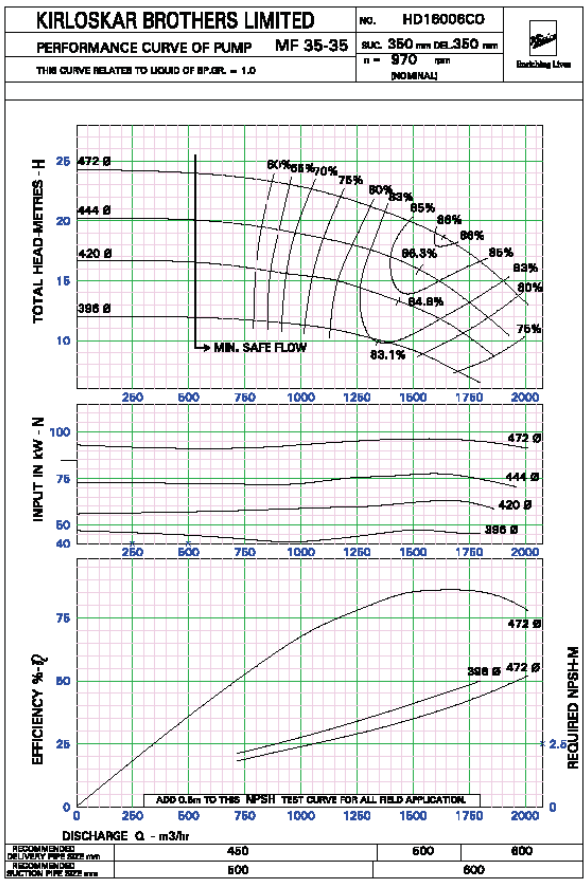

KIRLOSKAR BROTHERS LIMITED
NO. HD16002BO
PERFORMANCE CURVE OF PUMP MF 20-25
SUC. 200 mm DEL. 250mm
n = 1450 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES -H
INPUT IN kW -N
EFFICIENCY %- η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 250 300 350
RECOMMENDED SUCTION PIPE SIZE mm 250 300 350

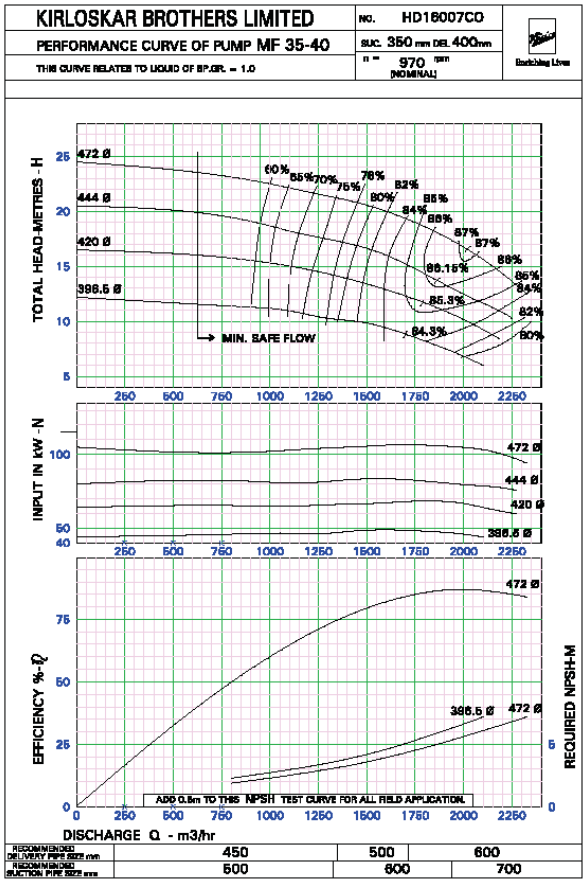

KIRLOSKAR BROTHERS LIMITED
NO. HD16003BO
PERFORMANCE CURVE OF PUMP MF 25-25
SUC. 250 mm DEL. 250mm
n = 1460 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES -H
INPUT IN kW -N
EFFICIENCY %- η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 300 350 400
RECOMMENDED SUCTION PIPE SIZE mm 350 400 450

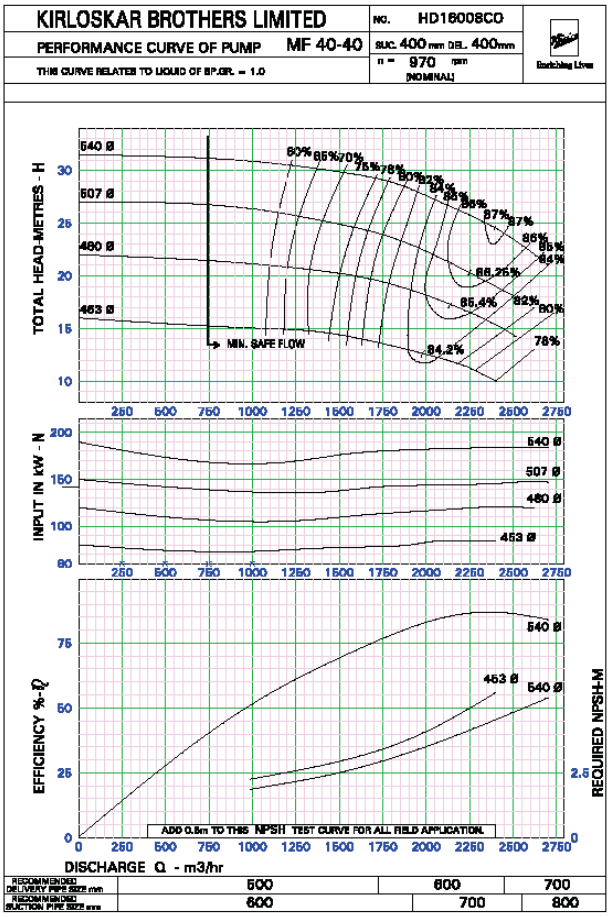

KIRLOSKAR BROTHERS LIMITED
NO. HD16004BO
PERFORMANCE CURVE OF PUMP MF 25-30
SUC. 250 mm DEL. 300mm
n = 1450 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES -H
INPUT IN kW -N
EFFICIENCY %- η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 350 400 450
RECOMMENDED SUCTION PIPE SIZE mm 400 450 500

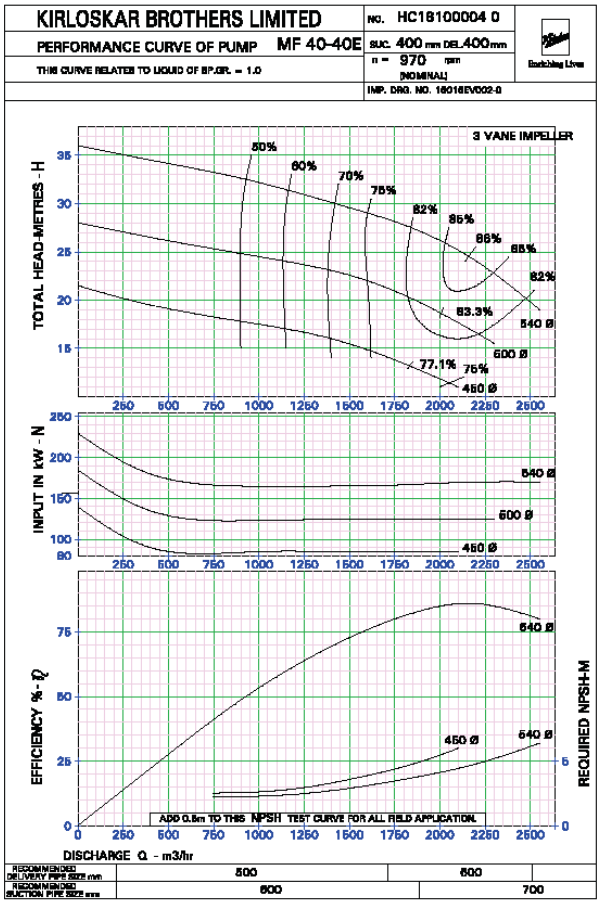

KIRLOSKAR BROTHERS LIMITED
NO. HC18100003 0
PERFORMANCE CURVE OF PUMP MF 25-30E
SUC. 250 mm DEL 300mm
n = 1450 rpm [NOMINAL]
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
IMP. DRG. NO. 18020EV002-1
3 VANE IMPELLER
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 350 400 450
RECOMMENDED SUCTION PIPE SIZE mm 300 400 450 500

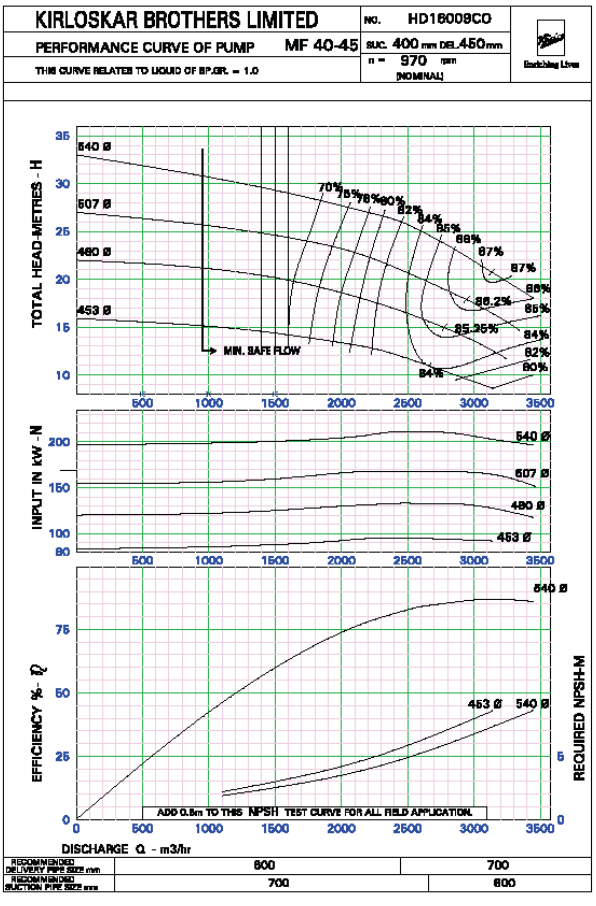

KIRLOSKAR BROTHERS LIMITED
NO. HD16005CO
PERFORMANCE CURVE OF PUMP MF 30-35
SUC. 300 mm DEL 350 mm
n = 970 rpm [NOMINAL]
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
MIN. SAFE FLOW
DISCHARGE Q - m3/hr
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 400 450 500
RECOMMENDED SUCTION PIPE SIZE mm 450 500 600

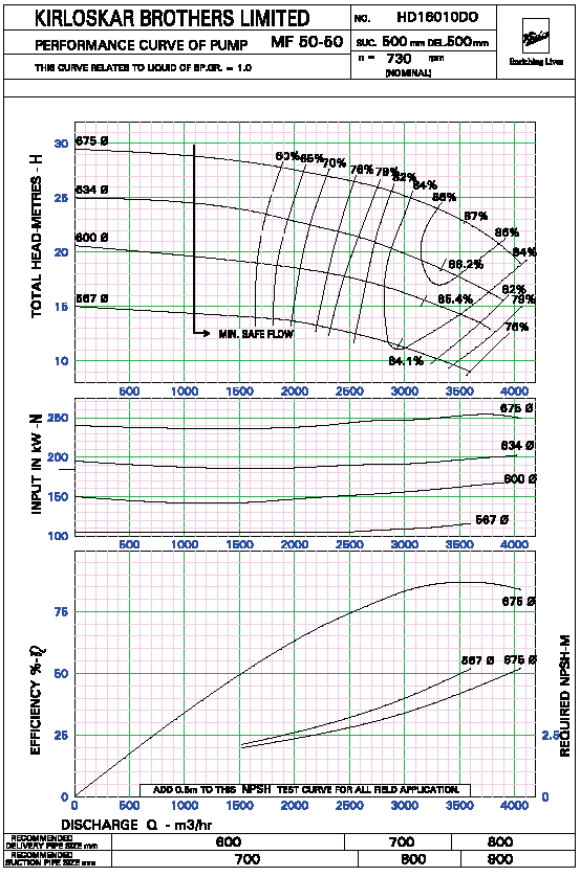

KIRLOSKAR BROTHERS LIMITED
NO. HD16006CO
PERFORMANCE CURVE OF PUMP MF 35-35
SUC. 350 mm DEL 350 mm
n = 970 rpm [NOMINAL]
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
MIN. SAFE FLOW
DISCHARGE Q - m3/hr
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 450 600 600
RECOMMENDED SUCTION PIPE SIZE mm 500 600

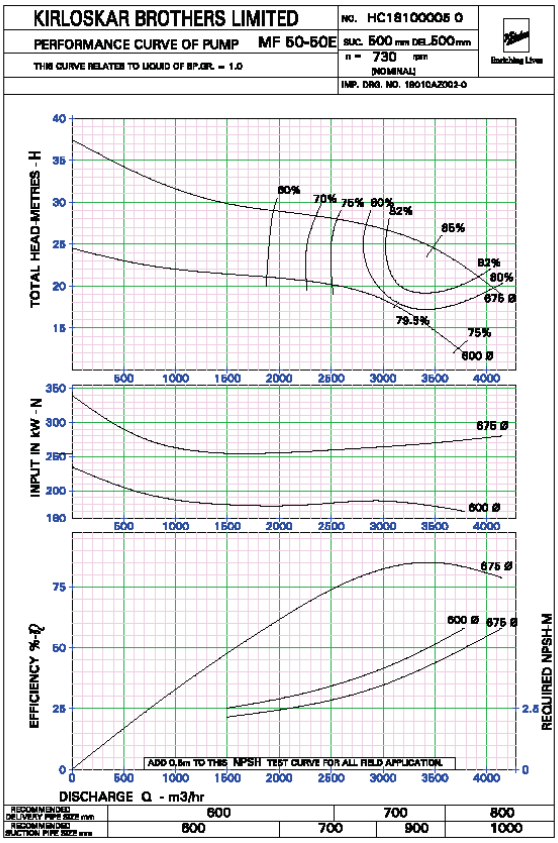

KIRLOSKAR BROTHERS LIMITED
NO. HD16007CO
PERFORMANCE CURVE OF PUMP MF 35-40
SUC. 350 mm DEL 400mm
n = 970 rpm [NOMINAL]
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
MIN. SAFE FLOW
DISCHARGE Q - m3/hr
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 450 500 600
RECOMMENDED SUCTION PIPE SIZE mm 500 600 700

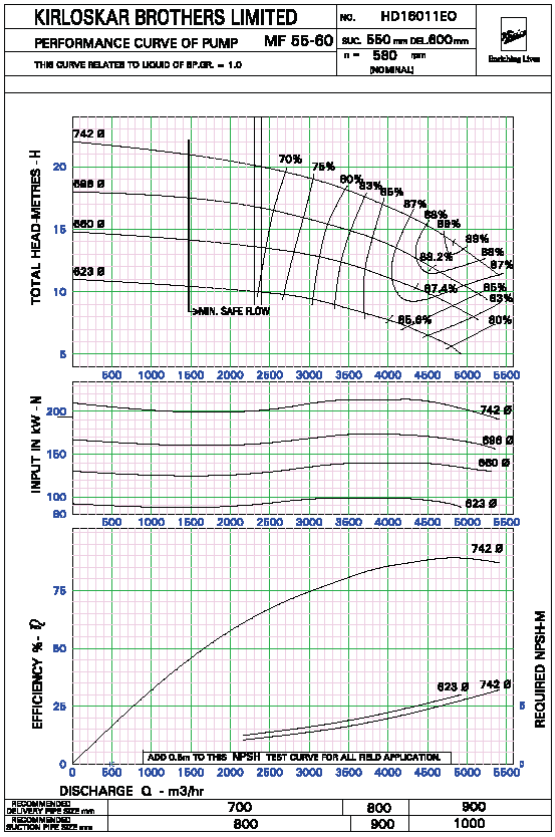

KIRLOSKAR BROTHERS LIMITED
NO. HD16008CO
PERFORMANCE CURVE OF PUMP MF 40-40
SUC. 400 mm DEL. 400mm
n = 970 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
MIN. SAFE FLOW
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 500 600 700
RECOMMENDED SUCTION PIPE SIZE mm 600 700 800

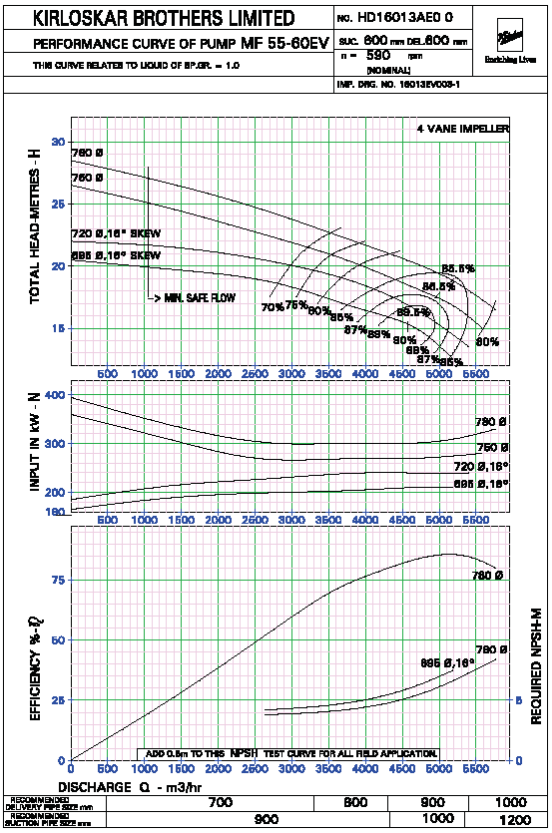

KIRLOSKAR BROTHERS LIMITED
NO. HC18100004 0
PERFORMANCE CURVE OF PUMP MF 40-40E
SUC. 400 mm DEL.400mm
n = 970 rpm (NOMINAL)
IMP. DRG. NO. 18016EV002-0
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
3 VANE IMPELLER
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 500 600
RECOMMENDED SUCTION PIPE SIZE mm 600 700

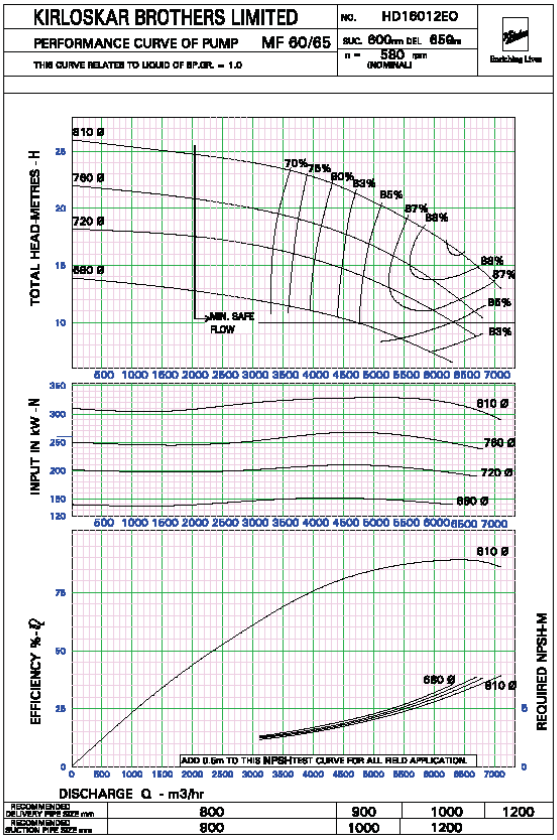

KIRLOSKAR BROTHERS LIMITED
NO. HD16009CO
PERFORMANCE CURVE OF PUMP MF 40-45
SUC. 400 mm DEL.450mm
n = 970 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
MIN. SAFE FLOW
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 600 700
RECOMMENDED SUCTION PIPE SIZE mm 700 800


KIRLOSKAR BROTHERS LIMITED
NO. HD16010DO
PERFORMANCE CURVE OF PUMP MF 50-50
SUC. 500 mm DEL.500mm
n = 730 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY % - η
REQUIRED NPSH-M
DISCHARGE Q - m3/hr
MIN. SAFE FLOW
ADD 0.8m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
RECOMMENDED DELIVERY PIPE SIZE mm 600 700 800
RECOMMENDED SUCTION PIPE SIZE mm 700 800 900


KIRLOSKAR BROTHERS LIMITED
NO. HC18100005 0
PERFORMANCE CURVE OF PUMP MF 50-50E
SUC. 500 mm DEL.500mm
n = 730 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
IMP. DRG. NO. 1801CA2002-0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY %-η
REQUIRED NPSH-M
675 Ø
600 Ø
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
DISCHARGE Q - m3/hr
RECOMMENDED DELIVERY PIPE SIZE mm 600 700 800
RECOMMENDED SUCTION PIPE SIZE mm 800 700 900 1000


KIRLOSKAR BROTHERS LIMITED
NO. HD16011EO
PERFORMANCE CURVE OF PUMP MF 55-60
SUC. 550 mm DEL.600mm
n = 580 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY %- η
REQUIRED NPSH-M
742 Ø
696 Ø
650 Ø
623 Ø
>MIN. SAFE FLOW
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
DISCHARGE Q - m3/hr
RECOMMENDED DELIVERY PIPE SIZE mm 700 800 900
RECOMMENDED SUCTION PIPE SIZE mm 800 900 1000


KIRLOSKAR BROTHERS LIMITED
NO. HD16013AE0 0
PERFORMANCE CURVE OF PUMP MF 55-60EV
SUC. 600 mm DEL.600 mm
n = 590 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
IMP. DRG. NO. 16013EV003-1
4 VANE IMPELLER
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY %-η
REQUIRED NPSH-M
780 Ø
760 Ø
720 Ø,16° SKEW
695 Ø,16° SKEW
720 Ø,16°
695 Ø,16°
-> MIN. SAFE FLOW
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
DISCHARGE Q - m3/hr
RECOMMENDED DELIVERY PIPE SIZE mm 700 800 900 1000
RECOMMENDED SUCTION PIPE SIZE mm 900 1000 1200

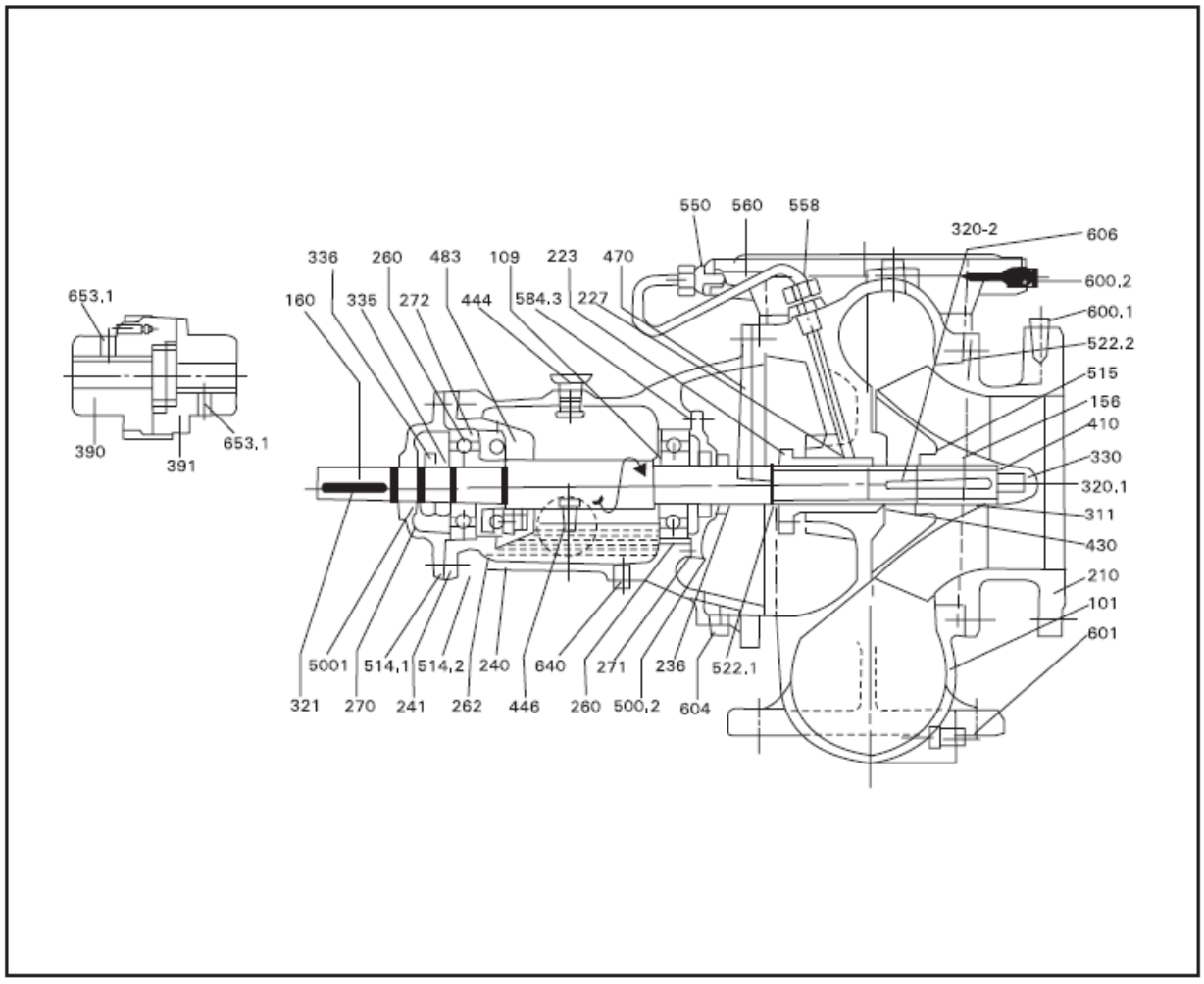

KIRLOSKAR BROTHERS LIMITED
NO. HD16012EO
PERFORMANCE CURVE OF PUMP MF 60/65
SUC. 600mm DEL. 650mm
n = 580 rpm (NOMINAL)
THIS CURVE RELATES TO LIQUID OF SP.GR. = 1.0
TOTAL HEAD-METRES - H
INPUT IN kW - N
EFFICIENCY %-η
REQUIRED NPSH-M
810 Ø
760 Ø
720 Ø
680 Ø
650 Ø
>MIN. SAFE FLOW
ADD 0.5m TO THIS NPSH TEST CURVE FOR ALL FIELD APPLICATION.
DISCHARGE Q - m3/hr
RECOMMENDED DELIVERY PIPE SIZE mm 800 900 1000 1200
RECOMMENDED SUCTION PIPE SIZE mm 800 1000 1200

G. Constructional features:

- MF type pumps are single stage, horizontal spindle volute type. They are foot mounted.
- They are fitted with ball and thrust bearings. MF Type pumps are centrifugal pumps with semi-open type mixed flow impellers and are provided with standard accessories.
- These pumps can be offered with back-pull out design against requirement in horizontal drive models & as a standard feature in vertical drive arrangement.

H. Cross sectional Drawings with MOC option:

For exploded Cross sectional drawing please refer annexure-6. Regular c/s drawing is shown below.



MATERIAL OF CONSTRUCTION (MOC) CODES:

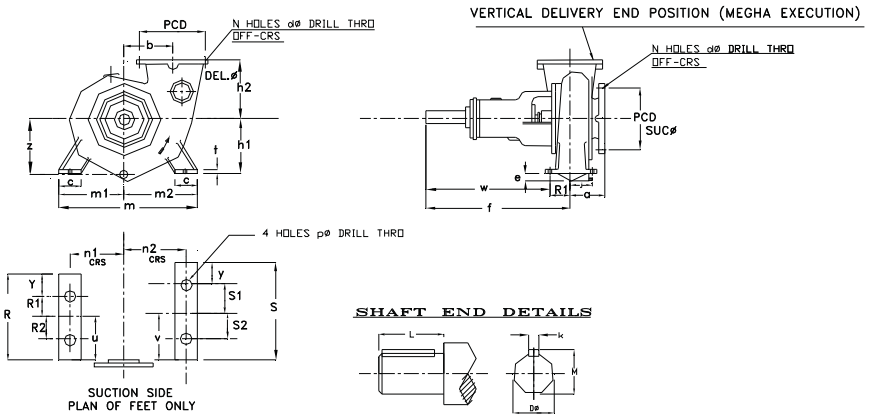
CODE	Material Construction
01	Standard Fitted
02	Bronze fitted
03	Ph. Bronze fitted
04	All Bronze fitted
05	All Ph. Bronze fitted
09	Cast Steel fitted
10	All Cast Steel fitted
11	St. Steel CF8M fitted
13	All St. Steel CF8M fitted
18	All 2% NiCI fitted
19	All St. Steel CN7M fitted
20	Standard fitted with Bronze Impeller
21	CI CI ST
27	Standard fitted with Bronze Impeller & St. Steel CF8M Suction cover
28	St. Steel CF8M fitted with St. Steel CF8M Suction cover
43	Standard fitted with Bronze Impeller & St. Steel 410 Shaft
44	Bronze fitted with St. Steel 410 Shaft
61	All 2% NiCI with St. Steel CF8M Impeller & St. Steel 410 Shaft
62	St. Steel CF8M fitted with St. Steel 410 Shaft

Notes:

- Material construction codes 04, 05 are to be offered up to MF 35-35 size only.
- Material construction codes 10, 13 are to be offered up to MF 50-50 size only.
- For MF 200 size, only Material construction codes 01, 02, 03, 09, 11, 20 are to be offered.
- Material construction code 19 to be offered up to MF 30-35 size only.

I. Outline drawings:

For outline dimensions of MF pump, please refer annexure 4 & 5.



Sr		PUMP MEASUREMENTS										FEET MEASUREMENTS																		SHAFT END MEASUREMENTS				DELIVERY FLANGE		
No.	PUMP TYPE	SUC.	DEL.	a	f	j	e	h1	h2	z	b	t	c	m1	m2	m	u	v	n1	n2	R1	R2	R	Y	S1	S2	S	Pø	W	Dø m6	M	K	L	PCD	N HOLES	Dø
																																		FLANGE DRILLING		
																																		SUCTION FLANGE		
1	MF 17 1/2-20(AM 20A)	175	200	200	564	102	32	250	230	255	208	24	110	270	320	590	140	140	215	265	90	110	260	30	110	110	280	7/8"	474	32	35.5	10	80	270 295	8	22
2	MF 20-25(AM 25A)	200	250	215	545	120	40	280	275	290	240	26	120	310	360	670	155	155	250	300	100	120	290	35	120	120	310	1"	445	32	35.5	10	80	295 350	8 12	22
3	MFX 20-25	200	250	215	545	120	40	280	275	290	240	26	120	310	360	670	155	155	250	300	100	120	290	35	120	120	310	1"	445	32	35.5	10	80	295 350	8 12	22
4	MF 250	250	250	248	545	120	40	280	275	290	240	26	120	310	360	670	155	155	250	300	100	120	290	35	120	120	310	1"	445	32	35.5	10	80	350	12	22
5	MF 25-25(AM 25B)	250	250	245	620	145	31	315	285	315	268	28	130	330	390	720	175	175	265	325	95	125	320	50	125	125	350	1 1/8"	525	42	45.5	12	110	350	12	22
6	MFX 25-25	250	250	255	620	145	31	315	285	315	268	28	130	330	390	720	175	175	265	325	95	125	320	50	125	125	350	1 1/8"	525	42	45.5	12	110	350	12	22
7	MF 25-30(AM 30A), A	250	300	245	620	145	50	355	320	370	300	32	140	385	450	835	190	190	315	380	120	140	360	50	140	140	380	1 1/8"	500	42	45.5	12	110	350 400	12	22
8	MFX 25-30	250	300	255	620	145	50	355	320	370	300	32	140	385	450	835	190	190	315	380	120	140	360	50	140	140	380	1 1/8"	500	42	45.5	12	110	350 400	12	22
9	MF 300	300	300	285	620	145	50	355	320	370	300	32	140	385	450	835	190	190	315	380	120	140	360	50	140	140	380	1 1/8"	500	42	45.5	12	110	400	12	22
10	MF 30-35(AM 35A),M,M1	300	350	295	707	161	85	400	370	435	355	36	170	470	550	1020	225	225	385	465	150	170	430	55	170	170	450	1 1/4"	557	50	54	14	120	400 460	12 16	22
11	MF 35-35(AM 35B),M	350	350	345	670	176	85	400	400	442	375	36	170	470	550	1020	225	225	385	465	140	170	420	55	170	170	450	1 1/4"	530	50	54	14	120	460	16	22
12	MFX 35-35	350	350	345	670	176	85	400	400	442	375	36	170	470	550	1020	225	225	385	465	140	170	420	55	170	170	450	1 1/4"	530	50	54	14	120	460	16	22
13	MF 35-40(AM 40A), M	350	400	345	670	195	100	500	440	520	415	40	200	530	620	1150	265	265	430	520	170	200	500	65	200	200	530	1 3/8"	500	50	54	14	120	460 515	16	22 26
14	MF 40-40(AM 40B)	400	400	390	872	182	85	470	450	515	428	56	196	663	733	1396	280	280	565	635	170	210	520	70	210	210	560	1 3/8"	702	70	76	20	170	515	16	26
15	MFX 40-40	400	400	390	872	182	85	470	450	515	428	56	196	663	733	1396	280	280	565	635	170	210	520	70	210	210	560	1 3/8"	702	70	76	20	170	515	16	26
16	MF 40-45(AM 45A)	400	450	400	862	185	85	600	500	590	475	60	200	625	700	1325	315	300	525	600	225	255	600	60	240	240	600	1 3/8"	637	70	76	20	170	515 565	16 20	26
17	MF 50-50(AM 50A)	500	500	490	960	212	140	600	625	648	535	60	200	660	790	1450	310	310	560	690	195	245	570	65	245	245	620	1 3/8"	765	80	87	25	170	620	20	26
18	MF 55-60(AM 60A), E	550*	600	540	920	260	135	800	680	825	650	75	250	800	950	1750	380	380	675	825	265	305	720	75	305	305	765	1 5/8"	655	80	87	25	170	725	20	30
19	MF 60-65(AM 65A)	600	650*	590	1047	297	214	800	850	890	710	75	270	925	1075	2000	400	400	790	940	265	325	740	75	325	325	782	1 5/8"	782	100	108	28	210	725 840	20 24	30

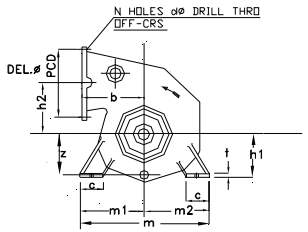
NOTES:- 1) FLANGES DRELLED AS PER BS 4504 PN 10
2) ALL DIMENSIONS ARE IN mm EXCEPT SPECIFIED
3) FOR MF-250 CENTER LINE OF SUCTION FLANGE IS 24 mm BELOW THE PUMP CENTER LINE
4) FOR MF-300 CENTER LINE OF SUCTION FLANGE IS 24.5 mm BELOW THE PUMP CENTER LINE
5) *FOR 550 SIZE DRILLING DETAILS ARE AS PER SIZE 600
*FOR 650 SIZE DRILLING DETAILS ARE AS PER SIZE 700

REV.NO.	ZONE	BRIEF DESCRIPTION OF REVISION	SIGN DATE
2		W DIMENSIONS CORRECTED & PLAIN FACE MADE	JBK/2-3-6
1		REVISED AS PER LATEST OUTLINE DIMENSIONS.	JBK/15-12-98

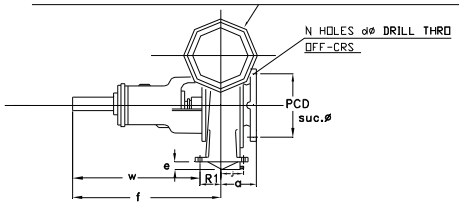
TITLE: OUTLINE DIMENSIONS OF MF(AM)(VDE) PUMPS

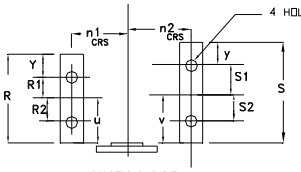
KIRLOSKAR BROTHERS LTD.
KIRLOSKARVADI-DIST:SANGLI

DRG. No. ANNEXURE-4

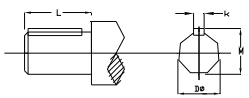


HORIZONTAL DELIVERY END POSITION (MRUGA EXECUTION)





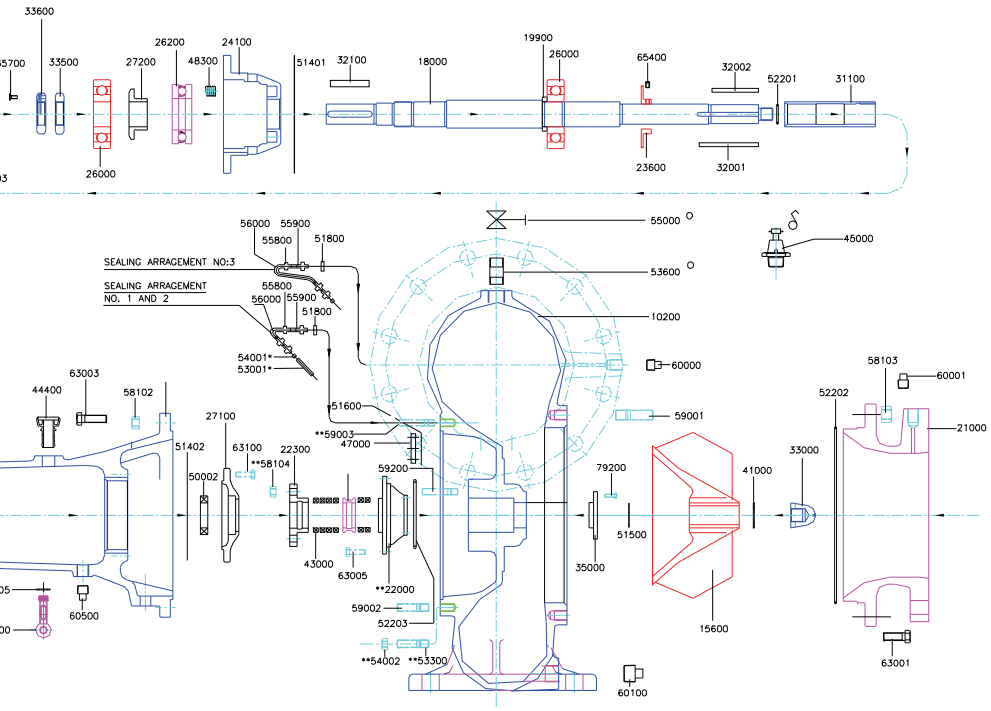
SHAFT END DETAILS



Sr		PUMP MEASUREMENTS										FEET MEASUREMENTS																		SHAFT END MEASUREMENTS				FLANGE DRILLING SUCTION FLANGE		DELIVERY FLANGE
No.	PUMP TYPE	SUC.	DEL.	a	f	j	e	h1	h2	z	b	t	c	m1	m2	m	u	v	n1	n2	R1	R2	R	Y	S1	S2	S	Pø	W	Dø m6	M	K	L	PCD	N HOLES	Dø
1	MF 17 1/2-20(AM 20A)	175	200	200	564	102	20	230	208	218	230	24	110	255	315	570	150	145	200	260	80	120	260	30	105	115	280	7/8"	484	32	35.5	10	80	270/295	8	22
2	MF 20-25(AM 25A)	200	250	215	545	120	3	280	240	253	275	26	120	310	360	670	150	160	250	300	75	115	260	35	105	125	300	1"	470	32	35.5	10	80	295/350	8/12	22
3	MFX 20-25	200	250	215	545	120	3	280	240	253	275	26	120	310	360	670	150	160	250	300	75	115	260	35	105	125	300	1"	470	32	35.5	10	80	295/350	8/12	22
4	MF 250	250	250	248	545	120	3	280	240	253	275	26	120	310	360	670	150	160	250	300	75	115	260	35	105	125	300	1"	470	32	35.5	10	80	350	12	22
5	MF 25-25(AM 25B)	250	250	245	620	145	25	280	268	259	285	28	130	320	380	700	185	180	255	315	85	135	320	50	110	130	340	1 1/8"	535	42	45.5	12	110	350	12	22
6	MFX 25-25	250	250	255	620	145	25	280	268	259	285	28	130	320	380	700	185	180	255	315	85	135	320	50	110	130	340	1 1/8"	535	42	45.5	12	110	350	12	22
7	MF 25-30(AM 30A), A	250	300	245	620	145	–	355	300	322	320	32	140	385	450	835	190	190	315	380	100	140	340	50	140	140	380	1 1/8"	520	42	45.5	12	110	350/400	12	22
8	MFX 25-30	250	300	255	620	145	–	355	300	322	320	32	140	385	450	835	190	190	315	380	100	140	340	50	140	140	380	1 1/8"	520	42	45.5	12	110	350/400	12	22
9	MF 300	300	300	285	620	145	–	355	300	322	320	32	140	385	450	835	190	190	315	380	100	140	340	50	140	140	380	1 1/8"	520	42	45.5	12	110	400	12	22
10	MF 30-35(AM 35A),M,M1	300	350	295	707	161	25	400	355	387	370	36	170	405	505	910	235	235	320	420	130	180	420	55	160	180	450	1 1/4"	577	50	54	14	120	400/460	12/16	22
11	MF 35-35(AM 35B),M	350	350	345	670	176	25	400	375	384	400	36	170	470	550	1020	225	225	385	465	140	170	420	55	170	170	450	1 1/4"	530	50	54	14	120	460	16	22
12	MFX 35-35	350	350	345	670	176	25	400	375	384	400	36	170	470	550	1020	225	225	385	465	140	170	420	55	170	170	450	1 1/4"	530	50	54	14	120	460	16	22
13	MF 35-40(AM 40A),M	350	400	345	670	195	30	500	415	448	440	40	200	430	550	980	268	285	330	450	147	230	480	65	200	220	550	1 3/8"	523	50	54	14	120	460/515	16	22/26
14	MF 40-40(AM 40B)	400	400	390	872	182	20	470	428	450	450	56	196	663	733	1396	280	280	565	635	170	210	520	70	210	210	560	1 3/8"	702	70	76	20	170	515	16	26
15	MFX 40-40	400	400	390	872	182	20	470	428	450	450	56	196	663	733	1396	280	280	565	635	170	210	520	70	210	210	560	1 3/8"	702	70	76	20	170	515	16	26
16	MF 40-45(AM 45A)	400	450	400	862	185	105	500	475	518	500	60	200	625	700	1325	310	310	525	600	180	250	550	60	230	250	600	1 3/8"	682	70	76	20	170	515/565	16/20	26
17	MF 50-50(AM 50A)	500	500	490	960	212	56	600	535	565	625	60	200	660	790	1450	310	325	560	690	135	245	510	65	230	260	620	1 3/8"	825	80	87	25	170	620	20	26
18	MF 55-60(AM 60A), E	550*	600	540	920	260	25	800	650	525	680	75	250	800	950	1750	380	380	675	825	165	305	620	75	265	305	720	1 5/8"	755	80	87	25	170	725	20	30
19	MF 60-65(AM 65A)	600	650*	590	1047	297	105	800	710	795	850	75	270	925	1075	2000	400	400	790	940	265	325	740	75	325	325	800	1 5/8"	782	100	108	28	210	725/840	20/24	30

NOTES:- 1) FLANGES DRELLED AS PER BS 4504 PN 10
2) ALL DIMENSIONS ARE IN mm EXCEPT SPECIFIED
3) FOR MF-250 CENTER LINE OF SUCTION FLANGE IS 24 mm BELOW THE PUMP CENTER LINE
4) FOR MF-300 CENTER LINE OF SUCTION FLANGE IS 24.5 mm BELOW THE PUMP CENTER LINE
5) *FOR 550 SIZE DRILLING DETAILS ARE AS PER SIZE 600
*FOR 650 SIZE DRILLING DETAILS ARE AS PER SIZE 700

TITLE	OUTLINE DIMENSIONS OF MF(AM)(HDE) PUMPS		
KIRLOSKAR BROTHERS LTD. KIRLOSKARVADI-DIST:SANGLI		DRG. No.	ANNEXURE-5



MARK ARE PROVIDED ONLY TO PUMP TYPES
0 AND MF 60–65.

MARK ARE PROVIDED ONLY TO PUMP TYPES
0–65.

' MARK ARE PROVIDED ONLY TO PUMP TYPES
0–65.

MARK ARE PROVIDED ONLY TO PUMP TYPES
F300.

OF CROSS–SECTIONAL ASSEMBLY

ANNEXURE–6

J. Consolidated Technical Data:

Design features:

- Casing: Volute type
- Impeller: 4 or 3 Vane semi-open or enclosed
- No. of stage: One
- Flanges:

Drilled to BSEN1092 PN 16 except MF 171/2-20, MF 55-60 & MF 60-65 pumps. MF 171/2-20 & MF 55-60 & MF 60-65 pumps flanges are drilled to BS: 10 Table D. Drilling as per BSEN: 1092 PN 10, BS: 10 Table D, DIN/ASA Standards is also possible on specific request.

Pump Model	Size of solid in mm	Test Pressure for CI casing & 90°C operating temp. (Kg/cm^2)	Max. Working Pressure In Kg/cm^2	Water fill capacity in liter	GD^2 Value Kg.cm^2	Imp. Dia. (mm)		Speed in r.p.m.		Pump Weight (Kg)
						Min	Max	Min	Max	
MF 17 1/2 -20	35	3.5	2.3	30	3040	198.5	236	720	1750	175
MF 20-25	40	3.5	2.3	40	5400	226.5	265	720	1500	235
MF 250	40	3.5	2.3	40	5400	226.5	265	720	1500	235
MF 25-25	48	4.5	3.0	50	17000	283.5	335	720	1500	325
MF 25-30	48	4.5	3.0	75	17000	283.5	338	720	1500	405
MF 300	48	4.5	3.0	75	17000	283.5	338	720	1500	405
MF 30-35	60	3.5	2.3	135	34880	340	405	412	1150	535
MF 35-35	68	4.0	2.6	140	68200	396.5	472	412	1000	550
MF 35-40	68	4.0	2.6	205	68200	396.5	472	412	1000	720
MF 40-40	80	5.0	3.3	210	158000	453	540	412	1000	1150
MF 40-45	80	5.5	3.6	310	158000	453	540	412	1000	1375
MF 50-50	95	5.0	3.3	405	404360	567	675	360	730	1700
MF 55-60	100	4.0	2.6	800	587560	623	742	320	580	2450
MF 60-65	110	4.5	3.0	1050	908800	680	810	320	580	2600
MF 30-35M	25	6.0	4.0	135	34880	360	414	412	1500	545
MF 30-35M1	100	3.5	2.3	135	34880	340	414	412	1000	530
MF 35-35M	100	4.0	2.6	140	68200	396.5	472	412	1000	545
MF 35-40M	100	4.0	2.6	205	68200	396.5	472	412	1000	715
MF 55-60E	100	4.0	2.6	800	587560	695	780	320	580	2500
MF 25-30A	60	4.5	3.0	75	17000	283.5	338	720	1500	400
MF 50-50B	95	5.0	3.3	405	404360	567	675	360	730	2040
MF 30-35B	60	3.5	2.3	135	34880	340	405	412	1150	670

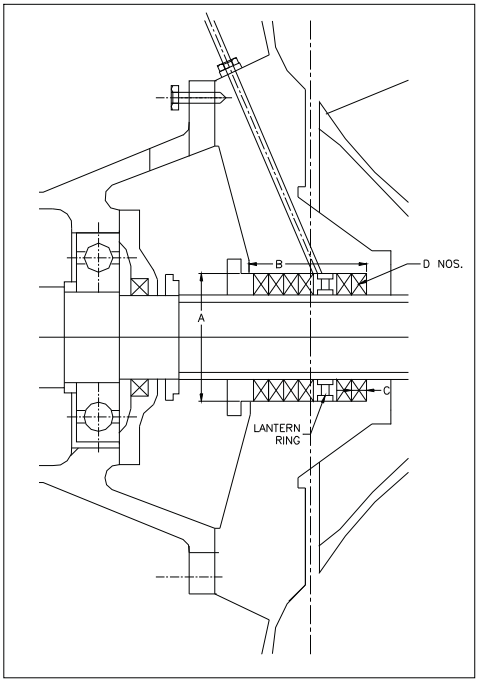
Minimum safe flow:

The minimum safe flow for MF pumps will be 30% of full rate discharge.

Shaft details:

Pump model	Dia. at coupling in mm	Dia. at impeller in mm	Dia. under shaft sleeve in mm	Distance between bearing in mm	Distance between impeller & NDE bearing in mm
MF 17 ½-20	32	30	32	217	247
MF 20-25	32	30	32	217	247
MF 250	32	30	32	217	247
MF 25-25	42	40	40	239	270
MF 25-30	42	40	40	239	270
MF 300	42	40	40	239	270
MF 30-35	50	50	50	277	285
MF 35-35	50	50	50	277	285
MF 35-40	50	50	50	277	285
MF 40-40	70	70	75	353	345
MF 40-45	70	70	75	353	345
MF 50-50	80	82	88	425	402
MF 55-60	80	82	88	425	402
MF 60-65	100	92	95	480	416
MF 30-35M	50	50	50	277	285
MF 30-35M1	50	50	50	277	285
MF 35-35M	50	50	50	277	285
MF 35-40M	50	50	50	277	285
MF 55-60E	80	82	88	425	402
MF 25-30A	42	40	40	239	270
MF 50-50B	85	82	85	530	727
MF 30-35B	55	50	52	368	475

Stuffing box details:



Pump model	Depth in mm (A)	Bore in mm (B)	Size of packing in mm©	Length of packing in mm	No. of packings & lantern ring (D)	Position from impeller L = lantern
MF 17 ½-20	72	55	8	915	6	2+L+4
MF 20-25	73	55	8	915	6	2+L+4
MF 250	73	55	8	915	6	2+L+4
MF 25-25	95	75	12	1040	5	2+L+3
MF 25-30	95	75	12	1040	5	2+L+3
MF 300	95	75	12	1040	5	2+L+3
MF 30-35	95	85	12	1188	5	2+L+3
MF 35-35	95	85	12	1188	5	2+L+3
MF 35-40	95	85	12	1188	5	2+L+3
MF 40-40	135	115	16	1890	6	2+L+4
MF 40-45	135	115	16	1890	6	2+L+4
MF 50-50	150	135	16	2265	6	2+L+4
MF 55-60	160	135	16	2265	6	2+L+4
MF 60-65	155	145	16	2450	6	2+L+4
MF 30-35M	95	85	12	1188	5	2+L+3
MF 30-35M1	95	85	12	1188	5	2+L+3
MF 35-35M	95	85	12	1188	5	2+L+3
MF 35-40M	95	85	12	1188	5	2+L+3
MF 55-60E	160	135	16	2265	6	2+L+4
MF 25-30A	95	75	12	1040	6	2+L+4
MF 50-50B	175	140	16	2325	6	2+L+4
MF 30-35B	90	95	12	1188	5	2+L+3

Maximum permissible N/n values (HP/speed) and maximum permissible speed with belt drive, moment of inertia of CI impeller of MF pumps

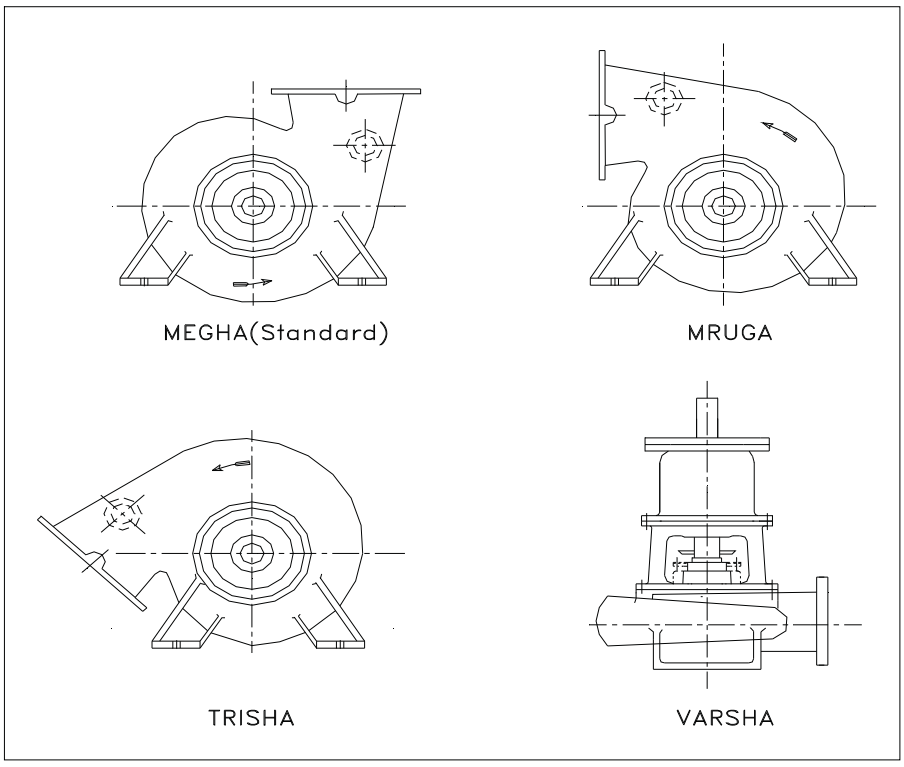
Pump model	Max. Power (HP)	Max. Speed (rpm)	N/n value (HP/rpm)	Maximum permissible speed in rpm for belt drives		Moment of Inertia in Kg-cm²
				Flat belt	V belt	
MF 17 ½-20	25.1	1750	0.0143	1450	1500	760
MF 20-25	26.5	1500	0.0176	1200	1300	1350
MF 250	26.5	1500	0.0176	1200	1300	1350
MF 25-25	87.94	1500	0.0586	940	1250	4250
MF 25-30	92.5	1500	0.0617	890	1200	4250
MF 300	92.5	1500	0.0617	890	1200	4250
MF 30-35	115.6	1150	0.1005	830	860	8720
MF 35-35	134.6	1000	0.1346	650	775	17050
MF 35-40	145.52	1000	0.1455	620	750	17050
MF 40-40	258.4	1000	0.2582	580	700	39500
MF 40-45	285.6	1000	0.2856	550	600	39500
MF 50-50	350.9	730	0.4810	420	500	101090
MF 55-60	299.2	580	0.5160	390	425	146890

MF 60-65	448.8	580	0.7740	380	410	227200
MF 30-35M	209.5	1500	0.1310	830	860	8720
MF 30-35M1	115.6	1150	0.1005	830	860	8720
MF 35-35M	134.6	1000	0.1346	650	775	17050
MF 35-40M	145.5	1000	0.1455	620	750	17050
MF 55-60E	544	580	0.9379	390	425	146890
MF 25-30A	92.5	1500	0.0617	890	1200	4250
MF 50-50B	350.9	730	0.4810	420	500	101090
MF 30-35B	115.6	1150	0.1005	830	860	8720

Nozzle orientation:

MF types of pumps have axial suction nozzle and the delivery nozzle is available in four different executions.

I) Pointing vertically upwards-Megha (Vertical delivery end) (Standard)
II) Pointing horizontal-Mruga (Horizontal delivery end)
III) Pointing at 45° downward to the horizontal – Trisha (Oblique delivery end)
IV) Vertical drive end – Versha



INTERCHANGEABILITY CHART OF COMPONENTS FOR "MF" PUMPS:

PART No. / PART CODE No.	DESCRIPTION	PUMP MODELS.											
		17½-20	20-25	25-25	25-30	30-35	35-35	35-40	40-40	40-45	50-50	55-60	60-65
15600	Impeller.	1	2	3	4	5	6	6	7	7	8	9	10
18000	Shaft.	1	1	2	2	3	3	3	4	4	5	5	6
24000	Bearing housing.	1	1	2	2	3	3	3	4	4	5	5	6
24100	Cartridge.	1	1	2	2	3	3	3	4	4	5	5	6
26001/ 26002	Ball bearing DE and NDE.	1	1	2	2	3	3	3	4	4	5	5	6
26200	Thrust bearing.	1	1	2	2	3	3	3	4	4	5	5	6
27000 / 27100	Bearing covers DE and NDE.	1	1	2	2	3	3	3	4	4	5	5	6
50001/ 50002	Oil seal DE and NDE.	1	1	2	2	3	3	3	4	4	5	5	6
31100	Shaft sleeve under stuffing box.	1	1	2	2	3	3	3	4	4	5	5	6
22300	Gland.	1	1	2	2	3	3	3	4	4	5	5	6
22700	Split lantern ring.	1	1	2	2	3	3	3	4	4	5	5	6
27200	Thrust bearing adaptor.	1	1	2	2	3	3	3	4	4	5	5	6
32001	Impeller key.	1	1	2	2	3	3	3	4	4	5	5	6
32002	Impeller and shaft sleeve key.	1	1	2	2	3	3	3	4	4	5	5	6
33000	Impeller nut.	1	1	2	2	3	3	3	4	4	5	5	6
33500	Bearing nut.	1	1	2	2	3	3	3	4	4	5	5	6
33600	Lock nut.	1	1	2	2	3	3	3	4	4	5	5	6
60500	Oil drain plug.	1	1	1	1	1	1	1	2	2	2	2	2
43000	Gland packing.	1	1	2	2	3	3	3	4	4	5	5	6
52202	"O" ring for suction cover and pump casing.	1	2	3	3	4	5	5	6	6	7	8	9
41000	Lock washer for impeller.	1	1	2	2	3	3	3	4	4	5	5	6
	DESCRIPTION	PUMP MODELS.											

PART No. / PART CODE No.		250	300	25-30A	30-35M	30-35M1	35-35M	35-40M	50-50B	55-60E	3035B		
15600	Impeller.	11	12	13	14	15	16	17	18	19	5		
18000	Shaft.	1	2	2	3	3	3	3	7	5	8		
24000	Bearing housing.	1	2	2	3	3	3	3	8	5	9		
24100	Cartridge.	1	2	2	3	3	3	3	9	5	10		
26001/ 26002	Ball bearing DE and NDE.	1	2	2	3	3	3	3	5	5	6		
26200	Thrust bearing.	1	2	2	3	3	3	3	6	5	7		
27000 / 27100	Bearing covers DE and NDE.	1	2	2	3	3	3	3	7	5	8		
50001/ 50002	Oil seal DE and NDE.	1	2	2	3	3	3	3	7	5	8		
31100	Shaft sleeve under stuffing box.	1	2	2	3	3	3	3	7	5	8		
22300	Gland.	1	2	2	3	3	3	3	7	5	8		
22700	Split lantern ring.	1	2	2	3	3	3	3	7	5	8		
27200	Thrust bearing adaptor.	1	2	2	3	3	3	3	7	5	8		
32001	Impeller key.	1	2	2	3	3	3	3	5	5	3		
32002	Impeller and shaft sleeve key.	1	2	2	3	3	3	3	5	5	3		
33000	Impeller nut.	1	2	2	3	3	3	3	5	5	3		
33500	Bearing nut.	1	2	2	3	3	3	3	5	5	6		
33600	Lock nut.	1	2	2	3	3	3	3	5	5	6		
60500	Oil drain plug.	1	1	1	1	1	1	1	2	2	1		
43000	Gland packing.	1	2	2	3	3	3	3	5	5	3		
52202	"O" ring for suction cover and pump casing.	1	3	3	4	4	5	5	7	8	4		
41000	Lock washer for impeller.	1	2	2	3	3	3	3	5	5	3		

NOTE: Same numbers in the same horizontal line represent interchangeable component

K. Reserve power margin:

In order to avoid continuous overloading of the electric motor, the rated power of the motor in kW should exceed the power requirement in pump of the following percentage:

Power absorbed by Pump in kW	Reserve power margin of driver
Up to 1.49	30%
1.5 to 3.6	25%
3.7 to 7.4	20%
7.5 to 18.4	15%
Over 18.5	10%

L. Recommended Spares:

List of components and recommended stock of spare parts:

PART No.	DESCRIPTION AND SIZE.	No/set
10100	Pump casing VDE.	1
15600*	Semi-open impeller.	1
18000+	Pump shaft.	1
19900*	Shoulder ring for bearing NDE.	1
21000	Suction cover.	1
22000	Casing cover.	1
22300*	Gland [non-split type].	1
22700*	Lantern ring [split in two halves].	1
24000	Bearing housing.	1
24100	Cartridge.	1
26001*	Deep groove ball bearing DE.	1
26002*	Deep groove ball bearing NDE.	1
26200*	Thrust ball bearing DE.	1
27000	Bearing cover DE.	1
27100	Bearing cover NDE.	1
27200	Thrust bearing adapter.	1
31100*	Shaft sleeve.	1
32001+	Key for impeller.	1
32002+	Key for impeller and shaft sleeve.	1
32100+	Key for coupling.	1
33000*	Impeller nut.	1
33500	Bearing nut.	1
33600	Bearing lock nut.	1
35000	Stuffing box bush.	1
41000	Lock washer for impeller nut.	1
43000*	Gland packing.	1 set

44600	Oil level indicator.	1
44400	Oil feeding plug.	1
47000	Inspection hole cover for pump casing.	1
50001*	Oil seal for DE cover.	1
50002*	Oil seal for NDE cover.	1
23600	Liquid deflector.	1
48300	Compression spring.	1 set
51403	Gasket for bearing housing cover and bearing cover NDE.	1
PART No.	**DESCRIPTION AND SIZE.**	**No/set**
51401	Gasket for cartridge and bearing cover DE.	1
51402	Gasket for bearing housing and cartridge.	1
51500	Gasket for shaft sleeve and impeller.	1
51600	Gasket [if applicable] for inspection hole cover and pump casing.	1
52201*	"O" ring for shaft and shaft sleeve.	1
52202*	"O" ring for suction cover and pump casing.	1
52203*	"O" ring for pump casing and casing cover.	1
53001	Pipe nipple for stuffing box sealing.	1
53400	Pipe nipple for priming.	1
53300	Pipe nipple for stuffing box drain.	1
54001	Pipe coupling stuffing box sealing.	2
54002	Pipe coupling stuffing box.	2
55900	Adaptor for stuffing box sealing.	2
55800	Hex. Nuts for stuffing box sealing.	2
55000	Wheel cock for priming connection.	1
56000	Copper tube for stuffing box sealing.	1
63001	Hex. Release bolts for inspection hole cover.	2
63002	Hex. Release bolts for cartridge.	2
63004	Hex. Release bolts for bearing cover NDE.	2
79200	Hex. Bolts for stuffing box bush.	4
63003	Hex. Release bolts for bearing housing.	2
63005	Hex. Release bolts for casing cover.	2
63001	Hex. Release bolts for suction cover.	2/3/4
58600	Hex. Nut for part No.270.	4/8
58101	Hex. Nut for part No.596.	4/6
58102	Hex. Nut for part No.210.	8/12/20
58104	Hex. Nut for part No.220.	8
58200	Hex. Nut for part No.223.	2
45000	Vent valve.	1
58103	Hex. Nut for part No.240 and 101.	8/12

59001	Studs for pump casing and suction cover.	8/12/20
59003	Studs for casing cover and pump casing.	8
59002	Studs for pump casing and bearing housing.	8/12
59300	Studs for bearing housing, cartridge and bearing cover.	4/8
59600	Studs for pump casing and inspection hole cover.	4/6

PART No.	DESCRIPTION AND SIZE.	No/set
59200	Studs for gland.	2
60001	Pipe plug for suction gauge connection.	1
60002	Pipe plug for delivery gauge connection.	1
60100	Pipe plug for pump casing drain.	1
60500	Pipe plug for bearing housing drain.	1
61103	Pin for bearing cover DE location.	1
61101	Pin for inspection hole cover location.	1
51705	Gasket for part No.240 and 446.	1
51800	Gasket for part No.559 and 101.	2
65700	CTSK screw for bearing lock nut.	1
65302	Hex. Socked grub screw for driver coupling.	1
65301	Hex. Socket grub screw for pump coupling	1

* **Recommended stock of spare parts for two years operation.**

\+ **Recommended for five years operation.**

M. Part of O & M:

Guidelines for Operating MF pump:

Before starting the pump check the following :

The pump rotates freely.

Sealing connection, if any, is properly tightened and adjusted.

Oil level in the bearing housing.

The direction of rotation of motor corresponds to the direction of rotation of the pump.

The pump and section pipe is fully primed with the liquid.

Stuffing box is packed properly and gland is tightened.

Valve on delivery side is closed

The cock for pressure gauge connection is closed.

Starting the pump :

Open delivery valve 30% approx of full open.

Start the motor. Let the prime mover pick up its full speed.

Open the valve on delivery side fully.

Open the cock for pressure gauge connection.

During running of pump, check the following and regulate if necessary :

The pump and motor is running smooth.

The flow of sealing liquid is uninterrupted if external sealing is applicable.

Leakage through stuffing box is normal. There should be leakage of 60 to 80 drops per minute.

The bearing not getting heated up excessively.

Head and capacity developed by the pump is as specified.

Power consumption is within limit.

Ensure that there is no mechanical friction in the pump.

Stop the pump immediately if any defects are noticed. DO NOT START IT AGAIN UNLESS DEFECTS ARE RECTIFIED. REPORT IMMEDIATELY TO THE SUPPLIER IF IT IS NOT POSSIBLE TO RECTIFY THE DEFECTS.

Stopping the pump :

Close the valve on delivery side.

Stop the motor.

Close the sealing connection.

If the pump is not required to be operated for long time drain the casing completely. Also drain the lubrication oil completely. The bearing housing should be dried internally with hot air and should be flushed with moisture free protective such as light oil or kerosene.

Guideline for Maintenance of MF pump:

Preventive maintenance schedule is the periodical checks and precautions by which possibilities of failure and break down are made very remote.

Daily checks :

Pressure gauge readings

Bearing temperature

Oil level in bearing housing

Leakage through st. box

Noise and vibrations

Voltage and current.

Periodical checks :

Check the alignment of pumpset

Calibrate the measuring instruments

Check the sealing connections.

OVERHAULING :

With normal daily operating spell, the pump will be due for overhaul after about 5000 working hours. This work should be done by skilled personnel. Please refer to the cross sectional drawing while dismantling and reassembling the pump.

Dismantling

Drain the delivery casing completely by removing drain plug (601).

Disconnected the pump from suction and delivery piping and auxiliary piping if any. Remove coupling grub screws (653. 1 & 653.2) Unscrew the bolts holding the pump on base plate and take out the pump.

Drain oil from bearing housing (240) by unscrewing the drain plug (605).

Remove, oil level indicator (446) and accessories such as vent valve (MF 17 1/2-20, to MF 25-30 MFX 20-25, 25-25, 25 -30, MF 25-30E) Pipe and Wheel Cock (MF 30-35 to MF 60-65, MF30-35M, MFX - 35-35, 40-40, MF 40-40E, MF 55-60E from pump casing (101). Remove pump coupling (390). Take out coupling key (321).

Remove the nuts holding down suction cover (210) from delivery casing (101). Take out suction cover along with (in case of MFX and MFE pumps) casing ring (190) by tightening release bolts. Take 'O' rings (522.2) from suction cover (210).

Unscrew impeller nut (330). Take out the lock washer for impeller nut (410).

Remove the impeller (156 for MF & 154 only for MFX & MFE Pump) from pump shaft.

Take out impeller key (320.1)

Remove nuts holding down bearing housing (240) to the delivery casing (101) and take it out carefully.

Unscrew gland nuts and remove gland (223). Take out gland packing (430) and lantern ring (227)

For pumps type MF 55-60, MF 55-60E and MF 60-65 unscrew the nuts holding casing cover (220) and delivery casing. Take out casing cover by tightening release bolts. Also remove 'O' ring. (522.1)

Remove stuffing box bush (350) from delivery casing by removing hexagonal bolts. The stuffing box bush is not provided in pumps type MF 171/2 -20 to MF 35-35 and MF 50-50 & MFX 35-35.

Remove shaft sleeve (311) 'O' ring (522.1) and key for impeller and shaft sleeve (320.2). Take out liquid deflector (236).

Remove bearing cover DE (270) alongwith oil seal (500.1) removing bolts and by tightening release bolts. Also remove bearing cover from non-driving side (271) alongwith oil seal (500.2) by unscrewing bolts.

Take out shaft (180) from bearing housing alongwith bearing lock nut (336), bearing nut (335), ball bearing DE (260.1), thrust bearing (262), cartridge (241) and ball bearing NDE (260.2).

Unscrew lock nut (336) and bearing nut (335).

Remove whole assembly that is cartridge, ball bearing D.E., thrust bearing by using suitable puller on cartridge (241).

Remove ball bearing NDE (260) and take out shoulder ring(199).

Remove back vane plate (168) from impeller (154) only for MFX & MFE Pumps.)

This completes the dismantling of the pump.

Before proceeding with reassembly of rotating unit and pump check the following :

A) Ball bearings are rotating freely and smoothly. Renew them if they are not rotating freely or if the races are deteriorated.

B) Check the shaft for possible run out. Remove the same before reassembly.

C) Remove any dust or rust from parts and if necessary apply new paint/coating on the same.

D) Clean all the parts thoroughly with kerosene or petrol.

E) If reassembly is not to be made immediately, apply rust preventive, coating on all machined surfaces.

F) Examine all the parts for refitting worn out etc. Damaged or corroded parts should be replaced by new.

G) Ensure that newly fitted parts are free from damage and from burrs.

H) Examine deflector 'O' rings for damage or deterioration. If replaced with new make sure that they are of requisite dimensions.

I) Check clearance between impeller and suc cover as per following chart. The clearance should be within max. and min. limit. (In case of MF pumps)

Pump Type	Clearance in mm	
	Max.	Min.
1. MF 171/2 -20 to MF 40-45	0.65	0.4
2. MF 50-50 to MF 60-65	0.93	0.65

J) Check clearance between casing ring and impeller as per following chart (In case of MFX & MFE pump). The clearance should be within max and mini limit.

Sr. No.	Pump Type	Diametrical Clearance between casing Ring & Impeller in mm			
		Cl/Br		St. St.	
		Max.	Mini	Max.	Mini
1.	MFX 20-25	0,581	0,42	0,831	0,67
2.	MFX 25-25 MFX 25-30	0,622	0,44	0,872	0,69
		Suc./Del. Side	Suc./Del. Side	Suc./Del. Side	Suc./Del. Side
3.	MFX 35-35	0,783/0,83	0,586/0,612	1,039/1,08	0,836/0,862
4.	MFX 40-40 MF 40-40E	0.824/0.83	0.606/0.612	1.074/1.08	0.856/0.862
5.	MF 25-30E	0.622	0.44	0.372	0.69
6.	MF 55-60 E	0,86/0,94	0,51/0,54	1,11/1,19	0,76/0,79

Reassembly

Wipe light clean oil cover shaft (180)

Insert shoulder ring (199) from NDE side and fit ball bearing NDE (260)

Put compression springs from thrust bearing (483) in the holes provided into cartridge (241). Fit the cage of thrust bearing (262) into cartridge. Fir another cage of thrust bearing on thrust bearing adaptor (272). Also fit bearing adaptor (272) on the shaft.

Fit ball bearing (260) at D.E. and N.D.E. Ensure that shoulder ring (199) is fitted at NDE prior to ball bearing. Fit bearing nut (335) and lock it by means of bearing lock nut (336). Fit gasket (514.2) on cartridge (241).

Lift the shaft (180) duly fitted with bearings and insert it in bearing housing (240).

Fit bearing cover DE (270) and bearing cover NDE (271). Ensure that gasket (514.1) and (514.3) is duly fitted and shaft is rotating freely.

Fit stuffing box bush (350) to delivery casing (101). This is only applicable for (pumps type MF 35-40, MF 40-40, MF 40-45, MF 55-60, MFX 40-40 MF40-40E. MF55-60E)

Fit stuffing box bush (350) to stuffing box cover (220). Also fit stuffing box cover (220) to delivery casing (101). Ensure that 'O' ring (522.1) is fitted properly. This provision is provided only for pumps type MF 55-60, MF 55-60E and MF 60-65.

Insert water deflector (236) and gland (223).

Fit bearing housing (240) to delivery casing (101) and tighten the nuts.

Fit shaft sleeve (311) alongwith 'O' ring (522.1) and insert key for impeller & shaft sleeve (320.2). Ensure that 'O' ring (522.1) is fitted properly. Fit gasket (515). Fit back vane plate (168) on impeller (154). (In case of MFX 25-25 to MFX 40-40, MF 40-40E, MF 25-30E & MF 55-60E)

Fit impeller key (320.1) and fit the impeller (156 & 154)

Insert lock washer for impeller nut (410) over pump shaft (180) and tighten impeller nut (330). Lock the impeller nut by means of lock washer (410) Fit casing ring (190) in suc. cover (210). (In case of MFX 35-35, MFX 40-40, MF 40-40E, MF 25-30E & MF 55-60E)

Ensure that impeller rotates freely, Fit suction cover (210) duly fitted with 'O' ring (522.2) to delivery casing (101) and tighten the nuts. Ensure that pump shaft rotates freely.

Insert gland packing (430) alongwith lantern ring (227) and tighten the gland (223). Do not over tighten it.

Fit coupling key (321) and fit pump coupling (390) over shaft.

Install the pump on base plate and make suction and delivery as well as auxiliary pipe connections.

Fill the oil in bearing housing. Align motor coupling with pump coupling and fix coupling grub screws (653.1 and 653.2)

This completes the reassembly of the pump.

SAFETY INSTRUCTIONS WHILE MAINTENANCE & SERVICING

Before attempting any maintenance on a pump particularly if it has been handling any form of hazardous liquid, it should be ensured that the unit is safe to work on. The pump must be flushed thoroughly with suitable cleaner to purge away any of the product left in the pump components. This should be carried out by the plant operator and a certificate of cleanliness obtained before starting work. To avoid any risk to health it is also advisable to wear protective clothing as recommended by the site safety officer especially when removing old packing which may be contaminated.

Check and ensure that the pump operates at below the maximum working pressure specified in the manual or on the pump nameplate and before maintenance, ensure that the pump is drained down.

Wear a suitable mask or respirator when working with packing and gasket components which contain fibrous material as these can be hazardous when the fibrous dust is inhaled. Be cautious, if other supplier's components have been substituted for genuine KBL parts, these may then contain hazardous materials.

Be aware of the hazards relating to the pumped fluid, especially the danger from inhalation of noxious and toxic gases, skin and eye contact or penetration. Obtain and understand the hazardous substance data sheets relating to the pumped fluid and note the recommended emergency and first aid procedures.

Isolate the equipment before any maintenance work is done. Switch off the mains supply, remove fuses, apply lock-outs where applicable and affix suitable isolation warning signs to prevent inadvertent reconnection. In order to avoid the possibility of maintenance personnel inhaling dangerous fumes or vapours, it is recommended that the maintenance work be carried out away from the pump locations by removal of bearing housing and shaft assembly to a suitable maintenance area.

N. Quality / Inspection / NDT requirements:

There are routine quality checks for MF pump component & pump. Inspection and NDT activity is carried out as per customer requirement.

P. Painting specification:

All hydraulic passage shall be coated with Red Oxide unless and otherwise specified.

The details of paint used for external surface of pump are as under.

Standard color: Water Blue
Brand name: Blue RAL 5021
Primer coat: Zinc Chromate
Coating thickness: 70 to 90 Microns

Q. Dispatch:

Pumps are dispatched in duly assembled condition. If the pump is oil lubricated then, lubricating oil in the bearing housing is drained prior to dispatch of pump. Pumps are protected against corrosion and packed for transport by normal road, rail and sea carriers.

R. Standard scope of supply:

Standard scope of supply for MF pumps is all cast iron with BS4504 pn16 flange drilling with VDE del. casing

A standard pump is assembled for clockwise rotation when seen from the coupling end.

S. Instrumentation:

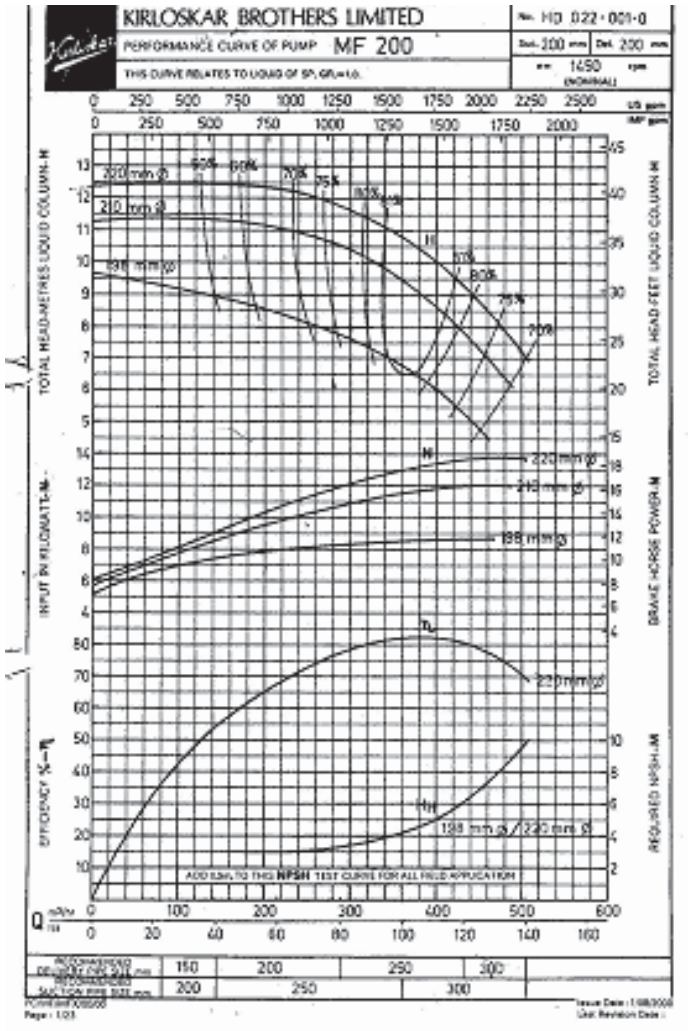
TECHNICAL INFORMATION OF MF-200 PUMP:

Application of MF-200 is similar as specified for other MF pumps.

Constructional features –

These are single stage horizontal spindle; volute type foot mounted pumps and fitted with ball bearings. They are centrifugal pump with enclosed type mixed flow impellers.

Performance Curve –



Design features –

a.	Casing	:	Volute type
b.	Impeller	:	4 vane enclosed
c.	No. of stages	:	One
d.	Flanges	:	Standard drilling BS:4504 Table 16/11. Other drillings i.e. BS:4504 10/11, DIN/ASA can also be given against specific requirement.

Operating data –

Capacity of water fill – 35 litres.

Rotational speed [direct drive –

Min. speed	-	1150 rpm.
Max. Speed	-	1750 rpm.

Test pressures – The test pressure with CI casing and operating temperature of pump upto 90°C is 2 Kg/c².

Construction –
Casing – The casing for these pumps is of close-grained, high tensile cast iron, volute type. Discharge nozzle and the supporting feet are cast integral with the casing.

Casing details –
Casing thickness in mm – 10 mm.
Max. working pressure – 1.6 Kg/cm²..

Flange drilling and suction/delivery nozzle sizes –

Flanges are drilled to BS:4504 Table 16/11 unless otherwise specified.

Suction nozzle dia.	-	200 mm.
Delivery nozzle dia.	-	200 mm.

Flanges to other standards like DIN/ASA etc can be offered on request at extra cost.

Nozzle orientation –

MF-200 pumps has axial suction nozzle and delivery nozzle is available in two different executions.

i. Pointing vertically upwards – Megha [standard].
ii. Pointing horizontal – Mruga.

Casing tapings –

Casing drain	-	3/4" BSP
Priming	-	3/4" BSP
Stuffing box drain	-	Core hole.
Stuffing box sealing	-	Internal by pumped liquid through a Passage in the pump casing.

Impellers –

Impeller of MF-200 pump is generally made of close grained CI, LT BR IS:318 Gr, LT B2 or Phosphor Bronze IS:28 Gr1. Impeller is enclosed. It is accurately and dynamically balanced impeller in other materials such as St.Steel, Cast Steel etc is also available on request.

Impeller details –

No. of vanes	-	4
Vane width	-	64 mm
Eye area	-	228 cm^2
Impeller dia	-	Max.220 mm Ø and Min.198 mmØ

Balancing –

For MF-200 pump impeller, the hydraulic axial thrust is balanced by Deep-groove ball bearing provided at driving end.

Bearing –

MF-200 pump is provided with Deep-groove ball bearing one each at driving end and non-driving end.

Bearing at DE/NDE	Min. bearing life in hours.
SKF-6307	20,000 hours.

The above bearing numbers refer to SKF standards. However equivalent bearings can also be used.

Lubrication –

All bearings in MF-200 pump are grease lubricated. Properties of grease are –

a. Soap-Lithium.
b. Colour-brown.
c. Structure-Smooth.
d. Penetration at 25°C [60 strokes] – 220-250.
e. Drop point-180°C.

Type of grease –

Manufacturer	-	CALTEX
Grade	-	Regai Star FAK No.3 or equivalent.

Period of lubrication – After 1,000 hours of running.

Maximum allowable temperature - 40°C above ambient.

Quantity of grease – 10 grams per bearing.

Shaft –

Shaft details –

Dia at coupling	-	32 mmØ length under stuffing box – 51 mm.
Dia at impeller	-	28 mmØ.
Distance between bearings	-	133 mm
Distance between impeller and NDE bearings	-	150.5 mm

Stuffing box arrangement – Same as other MF pumps.

Stuffing box details -

Depth in mm	-	51
Bore in mm	-	48
Size of packing in mm	-	8
Length of packing	-	515 mm

No.of packings and lantern ring position form impeller - 1 + L + 4

Pressure and quantity of water required for stuffing box sealing when supplied from external sources as per clause No.4.5.5.

Sealing arrangements for stuffing boxes –

1. Lantern ring is located between packing rings sealing liquid is fed internally to stuffing box through a passage in the pump casing.
2. Other arrangement as per clause No.4.5.4.3 and 4.5.4.4.

Coupling –

LOVE-JOY coupling details –

Coupling type - SW 150.

Materials –

Material construction codes 04, 05, 08, 10, 13, 14 are not to be offered for MF-200 pump.

DESIGN CRITERIA:

Maximum permissible HP/speed i.e. N/n values –

The maximum permissible N/v value for the standard constructions of shaft and impeller material is as follows.
N/n value - 0.019
Maximum permissible speed of MF-200 pump with "V" belt drive is 1450 rpm.
Moment of inertia –
Moment of inertia of complete rotating unit with full size impeller is 264 Kg/cm^2.

GD^2 value – The GD^2 value for complete rotating unit with full size impeller is 1056 Kg.cm^2.

Weight –
a. Net weight of standard fitted bare shaft pump – 102 Kg [approx.].
b. Gross weight – 150 Kg [approx.].

Weights of finished components for standard fitted construction

PART No.	PART DESCRIPTION.	Wt.in Kg.
10100	Delivery casing.	80
15400	Impeller [CI].	8.5
19000	Casing ring [suction side].	1
24000	Bearing housing.	21
27000	Bearing cover [DE].	6.5
22300	Gland.	6.5
33000	Impeller nut.	0.45
18000	Pump shaft.	3.17

Material construction chart for MF 200 pumps: Refer annexure-3

LIST OF COMPONENTS AND RECOMMENDED STOCK OF SPARE PARTS OF MF-200 PUMP:

Sr.No.	PART No.	DESCRIPTION.	No.REQD.
1.	10100	PUMP CASING	1
2.	*15400	IMPELLER	1
3.	+18000	SHAFT	1
4.	*19000	WEAR RING	1
5.	*19900	SHOULDER RING	2
6.	22300	GLAND	1
7.	*23600	LIQUID DEFLECTOR	1
8.	24000	BEARING HOUSING	1
9.	*26000	BALL BEARING SKF:6307 OR EQ.	2
10.	27000	BEARING COVER	1
11.	*32000	IMPELLER KEY	1
12.	*32100	COUPLING KEY	1
13.	*33000	IMPELLER NUT	1
14.	*22700	LANTERN RING	1
15.	*43000	GLAND PACKING	1
16.	44100	GREASE NIPPLE	2
17.	45000	VENT VALVE	1
18.	20600	COLLAR	1
19.	27300	BEARING END CAP	1
20.	39000	PUMP COUPLING	1
21.	39100	DRIVER COUPLING	1
22.	68700	GASKET FOR Sr.No.1	1
23.	65301	GRUB SCREW FOR PUMP COUPLING	1
24.	65302	GRUB SCREW FOR DRIVER COUPLING	1
25.	98400	SNAP WRAP	1
26.	98800	CHEESE HEAD SCREW	1
27.	60100	DRAIN PLUG FOR Sr.No.1	1
28.	41000	LOCK WASHER FOR Sr.No.13	1

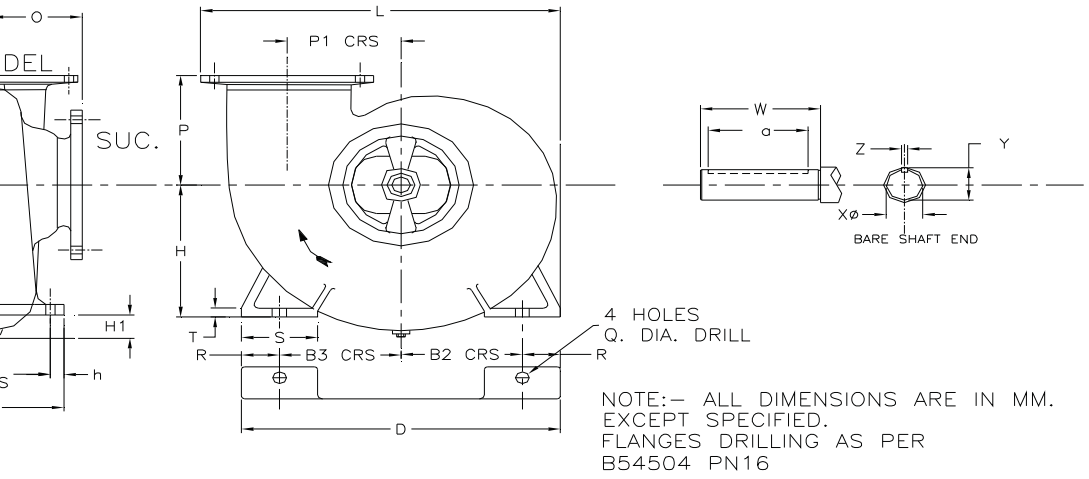
- **Recommended stock of spare parts for 2 years operation.**

\+ **Recommended for 5 years operation.**

HART OF MF 200 PUMPS:

PART CODE	MATERIAL CONSTRUCTION CODE						KEY TO MATERIAL CODE	
	01	02	03	09	11	20		
0100	011	011	011	011	011	011	MAT. CODE	DESCRIPTION
5400	011	110	112	202	232	110	011	CI IS: 210 GR-FG200
8000	053	053	053	053	053	053	110	LT.BR IS: 318 GR-LTB2
22300	011	011	011	011	011	011	112	PH.BR. IS: 28 GR-1
22700	011	011	011	011	011	011	202	CAST STEEL ASTM A216/216M WCB
32002	053	053	053	053	053	053	232	ST ST ASTM A351 GR-CF8M
33000	110	110	112	253	251	110	251	ST ST ASTM A276 TYPE 316
							253	ST ST ASTM A276 TYPE 410
							053	CS IS 1570 GR 40C8

pump



f	H	H1	h	L	N	O	P	P1	Q	R	S	T	W	X ø	Y	Z	GREASE NIPPLE	CASING DRAIN	PRIMING CONNECTION	SUCTION P.C.D.	SUCTION HOLE	SUCTION NO. OF HOLES	DELIVERY P.C.D.	DELIVERY HOLE	DELIVERY NO. OF HOLES
260	250	70	30	661	370	180	230	220	23	55	110	24	68	32 K6 +0.002 +0.018	35.5	10	1/8" B.S.P	3/4" B.S.P	3/4" B.S.P.	295	ø22	12 OFF. CRS.	295	ø22	12 OFF CRS.