

**TECHNICAL MANUAL
FOR
KIRLOSKAR
PUMP TYPE
" CF "**

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1. **INTRODUCTION:**

KIRLOSKAR multistage self-priming centrifugal pumps types "CF" are manufactured as per technical know-how of "SERO Pumpenfabrik, GmbH, Germany. These pumps are power driven centrifugal pumps primarily designed for handling clean liquids. Owing to its regenerative type impeller design, these pumps are self-priming type.

2. **MODELS:**

"CF" pumps are having following models.

Sr. No.	PUMP TYPE / MODEL	SERIES
1.	CF 111	110
2.	CF 112	
3.	CF 113	
4.	CF 114	
5.	CF 115	
6.	CF 116	
7.	CF 117	
8.	CF 118	
9.	CF 221	220
10.	CF 222	
11.	CF 223	
12.	CF 224	
13.	CF 225	
14.	CF 226	
15.	CF 227	
16.	CF 228	

Sr. No.	PUMP TYPE / MODEL.	SERIES
17.	CF 331	330
18.	CF 332	
19.	CF 333	
20.	CF 334	
21.	CF 335	
22.	CF 336	
23.	CF 337	
24.	CF 338	
25.	CF 441	440
26.	CF 442	
27.	CF 443	
28.	CF 444	
29.	CF 445	
30.	CF 446	
31.	CF 447	
32.	CF 448	
33.	CF 551	550
34.	CF 552	
35.	CF 553	
36.	CF 554	
37.	CF 555	
38.	CF 556	
39.	CF 557	
40.	CF 558	

3. WORKING PRINCIPLE:

The pumped liquid or liquid / gas mixture enters the impeller cells (2) and side channel (3) via the intake opening (1).

The side channel is interrupted (4) at one point in the casing, rather than extending over the entire circumference.

Rotation of the impeller, combined with the centrifugal force that builds up, causes the pumped liquid to move back and forward many times between the cells of the star wheel and the side channel, creating a very intense transfer of energy. (Arrows in figures 1 and 2).

This creates a pump head (increase in pressure), which is 5 to 10 times that generated by normal pump impellers rotating at the same speed.

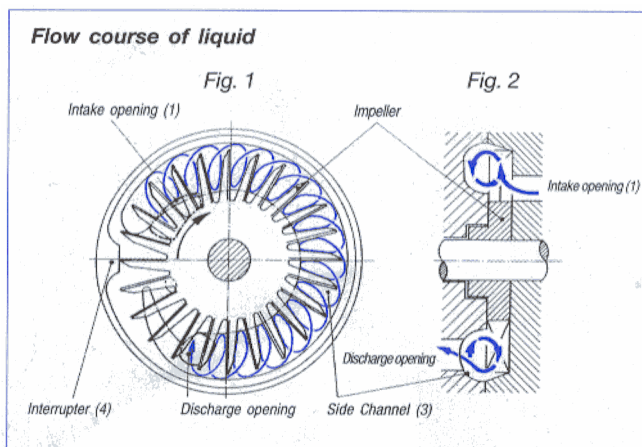
The side channel is tapered. As a result, the liquid is pumped into the discharge opening just before the interrupter (4) and passes either to the next stage or to the pump's discharge nozzles.

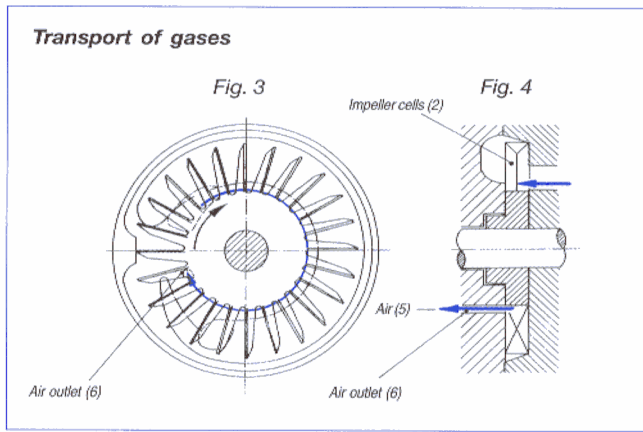
The centrifugal effect of the impeller separates air from the liquid. The liquid collects in the outer region of the impeller cells and side channel, whereas the air builds up the inner part (5).

The higher pressure in the vicinity of the discharge opening forces the air through a separate air outlet (6) into the next stage and, from there, to the delivery line.

In this way, more and more air is evacuated from the intake line until the liquid level reaches the top of the pump and full pumping starts.

The intake line can be vented even if it is empty, provided that there is sufficient liquid still left in the pump. The pump is designed so that there is always enough auxiliary liquid remaining to repeat the suction process.





4. NOMENCLATURE:

The self-priming pump type "CF" will be designated as below.

Example: CF 111

The details indicated by above codes are as follows.

- C - KIRLOSKAR self-priming channel type pump.
- F - Flow of liquid.
- 11 - These two digits indicate the branch size as under
 - 11 - 25 mm NB
 - 22 - 32 mm NB
 - 33 - 32 mm NB
 - 44 - 40 mm NB
 - 55 - 50 mm NB
- 1 - This digit shows the number of stages [1 to 8].

5. **APPLICATIONS:**

These pumps find applications in following areas,

- i. Chemical & Process industry.
- ii. Ship / Naval engineering.
- iii. Refrigeration installations.
- iv. Boiler feed installations.
- v. Booster service
- vi. LPG & other Petroleum products

6. **DESIGN FEATURE:**

Following are the design features of "CF" pumps.

- 6.1 "CF" pumps are self-priming, horizontal, centrifugal, side channel, and multistage pumps.
- 6.2 These pumps are designed and manufactured with close tolerances to achieve highest performance.
- 6.3 These pumps are designed on module technology, which enables interchangeability of parts with minimum components.
- 6.4 The power absorbed by the pumps increases with increasing head and decreasing capacity.
- 6.5 Due to self-priming feature, pumps can handle air and gases entrained in the liquid.
- 6.6 Minimum axial thrust resulting in long-term reliability.
- 6.7 Relatively high efficiency for regenerative type centrifugal pumps.
- 6.8 Lowest noise level.
- 6.9 Easy for maintenance and in reassembly.
- 6.10 Low NPSH requirements resulting in high suction lift capacity.

7 **CONSTRUCTIONAL FEATURES:**

7.1 "CF" is a self priming, heavy duty, side channel, centrifugal pump rated for 40 atm. [315 mwc] pressure for relatively low flow rates against high pressures.

7.2 These pumps are having round flanges ranged from 25 mm to 50 mm.

7.3 **Casing:**

This pump consists of radially split section casings i.e. suction, delivery interstage/side channel casings. Sealing is by means of radial gaskets.

7.4 **Impellers:**

The impellers of these pumps are made of Stainless Steel. These are regenerative type open impellers with very close tolerances and degree of finish.

7.5 **Couplings:**

These pumps are directly driven by electric motor through flexible coupling.

7.6 **Shaft seals:**

Pumps with stuffing boxes have Teflon packing rings. The following types of stuffing boxes are available.

- i. Without lantern ring and bypass pipe – applicable for pumps in single stage. [Refer Cross Section Drg. Fig i.]
- ii. With lantern ring and bypass pipe – applicable for models with two stages and above, for discharge above 6 bar. [Refer Cross Section Drg.Fig.ii]

8 OPERATIONAL DETAILS:

8.1 These pumps are designed for speed 1450 rpm. They can also be used for 60 Hz electric supplies with suitable prime mover.

8.2 **Direction of rotation:**

Pumps are designed for clockwise direction of rotation when viewed from driving end.

8.3 **Performance:**

Performance curves relates to liquid of specific gravity 1.0 and viscosity as water.

Tolerances:

Capacity: $\pm 5\%$, head: $\pm 5\%$, Power absorbed: $+ 10\%$.

8.4 **Temperature:**

The operating temperature range for these pumps is -40°C to 120°C .

9. BEARINGS & LUBRICATION DETAILS:

Ball bearings with metal shields on both sides are fitted at DE and NDE side of the pump. These types of bearings are special in design and are filled with lithium base grease having good rust inhibiting properties. The bearings are lubricated for life and maintenance free.

Sr. No.	PUMP MODEL.	BEARING DE / NDE.
1.	CF 110	SKF-6302 2Z OR EQUIVALENT.
2.	CF 220	SKF-6304 2Z OR EQUIVALENT.
3.	CF 330	SKF-6304 2Z OR EQUIVALENT.
4.	CF 440	SKF-6305 2Z OR EQUIVALENT.
5.	CF 550	SKF-6306 2Z OR EQUIVALENT.

10. GLAND PACKING DETAILS:

Sr. No.	PUMP MODEL	GLAND PACKING SIZE ID X OD X TH.	No. OF GLAND PACKINGS.		POSITION OF LANTERN RING FROM IMPELLER END.
			WITHOUT L. RING (Del Side)	WITH L.RING (Suc Side)	
1.	CF-110	16 X 26 X 5	8	6	4 + L + 2
2.	CF-220	24 X 39 X 7.5	8	6	4 + L + 2
3.	CF-330	24 X 39 X 7.5	8	6	4 + L + 2
4.	CF-440	28 X 44 X 7.5	8	6	4 + L + 2
5.	CF-550	32 X 50 X 9	8	6	4 + L + 2

Refer st.box details drg.no. S182020005 0 (page no: 18).

11. WEIGHT, M.I., GD² VALUE, SPECIFIC SPEED & HYDRO TEST PRESSURE DATA:

11.1 M.I., GD² & Specific speed values of CF pumps:

SR. NO.	PUMP TYPE	M.I.VALUE FOR SINGLE STAGE (KG-M ²)	M.I.VALUE FOR EACH ADDITIONAL STAGE (KG-M ²)	GD2 VALUE FOR SINGLE STAGE KG-M ²	GD2 VALUE FOR EACH STAGE KG-M ²	SP SPEED Ns (METRIC).
1	CF 110	0.0101	0.0005	0.0404	0.0020	10.60
2	CF220	0.0031	0.0001	0.0125	0.0005	11.66
3	CF330	0.0031	0.0001	0.0125	0.0005	20.85
4	CF440	0.0059	0.0027	0.0235	0.0109	27.98
5	CF 550	0.0132	0.0055	0.0528	0.0220	31.22

11.2 Weight of pump: -

SR. NO.	PUMP TYPE	WEIGHT. In KG.
1	CF 111	23
2	CF 112	23
3	CF 113	25
4	CF 114	26
5	CF 115	28
6	CF 116	30
7	CF 117	31
8	CF 118	33
9	CF221/331	33
10	CF222/332	35
11	CF223/333	39
12	CF224/334	43
13	CF225/335	47
14	CF226/336	51
15	CF227/337	55
16	CF228/338	59

SR. NO.	PUMP TYPE	WEIGHT. In KG.
17	CF 441	47
18	CF 442	51
19	CF 443	57
20	CF 444	63
21	CF 445	69
22	CF 446	75
23	CF 447	81
24	CF 448	87
25	CF 551	67
26	CF 552	75
27	CF 553	86
28	CF 554	97
29	CF 555	108
30	CF 556	119
31	CF 557	130
32	CF 558	141

11.3 Hydro test pressure CF pumps. Kg/cm² at 1450 RPM.

Sr. No.	Pump Type	No. Of stages.							
		1	2	3	4	5	6	7	8
1	CF110	4.5	8.3	12.4	16.8	20.7	24.3	28.5	32.3
2	CF220	6.3	12.3	18.3	24.0	30.0	37.5	41.2	47.2
3	CF330	7.2	8.7	15.0	19.2	24.0	28.2	33.0	37.5
4	CF440	4.8	9.3	13.8	18.3	22.5	27.3	31.9	36.7
5	CF550	9.0	11.2	16.8	22.5	26.2	33.0	38.2	43.8

12. MATERIAL OF CONSTRUCTION:

"CF" pumps are offered in following material of constructions.

Sr. No.	MATERIAL CONSTRUCTION CODE.	DESCRIPTION.
1.	01	Standard fitted [impeller in St.Steel].
2.	13	All stainless steel

i. KEY TO MATERIAL CODES:

Sr. No.	MATERIAL CODE.	DESCRIPTION.
1.	012	CI IS: 210 Gr.-FG260
2.	053	CS IS: 1570 Gr.-40C8
3.	255	St.Steel ASTMA-270 TYPE 420
4.	251	St.Steel ASTMA-276 TYPE 316
5.	232	St.Steel ASTMA-351 Gr.-CF8M
6.	366	P.T.F.E.
7.	188	HT Brass IS: 320 Alloy-1
8.	364	Nylon.
9.	350	CHAMPION- 3116 OR EQ. (Non.Asb.)
10.	370	Natural rubber.
11.	257	St.Steel tube/pipe ASTMA-269-316
12.	702	NON ASB GASKET FERROLITE NAM37 OR EQ

ii. **MATERIAL CONSTRUCTION CHART:**

Sr. No.	PART DESCRIPTION.	MATERIAL CONSTRUCTION CODES.	
		01	13
1.	Suction/delivery casing.	012	232
2.	Impeller.	232	232
3.	Side channel disc.	012	232
4.	Interstage casing.	012	232
5.	Shaft.	255	251
6.	Woodruff key.	255	251
7.	Gland	012	232
8.	Pump foot.	012	232
9.	Bearing cover DE/NDE.	012	012
10.	Bearing housing.	012	012
11.	Distance sleeve.	053	053
12.	Gaskets.	702	702
13.	Liquid deflector.	370	366

13. INTERCHANGEABILITY OF COMPONENTS:

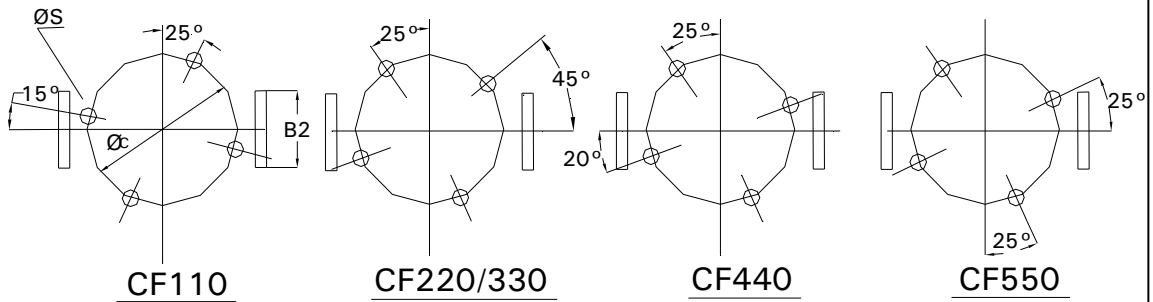
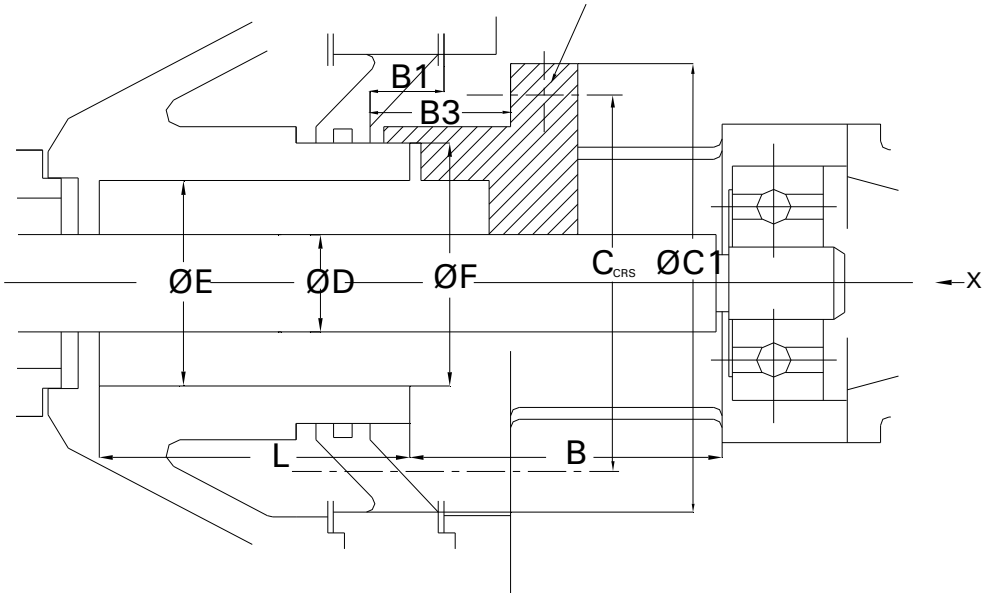
Sr. No.	PUMP TYPE.	C O M P O N E N T S .										
		DEL. \ SUC. CASING	IMPELLER	SIDE CHANNELDISC	INTERSTAGE CASING	SHAFT	GLAND	PUMP FOOT	ANTIFRICTION BEARING	BRG HOUSING DE \ NDE	BRG. COVER DE \ NDE	GLAND PACKING RING
1.	CF 111	1	1	1	1	1	1	1	1	1	1	1
2.	CF 112	1	1	1	1	2	1	1	1	1	1	1
3.	CF 113	1	1	1	1	3	1	1	1	1	1	1
4.	CF 114	1	1	1	1	4	1	1	1	1	1	1
5.	CF 115	1	1	1	1	5	1	1	1	1	1	1
6.	CF 116	1	1	1	1	6	1	1	1	1	1	1
7.	CF 117	1	1	1	1	7	1	1	1	1	1	1
8.	CF 118	1	1	1	1	8	1	1	1	1	1	1
9.	CF 221	2	2	2	2	9	2	2	2	2	2	2
10	CF 222	2	2	2	2	10	2	2	2	2	2	2
11.	CF 223	2	2	2	2	11	2	2	2	2	2	2
12.	CF 224	2	2	2	2	12	2	2	2	2	2	2
13.	CF 225	2	2	2	2	13	2	2	2	2	2	2
14.	CF 226	2	2	2	2	14	2	2	2	2	2	2
15.	CF 227	2	2	2	2	15	2	2	2	2	2	2
16.	CF 228	2	2	2	2	16	2	2	2	2	2	2

Sr. No.	PU MP TYPE.	C O M P O N E N T S .										
		DEL. \ SUC. CASING	IMPELLER	SIDE CHANNELDISC	INTERSTAGE CASING	SHAFT	GLAND	PUMP FOOT	ANTIFRICTION BEARING	BRG HOUSING DE \ NDE	BRG. COVER DE \ NDE	GLAND PACKING RING
17.	CF 331	2	2	3	2	9	2	2	2	2	2	2
18.	CF 332	2	2	3	2	10	2	2	2	2	2	2
19.	CF 333	2	2	3	2	11	2	2	2	2	2	2
20.	CF 334	2	2	3	2	12	2	2	2	2	2	2
21.	CF 335	2	2	3	2	13	2	2	2	2	2	2
22.	CF 336	2	2	3	2	14	2	2	2	2	2	2
23.	CF 337	2	2	3	2	15	2	2	2	2	2	2
24.	CF 338	2	2	3	2	16	2	2	2	2	2	2
25.	CF 441	3	3	4	3	17	3	3	3	3	3	3
26.	CF 442	3	3	4	3	18	3	3	3	3	3	3
27.	CF 443	3	3	4	3	19	3	3	3	3	3	3
28.	CF 444	3	3	4	3	20	3	3	3	3	3	3
29.	CF 445	3	3	4	3	21	3	3	3	3	3	3
30.	CF 446	3	3	4	3	22	3	3	3	3	3	3
31.	CF 447	3	3	4	3	23	3	3	3	3	3	3
32.	CF 448	3	3	4	3	24	3	3	3	3	3	3
33.	CF 551	4	4	5	4	25	4	4	4	4	4	4
34.	CF 552	4	4	5	4	26	4	4	4	4	4	4
35.	CF 553	4	4	5	4	27	4	4	4	4	4	4
36.	CF 554	4	4	5	4	28	4	4	4	4	4	4
37.	CF 555	4	4	5	4	29	4	4	4	4	4	4
38.	CF 556	4	4	5	4	30	4	4	4	4	4	4
39.	CF 557	4	4	5	4	31	4	4	4	4	4	4
40.	CF 558	4	4	5	4	32	4	4	4	4	4	4

15.1 List of part code against part description :

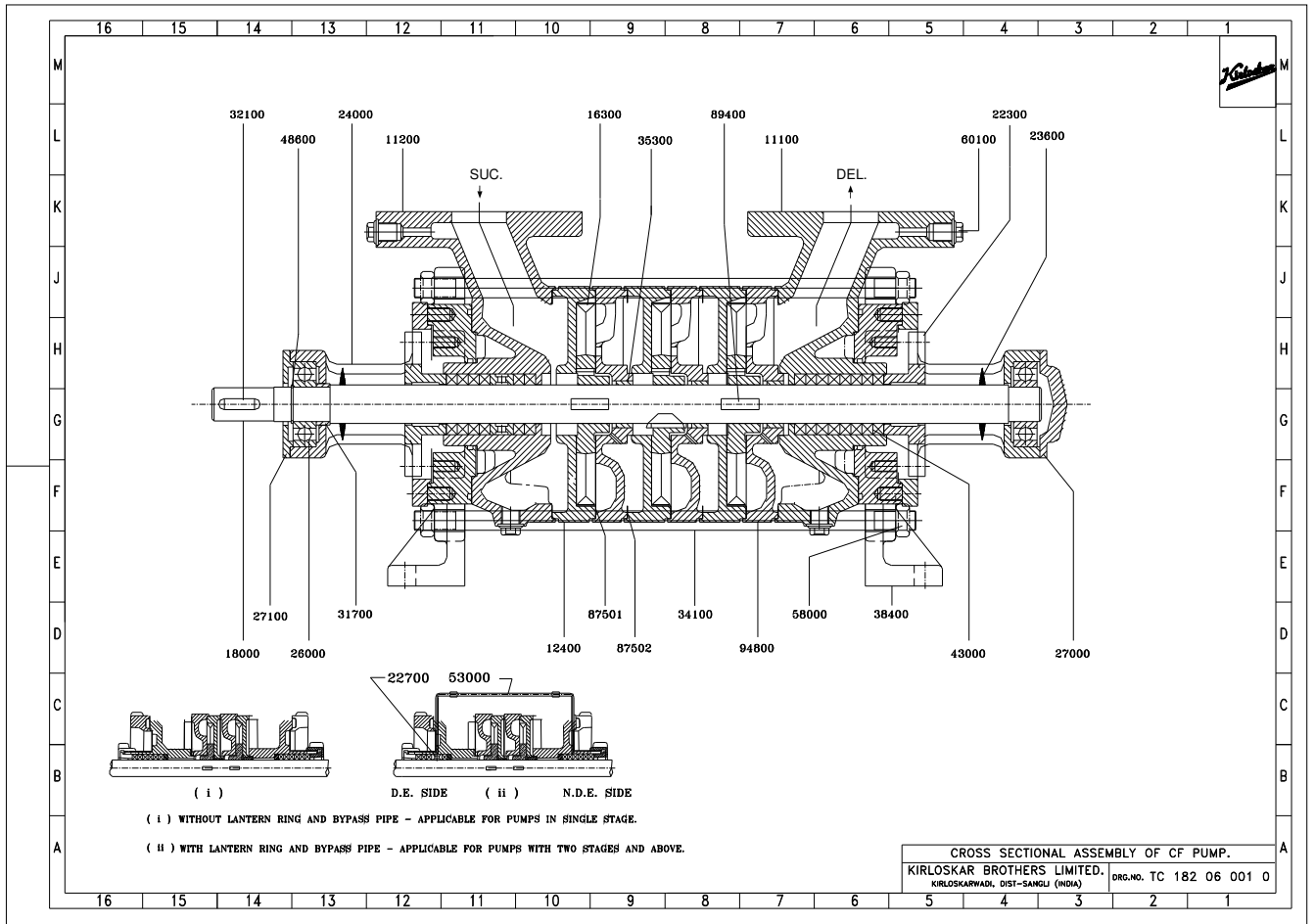
Sr. No.	PART CODE.	PART DESCRIPTION.
1.	11100	Suction casing.
2.	11300	Delivery casing.
3.	12400	Inter-stage casing.
4.	16300	Impeller.
5.	18000	Shaft.
6.	22300	Gland.
7.	22700	Lantern ring.
8.	23600	Liquid deflector.
9.	24000	Bearing housing.
10.	26000	Deep groove ball bearing.
11.	27000	Bearing cover DE.
12.	27100	Bearing cover NDE.
13.	31700	Distance sleeve.
14.	32100	Key for coupling.
15.	34100	Tie bar.
16.	35300	Bearing bush.
17.	38400	Pump foot.
18.	43000	Gland packing ring.
19.	48600	Circlip.
20.	53000	Tube.
21.	58000	Hex nut for tie bar.
22.	601 00	Plug.
23.	87501	Gasket for suction casing & inter-stage casing.
24.	87502	Gasket for interstage casing & side channel disc.
25.	89400	Wood ruff key for impeller.
26.	94800	Side channel disc.

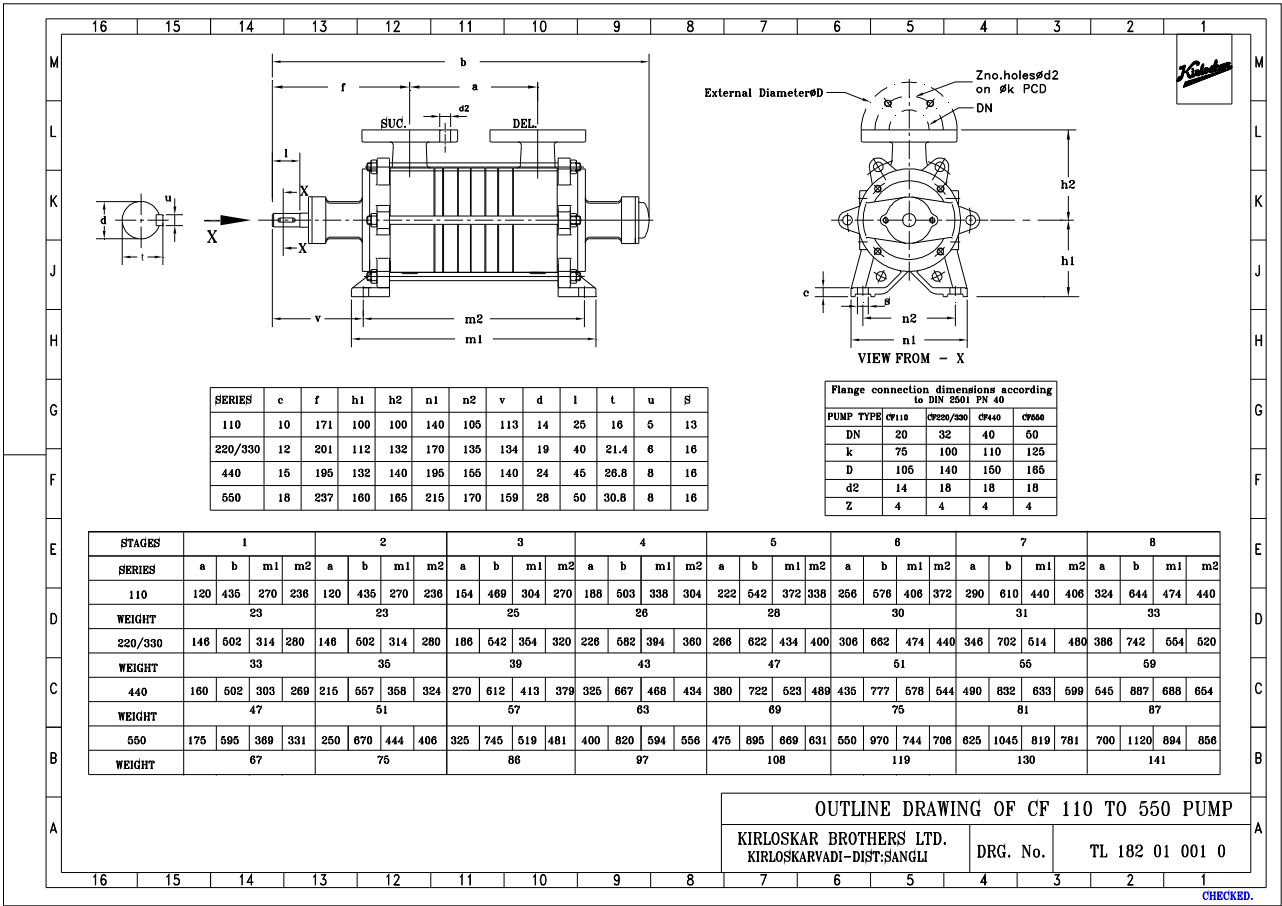
**STUFFING BOX DETAILS OF CF PUMP
(ONLY FOR MECH. SEAL ARRGT.)**



VIEW FROM ARROW-X (FOR GLAND STUDE)

PUMP TYPE	BORE 'E'	BORE OD 'F'	BORE LENGTH 'L'	SHAFT DIA 'D'	GLAND			NEAREST OBSTRUCTION			
					PCD 'C'	O.D. ØC1	BOLT SIZE ØS	'B'	B1	BOTH SIZE B2	B3
CF110	36 +0.1	48	49	16 -0.011	68	80	9.5	75	9	45	23
CF220 CF330	48 +0.1	60	66	24 -0.013	86	98	9.5	78	10.5	50	25
CF440	48 +0.1	60	67	28 -0.013	90	102	9.5	86	8.5	55	
CF550	54 +0.1	66	66	32 -0.016	88	100	9.5	112	12	58	





SERIES	c	f	h1	h2	n1	n2	v	d	l	t	u	s
110	10	171	100	100	140	105	113	14	25	16	5	13
220/330	12	201	112	132	170	135	134	19	40	21.4	6	16
440	16	195	132	140	195	155	140	24	45	26.8	8	16
550	18	237	160	165	215	170	159	28	50	30.8	8	16

Flange connection dimensions according to DIN 2501 PN 40			
PUMP TYPE	CF110	CF220/330	CF440
DN	20	32	40
k	75	100	110
D	105	140	150
d2	14	18	18
Z	4	4	4

STAGES	1				2				3				4				5				6				7				8			
	a	b	m1	m2	a	b	m1	m2	a	b	m1	m2	a	b	m1	m2	a	b	m1	m2	a	b	m1	m2	a	b	m1	m2	a	b	m1	m2
110	120	435	270	236	120	435	270	236	164	469	304	270	188	503	336	304	222	542	372	336	256	576	406	372	290	610	440	406	324	644	474	440
WEIGHT	23				23				25				26				28				30				31				33			
220/330	146	502	314	280	146	502	314	280	186	542	354	320	226	582	394	360	266	622	434	400	306	662	474	440	346	702	514	480	386	742	554	520
WEIGHT	33				35				39				43				47				51				55				59			
440	160	502	303	269	215	557	358	324	270	612	413	379	325	667	468	434	380	722	523	489	435	777	578	544	490	832	633	599	545	887	688	654
WEIGHT	47				51				57				63				69				75				81				87			
550	175	595	389	331	250	670	444	408	325	745	519	481	400	820	594	556	475	895	669	631	550	970	744	706	625	1045	819	781	700	1120	894	856
WEIGHT	67				76				86				97				108				119				130				141			

OUTLINE DRAWING OF CF 110 TO 550 PUMP

KIRLOSKAR BROTHERS LTD.
KIRLOSKARVADI-DIST.SANGLI

DRG. No. TL 182 01 001 0

CHECKED.