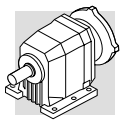
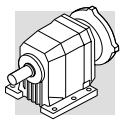
	i	J (• 10^{-4}) [Kgm^2]													
			IEC												
			63	71	80	90	100 112	132	160	180	200	225	250	280	
C 70 2_4.6	4.6	—	—	—	—	—	—	—	136	133	143	—	—	—	99
C 70 2_5.9	5.9	—	—	—	—	—	—	—	119	117	126	—	—	—	32
C 70 2_6.3	6.3	—	—	—	—	—	—	—	129	127	136	—	—	—	93
C 70 2_7.5	7.5	26.4	—	—	—	—	—	45	105	102	112	—	—	—	68
C 70 2_8.0	8.0	—	—	—	—	—	—	—	115	113	122	—	—	—	78
C 70 2_9.5	9.5	18.7	—	—	—	—	—	38	97	95	—	—	—	—	60
C 70 2_10.2	10.2	23.8	—	—	—	—	—	43	102	100	109.0	—	—	—	65
C 70 2_11.2	11.2	15.3	—	—	—	—	—	34	94	91	—	—	—	—	56
C 70 2_13.0	13.0	17.2	—	—	—	—	—	36	95	93	—	—	—	—	58
C 70 2_14.1	14.1	9.9	—	—	12.3	12.2	13.5	28.9	88	86	—	—	—	—	51
C 70 2_15.3	15.3	14.2	—	—	—	—	—	33	93	90	—	—	—	—	55
C 70 2_16.7	16.7	6.9	—	—	9.5	9.4	10.7	25.9	85	83	—	—	—	—	48
C 70 2_19.3	19.3	9.1	—	—	11.6	11.5	12.8	28.0	87	85	—	—	—	—	50
C 70 2_22.9	22.9	6.4	—	—	9.0	8.9	10.2	25.3	85	83	—	—	—	—	48
C 70 2_27.7	27.7	5.2	—	—	8.0	7.9	9.2	24.1	84	81	—	—	—	—	46
C 70 2_34.7	34.7	3.2	—	—	6.1	6.0	7.3	22.1	82	79	—	—	—	—	44
C 70 3_41.3	41.3	4.4	—	—	7.2	7.2	8.5	23.3	83	80	—	—	—	—	46
C 70 3_44.7	44.7	4.2	—	—	7.0	7.0	8.2	23.0	83	80	—	—	—	—	45
C 70 3_52.2	52.2	3.0	—	—	5.8	5.8	7.0	21.9	81	79	—	—	—	—	44
C 70 3_56.5	56.5	2.8	—	—	5.7	5.6	6.9	21.7	81	79	—	—	—	—	44
C 70 3_65.9	65.9	2.0	—	—	4.9	4.8	6.1	20.9	80	78	—	—	—	—	43
C 70 3_71.3	71.3	2.0	—	—	4.8	4.8	6.0	20.9	80	78	—	—	—	—	43
C 70 3_81.4	81.4	1.5	—	—	4.3	4.3	5.6	20.4	80	78	—	—	—	—	43
C 70 3_88.2	88.2	1.4	—	—	4.3	4.2	5.5	20.3	80	76	—	—	—	—	43
C 70 3_103.8	103.8	1.0	—	—	3.8	3.8	5.1	19.9	79	77	—	—	—	—	42
C 70 3_112.4	112.4	0.9	—	—	3.8	3.7	5.0	19.8	79	77	—	—	—	—	42
C 70 3_126.8	126.8	0.7	—	—	3.5	3.5	4.8	19.6	79	77	—	—	—	—	42
C 70 3_137.4	137.4	0.7	—	—	3.5	3.5	4.7	19.6	79	77	—	—	—	—	42
C 70 3_150.3	150.3	0.5	—	—	3.4	3.4	9.6	—	—	—	—	—	—	—	42
C 70 3_162.8	162.8	0.5	—	—	3.4	3.4	4.6	—	—	—	—	—	—	—	42
C 70 3_179.2	179.2	0.4	—	—	3.2	3.3	4.5	—	—	—	—	—	—	—	42
C 70 3_194.1	194.1	0.4	—	—	3.2	3.2	4.5	—	—	—	—	—	—	—	42
C 70 3_220.9	220.9	0.3	—	—	3.1	3.1	4.3	—	—	—	—	—	—	—	41
C 70 3_239.3	239.3	0.3	—	—	3.1	3.1	4.3	—	—	—	—	—	—	—	41
C 70 4_251.3	251.3	0.7	2.2	2.2	3.5	3.5	4.8	19.6	79	77	—	—	—	—	10.9
C 70 4_272.2	272.2	0.7	2.2	2.1	3.5	3.5	4.8	19.6	79	77	—	—	—	—	10.9
C 70 4_317.9	317.9	0.5	2.0	2.0	3.4	3.3	4.6	19.4	79	77	—	—	—	—	10.7
C 70 4_344.3	344.3	0.5	2.0	2.0	3.4	3.3	4.6	19.4	79	77	—	—	—	—	10.7
C 70 4_409.4	409.4	0.4	1.8	1.8	3.2	3.2	4.5	19.3	79	76	—	—	—	—	7.9
C 70 4_443.5	443.5	0.4	1.8	1.8	3.2	3.2	4.5	19.3	79	76	—	—	—	—	7.9
C 70 4_512.0	512.0	0.3	1.7	1.7	3.1	3.1	4.4	19.2	79	76	—	—	—	—	7.8
C 70 4_554.7	554.7	0.3	1.7	1.7	3.1	3.1	4.4	19.2	79	76	—	—	—	—	7.8
C 70 4_606.8	606.8	0.2	1.7	1.7	3.1	3.0	4.3	—	—	—	—	—	—	—	7.8
C 70 4_657.3	657.3	0.2	1.7	1.7	3.1	3.0	4.3	—	—	—	—	—	—	—	7.7
C 70 4_736.0	736.0	0.2	1.6	1.6	3.0	2.9	4.3	—	—	—	—	—	—	—	7.7
C 70 4_797.3	797.3	0.2	1.6	1.6	3.0	2.9	4.3	—	—	—	—	—	—	—	7.7
C 70 4_922.6	922.6	0.1	1.6	1.6	3.0	2.9	4.2	—	—	—	—	—	—	—	7.7
C 70 4_999.5	999.5	0.1	1.6	1.6	3.0	2.9	4.2	—	—	—	—	—	—	—	7.6
C 70 4_1069	1069	0.8	1.6	1.5	2.9	2.9	4.2	—	—	—	—	—	—	—	7.6
C 70 4_1158	1158	0.8	1.6	1.5	2.9	2.9	4.2	—	—	—	—	—	—	—	7.6
C 70 4_1362	1362	0.6	1.5	1.5	2.9	2.9	4.1	—	—	—	—	—	—	—	7.6
C 70 4_1476	1476	0.6	1.5	1.5	2.9	2.9	4.1	—	—	—	—	—	—	—	7.6



	i	J (· 10^{-4}) [Kgm^2]													
			IEC												
			63	71	80	90	100 112	132	160	180	200	225	250	280	
C 80 2_5.6	5.6	—	—	—	—	—	—	—	—	197	211	489	—	—	164
C 80 2_6.1	6.1	—	—	—	—	—	—	—	—	193	210	485	—	—	159
C 80 2_7.0	7.0	—	—	—	—	—	—	—	160	161	174	452	—	—	127
C 80 2_7.6	7.6	—	—	—	—	—	—	—	158	158	172	449	—	—	124
C 80 2_8.9	8.9	—	—	—	—	—	—	—	137	135	146	429	—	—	101
C 80 2_9.6	9.6	—	—	—	—	—	—	—	136	133	144	427	—	—	99
C 80 2_11.1	11.1	37.5	—	—	—	—	—	56	116	113	124	408	—	—	79
C 80 2_12.0	12.0	36.4	—	—	—	—	—	55	115	112	123	407	—	—	78
C 80 2_13.8	13.8	28.1	—	—	—	—	—	47	106	104	135	398	—	—	69
C 80 2_14.9	14.9	27.4	—	—	—	—	—	46	106	103	134	397	—	—	69
C 80 2_16.7	16.7	21.4	—	—	—	—	—	40	100	97	127	391	—	—	63
C 80 2_18.1	18.1	20.9	—	—	—	—	—	40	99	97	127	390	—	—	62
C 80 2_20.5	20.5	14.2	—	—	16.6	16.6	17.9	33	93	90	120	383	—	—	55
C 80 2_22.2	22.2	13.9	—	—	16.3	16.3	17.6	33	92	90	120	383	—	—	55
C 80 2_24.0	24.0	13.1	—	—	15.7	15.6	16.9	32	91	89	119	382	—	—	54
C 80 2_25.9	25.9	12.9	—	—	15.5	15.4	16.7	32	91	89	118	382	—	—	54
C 80 2_31.3	31.3	8.7	—	—	11.5	11.4	12.7	27.6	87	85	—	—	—	—	50
C 80 2_39.1	39.1	5.2	—	—	8.0	8.0	9.2	24.1	84	81	—	—	—	—	46
C 80 3_43.5	43.5	9.6	—	—	12.4	12.4	13.7	29	88	86	—	—	—	—	51
C 80 3_47.4	47.4	9.1	—	—	12.0	11.9	13.2	28	87	85	—	—	—	—	50
C 80 3_57.3	57.3	5.7	—	—	8.5	8.5	9.7	25	84	82	—	—	—	—	47
C 80 3_62.5	62.5	5.4	—	—	8.2	8.2	9.5	24	84	82	—	—	—	—	47
C 80 3_70.5	70.5	4.3	—	—	7.1	7.0	8.3	23	83	80	—	—	—	—	45
C 80 3_76.9	76.9	4.1	—	—	7.0	6.9	8.2	23	82	80	—	—	—	—	45
C 80 3_89.3	89.3	3.0	—	—	5.9	5.8	7.1	22	81	79	—	—	—	—	44
C 80 3_97.4	97.4	2.9	—	—	5.8	5.7	7.0	22	81	79	—	—	—	—	44
C 80 3_109.5	109.5	2.0	—	—	4.8	4.8	6.1	21	80	78	—	—	—	—	43
C 80 3_119.5	119.5	1.9	—	—	4.8	4.7	6.0	21	80	79	—	—	—	—	43
C 80 3_136.7	136.7	1.4	—	—	4.3	4.2	5.5	20	80	78	—	—	—	—	43
C 80 3_149.1	149.1	1.4	—	—	4.2	4.2	5.5	20	80	77	—	—	—	—	43
C 80 3_169.0	169.0	1.0	—	—	3.9	3.8	5.1	—	—	—	—	—	—	—	42
C 80 3_184.4	184.4	1.0	—	—	3.9	3.8	5.1	—	—	—	—	—	—	—	42
C 80 3_197.9	197.9	0.8	—	—	3.7	3.6	4.9	—	—	—	—	—	—	—	42
C 80 3_215.8	215.8	0.8	—	—	3.6	3.6	4.9	—	—	—	—	—	—	—	42
C 80 4_261.9	261.9	1.7	—	—	4.6	4.5	5.8	20.6	80	78	—	—	—	—	11.9
C 80 4_285.7	285.7	1.7	—	—	4.6	4.5	5.8	20.6	80	78	—	—	—	—	11.9
C 80 4_334.3	334.3	1.2	2.7	2.7	4.0	4.0	5.3	20.1	80	77	—	—	—	—	11.4
C 80 4_364.7	364.7	1.2	2.7	2.6	4.0	4.0	5.3	20.1	80	77	—	—	—	—	11.4
C 80 4_417.5	417.5	0.9	2.4	2.3	3.7	3.7	5.0	19.8	79	77	—	—	—	—	11.1
C 80 4_455.4	455.4	0.9	2.3	2.3	3.7	3.7	5.5	19.8	79	77	—	—	—	—	11.1
C 80 4_529.3	529.3	0.5	2.0	2	3.4	3.3	4.6	19.4	79	77	—	—	—	—	10.7
C 80 4_577.4	577.4	0.5	2.0	2	3.4	3.3	4.6	19.4	79	77	—	—	—	—	10.7
C 80 4_664.3	664.3	0.4	2.0	1.9	3.3	3.2	4.5	19.3	78	77	—	—	—	—	10.6
C 80 4_724.7	724.7	0.4	2.0	1.9	3.3	3.2	4.5	19.3	78	77	—	—	—	—	10.6
C 80 4_783.4	783.4	0.3	2.0	1.8	3.2	3.1	4.4	—	—	—	—	—	—	—	9.4
C 80 4_854.6	854.6	0.3	2.0	1.8	3.2	3.1	4.4	—	—	—	—	—	—	—	9.4
C 80 4_945.7	945.7	0.2	1.7	1.7	3.1	3.0	4.3	—	—	—	—	—	—	—	9.3
C 80 4_1032	1032	0.2	1.7	1.7	3.1	3.0	4.3	—	—	—	—	—	—	—	9.3
C 80 4_1168	1168	0.2	1.6	1.6	3.0	3.0	4.2	—	—	—	—	—	—	—	9.2
C 80 4_1274	1274	0.2	1.6	1.6	3.0	3.0	4.2	—	—	—	—	—	—	—	9.2
C 80 4_1358	1358	0.1	1.6	1.6	3	2.9	4.2	—	—	—	—	—	—	—	9.2
C 80 4_1481	1481	0.1	1.6	1.6	3	2.9	4.2	—	—	—	—	—	—	—	9.2

	i	J (• 10^{-4}) [Kgm^2]													
			IEC												
			63	71	80	90	100 112	132	160	180	200	225	250	280	
C 90 2_5.2	5.2	—	—	—	—	—	—	—	—	—	332	610	637	—	619
C 90 2_5.6	5.6	—	—	—	—	—	—	—	—	—	321	599	626	—	609
C 90 2_6.8	6.8	—	—	—	—	—	—	—	—	—	252	530	557	—	540
C 90 2_7.3	7.3	—	—	—	—	—	—	—	—	—	246	524	551	—	533
C 90 2_8.3	8.3	—	—	—	—	—	—	—	—	—	212	490	517	—	499
C 90 2_9.0	9.0	—	—	—	—	—	—	—	—	—	208	485	513	—	495
C 90 2_10.4	10.4	—	—	—	—	—	—	—	167	164	175	458	484	—	461
C 90 2_11.2	11.2	—	—	—	—	—	—	—	164	162	173	455	482	—	458
C 90 2_12.8	12.8	64.9	—	—	—	—	—	84	143	141	152	436	462	—	439
C 90 2_13.9	13.9	63.2	—	—	—	—	—	82	141	139	200	434	460	—	437
C 90 2_16.0	16.0	47.0	—	—	—	—	—	66	125	123	154	417	443	—	420
C 90 2_17.3	17.3	45.9	—	—	—	—	—	65	124	122	153	416	442	—	419
C 90 2_18.7	18.7	42.4	—	—	—	—	—	61	121	119	148	412	433	—	415
C 90 2_20.2	20.2	41.4	—	—	—	—	—	61	199	118	147	411	438	—	414
C 90 2_22.9	22.9	27.6	—	—	30	30	31	47	106	104	133	397	423	—	400
C 90 2_24.8	24.8	27.0	—	—	29.4	29.4	31	46	105	103	133	396	422	—	399
C 90 2_27.2	27.2	22.1	—	—	24.9	24.8	26.1	41	101	99	128	391	418	—	394
C 90 2_29.4	29.4	21.9	—	—	24.5	24.4	25.7	41	100	98	127	391	417	—	394
C 90 2_35.1	35.1	14.0	—	—	16.8	16.7	18.0	33	93	90	—	—	—	—	386
C 90 3_39.4	39.4	27.2	—	—	—	—	—	46	105	103	112	398	—	—	412
C 90 3_43.0	43.0	26.1	—	—	—	—	—	45	104	102	111	396	—	—	410
C 90 3_50.3	50.3	19.3	—	—	—	—	—	38	98	95	126	389	—	—	403
C 90 3_54.9	54.9	18.5	—	—	—	—	—	37	97	95	125	389	—	—	401
C 90 3_59.2	59.2	15.7	—	—	—	—	—	35	94	92	122	385	—	—	398
C 90 3_64.6	64.6	15.2	—	—	—	—	—	34	94	91	121	384	—	—	398
C 90 3_74.4	74.4	10.1	—	—	12.5	12.5	13.8	29.0	88	86	116	379	—	—	393
C 90 3_81.2	81.2	9.8	—	—	12.2	12.1	13.4	28.7	88	86	115	379	—	—	392
C 90 3_88.2	88.2	7.1	—	—	9.7	9.6	10.9	26.0	85	83	113	376	—	—	389
C 90 3_96.2	96.2	6.9	—	—	9.4	9.4	10.7	25.8	85	83	112	376	—	—	389
C 90 3_107.0	107.0	5.7	—	—	8.4	8.4	9.6	24.6	84	82	—	—	—	—	388
C 90 3_116.7	116.7	5.5	—	—	8.3	8.2	9.5	24.4	84	82	—	—	—	—	388
C 90 3_134.1	134.1	3.5	—	—	6.4	6.3	7.6	22.4	82	80	—	—	—	—	386
C 90 3_146.3	146.3	3.4	—	—	6.3	6.2	7.5	22.3	82	80	—	—	—	—	386
C 90 3_157.8	157.8	2.5	—	—	5.4	5.3	6.6	21.4	81	79	—	—	—	—	385
C 90 3_172.1	172.1	2.4	—	—	5.3	5.2	6.5	21.3	81	79	—	—	—	—	385
C 90 4_212.4	212.4	4.2	—	—	7.0	7.0	8.3	23.1	82.5	80.2	—	—	—	—	14.4
C 90 4_231.7	231.7	4.1	—	—	7.0	6.9	8.2	23.0	82.4	80.2	—	—	—	—	14.3
C 90 4_268.5	268.5	2.8	—	—	5.7	5.6	6.9	21.7	81.1	78.9	—	—	—	—	13
C 90 4_292.9	292.9	2.8	—	—	5.7	2.6	6.9	21.7	81.1	78.9	—	—	—	—	13
C 90 4_339.0	339.0	2.0	3.4	3.4	4.8	4.8	6.0	20.9	80.3	78.0	—	—	—	—	12.2
C 90 4_369.8	369.8	2.0	3.4	3.4	4.8	4.8	6.0	20.9	80.2	78.0	—	—	—	—	12.2
C 90 4_419.0	419.0	1.4	2.9	2.9	4.3	4.2	5.5	20.3	79.7	77.5	—	—	—	—	11.6
C 90 4_457.1	457.1	1.4	2.9	2.9	4.3	4.2	5.5	20.3	79.7	77.5	—	—	—	—	11.6
C 90 4_534.2	534.2	0.9	2.4	2.4	3.8	3.7	5.0	19.8	79.2	77.0	—	—	—	—	11.1
C 90 4_582.8	582.8	0.9	2.4	2.4	3.8	3.7	5.0	19.8	79.2	77.0	—	—	—	—	11.1
C 90 4_652.8	652.8	0.7	2.1	2.1	3.5	3.5	4.7	19.6	79.0	76.7	—	—	—	—	10.9
C 90 4_712.2	712.2	0.7	2.1	2.1	3.5	3.5	4.7	19.6	79.0	76.7	—	—	—	—	10.9
C 90 4_773.6	773.6	0.5	2	2	3.4	3.3	4.6	—	—	—	—	—	—	—	9.7
C 90 4_844.0	844.0	0.5	2	2	3.4	3.3	4.6	—	—	—	—	—	—	—	9.6
C 90 4_922.3	922.3	0.4	1.8	1.8	3.2	3.2	4.5	—	—	—	—	—	—	—	9.5
C 90 4_1006	1006	0.4	1.8	1.8	3.2	3.2	4.5	—	—	—	—	—	—	—	9.4
C 90 4_1137	1137	0.3	1.7	1.7	3.1	3.0	4.3	—	—	—	—	—	—	—	9.3
C 90 4_1240	1240	0.3	1.7	1.7	3.1	3.0	4.3	—	—	—	—	—	—	—	9.3



	i	J (· 10^{-4}) [Kgm^2]													
			IEC												
			63	71	80	90	100 112	132	160	180	200	225	250	280	
C 100 2_4.9	4.9	—	—	—	—	—	—	—	—	—	674	960	987	970	972
C 100 2_5.3	5.3	—	—	—	—	—	—	—	—	—	647	933	960	943	944
C 100 2_6.5	6.5	—	—	—	—	—	—	—	—	—	481	767	794	777	778
C 100 2_7.1	7.1	—	—	—	—	—	—	—	—	—	465	751	778	761	763
C 100 2_8.4	8.4	—	—	—	—	—	—	—	—	—	365	651	678	660	662
C 100 2_9.0	9.0	—	—	—	—	—	—	—	—	—	355	641	668	651	653
C 100 2_10.1	10.1	—	—	—	—	—	—	—	—	—	291	577	604	587	589
C 100 2_10.9	10.9	—	—	—	—	—	—	—	—	—	285	570	597	580	582
C 100 2_12.5	12.5	—	—	—	—	—	—	—	224	222	233	521	550	539	529
C 100 2_13.5	13.5	—	—	—	—	—	—	—	220	218	228	517	545	532	524
C 100 2_15.2	15.2	122.1	—	—	—	—	—	—	141	200	199	209	499	528	514
C 100 2_16.5	16.5	119.2	—	—	—	—	—	138	197	195	206	296	525	511	504
C 100 2_18.7	18.7	96.6	—	—	—	—	—	116	175	173	203	474	501	488	480
C 100 2_20.2	20.2	94.7	—	—	—	—	—	114	173	171	201	471	499	486	478
C 100 2_22.2	22.2	73.4	—	—	—	—	—	92	102	150	179	448	477	463	456
C 100 2_24.1	24.1	72.1	—	—	—	—	—	91	150	148	178	447	476	462	455
C 100 2_29.6	29.6	50.4	—	—	—	—	54.1	69	129	127	156	425	454	440	433
C 100 3_34.3	34.3	—	—	—	—	—	—	—	148	146	155	439	—	—	461
C 100 3_36.9	36.9	—	—	—	—	—	—	—	145	143	152	436	—	—	458
C 100 3_42.9	42.9	44.4	—	—	—	—	—	63	123	120	130	415	—	—	437
C 100 3_46.2	46.2	42.5	—	—	—	—	—	61	121	118	128	413	—	—	435
C 100 3_53.3	53.3	32.5	—	—	—	—	—	51	111	109	139	403	—	—	424
C 100 3_57.4	57.4	31.4	—	—	—	—	—	50	110	107	138	401	—	—	423
C 1003_64.5	64.5	24.4	—	—	—	—	—	43	103	101	130	394	—	—	415
C 100 3_69.4	69.4	23.6	—	—	—	—	—	43	102	100	129	393	—	—	414
C 100 3_79.4	79.4	16.2	—	—	18.6	18.6	19.9	35	95	92	122	385	—	—	407
C 100 3_85.6	85.6	15.7	—	—	18.1	18.0	19.3	35	94	92	121	385	—	—	406
C 100 3_92.7	92.7	14.6	—	—	17.2	17.1	18.4	34	93	91	—	—	—	—	405
C 100 3_99.8	99.8	14.2	—	—	16.8	16.7	18.0	33	93	901	—	—	—	—	404
C 100 3_111.9	111.9	9.9	—	—	12.6	12.6	13.9	28.8	88	86	—	—	—	—	392
C 100 3_120.5	120.5	9.6	—	—	12.4	12.3	13.6	28.5	88	86	—	—	—	—	392
C 100 3_139.7	139.7	6.0	—	—	8.8	8.7	10.0	24.8	84	82	—	—	—	—	388
C 100 3_150.4	150.4	5.8	—	—	8.6	8.5	9.8	24.7	84	82	—	—	—	—	388
C 100 4_162.1	162.1	12.7	—	—	15.6	15.5	16.8	32	100	89	—	—	—	—	22.9
C 100 4_185.4	185.4	9.6	—	—	12.5	12.4	13.8	28.5	88	86	—	—	—	—	19.8
C 100 4_199.6	199.6	8.5	—	—	12.4	12.3	13.7	28.4	88	86	—	—	—	—	19.7
C 100 4_244.2	244.2	5.7	—	—	8.5	8.5	9.8	24.6	84	82	—	—	—	—	15.9
C 100 4_263.0	263.0	5.6	—	—	8.5	8.4	9.7	24.5	84	82	—	—	—	—	15.8
C 100 4_300.5	300.5	4.2	—	—	7.1	7.1	8.4	23.2	83	80	—	—	—	—	14.5
C 100 4_323.6	323.6	4.2	5.7	5.7	7.1	7.0	8.3	23.1	83	80	—	—	—	—	14.4
C 100 4_380.5	380.5	3.1	4.5	4.5	5.9	5.5	7.1	22	81	79	—	—	—	—	13.3
C 100 4_409.8	409.8	3.0	4.5	4.5	5.9	5.5	7.1	22	81	79	—	—	—	—	13.2
C 100 4_466.7	466.7	2.0	3.5	3.5	4.9	4.8	6.1	20.1	80	78	—	—	—	—	12.2
C 100 4_502.6	502.6	2.0	3.5	3.4	4.8	4.8	6.1	20.1	80	78	—	—	—	—	12.2
C 100 4_582.6	582.6	1.4	2.9	2.9	4.3	4.2	5.5	20.3	80	77	—	—	—	—	11.6
C 100 4_627.4	627.4	1.4	2.9	2.9	4.3	4.2	5.5	20.3	80	77	—	—	—	—	11.6
C 100 4_720.3	720.3	1.0	2.5	2.5	3.9	3.4	5.1	20	79	77	—	—	—	—	11.2
C 100 4_775.7	775.7	1.0	2.5	2.5	3.9	3.4	5.1	20	79	77	—	—	—	—	11.2
C 100 4_843.3	843.3	0.8	2.3	2.3	3.7	3.6	4.9	—	—	—	—	—	—	—	9.9
C 100 4_908.2	908.2	0.8	2.3	2.3	3.7	3.6	4.9	—	—	—	—	—	—	—	9.9
C 100 4_1004	1004	0.6	2.1	2.0	3.4	3.4	4.7	—	—	—	—	—	—	—	9.7
C 100 4_1081	1081	0.6	2.1	2.0	3.4	3.4	4.7	—	—	—	—	—	—	—	9.7

28 - DIMENSIONI *28 - DIMENSIONS* **28 - ABMESSUNGEN** *28 - DIMENSIONS*

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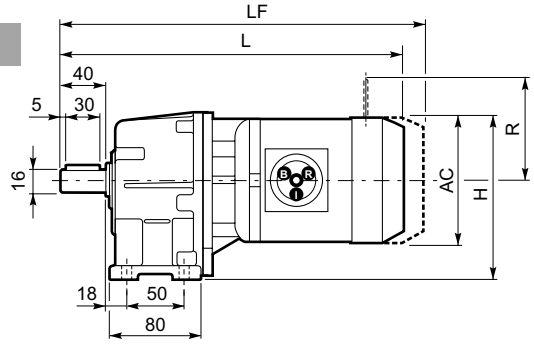

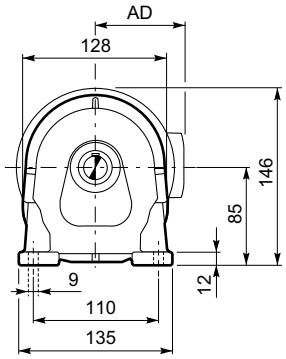

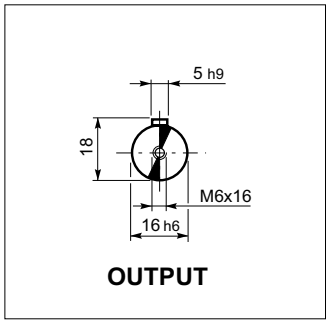

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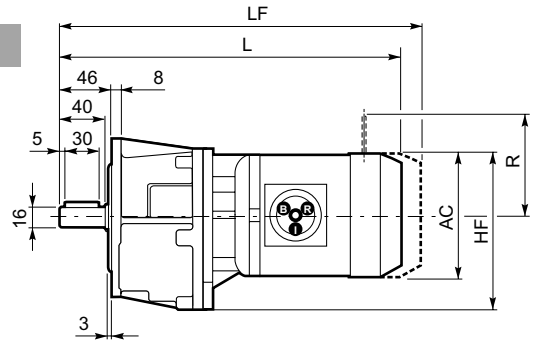
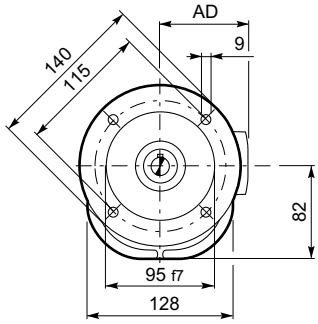
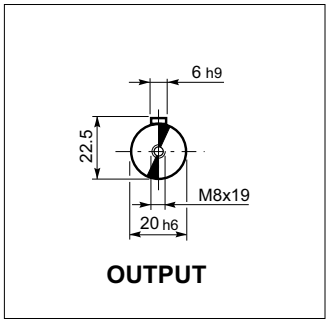
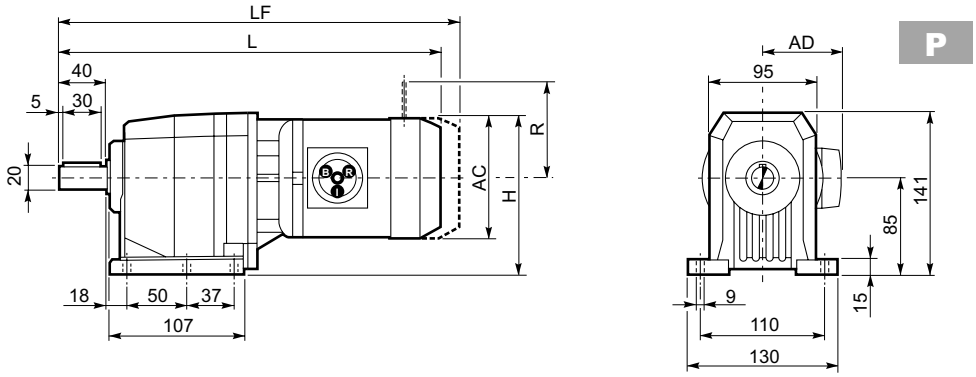
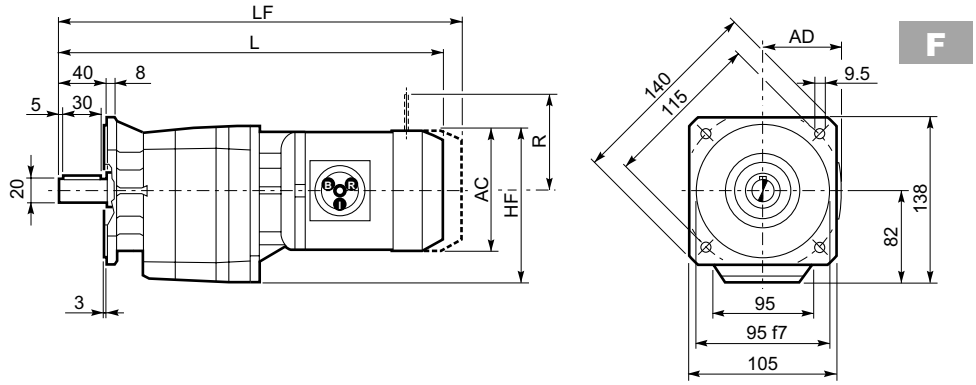


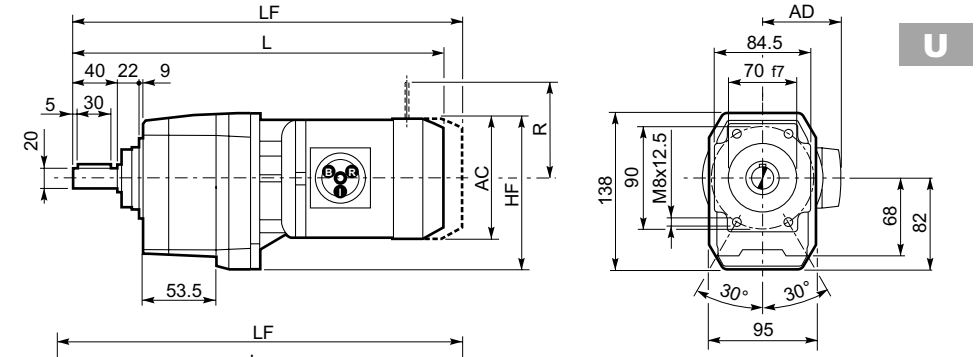


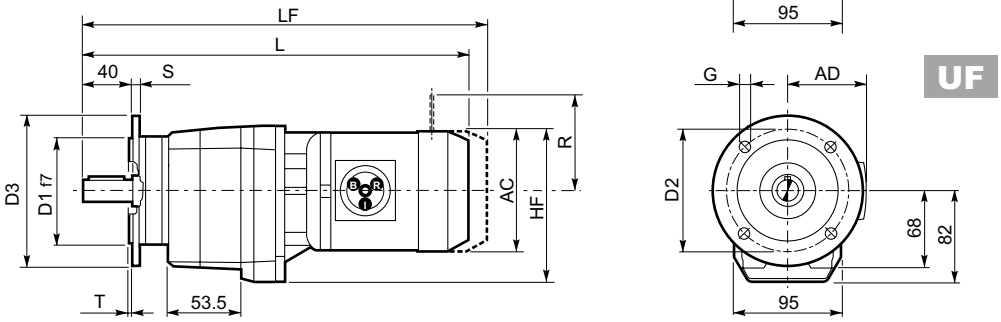
C 05									M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 05 2	**S0**	**M0**	110	140	137	287	91	7	—	—	—	—	—	—
C 05 2	**S05**	**M05**	121	145.5	142.5	332	95	8	398	10	96	119	116	95
C 05 2	**S1**	**M1S**	138	154	151	337	108	9	400	12	103	132	124	108
C 05 2	**S1**	**M1L**	138	154	151	360.5	108	11	423	13	103	132	124	108





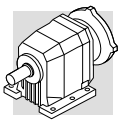






C 11 2_U						
	D1	D2	D3	G	T	S
FA	80	100	120	7	3	8
FB	95	115	140	9	3	10
FC	110	130	160	9	3	10

C 11													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 11 2	S05	M05	121	145.5	142.5	370.5	95	9	436.5	10	96	119	116	95
C 11 2	S1	M1S	138	154	151	375.5	108	10	438.5	12	103	132	124	108
C 11 2	S1	M1L	138	154	151	404.5	108	11	460.5	13	103	132	124	108
C 11 2	S2	M2S	156	163	160	422.5	119	15	498.5	18	129	143	134	119
C 11 2	S3	M3S	195	182.5	179.5	471.5	142	20	567.5	25	160	155	160	142
C 11 2	S3	M3L	195	182.5	179.5	503.5	142	22	594.5	27	160	155	160	142



C 11...P(IEC)

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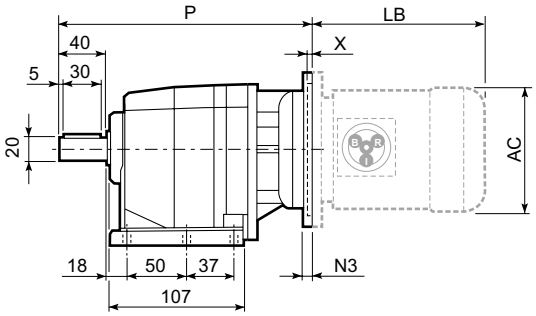

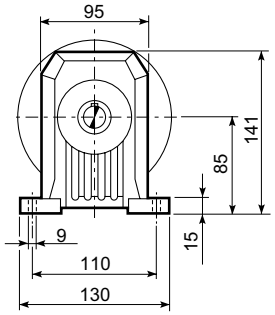

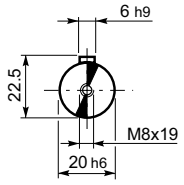

OUTPUT

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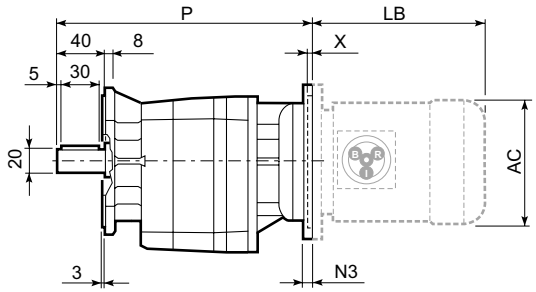

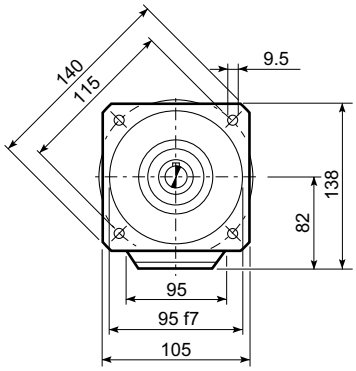

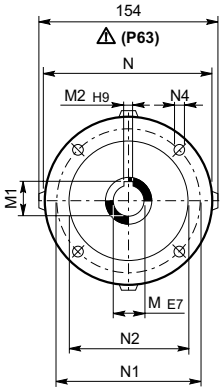

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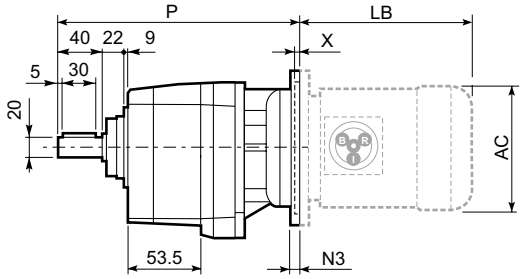

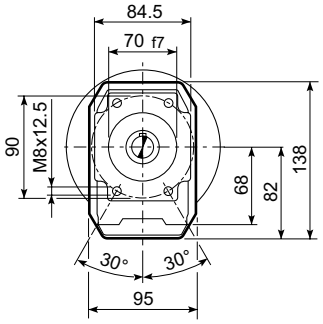

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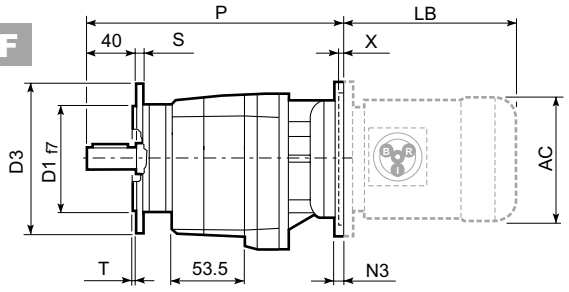
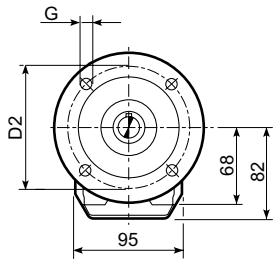
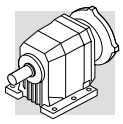
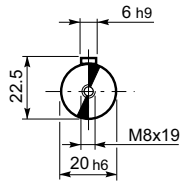




C 11 2_U						
	D1	D2	D3	G	T	S
FA	80	100	120	7	3	8
FB	95	115	140	9	3	10
FC	110	130	160	9	3	10

C 11														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg		LB	AC	LB	AC
C 11 2	P63	11	12.8	4	140	115	95	—	M8x19	4	244.5	6	BN 63	184	121	249	121
C 11 2	P71	14	16.3	5	160	130	110	—	M8x16	4,5	244.5	6	BN 71	219	138	280	138
C 11 2	P80	19	21.8	6	200	165	130	—	M10x12	4	264	7	BN 80	234	156	306	156
C 11 2	P90	24	27.3	8	200	165	130	—	M10x12	4	264	7	BN 90	276	176	359	176
C 11 2	P100	28	31.3	8	250	215	180	—	M12x16	4,5	274	11	BN 100	307	195	398	195
C 11 2	P112	28	31.3	8	250	215	180	—	M12x16	4,5	274	11	BN 112	325	219	424	219





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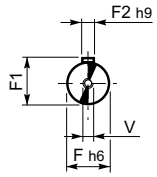

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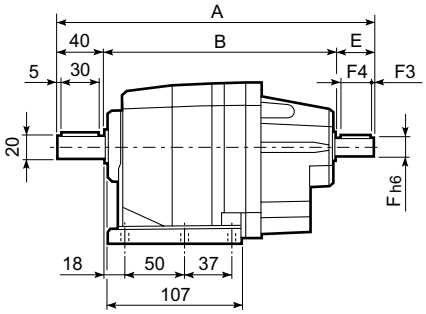

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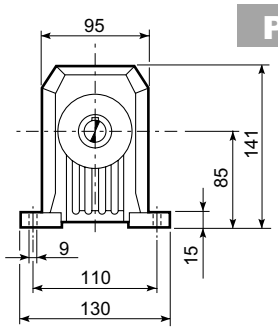

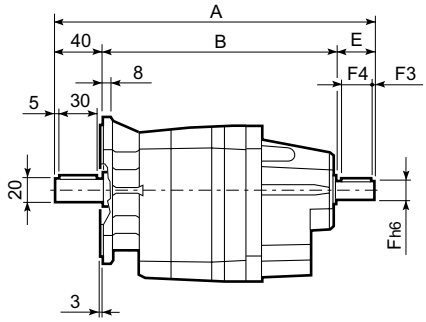

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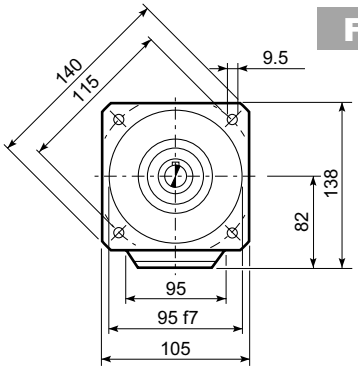

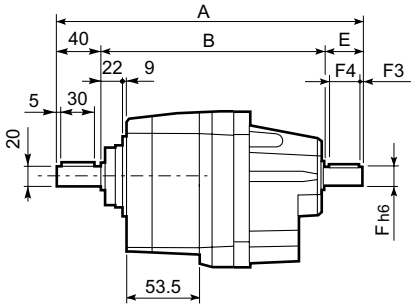

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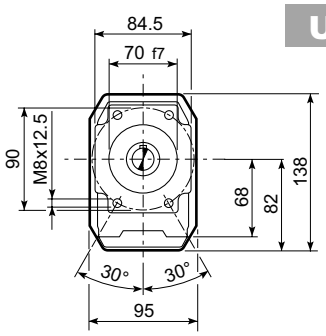

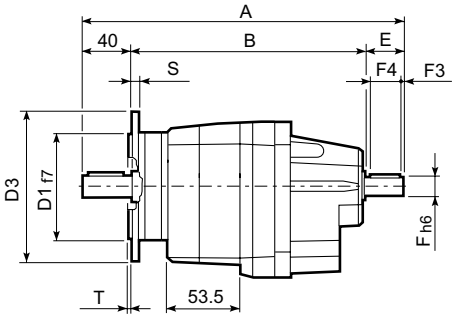

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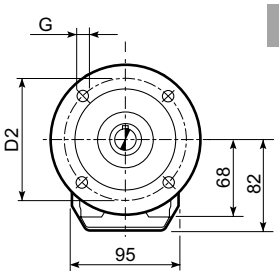
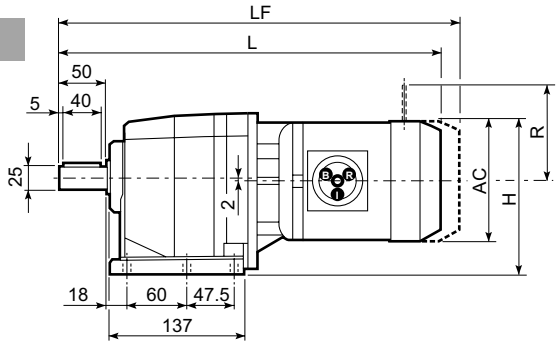
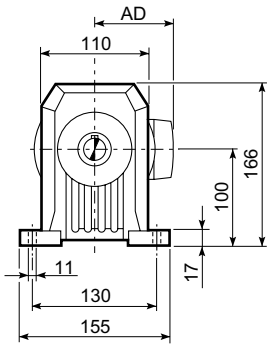


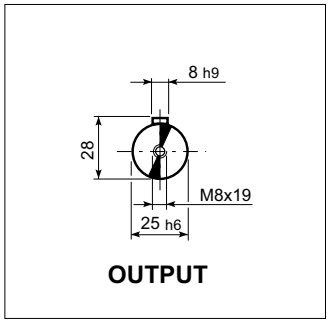
C 11 2_U						
	D1	D2	D3	G	T	S
FA	80	100	120	7	3	8
FB	95	115	140	9	3	10
FC	110	130	160	9	3	10

C 11											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 11 2	HS	251.5	171.5	40	16	18	5	2.5	35	M6x16	7.8

P







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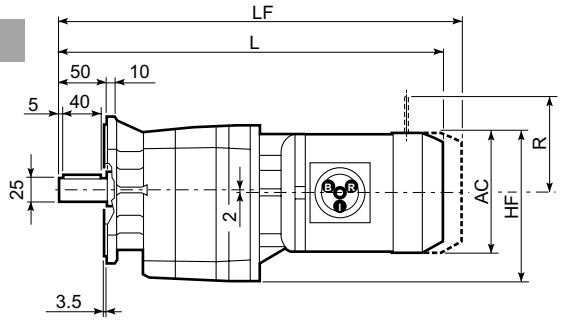

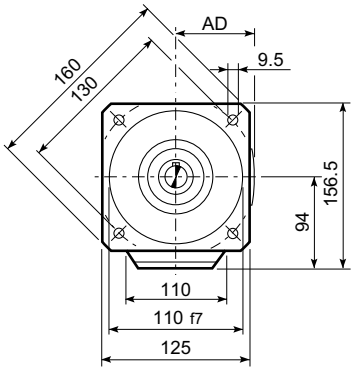

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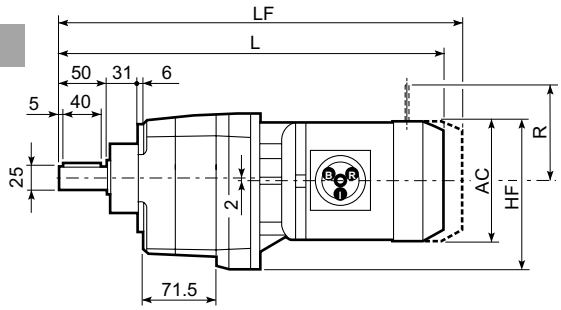

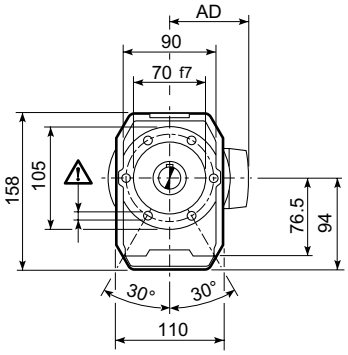

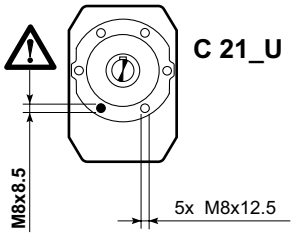

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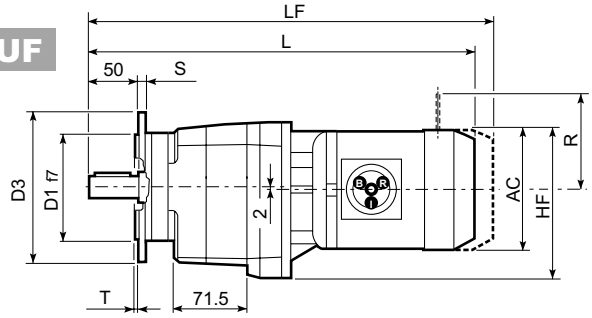
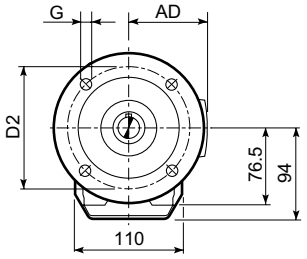
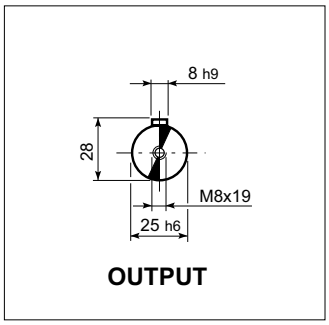
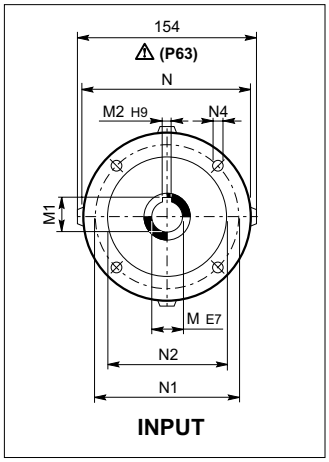


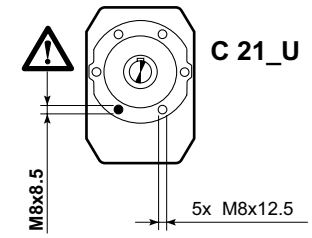


C 21_U						
	D1	D2	D3	G	T	S
FA	95	115	140	9	3	10
FB	110	130	160	9	3	10
FC	130	165	200	11	3.5	11

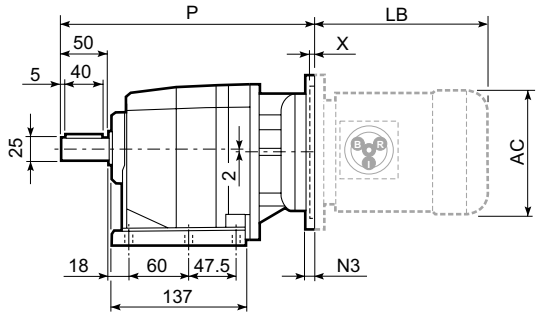
C 21													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 21 2	S1	M1S	138	169	163	404	108	10	467	13	103	132	124	108
C 21 2	S1	M1L	138	169	163	428	108	11	489	14	103	132	124	108
C 21 2	S2	M2S	156	178	170	456	119	16	527	19	129	143	134	119
C 21 2	S3	M3S	195	197.5	191.5	500	142	21	596	26	160	155	160	142
C 21 2	S3	M3L	195	197.5	191.5	532	142	27	623	32	160	155	160	142
C 21 3	S05	M05	121	160.5	154.5	454.5	95	11	520.5	12	96	119	116	95
C 21 3	S1	M1S	138	169	163	459.5	108	12	522.5	14	103	132	124	108
C 21 3	S1	M1L	138	169	163	483.5	108	13	544.5	15	103	132	124	108

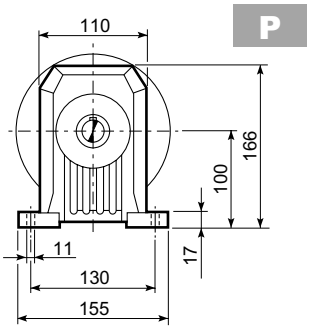


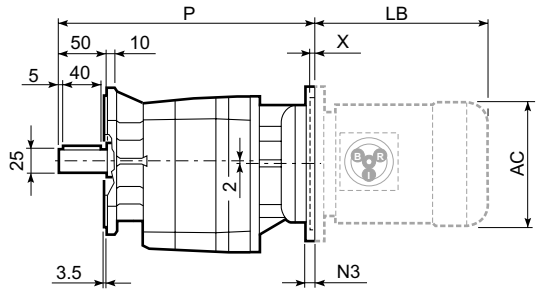


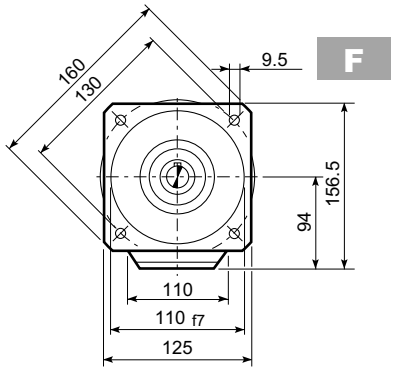


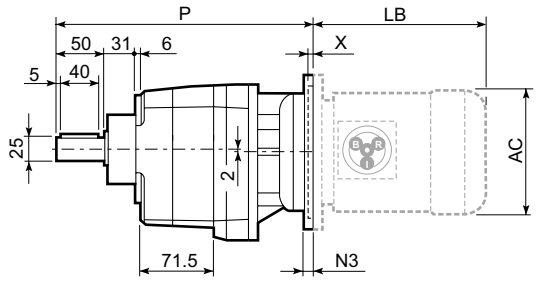
C 21_U						
	D1	D2	D3	G	T	S
FA	95	115	140	9	3	10
FB	110	130	160	9	3	10
FC	130	165	200	11	3.5	11

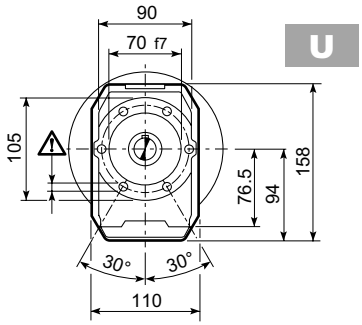


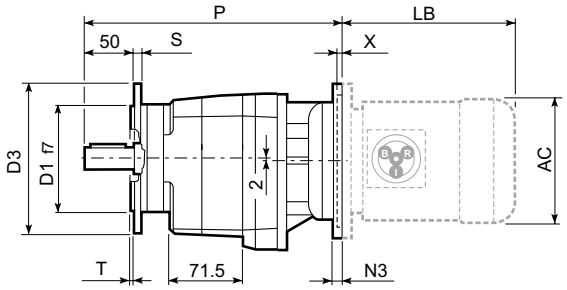


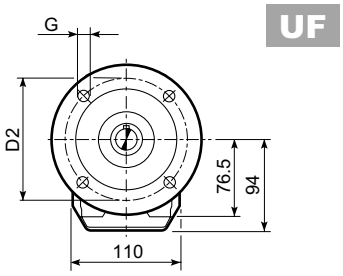






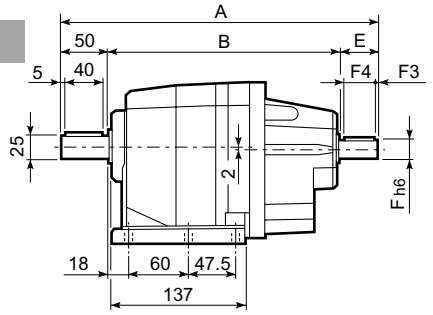


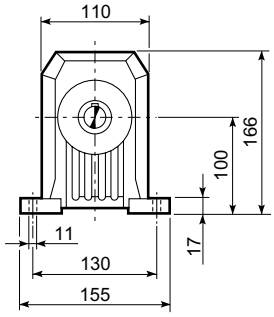


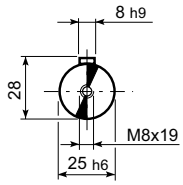


C 21													BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg		LB	AC	LB	AC
C 21 2	P63	11	12.8	4	140	115	95	—	M8x19	4	273	7	BN 63	184	121	249	121
C 21 2	P71	14	16.3	5	160	130	110	—	M8x16	4.5	273	7	BN 71	219	138	280	138
C 21 2	P80	19	21.8	6	200	165	130	—	M10x12	4	292.5	8	BN 80	234	156	306	156
C 21 2	P90	24	27.3	8	200	165	130	—	M10x12	4	292.5	8	BN 90	276	176	359	176
C 21 2	P100	28	31.3	8	250	215	180	—	M12X16	4.5	302.5	12	BN 100	307	195	398	195
C 21 2	P112	28	31.3	8	250	215	180	—	M12X16	4.5	302.5	12	BN 112	325	219	424	219
C 21 3	P63	11	12.8	4	140	115	95	—	M8x19	4	328.5	8	BN 63	184	121	249	121
C 21 3	P71	14	16.3	5	160	130	110	—	M8x16	4.5	328.5	8	BN 71	219	138	280	138
C 21 3	P80	19	21.8	6	200	165	130	—	M10x12	4	348	9	BN 80	234	156	306	156
C 21 3	P90	24	27.3	8	200	165	130	—	M10x12	4	348	9	BN 90	276	176	359	176
C 21 3	P100	28	31.3	8	250	215	180	—	M12x16	4.5	358	13	BN 100	307	195	398	195
C 21 3	P112	28	31.3	8	250	215	180	—	M12x16	4.5	358	13	BN 112	325	219	424	219

P







OUTPUT

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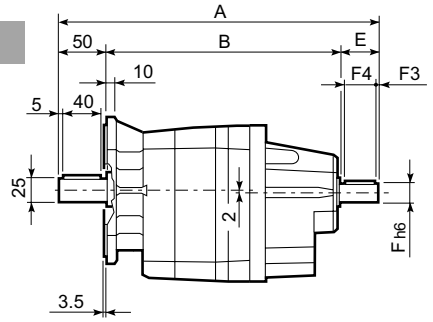

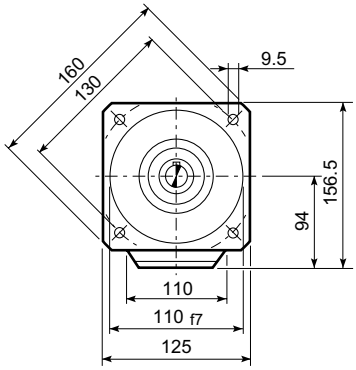

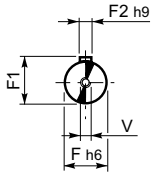

INPUT

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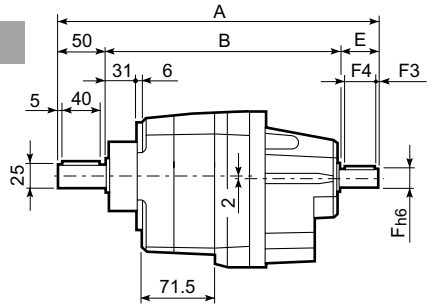

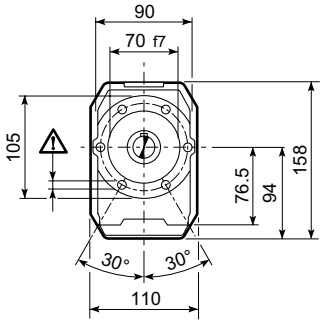

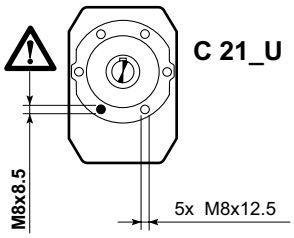

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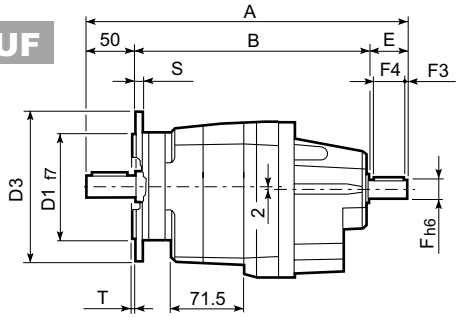
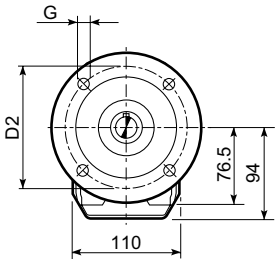
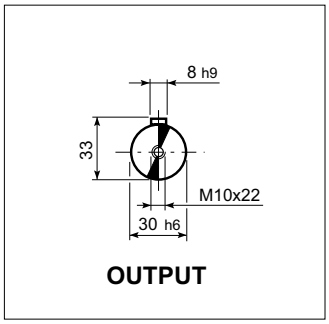
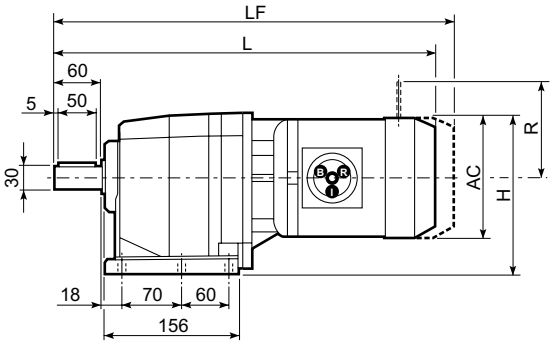


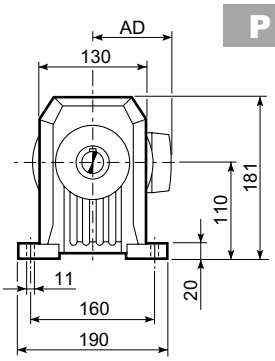


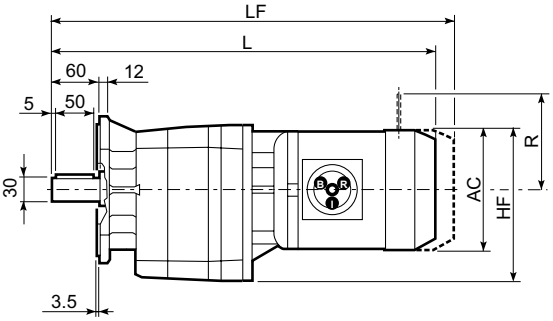
C 21_U						
	D1	D2	D3	G	T	S
FA	95	115	140	9	3	10
FB	110	130	160	9	3	10
FC	130	165	200	11	3.5	11

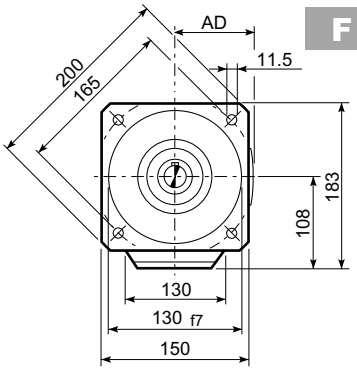
C 21											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 21 2	HS	323	233	40	19	21.5	6	2.5	35	M6x16	7.2
C 21 3		335.5	245.5	40	16	18	6	2.5	36	M6x16	7.5

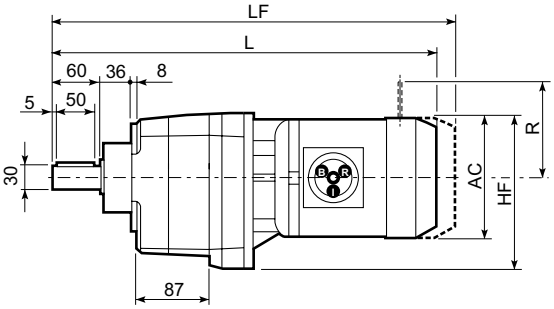


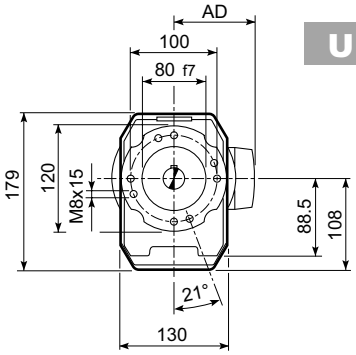


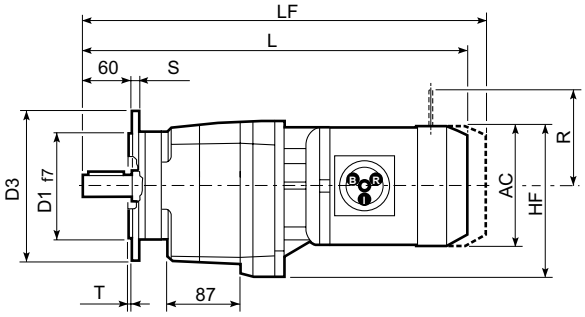


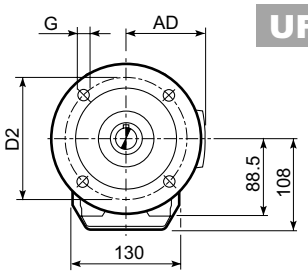






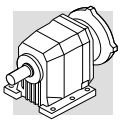






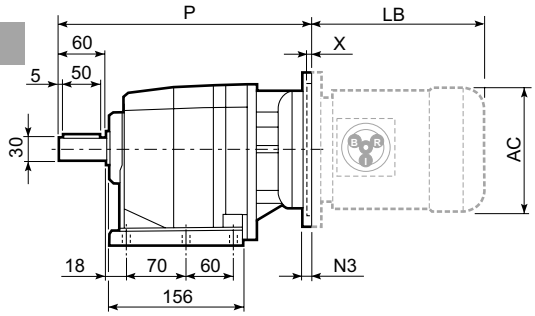
C 31_U						
	D1	D2	D3	G	T	S
FA	110	130	160	9	3	10
FB	130	165	200	11	3.5	11
FC	180	215	250	14	4	13

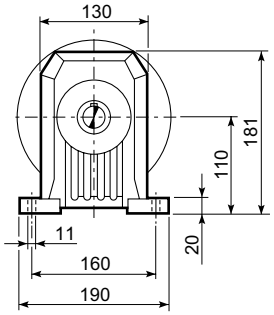
C 31													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 31 2	S1	M1S	138	179	177	438.5	108	13	501.5	15	103	132	124	108
C 31 2	S1	M1L	138	179	177	462.5	108	14	523.5	16	103	132	124	108
C 31 2	S2	M2S	156	188	186	490.5	119	18	561.5	21	129	143	134	119
C 31 2	S3	M3S	195	207.5	205.5	534.5	142	23	630.5	28	160	155	160	142
C 31 2	S3	M3L	195	207.5	205.5	566.5	142	32	657.5	37	160	155	160	142
C 31 3	S05	M05	121	170.5	168.5	491	95	13	557	15	96	119	116	95
C 31 3	S1	M1S	138	179	177	496	108	14	559	16	103	132	124	108
C 31 3	S1	M1L	138	179	177	520	108	15	581	17	103	132	124	108
C 31 3	S2	M2S	156	188	186	548	119	18	619	21	129	143	134	119

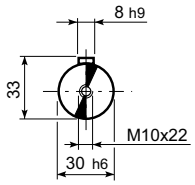


C 31...P(IEC)

P







OUTPUT

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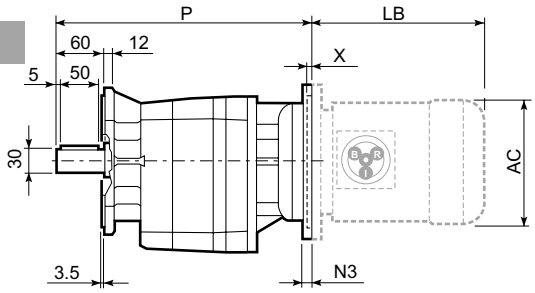

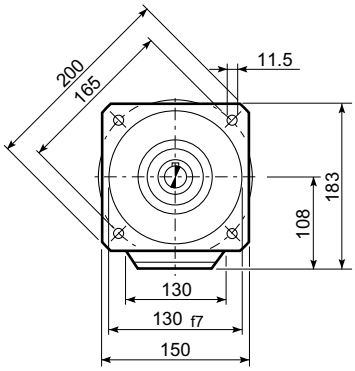

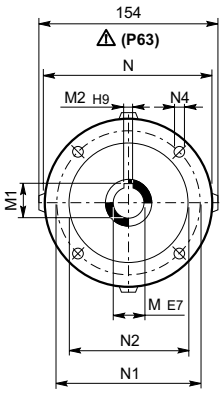

INPUT

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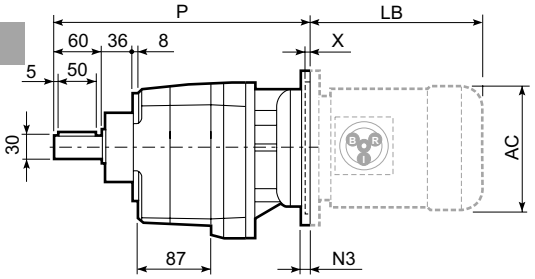

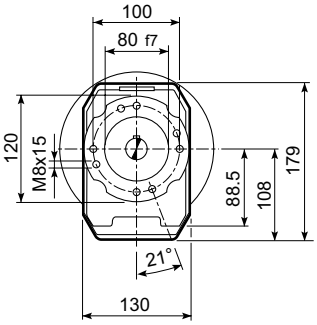

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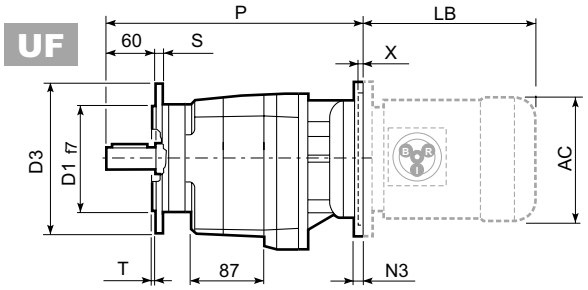
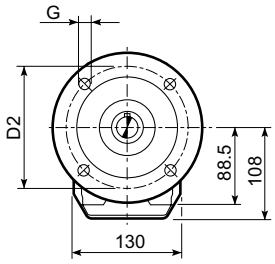
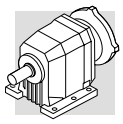
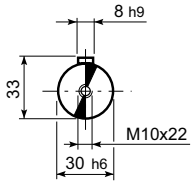




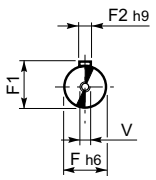
C 31_U						
	D1	D2	D3	G	T	S
FA	110	130	160	9	3	10
FB	130	165	200	11	3.5	11
FC	180	215	250	14	4	13

C 31														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg	IEC	LB	AC	LB	AC
C 31 2	P63	11	12.8	4	140	115	95	—	M8x19	4	307.5	9	BN 63	184	121	249	121
C 31 2	P71	14	16.3	5	160	130	110	—	M8x16	4.5	307.5	9	BN 71	219	138	280	138
C 31 2	P80	19	21.8	6	200	165	130	—	M10x12	4	327	10	BN 80	234	156	306	156
C 31 2	P90	24	27.3	8	200	165	130	—	M10x12	4	327	10	BN 90	276	176	359	176
C 31 2	P100	28	31.3	8	250	215	180	—	M12x16	4.5	337	14	BN 100	307	195	398	195
C 31 2	P112	28	31.3	8	250	215	180	—	M12x16	4.5	337	14	BN 112	325	219	424	219
C 31 3	P63	11	12.8	4	140	115	95	—	M8x19	4	365	10	BN 63	184	121	249	121
C 31 3	P71	14	16.3	5	160	130	110	—	M8x16	4.5	365	10	BN 71	219	138	280	138
C 31 3	P80	19	21.8	6	200	165	130	—	M10x12	4	384.5	11	BN 80	234	156	306	156
C 31 3	P90	24	27.3	8	200	165	130	—	M10x12	4	384.5	11	BN 90	276	176	359	176
C 31 3	P100	28	31.3	8	250	215	180	—	M12x16	4.5	394.5	15	BN 100	307	195	398	195
C 31 3	P112	28	31.3	8	250	215	180	—	M12x16	4.5	394.5	15	BN 112	325	219	424	219



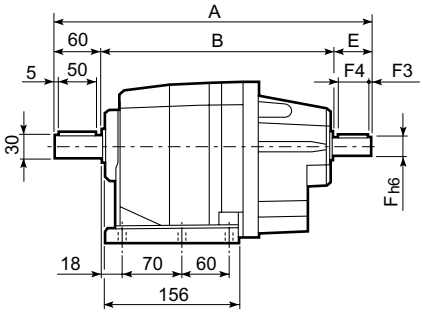


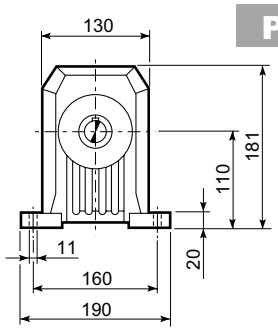
OUTPUT



INPUT

P





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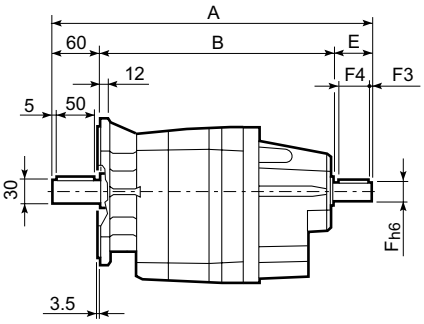

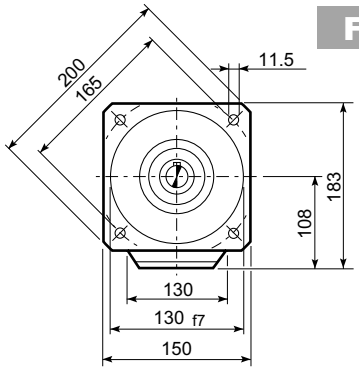

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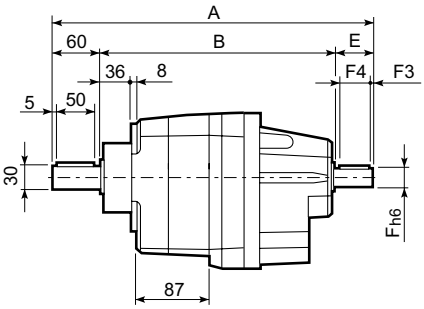

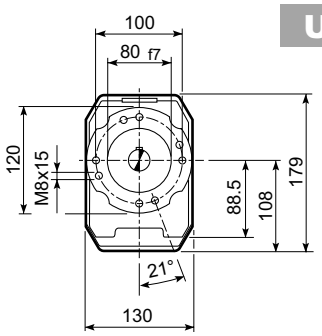

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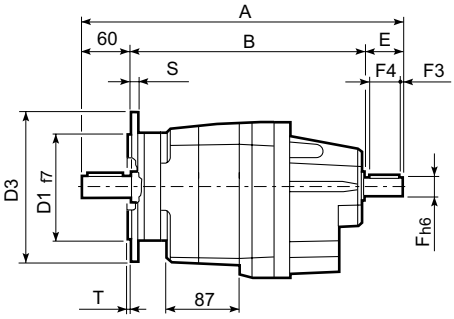
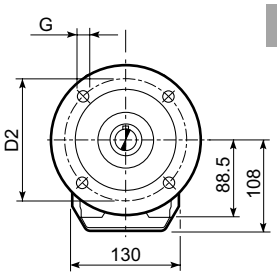
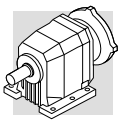




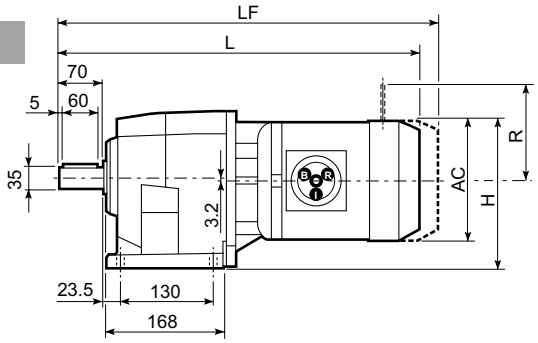
C 31_U						
	D1	D2	D3	G	T	S
FA	110	130	160	9	3	10
FB	130	165	200	11	3.5	11
FC	180	215	250	14	4	13

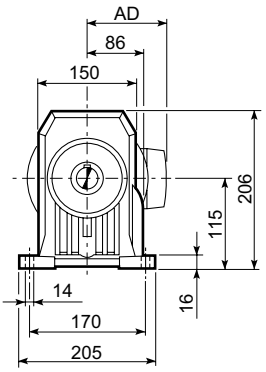
C 31											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 31 2	HS	357.5	257.5	40	19	21.5	6	2.5	35	M6x16	11.1
C 31 3		372	272	40	16	18	5	2.5	36	M6x16	10.6

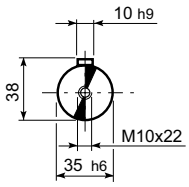


C 35...M

P

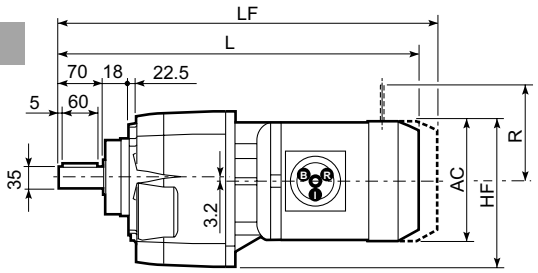


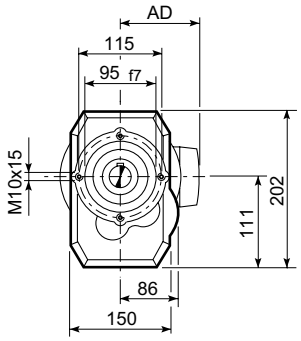




OUTPUT

U





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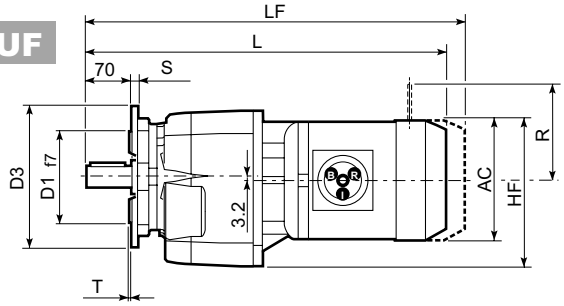
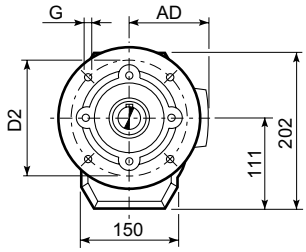
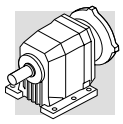
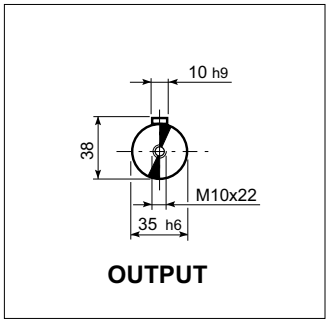


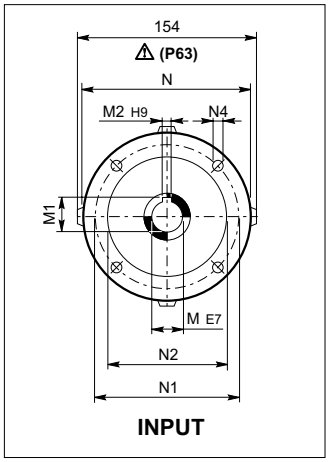


C 35_U						
	D1	D2	D3	G	T	S
FA	130	165	200	11	3.5	11
FB	180	215	250	14	4	14

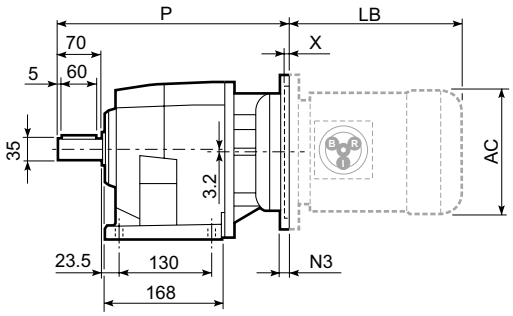
C 35														
									M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 35 2/3	S1	M1S	138	184	177	457	108	20	520	20	103	132	124	108
C 35 2/3	S1	M1L	138	184	177	481	108	20	542	21	103	132	124	108
C 35 2/3	S2	M2S	156	193	186	509	119	23	580	27	129	143	134	119
C 35 2/3	S3	M3S	195	212.5	205.5	553	142	28	649	33	160	155	160	142
C 35 2/3	S3	M3L	195	212.5	205.5	585	142	37	676	42	160	155	160	142
C 35 4	S05	M05	121	175.5	168.5	509.5	95	19	575.5	20	96	119	116	95
C 35 4	S1	M1S	138	184	177	514.5	108	21	577.5	21	103	132	124	108
C 35 4	S1	M1L	138	184	177	538.5	108	21	599.5	22	103	132	124	108
C 35 4	S2	M2S	156	193	186	566.5	119	24	637.5	28	129	143	134	119
C 35 4	S3	M3S	195	212.5	205.5	610.5	142	29	706.5	34	160	155	160	142
C 35 4	S3	M3L	195	212.5	205.5	642.5	142	38	733.5	43	160	155	160	142

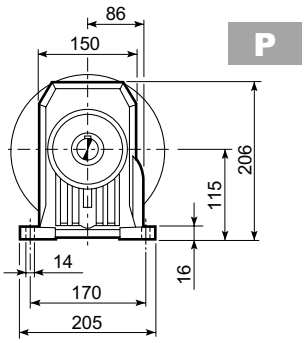


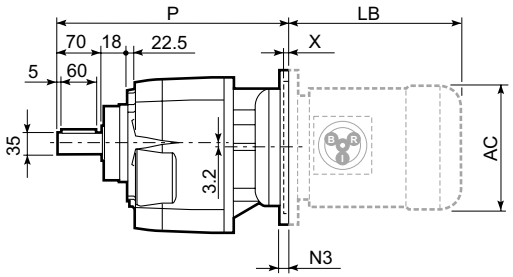


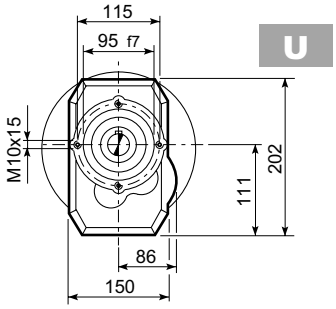


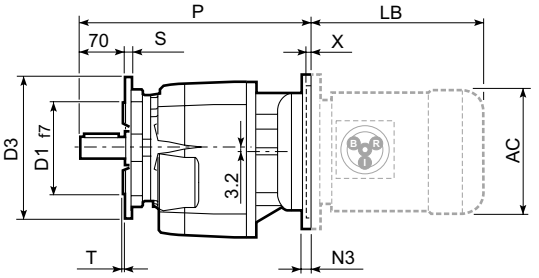
C 35_U						
	D1	D2	D3	G	T	S
FA	130	165	200	11	3.5	11
FB	180	215	250	14	4	14

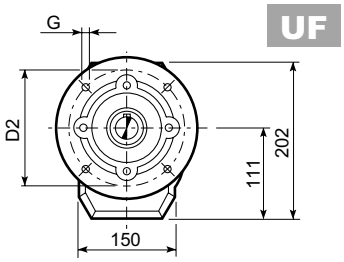




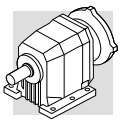








C 35														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg		LB	AC	LB	AC
C 35 2/3	P63	11	12.8	4	140	115	95	—	M8x19	4	326	17	BN 63	184	121	249	121
C 35 2/3	P71	14	16.3	5	160	130	110	—	M8x16	4.5	326	17	BN 71	219	138	280	138
C 35 2/3	P80	19	21.8	6	200	165	130	—	M10x12	4	345.5	18	BN 80	234	156	306	156
C 35 2/3	P90	24	27.3	8	200	165	130	—	M10x12	4	345.5	18	BN 90	276	176	359	176
C 35 2/3	P100	28	31.3	8	250	215	180	—	M12x16	4.5	355.5	22	BN 100	307	195	398	195
C 35 2/3	P112	28	31.3	8	250	215	180	—	M12x16	4.5	355.5	22	BN 112	325	219	424	219
C 35 4	P63	11	12.8	4	140	115	95	—	M8x19	4	383.5	20	BN 63	184	121	249	121
C 35 4	P71	14	16.3	5	160	130	110	—	M8x16	4.5	383.5	20	BN 71	219	138	280	138
C 35 4	P80	19	21.8	6	200	165	130	—	M10x12	4	403	21	BN 80	234	156	306	156
C 35 4	P90	24	27.3	8	200	165	130	—	M10x12	4	403	21	BN 90	276	176	359	176
C 35 4	P100	28	31.3	8	250	215	180	—	M12x16	4.5	413	25	BN 100	307	195	398	195
C 35 4	P112	28	31.3	8	250	215	180	—	M12x16	4.5	413	25	BN 112	325	219	424	219



C 35...HS

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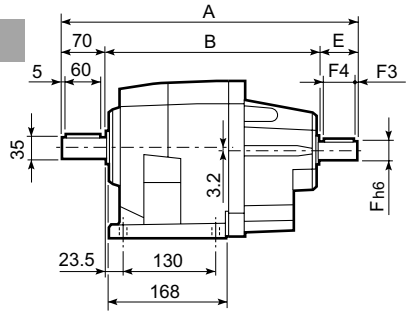
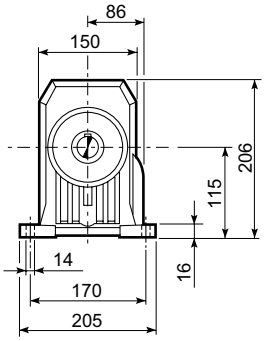
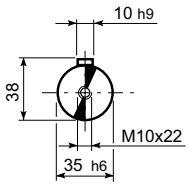
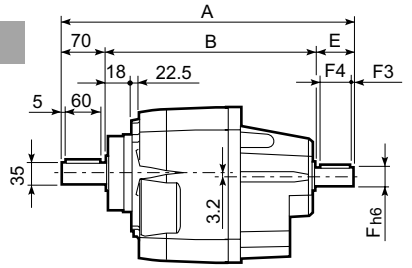


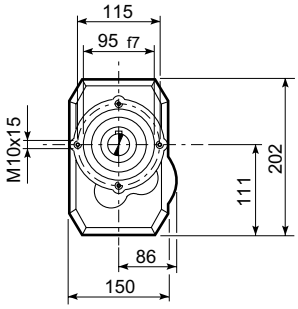


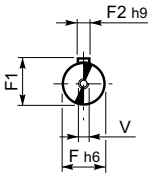


OUTPUT

U







INPUT

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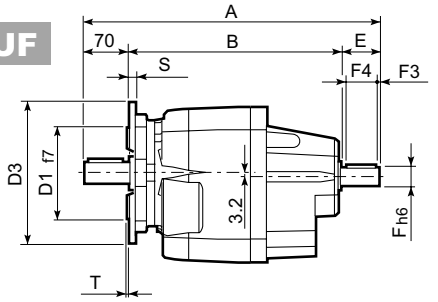

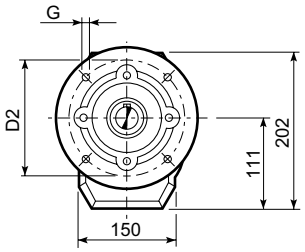

C 35_U						
	D1	D2	D3	G	T	S
FA	130	165	200	11	3.5	11
FB	180	215	250	14	4	14

C 35											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 35 2	HS	415.5	295.5	50	24	27	8	2.5	45	M8x19	25.5
C 35 3		415.5	295.5	50	24	27	8	2.5	45	M8x19	25.5
C 35 4		390.5	280.5	40	16	18	5	2.5	36	M6x16	26.5

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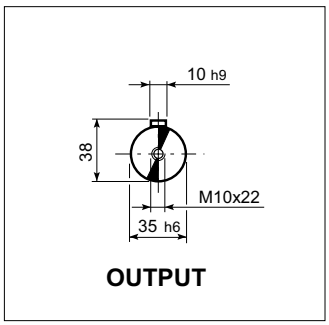
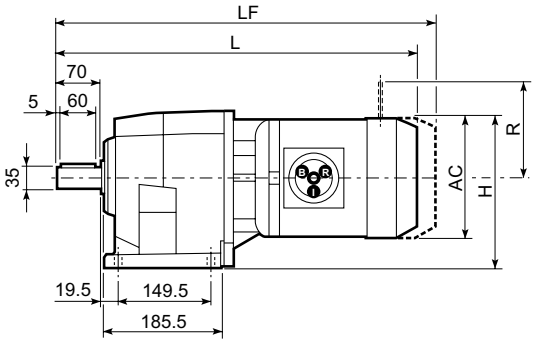
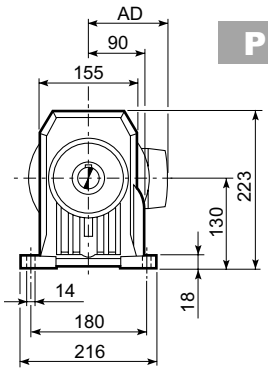
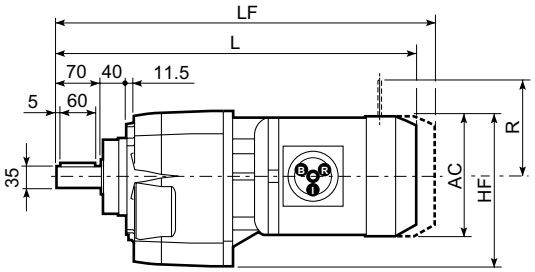
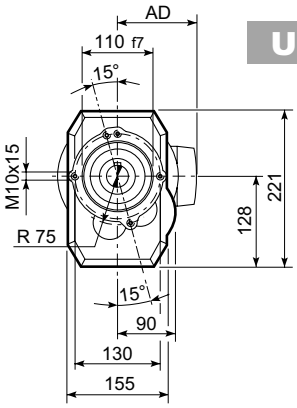






P





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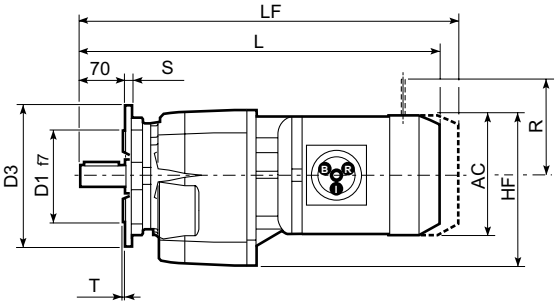
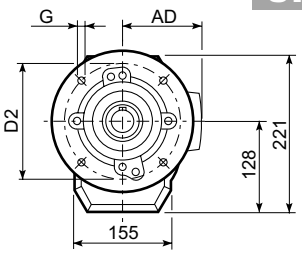
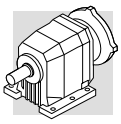




UF

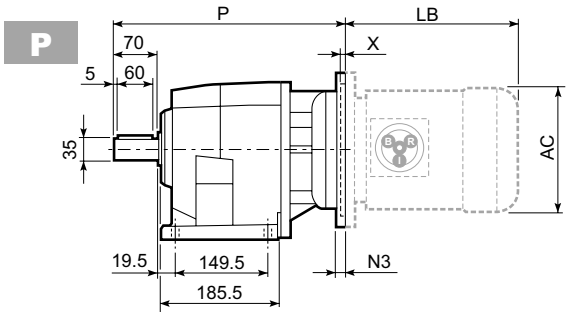
C 41_U						
	D1	D2	D3	G	T	S
FA	130	165	200	11	3.5	11
FB	180	215	250	14	4	13

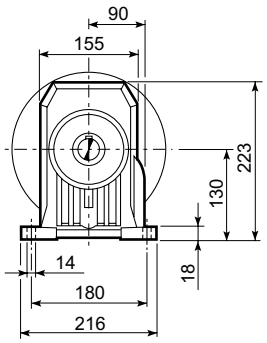
C 41													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 41 2/3	S1	M1S	138	199	197	467.5	108	25	530.5	27	103	132	124	108
C 41 2/3	S1	M1L	138	199	197	491.5	108	25	552.5	28	103	132	124	108
C 41 2/3	S2	M2S	156	208	206	519.5	119	31	590.5	34	129	143	134	119
C 41 2/3	S3	M3S	195	227.5	225.5	563.5	142	36	659.5	41	160	155	160	142
C 41 2/3	S3	M3L	195	227.5	225.5	595.5	142	45	686.5	50	160	155	160	142
C 41 2/3	S4	M4S	258	259	257	665.5	193	62	774.5	72	226	193	217	193
C 41 2/3	S4	M4L	258	259	257	703.5	193	71	812.5	83	226	193	217	193
C 41 4	S05	M05	231	245.5	243.5	524	95	27	590	28	96	119	116	95
C 41 4	S1	M1S	138	199	197	529	108	28	592	30	103	132	124	108
C 41 4	S1	M1L	138	199	197	553	108	28	614	31	103	132	124	108
C 41 4	S2	M2S	156	208	206	581	119	34	652	37	129	143	134	119
C 41 4	S3	M3S	195	227.5	225.5	625	142	39	721	44	160	155	160	142
C 41 4	S3	M3L	195	227.5	225.5	657	142	48	748	53	160	155	160	142

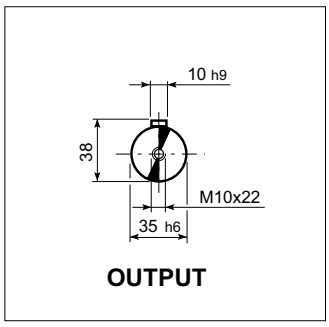


C 41...P(IEC)

P







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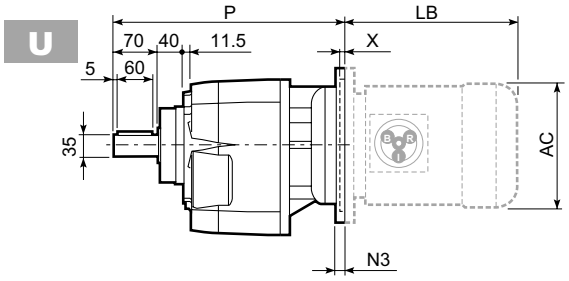

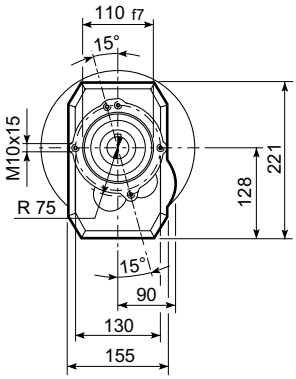

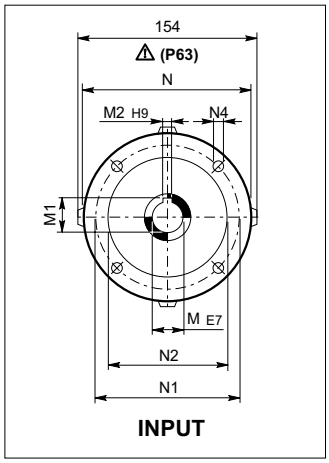

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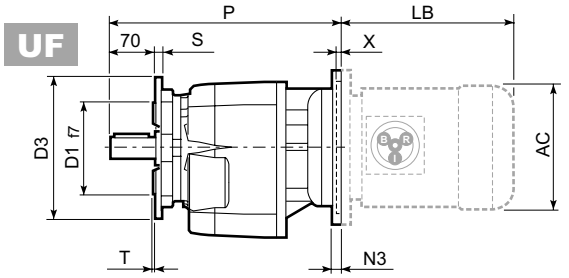
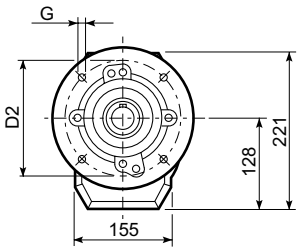
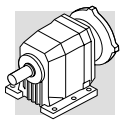
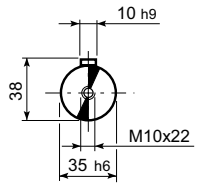




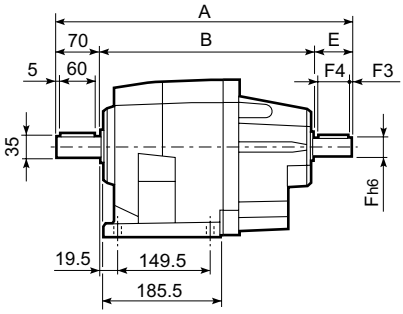
C 41_U						
	D1	D2	D3	G	T	S
FA	130	165	200	11	3.5	11
FB	180	215	250	14	4	13

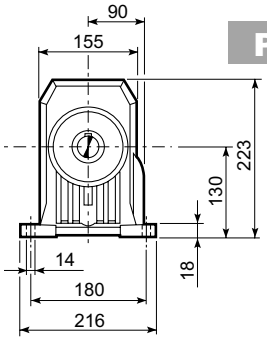
C 41														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg	IEC	LB	AC	LB	AC
C 41 2/3	P63	11	12.8	4	140	115	95	—	M8x19	4	336.5	27	BN 63	184	121	249	121
C 41 2/3	P71	14	16.3	5	160	130	110	—	M8x16	4.5	336.5	28	BN 71	219	138	280	138
C 41 2/3	P80	19	21.8	6	200	165	130	—	M10x12	4	356	29	BN 80	234	156	306	156
C 41 2/3	P90	24	27.3	8	200	165	130	—	M10x12	4	356	29	BN 90	276	176	359	176
C 41 2/3	P100	28	31.3	8	250	215	180	—	M12x16	4.5	366	33	BN 100	307	195	398	195
C 41 2/3	P112	28	31.3	8	250	215	180	—	M12x16	4.5	366	33	BN 112	325	219	424	219
C 41 2/3	P132	38	41.3	10	300	265	230	16	14	5	402.5	35	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 41 4	P63	11	12.8	4	140	115	95	—	M8x19	4	395	30	BN 63	184	121	249	121
C 41 4	P71	14	16.3	5	160	130	110	—	M8x16	4.5	395	31	BN 71	219	138	280	138
C 41 4	P80	19	21.8	6	200	165	130	—	M10x12	4	414.5	32	BN 80	234	156	306	156
C 41 4	P90	24	27.3	8	200	165	130	—	M10x12	4	414.5	32	BN 90	276	176	359	176
C 41 4	P100	28	31.3	8	250	215	180	—	M12x16	4.5	424.5	36	BN 100	307	195	398	195
C 41 4	P112	28	31.3	8	250	215	180	—	M12x16	4.5	424.5	36	BN 112	325	219	424	219





OUTPUT





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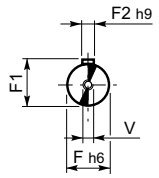
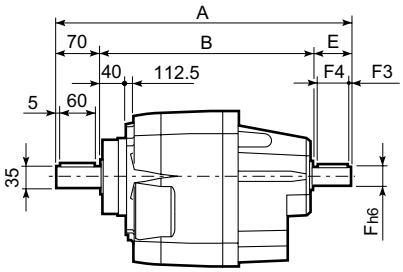
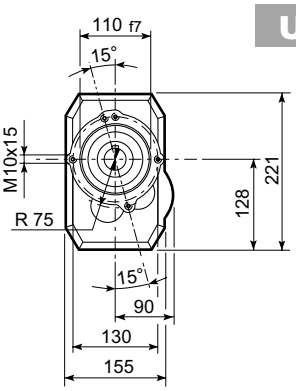


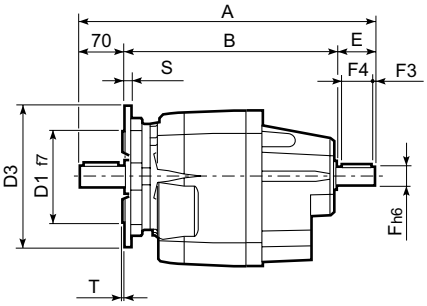
INPUT

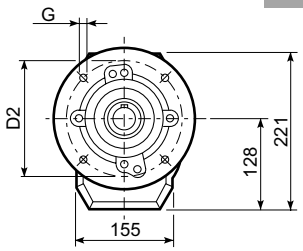




U

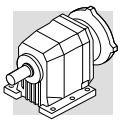
C 41_U						
	D1	D2	D3	G	T	S
FA	130	165	200	11	3.5	11
FB	180	215	250	14	4	13





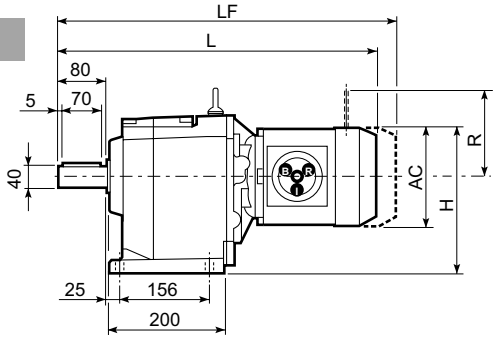
UF

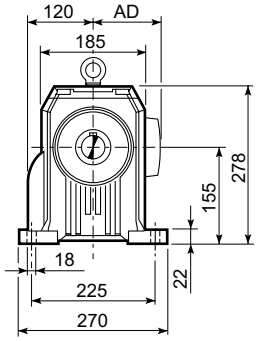
C 41											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 41 2	HS	425.5	305.5	50	24	27	8	2.5	45	M8x19	30
C 41 3		425.5	305.5	50	24	27	8	2.5	45	M8x19	30
C 41 4		448	338	40	19	21.5	6	2.5	35	M6x16	33

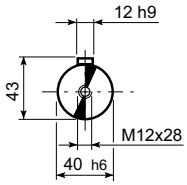


C 51...M

P







OUTPUT

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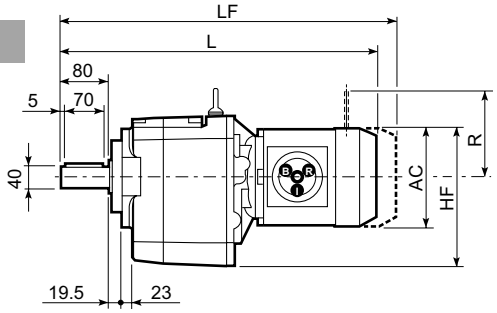

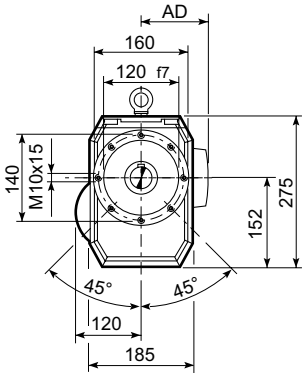

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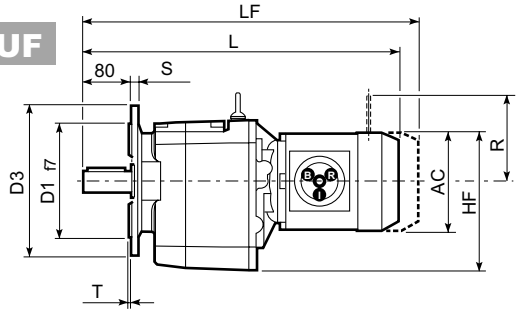

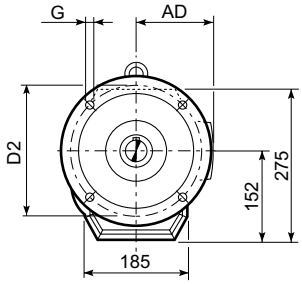

C 51_U						
	D1	D2	D3	G	T	S
FA	180	215	250	14	4	13
FB	230	265	300	14	4	16

C 51													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 51 2/3	S1	M1S	138	224	221	493.5	108	48	556.5	50	103	132	124	108
C 51 2/3	S1	M1L	138	224	221	517.5	108	49	578.5	52	103	132	124	108
C 51 2/3	S2	M2S	156	233	230	545.5	119	53	616.5	57	129	143	134	119
C 51 2/3	S3	M3S	195	252.5	249.5	589.5	142	58	685.5	65	160	155	160	142
C 51 2/3	S3	M3L	195	252.5	249.5	621.5	142	65	712.5	72	160	155	160	142
C 51 2/3	S4	M4S	258	284	281	691.5	193	84	800.5	98	226	193	217	193
C 51 2/3	S4	M4L	258	284	281	729.5	193	99	838.5	117	226	193	217	193
C 51 2/3	S4	M4LC	258	284	281	764.5	193	107	863.5	125	226	193	217	193
C 51 4	S1	M1S	138	224	221	565	108	51	628	54	103	132	124	108
C 51 4	S1	M1L	138	224	221	589	108	52	650	55	103	132	124	108
C 51 4	S2	M2S	156	233	230	617	119	56	688	60	129	143	134	119
C 51 4	S3	M3S	195	252.5	249.5	661	142	61	757	68	160	155	160	142
C 51 4	S3	M3L	195	252.5	249.5	693	142	68	784	75	160	155	160	142

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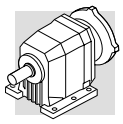
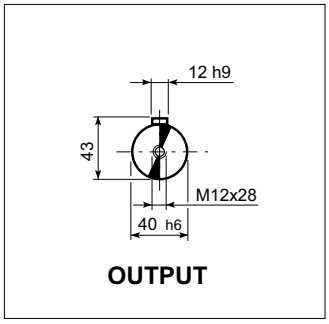
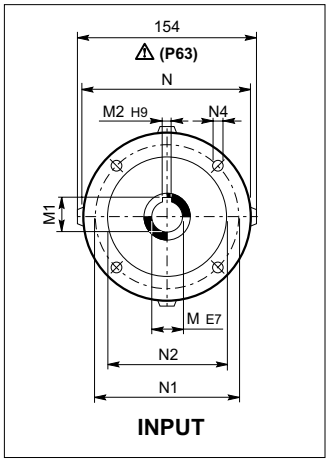
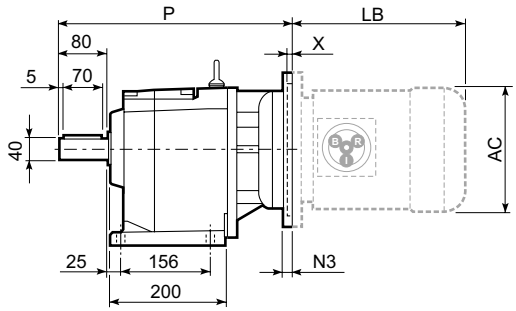
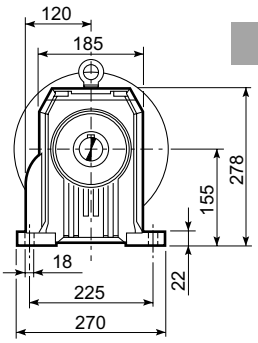


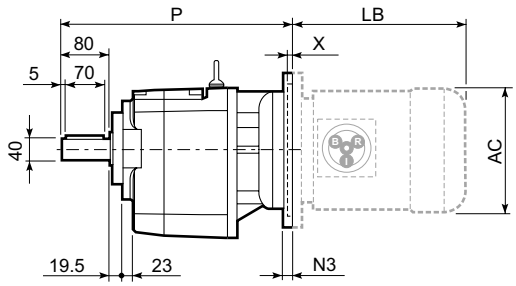


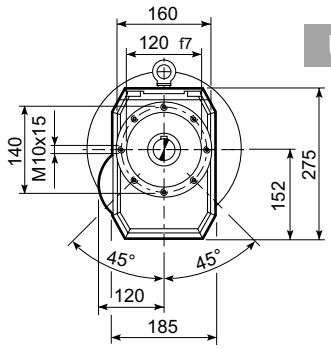


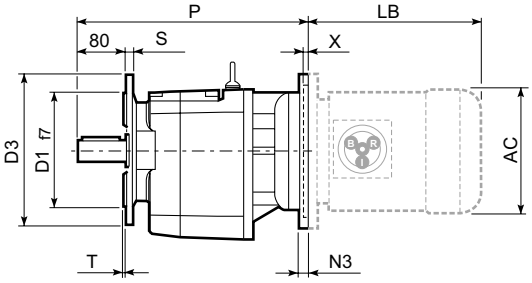
C 51_U						
	D1	D2	D3	G	T	S
FA	180	215	250	14	4	13
FB	230	265	300	14	4	16

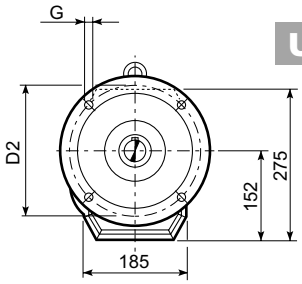






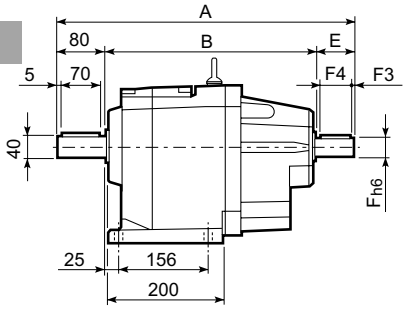


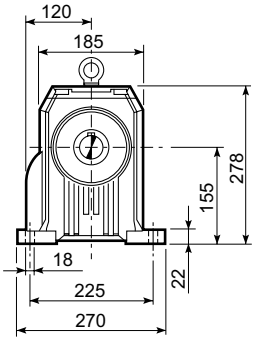


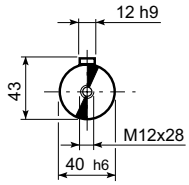


C 51													BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg		LB	AC	LB	AC
C 51 2/3	P63	11	12.8	4	140	115	95	—	M8x19	4	362.5	45	BN 63	184	121	249	121
C 51 2/3	P71	14	16.3	5	160	130	110	—	M8x16	4.5	362.5	45	BN 71	219	138	280	138
C 51 2/3	P80	19	21.8	6	200	165	130	—	M10x12	4	382	47	BN 80	234	156	306	156
C 51 2/3	P90	24	27.3	8	200	165	130	—	M10x12	4	382	47	BN 90	276	176	359	176
C 51 2/3	P100	28	31.3	8	250	215	180	—	M12x16	4.5	392	51	BN 100	307	195	398	195
C 51 2/3	P112	28	31.3	8	250	215	180	—	M12x16	4.5	392	51	BN 112	325	219	424	219
C 51 2/3	P132	38	41.3	10	300	265	230	16	14	5	428.5	54	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 51 2/3	P160	42	45.3	12	350	300	250	23	18	5.5	479	58	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 51 2/3	P180	48	51.8	14	350	300	250	23	18	5.5	479	58	BN 180M	530	310	670	310
													BN 180L	598	348	756	348
C 51 4	P63	11	12.8	4	140	115	95	—	M8x19	4	434	47	BN 63	184	121	249	121
C 51 4	P71	14	16.3	5	160	130	110	—	M8x16	4.5	434	47	BN 71	219	138	280	138
C 51 4	P80	19	21.8	6	200	165	130	—	M10x12	4	453.5	49	BN 80	234	156	306	156
C 51 4	P90	24	27.3	8	200	165	130	—	M10x12	4	463.5	49	BN 90	276	176	359	176
C 51 4	P100	28	31.3	8	250	215	180	—	M12x16	4.5	463.5	53	BN 100	307	195	398	195
C 51 4	P112	28	31.3	8	250	215	180	—	M12x16	4.5	463.5	53	BN 112	325	219	424	219

P







OUTPUT

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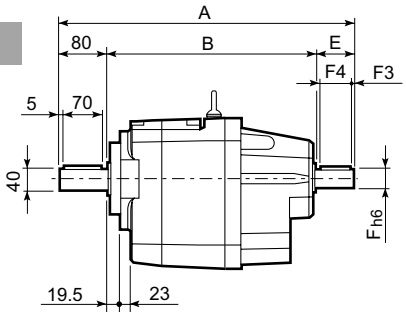

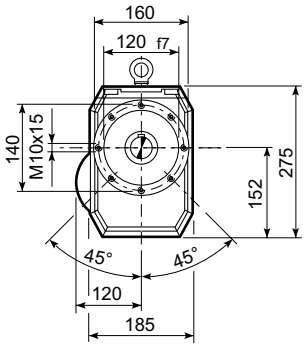

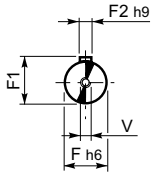

INPUT

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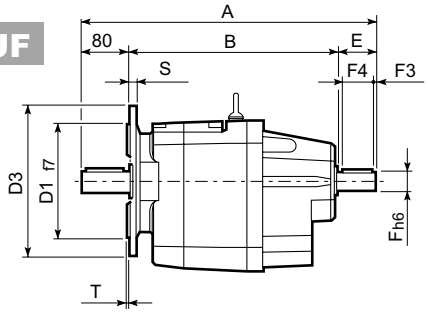
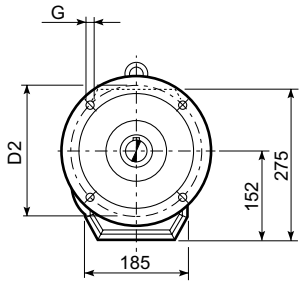
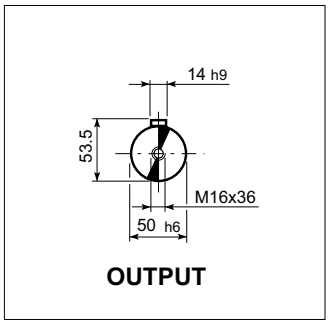
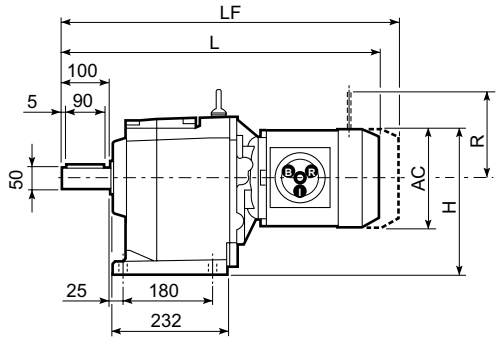


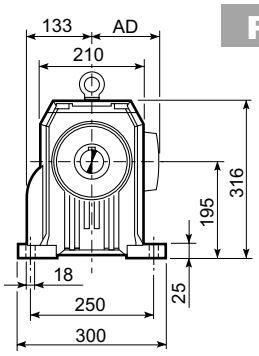


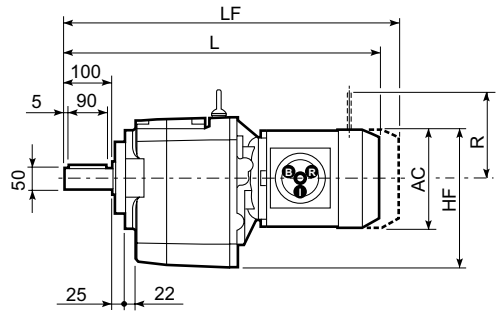
C 51_U						
	D1	D2	D3	G	T	S
FA	180	215	250	14	4	13
FB	230	265	300	14	4	16

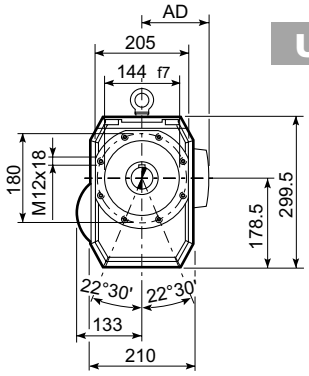
C 51											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 51 2	HS	451.5	322	50	24	24	8	2.5	45	M8x19	45
C 51 3		451.5	322	50	24	24	8	2.5	45	M8x19	45
C 51 4		484	364	40	19	21.5	6	2.5	35	M6x16	48

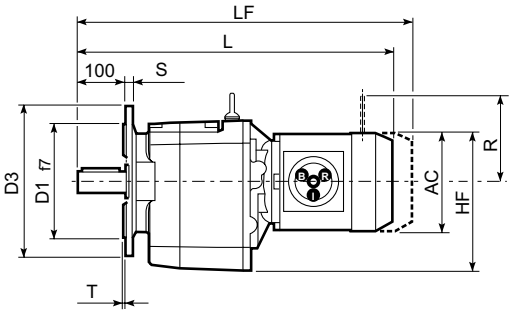


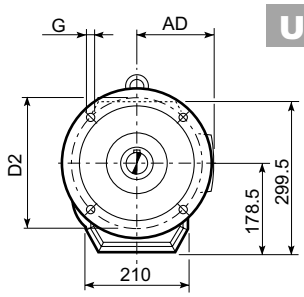






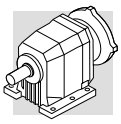






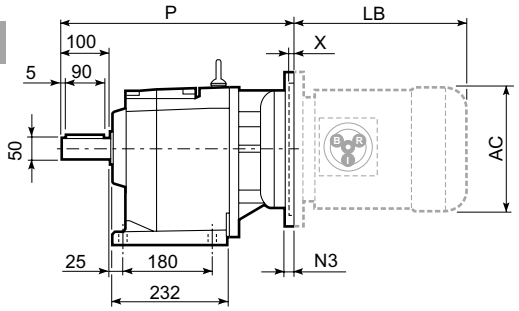
C 61_U						
	D1	D2	D3	G	T	S
FA	230	265	300	14	4	16
FB	250	300	350	18	5	18

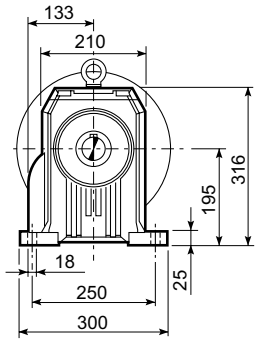
C 61													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 61 2/3	S2	M2S	156	273	256.5	598.5	119	61	669.5	65	129	143	134	119
C 61 2/3	S3	M3S	195	292.5	276	642.5	142	66	738.5	74	160	155	160	142
C 61 2/3	S3	M3L	195	292.5	276	674.5	142	74	765.5	81	160	155	160	142
C 61 2/3	S4	M4S	258	324	307.5	744.5	193	93	853.5	107	226	193	217	193
C 61 2/3	S4	M4L	258	324	307.5	782.5	193	108	891.5	126	226	193	217	193
C 61 2/3	S4	M4LC	258	324	307.5	817.5	193	116	916.5	134	226	193	217	193
C 61 2/3	S5	M5S	310	350	333.5	869	245	136	1009	166	266	245	247	245
C 61 2/3	S5	M5L	310	350	333.5	913	245	152	1053	182	266	245	247	245
C 61 4	S1	M1S	138	264	247.5	617	108	69	680	72	103	132	124	108
C 61 4	S1	M1L	138	264	247.5	641	108	71	702	74	103	132	124	108
C 61 4	S2	M2S	156	273	256.5	669	119	75	740	78	129	143	134	119
C 61 4	S3	M3S	195	292.5	276	713	142	79	809	87	160	155	160	142
C 61 4	S3	M3L	195	292.5	276	745	142	87	836	94	160	155	160	142

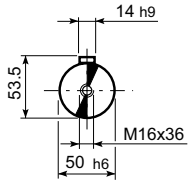


C 61...P(IEC)

P







OUTPUT

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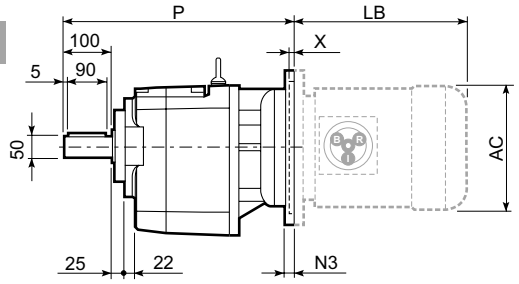

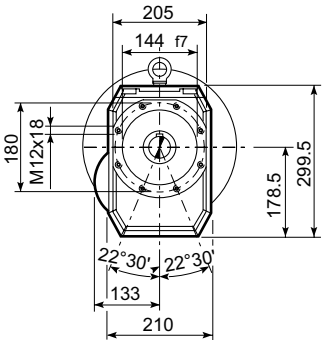

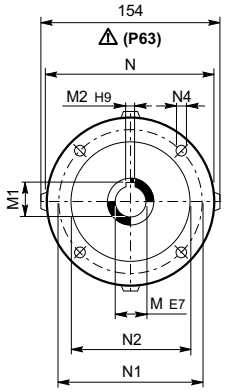

INPUT

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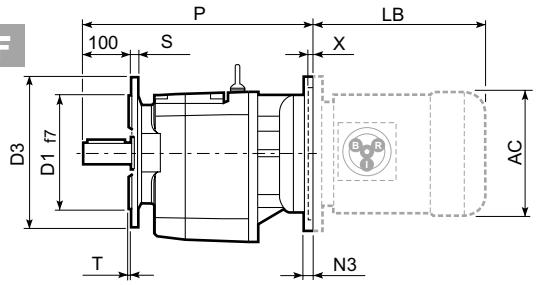
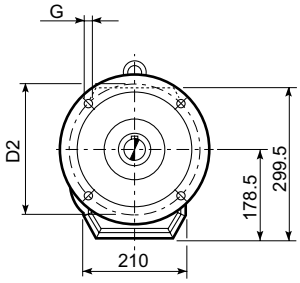
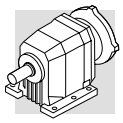


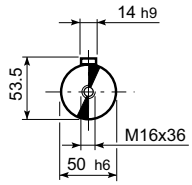


C 61_U

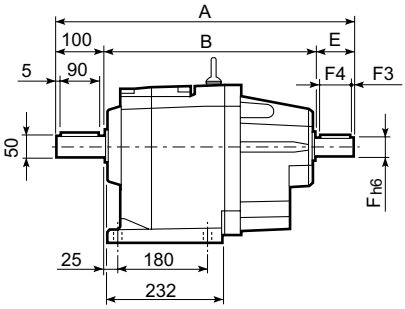
	D1	D2	D3	G	T	S
FA	230	265	300	14	4	16
FB	250	300	350	18	5	18

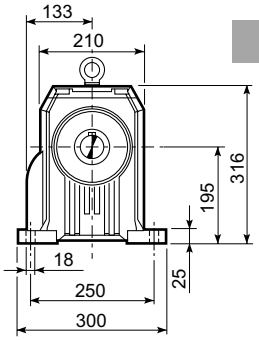
C 61														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg	IEC	LB	AC	LB	AC
C 61 2/3	**P63**	11	12.8	4	140	115	95	—	M8x19	4	415.5	55	BN 63	184	121	249	121
C 61 2/3	**P71**	14	16.3	5	160	130	110	—	M8x16	4.5	415.5	57	BN 71	219	138	280	138
C 61 2/3	**P80**	19	21.8	6	200	165	130	—	M10x12	4	435	61	BN 80	234	156	306	156
C 61 2/3	**P90**	24	27.3	8	200	165	130	—	M10x12	4	435	61	BN 90	276	176	359	176
C 61 2/3	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	444	65	BN 100	307	195	398	195
C 61 2/3	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	444	65	BN 112	325	219	424	219
C 61 2/3	**P132**	38	41.3	10	300	265	230	16	14	5	481.5	68	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 61 2/3	**P160**	42	45.3	12	350	300	250	23	18	5.5	532	73	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 61 2/3	**P180**	48	51.8	14	350	300	250	23	18	5.5	532	73	BN 180M	530	310	670	310
													BN 180L	598	348	756	348
C 61 4	**P63**	11	12.8	4	140	115	95	—	M8x19	4	486	61	BN 63	184	121	249	121
C 61 4	**P71**	14	16.3	5	160	130	110	—	M8x16	4.5	489	63	BN 71	219	138	280	138
C 61 4	**P80**	19	21.8	6	200	165	130	—	M10x12	4	505.5	67	BN 80	234	156	306	156
C 61 4	**P90**	24	27.3	8	200	165	130	—	M10x12	4	505.5	67	BN 90	276	176	359	176
C 61 4	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	515.5	71	BN 100	307	195	398	195
C 61 4	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	515.5	71	BN 112	325	219	424	219

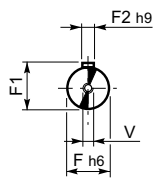




OUTPUT







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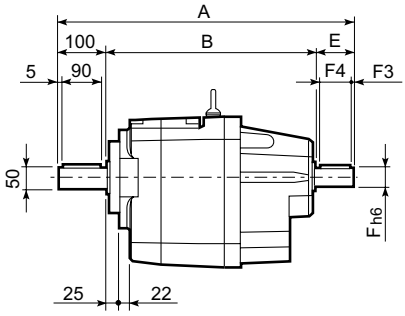
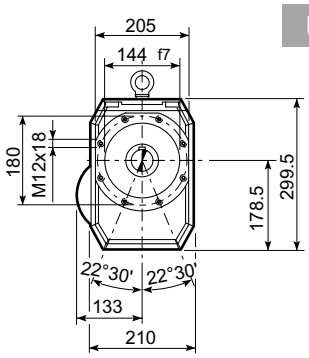
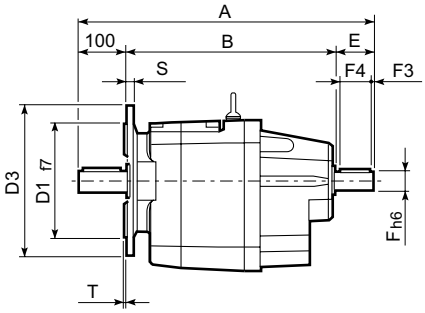
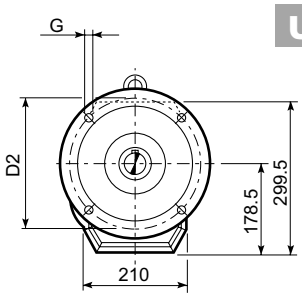


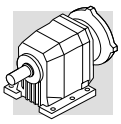






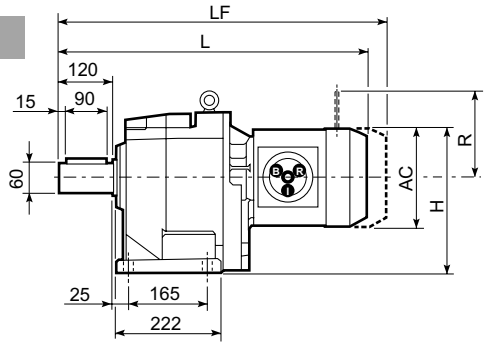
C 61_U						
	D1	D2	D3	G	T	S
FA	230	265	300	14	4	16
FB	250	300	350	18	5	18

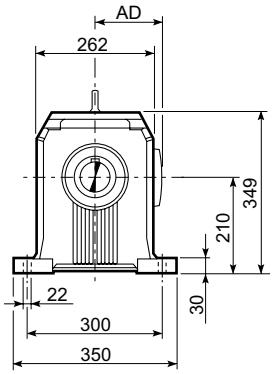
C 61											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 61 2	HS	532	372	60	28	31	8	5	50	M10x22	66
C 61 3		532	372	60	28	31	8	5	50	M10x22	66
C 61 4		575	425	50	24	27	8	2.5	45	M8x19	72

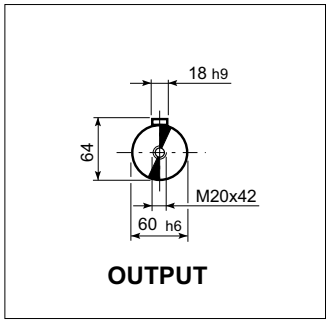


C 70...M

P







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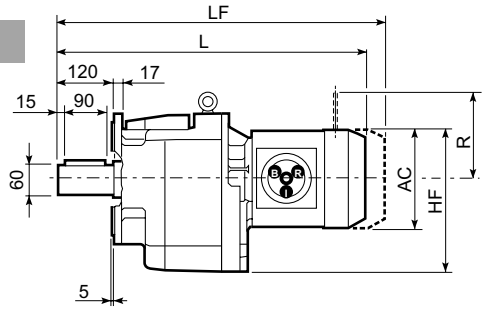
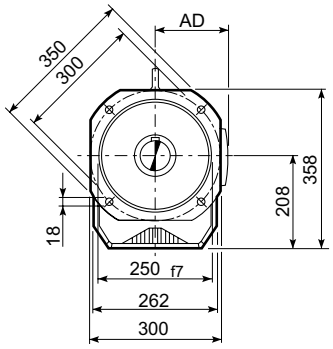
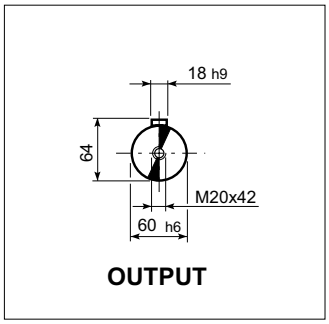
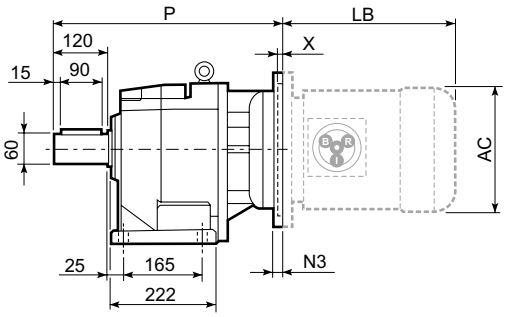
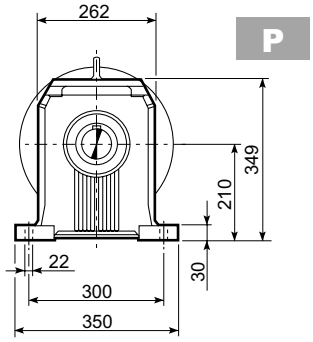


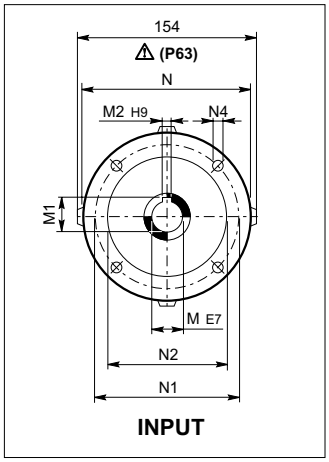


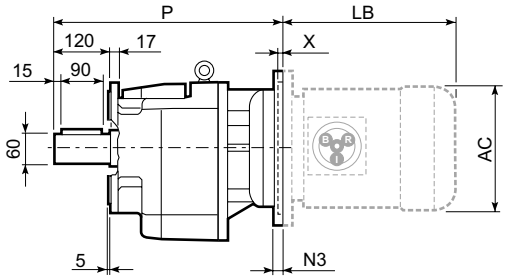
C 70													
								M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 70 2/3	**S2**	**M2S**	156	288	286	636.5	119	88	707.5	92	129	143	134	119
C 70 2/3	**S3**	**M3S**	195	307.5	305.5	680.5	142	93	776.5	101	160	155	160	142
C 70 2/3	**S3**	**M3L**	195	307.5	305.5	712.5	142	101	803.5	108	160	155	160	142
C 70 2/3	**S4**	**M4S**	258	339	337	782.5	193	120	891.5	134	226	193	217	193
C 70 2/3	**S4**	**M4L**	258	339	337	820.5	193	135	929.5	153	226	193	217	193
C 70 2/3	**S4**	**M4LC**	258	339	337	855.5	193	143	954.5	161	226	193	217	193
C 70 2/3	**S5**	**M5S**	310	365	363	907	245	163	1047	193	266	245	247	245
C 70 2/3	**S5**	**M5L**	310	365	363	951	245	179	1091	209	266	245	247	245
C 70 4	**S1**	**M1S**	138	279	277	635.5	108	87	698.5	90	103	132	124	108
C 70 4	**S1**	**M1L**	138	279	277	659.5	108	88	720.5	91	103	132	124	108
C 70 4	**S2**	**M2S**	156	288	286	687.5	119	92	758.5	96	129	143	134	119
C 70 4	**S3**	**M3S**	195	307.5	305.5	731.5	142	97	827.5	104	160	155	160	142
C 70 4	**S3**	**M3L**	195	307.5	305.5	763.5	142	104	854.5	111	160	155	160	142
C 70 4	**S4**	**M4S**	258	339	337	833.5	193	123	942.5	137	226	193	217	193
C 70 4	**S4**	**M4L**	258	339	337	871.5	193	138	980.5	156	226	193	217	193

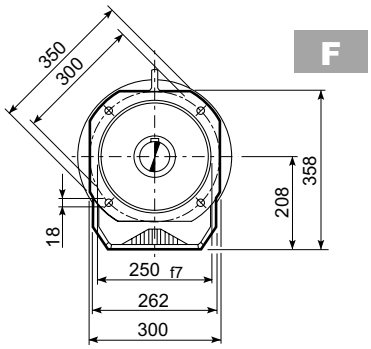




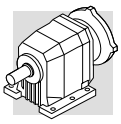






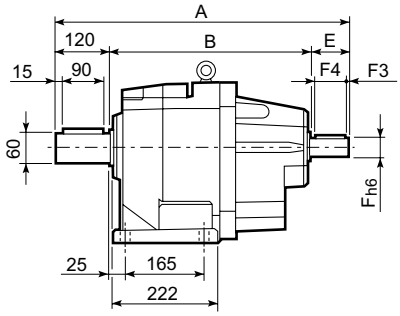


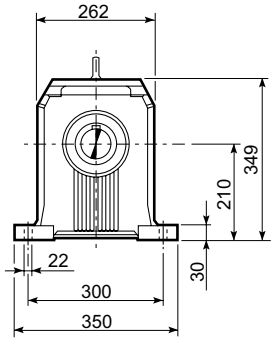
C 70														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg	IEC	LB	AC	LB	AC
C 70 2/3	P80	19	21.8	6	200	165	130	—	M10x12	4	473	88	BN 80	234	156	306	156
C 70 2/3	P90	24	27.3	8	200	165	130	—	M10x12	4	473	88	BN 90	276	176	359	176
C 70 2/3	P100	28	31.3	8	250	215	180	—	M12x16	4.5	483	92	BN 100	307	195	398	195
C 70 2/3	P112	28	31.3	8	250	215	180	—	M12x16	4.5	483	92	BN 112	325	219	424	219
C 70 2/3	P132	38	41.3	10	300	265	230	16	14	5	519.5	95	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 70 2/3	P160	42	45.3	12	350	300	250	23	18	6	575	107	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 70 2/3	P180	48	51.8	14	350	300	250	23	18	6	575	107	BN 180M	530	310	670	310
													BN 180L	598	348	756	348
C 70 2/3	P200	55	59.3	16	400	350	300	—	M16x25	7	600	129	BN 200L	612	348	768	348
C 70 4	P63	11	12.8	4	140	115	95	—	M8x19	4	504.5	91	BN 63	184	121	249	121
C 70 4	P71	14	16.3	5	160	130	110	—	M8x16	4.5	504.5	91	BN 71	219	138	280	138
C 70 4	P80	19	21.8	6	200	165	130	—	M10x12	4	524	92	BN 80	234	156	306	156
C 70 4	P90	24	27.3	8	200	165	130	—	M10x12	4	524	92	BN 90	276	176	359	176
C 70 4	P100	28	31.3	8	250	215	180	—	M12x16	4.5	534	96	BN 100	307	195	398	195
C 70 4	P112	28	31.3	8	250	215	180	—	M12x16	4.5	534	96	BN 112	325	219	424	219
C 70 4	P132	38	41.3	10	300	265	230	16	14	5	570.5	98	BN 132S	375	258	485	258
													BN 132M	413	258	523	258

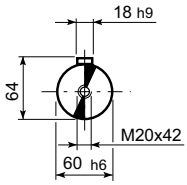


C 70...HS

P

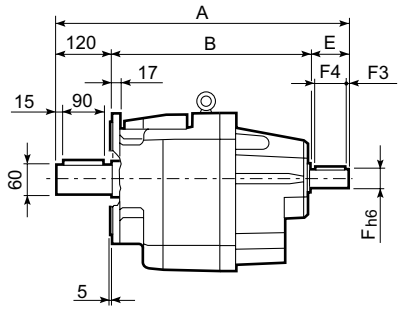


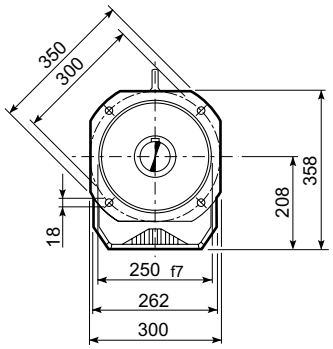


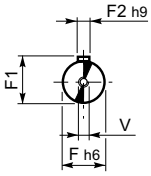


OUTPUT

F

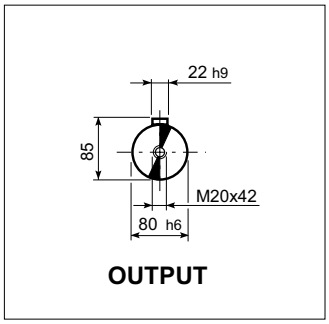


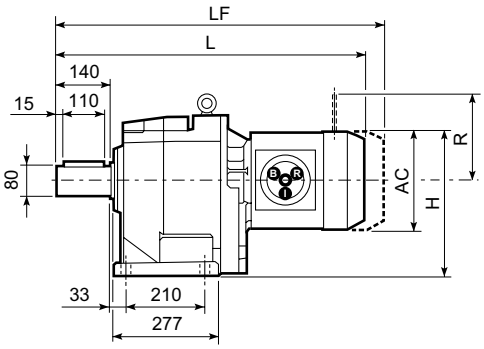


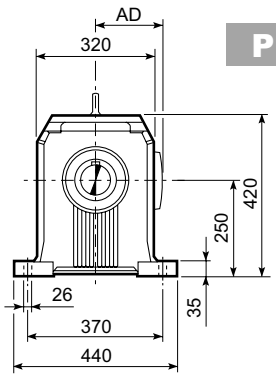


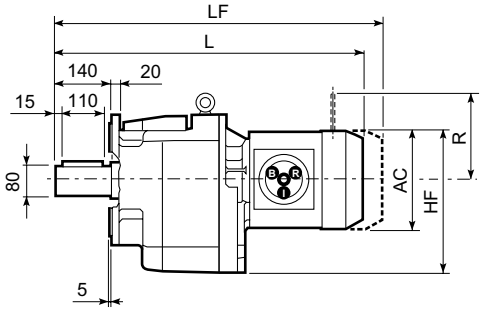
INPUT

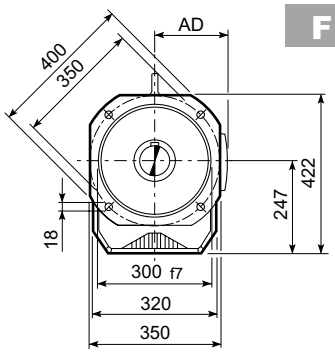
C 70											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 70 2		657.5	427.5	110	42	45	12	10	90	M12x28	108
C 70 3	**HS**	657.5	427.5	110	42	45	12	10	90	M12x28	108
C 70 4		593.5	423.5	50	24	27	8	2.5	45	M8x19	94



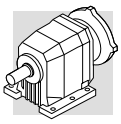






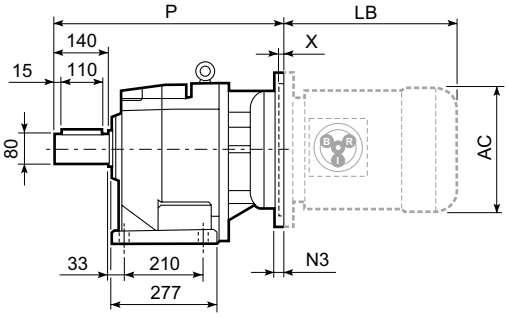


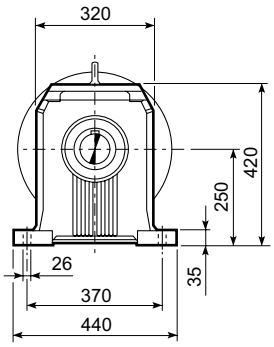
C 80														
									M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 80 2/3	**S3**	**M3S**	195	347.5	344.5	742.5	142	139	838.5	146	160	155	160	142
C 80 2/3	**S3**	**M3L**	195	347.5	344.5	774.5	142	146	865.5	153	160	155	160	142
C 80 2/3	**S4**	**M4S**	258	379	376	844.5	193	165	953.5	178	226	193	217	193
C 80 2/3	**S4**	**M4L**	258	379	376	882.5	193	180	991.5	196	226	193	217	193
C 80 2/3	**S4**	**M4LC**	258	379	376	917.5	193	188	1016.5	204	226	193	217	193
C 80 2/3	**S5**	**M5S**	310	405	402	969	245	208	1109	238	266	245	247	245
C 80 2/3	**S5**	**M5L**	310	405	402	1013	245	224	1153	254	266	245	247	245
C 80 4	**S1**	**M1S**	138	319	316	709.5	108	132	772.5	135	103	132	124	108
C 80 4	**S1**	**M1L**	138	319	316	733.5	108	133	794.5	136	103	132	124	108
C 80 4	**S2**	**M2S**	156	328	325	761.5	119	137	832.5	141	129	143	134	119
C 80 4	**S3**	**M3S**	195	347.5	344.5	805.5	142	142	901.5	149	160	155	160	142
C 80 4	**S3**	**M3L**	195	347.5	344.5	837.5	142	149	928.5	156	160	155	160	142
C 80 4	**S4**	**M4S**	258	379	376	907.5	193	168	1016.5	182	226	193	217	193
C 80 4	**S4**	**M4L**	258	379	376	945.5	193	183	1054.5	201	226	193	217	193

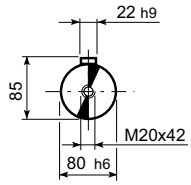


C 80...P(IEC)

P

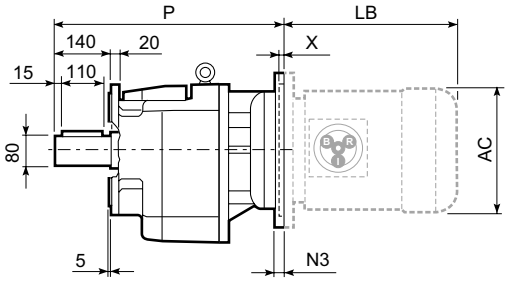


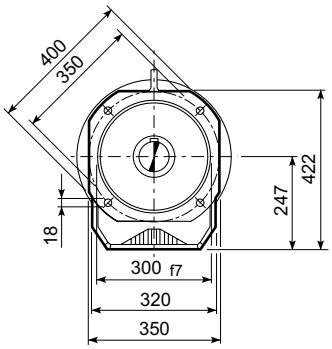


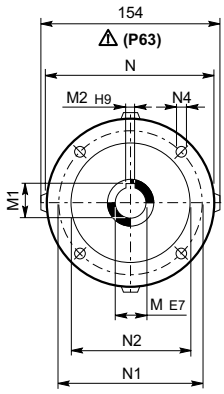


OUTPUT

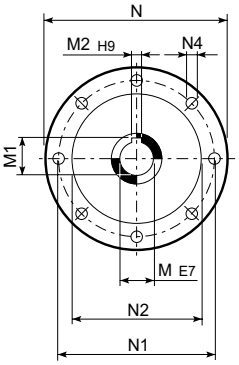
F





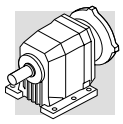


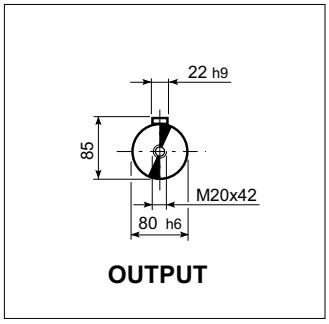
INPUT
P63...P200

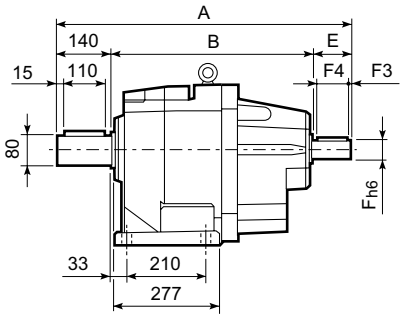


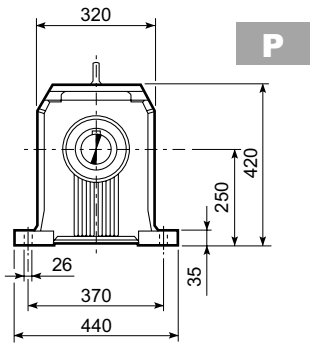
INPUT
P225

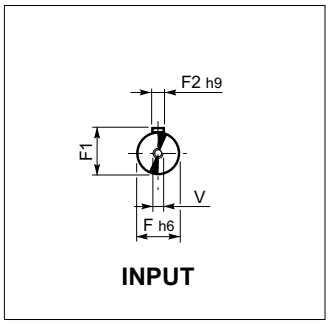
C 80														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg	IEC	LB	AC	LB	AC
C 80 2/3	**P80**	19	21.8	6	200	165	130	—	M10x12	4	533	135	BN 80	234	156	306	156
C 80 2/3	**P90**	24	27.3	8	200	165	130	—	M10x12	4	533	135	BN 90	276	176	359	176
C 80 2/3	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	543	139	BN 100	307	195	398	195
C 80 2/3	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	543	139	BN 112	325	219	424	219
C 80 2/3	**P132**	38	41.3	10	300	265	230	16	14	5	579.5	141	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 80 2/3	**P160**	42	45.3	12	350	300	250	23	18	6	635	154	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 80 2/3	**P180**	48	51.8	14	350	300	250	23	18	6	635	154	BN 180M	530	310	670	310
													BN 180L	598	348	756	348
C 80 2/3	**P200**	55	59.3	16	400	350	300	—	M16x25	7	660	176	BN 200L	612	348	768	348
C 80 2/3	**P225**	60	64.4	18	450	400	350	25	18	6	705.5	178	BN 225	—	—	—	—
C 80 4	**P63**	11	12.8	4	140	115	95	—	M8x19	4	576.5	138	BN 63	184	121	249	121
C 80 4	**P71**	14	16.3	5	160	130	110	—	M8x16	4.5	576.5	138	BN 71	219	138	280	138
C 80 4	**P80**	19	21.8	6	200	165	130	—	M10x12	4	596	140	BN 80	234	156	306	156
C 80 4	**P90**	24	27.3	8	200	165	130	—	M10x12	4	596	140	BN 90	276	176	359	176
C 80 4	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	606	144	BN 100	307	195	398	195
C 80 4	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	606	144	BN 112	325	219	424	219
C 80 4	**P132**	38	41.3	10	300	265	230	16	M12x16	5	642.5	146	BN 132S	375	258	485	258
													BN 132M	413	258	523	258

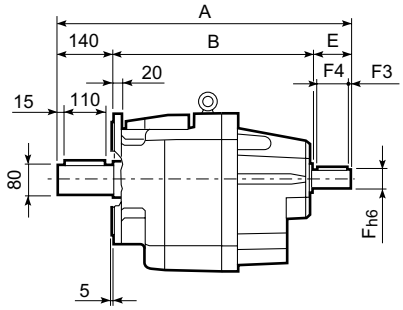


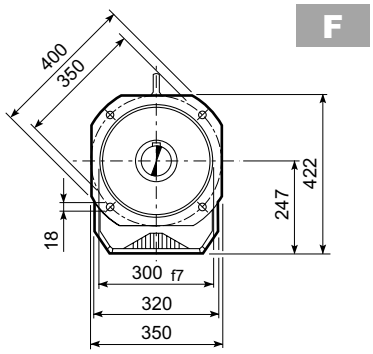




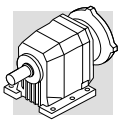






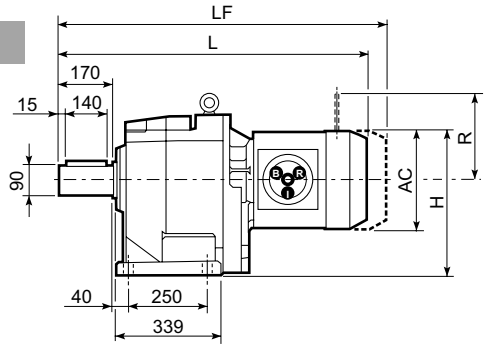


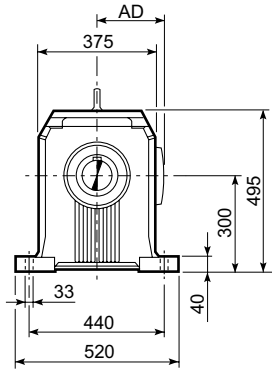
C 80											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 80 2		718.5	468.5	110	42	45	12	10	90	M12x28	154
C 80 3	**HS**	718.5	468.5	110	42	45	12	10	90	M12x28	154
C 80 4		666.5	476.5	50	24	27	8	2.5	45	M8x19	141

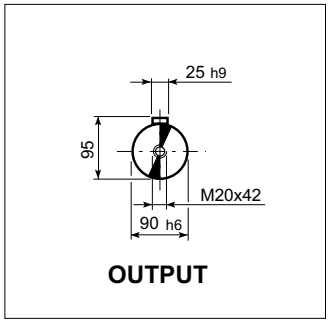


C 90...M

P







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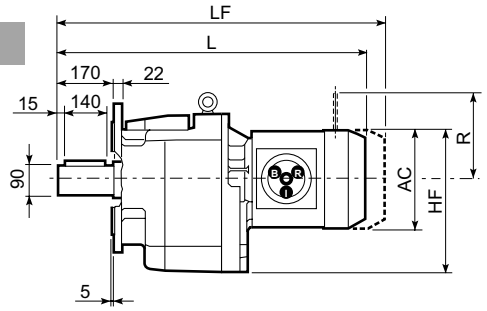
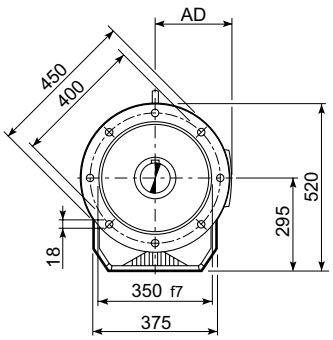
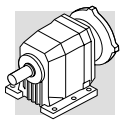
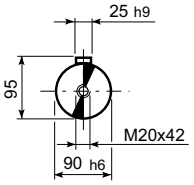




C 90									M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 90 2/3	**S3**	**M3S**	195	397.5	392.5	852	142	228	948	236	160	155	160	142
C 90 2/3	**S3**	**M3L**	195	397.5	392.5	884	142	236	975	243	160	155	160	142
C 90 2/3	**S4**	**M4S**	258	429	424	954	193	255	1063	269	226	193	217	193
C 90 2/3	**S4**	**M4L**	258	429	424	992	193	270	1101	288	226	193	217	193
C 90 2/3	**S4**	**M4LC**	258	429	424	1027	193	278	1126	296	226	193	217	193
C 90 2/3	**S5**	**M5S**	310	455	450	1078.5	245	298	1218.5	328	266	245	247	245
C 90 2/3	**S5**	**M5L**	310	455	450	1122.5	245	314	1262.5	344	266	245	247	245
C 90 4	**S2**	**M2S**	156	378	373	891	119	234	962	238	129	143	134	119
C 90 4	**S3**	**M3S**	195	397.5	392.5	935	142	239	1031	246	160	155	160	142
C 90 4	**S3**	**M3L**	195	397.5	392.5	967	142	246	1058	253	160	155	160	142
C 90 4	**S4**	**M4S**	258	429	424	1037	193	265	1146	279	226	193	217	193
C 90 4	**S4**	**M4L**	258	429	424	1075	193	280	1184	298	226	193	217	193





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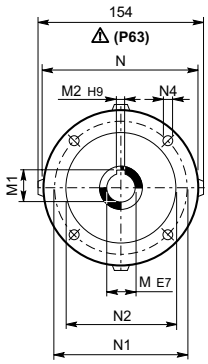
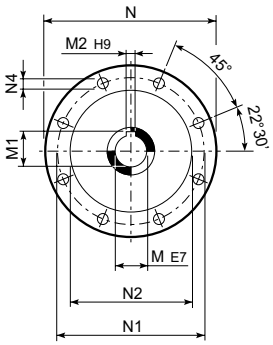


INPUT
P71...P200



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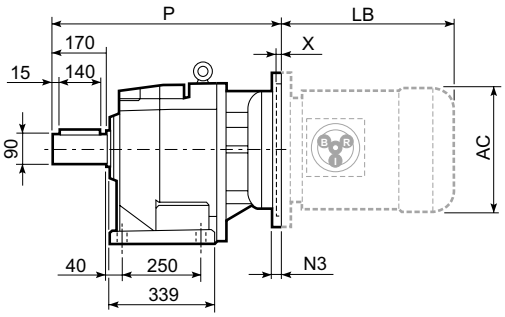
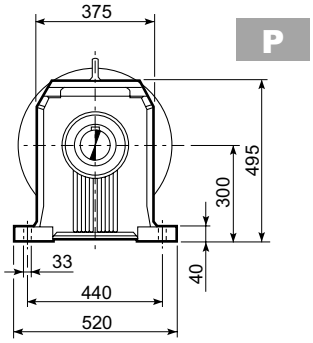
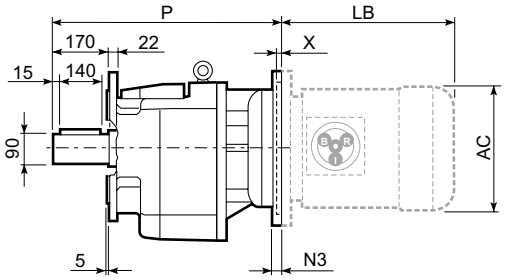
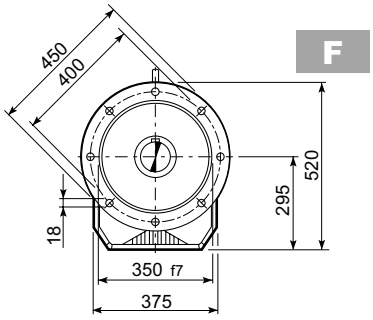
P225...P250









C 90														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg		LB	AC	LB	AC
C 90 2/3	**P80**	19	21.8	6	200	165	130	—	M10x12	4	644.5	229	BN 80	234	156	306	156
C 90 2/3	**P90**	24	27.3	8	200	165	130	—	M10x12	4	644.5	229	BN 90	276	176	359	176
C 90 2/3	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	654.5	234	BN 100	307	195	398	195
C 90 2/3	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	654.5	234	BN 112	325	219	424	219
C 90 2/3	**P132**	38	41.3	10	300	265	230	16	14	5	691	236	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 90 2/3	**P160**	42	45.3	12	350	300	250	23	18	6	746.5	251	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 90 2/3	**P180**	48	51.8	14	350	300	250	23	18	6	746.5	251	BN 180M	530	310	670	310
													BN 180L	598	348	756	348
C 90 2/3	**P200**	55	59.3	16	400	350	300	—	M16x25	7	771.5	272	BN 200L	612	348	768	348
C 90 2/3	**P225**	60	64.4	18	450	400	350	30	18	6	817	273	BN 225	—	—	—	—
C 90 2/3	**P250**	65	69.4	18	550	500	450	30	18	6	847	295	BN 250	—	—	—	—
C 90 4	**P71**	14	16.3	5	160	130	110	—	M8x16	4.5	707.5	236	BN 71	219	138	280	138
C 90 4	**P80**	19	21.8	6	200	165	130	—	M10x12	4	727	238	BN 80	234	156	306	156
C 90 4	**P90**	24	27.3	8	200	165	130	—	M10x12	4	727	238	BN 90	276	176	359	176
C 90 4	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	737	242	BN 100	307	195	398	195
C 90 4	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	737	242	BN 112	325	219	424	219
C 90 4	**P132**	38	41.3	10	300	265	230	16	14	5	773.5	244	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 90 4	**P160**	42	45.3	12	350	300	250	23	18	5.5	824	248	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 90 4	**P180**	48	51.8	14	350	300	250	23	18	5.5	824	248	BN 180M	530	310	670	310
													BN 180L	598	348	756	348

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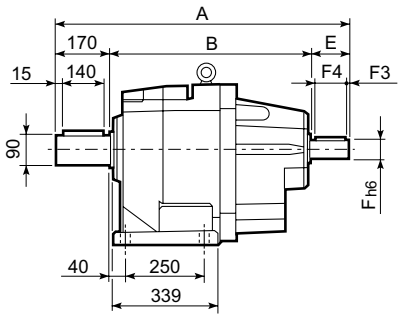

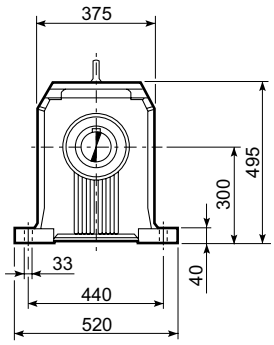

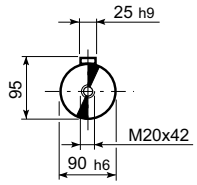

OUTPUT

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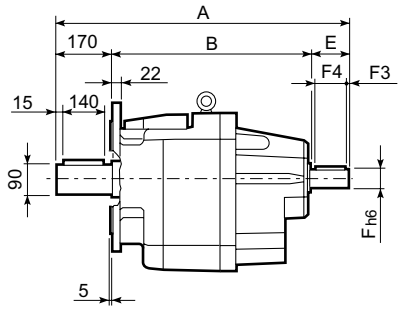
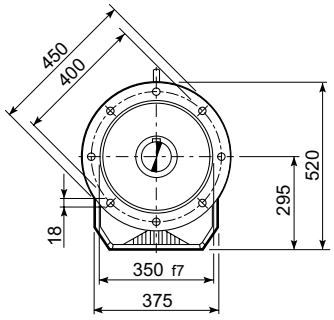
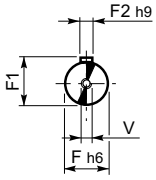
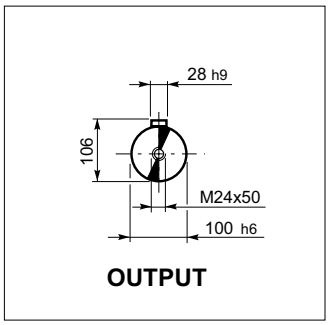


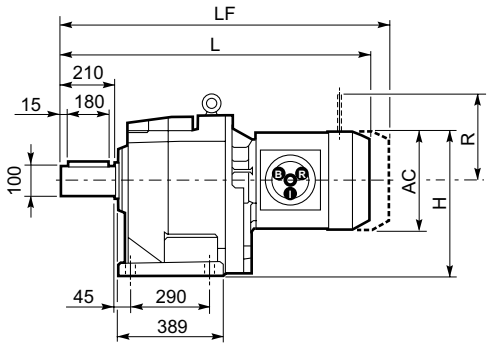


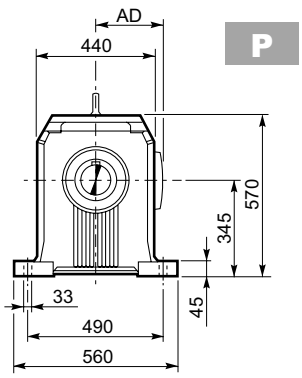


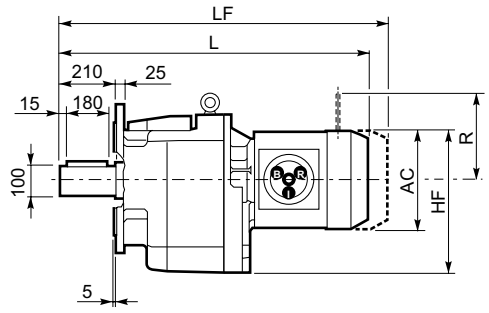
INPUT

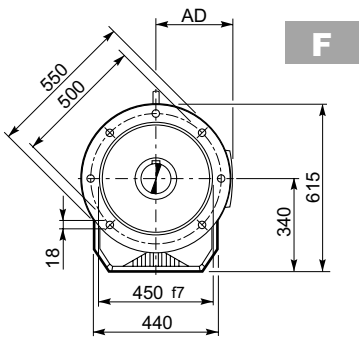
C 90											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 90 2		930.5	620.5	140	60	64	18	10	120	M16x36	273
C 90 3	**HS**	930.5	620.5	140	60	64	18	10	120	M16x36	273
C 90 4		797	577	50	24	27	8	2.5	45	M8x19	240



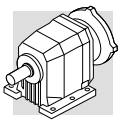






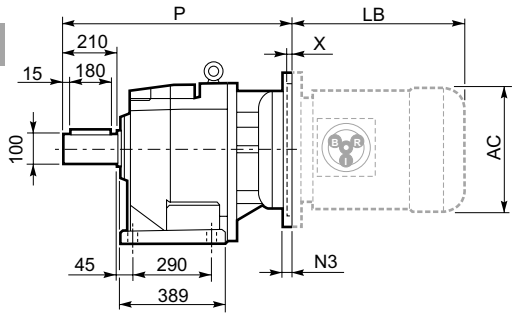


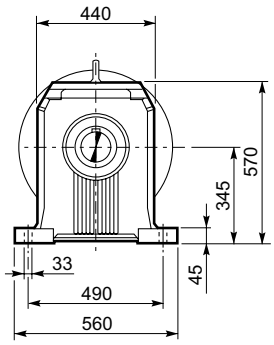
C 100														
									M...FD M...FA		M...FD		M...FA	
			AC	H	HF	L	AD	Kg	LF	Kg	R	AD	R	AD
C 100 2/3	**S4**	**M4S**	258	474	469	1049	193	377	1158	391	226	193	217	193
C 100 2/3	**S4**	**M4L**	258	474	469	1087	193	392	1196	410	226	193	217	193
C 100 2/3	**S4**	**M4LC**	258	474	469	1122	193	400	1221	418	226	193	217	193
C 100 2/3	**S5**	**M5S**	310	500	495	1173.5	245	420	1313.5	450	266	245	247	245
C 100 2/3	**S5**	**M5L**	310	500	495	1217.5	245	436	1357.5	466	266	245	247	245
C 100 4	**S2**	**M2S**	156	423	418	985.5	119	354	1056.5	357	129	143	134	119
C 100 4	**S3**	**M3S**	195	442.5	437.5	1029.5	142	358	1125.5	366	160	155	160	142
C 100 4	**S3**	**M3L**	195	442.5	437.5	1061.5	142	366	1152.5	373	160	155	160	142
C 100 4	**S4**	**M4S**	258	474	469	1131.5	193	385	1240.5	399	226	193	217	193
C 100 4	**S4**	**M4L**	258	474	469	1169.5	193	400	1278.5	418	226	193	217	193
C 100 4	**S4**	**M4LC**	258	474	469	1204.5	245	408	1303.5	426	226	193	217	193

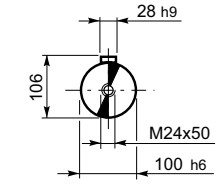


C 100...P(IEC)

P

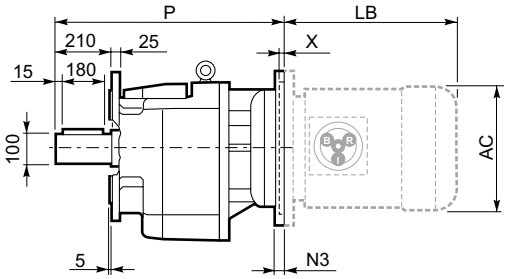


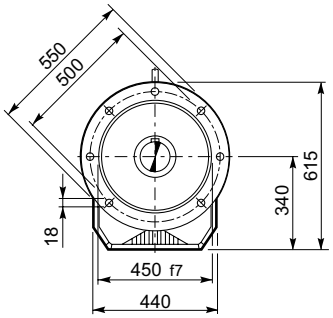


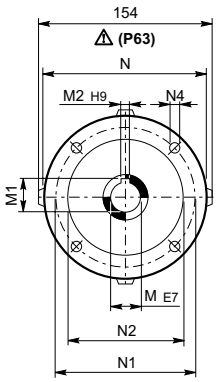


OUTPUT

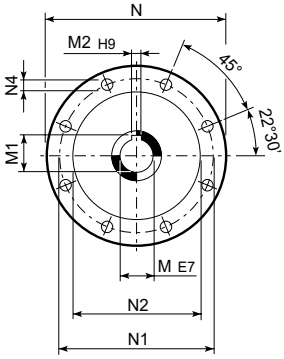
F





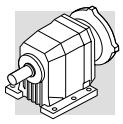


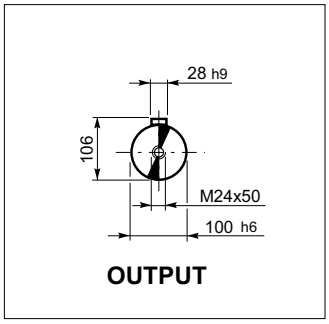
INPUT
P80...P200

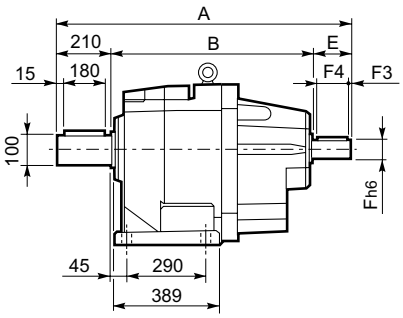


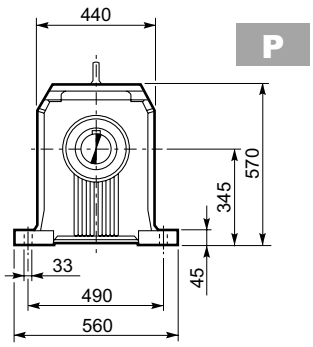
INPUT
P225...P280

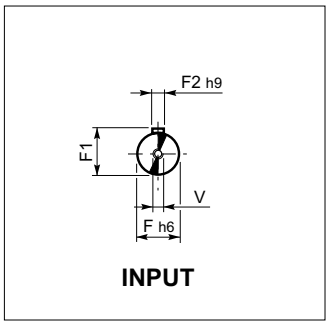
C 100														BN...		BN...FD BN...FA	
		M	M1	M2	N	N1	N2	N3	N4	X	P	Kg		LB	AC	LB	AC
C 100 2/3	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	749.5	364	BN 100	307	195	398	195
C 100 2/3	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	749.5	364	BN 112	325	219	424	219
C 100 2/3	**P132**	38	41.3	10	300	265	230	16	14	5	786	367	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 100 2/3	**P160**	42	45.3	12	350	300	250	23	18	6	841.5	382	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 100 2/3	**P180**	48	51.8	14	350	300	250	23	18	6	841.5	382	BN 180M	530	310	670	310
													BN 180L	598	348	756	348
C 100 2/3	**P200**	55	59.3	16	400	350	300	—	M16x25	7	866.5	403	BN 200L	612	348	768	348
C 100 2/3	**P225**	60	64.4	18	450	400	350	30	18	7	912	403	BN 225	—	—	—	—
C 100 2/3	**P250**	65	69.4	18	550	500	450	30	18	7	942	426	BN 250	—	—	—	—
C 100 2/3	**P280**	75	79.9	20	550	500	450	30	18	6	942	426	BN 280	—	—	—	—
C 100 4	**P80**	19	21.8	6	200	165	130	—	M10x12	4	822.5	371	BN 80	234	156	306	156
C 100 4	**P90**	24	27.3	8	200	165	130	—	M10x12	4	822.5	371	BN 90	276	176	359	176
C 100 4	**P100**	28	31.3	8	250	215	180	—	M12x16	4.5	832.5	375	BN 100	307	195	398	195
C 100 4	**P112**	28	31.3	8	250	215	180	—	M12x16	4.5	832.5	375	BN 112	325	219	424	219
C 100 4	**P132**	38	41.3	10	300	265	230	16	14	5	869	377	BN 132S	375	258	485	258
													BN 132M	413	258	523	258
C 100 4	**P160**	42	45.3	12	350	300	250	23	18	5.5	919.5	381	BN 160MR	452	258	562	258
													BN 160M/L	486	310	626	310
C 100 4	**P180**	48	51.8	14	350	300	250	23	18	5.5	919.5	381	BN 180M	530	310	670	310
													BN 180L	598	348	756	348

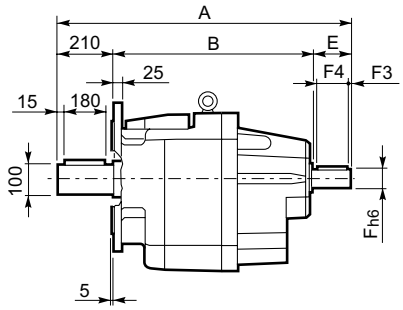


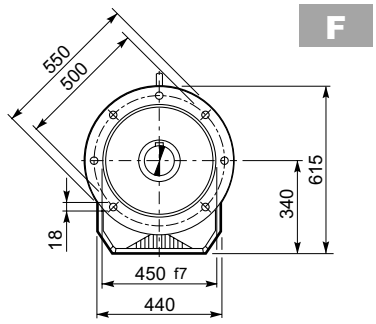




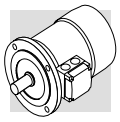








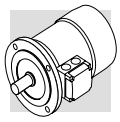
C 100											
		A	B	E	F	F1	F2	F3	F4	V	Kg
C 100 2		1025.5	676	140	60	64	18	10	120	M16x36	409
C 100 3	**HS**	1025.5	676	140	60	64	18	10	120	M16x36	409
C 100 4		892	632	50	24	27	8	2.5	45	M8x19	372



MOTORI ELETTRICI — *ELECTRIC MOTORS* — ELEKTROMOTOREN — *MOTEURS ELECTRIQUES*

M1 - SIMBOLOGIA E UNITÀ DI MISURA — *M1 - SYMBOLS AND UNITS OF MEASUREMENT* — M1 - SYMBOLE UND MAßEINHEITEN — *M1 - SYMBOLES ET UNITES DE MESURE*

Simb. Symb.	U.m. Einheit	Descrizione	*Description*	Beschreibung	*Description*
$\cos\varphi$	–	Fattore di potenza	*Power factor*	Leistungsfaktor	*Facteur de puissance*
η	–	Rendimento	*Efficiency*	Wirkungsgrad	*Rendement*
f_m	–	Fattore correttivo della potenza	*Power adjusting factor*	Leistungskorrekturfaktor	*Facteur de correction de la puissance*
I	–	Rapporto di intermittenza	*Cyclic duration factor*	Relative Einschaltdauer	*Rapport d'intermittence*
I_N	[A]	Corrente nominale	*Rated current*	Nennstrom	*Courant nominal*
I_S	[A]	Corrente di spunto	*Locked rotor current*	Kurzschlußstrom	*Courant de démarrage*
J_C	[Kgm^2]	Momento di inerzia del carico	*Load moment of inertia*	Massenträgheitsmoment der externen Massen	*Moment d'inertie de la charge*
J_M	[Kgm^2]	Momento di inerzia motore	*Moment of inertia*	Trägheitsmoment	*Moment d'inertie du moteur*
K_c	–	Fattore di coppia	*Torque factor*	Drehmomentfaktor	*Facteur de couple*
K_d	–	Fattore di carico	*Load factor*	Lastfaktor	*Facteur de charge*
K_J	–	Fattore di inerzia	*Inertia factor*	Trägheitsfaktor	*Facteur d'inertie*
M_A	[Nm]	Coppia accelerante media	*Mean breakaway torque*	Losbrechmoment	*Couple d'accélération moyen*
M_B	[Nm]	Coppia frenante	*Brake torque*	Bremsemoment	*Couple du frein*
M_N	[Nm]	Coppia nominale	*Rated torque*	Nennmoment	*Couple nominal*
M_L	[Nm]	Coppia resistente media	*Counter-torque during acceleration*	Lastmoment	*Couple résistant moyen*
M_S	[Nm]	Coppia di spunto	*Starting torque*	Startmoment	*Couple de démarrage*
n	[min^{-1}]	Velocità nominale	*Rated speed*	Nenndrehzahl	*Vitesse nominale*
P_B	[W]	Potenza assorbita dal freno a 20°C	*Power drawn by the brake at 20°C*	Leistungsaufnahme der Bremse bei 20°C	*Puissance absorbée par le frein à 20°C*
P_n	[kW]	Potenza nominale	*Motor rated power*	Nennleistung	*Puissance nominale*
P_r	[kW]	Potenza richiesta	*Required power*	Benötigte Leistung	*Puissance nécessaire*
t_1	[ms]	Ritardo di sblocco del freno con alimentatore a semionda	*Brake response time with one-way rectifier*	Ansprechzeit Bremse mit Einweg-Gleichrichter	*Temps de déblocage du frein avec alimentation à demi-onde*
t_{1s}	[ms]	Tempo di sblocco del freno con alimentatore a controllo elettronico	*Brake response time with electronic-controlled rectifier*	Ansprechzeit Bremse mit elektronisch gesteuertem Gleichrichter	*Temps de déblocage du frein avec alimentation à contrôle électronique*
t_2	[ms]	Ritardo di frenatura con disgiunzione lato c.a.	*Brake reaction time with a.c. disconnect*	Einfallzeit Bremse bei Unterbrechung der Stromversorgung WS	*Retard de freinage avec coupure coté c.a.*
t_{2c}	[ms]	Ritardo di frenatura con disgiunzione circuito c.a. e c.c.	*Brake reaction time with a.c. and d.c. disconnect*	Einfallzeit Bremse bei Unterbrechung der Stromversorgung WS und GS	*Retard de freinage avec coupure coté c.a. et c.c.*
t_a	[°C]	Temperatura ambiente	*Ambient temperature*	Umgebungstemperatur	*Température ambiante*
t_f	[min]	Tempo di funzionamento a carico costante	*Work time at constant load*	Betriebsdauer unter Nennbelastung	*Temps de fonctionnement à charge constante*
t_r	[min]	Tempo di riposo	*Rest time*	Aussetzzeit	*Temps de repos*
W	[J]	Lavoro di frenatura accumulato tra due regolazioni del traferro	*Braking work between service interval*	Bremsenergie zwichen zwei Einstellungen	*Energie de freinage accumulée entre deux réglages de l'entrefer*
W_{max}	[J]	Energia massima per singola frenatura	*Maximum brake work for each braking*	Max. Bremsarbeit pro Bremsvorgang	*Energie maxi par freinage*
Z	[1/h]	N° di avviamenti ammissibili, a carico	*Permissible starting frequency, loaded*	Schalthäufigkeit Nennbetrieb	*Nombre de démarrages admissibles en charge*
Z_0	[1/h]	N° di avviamenti ammissibili a vuoto (I = 50%)	*Max. permissible unloaded starting frequency (I = 50%)*	Max. Schalthäufigkeit im Leerlauf (relative Einschaltdauer I = 50%)	*Nombre de démarrages admissible à vide (I = 50%)*



M2 - CARATTERISTICHE GENERALI

Programma di produzione

I motori elettrici asincroni trifase del programma di produzione della BONFIGLIOLI RIDUTTORI sono previsti nelle forme costruttive base IMB5, IMB14 e loro derivate con le seguenti polarità: 2, 4, 6, 2/4, 2/6, 2/8, 2/12. Nel presente catalogo sono evidenziate inoltre, le caratteristiche tecniche dei motori in versione integrata, tipo M.

Normative

I motori descritti in questo catalogo sono costruiti in accordo alle Norme ed unificazioni applicabili evidenziate nella tabella seguente.

M2 - GENERAL CHARACTERISTICS

Production range

The asynchronous three-phase electric motors of BONFIGLIOLI RIDUTTORI's production, are available in basic designs IMB5 and IMB14 and derived versions, with the following polarities: 2, 4, 6, 2/4, 2/6, 2/8, 2/12. The technical characteristics of compact motors, M type, are also supplied in this manual.

Standards

The motors described in this catalogue are manufactured to the applicable standards shown in the following table.

M2 - ALLGEMEINE EIGENSCHAFTEN

Produktprogramm

Die Dreiphasen-Asynchronmotoren aus dem Produktprogramm von BONFIGLIOLI RIDUTTORI gibt es in den Grundbauformen IMB5, IMB14 und deren Ableitungen mit folgenden Polzahlen: 2, 4, 6, 2/4, 2/6, 2/8 und 2/12.
Im vorliegenden Katalog sind außerdem die technischen Eigenschaften der Motoren in Kompaktausführung hervogehoben.

Normen

Die in diesem Katalog beschriebenen Motoren sind in Übereinstimmung mit den in der folgenden Tabelle angegebenen einschlägigen Normen und Vereinheitlichungsrichtlinien konstruiert worden.

M2 - CARACTERISTIQUES GENERALES

Programme de production

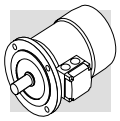
Les moteurs électriques asynchrones triphasés du programme de production de BONFIGLIOLI RIDUTTORI sont prévus dans les formes de construction de base IMB5, IMB14 et leur dérivés avec les polarités suivantes: 2, 4, 6, 2/4, 2/6, 2/8, 2/12.
Dans le présent catalogue sont également mises en évidence les caractéristiques techniques des moteurs en version compacte, type M.

Réglementations

Les moteurs décrits dans ce catalogue sont construits en accord avec les Normes et standardisations applicables mises en évidence dans le tableau ci-dessous.

(A26)

Titolo / *Title* / Titel / *Titre*	**CEI**	**IEC**
Prescrizioni generali per macchine elettriche rotanti *General requirements for rotating electrical machines* Allgemeine Vorschriften für umlaufende elektrische Maschinen *Prescriptions générales pour machines électriques tournantes*	**CEI EN 60034-1**	**IEC 60034-1**
Marcatura dei terminali e senso di rotazione per macchine elettriche rotanti *Terminal markings and direction of rotation of rotating machines* Kennzeichnung der Anschlußklemmen und Drehrichtung von umlaufenden elektrischen Maschinen *Définitions des bornes et sens de rotation pour machines électriques tournantes*	**CEI 2-8**	**IEC 60034-8**
Metodi di raffreddamento delle macchine elettriche *Methods of cooling for electrical machines* Verfahren zur Kühlung von elektrischen Maschinen *Méthodes de refroidissement des machines électriques*	**CEI EN 60034-6**	**IEC 60034-6**
Dimensioni e potenze nominali per macchine elettriche rotanti *Dimensions and output ratings for rotating electrical machines* Auslegung der Nennleistung von umlaufenden elektrischen Maschinen *Dimensions, puissances nominales pour machines électriques tournantes*	**EN 50347**	**IEC 60072**
Classificazione dei gradi di protezione delle macchine elettriche rotanti *Classification of degree of protection provided by enclosures for rotating machines* Klassifizierung der Schutzart von umlaufenden elektrischen Maschinen *Classification des degrés de protection des machines électriques tournantes*	**CEI EN 60034-5**	**IEC 60034-5**
Limiti di rumorosità *Noise limits* Geräuschgrenzwerte *Limites de bruit*	**CEI EN 60034-9**	**IEC 60034-9**
Sigle di designazione delle forme costruttive e dei tipi di installazione *Classification of type of construction and mounting arrangements* Abkürzungen zur Kennzeichnung der Bauform und der Einbaulagen *Sigles de dénomination des formes de construction et des types d'installation*	**CEI EN 60034-7**	**IEC 60034-7**
Tensione nominale per i sistemi di distribuzione pubblica dell'energia elettrica a bassa tensione *Rated voltage for low voltage mains power* Nennspannung für öffentliche NS-Stromverteilungssysteme *Tension nominale pour les systèmes de distribution publique de l'énergie électrique en basse tension*	**CEI 8-6**	**IEC 60038**
Grado di vibrazione delle macchine elettriche *Vibration level of electric machines* Schwingstärke bei elektrischen Maschinen *Degré de vibration des machines électriques*	**CEI EN 60034-14**	**IEC 60034-14**



I motori corrispondono inoltre alle Norme straniere adeguate alle IEC 60034-1 e qui riportate.

The motors also comply with foreign standards adapted to IEC 60034-1 as shown here below.

Die Motoren entsprechen außerdem den an die IEC-Norm 60034-1 angepaßten ausländischen Normen, die in der folgenden Tabelle genannt werden.

En outre, les moteurs correspondent aux Normes étrangères adaptées aux IEC 60034-1 indiquées dans le tableau ci-dessous.

(A27)

DIN VDE 0530	Germania	*Germany*	Deutschland	*Allemagne*
BS5000 / BS4999	Gran Bretagna	*Great Britain*	Großbritannien	*Grande Bretagne*
AS 1359	Australia	*Australia*	Australien	*Australie*
NBNC 51 - 101	Belgio	*Belgium*	Belgien	*Belgique*
NEK - IEC 34	Norvegia	*Norway*	Norwegen	*Norvège*
NF C 51	Francia	*France*	Frankreich	*France*
OEVE M 10	Austria	*Austria*	Österreich	*Autriche*
SEV 3009	Svizzera	*Switzerland*	Schweiz	*Suisse*
NEN 3173	Paesi Bassi	*Netherlands*	Niederlande	*Pays Bas*
SS 426 01 01	Svezia	*Sweden*	Schweden	*Suède*

CUS

MOTORI PER USA E CANADA

I motori BN ed M sono disponibili in esecuzione NEMA Design C (per le caratteristiche elettriche), certificata in conformità alle norme CSA (Canadian Standard) C22.2 N° 100 e UL (Underwriters Laboratory) UL 1004 con targhetta riportante il marchio cCSAus (tensione ≤ 600V), specificare in questo caso l'opzione CUS.
Le tensioni delle reti di distribuzione americane e le corrispondenti tensioni nominali da specificare per il motore sono indicate nella tabella seguente:

MOTORS FOR USA AND CANADA

BN and M motors are available in NEMA Design C configuration (concerning electrical characteristics), certified to CSA (Canadian standard) C22.2 No. 100 and UL (Underwriters Laboratory) UL 1004. Name plate includes the cCSAus mark (voltage ≤ 600V), in this case, please specify CUS option.
US power mains voltages and the corresponding rated voltages to be specified for the motor are indicated in the following table:

MOTOREN FÜR DIE USA UND KANADA

Die BN/M-Motoren sind in der Ausführung NEMA, Design C (aufgrund der elektrischen Eigenschaften), den Normen CSA (Canadian Standard) C22.2 Nr 100 und UL (Underwriters Laboratory) UL 1004 gemäß zertifiziert, mit einem Typenschild mit cCSAus Zeichen (Spannung ≤ 600V), in diesem Fall muss die Option CUS angegeben werden.
Die Spannungen der amerikanischen Verteilernetze und die entsprechenden tens-Nennspannungen, die bei den Motoren angegeben werden müssen, können der folgenden Tabelle entnommen werden:

MOTEURS POUR ETATS-UNIS ET CANADA

Les moteurs BN et M sont disponibles en exécution NEMA Design C (pour les caractéristiques électriques), certifiée conforme aux normes CSA (Canadian Standard) C22.2 N°100 et UL (Underwriters Laboratory) UL 1004 avec plaque signalétique indiquant la marque cCSAus (tension ≤ 600V), dans ce cas, spécifier l'option CUS.
Les tensions des réseaux de distribution américains ainsi que les tensions nominales à spécifier por le moteur sont indiquées dans le tableau suivant :

(A28)

Frequenza / *Frequency* Frequenz / *Fréquence*	Tensione di rete / *Mains voltage* Netzspannung / *Tension de réseau*	V_{mot}
60 Hz	208 V	**200 V**
	240 V	**230 V**
	480 V	**460 V**
	600 V	**575 V**

I motori dotati di collegamento YY/Y (es. 230/460-60; 220/440-60) presentano di serie una morsettiera a 9 terminali.
Per le stesse esecuzioni, e inoltre per l'alimentazione 575V-60Hz, la potenza di targa corrisponde a quella normalizzata a 50Hz.
Per i motori autofrenanti con freno in c.c. tipo BN_FD l'alimentazione del raddrizzatore è da morsettiera motore con tensione 230V a.c. monofase.
Per i motori autofrenanti **l'alimentazione del freno** è così predisposta:

Motors with YY/Y connection (e.g. 230/460-60; 220/440-60) feature, as standard, a 9-stud terminal board. For same executions, as well as for 575V-60Hz supply, the nominal rating is coincident with the correspondent 50Hz rating.
For DC brake motors type BN_FD, the rectifier is connected to a single-phase 230 VAC supply voltage in the motor terminal box.
***Brake power supply** for brake motors is as follows:*

Motoren mit YY/Y-Anschluss (z.B. 230/460-60; 220/440-60) sind standardmäßig mit 9 Pins auf dem Klemmbrett ausgeführt. Für gleiche Ausführungen, ebenso wie für 575V-60Hz, die Nennleistung ist gleich mit der entsprechenden 50 Hz-Leistung.Für Bremsmotoren mit Gleichstrombremse vom Typ BN_FD erfolgt die Versorgung des Gleichrichters über den Motorklemmenkasten mit einer Spannung von 230V (einphasiger Wechselstrom). Bei Bremsmotoren stellt sich die **Versorgung der Bremse** wie folgt dar:

Les moteurs avec connexion YY/Y (ex. 230/460-60; 220/440-60) presentent, en standard, une plaque à borne avec 9 bornes. Pour les memes executions, et aussi pour l'alimentation 575V-60Hz, la puissance de plaque corresponde à celle normalisé à 50Hz.
Pour les moteurs frein avec frein en c.c. type BN_FD , l'alimentation du redresseur provient de la boîte à bornes moteur avec une tension 230V c.a. monophasée.
*Pour les moteurs frein **l'alimentation du frein** est la suivante :*

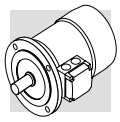
BN_FD **M_FD**	**BN_FA ; BN_BA** **M_FA**	Specificare / *Specify* Bitte angeben / *Spécifier*
Da morsettiera motore 1~230V c.a. *Wired to terminal box 1~230V a.c.* Vom Motorklemmenkasten1~230V W.S. *Depuis boîte à bornes moteur 1~230V c.a.*	Alimentazione separata / *Separate power supply* Fremdversorgung / *Alimentation séparée* 230V Δ - 60Hz	230SA
	Alimentazione separata / *Separate power supply* Fremdversorgung / *Alimentation séparée* 460V Y - 60Hz	460SA

L'opzione CUS non è applicabile ai motori dotati di servoventilazione.

The option CUS does not apply to servo-ventilated motors.

Die CUS-Option ist für die Fremdlüftermotoren nicht anwendbar.

L'option CUS n'est pas applicable aux moteurs doués de ventilation forcée.



Direttive CEE 73/23 (LVD) e CEE 89/336 (EMC)

I motori delle serie BN ed M sono conformi ai requisiti delle Direttive CEE 73/23 (Direttiva Bassa Tensione) e CEE 89/336 (Direttiva Compatibilità Elettromagnetica), e riportano in targa la marcatura CE.
Per quanto riguarda la Direttiva EMC, la costruzione è in accordo alle Norme CEI EN 60034-1 sez. 12, EN 50081, EN 50082.

I motori con freno in c.c. tipo FD, se corredati dell'opportuno filtro capacitivo in ingresso al raddrizzatore (opzione **CF**), rientrano nei limiti di emissione previsti dalla Norma EN 50081-1 "Compatibilità elettromagnetica - Norma Generica sull'emissione - Parte 1: Ambienti residenziali, commerciali e dell'industria leggera".

I motori soddisfano inoltre le prescrizioni della Norma CEI EN 60204-1 "Equipaggiamento elettrico delle macchine".
È responsabilità del costruttore o dell'assemblatore dell'apparecchiatura che incorpora i motori come componenti garantire la sicurezza e la conformità alle direttive del prodotto finale.

Directives 73/23/EEC (LVD) and 89/336/EEC (EMC)

BN motors meet the requirements of Directives 73/23/EEC (Low Voltage Directive) and 89/336/EEC (Electromagnetic Compatibility Directive) and their name plates bear the CE mark.
As for the EMC Directive, construction is in accordance with standards CEI EN 60034-1 Sect. 12, EN 50081, EN50082.

Motors with FD brakes, when fitted with the suitable capacitive filter at rectifier input (option CF), meet the emission limits required by Standard EN 50081-1 "Electromagnetic compatibility - Generic Emission Standard - Part 1: Residential, commercial and light industrial environment".

Motors also meet the requirements of standard CEI EN 60204-1 "Electrical equipment of machines".

The responsibility for final product safety and compliance with applicable directives rests with the manufacturer or the assembler who incorporate the motors as component parts.

Richtlinien EWG 73/23 (LVD) und EWG 89/336 (EMC)

Die Motoren der Serie BN entsprechen den Anforderungen der Richtlinien EWG 73/23 (Richtlinie - Niederspannung) und CEE 89/336 (Richtlinie - elektromagnetische Kompatibilität) und sind mit dem CE-Zeichen ausgestattet.
Im Hinblick auf die Richtlinie EMC entspricht die Konstruktion den Normen CEI EN 60034-1, Abschn. 12, EN 50081, EN 50082.

Die Motoren mit dem Bremstyp FD fallen, falls mit dem entsprechenden kapazitiven Filter am Eingang des Gleichrichters ausgestattet (Option CF), unter die Emissionsgrenzwerte, die von der Norm EN 50081-1 "Elektromagnetische Kompatibilität - Allgemeine Norm für Emissionen - Teil 1: Wohngebiete, Handels- und Leichtindustriezonen" vorgesehen werden.

Die Motoren entsprechen darüber hinaus den von der Norm CEI EN 60204-1 "Elektrische Maschinenausstattung" gegebenen Vorschriften.

Es liegt in der Verantwortung des Herstellers oder es Monteurs der Ausrüstung, in der die Motoren als Komponenten montiert werden, die Sicherheit und die Übereinstimmung mit den Richtlinien des Endprodukts zu gewährleisten.

Directives CEE 73/23 (LVD) et CEE 89/336 (EMC)

Les moteurs de la série BN sont conformes aux conditions requises pae les Directives CEE 73/23 (Directive Basse Tension) et CEE 89/336 (Directive Compatibilité Electromagnétique), et le marquage CE est indiqué sur la plaquette signalétique.
En ce qui concerne la Directive EMC, la fabrication répond aux Normes CEI EN 60034-1 Sect. 12, EN 50081, EN 50082.

Les moteurs avec frein FD, s'ils sont équipés du frein capacitif approprié en entrée du redresseur (option CF), rentrent dans les limites d'émission prévues par la Norme EN 50081-1 "Compatibilité électromagnétique - Norme Générique sur l'émission - Partie 1 : Milieux résidentiels, commerciaux et de l'industrie légère".

Les moteurs répondent aussi aux prescriptions de la Norme CEI EN 60204-1 "Equipement électrique des machines".

Le fabricant ou le monteur de la machine qui comprend les moteurs comme composant est responsable et doit se charger de garantir la sécurité et la conformité aux directives du produit final.

Tolleranze

Secondo le Norme sono ammesse le tolleranze indicate nella tabella seguente sulle grandezze garantite.

Tolerances

As per the Norms applicable the tolerances here below apply to the following quantities.

Toleranzen

Die Normen lassen die in folgenden Tabelle genannten Toleranzen bei den garantierten Größen zu.

Tolérances

Selon les Normes, les tolérances indiquées dans le tableau ci-dessous sont admises sur les tailles garanties.

(A29)

-0.15 (1 - η) P ≤ 50kW	Rendimento	*Efficiency*	Wirkungsgrad	*Rendement*
-(1 - cosφ)/6 min 0.02 max 0.07	Fattore di potenza	*Power factor*	Leistungsfaktor	*Facteur de puissance*
±20% *	Scorrimento	*Slip*	Schlupf	*Glissement*
+20%	Corrente a rotore bloccato	*Locked rotor current*	Strom bei blockiertem Läufer	*Courant à rotor bloqué*
-15% +25%	Coppia a rotore bloccato	*Locked rotor torque*	Drehmoment bei blockiertem Läufer	*Couple à rotor bloqué*
-10%	Coppia max	*Max. torque*	Max. Drehmoment	*Couple max*

* ± 30% per motori con Pn < 1 kW

** ± 30% for motors with Pn < 1 kW*

* ± 30% für Motoren mit Pn < 1 kW

** ± 30% pour moteurs avec Pn < 1 kW*

M3 - CARATTERISTICHE MECCANICHE

Forme costruttive

I motori serie BN sono previsti nelle forme costruttive indicate in tabella (A30) secondo le Norme CEI EN 60034-14.

Le forme costruttive sono le seguenti:

IM B5 (base)
IM V1, IM V3 (derivate)

IM B14 (base)
IM V18, IMV19 (derivate)

I motori in forma costruttiva IM B5 possono essere installati nelle posizioni IM V1 e IM V3; i motori in forma costruttiva IM B14 possono essere installati nelle

M3 - MECHANICAL FEATURES

Versions

IEC-normalised BN motors are available in the design versions indicated in table (A30) as per Standards CEI EN 60034-14.

Mounting versions are:

***IM B5** (basic)*
IM V1, IM V3 (derived)

***IM B14** (basic)*
IM V18, IM V19 (derived)

IM B5 design motors can be installed in positions IM V1 and IM V3; IM B14 design motors can be installed in positions IM V18 and IM V19.

M3 - MECHANISCHE EIGENSCHAFTEN

Bauformen

Die Motoren der Serie BN weisen die in der Abbildung (A30) angegebene Bauform gemäß den Normen CEI EN 60034-14 auf.

Die Bauformen sind:

IM B5 (Grundmodell)
IM V1, IM V3 (Ableitungen)

IM B14 (Grundmodell)
IM V18, IM V19 (Ableitungen)

Die Motoren mit der Bauform IM B5 können mit den Einbaulagen IM V1 und IM V3 eingebaut werden; die Motoren mit der Bauform IM B14 können mit den Ein-

M3 - CARACTERISTIQUES MECANIQUES

Formes de construction

Les moteurs série BN sont prévus dans les formes de construction indiquées sur le tableau (A30) selon les normes CEI EN 60034-14.

Les formes de construction sont les suivantes:

***IM B5** (base)*
IM V1, IM V3 (dérivées)

***IMB14** (base)*
IM V18, IMV19 (dérivées)

Les moteurs en forme de construction IM B5 peuvent être installés dans les positions IM V1 et IM V3; les moteurs en forme de construction IM B14 peuvent

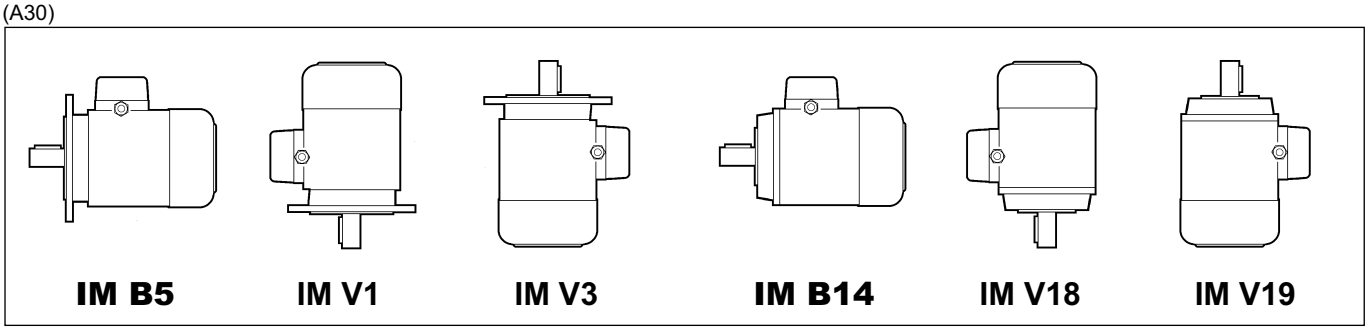
posizioni IM V18 e IM V19.
In questi casi, sulla targa del motore sarà indicata la forma costruttiva base IM B5 o IM B14.
Nelle forme costruttive dove il motore assume una posizione verticale con albero in basso, si consiglia di richiedere l'esecuzione con tettuccio parapioggia (da prevedere sempre nel caso di motori autofrenanti). Tale esecuzione, pressente nelle opzioni, va richiesta espressamente in fase di ordine in quanto non è prevista nella versione base.

In such cases, the basic design IM B5 or IM B14 is indicated on the motor name plate.
In design versions with a vertically located motor and shaft downwards, it is recommended to request the drip cover (always necessary for brake motors). This facility, included in the option list should be specified when ordering as it does not come as a standard device.

baulagen IM V18 und IM V19 eingebaut werden.
In diesen Fällen ist auf dem Leistungsschild des Motors die Bauform IM B5 oder IM B 14 angegeben.
Bei Bauformen mit vertikaler Lage des Motors und nach unten gerichteter Welle wird die Aus-führung mit Regenschutzabdeckung empfohlen (bei Bremsmotoren stets vorzusehen). Dieses wahlweise Zubehör muß ausdrücklich zum Zeitpunkt der Bestellung verlangt werden, da es bei der Grundausführung nicht vorgesehen ist.

être installés dans les positions IM V18 et IM V19.
Dans ces cas, la forme de construction base IM B5 ou IM B14 sera indiquée sur la plaque du moteur. Dans les formes de construction où le moteur présente une position verticale avec arbre vers le bas, nous conseillons de demander l'exécution avec capot de protection contre la pluie (à prévoir toujours dans le cas de moteurs freins). Cette exécution, prévue dans les options, doit être expressément demandée en phase de commande étant donné qu'elle n'est pas prévue dans la version de base.

(A30)



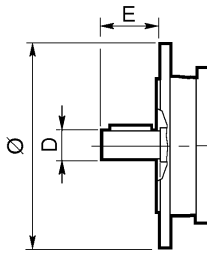
I motori in forma flangiata possono essere forniti con dimensioni di accoppiamento ridotte, come riportato in tabella (A31) - esecuzioni **B5R**, **B14R**.

Flanged motors can be supplied with a reduced mounting interface, as shown in chart (A31) below.

Die Motoren in der Auslegung mit Flansch können mit reduzierten Passmassen gemäß Tabelle (A31) - Versionen **B5R**, **B14R** geliefert werden.

*Les moteurs avec forme à bride peuvent être fournis avec des tailles d'accouplement réduites, comme indiqué dans le tableau (A31) - exécutions **B5R**, **B14R**.*

(A31)



	BN 71	BN 80	BN 90	BN 100	BN 112	BN 132
	DxE - ∅					
B5R (1)	11x23 - 140	14x30 - 160	19x40 - 200	24x50 - 200	24x50 - 200	28x60 - 250
B14R (2)	11x23 - 90	14x30 - 105	19x40 - 120	24x50 - 140	—	—

(1) flangia con fori passanti
(2) flangia con fori filettati

(1) flange with through holes
(2) flange with threaded holes

(1) Flansch mit durchgehenden Bohrungen
(2) Flansch mit Gewindebohrungen

(1) bride avec orifices passants
(2) bride avec orifices filetés

IP..

Grado di protezione

La tabella sottostante riassume la disponibilità dei vari gradi di protezione.
Indipendentemente dal grado di protezione specificato, per installazione all'aperto i motori devono essere protetti dall'irrag-

Degree of protection

The following chart provides an overview of the degrees of protection available.
In addition to the degree of protection specified when ordering, motors to be installed outdoors require protection against direct

Schutzart

In der nachstehenden Tabelle werden die jeweiligs zur Verfügung stehenden Schutzarten zusammengefasst.
Unabhängig von der spezifischen Schutzart müssen die im Freien installierten Motoren vor

Degré de protection

Le tableau ci-dessous résume la disponibilité des différents degrés de protection.
Indépendamment du degré de protection spécifié, en cas d'installation en plein air, les moteurs doivent être protégés des

BONFIGLIOLI RIDUTTORI

giamento diretto e, nel caso d'installazione con albero rivolto verso il basso, è necessario specificare ulteriormente il tettuccio di protezione contro l'ingresso di acqua e corpi solidi (opzione **RC**).

*sunlight and also – when they are to be installed vertically down – a drip cover to prevent the ingress of water and solid particles (option **RC**).*

direkten Strahlungen geschützt werden. Im Fall einer senkrechten Montage, in der die Welle nach unten gerichtet ist, sollte darüber hinaus das Schutzdach bestellt werden, das vor dem Eindringen von Wasser und festen Fremdkörpern schützt (Option **RC**).

*rayons directs du soleil et, en cas d'installation avec l'arbre dirigé vers le bas, il est nécessaire de spécifier ultérieurement le capot de protection contre la pénétration de l'eau et des corps solides (option **RC**).*

(A32)

		IP 54	IP 55	IP 56
BN	**M**	⊖	standard	
BN_FD **BN_FA**	**M_FD** **M_FA**	standard		⊖
BN_BA	**–**	⊖	standard	⊖

Ventilazione

I motori sono raffreddati mediante ventilazione esterna (IC 411 secondo CEI EN 60034-6) e sono provvisti di ventola radiale in plastica che funziona in entrambi i sensi di rotazione.
L'installazione deve assicurare una distanza minima dalla calotta copriventola alla parete in modo da non avere impedimenti all'ingresso aria e permettere la possibilità di eseguire l'opportuna manutenzione del motore e, se previsto, del freno.
Su richiesta è possibile prevedere una ventilazione forzata indipendente (opzione U1). Questa soluzione consente di aumentare il fattore di utilizzo del motore nel caso di alimentazione da inverter e funzionamento a giri ridotti.

Cooling

The motors are externally ventilated (IC 411 to CEI EN 60034-6) and are equipped with a plastic fan working in both directions.
The motors must be installed allowing sufficient space between fan cowl and the nearest wall to ensure free air intake and allow access for maintenance purposes on motor and brake, if supplied.
Independent, forced air ventilation (IC 416) can be supplied on request (option U1).
This solution enables to increase the motor duty factor when driven by an inverter and operating at reduced speed.

Lüftung

Die Motoren sind eigenbelüftet (IC 411 gemäß CEI EN 60034-6) und verfügen über ein Radiallüfterrad aus Kunststoff, das in beiden Drehrichtungen arbeiten kann.
Bei der Installation muß sichergestellt werden, daß die Lüfterradabdeckung soweit von der Wand entfernt ist, daß der Lufteintritt nicht behindert wird, und daß der Motor und (falls vorhanden) die Bremse problemlos gewartet werden können.
Auf Wunsch können die Motoren mit Fremdbelüftung geliefert werden (Option U1). Diese Lösung ermöglicht das Motorbetriebsfaktor zu erhöhen, wenn vom Frequenzumrichter gesteuert und zu niedrigen Geschwindigkeit betrieben.

Ventilation

Les moteurs sont refroidis à l'aide d'une ventilation extérieure (IC 411 selon CEI EN 60034-6) et sont dotés d'un ventilateur à ailettes en plastique qui fonctionne dans les deux sens de rotation.
L'installation doit assurer une distance minimum entre le capot de protection du ventilateur et la paroi afin de permettre une bonne circulation de l'air et rendre plus aisé l'entretien du moteur et si prévu, du frein.
Sur demande, il est possible de prévoir une ventilation forcée indépendante (option U1).
Cette solution permet d'augmenter le facteur d'utilisation du moteur en cas d'alimentation, via un variateur de fréquence, et pour un fonctionnement à faible vitesse.

Senso di rotazione

È possibile il funzionamento in entrambi i sensi di rotazione.
Con collegamento dei morsetti U1,V1,W1 alle fasi di linea L1,L2,L3 si ha rotazione oraria vista dal lato accoppiamento, mentre la marcia antioraria si ottiene scambiando fra loro due fasi.

Direction of rotation

Rotation is possible in both directions. If terminals U1, V1, and W1 are connected to line phases L1,L2 and L3, clockwise rotation (looking from drive end) is obtained. For counterclockwise rotation, switch two phases.

Drehrichtung

Der Betrieb in beiden Drehrichtungen ist möglich.
Schließt man die Klemmen U1, V1, W1 an die Phasen L1, L2, L3 an, dreht sich der Motor im Uhrzeigersinn (von der Verbindungsseite her betrachtet); die Drehung im Gegenuhrzeigersinn erhält man, indem man zwei Phasen vertauscht.

Sens de rotation

Un fonctionnement dans les deux sens de rotation est possible. Avec raccordement des bornes U1, V1,W1 aux phases de ligne L1, L2,L3, on a la rotation dans le sens des aiguilles d'une montre vue du côté liaison alors que le sens inverse s'obtient en intervertissant les deux phases entre elles.

Rumorosità

I valori di rumorosità, rilevati secondo il metodo previsto dalle Norme ISO 1680, sono contenuti entro i livelli massimi previsti dalle Norme CEI EN 60034-9.

Noise

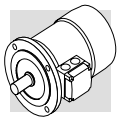
Noise levels, measured using the method prescribed by ISO 1680 Standards, are within the maximum levels specified by Standards CEI EN 60034-9.

Geräuschpegel

Die mit der von der ISO-Norm 1680 vorgesehenen Methoden gemessenen Lärmstärkewerte liegen innerhalb der gemäß den Normen CEI EN 60034-9 zulässigen Höchstgrenzen.

Niveau de bruit

Les valeurs relevées selon la méthode prévue par les normes ISO 1680 sont situées sous les niveaux maximums prévus par les normes CEI EN 60034-9.



Vibrazioni ed equilibratura

Tutti i rotori sono equilibrati con mezza linguetta e rientrano nei limiti di intensità di vibrazione previsti dalle Norme CEI EN 60034-14.
Per particolari esigenze di silenziosità potrà essere previsto, a richiesta, un'esecuzione antivibrante in grado ridotto R.
La tabella seguente riporta i valori della velocità efficace di vibrazione per equilibratura standard (N) e incrementata (R).

Vibrations and balancing

Rotor shafts are balanced with half key fitted and fall within the vibration class N, as per Standard CEI EN 60034-14.
If a further reduced noise level is required improved balancing can be optionally requested (class N).
Table below shows the value for the vibration velocity for standard (N) and improved (R) balancing.

Schwingungen und Ausgleich

Alle Rotoren werden durch einen halben Federkeil ausgeglichen und fallen somit unter die, von den Normen CEI EN 60034-14 vorgesehenen Scwingungsgradgrezen.
Bei besonderen Anforderungen an die Laufruhe kann auf Anfrage eine schwingungsdämpfende Ausführung in der reduzierten Klasse (R) geliefert werden.
Die folgende Tabelle führt die Werte der Ist-Schwingungsgeschwindigkeit für einen normalen (N) und verbesserten (R) Ausgleich auf.

Vibrations et équilibrage

Tous les rotors sont équilibrés avec une demi languette et renttret dans les limites d'intensité de vibration prévues par les Normes CEI EN 60034-14.
En cas d'exigences particulière concernant le niveau de bruit, sur demande, il est possible de réaliser une exécution anti-vibrante, de degré réduit (R).
Le tableau ci-dessous indique les valeurs de la vitesse efficace de vibration pour un équilibrage standard (N) et améliorée (R).

(A33)

Grado di vibrazione *Vibration class* Schwingungsklasse *Degré de vibration*	Velocità di rotazione *Angular velocity* Drehungsgeswindikeit *Viitesse de rotation* n [min^{-1}]	Limiti della velocità di vibrazione *Limits of the vibration velocity* Grenzen der Schwingungsgeschwindigkeit *Limites de la vitesse de vibration* [mm/s]	
		BN 56…BN 132 **M05…M4**	**BN 160MR…BN 200** **M5**
N	600 ≤ n ≤ 3600	1.8	2.8
R	600 ≤ n ≤ 1800	0.71	1.12
	1800 < n ≤ 3600	1.12	1.8

I valori si riferiscono a misure con motore liberamente sospeso e funzionamento a vuoto.

Values refer to measures with freely suspended motor in unloaded conditions.

Die Werte beziehen sich auf die Abmessungen mit stehendem Motor, ohne Getriebe und Leerlauf.

Les valeurs se référent à des mesures avec moteur librement suspendu et fonctionnement à vide.

Morsettiera motore

La morsettiera principale è a sei morsetti per collegamento con capicorda. All'interno della scatola è previsto un morsetto per il conduttore di terra.
Le dimensioni dei perni di attacco sono riportate nella tabella seguente.
Nel caso di motori autofrenanti, il raddrizzatore per l'alimentazione del freno è fissato all'interno della scatola e provvisto di adeguati morsetti di collegamento.
Eseguire i collegamenti secondo gli schemi riportati all'interno della scatola coprimorsetti o nei manuali d'uso.

Terminal box

Terminal board features 6 studs for eyelet terminal connection.
A ground terminal is also supplied for earthing of the equipment.
Terminals number and type are shown in the following table.
Brakemotors house the a.c./d.c. rectifier (factory pre-wired) inside the terminal box.
Wiring instructions are provided either in the box or in the user manual.

Motorklemmenkasten

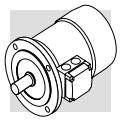
Die Hauptklemmleiste hat 6 Klemmen für den Anschluß mit Kabelschuhen. Im Innern des Klemmenkasten befindet sich eine Klemme für den Erdleiter.
Die Abmessungen der Auschüsse sind in der folgenden Tabelle angegeben.
Bei den Bremsmotoren befindet sich auch der mit den erforderlichen Anschlußklemmen ausgestattete Gleichrichter für die Stromversorgung der Bremse im Klemmenkasten.
Die Anschlüße müssen gemäß den Diagrammen im Klemmkasten oder in den Betriebsanwiesungen durchgeführt werden.

Bornier moteur

Le bornier principal prevoit six bornes pour raccordement avec cosses. Dans le boîtier se trouve une borne pour le conducteur de terre.
Les dimensions des axes de fixation sont reportées dans le tableau ci-dessous.
Dans le cas de moteurs freins, le redresseur pour l'alimentation du frein est fixé à l'intérieur du boîtier et est doté de bornes de raccordement.
Effectuer les connexions selon les schémas indiqués à l'intérieur du bornier, ou dans les manuels d'utilisation.

(A34)

		N° terminali *No. of terminals* Klemmen *N° bornes*	Filettatura terminali *Terminal threads* Gewinde *Filetage bornes*	Sezione max del conduttore *Wire max cross section area* Max. leiterquerschnitt *Section max du conducteur* mm^2
BN 56...BN 71	**M05, M1**	6	M4	2.5
BN 80, BN 90	**M2**	6	M4	2.5
BN 100...BN 112	**M3**	6	M5	6
BN 132...BN 160MR	**M4**	6	M5	6
BN 160M...BN 180M	**M5**	6	M6	16
BN 180L...BN 200L	**–**	6	M8	25



Ingresso cavi

Nel rispetto della Norma EN 50262, i fori di ingresso cavi nelle scatole morsettiera presentano filettature metriche della misura indicata nella tabella seguente.

Cable entry

The holes used to bring cables to terminal boxes use metric threads in accordance with standard EN 50262 as indicated in the table here after.

Kabeleingang

Unter Berücksichtigung der Norm EN 50262 verfügen die Kabeleingänge in die Klemmenkästen über metrische Gewinde, deren Maße, der nachstehenden Tabelle entnommen werden können.

Entrée câbles

Dans le respect de la Norme EN 50262, les orifices d'entrée câbles dans les boîtes à bornes présentent des filetages métriques de la taille indiquée dans le tableau ci-dessous.

(A35)

		Ingresso cavi / *Cable entry* kabeldurchführung / *Entrée câbles*	Diametro max. cavo allacciabile / *Max. cable diameter allowed* Max. zulässiger Kabeldurchmesser / *Diam. maxi câble* [mm]
BN 63	**M05**	2 x M20 x 1.5	13
BN 71	**M1**	2 x M25 x 1.5	17
BN 80 - BN 90	**M2**	2 x M25 x 1.5	17
BN 100	**M3**	2 x M32 x 1.5	21
		2 x M25 x 1.5	17
BN 112	**—**	4 x M25 x 1.5	17
BN 132...BN 160MR	**M4**	4 x M32 x 1.5	21
BN 160M...BN 200L	**M5**	2 x M40 x 1.5	29

Cuscinetti

I cuscinetti previsti sono del tipo radiale a sfere con lubrificazione permanente precaricati assialmente.
I tipi utilizzati sono indicati nelle tabelle seguenti. La durata nominale a fatica L_{10h} dei cuscinetti, in assenza di carichi esterni applicati è superiore a 40.000 ore, calcolata secondo ISO 281.

DE = lato comando
NDE = lato opposto comando

Bearings

Life lubricated preloaded radial ball bearings are used, types are shown in the chart here under.
Calculated endurance lifetime L_{10}, as per ISO 281, in unloaded condition, exceeds 40000 hrs.

***DE** = drive end*
***NDE** = non drive end*

Lager

Bei den Lagern handelt es sich um Radialkugellager mit Dauerschmierung.
Die verwendeten Typen sind in den folgenden Tabellen angegeben.
Die Lebensdauer der Lager bei einer Beanspruchung L_{10h} ist, sofern keine externen Kräfte wirken, über 40.000 Stunden (Berechnung gemäß ISO 281).

DE = Wellenseite
NDE = Lüfterseite

Roulements

Les roulements prévus sont du type radial à billes avec lubrification permanente.
Les types utilisés sont indiqués dans les tableaux ci-dessous.
La résistance à la déformation L_{10h} des roulements en absence de charges extérieures appliquées est supérieure à 40.000 heures calculée selon ISO 281.

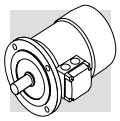
***DE** = sortie arbre*
***NDE** = côté ventilateur*

(A36)

	DE	**NDE**	
	M, M_FD, M_FA	**M**	**M_FD; M_FA**
M05	6004 2Z C3	6201 2Z C3	6201 2RS C3
M1	6004 2Z C3	6202 2Z C3	6202 2RS C3
M2	6007 2Z C3	6204 2Z C3	6204 2RS C3
M3	6207 2Z C3	6206 2Z C3	6206 2RS C3
M4	6309 2Z C3	6308 2Z C3	6308 2RS C3
M5	6309 2Z C3	6309 2Z C3	6309 2RS C3

(A37)

	DE	**NDE**	
	BN, BN_FD, BN_FA, BN_BA	**BN, BN_BA**	**BN_FD; BN_FA**
BN 56	6201 2Z C3	6201 2Z C3	–
BN 63	6201 2Z C3	6201 2Z C3	6201 2RS C3
BN 71	6202 2Z C3	6202 2Z C3	6202 2RS C3
BN 80	6204 2Z C3	6204 2Z C3	6204 2RS C3
BN 90	6205 2Z C3	6205 2Z C3	6305 2RS C3
BN 100	6206 2Z C3	6206 2Z C3	6206 2RS C3
BN 112	6306 2Z C3	6306 2Z C3	6306 2RS C3
BN 132	6308 2Z C3	6308 2Z C3	6308 2RS C3
BN 160MR	6309 2Z C3	6308 2Z C3	6308 2RS C3
BN 160M/L	6309 2Z C3	6309 2Z C3	6309 2RS C3
BN 180M	6310 2Z C3	6309 2Z C3	6309 2RS C3
BN 180L	6310 2Z C3	6310 2Z C3	6310 2RS C3
BN 200L	6312 2Z C3	6310 2Z C3	6310 2RS C3



M4 - CARATTERISTICHE ELETTRICHE

Tensione

I motori a una velocità sono previsti nell'esecuzione normale per tensione nominale 230V Δ / 400V Y, 50 Hz con tolleranza di tensione ± 10% (escluso i tipi M3LC4 e M3LC6).
In targa sono indicati oltre alla tensione nominale i campi di funzionamento consentiti,p.e.:
220 - 240V Δ
380 - 415V Y /50 Hz.
In accordo alle Norme CEI EN 60034-1 i motori possono funzionare alle tensioni sopra indicate con tolleranza del ± 5%.
Per funzionamento ai limiti di tolleranza la temperatura può superare di 10 K il limite previsto dalla classe di isolamento adottata.
Ad eccezione dei motori autofrenanti tipo BN_FD in targa vengono indicati anche i valori corrispondenti al funzionamento a 60 Hz (p.e. 460Y, 60 Hz) ed il relativo campo di tensione:
440 - 480VY, 60 Hz.

Per i motori autofrenanti con freno tipo FD le tensioni standard sono:
220V - 240V Δ - 50 Hz
380V - 415V Y - 50 Hz
con tensione di alimentazione freno 230V ± 10%.

La tabella seguente riporta le tensioni previste per i motori.

M4 - ELECTRICAL CHARACTERISTICS

Voltage

Single speed motors are rated for 230/400 V - 50 Hz.
A tolerance of ±10% applies to nominal voltage, with the exception of motors type M3LC4 and M3LC6.
In addition to nominal voltage-frequency values the name plate also shows voltage ranges the motor can operate under, e.g.:
220-240V Δ - 50 Hz
380-415V Y - 50 Hz
As per Norms CEI EN 60034-1 on above voltage values the ±5% tolerance applies.
When operating close to the tolerance limit values the winding temperature can exceed by 10 K the rated temperature for the given insulation class.
With the exception of BN_FD brakemotors, the rated voltage values for operation under 60 Hz mains are also shown on the nameplate, e.g. 460Y-60 Hz along with related tolerance field, e.g. 440-480V Y-60 Hz.

For brakemotors, FD type, rated voltage is:
220-240V Δ - 50 Hz
380-415V Y - 50 Hz
Brake supply is a.c. 230V ±10% single phase.

Chart below shows standard and optional wiring of motors.

M4 - ELEKTRISCHE EIGENSCHAFTEN

Spannung

Die eintourigen Motoren müssen in der Standardausführung mit einer Spannung von 230 V Δ / 400 V Y, 50 Hz mit einer Toleranz von ± 10% gespeist werden (Type M3LC4 und M3LC6 ausgenommen).
Auf dem Schild werden die Nennspannung hinaus, auch die zulässigen Ansprechbereiche angegeben, z.B.:
220-240V Δ
380-415V Y/50 Hz.
Gemäß den Normen CEI EN 60034-1 können die Motoren auf die oben genannten Spannungen mit Toleranzen von ± 5% arbeiten.
Bei Betrieb an den Spannungsgrenzen, kann die Temperatur bis zum 10K die für die verwendeten Isolierstoffklasse angegebenen Grenze überschreiten.
Darüber hinaus wird auf den Typensschild die dem 60 Hz-Betrieb entsprechenden Werte angegeben (d.h. 460 Y, 60 Hz) und das entsprechende Spannungsfeld, 440-480VY, 60 Hz.

Für die selbstbremsenden Motoren mit dem Bremsetyp FD sind die Standardspannungen folgende:
220V - 240V Δ - 50 Hz
380V - 415V Y - 50 Hz
mit Bremsspannungsversorgung von 230V ± 10%.

Die folgende Tabelle fürth die für die Motoren vorgesehenen Spannungen auf.

M4 - CARACTERISTIQUES ELECTRIQUES

Tension

Les moteurs à polarité unique sont prévus dans l'exécution normale pour tension 230V Δ / 400V Y, 50 Hz avec tolérance de tension ± 10% (sauf les types M3LC4 et M3LC6).
Outre la tension nominale, les plages de fonctionnement permises sont indiquées sur la plaquette signalétique, à savoir:
220-240V Δ
380-415V Y/50 Hz.
Selon les normes CEI EN 60034-1 les moteurs peuvent fonctionner aux tension indiquées ci-dessus avec une tolérance de ± 5%.
Pour un fonctionnement à la limite de tolérance, la température peut dépasser les 10K, la limite prevue de la classe d'isolation choisie.
Sur la plaque marque sont de plus indiqués les valeurs correspondantes au fonctionnement en 60 Hz (ex.460Y, 60 Hz) et la relative plage de tension:
440 - 480VY, 60 Hz.

En ce qui concerne les moteurs autofrenants avec frein de type FD, les tensions standard sont les suivantes :
220V - 240V Δ - 50 Hz
380V - 415V Y - 50 Hz
avec tension d'alimentation du frein 230V ± 10%.

La tableau ci-dessous indique les tensions prévues pour les moteurs.

(A38)

		BN M V_{mot} ± 10 % 3 ~	**BN_FD M_FD** V_{mot} ± 10 % 3 ~	V_B ± 10 % 1 ~	**BN_FA / BN_BA M_FA** V_{mot} ± 10 % 3 ~	V_B ± 10 % 3 ~	Esecuzione *Configuation* Version *Execution*
BN 56 - BN 132	**M05…M4**	230/400 - 50Hz 460 - 60Hz	230/400V Δ/Y- 50 Hz	230V	230/400V Δ/Y- 50 Hz 460V Y - 60Hz	230/400V Δ/Y- 50 Hz 460V Y - 60Hz	Standard
BN 100 - BN 132	**M3 - M4**	400/690 - 50Hz 460 - 60Hz	400/690V Δ/Y- 50 Hz	400V	400/690V Δ/Y- 50 Hz 460V Y - 60Hz	400/690V Δ/Y- 50 Hz 460V Y - 60Hz	A richiesta, senza sovrapprezzo *On request at no extra charge* Auf Anfrage, ohne Aufpreis *Sur demande, sans majoration de prix*

I motori a due velocità 400V/50Hz, sono previsti per tensione nominale standard 400V; tolleranze applicabili secondo CEI EN 60034-1.

Nella tabella seguente sono indicati i vari tipi di collegamenti previsti per i motori in funzione della polarità.

The only rated voltage for motors type 400V/50Hz and all double speed motors is 400V.
Applicable tolerances as per CEI EN 60034-1.

The table below shows the wiring options available.

Alle polumschaltbaren Motoren, die Typen 400V/50Hz, sind nicht umschaltbar, standard-mäßig nur für ein Spannung 400V vorgesehen; geltenden Toleranzen gemäß CEI EN 60034-1.

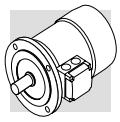
Auf die folgende Tabelle werden die verschiedenen für die Motoren vorgesehenen Anschlußtypen angegeben.

Tous les moteur à deux vitesses, les types 400V/50Hz, sont prevus pour une tension nominale standard de 400V; tolérances applicables selon CEI EN 60034-1.

Dans le tableau ci-dessous sont indiqués les differents types de connexion prevus pour les moteurs.

(A39)

		Poli / *Pole* / Polig / *Pôles*	Collegamento avvolgimento / *Wiring options* Wicklungsanschlubß / *Connexion du bobinage*
BN 56…BN 200	**M05…M5**	2, 4, 6	Δ / Y
		2/4	Δ / YY (Dahlander)
		2/6, 2/8, 2/12	Y / Y (due avvolgimenti / *Two windings* zwei Wicklungen / *Deux bobinage*)



Frequenza

I motori ad una velocità nell'esecuzione standard riportano in targa oltre alle tensioni del funzionamento a 50 Hz il campo di tensione 440 - 480V 60 Hz (escluso motori autofrenanti con freno FD) con potenza aumentata di circa il 20%
La potenza di targa dei motori a 60Hz corrisponde a quanto riportato nella tabella (A40) seguente:

Frequency

With the exception of brakemotors, name plate of standard single speed motors shows, besides the 50 Hz voltage ratings, also the rated power output for 60 Hz operation in the 440-480 V range.
Power output is increased by approx 20%.
Rated output power for 60 Hz operation is shown in the following diagram.

Frequenz

Bei eintourigen Motoren in der Standardausführung wird außer den 50 Hz-Betriebsspannungen auch den Spannungsfeld 440 - 480V 60 Hz angegeben (mit Ausnahme von Bremsmotoren mit Bremsentyp FD) mit einer erhöhten Leistung von ungefähr 20%.
Die Leistung auf das Namenschild von 60 Hz-Motoren entspricht den Daten aus der folgenden Tabelle (A40):

Fréquence

Les moteurs à une vitesse en exécution standard reportent sur la plaque marque en plus des tension du fonctionnement à 50 Hz la plage de tension 440 - 480V 60 Hz (moteurs freins avec frein FD exclus) avec puissance augmentée de 20% env.
La puissance sur la plaque marque des moteurs à 60 Hz correspond à celle indiquée au tableau (A40) suivant:

(A40)

		2P	4P	6P
		P_n [kW]		
BN 56A	**–**	–	0.06	–
BN 56B	**M0B**	–	0.10	–
BN 63A	**M05A**	0.21	0.14	0.10
BN 63B	**M05B**	0.30	0.21	0.14
BN 71A	**M05C**	0.45	0.30	0.21
BN 71B	**M1SD**	0.65	0.45	0.30
BN 80A	**M1LA**	0.90	0.65	0.45
BN 80B	**M2SA**	1.30	0.90	0.65
BN 90S	**M2SB**	–	1.30	0.90
BN 90SA	**M2SB**	1.8	–	–
BN 90L	**M3SA**	2.5	–	1.3
BN 90LA	**M3SA**	–	1.8	–
BN 100L	**M3LA**	3.5	–	–
BN 100LA	**M3LA**	–	2.5	1.8
BN 100LB	**M3LB**	4.7	3.5	2.2
BN 112M	**M3LB**	4.7	4.7	2.5
	M3LC	–	4.7	2.5
BN 132S	**M4SA**	–	6.5	3.5
BN 132SA	**M4SA**	6.3	–	–
BN 132SB	**M4SB**	8.7	–	–
BN 132M	**M4LA**	11	–	–
BN 132MA	**M4LA**	–	8.7	4.6
BN 132MB	**M4LB**	–	11	6.5
BN 160MR	**M4LC**	12.5	12.5	–
BN 160MB	**M5SB**	17.5	–	–
BN 160M	**M5SA**	–	–	8.6
BN 160L	**M5S**	21.5	17.5	12.6
BN 180M	**M5LA**	24.5	21.5	–
BN 180L	**–**	–	25.3	17.5
BN 200L	**–**	34	34	22

Motori a doppia polarità alimentati a 60 Hz avranno un aumento della potenza nominale, riferita a 50 Hz, pari al 15%.
Qualora sulla targhetta di un motore destinato ad essere alimentato a 60 Hz sia richiesto un valore di potenza nominale pari a quello normalizzato a 50 Hz specificare in designazione l'opzione PN.

For two-speed motors operated under 60 Hz supply the rated power output is increased by 15% as compared to same motor with 50 Hz supply.
If same IEC-normalised 50 Hz power rating value is desired on name plate of a 60 Hz operated motor specify option PN in the ordering code.
Standard motors wound for 50

Für polumschaltbare Motoren mit 60 Hz Spannungsversorgung ist die vorgesehene Leistungserhöhung gemäß den Datenblätter von 15%.
Wenn die angefragte 60 Hz-Leistung der normierten 50 Hz-Leistung entspricht, geben bei der Bezeichnung das Option PN an.
Die Motoren mit einer Wicklung für eine Frequenz von 50 Hz

Pour les moteurs à deux vitesses avec alimentation 60 Hz l'augmentation de puissance prevue per rapport aux valeurs indiquées dans les tableaux techniques, sera de 15%.
Si la puissance requise à 60 Hz correspond à la puissance normalisée à 50 Hz on devra indiquer l'option PN.
Les moteurs bobinés pour fré-

I motori normalmente avvolti per frequenza 50 Hz possono essere usati in reti a 60 Hz con i loro dati che saranno corretti come da tabella seguente.
I freni, se presenti, dovranno sempre essere alimentati alla tensione V_b, riportata in targa.

Hz supply can be operated under 60 Hz with main data corrected as per chart below:
Brakes, if fitted, must be supplied with the voltage value V_b that is stated on the nameplate.

können entsprechend den Angaben von Tabelle (A40) an Netze mit 60 Hz angeschlossen werden.
Die Bremse muss, falls angebaut, mit der auf dem Typenschild angegebenen Spannung V_b betrieben werden.

quence 50 Hz peuvent être utilisés sur réseau à 60 Hz selon les indications du tableau (A40).
Les freins, si présents, devront toujours être alimentés avec la tension V_b rapportée sur la plaque.

(A41)

50 Hz	**60 Hz**			
V - 50 Hz	**V** - 60 Hz	**Pn** - 60 Hz	**M_n, M_a/M_n** - 60 Hz	**n** [min^{-1}] - 60 Hz
230/400 Δ/Y	220 - 240 Δ 380 - 415 Y	1	0.83	1.2
400/690 Δ/Y	380 - 415 Δ			
230/400 Δ/Y	265 - 280 Δ 440 - 480 Y	1.15	1	1.2
400/690 Δ/Y	440 - 480 Δ			

Potenza nominale

Le tabelle dei dati tecnici del catalogo riportano le caratteristiche funzionali a 50 Hz in condizioni ambientali standard secondo le Norme CEI EN 60034-1 (temperatura 40 °C e altitudine <1000 m s.l.m.).
I motori possono essere impiegati a temperature comprese tra 40 °C e 60 °C applicando i declassamenti di potenza indicati nelle tabelle seguenti.

Rated power

Catalogue rating values are calculated for 50 Hz operation and for standard ambient conditions (temperature 40 °C; elevation <1000 m a.s.l.) as per the CEI EN 60034-1 Standards.
The motors can be used within the 40 - 60 °C temperature range with rated power output adjusted by factors given in the following charts.

Nennleistung

Die Betriebsdatentabellen des Katalogs enthalten die technischen Daten bei einer Frequenz von 50 Hz bei normalen Umgebungsbedingungen gemäß den Normen CEI EN 60034-1 (Temperatur 40°C und Höhe <1000 m ü.d.M.). Die Motoren können in größeren Temperaturen zwischen 40°C und 60°C betrieben werden, wenn man die in den Tabellen (A41) angegebenen Rückstufungen anwendet.

Puissance nominale

Les tableaux fonctionnels du catalogue présentent les caractéristiques techniques à 50 Hz dans des conditions ambiantes standard selon les normes CEI EN 60034-1 (température 40°C et altitude <1000 m).
Les moteurs peuvent être employés à des températures comprises entre 40°C et 60°C en appliquant les déclassements de puissance indiqués dans les tableaux suivantes.

(A42)

Temperatura ambiente / *Ambient temperature* / Umgebungstemperatur / *Température ambiante(°C)*	40°	45°	50°	55°	60°
Potenza ammissibile in % della potenza nominale / *Permitted power as a % of rated power* Zulässige Leistung in % der Nennleistung / *Puissance admissible en % de la puissance nominale*	100%	95%	90%	85%	80%

Quando è richiesto un declassamento del motore superiore al 15%, contattare il ns. Servizio Tecnico.

Should a derating factor higher than 15% apply please consult factory.

Wenn eine Motordeklassierung höher als 15% gefragt ist, wir bitten um Rückfrage.

Si un déclassement du moteur supérieur à 15% est requis, on devra contacter notre Service Technique.

Classe d'isolamento

Insulation class

Isolationsklasse

Classes d'isolation

CL F

I motori di produzione Bonfiglioli impiegano, di serie, materiali isolanti (filo smaltato, isolanti, resine d'impregnazione) in classe **F**.

*Bonfiglioli motors use class **F** insulating materials (enamelled wire, insulators, impregnation resins) as compare to the standard motor.*

Die Motoren von Bonfiglioli sind serienmäßig mit Isolierstoffen (Emaildraht, Isolierstoffen, Imprägnierharzen) der Klasse **F** ausgestattet.

*De série, les moteurs fabriqués par Bonfiglioli utilisent des matériaux isolants (fil émaillé, isolants, résines d'imprégnation) en classe **F**.*

CL H

Su richiesta può venire specificata la classe di isolamento **H**.

In genere, per i motori in esecuzione standard la sovratemperatura dell'avvolgimento statore è contenuta entro il limite di 80 K, corrispondente alla sovratemperatura di classe B.

*Motors manufactured in insulation class **H** are available at request.*

In standard motors, stator windings over temperature normally stays below the 80 K limit corresponding to class B over temperature.

Auf Anfrage können sie auch in der Klasse **H** geliefert werden.

Allgemein hält sich die Übertemperatur der Motoren in der Standardausführung innerhalb des Grenzwerts von 80 K, der einer Übertemperatur der Klasse B entspricht.

*Sur demande, la classe d'isolation **H** peut être spécifiée.*

En général, pour les moteurs en exécution standard, l'échauffement de l'enroulement du stator se situe dans la limite de 80 K, correspondant à un échauffement de classe B.

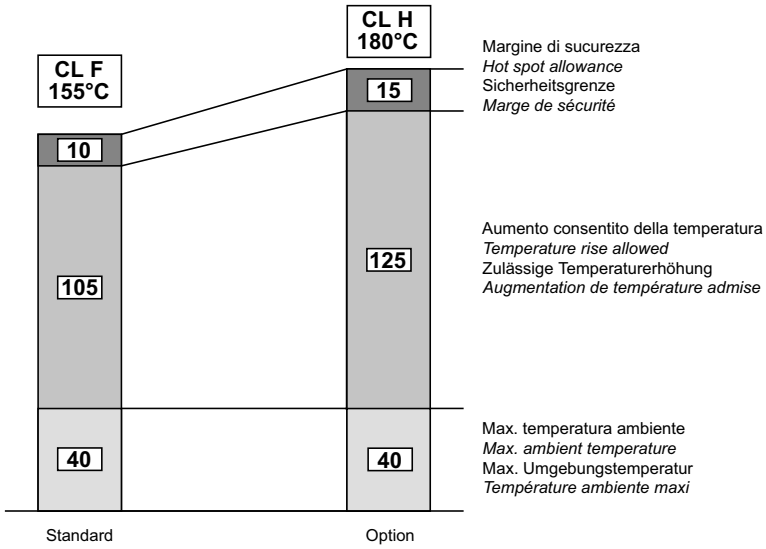
L'accurata scelta dei componenti del sistema isolante consente l'impiego dei motori anche in climi tropicali ed in presenza di vibrazioni normali.
Per applicazioni in presenza di sostanze chimiche aggressive, o di elevata umidità, è consigliabile contattare il Servizio Tecnico Bonfiglioli per la selezione del prodotto più idoneo.

A careful selection of insulating components makes the motors compatible with tropical climates and normal vibration.
For applications involving the presence of aggressive chemicals or high humidity, contact Bonfiglioli Engineering for assistance with product selection.

Die sorgfältig Wahl der Komponenten des Isoliersystem gestatten den Einsatz dieser Motoren auch unter tropischen Klimabedingungen und bei Vorliegen normaler Schwingungen.
Für den Einsatz in in der Nähe aggressiv wirkenden chemischen Substanzen oder bei hoher Luftfeuchtigkeit, wird empfohlen sich zur Wahl eines passendes Produktes mit unserem Technischen Kundendienst in Verbindung zu setzen.

Le choix soigné des composants du système d'isolation permet d'utiliser également les moteurs dans des climats tropicaux et en présence de vibrations normales.
Pour des applications en présence de substances chimiques agressives, ou d'humidité élevée, il est conseillé de contacter le Service Technique Bonfiglioli pour sélectionner le produit le plus adapté.

(A43)



Tipo di servizio

Se non indicato diversamente la potenza dei motori riportata a catalogo si riferisce al servizio continuo S1.
Per i motori utilizzati in condizioni diverse da S1 sarà necessario identificare il tipo di servizio previsto con riferimento alle Norme CEI EN 60034-1.
In particolare, per i servizi S2 ed S3, è possibile ottenere una maggiorazione della potenza termica rispetto a quella prevista per il servizio continuo secondo quanto indicato nella tabella (A44) valida per motori ad una velocità. Per motori a doppia polarità interpellare il nostro Servizio Tecnico.

Type of duty

Unless otherwise indicated, the power of motors specified in the catalogue refers to continuous duty S1.
For motors used under conditions other than S1, the type of duty required must be adjusted with reference to CEI EN 60034-1 Standards.
In particular, for duties S2 and S3, power can be adjusted with respect to continuous duty according to data in table (A44) applicable to single speed motors. For double speed motors, contact our Technical Service.

Betriebsart

Sofern nicht anders angegeben, bezieht sich die im Katalog angegebene Motorleistung auf den Dauerbetrieb S1.
Bei den Motoren, die für eine andere Betriebsart als S1 vorgesehen sind, muß man die Betriebsart unter Bezugnahme auf die Normen CEI EN 60034-1 identifizieren.
Insbesondere kann man für die Betriebsarten S2 und S3 nach der für Motoren mit einer Drehzahl. Gültigen Tabelle (A44) eine Überdimensionierung der Leistung für den Dauerbetrieb im Vergleich zur vorgesehenen Betriebsart erreichen. Für polumschaltbaren Motoren, bitte Rückfrage.

Type de service

Sauf indication contraire, la puissance des moteurs reportée dans le catalogue se réfère au service continu S1.
Pour les moteurs utilisés dans des conditions différentes de S1, il sera nécessaire d'identifier le type de service prévu en se référant aux normes CEI EN 60034-1.
En particulier, pour les services S2 et S3, il est possible d'obtenir une majoration de la puissance par rapport à celle prévue pour le service continu selon ce qui est indiqué dans le tableau (A44) valable pour les moteurs à une vitesse. Pour les moteurs à double polarité, contacter notre Service Technique.

(A44)

	Servizio / *Duty* / Betriebsart / *Service*						
	S2			**S3 ***			**S4 - S9**
	Durata del ciclo (min) / *Cycle duration (min)* Zyklusdauer (min) / *Durée du cycle (min)*			Rapporto di intermittenza (I) / *Cyclic duration factor (I)* Relative Einschaltdauer (I) / *Rapport d'intermittence (I)*			Interpellarci *Consult factory* Rückfrage *Nous contacter*
	10	**30**	**60**	**25%**	**40%**	**60%**	
f_m	1.35	1.15	1.05	1.25	1.15	1.1	

* La durata del ciclo dovrà comunque essere uguale o inferiore a 10 minuti; se superiore interpellare il nostro Servizio Tecnico.

** Cycle duration must, in any event, be equal to or less than 10 minutes; if this time is exceeded, please contact our Technical Service.*

* Die Zyklusdauer muß in jedem Fall kleiner oder gleich 10 Minuten sein. Wenn sie darüber liegt, unseren Technischen Kundendienst zu Rate ziehen.

** La durée du cycle devra être inférieure ou égale à 10 minutes. Si supérieure, contacter notre Service Technique.*

Rapporto di intermittenza: ***Cyclic duration factor:*** **Relative Einschaltdauer:** ***Rapport d'intermittence:***

$$I = \frac{t_f}{t_f + t_r} \cdot 100 \qquad (23)$$

t_f = tempo di funzionamento a carico costante
t_r = tempo di riposo

t_f = work time under constant load
t_r = rest time

t_f = Betriebszeit mit konstanter Last
t_r = Aussetzzeit

t_f = temps de fonctionnement à charge constante
t_r = temps de repos

Servizio di durata limitata S2

Caratterizzato da un funzionamento a carico costante per un periodo di tempo limitato, inferiore a quello richiesto per raggiungere l'equilibrio termico, seguito da un periodo di riposo di durata sufficiente a ristabilire, nel motore, la temperatura ambiente.

Limited duration duty S2

This type of duty is characterized by operation at constant load for a limited time, which is shorter than the time required to reach thermal equilibrium, followed by a rest period of sufficient duration to restore ambient temperature in the motor.

Kurzzeitbetrieb S2

Betrieb mit konstanter Last für eine begrenzte Zeit, die unter der Zeit liegt, die zum Erreichen des thermischen Gleichgewichts benötigt wird, gefolgt von einer Aussetzzeit, die so lang ist, daß der Motor wieder auf die Umgebungstemperatur abkühlen kann.

Service de durée limitée S2

Caractérisé par un fonctionnement à charge constante pour une période de temps limitée, inférieure à celle necessaire pour atteindre l'équilibre thermique, suivie par une période de repos de durée suffisante pour rétablir, dans le moteur, la température ambiante.

Servizio intermittente periodico S3:

Caratterizzato da una sequenza di cicli di funzionamento identici, ciascuno comprendente un periodo di funzionamento a carico costante ed un periodo di riposo. In questo servizio, la corrente di avviamento non influenza la sovratemperatura in modo significativo.

Periodical intermittent duty S3:

This type of duty is characterized by a sequence of identical operation cycles, each including a constant load operation period and a rest period.
For this type of duty, the starting current does not significantly influence overtemperature.

Periodische Einschaltsdauer S3:

Betrieb mit aufeinanderfolgenden identischen Betriebszyklen, die alle einen kurzzeitigen Betrieb mit konstanter Belastung und eine Aussetzzeit einschließen.
Bei dieser Betriebsart beeinflußt der Anlaufstrom die Übertemperatur nicht in signifikanter Weise.

Service intermittent périodique S3

Caractérisé par une séquence de cycles de fonctionnement identiques, comprenant chacun une période de fonctionnement à charge constante et une période de repos. Dans ce service, le courant de démarrage n'influence pas l'excès de température de façon significative.

Funzionamento con alimentazione da inverter

I motori elettrici della serie BN ed M possono essere utilizzati con alimentazione da inverter PWM, e tensione nominale all'ingresso del convertitore fino a 500 V.
Il sistema isolante sui motori di serie prevede l'isolamento di fase con separatori, l'utilizzo di filo smaltato in grado 2 e resine d'impregnazione in classe H (limite di tenuta all'impulso di tensione 1600V picco-picco e fronte di salita t_s > 0.1µs ai morsetti motore).
Le caratteristiche tipiche coppia/velocità in servizio S1 per motore con frequenza base f_b = 50 Hz sono riportate in tab. (A54).
Per frequenze di funzionamento inferiori a circa 30 Hz, a causa della diminuzione della ventilazione, i motori standard autoventilati (IC411) devono essere opportunamente declassati in coppia o, in alternativa, devono essere provvisti di servoventilatore indipendente.
Per frequenze maggiori alla frequenza base, raggiunto il valore massimo di tensione di uscita dell'inverter, il motore lavora in un

Inverter-controlled motors

The electric motors of series BN and M may be used in combination with PWM inverters with rated voltage at transformer input up to 500 V.Standard motors use a phase insulating system with separators, class 2 enamelled wire and class H impregnation resins (1600V peak-to-peak voltage pulse capacity and rise edge t_s > 0.1µs at motor terminals). Table (A54) shows the typical torque/speed curves referred to S1 duty for motors with base frequency f_b = 50 Hz.
Because ventilation is somewhat impaired in operation at lower frequencies (about 30 Hz), standard motors with incorporated fan (IC411) require adequate torque derating or - alternately - the addition of a separate supply fan cooling.
Above base frequency, upon reaching the maximum output voltage of the inverter, the motor enters a steady-power field of operation, and shaft torque drops with ratio (f/f_b).

Betrieb mit Versorgung über Inverter

Die Elektromotoren der Serie BN und M können über einen Inverter PWM und mit einen Nennspannung am Wandlereingang bis zu 500 V versorgt werden. Das an den Serienmotoren angewendete System sieht eine Phasenisolierung mittels Trennvorrichtungen vor, ebenso wie einen Emaildraht mit Grad 2 und Imprägnierungsharze in der Klasse H vor (Abdichtungsgrenze bei Spannungsimpuls 1600V Spitze-Spitze und Anstiegsfront t_s > 0.1µs an den Motorklemmen).Die typischen Merkmale von Drehmoment/Geschwindigkeit im Betrieb S1 für Motoren mit einer Grundfrequenz f_b = 50 Hz werden in der Tab. (A54) angegeben.Bei Betriebsfrequenzen unter ungefähr 30 Hz müssen die selbstlüftenden Standardmotoren (IC411) aufgrund der in diesem Fall abnehmenden Belüftung entsprechend paarweise deklassiert, oder in Alternative, mit unabhängigen Servoventilatoren ausgestattet werden. Bei über der Grundfrequenz liegenden Frequenzen arbeitet der Motor,

Fonctionnement avec alimentation par variateur de vitesse

Les moteurs électriques de la série BN et M peuvent être utilisés avec alimentation par variateur PWM, et tension nominale en entrée du convertisseur jusqu'à 500V.Le système adopté sur les moteurs de série prévoit l'isolation de phase avec des séparateurs, l'utilisation de fil émaillé niveau 2 et résines d'imprégnation de classe H (limite de maintien à l'impulsion de tension 1600V pic-pic et front de montée t_s > 0.1µs aux bornes moteur).Les caractéristiques typiques couple/vitesse en service S1 pour moteur avec fréquence de base f_b = 50 Hz sont indiquées dans le tab. (A54).
Pour des fréquences de fonctionnement inférieures à environ 30 Hz, à cause de la diminution de la ventilation, les moteurs standards autoventilés (IC411) doivent être opportunément déclassés au niveau du couple ou, en alternative, doivent être équipés de servoventilateur indépendant.
Pour des fréquences supérieures à la fréquence de base, une fois

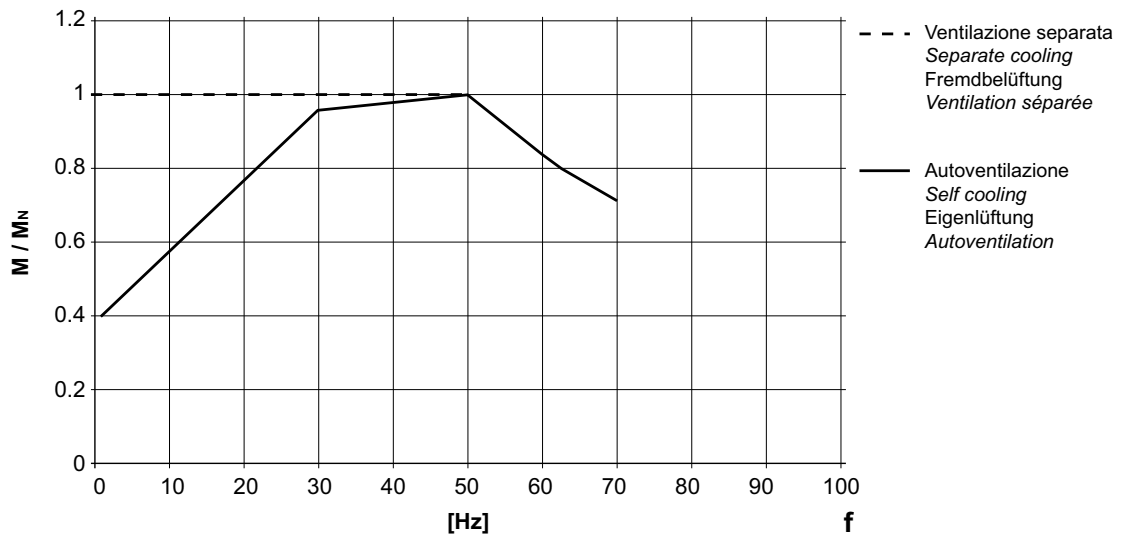
campo di funzionamento a potenza costante, con coppia all'albero che si riduce ca. con il rapporto (f/f_b).
Poiché la coppia massima del motore decresce ca. con $(f/f_b)^2$, il margine di sovraccarico ammesso dovrà essere progressivamente ridotto.

As motor maximum torque decreases with $(f/f_b)^2$, the allowed overloading must be reduced progressively.

nach Erreichen des max. Spannungswerts am Inverterausgang in einem Betriebsbereich unter konstanter Leistung mit einem Drehmoment an der Welle, der sich ungefähr im Verhältnis (f/f_b) reduziert. Da das max. Drehmoment des Motors mit ungefähr $(f/f_b)^2$ abnimmt, muss auch der zulässige Überbelastungsgrenzwert progressiv reduziert werden.

la valeur maximale de tension de sortie du variateur atteinte, le moteur fonctionne dans une plage de fonctionnement à puissance constante, avec couple à l'arbre qui se réduit avec le rapport (f/f_b).Dans la mesure où le couple maximal du moteur diminue avec $(f/f_b)^2$, la marge de surcharge admise doit être progressivement réduite.

(A45)



Per funzionamento oltre la frequenza nominale, la velocità limite meccanica dei motori è riportata in tabella (A45):

Table (A45) reports the mechanical limit speed for motor operation above rated frequency:

Für einen Betrieb, der über die Nennfrequenz hinausgeht, wird die Geschwindigkeitsbegrenzung der Motoren in der Tabelle (A45) angegeben:

En cas de fonctionnement au-delà de la fréquence nominale, la vitesse limite mécanique des moteurs est indiquée dans le tableau (A45):

(A46)

		n [min^{-1}]		
		2p	**4p**	**6p**
≤ BN 112	**M05…M3**	5200	4000	3000
BN 132...BN 200L	**M4, M5**	4500	4000	3000

A velocità superiori alla nominale i motori presentano maggiori vibrazioni meccaniche e rumorosità di ventilazione; è consigliabile, per queste applicazioni, un bilanciamento del rotore in grado R e l'eventuale montaggio del servoventilatore indipendente.

Above rated speed, motors generate increased mechanical vibration and fan noise. Class R rotor balancing is highly recommended in these applications. Installing a separate supply fan cooling may also be advisable.

Bei Geschwindigkeiten über die Nennwerte hinaus, weisen die Motoren höhere mechanische Schwingungen und mehr Funktionsgeräusche bei der Belüftung auf. Bei diesen Applikationen wird ein Auswuchten des Rotors im Grad R und eine eventuelle Montage des unabhängig funktionierenden Servoventilators empfohlen.

A des vitesses supérieures à la vitesse nominale, les moteurs présentent plus de vibrations mécaniques et de bruit de ventilation ; pour ces applications, il est conseillé d'effectuer un équilibrage du rotor en niveau R et de monter éventuellement un servoventilateur indépendant.

Il servoventilatore e, se presente, il freno elettromagnetico devono sempre essere alimentati direttamente da rete.

Remote-controlled fan and brake (if fitted) must always be connected direct to mains power supply.

Der Servoventilator und, falls vorhanden, die elektromagnetische Bremse müssen immer direkt über das Netz gespeist werden.

Le servoventilateur et, si présent, le frein électromagnétique doivent toujours être alimentés directement par le réseau.