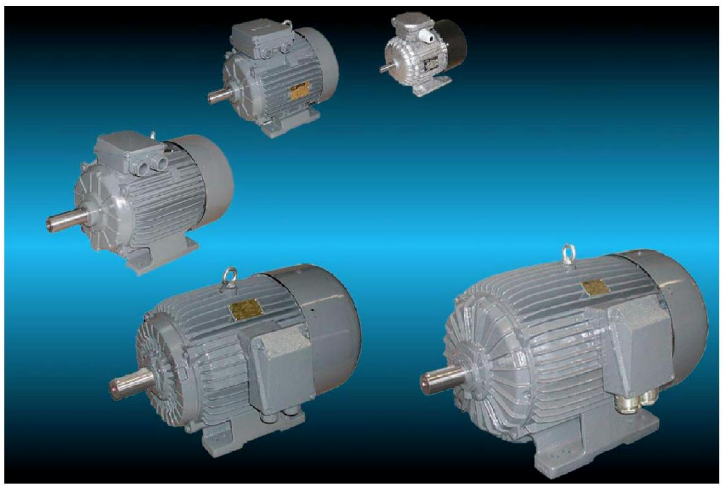
Frank & Dvorak

AUSTRIA

Permanent Capacitor and Capacitor Start Capacitor Run Single Phase Electric Motors

INTRODUCTION

FFD offers a full range of low voltage electric motors. Single phase motors as well as three phase squirrel cage induction motors for continuous duty are available. All motors are manufactured according to the ISO 9001 certification.



Single Phase Electric Motors

a.) Types **NPEKg**, **NPEKh** and **NPEg** with a low starting torque. These motors have a single running capacitor.

They are available in the frame sizes 56 to 100 with the outputs 0,04kW to 2,7kW and with the starting torque ratio 0,4 to 1,4.

b.) Types **FDEB** and **FDET** with a high starting torque. These motors have built on a starting and a running capacitor.

The design incorporates a centrifugal switch. They are available in the frame sizes 63 to 112 with the outputs 0,12kW to 4,0kW and with the starting torque ratio 1,5 to 2,55.

Construction of the Motors

1.) **Housing:**
The motor frame, sizes 56 to 112, is made of die-cast aluminium alloy and has detachable feet.

2.) **End-shields and flanges:**
End-shields and flanges for motors of the frame sizes 56 to 80 are made of aluminium alloy.
End-shields and flanges for motors of the frame sizes 90 to 112 are made of cast iron.

3.) **Rotor:**
The rotor is made of die-cast aluminium. The rotor and shaft is dynamically balanced with half key according. to DIN ISO 8821.

4.) **Terminal boxes:**
The motors of the frame size 56 to 112 have their terminal box on the top of the housing. The terminal box can be rotated in steps of 90 deg. Motors with the terminal box on the left side also are available on request.

5.) **Fan:**
The fan for the motors of the frame size 56 to 112 is made of plastic.

6.) **Cooling:**
The motors are surface cooled (IC411).

7.) **Fan cover:**
The fan cover for all motors is made of sheet steel.

8.) **The shaft ends:**
Motors in their standard version have one shaft end with the dimensions according to EN.
Shaft ends of the motors of the frame size 63 and above have a drilled and tapped hole.
On request, with an extra charge motors are available with a special shaft end and/or two shaft ends too.

9.) **Degree of protection:**
All motors of this catalogue are manufactured with the degree of protection IP 55 On request the motors are available with a higher degree of protection.

10.) **Nominal voltage and frequency:**
The nominal voltage of single phase motors is 230 V ±10% at the nominal frequency of 50Hz.
Motors for another nominal voltage and/or another nominal frequency are available on request.

11.) **Nominal output:**
The motors will properly operate with the nominal output at continuous duty (S1) when the following conditions are observed:

- motor is supplied with nominal voltage and frequency
- ambient temperature is not higher than + 40°C
- altitude of site is up to 1000m above sea level

12) **Insulation:**
The standard motors (DPIG and DPIH series) are manufactured in the insulation class F.

STANDARDS

The motors are manufactured in accordance with the following standards:

Subject	European Norm (EN)	Subject	European Norm (EN)
Nominal data	EN 60034-1	Direction of rotation	EN 60034-8
Losses and efficiency	EN 60034-2	Noise limits	EN 60034-9
Degree of protection	EN 60034-5	Vibration limits	EN 60034-14
Methods of cooling	EN 60034-6	Mounting dimensions	EN 60072-1
Type of mounting	EN 60034-7		

The motors comply with national standards of other European countries too:

Belgium:	NBNC 51-101/1976	Germany:	VDE 0530	Netherlands:	NEN 3173/1977
Denmark:	DS 5002/1958	Great Britain:	BS 4999.1987	Norway:	NEK 41.69-49.72
France:	NF C51-111/11.1975		BS 5000 part 16:1985	Sweden:	SEN 260101/1974

BEARINGS

The exact bearing type for each motor is specified in the table below:

Motor		Type of bearing	
Size	**Speed poles**	**DE**	**NDE**
DPIG 56	2,4	6201 ZZ	
DPIG 63	2,4,6,8	6202 ZZ	
DPIH 71	2,4,6,8	6203 ZZ	
DPIH 80	2,4,6,8	6204 ZZ	
DPIH 90 S,L	2,4,6,8	6205 ZZ C3 (6205 2RS at IMV1)	
DPIG 100 L	2,4,6,8	6206 ZZ C3 (6206 2RS at IMV1)	
DPIG 112 M	2,4,6,8	6306 ZZ C3 (6306 2RS at IMV1)	

The quality of the bearings and a perfect grease ensures the lifetime of the bearing system of about 10 000 hours at 2-pole motors and of about 20 000 hours at 4-, 6- and 8-pole motors

Performance data of single phase motors 230V

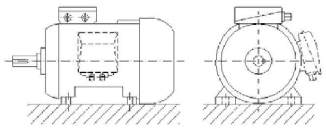
Type	Rated seed	Nominal output		Nominal current Amps	Efficiency	Power factor Cos φ	Nominal torque T_N	Start / Nominal torque	Start / Nominal Current	Breakdown/ Nominal torque	Moment of inertia	Run capacitor (450V)	Start Capacitor (450V)	Weight
	min-1	kW	HP	230V	%		Nm	TS/TN	IS/IN	TB/TN	kgm2	µF	µF	Kg
2 pole; 50Hz; 3000rpm														
Low starting torque														
NPEKg 56 - 2A	2800	0,06	0,08	0,70	50	0,78	0,205	1,00	2,4	2,3	0,000070	3	--	3,1
NPEKg 56 - 2B	2790	0,09	0,12	0,85	53	0,90	0,307	1,00	2,5	2,0	0,000090	5	--	3,5
NPEKg 56 - 2C	2800	0,12	0,17	1,15	57	0,84	0,409	0,75	3,0	2,0	0,000100	5	--	3,9
NPEKg 63 - 2B	2760	0,18	0,25	1,80	52	0,84	0,614	0,80	2,7	2,0	0,000235	8	--	4,4
NPEKg 63 - 2C	2800	0,25	0,33	1,80	65	0,95	0,847	0,70	3,1	2,0	0,000310	10	--	5,2
NPEKh 71 - 2B	2800	0,37	0,50	3,00	64	0,90	1,260	0,70	2,7	1,8	0,000536	12	--	6,3
NPEKh 71 - 2C	2780	0,55	0,75	3,60	70	0,98	1,890	0,65	3,2	1,6	0,000691	20	--	7,7
NPEKh 80 - 2B	2800	0,75	1,00	5,00	70	0,94	2,560	0,65	3,4	1,9	0,001110	25	--	9,7
NPEKh 80 - 2C	2800	1,10	1,50	7,20	71	0,95	3,750	0,60	3,5	1,8	0,001420	30	--	11,6
NPEh 90 - 2S	2800	1,50	2,00	9,00	77	0,99	5,120	0,40	3,3	1,6	0,001200	40	--	12,4
NPEh 90 - 2L	2780	2,00	2,80	13,0	74	0,99	6,870	0,40	2,5	1,4	0,001600	50	--	15,2
NPEg 100L – 2	2830	2,70	3,60	16,7	71	0,99	9,100	0,50	4,4	1,5	0,005200	60	--	24,0
High starting torque														
FDEB 63 - 2A	2820	0,18	0,25	1,45	57	0,95	0,610	1,80	4,0	1,7	0,000175	8	25	4,0
FDEB 63 - 2B	2850	0,25	0,33	1,85	66	0,94	0,838	1,90	4,1	1,9	0,000235	10	30	4,6
FDEB 63 - 2C	2850	0,37	0,50	2,45	72	0,95	1,240	1,70	4,5	1,6	0,000310	12	40	5,4
FDEB 71 - 2B	2820	0,55	0,75	3,80	68	0,96	1,860	1,70	3,6	1,6	0,000530	14	25	6,5
FDEB 71 - 2C	2820	0,75	1,00	4,90	71	0,98	2,540	1,70	4,0	1,5	0,000690	25	70	8,1
FDEB 80 - 2B	2780	1,10	1,50	7,00	72	0,97	3,780	1,70	3,5	1,4	0,001110	25	70	10,6
FDEB 80 - 2C	2800	1,50	2,00	9,50	75	0,96	5,120	1,90	3,7	1,7	0,001420	40	60	12,2
FDET 90S - 2	2880	1,50	2,00	9,09	75	0,96	4,900	1,80	5,5	2,0	0,002100	25	125	16,0
FDET 90L - 2	2880	2,20	3,00	13,1	77	0,95	7,300	1,60	5,3	2,0	0,002600	35	160	19,0
FDET 100L - 2	2915	3,00	4,00	17,6	79	0,94	9,800	1,60	6,4	2,1	0,005200	40	250	27,0
FDEB 112M - 2F	2840	4,00	5,40	25,0	74	0,96	13,45	1,7	4,0	1,4	0,007900	75	625	35,0
4 pole; 50Hz; 1500rpm														
Low starting torque														
NPEKg 56 - 4A	1390	0,04	0,06	0,50	40	0,84	0,275	1,40	2,0	2,10	0,000200	3	--	3,1
NPEKg 56 - 4B	1390	0,06	0,08	0,73	44	0,85	0,412	1,10	2,1	2,20	0,000250	4	--	3,5
NPEKg 56 - 4C	1360	0,09	0,12	1,10	50	0,86	0,632	1,10	2,0	1,80	0,000300	5	--	4,0
NPEKg 63 - 4B	1360	0,12	0,17	1,25	53	0,88	0,843	1,00	2,2	1,90	0,000307	6	--	4,3
NPEKg 63 - 4C	1350	0,18	0,25	1,72	58	0,78	1,273	0,80	2,3	1,60	0,000380	8	--	5,1
NPEKh 71 - 4B	1340	0,25	0,33	2,60	56	0,82	1,780	1,00	2,0	1,70	0,000852	10	--	6,3
NPEKh 71 - 4C	1340	0,37	0,50	3,00	63	0,88	2,640	0,80	2,3	1,50	0,001099	16	--	7,7
NPEKh 80 - 4B	1360	0,55	0,75	3,90	66	0,94	3,860	0,60	3,2	1,60	0,002080	20	--	10,0
NPEKh 80 - 4C	1340	0,75	1,00	5,60	65	0,90	5,350	0,65	2,5	1,50	0,002650	25	--	11,4
NPEh 90 - 4S	1370	1,10	1,50	7,20	72	0,93	7,700	0,40	2,6	1,40	0,002400	30	--	12,3
NPEh 90 - 4L	1370	1,30	1,80	9,00	72	0,91	9,100	0,38	2,8	1,40	0,003200	40	--	14,0
NPEg 100L - 4	1370	2,20	3,00	14,2	73	0,92	15,30	0,40	3,6	1,80	0,007900	45	--	23,0
High starting torque														
FDEB 63 - 4A	1400	0,12	0,17	1,10	54	0,92	0,819	1,70	3,3	1,60	0,000240	6	14	3,8
FDEB 63 - 4B	1380	0,18	0,25	1,45	57	0,95	1,250	1,50	3,2	1,50	0,000307	8	16	4,4
FDEB 63 - 4C	1400	0,25	0,33	1,80	68	0,92	1,710	1,60	3,3	1,40	0,000380	10	20	5,2
FDEB 71 - 4B	1360	0,37	0,50	3,10	62	0,87	2,600	1,80	3,5	1,30	0,000850	10	25	6,5
FDEB 71 - 4C	1350	0,55	0,75	4,10	65	0,90	3,860	1,90	3,6	1,40	0,001010	18	60	8,0
FDEB 80 - 4B	1370	0,75	1,00	4,90	70	0,95	5,230	1,80	3,0	1,40	0,002080	20	60	10,4
FDEB 80 - 4C	1400	1,10	1,50	7,40	74	0,91	7,500	1,9	3,6	1,5	0,002650	30	75	12,2
FDET 90S - 4	1430	1,10	1,50	6,70	74	0,96	7,300	1,90	5,5	1,80	0,003800	25	125	16,0
FDET 90L - 4	1440	1,50	2,00	8,90	76	0,96	9,900	1,80	5,5	1,80	0,004700	30	160	18,5
FDET 100L - 4A	1435	2,20	3,00	13,3	75	0,96	14,60	1,90	5,4	2,10	0,007900	40	160	26,0
FDET 100L - 4B	1440	3,00	4,00	17,7	81	0,91	19,90	1,85	5,5	1,40	0,009400	40	250	30,5
FDEB 112M - 4F	1400	4,00	5,40	24,0	78	0,95	27,30	1,70	4,0	1,40	0,011800	70	500	35,0

Performance data of single phase motors 110V

Type	Rated seed	Nominal output		Nominal current Amps	Efficiency	Power factor Cos φ	Nominal torque T_N	Start / Nominal torque	Start / Nominal Current	Breakdown/ Nominal torque	Moment of inertia	Run capacitor (450V)	Start Capacitor (450V)	Weight
	min^{-1}	kW	HP	110V	%		Nm	T_S/T_N	I_S/I_N	T_B/T_N	kgm^2	µF	µF	Kg
2 pole; 50Hz; 3000rpm														
High starting torque														
FDET 90S - 2	2870	1,50	2,00	18,30	77	0,97	4,500	1,60	5,5	1,8	0,002100	100	500	16,5
FDET 90L - 2	2880	2,20	3,00	26,60	76	0,95	7,000	1,60	5,3	1,8	0,002600	35	160	19,0
4 pole; 50Hz; 1500rpm														
High starting torque														
FDET 90S - 4	1430	1,10	1,50	14,90	68	0,99	7,000	1,60	5,5	1,60	0,003800	100	500	16,5
FDET 90L - 4	1435	1,50	2,00	18,50	76	0,97	9,500	1,50	5,5	1,60	0,004700	120	500	19,0
FDET 100L - 4A	1440	2,20	3,00	26,80	77	0,97	14,00	1,60	5,4	1,90	0,007900	150	500	26,5

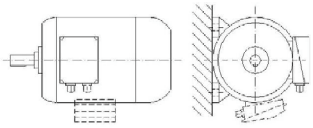
TYPES OF MOUNTING - According to IEC CODE I / IEC CODE II

IM B3/IM 1001



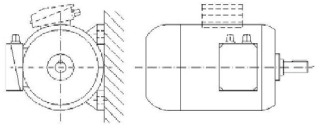
Foot mounted, frame size 56 to 315

IM B6/IM 1051



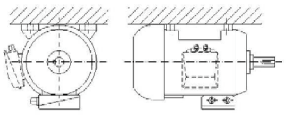
Foot wall mounted, with feet on left-hand side when viewed from D.E., frame size 56 to 315 excl. SEE 315 series

IM B7/IM 1061



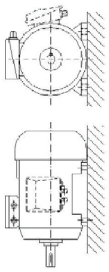
Foot wall mounted, with feet on right-hand side when viewed from D.E., frame size 56 to 315 excl. SEE 315 series

IM B8/IM 1071



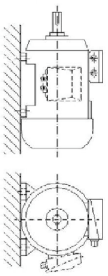
Ceiling mounted, with feet above motor, frame size 56 to 315 excl. SEE 315 series

IM V5/IM 1011



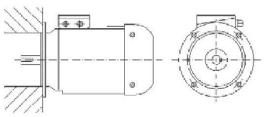
Vertical feet, wall mounted, shaft down frame size 56 to 315

IM V6/IM 1031



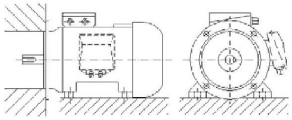
Vertical feet, wall mounted, shaft up frame size 56 to 315

IM B5/IM 3001



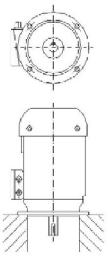
´D´ type flange at D.E. side, no feet frame size 56 to 315

IM B35/IM 2001



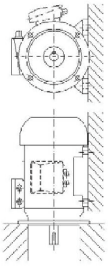
´D´ type flange at D.E. side, with feet, frame size 56 to 315

IM V1/IM 3011



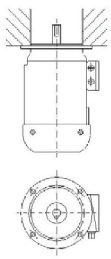
´D´ type flange at D.E. side, shaft down, no feet, frame size 56 to 315

IM V15/IM 2011



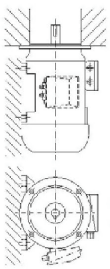
´D´ type flange at D.E. side, shaft down, with feet, frame size 56 to 315

IM V3/IM 3031



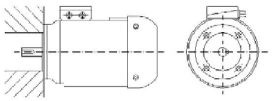
´D´ type flange at D.E. side, shaft up, no feet, frame size 56 to 315 excl. SEE 315 series

IM V36/IM 2031



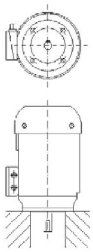
´D´ type flange at D.E. side, shaft up, with feet, frame size 56 to 315

IM B14/IM 3601



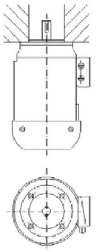
´C´ type flange at D.E. side, no feet, frame size 56 to 132

IM V18/IM 3611



´C´ type flange at D.E. side, shaft down, no feet, frame size 56 to 180

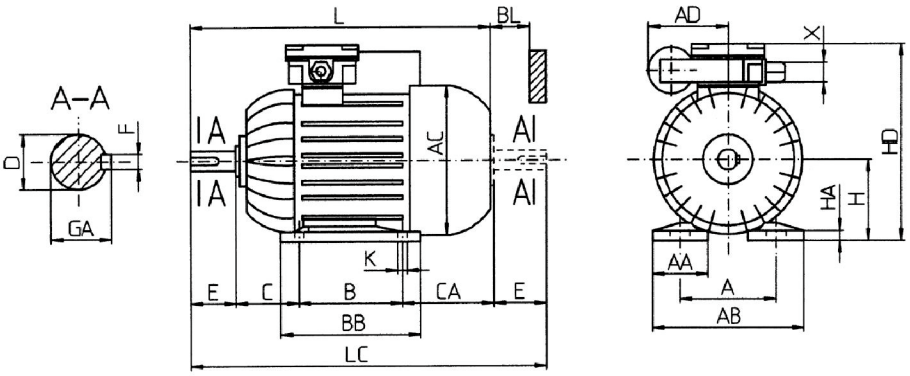
IM V19/IM 3631



´C´ type flange at D.E. side, shaft up, no feet, frame size 56 to 180

Dimensions of single phase motors (low starting torque)

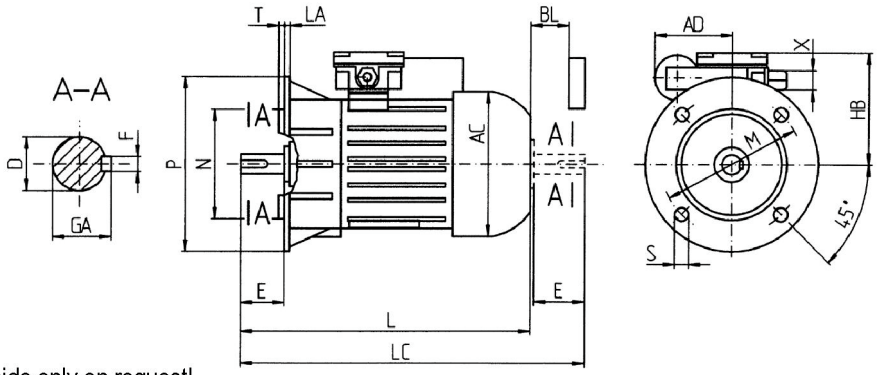
Foot mounted IMB3/IM1001



*Note: Shaft on NDE side only on request!

Type	Poles	Mounting dimensions in mm										Overall dimensions in mm										
								Shaft end														
		A	B	C	H -0,5	K	X	D j6	E	F h9	GA	AA	AB	AC	AD max	BB	BL min	CA	HA	HD	L	LC
NPEKg 56	A	2 - 4	90	71	36	56	5,8	M 20 x 1,5	9	20	3	10,2	30	110	117	74	92	11	66,5	7	154	188	213,5
	B	2 - 4																	74,5			196	221,5
	C	2 - 4																	82,5			204	229,5
NPEKg 63	B	2 - 4	100	80	40	63	7	M 20 x 1,5	11	23	4	12,5	36	124	126	74	106	11	79	8,5	165	214	245
	C	2 - 4																	94			228	260
NPEKh 71	B	2 - 4	112	90	45	71	7	M 20 x 1,5	14	30	5	16	45	142	141	90	116	12	88	8	182	245	283
	C	2 - 4																	106			263	301
NPEKh 80	B	2 - 4	125	100	50	80	10	M 20 x 1,5	19	40	6	21,5	55	160	150	95	130	15	98	9	200	278	329
	C	2 - 4																	120			306	357
NPEh 90	S	2 - 4	140	100	56	90	10	M 20 x 1,5	24	50	8	27	60	170	157	95	153	15	114	12	208	316	376
	L	2 - 4		125															107			328	388
NPEg 100	L	2 - 4	160	140	63	100	10	M 20 x 1,5	28	60	8	31	32	188	206	110	170	15	—	4	255	399	—

Flange mounted IMB5/IM3001



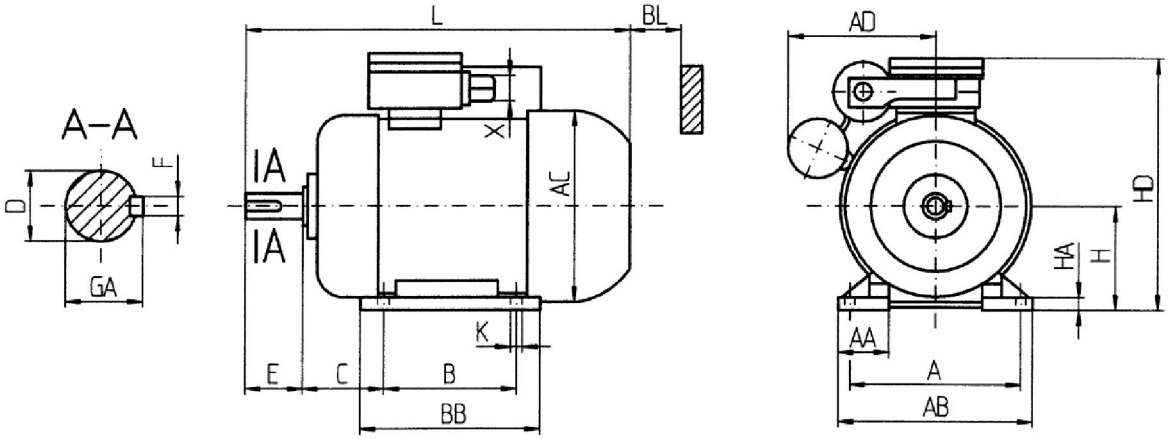
*Note: Shaft on NDE side only on request!

Type	Poles	Mounting dimensions in mm													Overall dimensions in mm					
		Shaft end				Flange														
		D j6	E	F h9	GA	DIN 42948	IEC Publ72	M	N j6	P	LA	S Ø	S Qty	T	X	AC	AD max	BL min	HB	L	LC
NPEKg 56	A	9	20	3	10,2	A120	F100	100	80	120	8	7	4	3	M 20 x 1,5	117	74	11	98	188	213,5
	B																			196	221,5
	C																			204	229,5
NPEKg 63	B	11	23	4	12,5	A140	F115	115	95	140	9	10	4	3	M 20 x 1,5	126	74	11	102	214	245
	C																			228	260
NPEKh 71	B	14	30	5	16	A160	F130	130	110	160	9	10	4	3,5	M 20 x 1,5	141	90	12	111	245	283
	C																			263	301
NPEKh 80	B	19	40	6	21,5	A200	F165	165	130	200	10	12	4	3,5	M 20 x 1,5	150	95	15	120	278	329
	C																			306	357

Type		Poles	Mounting dimensions in mm														Overall dimensions in mm					
			Shaft end				Flange															
			D j6	E	F h9	GA	DIN 42948	IEC Publ72	M	N j6	P	LA	S Ø	S Qty	T	X	AC	AD max	BL min	HB	L	LC
NPEh 90	S	2 - 4	24	50	8	27	A200	FF165	165	130	200	10	12	4	3,5	M 20 x 1,5	157	95	15	118	316	376
	L	2 - 4																			328	388
NPEg 100	L	2 - 4	28	60	8	31	A250	FF215	215	180	250	11	12	4	4	M 20 x 1,5	206	110	15	155	399	—

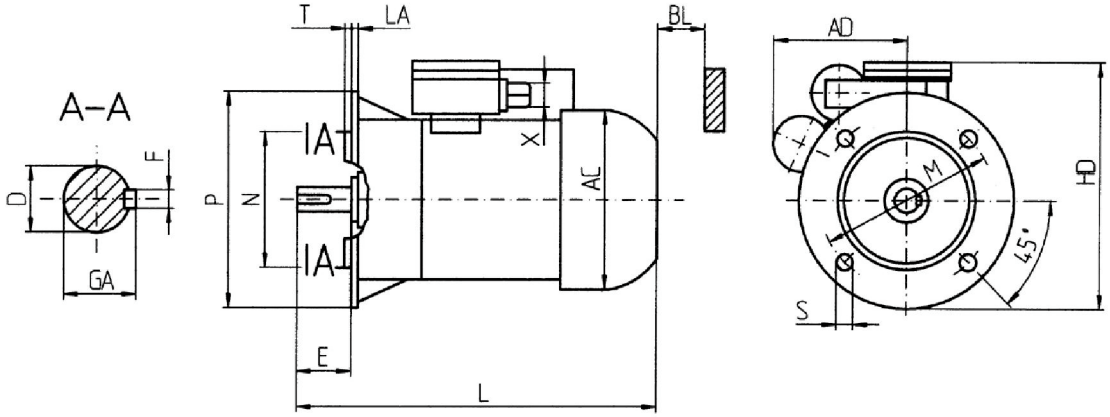
Dimensions of single phase motors (high starting torque)

Foot mounted IMB3/IM1001



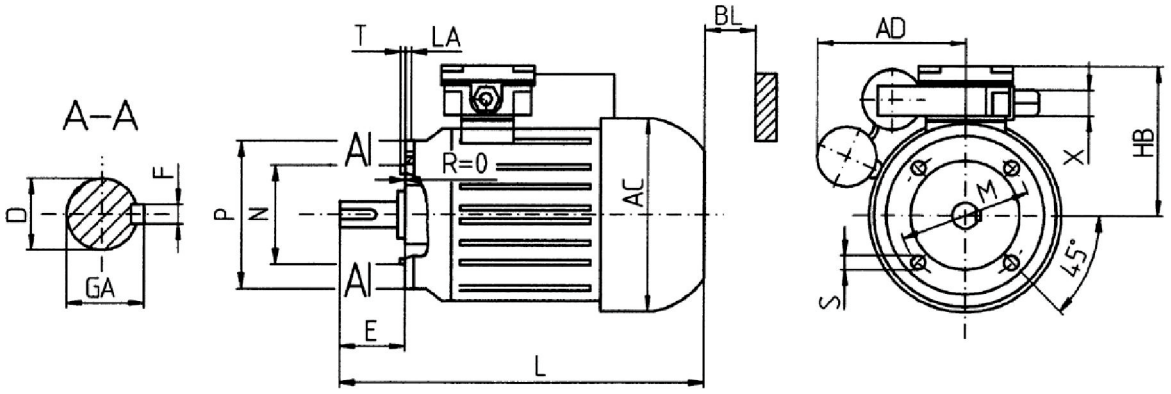
Type		Poles	Mounting dimensions in mm										Overall dimensions in mm								
			A	B	C	H -0,5	K	X	Shaft end D j6	Shaft end E	Shaft end F h9	Shaft end GA	AA	AB	AC	AD max	BB	BL min	HA	HD	L
FDEB 63	A	2 - 4	100	80	40	63	7	M 20 x 1,5	11	23	4	12,5	36	124	126	100	106	11	8,5	165	245
	B	2 - 4																			257
	C	2 - 4																			271
FDEB 71	B	2 - 4	112	90	45	71	7	M 20 x 1,5	14	30	5	16	45	142	141	100	116	12	8	182	285
	C	2 - 4																			303
FDEB 80	B	2 - 4	125	100	50	80	10	M 20 x 1,5	19	40	6	21,5	55	160	150	120	130	15	9	200	315
	C	2 - 4																			343
FDET 90	S	2 - 4	140	100	56	90	8	M 20 x 1,5	24	50	8	27	45	170	180	132	126	15	10	232	348
	L	2 - 4		125													151				373
FDET 100	L	2 - 4	160	140	63	100	10	M 20 x 1,5	28	60	8	31	32	188	206	145	170	15	4	255	422
FDEB 112	M	2 - 4	190	140	70	112	12	M 20 x 1,5	28	60	8	31	54	230	233	115	174	15	14	276	440

Flange mounted IMB5/IM3001



Type		Poles	Mounting dimensions in mm														Overall dimensions in mm				
			Shaft end				Flange														
			D j6	E	F h9	GA	DIN 42948	IEC Publ72	M	N j6	P	LA	S Ø	S Qty	T	X	AC	AD max	BL min	HD	L
FDEB 63	A	2 - 4	11	23	4	12,	A140	F115	115	95	140	9	10	4	3	M 20 x 1,5	126	100	11	165	245
	B	2 - 4																			257
	C	2 - 4																			271
FDEB 71	B	2 - 4	14	30	5	16	A160	F130	130	110	160	9	10	4	3,5	M 20 x 1,5	141	100	12	182	285
	C	2 - 4																			303
FDEB 80	B	2 - 4	19	40	6	21,5	A200	F165	165	130	200	10	12	4	3,5	M 20 x 1,5	150	120	15	200	315
	C	2 - 4																			343
FDET 90	S	2 - 4	24	50	8	27	A200	FF165	165	130	200	10	10	4	3,5	M 20 x 1,5	180	132	15	232	348
	L	2 - 4																			373
FDET 100	L	2 - 4	28	60	8	31	A250	FF215	215	180	250	11	12	4	4	M 20 x 1,5	206	145	15	270	422
FDEB 112	M	2 - 4	28	60	8	31	A250	FF215	215	180	250	11	14	4	4	M 20 x 1,5	233	115	15	289	440

Type of mounting IMB14/IM3601



Type		Poles	Mounting dimensions in mm																	Overall dim. in mm			
			Flange C1						Flange C2						X	Shaft end				AC	AD max	HB	L
			DIN	M	N j6	P	S	T	DIN	M	N j6	P	S	T		D j6	E	F h6	GA				
FDEB 63	A	2 - 4	FT100	100	80	120	M6	3,0	FT75	75	60	90	M5	2,5	M 20 x 1,5	11	23	4	12,5	126	100	102	245
	B	2 - 4																					257
	C	2 - 4																					271
FDEB 71	B	2 - 4	FT115	115	95	140	M8	3,0	FT85	85	70	105	M6	2,5	M 20 x 1,5	14	30	5	16	141	100	111	285
	C	2 - 4																					303
FDEB 80	B	2 - 4	FT130	130	110	160	M8	3,5	FT100	100	80	120	M6	3,0	M 20 x 1,5	19	40	6	21,5	150	120	120	315
	C	2 - 4																					343
FDET 90	S	2 - 4	FT130	130	110	160	M8	3,5	FT115	115	95	140	M8	3	M 20 x 1,5	24	50	8	27	180	132	142	348
	L	2 - 4																					373
FDET 100	L	2 - 4	FT165	165	130	200	M10	3,5	FT130	130	110	160	M8	3,5	M 20 x 1,5	28	60	8	31	206	145	155	422
FDEB 112	M	2 - 4	FT165	165	130	200	M10	3,5	FT130	130	110	160	M8	3,5	M 20 x 1,5	28	60	8	31	233	115	164	440

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