

### IEC (International Electrotechnical Commission)

#### ENCLOSURES

- IEC uses numbers to denote a particular enclosure type
- The numbers follow the letters IP (Ingress Protection) in the motor description
- The first digit signifies, on a rating scale, how well-protected the motor is against entry of solid objects such as dust, wire, tools, or fingers
- The second digit signifies, on a rating scale, the motor's ability to protect against water entry

#### First Digit (solid object protection scale)

- 0 - None
- 1 - Protection against objects larger than 50 mm (approx. 2 in.) in diameter, like hands
- 2 - Protection against objects larger than 12 mm (approx. 1/2 in.) in diameter, like fingers
- 4 - Protection against objects larger than 1 mm (approx. 0.04 in.) in diameter, like small tools and wires
- 5 - Complete protection, including dust tightness
- 6 - Does not apply to motors

#### Second Digit (water entry protection scale)

- 0 - None
- 1 - Protected from water falling straight down
- 2 - Protected from water falling as much as 15° from vertical
- 3 - Protected from spraying water as much as 60° from vertical
- 4 - Protected from splashing water coming from any direction
- 5 - Protected from water sprayed from a nozzle in any direction
- 6 - Protected from heavy seas
- 7 - Protected against immersion for given time
- 8 - Protected against immersion indefinitely

#### Common Enclosure Ratings

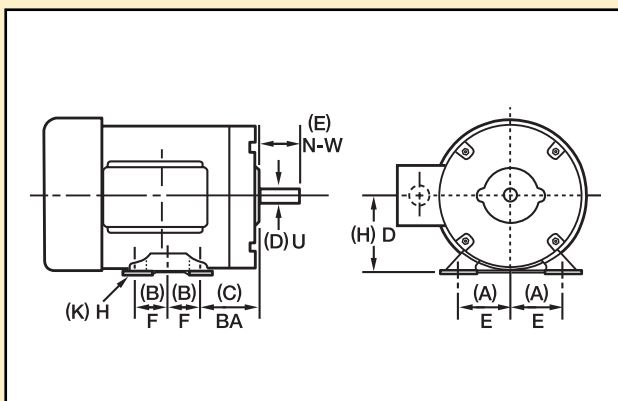
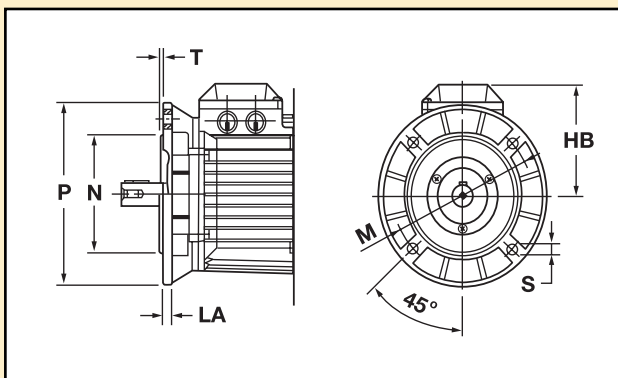
- IP 22 - Open Dripproof Motors
- IP 44 or 54 - Totally Enclosed (NEMA 12)
- IP 45 - Weatherproof Motors
- IP 55 - Washdown-Duty Motors

#### Common Motor Applications

- IC 01 - NEMA Standard Open Motors
- IC 40 (IC 410) - Totally Enclosed, Nonvented
- IC 41 (IC 411) - Totally Enclosed, Fan-cooled
- IC 48 (IC 418) - Totally Enclosed, Air Over

#### 3-Phase Motors

A 50 Hz, 3-Phase motor will operate satisfactorily (at the nameplate KW) on a 60 Hz supply if the voltage is increased by the same ratio as the frequency. For example, a 400V, 50 Hz motor can satisfactorily operate on a 460V, 60 Hz input supply. The motor will perform acceptably at full nameplate KW, though shaft speed would be 1/6th higher than the nameplate speed. The available output KW of the motor will actually increase by the ratio of the frequencies (i.e. about 20%). 230V, 50 Hz, 3-Phase motors operated at 230V, 60 Hz may not operate satisfactorily without derating. A typical derate of KW might be by a factor of 0.80 to 0.85. This all relates to keeping motor heating in check on the 230V, 60 Hz load. Most manufacturers indicate in their literature whether a given motor is satisfactory for 60 Hz input and at what KW rating. Manufacturers will provide this information upon request.



#### IEC FLANGE MOUNT MOTOR DIMENSIONS (mm)

Frame	Large Flange (B5) D-Flange							Small Flange (B14) C-Face						
	HB	LA	M	N	P	S	T	HB	LA	M	N	P	S	T
63 (*)	108	7	115	95	140	10	3.0	68	7	75	60	90	M5	2.5
63	108	7	130	110	160	10	3.5	—	—	—	—	—	—	—
71	120	7	130	110	160	10	3.5	120	9	85	70	105	M6	2.5
80	126	12	165	130	200	12	3.5	126	9	100	80	120	M6	3.0
90S	139	12	165	130	200	12	3.5	139	9	115	95	140	M8	3.0
90L	139	12	165	130	200	12	3.5	139	9	115	95	140	M8	3.0
100L	170	11	215	180	250	15	4.0	170	14	130	110	160	M8	3.5
112	188	12	215	180	250	15	4.0	188	14	130	110	160	M8	3.5
132	213	12	265	230	300	15	4.0	215	14	165	130	200	M10	3.5

(\*) M2AA63 can be supplied with shaft extension D=11, E=23, F=4 and GA=125mm, and DB=M4, if flange M=115mm.

#### IEC and NEMA DIMENSIONS AND FRAME COMPARISONS (mm)

(IEC) NEMA	(H) D	(A) E	(B) F	(K) H	(D) U	(C) BA	(E) N-W
(56) †	56	45	35.5	5.8	9	36	20
(63)	63	50	40	7	11	40	23
42	66.7	44.5	21.4	7.1	9.5	52.4	28.6
(71)	71	56	45	7	14	45	30
48	76.2	54	34.9	8.7	12.7	63.5	38.1
(80)	80	62.5	50	10	19	50	40
56	88.9	61.9	38.1	8.7	15.9	69.9	47.6
(90S)	90	70	50	10	24	56	50
143T	88.9	69.8	50.8	8.7	22.2	57.2	57.2
(90L)	90	70	62.5	10	24	56	50
145T	88.9	69.8	63.5	8.7	22.2	57.2	57.2
(100L) †	100	80	70	12	28	63	60
(112S)	112	95	57	12	28	70	60
182T	114.3	95.2	57.2	10.7	28	70	69.9
(112M)	112	95	70	12	28	70	60
184T	114.3	95.2	68.2	10.7	28	70	69.9
(132S)	132	108	70	12	38	89	80
213T	133.4	108	69.8	10.7	34.9	89	85.7
(132M)	132	108	89	12	38	89	80
215T	133.4	108	88.8	10.7	34.9	89	85.7
(160M)*	160	127	105	15	42	108	110
254T	158.8	127	104.8	13.5	41.3	108	101.6
(160L)*	160	127	127	15	42	108	110
256T	158.8	127	127	13.5	41.3	108	101.6
(180M)*	180	139.5	120.5	15	48	121	110
284T	177.8	139.8	120.2	13.5	47.6	121	117.5
(180L)*	180	139.5	139.5	15	48	121	110
286T	177.8	139.8	139.8	13.5	47.6	121	117.5
(200M)*	180	159	133.5	19	55	133	110
324T	203.3	158.8	133.4	16.7	54	133	133.4
(200L)*	200	159	152.5	19	55	133	110
326T	203.2	158.8	152.4	16.7	54	133	133.4

(\*) Shaft dimensions of these motors may vary among manufacturers. (†) No NEMA equal.