

Unimotor fm 230 V / 460 V

UNIMOTOR FM

Flexible Configuration AC Servo Motors

Unimotor fm is a high performance, brushless AC Servo motor range matched for use with Control Techniques' brand drives. "FM" stands for "Flexible Motor" and is designed to accommodate a wide range of applications. The motors are available in six frame sizes with various mounting arrangements and motor lengths. Control Techniques' drives and motors are designed to function as an optimized system. Unimotor fm is the perfect partner for Unidrive M, Digitax ST and Epsilon EP servo drives.

Key Features

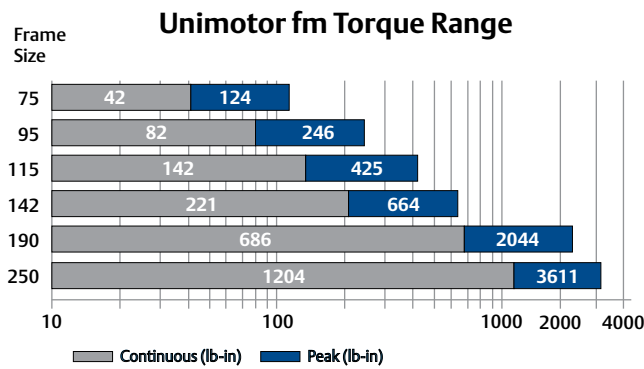
- Torque range: 12.4 to 1204 lb-in (1.4 to 136.0 Nm)
- Medium inertia design with high inertia option available
- Connector styles include vertical, low profile and 90° rotatable
- Variety of flange possibilities (IEC/NEMA)
- Holding brake option
- IP65 conformance
- Winding to suit 230 V and 460 V
- Speed options include 2000, 3000, 4000 and 6000 rpm
- Multiple feedback options:
 - Resolver: Robust for extreme applications and conditions — lower accuracy, medium resolution
 - Incremental encoder: High accuracy, medium resolution
 - Absolute: Medium accuracy, medium resolution, single-turn and multi-turns
 - SinCos/Absolute: High accuracy, high resolution, single-turn and multi-turn
- HIPERFACE (SICK) and EnDat (Heidenhain) protocols supported

Approvals



Unimotor

NOW WITH EVEN HIGHER PERFORMANCE!



Electronic Nameplate Capability



When a Unidrive M, Unidrive SP or Digitax ST servo drive is connected to a SinCos or absolute encoder, it can recognize and communicate with the motor to obtain the "electronic nameplate" data. This motor data can then be used to automatically optimize the drive settings. This feature simplifies commissioning and maintenance, ensures consistent performance and saves time.

Unimotor fm Order Information

Use the information below to create an order code for a Unimotor fm (top row is an example).

095	U3	A	30	5	B	A	CA	A	100	190
Frame size	Motor voltage	Stator length	Rated speed (rpm)	Brake	Connection type	Output shaft	Feedback device	Inertia + Temp sensor	BCD	Shaft Diameter (ex. 110=11.0 mm)
075	E3 = 230 V	075 Frame	20 = 2000	0 = No Brake	B = Power and Signal 90° and rotatable size 1.0	A = Keyway w/ Full Key installed	075-250 Frames	EQI 1331 [†]	075 Std	075 Frame
095	U3 = 460 V	B	30 = 3000	5 = 24 Vdc Parking brake	C = Power 90° rotatable and signal vertical size 1.0	B = No Keyway	Inductive Absolute Multi-turn EnDat	ECI 1319 [†]	080 Opt	110 23
115	250 Frame	C	40 = 4000		V = Power and Signal Vertical size 1.0	E* = Keyway w/ Half Key installed	Inductive Absolute Single-turn EnDat	SEL 52	085 Opt	140 30
142	U3 = 460 V	D	60 = 6000 ⁰		D = Hybrid power and signal 90° size 1.0**	F* = Keyway w/ Half and Full Key included	Capacitive Hiperface SinCos Multi-turn	SEK 52	095 Frame	190 40
190		095 -142 Frames	250 Frame		J = 1.5 size Power 90° and signal 90° and rotatable		Capacitive Hiperface SinCos Single-turn		100 Std	095 Frame
250		A	10 = 1000		E = Hybrid power and signal 90° size 1.5**		075-250 Frames		108 Opt	140 30
		B	15 = 1500		N = Power 90° rotatable and signal vertical size 1.0		AE = Resolver		115 Opt	190 40
		C*	20 = 2000 ⁰		M = Power and Signal Vertical size 1.0		CA = Incremental Encoder (Std)	4096 ppr	115 Std	115 Frame
		D*	25 = 2500 ⁰		H = Power hybrid box and signal vertical		EA = Optical Absolute Multi-turn EnDat	EQN 1325	130 Opt	190 40
		E*			H = Power hybrid box and signal vertical		EB = Optical Absolute Single-turn EnDat	ECN 1313	142 Frame	240 50
		190 Frame			250 ^{b,c} Frame		EC = Inductive Absolute Multi-turn EnDat	SRM 50	165 Std	142 Frame
		A			H = Power hybrid box and signal vertical		FC = Inductive Absolute Single-turn EnDat	SRS 50	149 Opt	142 Frame
		B			H = Power hybrid box and signal vertical		VF = Capacitive Hiperface SinCos Multi-turn	EQI 1331 [†] **	190 Frame	240 50
		C*			H = Power hybrid box and signal vertical		WF = Capacitive Hiperface SinCos Single-turn	EQI 1337 [†] **	215 Std	320 58
		D*			H = Power hybrid box and signal vertical		075-250 Frames	ECN 1325 [†] **	250 Frame	190 Frame
		E*			H = Power hybrid box and signal vertical		AE = Resolver		300 Std	190 Frame
		F*			H = Power hybrid box and signal vertical		CA = Incremental Encoder (Std)		320*	80* A-H*
		G*			H = Power hybrid box and signal vertical		EA = Optical Absolute Multi-turn EnDat		320	58 A-H
		H*			H = Power hybrid box and signal vertical		EB = Optical Absolute Single-turn EnDat		380	58
		250 Frame			H = Power hybrid box and signal vertical		EC = Inductive Absolute Multi-turn EnDat		480	110 D-F
		D ^b			H = Power hybrid box and signal vertical		FC = Inductive Absolute Single-turn EnDat			
		E ^b			H = Power hybrid box and signal vertical		VF = Capacitive Hiperface SinCos Multi-turn			
		F			H = Power hybrid box and signal vertical		WF = Capacitive Hiperface SinCos Single-turn			

* Add (-SREL) to end of E3/U3 order string for 80 mm length shafts on 190 mm frames.

Notes:

*Half key is used to balance shaft. It does not complete shaft radius

**Single cable option

[†]Bearingless design recommended for light duty applications only

a 6000 rpm not available on all frames sizes

b 250 D and E lengths, rated speed equal and above 2500 rpm are supplied with a terminal box "H" connector options

c 250 F lengths, rated speed equal and above 2000 rpm are supplied with a terminal box "H" connector options

d use if replacing E2/U2 motors

e "J" connector option available on 142E3 and 142U3 frames, refer to stator lengths marked with an asterisk

f "H" connector option available on some E3 and U3 190 frames, refer to stator lengths marked with an asterisk

Unimotor fm 75 mm Frame Ratings

Motor Frame Size (mm)		075E3				075U3			
Voltage (Vrms)		230				460			
Frame Length		A	B	C	D	A	B	C	D
Continuous Stall Torque (lb-in)		12.4	23.9	32.7	41.6	12.4	23.9	32.7	41.6
Continuous Stall Torque (Nm)		1.4	2.7	3.7	4.7	1.4	2.7	3.7	4.7
Peak Torque (lb-in)		38	71	99	124	38	71	99	124
Peak Torque (Nm)		4.3	8	11.2	14	4.3	8	11.2	14
Standard Inertia (lb-in-sec ²)		0.00069	0.00108	0.00142	0.00180	0.00069	0.00108	0.00142	0.00180
Standard Inertia (kgm ²)		0.00008	0.00012	0.00016	0.00020	0.00008	0.00012	0.00016	0.00020
High Inertia (lb-in-sec ²)		0.00104	0.00142	0.00180	0.00218	0.00104	0.00142	0.00180	0.00218
High Inertia (kgm ²)		0.00012	0.00016	0.00020	0.00025	0.00012	0.00016	0.00020	0.00025
Winding Thermal Time Const. (s)		63	58	73	78	63	58	73	78
Motor Weight (lbs)		6.4	8.1	9.9	11.7	6.4	8.1	9.9	11.7
Motor Weight (kg)		2.9	3.7	4.5	5.3	2.9	3.7	4.5	5.3
Number of Poles		6	6	6	6	6	6	6	6
2000 rpm	Kt (lb-in/A) =	12.4				21.24			
	Kt (Nm/A) =	1.4				2.4			
	Ke (V/k rpm) =	85.5				147			
Rated Torque (lb-in)		11.5	22.1	31.0	39.8	11.5	21.9	31.0	39.5
Rated Torque (Nm)		1.3	2.5	3.5	4.5	1.3	2.5	3.5	4.5
Stall Current (A)		1.0	1.9	2.7	3.3	0.6	1.1	1.6	1.9
Rated Power (kW)		0.72	0.52	0.73	0.93	0.27	0.52	0.73	0.93
R (ph-ph) (Ohms)		48.24	16.32	8.96	6.22	148.5	52.2	27.3	19.97
L (ph-ph) (mH)		87.47	39.77	24.68	19.15	258.7	117.28	74.2	56.97
3000 rpm	Kt (lb-in/A) =	8.23				14.16			
	Kt (Nm/A) =	0.93				1.6			
	Ke (V/k rpm) =	57.0				98.0			
Rated Torque (lb-in)		11.5	20.4	29.2	37.2	11.5	20.3	29.3	37.0
Rated Torque (Nm)		1.3	2.3	3.3	4.2	1.3	2.29	3.3	4.18
Stall Current (A)		1.55	2.85	4.9	5.02	0.90	1.66	2.33	2.92
Rated Power (kW)		0.41	0.72	1.04	1.31	0.41	0.72	1.04	1.31
R (ph-ph) (Ohms)		19.8	6.69	3.71	2.72	62.08	21.07	12.54	7.81
L (ph-ph) (mH)		37.2	16.8	10.69	8.27	114.6	52.65	34.18	23.89
4000 rpm	Kt (lb-in/A) =	6.37				10.62			
	Kt (Nm/A) =	0.72				1.2			
	Ke (V/k rpm) =	44.0				73.5			
Rated Torque (lb-in)		10.6	18.6	24.8	33.6	10.6	18.2	24.7	33.6
Rated Torque (Nm)		1.2	2.1	2.8	3.8	1.2	2.06	2.79	3.8
Stall Current (A)		2.06	3.79	5.31	6.67	1.20	2.21	3.10	3.89
Rated Power (kW)		0.5	0.86	1.17	1.59	0.50	0.86	1.17	1.59
R (ph-ph) (Ohms)		12.44	4.01	2.26	1.53	38.01	12.71	6.49	4.94
L (ph-ph) (mH)		23.35	9.62	6.32	4.63	68.39	30.46	18.28	13.97
6000 rpm	Kt (lb-in/A) =	4.16				7.08			
	Kt (Nm/A) =	0.47				0.8			
	Ke (V/k rpm) =	28.5				49.0			
Rated Torque (lb-in)		9.7	16.8	24.8	30.1	9.6	17.0	24.3	30.1
Rated Torque (Nm)		1.1	1.9	2.8	3.4	1.08	1.92	2.75	3.4
Stall Current (A)		3.06	5.64	7.91	9.94	1.80	3.31	4.65	5.84
Rated Power (kW)		0.68	1.21	1.73	2.14	0.68	1.21	1.73	2.14
R (ph-ph) (Ohms)		5.37	1.81	1.02	0.68	15.48	5.19	2.86	2.12
L (ph-ph) (mH)		9.8	4.42	2.88	2.06	28.66	12.77	8.01	6.33

NOTES:

At = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

All data subject to ±10% tolerance

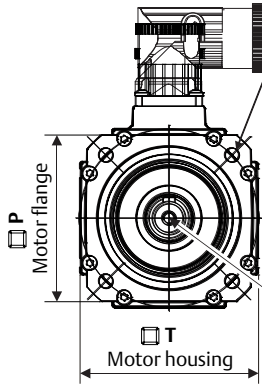
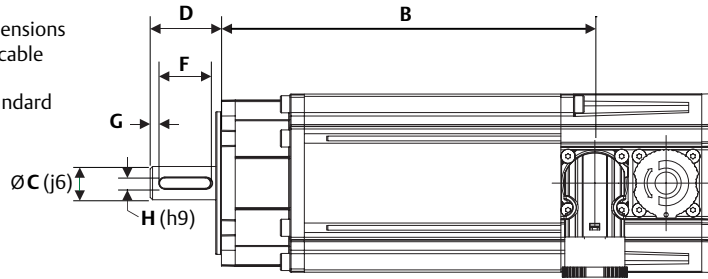
Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

Nidec has an ongoing process of development and reserves the right to change the specification without notice

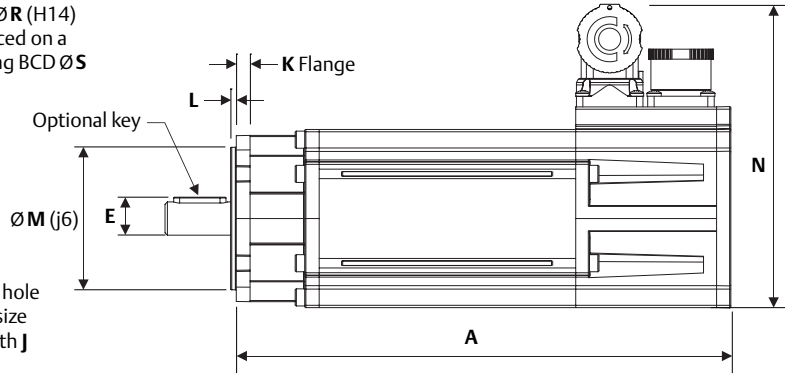
All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

Unimotor fm 75 mm Frame Dimensions

NOTE: Output key dimensions (E,F,G and H) are applicable to keyed units only. 90° connectors are standard



4 holes ØR (H14) equispaced on a mounting BCD ØS



For vertical connectors, allow approximately 175.0 mm clearance for mating cable

Motor Dimensions*	Frame Length								
	A		B		C		D		
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	
Unbraked Length	A	8.20	208.2	9.38	238.2	10.56	268.2	11.74	298.2
	B	6.19	157.2	7.37	187.2	8.55	217.2	9.73	247.2
Braked Length	A	9.38	238.2	10.56	268.2	11.74	298.2	12.92	328.2
	B	7.37	187.2	8.55	217.2	9.73	247.2	10.91	277.2

Connector Type	Connector Height		
	(in)	(mm)	
"A"	N	4.7	118.5
"B" (std)		5.0	126.0
"C"		5.0	126.0
"V"		4.7	118.5

Dimensions for power connectors size 1.0

*PCD 085 motor lengths differ from the above, refer to drawings for complete details

Flange Dimensions		BCD Code					
		Standard		Optional			
		075		080		085	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Flange Thickness	K	0.23	5.8	0.23	5.8	0.23	5.8
Pilot Thickness	L	0.09	2.4	0.09	2.4	0.09	2.4
Pilot Diameter (J6)	M	2.36	60.0	2.36	60.0	2.76	70.0
Flange Square	P	2.76	70.0	2.76	70.0	3.15	80.0
Mounting Hole Dia. (H14)	R	0.23	5.8	0.23	5.8	0.28	7.0
Mounting Hole BCD	S	2.6 to 3.0	66.7 to 75.0	3.0 to 3.2	75.0 to 80.0	3.4	85
Motor Housing	T	2.95	75	2.95	75	2.95	75
Mounting Bolts		M5			M6		

Shaft Dimensions		Shaft Diameter Code					
		11.0 mm Frame A		14.0 mm Frames B-D		19.0 mm Opt	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Shaft Diameter (J6)	C	0.43	11.0	0.55	14.0	0.75	19.0
Shaft Length	D ¹	0.91	23.0	1.18	30.0	1.57	40.0
Key Height	E ²	0.49	12.5	0.63	16.0	0.85	21.5
Key Length	F ³	0.55	14.0	0.98	25.0	1.26	32.0
Key-to-Shaft End	G ⁴	0.14	3.6	0.06	1.5	0.14	3.6
Key Width (H9)	H	0.16	4.0	0.20	5.0	0.24	6.0
Tapped Hole thread Size	I	M4 x 0.7		M5 x 0.8		M6 x 1.0	
Tapped Hole Depth	J ⁵	0.43	11.0	0.53	13.5	0.67	17.0

¹±0.45 mm, ²To IEC 72-1, ³±0.25 mm, ⁴±1.1 mm, ⁵±0.4 mm

Unimotor fm 95 mm Frame Ratings

Motor Frame Size (mm)		095E3					095U3				
Voltage (Vrms)		230					460				
Frame Length		A	B	C	D	E	A	B	C	D	E
Continuous Stall Torque (lb-in)		22.1	39.8	55.8	69.9	82.3	21.7	39.8	55.8	69.9	81.9
Continuous Stall Torque (Nm)		2.5	4.5	6.3	7.9	9.3	2.5	4.5	6.3	7.9	9.3
Peak Torque (lb-in)		65	119	167	210	246	65	119	167	210	246
Peak Torque (Nm)		7.4	13.5	18.9	23.7	27.8	7.4	13.5	18.9	23.7	27.8
Standard Inertia (lb-in-sec ²)		0.00128	0.00230	0.00329	0.00427	0.00531	0.00128	0.00230	0.00329	0.00427	0.00531
Standard Inertia (kgm ²)		0.00015	0.00026	0.00037	0.00048	0.00060	0.00015	0.00026	0.00037	0.00048	0.00060
High Inertia Option (lb-in-sec ²)		0.00116	0.00398	0.00496	0.00593	0.00690	0.00116	0.00398	0.00496	0.00593	0.00690
High Inertia Option (kgm ²)		0.00013	0.00045	0.00056	0.00067	0.00078	0.00013	0.00045	0.00056	0.00067	0.00078
Winding Thermal Time Const. (s)		84	82	73	90	108	84	82	90	108	112
Motor Weight (lbs)		10.1	12.8	15.4	18	20.7	10.1	12.8	15.4	18	20.7
Motor Weight (kg)		4.6	5.8	7	8.2	9.4	4.6	5.8	7	8.2	9.4
Number of Poles		6	6	6	6	6	6	6	6	6	6
2000 rpm	Kt (lb-in/A) =	12.4					21.2				
	Kt (Nm/A) =	1.4					2.4				
	Ke (V/k rpm) =	85.5					147.0				
Rated Torque (lb-in)		21.2	38.1	52.2	64.6	75.2	21.2	38.1	52.2	64.6	75.2
Rated Torque (Nm)		2.4	4.3	5.9	7.3	8.5	2.4	4.3	5.9	7.3	8.5
Stall Current (A)		1.8	3.2	4.5	5.6	6.6	1.0	1.9	2.6	3.3	3.9
Rated Power (kW)		0.51	0.9	1.23	1.53	1.77	0.51	0.9	1.23	1.53	1.77
R (ph-ph) (Ohms)		20.69	6.78	3.79	2.42	1.92	64.08	20.88	10.46	7.46	5.09
L (ph-ph) (mH)		57.78	26.1	16.36	11.83	9.75	173.4	78.16	47.02	35.44	27.18
3000 rpm	Kt (lb-in/A) =	8.23					14.2				
	Kt (Nm/A) =	0.93					1.60				
	Ke (V/k rpm) =	57.0					98.0				
Rated Torque (lb-in)		20.6	36.3	49.6	61.1	72.1	20.4	36.3	49.6	61.1	72.6
Rated Torque (Nm)		2.33	4.1	5.6	6.9	8.15	2.3	4.1	5.6	6.9	8.2
Stall Current (A)		2.63	4.84	6.77	8.49	9.95	1.5	2.8	3.9	4.9	5.8
Rated Power (kW)		0.73	1.29	1.76	2.17	2.56	0.73	1.29	1.76	2.17	2.56
R (ph-ph) (Ohms)		9.62	2.99	1.64	1.07	0.86	26.7	8.63	4.67	3.16	2.27
L (ph-ph) (mH)		26.29	11.47	7.15	5.16	4.35	76.65	33.71	21.09	15.95	12.06
4000 rpm	Kt (lb-in/A) =	6.2					10.6				
	Kt (Nm/A) =	0.72					1.2				
	Ke (V/k rpm) =	42.75					73.5				
Rated Torque (lb-in)		20.4	33.6	46.9	56.6	65.5	20.4	33.6	46.9	56.6	65.5
Rated Torque (Nm)		2.3	3.8	5.3	6.4	7.4	2.3	3.8	5.3	6.4	7.4
Stall Current (A)		3.5	6.43	9.0	11.29	13.21	2.0	3.8	5.3	6.6	7.7
Rated Power (kW)		0.94	1.59	2.2	2.68	3.1	0.94	1.59	2.2	2.68	3.1
R (ph-ph) (Ohms)		5.26	1.76	1.04	0.74	0.48	16.14	5.22	2.61	1.81	1.4
L (ph-ph) (mH)		14.94	6.67	4.52	3.53	2.44	44.25	19.54	11.75	8.86	7.25
6000 rpm	Kt (lb-in/A) =	4.2					7.1				
	Kt (Nm/A) =	0.47					0.8				
	Ke (V/k rpm) =	28.5					49.0				
Rated Torque (lb-in)		17.5	28.3	37.2			17.7	28.3	37.2		
Rated Torque (Nm)		1.98	3.2	4.2			2.0	3.2	4.2		
Stall Current (A)		5.21	9.57	13.4			3.1	5.6	7.9		
Rated Power (kW)		1.24	2.01	2.64			1.24	2.01	2.64		
R (ph-ph) (Ohms)		2.33	0.73	0.46			6.59	2.13	1.22		
L (ph-ph) (mH)		6.57	2.77	2.07			18.62	8.24	5.44		

NOTES:

At = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

All data subject to ±10% tolerance

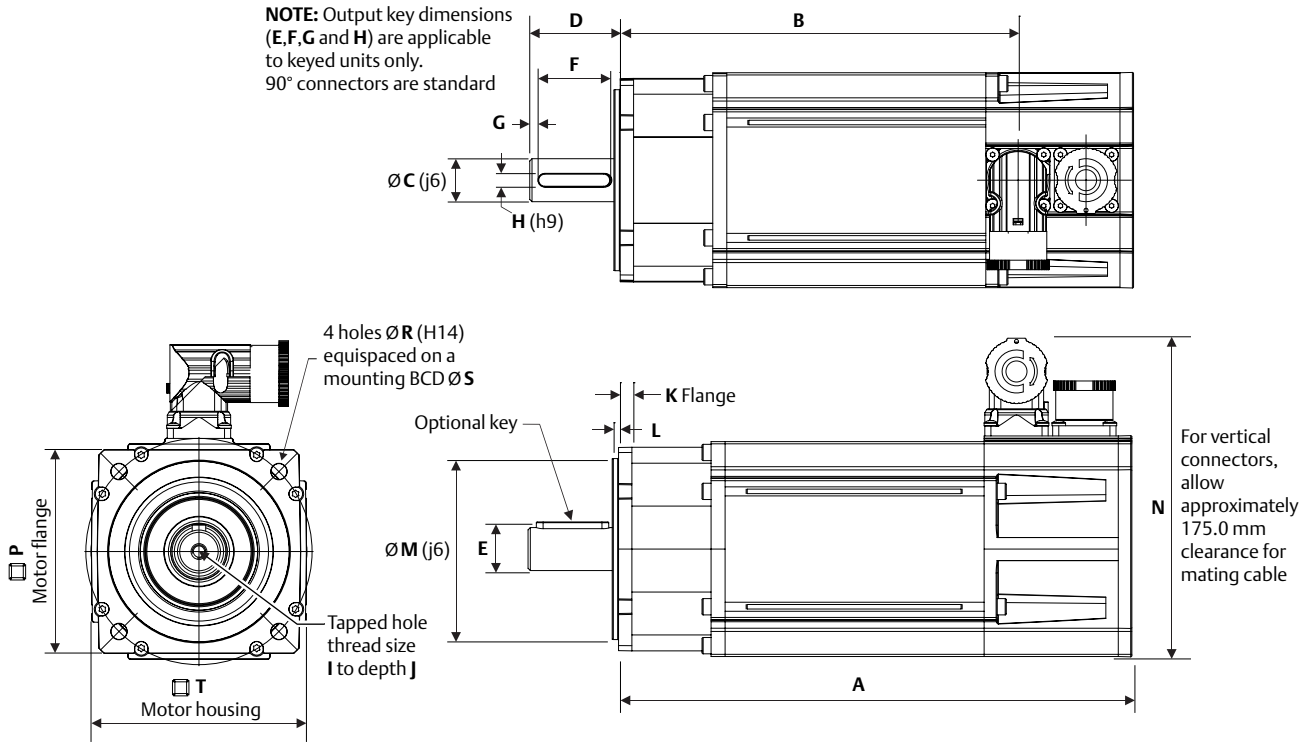
Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

Nidec has an ongoing process of development and reserves the right to change the specification without notice

All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

Unimotor fm 95 mm Frame Dimensions

NOTE: Output key dimensions (E, F, G and H) are applicable to keyed units only. 90° connectors are standard



Motor Dimensions	Frame Length										
	A		B		C		D		E		
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	
Unbraked Length	A	8.93	226.9	10.11	256.9	11.3	286.9	12.48	316.9	13.66	346.9
	B	6.93	175.9	8.11	205.9	9.29	235.9	10.47	265.9	11.65	295.9
Braked Length	A	10.11	256.9	11.3	286.9	12.48	316.9	13.66	346.9	14.84	376.9
	B	8.11	205.9	9.29	235.9	10.47	265.9	11.65	295.9	12.83	325.9

BCD 098 and 115 motor lengths differ from the above, refer to draw for motor details

Connector Type	Connector Height		
	(in)	(mm)	
"A"	N	5.18	131.5
"B" (std)		5.47	139.0
"C"		5.47	139.0
"V"		5.18	131.5

Dimensions for power connectors size 1.0

Flange Dimensions		BCD Code					
		Standard		Optional			
		100		098 [†]		115	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Flange Thickness	K	0.23	5.9	0.268	6.8	0.268	6.8
Pilot Thickness	L	0.11	2.8	0.11	2.8	0.11	2.8
Pilot Diameter (J6)	M	3.15	80.0	2.87	73.0	3.74	95.0
Flange Square	P	3.54	90.0	3.54	90.0	4.13	105.0
Mounting Hole Dia. (H14)	R	0.28	7.0	0.28	7.0	0.29	10.0
Mounting Hole BCD	S	3.94	100.0	3.88	98.43	4.53	115.0
Motor Housing	T	3.74	95.0	3.74	95.0	3.74	95.0
Mounting Bolts		M6		M6		M8	

[†]NEMA 34 flange option; shaft diameters differ from typical NEMA 34 flange

Shaft Dimensions		Shaft Diameter Code					
		14.0 mm Frame A		19.0 mm Frames B-E		22.0 mm Opt.	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Shaft Dia. (J6)	C	0.55	14.0	0.75	19.0	0.866	22.0
Shaft Length	D ¹	1.18	30.0	1.57	40.0	1.97	50.0
Key Height	E ²	0.63	16.0	0.85	21.5	1.0	24.5
Key Length	F ³	0.98	25.0	1.26	32.0	1.63	40.0
Key-to-Shaft End	G ⁴	0.06	1.5	0.14	3.6	0.188	4.6
Key Width (H9)	H	0.20	5.0	0.24	6.0	0.245	6.0
Tapped Hole thread Size	I	M5 x 0.8		M6 x 1.0		M8 x 1.25	
Tapped Hole Depth	J ⁵	0.53	13.5	0.67	17.0	0.816	20.0

¹±0.45 mm, ²To IEC 72-1, ³±0.25 mm, ⁴±1.1 mm, ⁵±0.4 mm

Unimotor fm 115 mm Frame Ratings

Motor Frame Size (mm)	115E3					115U3				
Voltage (Vrms)	230					460				
Frame Length	A	B	C	D*	E*	A	B	C	D	E
Continuous Stall Torque (lb-in)	35	65	96	121	142	35	65	96	121	142
Continuous Stall Torque (Nm)	3.9	7.4	10.8	13.7	16.0	3.9	7.4	10.8	13.7	16.0
Peak Torque (lb-in)	104	196	287	363	425	104	196	287	363	425
Peak Torque (Nm)	11.7	22.2	32.4	41	48	11.7	22.2	32.4	41	48
Standard Inertia (lb-in-sec ²)	0.00478	0.00682	0.00885	0.01106	0.0131	0.00478	0.00682	0.00885	0.01106	0.0131
Standard Inertia (kgm ²)	0.00054	0.00077	0.001	0.00125	0.00148	0.00054	0.00077	0.001	0.00125	0.00148
High Inertia Option (lb-in-sec ²)	0.00885	0.01089	0.01301	0.01513	0.01717	0.00885	0.01089	0.01301	0.01513	0.01717
High Inertia Option (kgm ²)	0.001	0.00123	0.00147	0.00171	0.00194	0.001	0.00123	0.00147	0.00171	0.00194
Winding Thermal Time Const. (s)	103	109	116	127	141	103	109	116	127	141
Motor Weight (lbs)	15.2	19.4	23.5	27.7	31.9	15.2	19.4	23.5	27.7	31.9
Motor Weight (kg)	6.9	8.8	10.7	12.6	14.5	6.9	8.8	10.7	12.6	14.5
Number of Poles	6	6	6	6	6	6	6	6	6	6
2000 rpm	Kt (lb-in/A) =		12.4			21.2				
	Kt (Nm/A) =		1.4			2.4				
	Ke (V/k rpm) =		85.5			147.0				
Rated Torque (lb-in)	32.7	64.6	89.4	105.3	124.8	32.7	64.6	89.4	105.3	124.8
Rated Torque (Nm)	3.7	7.3	10.1	11.9	14.1	3.7	7.3	10.1	11.9	14.1
Stall Current (A)	2.8	5.3	7.7	9.8	11.4	1.6	3.1	4.5	5.7	6.7
Rated Power (kW)	0.77	1.53	2.12	2.49	2.95	0.77	1.53	2.12	2.49	2.95
R (ph-ph) (Ohms)	10.65	3.43	1.82	1.81	1.34	32.92	10.68	5.25	3.7	2.75
L (ph-ph) (mH)	55.83	19.43	12.31	9.5	7.68	139.43	59.51	35.9	27.63	21.87
3000 rpm	Kt (lb-in/A) =		8.23			14.2				
	Kt (Nm/A) =		0.93			1.6				
	Ke (V/k rpm) =		57.00			98.0				
Rated Torque (lb-in)	31.0	59.3	84.1	99.1	112.4*	31.0	59.3	84.1	99.1	112.4
Rated Torque (Nm)	3.5	6.7	9.5	11.2	12.7	3.5	6.7	9.5	11.2	12.7
Stall Current (A)	4.19	7.96	11.61	14.68	17.2	2.4	4.6	6.8	8.5	10.0
Rated Power (kW)	1.1	2.1	2.98	3.52	3.99	1.1	2.1	2.98	3.52	3.99
R (ph-ph) (Ohms)	4.91	1.52	0.81	0.57	0.43	14.74	4.37	2.3	1.53	1.23
L (ph-ph) (mH)	20.26	8.63	5.47	4.35	3.41	57.29	25.19	15.57	11.6	9.89
4000 rpm	Kt (lb-in/A) =		6.2			10.6				
	Kt (Nm/A) =		0.7			1.2				
	Ke (V/k rpm) =		42.75			73.5				
Rated Torque (lb-in)	26.6	51.3	66.4	73.5*	77.9*	26.6	51.3	66.4	73.5	77.9
Rated Torque (Nm)	3.0	5.8	7.5	8.3	8.8	3.0	5.8	7.5	8.3	8.8
Stall Current (A)	5.57	10.57	15.43	19.5	22.9	3.3	6.2	9.0	11.4	13.3
Rated Power (kW)	1.26	2.43	3.12	3.46	3.69	1.26	2.43	3.12	3.46	3.69
R (ph-ph) (Ohms)	3.05	0.93	0.49	0.3	0.27	8.49	2.61	1.31	0.84	0.66
L (ph-ph) (mH)	12.44	5.13	3.34	2.25	2.18	33.79	14.87	8.98	6.27	5.35
6000 rpm	Kt (lb-in/A) =		4.2			7.1				
	Kt (Nm/A) =		0.47			0.8				
	Ke (V/k rpm) =		28.5			49.0				
Rated Torque (lb-in)	23.9	44.3				23.9	44.3			
Rated Torque (Nm)	2.7	5.0				2.7	5.0			
Stall Current (A)	8.3	15.74				4.9	9.3			
Rated Power (kW)	1.7	3.14				1.7	3.14			
R (ph-ph) (Ohms)	1.5	0.41				3.48	1.09			
L (ph-ph) (mH)	6.08	2.34				14.31	6.3			

NOTES:

*Ratings shown require connector option "H" terminal box.

Δt = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

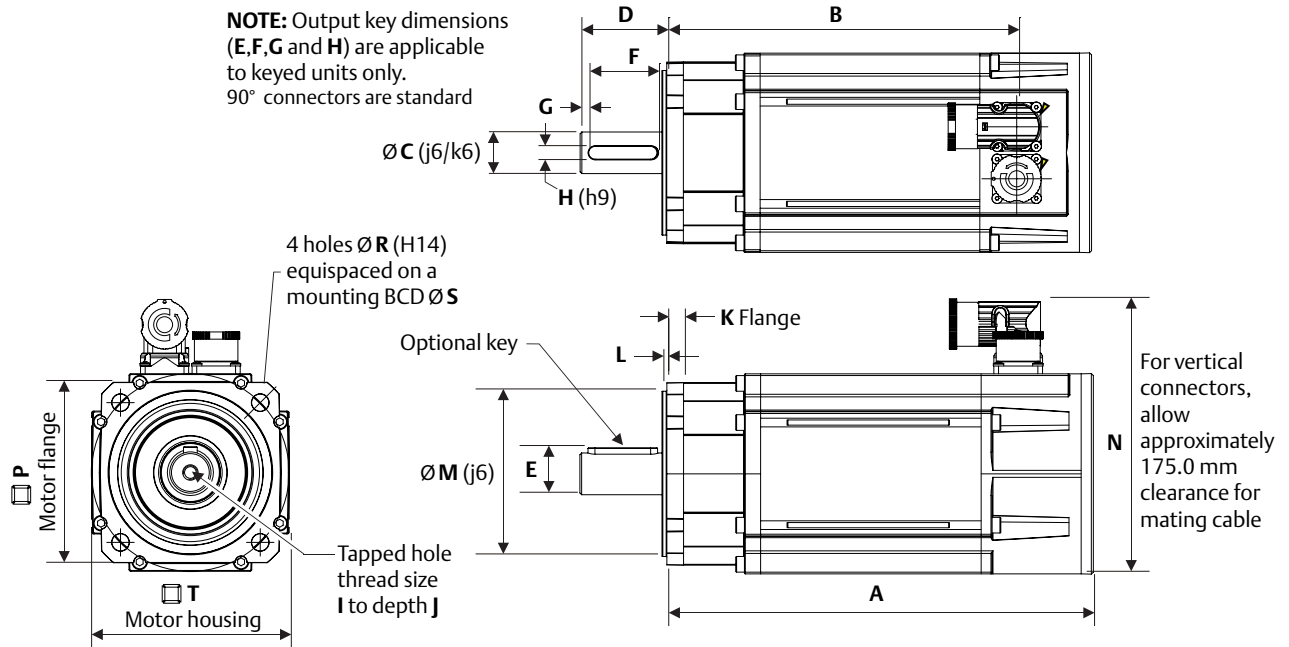
All data subject to ±10% tolerance

Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

Nidec has an ongoing process of development and reserves the right to change the specification without notice

All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

Unimotor fm 115 mm Frame Dimensions



Motor Dimensions	Frame Length										
	A		B		C		D		E		
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	
Unbraked Length	A	9.71	246.6	10.89	276.6	12.07	306.6	13.25	336.6	14.43	366.6
	B	7.63	193.8	8.81	223.8	9.99	253.8	11.17	283.8	12.35	313.8
Braked Length	A	10.89	276.6	12.07	306.6	13.25	336.6	14.43	366.6	15.61	396.6
	B	8.81	223.8	9.99	253.8	11.17	283.8	12.35	313.8	13.54	343.8

BCD 130 motor lengths differ from the above, refer to draw for motor details

Connector Type	Connector Size	Connector Height	
		(in)	(mm)
"A"	N	1.0	5.87
"B" (std)		1.0	6.16
"C"		1.0	6.16
"V"		1.0	5.87
"J"		1.5	7.38
"M"		1.5	6.59

Flange Dimensions		BCD Code			
		Standard		Optional	
		115		130	
		(in)	(mm)	(in)	(mm)
Flange Thickness	K	0.39	10.1	0.52	13.2
Pilot Thickness	L	0.11	2.8	0.11	2.8
Pilot Diameter (J6)	M	3.74	95	4.33	110
Flange Square	P	4.13	105	5.12	130
Mounting Hole Dia. (H14)	R	0.39	10	0.39	10
Mounting Hole BCD	S	4.53	115	5.12	130
Motor Housing	T	4.53	115	4.53	115
Mounting Bolts		M8			

Shaft Dimensions		Shaft Diameter Code			
		19.0 mm Frame A-C		24.0 mm Frame D-E	
		(in)	(mm)	(in)	(mm)
Shaft Diameter (J6)	C	0.75	19.0	0.94	24.0
Shaft Length	D ¹	1.57	40.0	1.97	50.0
Key Height	E ²	0.85	21.5	1.06	27.0
Key Length	F ³	1.26	32.0	1.57	40.0
Key-to-Shaft End	G ⁴	0.14	3.6	0.18	4.6
Key Width (H9)	H	0.24	6.0	0.31	8.0
Tapped Hole Thread Size	I	M6 x 1.0		M8 x 1.25	
Tapped Hole Depth	J ⁵	0.67	17.0	0.79	20.0

¹±0.45 mm, ²To IEC 72-1, ³±0.25 mm, ⁴±1.1 mm, ⁵±0.4 mm

Unimotor fm 142 mm Frame Ratings

Motor Frame Size (mm)		142E3					142U3				
Voltage (Vrms)		230					460				
Frame Length		A	B	C*	D*	E*	A	B	C	D	E*
Continuous Stall Torque (lb-in)		55.0	97.0	139.0	181.0	221.0	55.0	97.0	139.0	181.0	221.0
Continuous Stall Torque (Nm)		6.2	11.0	15.7	20.5	25.0	6.2	11.0	15.7	20.5	25.0
Peak Torque (lb-in)		165.0	292.0	417.0	544.0	664.0	165.0	292.0	417.0	544.0	664.0
Peak Torque (Nm)		18.6	33.0	47.1	61.5	75.0	18.6	33.0	47.1	61.5	75.0
Standard Inertia (lb-in-sec ²)		0.00903	0.01496	0.0208	0.02673	0.03266	0.00903	0.01496	0.0208	0.02673	0.03266
Standard Inertia (kgm ²)		0.00102	0.00169	0.00235	0.00302	0.00369	0.00102	0.00169	0.00235	0.00302	0.00369
High Inertia Option (lb-in-sec ²)		0.02053	0.02638	0.03231	0.03815	0.04408	0.02053	0.02638	0.03231	0.03815	0.04408
High Inertia Option (kgm ²)		0.00232	0.00298	0.00365	0.00431	0.00498	0.00232	0.00298	0.00365	0.00431	0.00498
Winding Thermal Time Const. (s)		145	148	188	206	249	145	148	188	206	249
Motor Weight (lbs)		18.3	25.1	31.9	38.7	45.5	18.3	25.1	31.9	38.7	45.5
Motor Weight (kg)		8.3	11.4	14.5	17.6	20.7	8.3	11.4	14.5	17.6	20.7
Number of Poles		6	6	6	6	6	6	6	6	6	6
2000 rpm	Kt (lb-in/A) =	12.4					21.2				
	Kt (Nm/A) =	1.4					2.4				
	Ke (V/k rpm) =	85.5					147.0				
Rated Torque (lb-in)		52.2	92.0	130.1	163.7	190.3*	52.2	92.0	130.1	163.7	190.3
Rated Torque (Nm)		5.9	10.4	14.7	18.5	21.5	5.9	10.4	14.7	18.5	21.5
Stall Current (A)		4.4	7.9	11.2	14.6	17.9	2.6	4.6	6.5	8.5	10.4
Rated Power (kW)		1.23	2.18	3.08	3.87	4.49	1.23	2.18	3.08	3.87	4.49
R (ph-ph) (Ohms)		5.56	1.54	0.80	0.51	0.40	14.64	4.71	2.38	1.60	1.11
L (ph-ph) (mH)		35.43	14.25	8.99	6.35	5.25	98.76	42.15	26.32	19.46	15.08
3000 rpm	Kt (lb-in/A) =	8.23					14.2				
	Kt (Nm/A) =	0.93					1.6				
	Ke (V/k rpm) =	57.0					98.0				
Rated Torque (lb-in)		48.7	84.1	113.3	141.6*	161.1*	48.7	84.1	113.3	141.6	161.1
Rated Torque (Nm)		5.5	9.5	12.8	16.0	18.2	5.5	9.5	12.8	16.0	18.2
Stall Current (A)		6.67	11.83	16.88	22.04	26.88	3.9	6.9	9.8	12.8	15.6
Rated Power (kW)		1.73	2.98	4.02	5.03	5.70	1.73	2.98	4.02	5.03	5.7
R (ph-ph) (Ohms)		2.25	0.68	0.35	0.23	0.16	6.2	2.12	1.08	0.70	0.50
L (ph-ph) (mH)		14.68	6.33	3.89	3.66	2.23	42.97	19.11	12.06	8.91	6.7
4000 rpm	Kt (lb-in/A) =	6.2					10.6				
	Kt (Nm/A) =	0.7					1.2				
	Ke (V/k rpm) =	42.75					73.5				
Rated Torque (lb-in)		36.3	71.7	90.3*	108.0*	123.9*	36.3	71.7	90.3	108*	123.9*
Rated Torque (Nm)		4.1	8.1	10.2	12.2	14.0	4.1	8.1	10.2	12.2	14.0
Stall Current (A)		8.86	15.71	22.43	29.3	35.7	5.2	9.2	13.1	17.1	20.8
Rated Power (kW)		1.72	3.37	4.27	5.11	5.86	1.72	3.37	4.27	5.11	5.86
R (ph-ph) (Ohms)		1.29	0.38	0.23	0.13	0.09	3.64	1.18	0.61	0.41	0.29
L (ph-ph) (mH)		8.39	3.44	2.49	1.99	1.2	24.44	10.54	6.78	5.06	3.97
6000 rpm	Kt (lb-in/A) =						0.7				
	Kt (Nm/A) =						0.8				
	Ke (V/k rpm) =						49.0				
	Rated Torque (lb-in)						28.3	46.0			
	Rated Torque (Nm)						3.2	5.2			
	Stall Current (A)						7.8	13.8			
	Rated Power (kW)						2.01	3.27			
	R (ph-ph) (Ohms)						1.63	0.53			
	L (ph-ph) (mH)						11.08	4.78			

NOTES:

*Ratings shown require connector option "J" size 1.5 power connector.

Δt = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

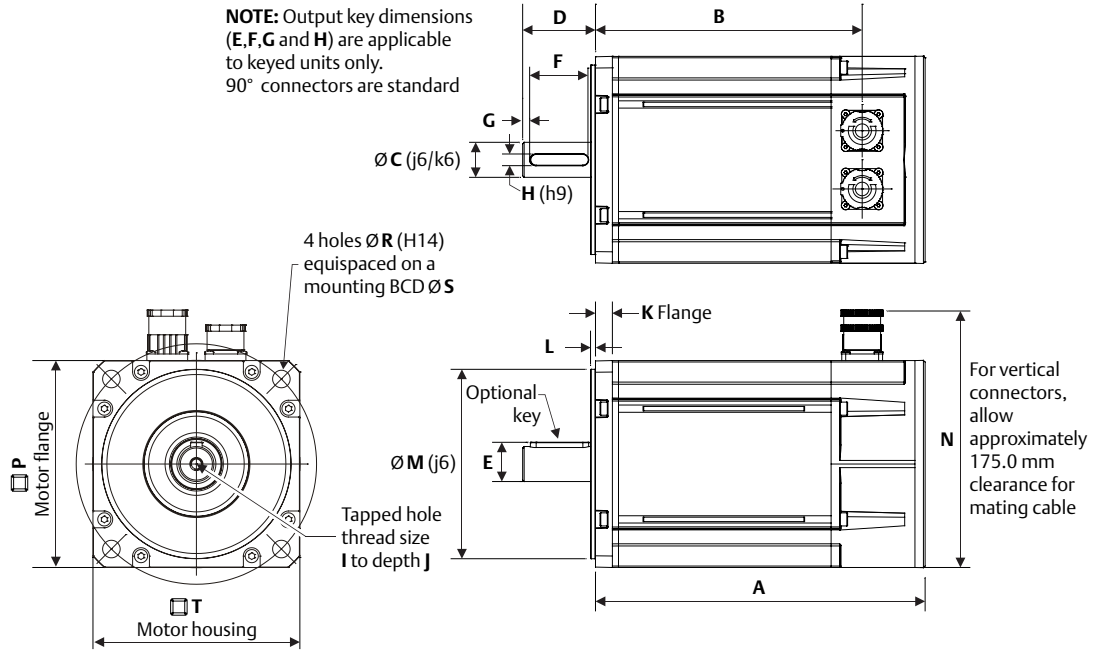
All data subject to ±10% tolerance

Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

Nidec has an ongoing process of development and reserves the right to change the specification without notice

All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

Unimotor fm 142 mm Frame Dimensions



Motor Dimensions		Frame Length									
		A		B		C		D		E	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length	A	7.59	192.8	8.77	222.8	9.95	252.8	11.13	282.8	12.31	312.8
	B	6.22	158	7.4	188	8.58	218	9.76	248	10.94	278
Braked Length	A	9.95	252.8	11.13	282.8	12.31	312.8	13.5	342.8	14.68	372.8
	B	8.58	218	9.76	248	10.94	278	12.13	308	13.31	338

BCD 149 motor lengths differ from the above, refer to draw for motor details

Connector Type	Connector Size	Connector Height	
		(in)	(mm)
"A"	N	1.0	176.0
"B" (std)		1.0	183.5
"C"		1.0	183.5
"V"		1.0	176.0
"J"		1.5	8.05
"M"		1.5	7.26

Flange Dimensions		BCD Code			
		Standard		Optional	
		165		149 [†]	
		(in)	(mm)	(in)	(mm)
Flange Thickness	K	0.55	14.0	0.45	11.5
Pilot Thickness	L	0.13	3.4	0.13	3.4
Pilot Diameter (J6)	M	5.12	130	4.5	114.3
Flange Square	P	5.59	142	5.51	140
Mounting Hole Dia. (H14)	R	0.47	12.0	0.47	12.0
Mounting Hole BCD	S	6.5	165	5.88	149.23
Motor Housing	T	5.59	142	5.59	142
Mounting Bolts		M10		M10	

[†]NEMA 56 flange option; shaft diameter 0.945 in (24 mm)

Shaft Dimensions		Shaft Diameter Code			
		24.0 mm Frame A-E		32.0 mm Opt.	
		(in)	(mm)	(in)	(mm)
Shaft Diameter (J6)	C	0.94	24.0	1.26	32.0
Shaft Length	D ¹	1.97	50.0	2.28	58.0
Key Height	E ²	1.06	27.0	1.38	35.0
Key Length	F ³	1.57	40.0	1.97	50.0
Key-to-Shaft End	G ⁴	0.18	4.6	0.18	4.6
Key Width (H9)	H	0.31	8.0	0.39	10.0
Tapped Hole Thread Size	I	M8 x 1.25		M12 x 1.75	
Tapped Hole Depth	J ⁵	0.79	20.0	1.14	29.0

¹±0.45 mm, ²To IEC 72-1, ³±0.25 mm, ⁴±1.1 mm, ⁵±0.4 mm

Unimotor fm 230 V 190 mm Frame Ratings

Motor Frame Size (mm)		190E3							
Voltage (Vrms)		230							
Frame Length		A	B	C	D	E	F*	G*	H*
Continuous Stall Torque (lb-in)		100.0	199.1	296.5	393.9	477.9	557.6	628.4	681.5
Continuous Stall Torque (Nm)		11.3	22.5	33.5	44.5	54.0	63.0	71.0	77.0
Peak Torque (lb-in)		299.2	597.4	889.5	1181.6	1433.8	1672.8	1885.2	2044.5
Peak Torque (Nm)		33.8	67.5	100.5	133.5	162.0	189.0	213.0	231.0
Standard Inertia (lb-in-sec ²)		0.0277	0.04408	0.06045	0.07682	0.0932	0.10957	0.12595	0.14232
Standard Inertia (kgm ²)		0.00313	0.00498	0.00683	0.00868	0.01053	0.01238	0.01423	0.01608
High Inertia Option (lb-in-sec ²)		0.06178	0.07815	0.09453	0.11090	0.12727	0.14365	0.16002	0.1764
High Inertia Option (kgm ²)		0.00698	0.00883	0.01068	0.01253	0.01438	0.01623	0.01808	0.01993
Winding Thermal Time Const. (s)		194	214	215	216	251	285	425	564
Motor Weight (lbs)		31.68	42.24	52.8	63.36	73.92	84.48	95.04	105.6
Motor Weight (kg)		14.4	19.2	24	28.8	33.6	38.4	43.2	48
Number of Poles		8	8	8	8	8	8	8	8
2000 rpm	Kt (lb-in/A) =	12.39							
	Kt (Nm/A) =	1.4							
	Ke (V/k rpm) =	85.5							
Rated Torque (lb-in)		95.6	182.3	260.2	335.4	392.1	447.0*	477.9*	495.6*
Rated Torque (Nm)		10.8	20.6	29.4	37.9	44.3	50.5	54.0	56.0
Stall Current (A)		8	16.1	23.9	31.8	38.6	45	50.7	55
Rated Power (kW)		2.26	4.31	6.15	7.94	9.28	10.58	11.31	11.73
R (ph-ph) (Ohms)		1.8	0.5	0.25	0.19	0.13	0.1	0.08	0.054
L (ph-ph) (mH)		17.34	7.77	4.66	3.26	3.02	2.65	2.12	1.55
3000 rpm	Kt (lb-in/A) =	8.23							
	Kt (Nm/A) =	0.93							
	Ke (V/k rpm) =	57.0							
Rated Torque (lb-in)		91.2	171.7	234.5	293.8*	302.7*	311.5*	320.4*	327.5*
Rated Torque (Nm)		10.3	19.4	26.5	33.2	34.2	35.2	36.2	37.0
Stall Current (A)		12.1	24.19	36.92	47.85	58.06	67.74	76.34	82.8
Rated Power (kW)		3.24	6.09	8.33	10.43	10.74	11.06	11.37	11.62
R (ph-ph) (Ohms)		0.83	0.256	132	0.09	0.07	0.05	0.05	0.03
L (ph-ph) (mH)		7.94	3.87	2.46	1.81	1.55	1.17	1.36	0.86
4000 rpm	Kt (lb-in/A) =	6.20							
	Kt (Nm/A) =	0.7							
	Ke (V/k rpm) =	42.8							
Rated Torque (lb-in)		72.6	161.1	203.6*	256.7*				
Rated Torque (Nm)		8.2	18.2	23	29				
Stall Current (A)		16.07	32.14	47.86	63.57				
Rated Power (kW)		3.43	7.62	9.63	12.15				
R (ph-ph) (Ohms)		0.46	0.14	0.07	0.06				
L (ph-ph) (mH)		4.34	2.18	1.39	1.26				

NOTES:

* Ratings shown require connector option "H"

Δt = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

All data subject to ±10% tolerance

Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

Nidec has an ongoing process of development and reserves the right to change the specification without notice

All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

† Order Code Information for 230/460 V 190 mm Frame

The Unimotor E3/U3 190 frame models are now supplied with an 58 mm long output shaft. If replacing an existing Unimotor fm 190 E2/U2 model which has a standard 80 mm long output shaft add the suffix -SREL to the order code.

80mm long output shaft order code example:		shaft length	shaft diameter	notes
Unimotor fm E3/U3	190U3D300BACAA215320	58 mm	32 mm	New standard offering
Unimotor fm E2/U2 (replacement)	190U3D300JACAA215320-SREL	80 mm	32 mm	Previous standard offering

Unimotor fm 460 V 190 mm Frame Ratings

Motor Frame Size (mm)	190U3							
Voltage (Vrms)	460							
Frame Length	A	B	C	D	E	F	G*	H*
Continuous Stall Torque (lb-in)	100	199.1	296.5	393.8	477.9	557.6	628.4	681.5
Continuous Stall Torque (Nm)	11.3	22.5	33.5	44.5	54	63	71	77
Peak Torque (lb-in)	299.1	597.4	889.4	1181.5	1433.7	1672.7	1885.1	2044.4
Peak Torque (Nm)	33.8	67.5	100.5	133.5	162	189	213	231
Standard Inertia (lb-in-sec ²)	0.0277	0.04408	0.06045	0.07682	0.0932	0.10957	0.12595	0.14232
Standard Inertia (kgm ²)	0.00313	0.00498	0.00683	0.00868	0.01053	0.01238	0.01423	0.01608
High Inertia Option (lb-in-sec ²)	0.06178	0.07815	0.09453	0.1109	0.12727	0.14365	0.16002	0.1764
High Inertia Option (kgm ²)	0.00698	0.00883	0.01068	0.01253	0.01438	0.01623	0.01808	0.01993
Winding Thermal Time Const. (s)	194	214	215	216	251	285	425	564
Motor Weight (lbs)	37.4	48	58.5	69.1	79.6	90.2	100.8	111.3
Motor Weight (kg)	17	21.8	26.6	31.4	36.2	41	45.8	50.6
Number of Poles	8	8	8	8	8	8	8	8
2000 rpm	Kt (lb-in/A) = 21.24							
	Kt (Nm/A) = 2.4							
	Ke (V/k rpm) = 147.0							
	Rated Torque (lb-in)	95.6	182.3	260.2	335.4	392.1	446.9	477.9
Rated Torque (Nm)	10.8	20.6	29.4	37.9	44.3	50.5	54.0	56.0
Stall Current (A)	4.7	9.4	14.0	18.5	22.5	26.3	29.6	32.1
Rated Power (kW)	2.26	4.31	6.15	7.94	9.28	10.58	11.31	11.73
R (ph-ph) (Ohms)	6.15	1.54	0.83	0.5	0.37	0.28	0.26	0.23
L (ph-ph) (mH)	52.9	23.55	15.0	8.81	8.68	7.36	6.89	6.3
3000 rpm	Kt (lb-in/A) = 14.2							
	Kt (Nm/A) = 1.6							
	Ke (V/k rpm) = 98.0							
	Rated Torque (lb-in)	91.2	171.7	234.5	293.8	302.7	311.5	320.4*
Rated Torque (Nm)	10.3	19.4	26.5	33.2	34.2	35.2	36.2	37.0
Stall Current (A)	7.0	14.1	20.9	27.8	33.8	39.4	44.4	48.1
Rated Power (kW)	3.24	6.09	8.33	10.43	10.74	11.06	11.37	11.62
R (ph-ph) (Ohms)	2.73	0.7	0.41	0.22	0.17	0.14	0.15	0.08
L (ph-ph) (mH)	23.5	10.47	7.35	4.89	3.86	3.6	3.06	2.42
4000 rpm	Kt (lb-in/A) = 10.6							
	Kt (Nm/A) = 1.2							
	Ke (V/k rpm) = 73.5							
	Rated Torque (lb-in)	72.6	161.1	203.6	256.7			
Rated Torque (Nm)	8.2	18.2	23.0	29.0				
Stall Current (A)	9.4	18.8	27.9	37.1				
Rated Power (kW)	3.43	7.62	9.63	12.15				
R (ph-ph) (Ohms)	1.35	0.38	0.21	0.14				
L (ph-ph) (mH)	13.56	6.05	3.86	2.45				

NOTES:

* Ratings shown require connector option "H"

Δt = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

All data subject to ±10% tolerance

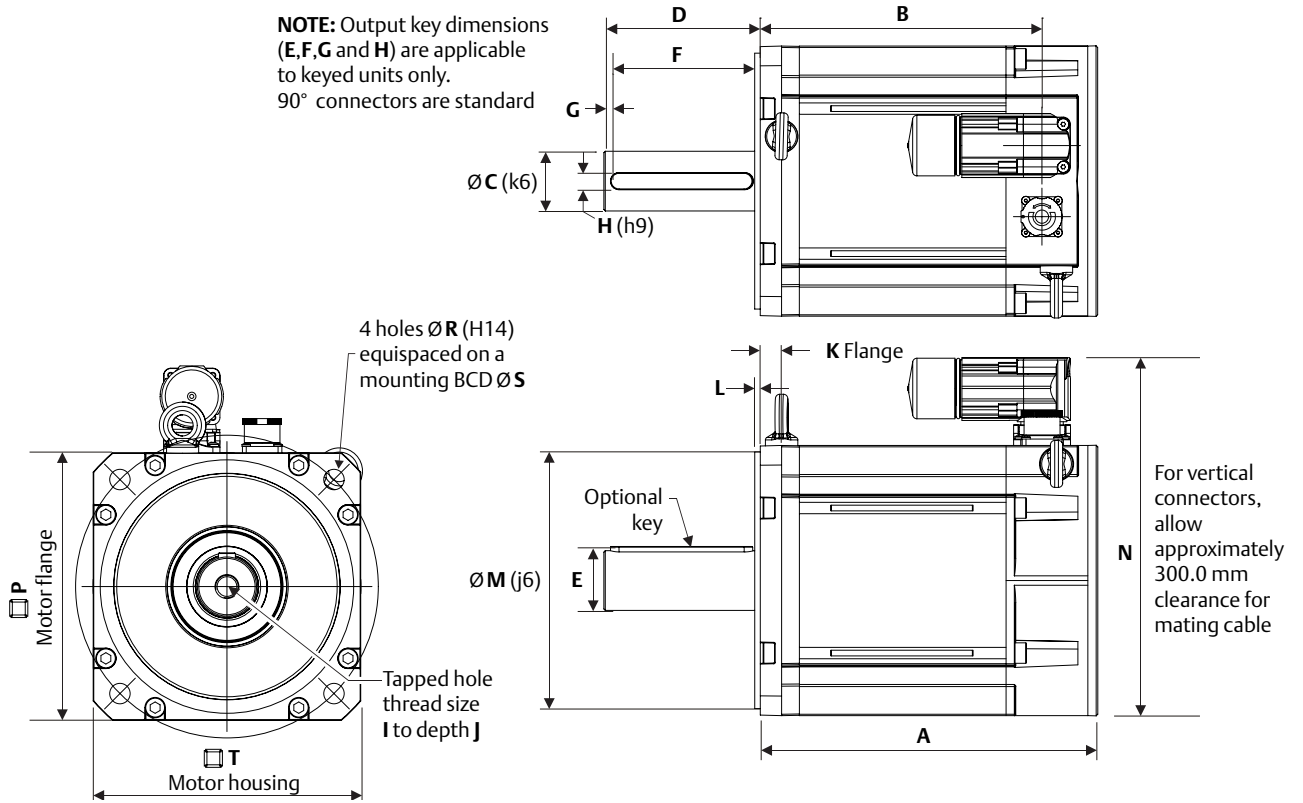
Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

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All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

Unimotor fm 230 V and 460 V 190 mm Frame Dimensions

NOTE: Output key dimensions (E,F,G and H) are applicable to keyed units only.
90° connectors are standard



Motor Dimensions	Frame Length																
	A		B		C		D		E		F		G		H		
	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	
Unbraked Length	A	7.85	199.4	9.03	229.4	10.21	259.4	11.39	289.4	12.57	319.4	13.76	349.4	14.94	379.4	16.12	409.4
	B	6.68	169.6	7.86	199.6	9.04	229.6	10.22	259.6	11.4	289.6	12.58	319.6	13.76	349.6	14.94	379.6
Braked Length	A	11.39	289.4	12.57	319.4	13.76	349.4	14.94	379.4	16.12	409.4	17.3	439.4	18.48	469.4	19.66	499.4
	B	10.22	259.6	11.4	289.6	12.58	319.6	13.76	349.6	14.94	379.6	16.13	409.6	17.31	439.6	18.49	469.6

Flange Dimensions		BCD Code	
		Standard	
		215	
		(in)	(mm)
Flange Thickness	K	0.73	18.5
Pilot Thickness	L	0.15	3.9
Pilot Diameter (J6)	M	7.09	180.0
Flange Square	P	7.48	190.0
Mounting Hole Dia. (H14)	R	.057	14.5
Mounting Hole BCD	S	8.46	215.0
Motor Housing	T	7.48	190.0
Mounting Bolts		M12	

Shaft Dimensions		Shaft Diameter Code					
		32.0 mm Frames A-H		32.0 mm Frame A-H Opt.		38.0 mm Opt.	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Shaft Diameter (J6)	C	1.26	32	1.26	32	1.5	38
Shaft Length	D ¹	2.28	58	3.15	80	2.28	58
Key Height	E ²	1.61	41	1.61	41	1.61	41
Key Length	F ³	2.76	7.0	2.76	70	2.76	70
Key-to-Shaft End	G ⁴	0.18	4.6	0.18	4.6	0.18	4.6
Key Width (H9)	H	0.39	10	0.39	10	0.39	10
Tapped Hole Thread Size	I	M12 x 1.75		M12 x 1.75		M12 x 1.75	
Tapped Hole Depth	J ⁵	1.14	29	1.14	29	1.14	29

¹±0.45 mm, ²To IEC 72-1, ³±0.25 mm, ⁴±1.1 mm, ⁵±0.4 mm

Connector Type	Connector Size	Connector Height	
		(in)	(mm)
"A"	N	1.5	9.65
"J"		1.5	9.94
"N"		1.5	9.94
"M"		1.5	9.13

Unimotor fm 250 mm Frame Ratings

Motor Frame Size (mm)		250U3		
Voltage (Vrms)		460		
Frame Length		D	E	F
Continuous Stall Torque (lb-in)		814	1027	1204
Continuous Stall Torque (Nm)		92	116	136
Peak Torque (lb-in)		2443	3080	3611
Peak Torque (Nm)		276	348	408
Standard Inertia (lb-in-sec ²)		0.243	0.298	0.354
Standard Inertia (kgm ²)		0.028	0.034	0.04
High Inertia Option (lb-in-sec ²)		0.361	0.444	0.528
High Inertia Option (kgm ²)		0.041	0.050	0.060
Winding Thermal Time Const. (s)		439	486	608
Motor Weight (lbs)		126.5	144.1	162.1
Motor Weight (kg)		57.5	65.5	73.7
Number of Poles		8	8	8
1000 rpm	Kt (lb-in/A) =	47.8		
	Kt (Nm/A) =	5.4		
	Ke (V/k rpm) =	323		
Rated Torque (lb-in)		664	814	938
Rated Torque (Nm)		75	92	106
Stall Current (A)		17.2	21.7	25.4
Rated Power (kW)		7.9	9.6	11.1
R (ph-ph) (Ohms)		0.61	0.48	0.34
L (ph-ph) (mH)		22.9	19.1	14.9
1500 rpm	Kt (lb-in/A) =	31.9		
	Kt (Nm/A) =	3.6		
	Ke (V/k rpm) =	216		
Rated Torque (lb-in)		593	673	743
Rated Torque (Nm)		67	76	84
Stall Current (A)		25.8	32.5	38.1
Rated Power (kW)		10.5	11.9	13.2
R (ph-ph) (Ohms)		0.27	0.21	0.15
L (ph-ph) (mH)		10.0	8.6	6.6
2000 rpm	Kt (lb-in/A) =	23.9		
	Kt (Nm/A) =	2.7		
	Ke (V/k rpm) =	162		
Rated Torque (lb-in)		593	655	717
Rated Torque (Nm)		67	74	81
Stall Current (A)		34.4	43.4	50.9
Rated Power (kW)		10.2	11.5	12.7
R (ph-ph) (Ohms)		0.15	0.10	0.08
L (ph-ph) (mH)		5.7	4.2	3.7
2500 rpm	Kt (lb-in/A) =	18.6		
	Kt (Nm/A) =	2.1		
	Ke (V/k rpm) =	129		
Rated Torque (lb-in)		549	620	681
Rated Torque (Nm)		62	70	77
Stall Current (A)		43	54.2	63.6
Rated Power (kW)		9.7	11	12.1
R (ph-ph) (Ohms)		0.09	0.08	0.06
L (ph-ph) (mH)		3.5	3.1	2.6

NOTES:

Δt = 212 °F (100 °C) winding 104 °F (40 °C) maximum ambient

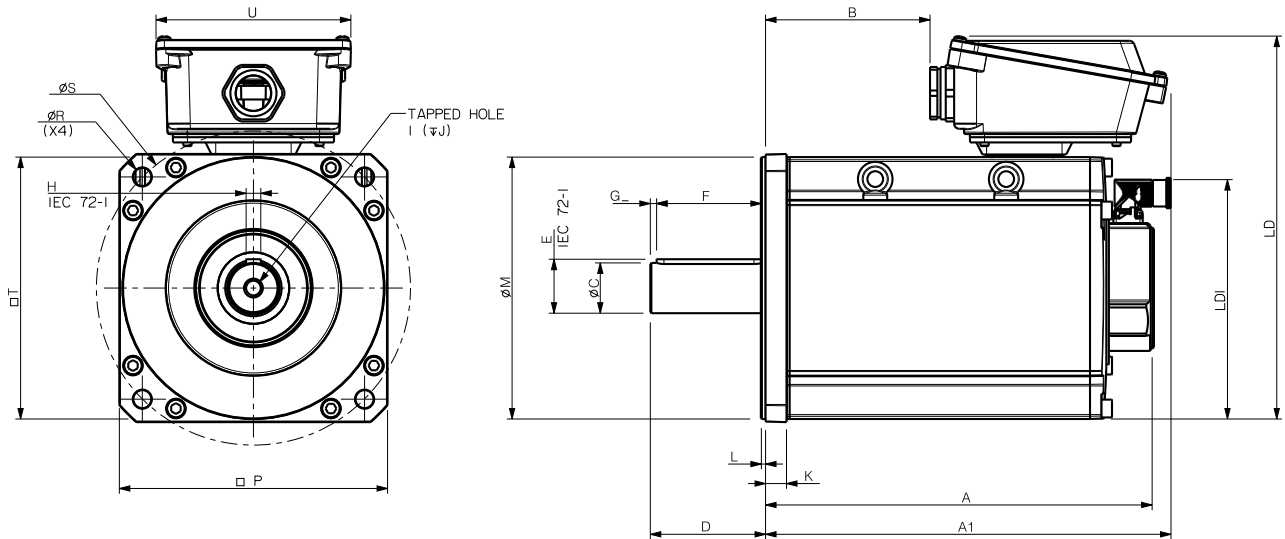
All data subject to ±10% tolerance

Stall torque, rated torque and power relate to maximum continuous operation tested in a 68 °F (20 °C) ambient at 12 kHz drive switching frequency

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All other figures relate to a 68 °F (20 °C) motor temperature; maximum intermittent winding temperature is 284 °F (140 °C)

Unimotor fm 250 mm Frame Dimensions



Motor Dimensions		Frame Length					
		D		E		F	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length	A	14.59	370.7	15.78	400.7	16.96	430.7
	A1	24.8	630.1	25.9	660.1	27.2	690.1
	B	7.07	179.7	8.26	209.7	9.44	239.7
Braked Length	A	17.42	442.5	18.60	472.5	19.78	502.5
	A1	27.6	701.9	28.8	731.9	30.0	761.9
	B	9.90	251.5	11.08	281.5	12.26	311.5

Flange Dimensions		BCD Code	
		Standard	
		300	
		(in)	(mm)
Flange Thickness	K	0.79	20.0
Pilot Thickness	L	0.18	4.50
Pilot Diameter (J6)	M	9.84	250.0
Flange Square	P	10.08	256.0
Mounting Hole Dia. (H14)	R	0.73	18.5
Mounting Hole BCD	S	11.81	300.0
Motor Housing	T	9.82	249.5
Terminal box width	U	7.32	186.0
Mounting Bolts		M16	

Shaft Dimensions		Shaft Diameter Code					
		38.0 mm Opt.		42.0 mm Opt.		48.0 mm standard	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Shaft Diameter (J6)	C	1.50	38.0	1.65	42.0	1.89	48.0
Shaft Length	D ¹	3.15	80.0	4.33	110.0	4.33	110.0
Key Height	E ²	1.61	41.0	1.77	45.0	2.03	51.5
Key Length	F ³	2.76	70.0	3.94	100.0	3.94	100.0
Key-to-Shaft End	G ⁴	0.18	4.6	0.24	6.0	0.24	6.0
Key Width (h9)	H	0.39	10.0	0.47	12.0	0.55	14.0
Tapped Hole Thread Size	I	M12x1.75mm		M16x2.0mm		M16x2.0mm	
Tapped Hole Depth	J ⁵	1.46	37.0	1.46	37.0	1.14	29.0

¹±0.45 mm, ²To IEC 72-1, ³±0.25 mm, ⁴±1.1 mm, ⁵±0.4 mm

Connector Type		Connector Height			
		LD		LD1	
		(in)	(mm)	(in)	(mm)
"V"	11.48	291.5	8.70	221	
"C"	12.30	312.5	8.70	221	
"B"	12.30	312.5	8.70	221	
"H"	14.3	363.5	8.70	221	

NOTE: Shaft options below the standard (Std) dimensions will require customer approval and may not be covered by warranty.

Unimotor fm E3/U3 Power Connector Size Reference Tables

Unimotor fm E3/U3 Power Connector size reference tables for cable order code

230 V - 75 to 142 mm Frames

230V	075E3				095E3					115E3					142E3				
	A	B	C	D	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
2000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5
3000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	H	1.0	1.0	1.0	1.5	1.5
4000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	H	H	1.0	1.0	1.5	1.5	1.5
6000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0								

Power Connector code above B, C, V =Size 1.0 and J, M, N =Size 1.5, H =terminal box

460 V - 75 to 142 mm Frames

460V	75U3				95U3					115U3					142U3				
	A	B	C	D	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
2000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
4000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5
6000 (rpm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0			1.0	1.0				1.0	1.0			

Power Connector code above B, C, V =Size 1.0 and J, M, N =Size 1.5, H =terminal box

230 V - 190 mm Frames

230V	190E3							
	A	B	C	D	E	F	G	H
2000 (rpm)	1.5	1.5	1.5	1.5	1.5	H	H	H
3000 (rpm)	1.5	1.5	1.5	H	H	H	H	H
4000 (rpm)	1.5	1.5	H	H				

Power Connector code J, M, N =Size 1.5, H =terminal box

460 V - 190 mm Frames

460V	190U3							
	A	B	C	D	E	F	G	H
2000 (rpm)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
3000 (rpm)	1.5	1.5	1.5	1.5	1.5	1.5	H	H
4000 (rpm)	1.5	1.5	1.5	1.5				

Power Connector code J, M, N =Size 1.5, H =terminal box

460 V - 250 mm Frames

460V			
	D	E	F
1000 (rpm)	1.5	1.5	1.5
1500 (rpm)	1.5	1.5	1.5
2000 (rpm)	1.5	H	H
2500 (rpm)	H	H	H

This information is to identify the motor power connector size for cable selection

This motor example has power connector order option J (size 1.5) and requires a motor power cable with a size 1.5 connector. example: 142E3400JACAA165240

Unimotor fm Motor Selection Considerations

Feedback

Feedback Device Order Code	Feedback Type	Encoder Supply Voltage	SinCos Cycles or Incremental Pulses per Revolution	Resolution Available to Position Loop	Feedback Accuracy
075-250 motors					
				Medium	Medium
AE	Resolver ¹	6 Vrms Excitation 6 kHz	1	16384 (14 bit)	+/- 720"
				Medium	High
CA	Incremental Encoder	5 V	4096	16384 (14 bit)	+/- 60"
				Medium	Medium
EC (Multi-turn)	Inductive Absolute Encoder EnDat ^{2/3}	3.6 - 14 V	32	Absolute position 524288	+/- 280"
FC (Single-turn)				(19 bits)	
				Very high	High
RA (Multi-turn)	SinCos Encoder HIPERFACE ²	7 - 12 V	1024	1.04 x 10 ⁶	(Total accuracy +/-52")
SA (Single-turn)				(20 bits)	
				Very High	Very High
EB (Multi-turn)	Optical Absolute Encoder EnDat ^{2/3}	3.6 - 14 V	2048	2.08 x 10 ⁶	+/-20" (Differential non linearity +/- 1% signal period)
FB (Single-turn)				(21 bits)	

NOTES:

¹Resolution value shown when used with the Unidrive M resolver input or SM-Resolver Option Module (Unidrive Sp and Digitax ST)

²Resolution value shown when used with the Unidrive M, Unidrive SP or Digitax ST when the encoder type is set to either SC EnDat or SC Hiper, depending on the encoder

³Optical EnDat encoders are recommended for heavy duty applications. Inductive EnDat encoders are recommended for std duty applications

Motor Selection

Motor Derating

Any adverse operating conditions require that the motor performance be derated. These conditions include ambient temperature above 104 °F (40 °C), motor mounting position, drive switching frequency or a drive oversized for the motor.

Ambient Temperatures

For ambient temperatures above 104 °F (40 °C), the torque must be derated using the following formula as a guideline (only applies to motors up to 3000 rpm and assumes copper losses dominate).

New derated torque =

$$\text{Specified torque} \times \sqrt{1 - \frac{([\text{ambient temperature}^* - 40] / 100)}{1}}$$

*Measured in °C

For example, with an ambient temperature of 169 °F (76 °C), the new derated torque will be 0.8 x specified torque.

Unimotor fm Motor Derating Factors

Switching Frequency	Motor Type/Frame								
	075 A-D	095 A-E	115 A-C	115 D-E	142 A-C	142 D-E	190 A-B	190 C-H	250 D-F
3 kHz	0.93	0.88	0.89	0.84	0.87	0.81	0.98	N/A	0.88
4 kHz	0.94	0.91	0.91	0.87	0.91	0.86	0.99	0.55	0.90
5/6 kHz	0.95	0.93	0.93	0.90	0.94	0.89	0.99	0.77	0.94
8 kHz	0.98	0.97	0.97	0.95	0.97	0.96	1	0.90	0.98
10/12/16 kHz	1	1	1	1	1	1	1	1	1

Drive Switching Frequency

Most drive current ratings are reduced at higher switching frequencies. See individual drive manuals for details.

Most motor current ratings are reduced at lower switching frequencies. See the table left for motor derating factors.

Unimotor fm Motor Holding Brake Specifications

Motor Frame Size (mm)	Power Supply (Vdc)	Input Power (W)	Static Torque		Mechanical Release Time (ms)	Added Inertia		Added Weight		Degress (°)
			(lb-in)	(Nm)		(lb-in-sec ²)	(kgcm ²)	(lb)	(kg)	
75	24	6.3	19.5	2.2	22	0.00006	0.07	1.1	0.5	1.03
95	24	16	108	12.2	60	0.00035	0.39	1.3	0.6	0.94
115	24	23	177	20	120	0.00039	0.24	2.6	1.2	0.75
142	24	23	177	20	120	0.00048	0.3	3.7	1.7	0.75
190 (A-D)	24	25	221	42	95	0.00035	0.39	4.4	2.0	0.77
190 (E-H)	24	25	548	67	120	0.00035	0.39	4.4	2.0	0.77
250	24	62	1195	135	250	0.01452	16.4			0.5

NOTES:

Figures shown in individual motor sections are at 68 °F (20 °C) ambient

Apply a derate factor of 0.7 to standard brake torque figures if motor temperature is above 212 °F (100 °C)

*Backlash will increase over time

Motor Selection Considerations

Ingress Protection

IP65 conformance; sealed against water spray and dust when mounted and connected.

Thermal Protection

An incorrect system set up can give rise to excessive motor temperatures. This can be guarded against by the use of the motor thermistor protection facility.

Servo motor/drive system faults

Common but often unnoticed causes of motor overheating can be created by:

- Instability (self induced oscillation) within the overall servo feedback system
- Incorrect parameter settings in the drive protection system, for example peak current, and I²t (thermal protection calculation for the drive)

The increase in resistance is measured by the drive and a “th trip” will occur. Only once the motor has cooled can the trip be cleared.

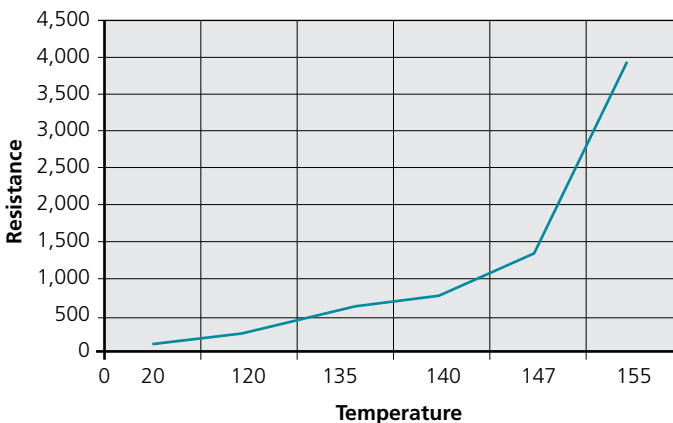
The installer must connect the motor thermistor to the drive to cause motor power shutdown in the event of overheating.

It is the installer’s responsibility to ensure that this protection facility is properly connected and set at the drive.

Failure to ensure the correct operation of the protection facility invalidates the warranty in respect of a burnt out winding.

The ambient temperature of the environment into which the Unimotor is mounted must be considered.

Unimotor PTC 145 °C

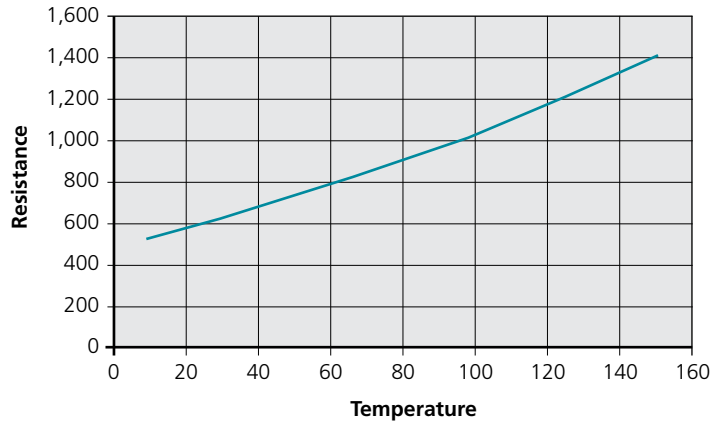


Standard Thermistor protection

A PTC thermistor rated to 145 C, is built into the motor windings and is used to protect the motor against overheating problems.

The device remains a low resistance until a critical temperature is reached, where it will then switch to a very high resistance.

Unimotor KTY 84 -130 °C



Optional KTY protection

A KTY 84-130 linear temperature sensor is built into the motor windings and is used to protect the motor against overheating problems. This device returns a resistance proportional to the winding temperature.

Environmental Conditions

Any liquids or gases that may come into contact with the motor must be confirmed to ensure compliance with the correct international standards.

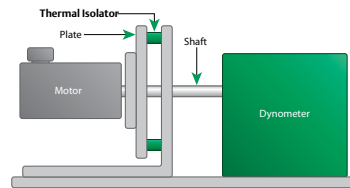
Brake Operation

Do not apply the brake while the motor shaft is rotating. The brake can only take a limited number of emergency braking operations and must not be used for repeated dynamic braking.

Thermal Test Conditions

In general, motor torque should be derated if the motor mounting surface is heated from an external source such as a gearbox, the motor is connected to a poor thermal conductor, or the motor is mounted in a confined space with restricted air flow.

Thermal motor mounting arrangement test example:

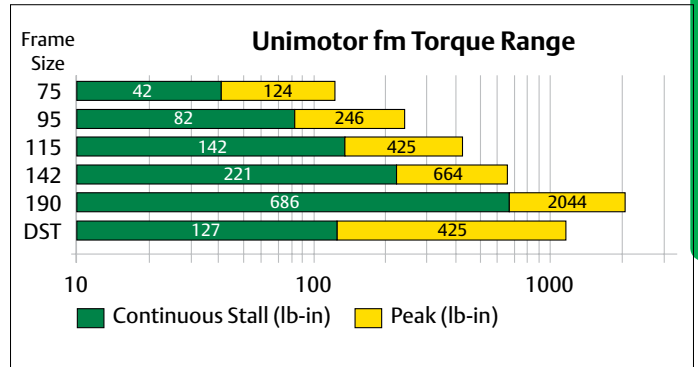


Motor Type/Frame	Aluminum Heatsink Plate	
	(in)	(mm)
075-095	9.8 x 9.8 x 0.6	250 x 250 x 15
115-142	13.8 x 13.8 x 0.8	350 x 350 x 20
190	19.7 x 19.7 x 0.8	500 x 500 x 20

Unimotor fm 230 V | 460 V

Control Techniques' Unimotor fm series is designed to accommodate a wide range of applications with a highly configurable selection of feedback devices, shafts, inertias and more.

- High inertia
- IEC mounting (NEMA option on 95 and 142 only)
- Configuration options include brake, bolt circle, shaft diameter, plus high-peak and high-inertia options
- Multiple feedback options
- IP65 rating, UL, CE and RoHS compliant



Sample Motor and Drive Combinations

Digitax ST and Unimotor fm – 230 V, 3Ø															
Drive Model	Drive Switching Frequency	Motor Model	Cont. Stall Torque		Peak Torque		Rated Torque		Rated Power		Rated Operating Speed	Inertia		Kt	
	kHz		lb-in	Nm	lb-in	Nm	lb-in	Nm	HP	kW	rpm	lb-in-sec ²	kgm ²	lb-in/Arms	Nm/Arms
DST1202	12	075E3A400	12.39	1.40	38.06	4.30	10.62	1.20	0.67	0.50	4000	0.00069	0.00008	6.20	0.70
DST1203	12	075E3B300	23.90	2.70	70.80	8.00	20.36	2.30	0.97	0.72	3000	0.00108	0.00012	8.23	0.93
DST1204	12	095E3B300	39.83	4.50	119.48	13.50	36.29	4.10	1.73	1.29	3000	0.00230	0.00026	8.23	0.93
Digitax ST and Unimotor fm – 460 V, 3Ø															
Drive Model	Drive Switching Frequency	Motor Model	Cont. Stall Torque		Peak Torque		Rated Torque		Rated Power		Rated Operating Speed	Inertia		Kt	
	kHz		lb-in	Nm	lb-in	Nm	lb-in	Nm	HP	kW	rpm	lb-in-sec ²	kgm ²	lb-in/Arms	Nm/Arms
DST1402	12	075U3B300	23.90	2.70	70.80	8.00	20.27	2.29	0.97	0.72	3000	0.00108	0.00012	14.16	1.60
DST1402	12	075U3B400	23.90	2.70	70.80	8.00	18.23	2.06	1.15	0.86	4000	0.00108	0.00012	10.62	1.20
DST1403	12	095U3B300	39.83	4.50	119.48	13.50	36.29	4.10	2.13	1.59	3000	0.00230	0.00026	14.16	1.60
DST1403	8	095U3C300	53.99	6.10	167.27	18.90	47.79	5.40	2.28	1.70	3000	0.00329	0.00037	14.16	1.60
DST1404	8	115U3B300	63.72	7.20	197.47	22.20	57.53	6.50	2.74	2.04	3000	0.00682	0.00077	14.16	1.60
DST1405	6	115U3E200	127.44	14.40	424.80	48.00	112.40	12.70	3.57	2.66	2000	0.01310	0.00148	21.24	2.40