

# Unimotor hd 230 V | 460 V

## Compact, Powerful High Dynamic AC Servo Motors

Designed for maximum torque density, the Unimotor hd brushless AC Servo motor series provides an exceptionally compact, low inertia solution for applications that require very high torque during rapid acceleration and deceleration profiles. Unimotor hd motors fitted with high resolution SinCos or absolute encoders are pre-loaded with the motor "electronic nameplate" data during the manufacturing process. This data can be read by most Control Techniques' servo drives and used to automatically optimize the drive settings. This feature simplifies commissioning and maintenance, ensures consistent performance and saves time.

The Unimotor hd torque profile is closely matched to Digitax ST Servo drives providing up to 300% peak overload for maximum dynamic performance.

### Key Features

- Torque range: 6.4 to 752 lb-in (0.72 to 85.0 Nm)
- High torque-to-inertia ratio for high-dynamic performance
- Compact and powerful
- Optional holding brake
- IP65 conformance
- Segmented stator design
- World class performance
- Winding to suit 230 V and 460 V
- Speeds include 2000, 3000, 4000 and 6000 rpm
- Large shafts to increase torsional rigidity
- Multiple feedback options:
  - Incremental encoder: High accuracy, medium resolution
  - Absolute: Medium accuracy, medium resolution, single-turn and multi-turn
  - SinCos/absolute: High accuracy, high resolution, single-turn and multi-turn
  - HIPERFACE (SICK) and EnDat (Heidenhain) protocols supported
  - Resolver: Robust for extreme applications and conditions; lower accuracy, medium resolution

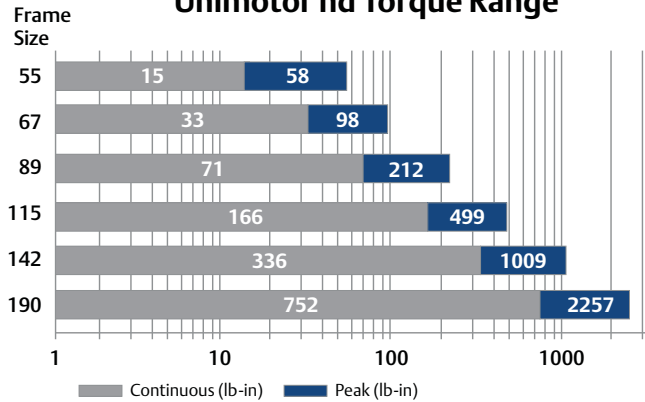
UNIMOTOR HD

## Unimotor



Unimotor hd motors (shown with a Digitax ST Servo drive).

### Unimotor hd Torque Range



All Unimotor hd motors feature connections that rotate for easier cable routing and installation.

### Approvals



Certificate No. Q 9576  
003  
FM30610

RoHS  
Compliant



# Unimotor hd 230 V | 460 V

## Order Code information

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

089	UD	B	30	5	B	A	CA		A	XXX	XXX
Frame Size	Motor Voltage	Stator Length	Speed	Brake (24 V)	Connection Type	Output Shaft	Feedback Device		Inertia	BCD	Shaft Diameter
		055 - 089 Frames	055 - 067 Frames	055 - 190 Frames	055 - 115 Frames		055 & 067 Frames		055-190 Frames	055 Frame Only <sup>‡</sup>	
055	ED = 230 V	A	30 = 3000 rpm	0 = Not Fitted	B = Power size 1.0 and Signal 90° and Rotatable	A = Keyway w/ full key installed	AR = Resolver		A = Std. + PTC	063	9.0 A-C
067	UD = 460 V	B	60 = 6000 rpm				CR = Incremental Encoder*****	4096 ppr (R35l)			11.0 A-C
089		C	089 Frame	5 = Holding Brake**	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	EM = Sin/Cos Inductive Multi-turn*****	EQI 1130	C = Std. + KTY84-130*		14.0 A-C
115		115 Frame	30 = 3000 rpm				FM = Sin/Cos Inductive Single-turn	ECI 1118			
142		B	40 = 4000 rpm	6 = Parking Brake <sup>†</sup>	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	TL = Optical Sin/Cos Multi-turn	SKM36			
190		C	60 = 6000 rpm				UL = Optical Sin/Cos Single-turn	SKS36			
		D	115 Frame	B = Power size 1.0 and Signal 90° and Rotatable	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	EG = Inductive serial Multi-turn EnDat	EQI 1131*			
		142 Frame	20 = 2000 rpm				E = Hybrid power and signal 90° size 1.5*	EN = Optical serial Multi-turn EnDat			EQN 1135*
		C	30 = 3000 rpm	J = Power size 1.5 and Signal 90° Rotatable	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	FG = Inductive serial Single-turn EnDat	ECI 1119*			
		D	142 Frame				E = Hybrid power and signal 90° size 1.5*	EN = Optical serial Single-turn EnDat			ECN 1123*
		E	10 = 1000 rpm	J = Power size 1.5 and signal 90° and Rotatable	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	089 - 190 Frames				
		190 Frame	15 = 1500 rpm				AE = Resolver				
		C	20 = 2000 rpm	E = Hybrid power and signal 90° size 1.5*	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	CA = Incremental Encoder*****	4096 ppr (CF550)			
		D	30 = 3000 rpm				EB = Sin/Cos Optical Multi-turn EnDat	EQN 1325			
		D	30 = 3000 rpm	J = Power size 1.5 and signal 90° and Rotatable	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	FB = Sin/Cos Optical Single-turn EnDat	ECN 1313			
		E	10 = 1000 rpm				EC = Inductive Multi-turn EnDat*****	EQI 1331*****			
		F	190 Frame	J = Power size 1.5 and signal 90° and Rotatable	D = Hybrid power and signal 90° size 1.0*	F = Keyway w/ full & half key*** provided	FC = Inductive Single-turn EnDat	ECI 1319*****			
		10 = 1000 rpm	RA = Sin/Cos Optical Multi-turn Hiperface <sup>†</sup>				SRM 50 (GEN 2)				
		15 = 1500 rpm	SA = Sin/Cos Optical Single-turn Hiperface	SRS 50 (GEN 2)							
		20 = 2000 rpm	EF = Inductive serial Multi-turn EnDat	EQI 1331*							
			FF = Inductive serial Single-turn EnDat	ECI 1319*							
			BG = Optical serial Multi-turn EnDat	EQN 1337*							
			HB = Optical serial Single-turn EnDat	ECN 1325*							

142 hd Frames using connection type E or J			
Motor	Frame	RPM	Order Code
142ED	C	2000	E or J
	D	2000	E or J
	E	2000	E or J
142ED	C	3000	E or J
	D	3000	E or J
142UD	D	3000	E or J
	E	3000	E or J

**NOTES:**

- \*Single cable option
- \*\*Holding brakes are not designed for dynamic use
- \*\*\*Half key provided to create a smooth shaft and balance
- \*\*\*\*Bearingless design recommended for light duty applications only.
- \*\*\*\*\*Express Availability motor standard feedback.
- <sup>†</sup>Refer to Dimensions table for connector size data
- <sup>‡</sup>Add Bolt Circle Diameter (BCD) and Shaft Diameter code for 055 frame only (11 and 14 mm are standard). ex. 055EDC600BACRA063110

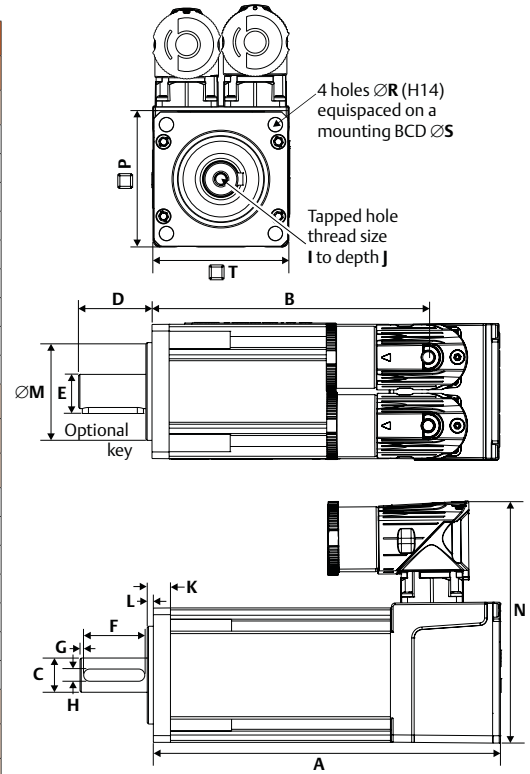


The Unimotor hd series servo motor expands the capabilities of Control Techniques motion systems that provide high torque in a small size as well as support for incremental encoders, absolute encoders and resolver motor feedback.

UNIMOTOR HD

# Unimotor hd 55 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		055ED			055UD		
Voltage (Vrms)		230			460		
Frame Length		A	B	C	A	B	C
Continuous Stall Torque (lb-in)		6.37	10.44	14.6	6.37	10.44	14.6
Continuous Stall Torque (Nm)		0.72	1.18	1.65	0.72	1.18	1.65
Peak Torque (lb-in)		25.49	41.78	58.42	25.49	41.78	58.42
Peak Torque (Nm)		2.88	4.72	6.6	2.88	4.72	6.6
Inertia (lb-in-sec <sup>2</sup> )		0.00012	0.00022	0.00032	0.00012	0.00022	0.00032
Inertia (kgm <sup>2</sup> )		0.000014	0.000025	0.000036	0.000014	0.000025	0.000036
Motor Weight (lb)		2.64	3.3	3.96	2.64	3.3	3.96
Motor Weight (kg)		1.2	1.5	1.8	1.2	1.5	1.8
Number of Poles		8	8	8	8	8	8
3000 rpm	Kt (lb-in/A) =	6.55	7.7	8.05	6.55	13.19	14.6
	Kt (Nm/A) =	0.74	0.87	0.91	0.74	1.49	1.65
	Ke (V/k rpm) =	45	52.5	55	45	90	100
Rated Torque (lb-in)		6.2	9.29	13.1	6.2	9.29	13.1
Rated Torque (Nm)		0.7	1.05	1.48	0.7	1.05	1.48
Stall Current (A)		0.97	1.36	1.81	0.97	0.79	1
Rated Power (HP)		0.29	0.44	0.62	0.29	0.44	0.62
Rated Power (kW)		0.22	0.33	0.46	0.22	0.33	0.46
R (ph-ph) (Ohms)		28.0	14.12	9.53	28.0	45.0	31.0
L (ph-ph) (mH)		50.0	32.00	23.0	50.0	100.0	75.0
6000 rpm	Kt (lb-in/A) =	3.98	3.81	4.25	6.55	6.99	7.35
	Kt(Nm/A) =	0.45	0.43	0.48	0.74	0.79	0.83
	Ke (V/k rpm) =	27	26	29	45	47.5	50
Rated Torque (lb-in)		6.02	7.97	10.62	6.02	7.97	10.62
Rated Torque (Nm)		0.68	0.9	1.2	0.68	0.9	1.2
Stall Current (A)		1.61	2.74	3.44	0.97	1.49	1.99
Rated Power (HP)		0.58	0.76	1.01	0.58	0.76	1.01
Rated Power (kW)		0.43	0.57	0.75	0.43	0.57	0.75
R (ph-ph) (Ohms)		8.50	3.55	2.38	28.00	10.70	7.80
L (ph-ph) (mH)		16.00	8.20	6.30	50.00	25.00	20.00



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Shaft Dimensions		Shaft Diameter Code					
		9.0 mm		11.0 mm		14.0 mm	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Shaft Diameter (J6)	C	0.354	9.0	0.433	11.0	0.551	14.0
Shaft Length	D	0.790	20.0	0.906	23.0	1.181	30.0
Key Height	E	0.402	10.2	0.492	12.5	0.629	16.0
Key Length	F	0.591	15.0	0.591	15.0	0.886	22.0
Key-to-Shaft End	G	0.039	1.0	0.059	1.5	0.142	3.6
Key Width (H9)	H	0.118	3.0	0.157	4.0	0.197	5.0
Tapped Hole Thread Size	I	M4 x 10		M4 x 10		M5 x 12.5	
Tapped Hole Depth	J	0.394	10.0	0.531	13.5	0.492	12.5

Motor Dimensions		Frame Length					
		A		B		C	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length	A	4.65	118	5.59	142	6.54	166
	B	3.55	90	4.49	114	5.43	138
Braked Length	A	6.22	158	7.17	182	8.11	206
	B	5.12	130	6.06	154	7.01	178

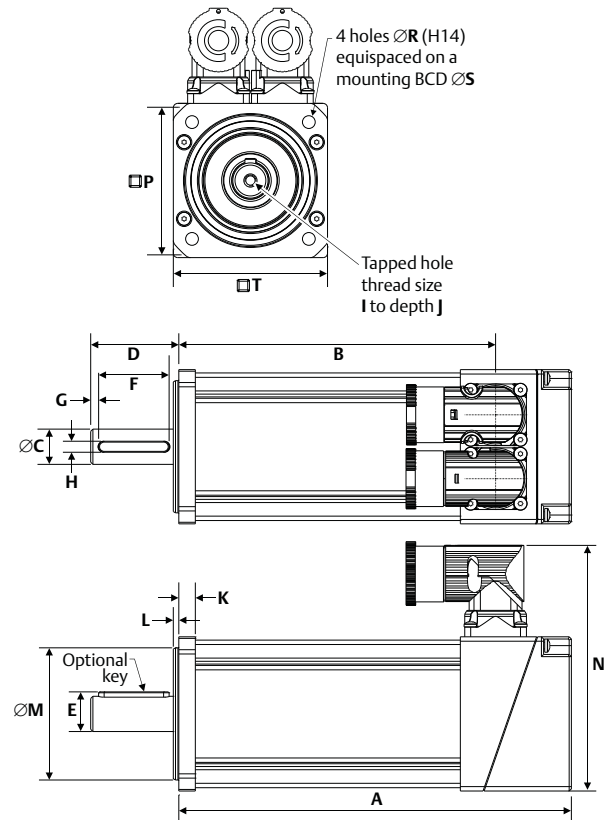
Flange Dimensions		BCD Code	
		Standard	
		063	
		(in)	(mm)
Flange Thickness	K	0.276	7.0
Pilot Thickness	L	0.098	2.5
Pilot Diameter (J6)	M	1.584	40.0
Flange Square	N	3.897	99.0
Mounting Hole Diameter (H14)	P	2.165	55.0
Mounting Hole BCD	R	0.228	5.8
Motor Housing	S	2.480	63.0
Terminal Box Width	T	2.115	55.0
Mounting Bolts		M5	

# Unimotor hd 67 mm Frame Ratings and Dimensions

Motor Frame Size (mm)	067ED			067UD		
Voltage (Vrms)	230			460		
Frame Length	A	B	C	A	B	C
Continuous Stall Torque (lb-in)	12.8	22.6	32.7	12.8	22.5	32.7
Continuous Stall Torque (Nm)	1.45	2.55	3.70	1.45	2.55	3.70
Peak Torque (lb-in)	38.5	67.7	98.2	38.5	67.7	98.2
Peak Torque (Nm)	4.35	7.65	11.10	4.35	7.65	11.10
Inertia (lb-in-sec <sup>2</sup> )	0.00027	0.00047	0.00066	0.00027	0.00047	0.00066
Inertia (kgm <sup>2</sup> )	0.000030	0.000053	0.000075	0.000030	0.000053	0.000075
Motor Weight (lb)	4.40	5.72	7.04	4.41	5.73	7.05
Motor Weight (kg)	2.00	2.60	3.20	2.00	2.60	3.20
Number of Poles	10	10	10	10	10	10
3000 rpm	Kt (lb-in/A) =	8.23		7.08	14.16	
	Kt (Nm/A) =	0.93		0.80	1.60	
	Ke (V/k rpm) =	57.0		49.0	98.0	
Rated Torque (lb-in)	12.4	21.7	31.0	12.4	21.7	31.0
Rated Torque (Nm)	1.40	2.45	3.50	1.40	2.45	3.50
Stall Current (A)	1.56	2.74	3.98	1.81	1.59	2.31
Rated Power (HP)	0.59	1.03	1.48	0.59	1.03	1.48
Rated Power (kW)	0.44	0.77	1.10	0.44	0.77	1.10
R (ph-ph) (Ohms)	14.92	4.88	3.33	11.69	15.20	10.70
L (ph-ph) (mH)	45.43	17.40	12.70	35.18	54.20	40.80
6000 rpm	Kt (lb-in/A) =	4.16		7.08		
	Kt (Nm/A) =	0.47		0.80		
	Ke (V/k rpm) =	28.5		49.0		
Rated Torque (lb-in)	11.5	19.5		11.5	19.5	27.4
Rated Torque (Nm)	1.30	2.20		1.30	2.20	3.10
Stall Current (A)	3.12	5.48		1.81	3.19	4.63
Rated Power (HP)	1.10	1.85		1.10	1.85	2.61
Rated Power (kW)	0.82	1.38		0.82	1.38	1.95
R (ph-ph) (Ohms)	3.86	1.22		11.69	3.79	2.68
L (ph-ph) (mH)	11.06	4.35		35.18	13.60	10.20

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 above 12 kHz drive switching frequency  
 Maximum intermittent winding temperature is 284 °F (140 °C)

Motor Dimensions	Frame Length						
		A		B		C	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length	A	5.62	142.7	6.80	172.7	7.98	202.7
	B	4.28	108.8	5.46	138.8	6.65	168.8
Braked Length	A	7.00	177.7	8.18	207.7	9.37	237.7
	B	5.66	143.8	6.84	173.8	8.02	203.8



Shaft Dimensions	Shaft Diameter Code	
	14.0 mm	
	(in)	(mm)
Shaft Diameter	C	0.551 14.0
Shaft Length	D	1.181 30.0
Key Height	E	0.629 16.0
Key Length	F	0.964 25.0
Key-to-Shaft End	G	0.142 3.6
Key Width	H	0.197 5.0
Tapped Hole Thread Size	I	M5 x 0.8
Tapped Hole Depth	J	0.53 13.5

Flange Dimensions	BCD Code	
	Standard	
	075	
	(in)	(mm)
Flange Thickness	K	0.295 7.5
Pilot Thickness	L	0.098 2.5
Pilot Diameter	M	2.362 60.0
Overall Height	N	4.389 111.5
Flange Square	P	2.755 70.0
Mounting Hole Diameter	R	0.228 5.8
Mounting Hole BCD	S	2.953 75.0
Motor Housing	T	2.637 67.0
Mounting Bolts		M5

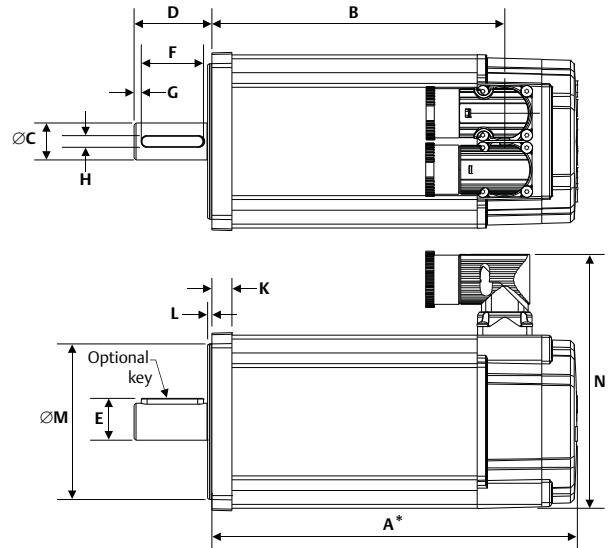
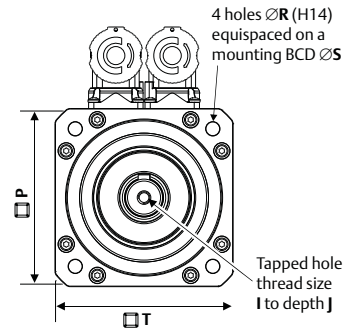
# Unimotor hd 89 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		089ED			089UD		
Voltage (Vrms)		230			460		
Frame Length		A	B	C	A	B	C
Continuous Stall Torque (lb-in)		28.3	48.7	70.8	28.3	48.7	70.8
Continuous Stall Torque (Nm)		3.20	5.50	8.00	3.20	5.50	8.00
Peak Torque (lb-in)		85.0	146.0	212.4	85.0	146.0	212.4
Peak Torque (Nm)		9.60	16.50	24.00	9.60	16.50	24.00
Inertia (lb-in-sec <sup>2</sup> )		0.00077	0.00142	0.00207	0.00077	0.00142	0.00207
Inertia (kgm <sup>2</sup> )		0.000087	0.000161	0.000234	0.000087	0.000161	0.000234
Motor Weight (lb)		6.8	9.2	11.7	6.8	9.2	11.7
Motor Weight (kg)		3.30	4.40	5.50	3.30	4.40	5.50
Number of Poles		10	10	10	10	10	10
3000 rpm	Kt (lb-in/A) =	8.2			14.2		
	Kt (Nm/A) =	0.93			1.60		
	Ke (V/k rpm) =	57.0			98.0		
Rated Torque (lb-in)	26.6	42.9	61.1	26.6	42.9	61.1	
Rated Torque (Nm)	3.0	4.85	6.90	3.00	4.85	6.90	
Stall Current (A)	3.44	5.91	8.60	2.00	3.44	5.00	
Rated Power (HP)	1.26	2.04	2.91	1.26	2.04	2.91	
Rated Power (kW)	0.94	1.52	2.17	0.94	1.52	2.17	
R (ph-ph) (Ohms)	3.28	1.57	0.89	10.10	5.05	2.68	
L (ph-ph) (mH)	21.55	11.84	7.09	65.17	38.36	21.72	
4000 rpm	Kt (lb-in/A) =	6.2			10.6		
	Kt (Nm/A) =	0.70			1.20		
	Ke (V/k rpm) =	42.8			73.5		
Rated Torque (lb-in)	25.7	40.3	56.2	25.7	40.3	56.2	
Rated Torque (Nm)	2.90	4.55	6.35	2.90	4.55	6.35	
Stall Current (A)	4.57	7.86	11.43	2.67	4.58	6.67	
Rated Power (HP)	1.62	2.56	3.57	1.62	2.56	3.57	
Rated Power (kW)	1.21	1.91	2.66	1.21	1.91	2.66	
R (ph-ph) (Ohms)	2.04	0.79	0.54	6.16	2.47	1.75	
L (ph-ph) (mH)	13.20	5.97	4.38	39.78	18.8	14.03	
6000 rpm	Kt (lb-in/A) =	4.2			7.1		
	Kt (Nm/A) =	0.47			0.80		
	Ke (V/k rpm) =	28.5			49.0		
Rated Torque (lb-in)	23.5	33.6	44.3	23.5	33.6	44.3	
Rated Torque (Nm)	2.65	3.80	5.00	2.65	3.80	5.00	
Stall Current (A)	6.88	11.83	17.20	4.00	6.88	10.00	
Rated Power (HP)	2.24	3.21	4.21	2.24	3.21	4.21	
Rated Power (kW)	1.67	2.39	3.14	1.67	2.39	3.14	
R (ph-ph) (Ohms)	0.98	0.39	0.23	2.52	1.27	0.83	
L (ph-ph) (mH)	6.24	2.96	1.89	16.29	9.59	6.66	

**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 above 12 kHz drive switching frequency  
 Maximum intermittent winding temperature is 284 °F (140 °C)

\*Motor length increases 0.512 in (13 mm) for feedback options FB, EB, CA, SA and RA; motor length decreases 0.394 in (10 mm) for feedback option AE



Motor Dimensions		Frame Length						
		A		B		C		
		(in)	(mm)	(in)	(mm)	(in)	(mm)	
Feedback EC and FC only*	Unbraked Length	A*	5.82	147.8	7.00	177.8	8.16	207.8
		B	4.35	110.5	5.53	140.5	6.71	170.5
	Braked Length	A*	7.40	187.9	8.58	217.9	9.76	247.9
		B	5.93	150.6	7.11	180.6	8.29	210.6
Flange Dimensions		(in)		(mm)				
Flange Thickness	K	0.406		10.3				
Pilot Thickness	L	0.087		2.2				
Pilot Diameter	M	3.150		80.0				
Overall Height	N	5.140		130.5				
Flange Square	P	3.583		91.0				
Mounting Hole Diameter	R	0.276		7.0				
Mounting Hole BCD	S	3.940		100.0				
Motor Housing	T	3.504		89.0				
Mounting Bolts		M6						
Shaft Dimensions		(in)		(mm)				
Shaft Diameter	C	0.750		19.0				
Shaft Length	D	1.575		40.0				
Key Height	E	0.850		21.5				
Key Length	F	1.260		32.0				
Key-to-Shaft End	G	0.146		3.7				
Key Width	H	0.236		6.0				
Tapped Hole Thread Size	I	M6 x 1.0						
Tapped Hole Depth	J	0.670		17.0				

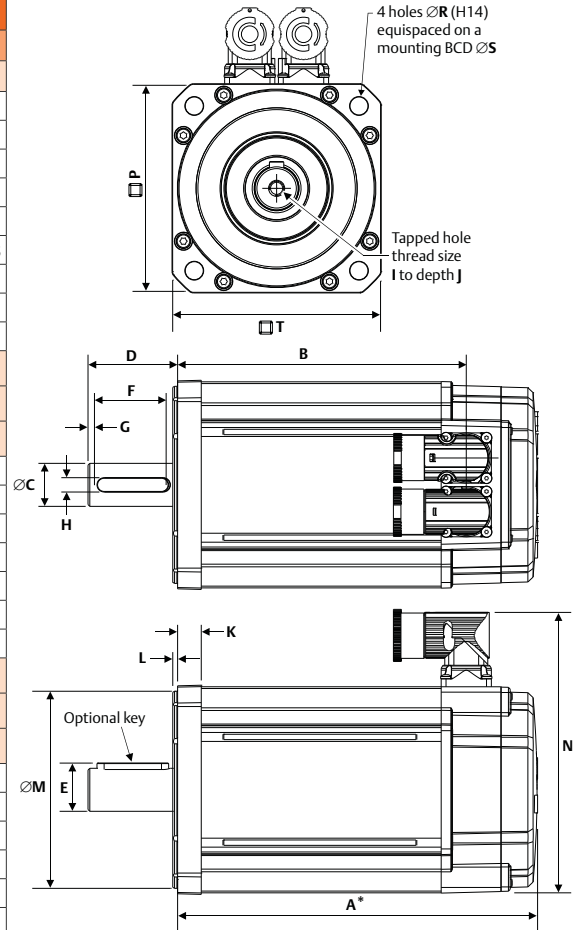
# Unimotor hd 115 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		115ED			115UD		
Voltage (Vrms)		230			460		
Frame Length		B	C	D	B	C	D
Continuous Stall Torque (lb-in)		90.3	129.2	166.4	90.3	129.2	166.4
Continuous Stall Torque (Nm)		10.20	14.60	18.80	10.20	14.60	18.80
Peak Torque (lb-in)		270.8	387.6	499.1	270.8	387.6	499.1
Peak Torque (Nm)		30.60	43.80	56.40	30.60	43.80	56.40
Inertia (lb-in-sec <sup>2</sup> )		0.00390	0.00566	0.00742	0.00391	0.00566	0.00742
Inertia (kgm <sup>2</sup> )		0.000441	0.000639	0.000838	0.000441	0.000639	0.000838
Motor Weight (lb)		15.87	19.62	23.6	15.87	19.62	23.6
Motor Weight (kg)		7.20	8.90	10.70	7.20	8.90	10.70
Number of Poles		10	10	10	10	10	10
2000 rpm	Kt (lb-in/A) =	12.4			21.2		
	Kt (Nm/A) =	1.40			2.40		
	Ke (V/k rpm) =	85.5			147.0		
Rated Torque (lb-in)		76.1	105.3	138.1	76.1	105.3	138.1
Rated Torque (Nm)		8.60	11.90	15.60	8.60	11.90	15.60
Stall Current (A)		7.29	10.43	13.43	4.25	6.08	7.83
Rated Power (HP)		2.41	3.34	4.38	2.41	3.34	4.38
Rated Power (kW)		1.80	2.49	3.27	1.80	2.49	3.27
R (ph-ph) (Ohms)		1.40	0.77	0.61	4.41	2.41	1.80
L (ph-ph) (mH)		12.84	7.87	6.62	40.59	24.69	19.45
3000 rpm	Kt (lb-in/A) =	8.2			14.2		
	Kt (Nm/A) =	0.93			1.60		
	Ke (V/k rpm) =	57.0			98.0		
Rated Torque (lb-in)		68.2	92.9		68.2	92.9	120.4
Rated Torque (Nm)		7.70	10.50		7.70	10.50	13.60
Stall Current (A)		10.97	15.70		6.38	9.13	11.75
Rated Power (HP)		3.25	4.43		3.25	4.43	5.73
Rated Power (kW)		2.42	3.30		2.42	3.30	4.27
R (ph-ph) (Ohms)		0.58	0.39		1.83	1.21	0.78
L (ph-ph) (mH)		5.40	4.01		16.93	12.72	8.65

**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 above 12 kHz drive switching frequency  
 Maximum intermittent winding temperature is 284 °F (140 °C)

\*Motor length increases 0.512 in (13 mm) for feedback options FB, EB, CA, SA and RA; motor length decreases 0.394 in (10 mm) for feedback option AE



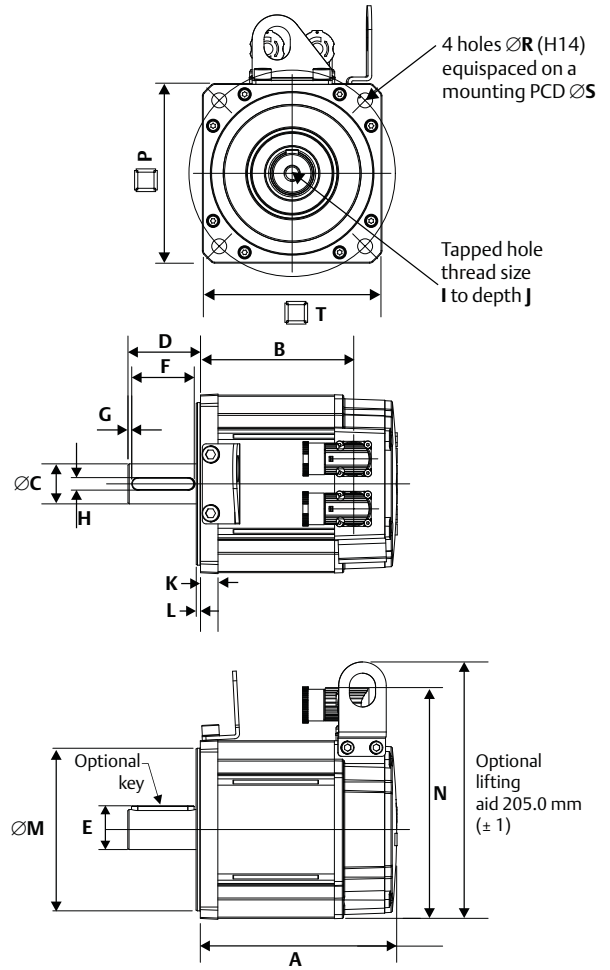
Motor Dimensions		Frame Length						
		B		C		D		
		(in)	(mm)	(in)	(mm)	(in)	(mm)	
Feedback EC and FC only*	Unbraked Length	A*	7.63	193.8	8.81	223.8	9.99	253.8
		B	6.06	154.0	7.24	184.0	8.43	214.0
	Braked Length	A*	9.09	230.9	10.27	260.9	11.45	290.9
		B	7.52	191.1	8.70	221.1	9.89	251.1
<b>Flange Dimensions</b>		(in)		(mm)				
Flange Thickness		K		0.519		13.2		
Pilot Thickness		L		0.106		2.7		
Pilot Diameter		M		4.33		110.0		
Overall Height		N		6.16		156.5		
Flange Square		P		4.57		116.0		
Mounting Hole Diameter		R		0.394		10.0		
Mounting Hole BCD		S		5.12		130.0		
Motor Housing		T		4.53		115.0		
Mounting Bolts		M8						
<b>Shaft Dimensions</b>		(in)		(mm)				
Shaft Diameter		C		0.945		24.0		
Shaft Length		D		1.97		50.0		
Key Height		E		1.06		27.0		
Key Length		F		1.57		40.0		
Key-to-Shaft End		G		0.209		5.3		
Key Width		H		0.315		8.0		
Tapped Hole Thread Size		M8 x 1.25						
Tapped Hole Depth		J		0.79		20.0		

# Unimotor hd 142 mm Frame Ratings and Dimensions

UNIMOTOR HD

Motor Frame Size (mm)	142ED			142UD			
Voltage (Vrms)	230			460			
Frame Length	C	D	E	C	D	E	
Continuous Stall Torque (lb-in)	221.3	278.8	336.3	221.3	278.8	336.3	
Continuous Stall Torque (Nm)	25.0	31.5	38.0	25.0	31.5	38.0	
Peak Torque (lb-in)	662.9	836.4	1008.9	662.9	836.4	1008.9	
Peak Torque (Nm)	74.9	94.5	114.0	74.9	94.5	114.0	
Inertia (lb-in-sec <sup>2</sup> )	.01505	.01956	.02407	.01505	.01956	.02407	
Inertia (kgm <sup>2</sup> )	.0017	.00221	.00272	.0017	.00221	.00272	
Motor Weight (lb)	25.4	33.1	40.8	25.4	33.1	40.8	
Motor Weight (kg)	11.5	15.0	18.5	11.5	15.0	18.5	
Number of Poles	10	10	10	10	10	10	
1000 rpm	Kt (lb-in/A) =		24.78				
	Kt (Nm/A) =		2.8				
	Ke (V/k rpm) =		171.0				
1500 rpm	Rated Torque (lb-in)	206.2	256.7	305.4			
	Rated Torque (Nm)	23.3	29.0	34.5			
	Stall Current (A)	8.9	11.2	13.6			
	Rated Power (HP)	3.27	4.08	4.84			
	Rated Power (kW)	2.44	3.04	3.61			
	R (ph-ph) (Ohms)	1.36	0.94	0.72			
	L (ph-ph) (mH)	21.34	15.17	12.3			
	Power Connector Size	1.0					
	2000 rpm	Kt (lb-in/A) =		12.39			
		Kt (Nm/A) =		1.4			
Ke (V/k rpm) =		85.5					
Rated Torque (lb-in)		189.4	227.5	261.9	189.4	227.5	261.9
Rated Torque (Nm)		21.4	25.7	29.6	21.4	25.7	29.6
Stall Current (A)		17.8	22.5	27.1	10.4	13.1	15.8
Rated Power (HP)		6.01	7.21	8.31	6.01	7.21	8.31
Rated Power (kW)		4.48	5.38	6.2	4.48	5.38	6.2
R (ph-ph) (Ohms)		0.34	0.24	0.18	0.79	0.62	0.49
L (ph-ph) (mH)		5.33	3.79	3.07	12.15	9.66	8.34
Power Connector Size	1.5*		1.0				
3000 rpm	Kt (lb-in/A) =		8.23				
	Kt (Nm/A) =		0.93				
	Ke (V/k rpm) =		57.0				
	Rated Torque (lb-in)	162.8	184.9	203.6	162.8	184.9	203.6
	Rated Torque (Nm)	18.4	20.9	23.0	18.4	20.9	23.0
	Stall Current (A)	26.9	33.9	37.8	15.6	19.7	23.8
	Rated Power (HP)	7.75	8.81	9.70	7.75	8.81	9.70
	Rated Power (kW)	5.78	6.57	7.23	5.78	6.57	7.23
	R (ph-ph) (Ohms)	0.12	0.10	0.18	0.34	0.24	0.18
	L (ph-ph) (mH)	1.90	1.57	3.07	5.33	3.79	3.07
Power Connector Size	1.5*		1.0				

\*These frames use Order Code Connection Type option "J".

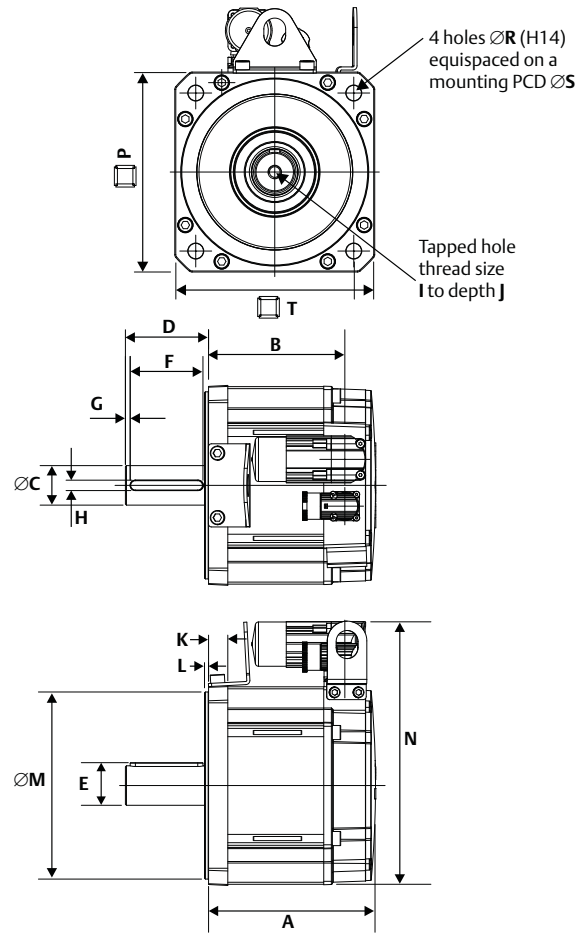


Motor Dimensions	Frame Length						
		C		D		E	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length	A	8.54	217.0	9.72	247.0	10.91	277.0
	B	7.19	182.5	8.37	212.5	9.55	242.5
Braked Length	A	11.12	282.5	12.30	312.5	13.48	342.5
	B	9.76	248.0	10.94	278.0	12.13	308.0
<b>Flange Dimensions</b>		<b>(in)</b>		<b>(mm)</b>			
Flange Thickness	K	0.551		14.00			
Pilot Thickness	L	0.134		3.40			
Pilot Diameter	M	5.120		130.0			
Overall Height	N	4.1/8.1*		104/205*			
Flange Square	P	5.591		142.0			
Mounting Hole Dia.	R	0.472		12.0			
Mounting Hole BCD	S	6.500		165.0			
Motor Housing	T	5.591		142.0			
Mounting Bolts		M10					
<b>Shaft Dimensions</b>		<b>(in)</b>		<b>(mm)</b>			
Shaft Diameter	C	1.260		32.0			
Shaft Length	D	2.283		58.0			
Key Height	E	1.380		35.0			
Key Length	F	1.970		50.0			
Key-to-Shaft End	G	0.118		3.0			
Key Width	H	0.394		10.0			
Tapped Hole Thread Size	I	M12 x 1.75					
Tapped Hole Depth	J	1.142		29.0			

# Unimotor hd 190 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		190ED			190UD		
Voltage (Vrms)		230			460		
Frame Length		C	D	F	C	D	F
Continuous Stall Torque (lb-in)		460.2	548.7	752.3	460.2	548.7	752.3
Continuous Stall Torque (Nm)		52.0	62.0	85.0	52.0	62.0	85.0
Peak Torque (lb-in)		1380.7	1646.2	2256.9	1380.7	1646.2	2256.9
Peak Torque (Nm)		156.0	186.0	255.0	156.0	186.0	255.0
Inertia (lb-in-sec <sup>2</sup> )		.04833	.06275	.09161	.04833	.06275	.09161
Inertia (kgm <sup>2</sup> )		.00546	.00709	.0103	.00546	.00709	.0103
Motor Weight (lb)		51.8	66.1	85.5	51.8	66.1	85.5
Motor Weight (kg)		23.5	28.6	38.8	23.5	28.6	38.6
Number of Poles		10	10	10	10	10	10
1000 rpm	Kt (lb-in/A) =	24.78					
	Kt (Nm/A) =	2.8					
	Ke (V/k rpm) =	171.0					
Rated Torque (lb-in)		433.7	500.1	685.9			
Rated Torque (Nm)		49.0	56.5	77.5			
Stall Current (A)		18.6	22.1	30.4			
Rated Power (HP)		6.88	7.94	10.89			
Rated Power (kW)		5.13	5.92	8.12			
R (ph-ph) (Ohms)		0.47	0.4	0.23			
L (ph-ph) (mH)		12.3	10.4	6.79			
1500 rpm	Kt (lb-in/A) =				28.32		
	Kt (Nm/A) =				3.2		
	Ke (V/k rpm) =				196.0		
Rated Torque (lb-in)					408.9	462.0	606.3
Rated Torque (Nm)					46.2	52.2	68.5
Stall Current (A)					16.3	19.4	26.6
Rated Power (HP)					9.74	11.00	14.43
Rated Power (kW)					7.26	8.2	10.76
R (ph-ph) (Ohms)					0.47	0.4	0.23
L (ph-ph) (mH)					12.3	10.4	6.79
2000 rpm	Kt (lb-in/A) =	12.39			21.24		
	Kt (Nm/A) =	1.4			2.4		
	Ke (V/k rpm) =	85.5			147		
Rated Torque (lb-in)		376.2			376.2		
Rated Torque (Nm)		42.5			42.5		
Stall Current (A)		37.1			21.7		
Rated Power (HP)		11.9			11.9		
Rated Power (kW)		8.9			8.9		
R (ph-ph) (Ohms)		0.12			0.34		
L (ph-ph) (mH)		3.07			8.2		

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 above 12 kHz drive switching frequency  
 Maximum intermittent winding temperature is 284 °F (140 °C)



UNIMOTOR HD

Motor Dimensions	Frame Length						
		C		D		E	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length	A	8.69	220.6	9.87	250.6	12.23	310.6
	B	7.52	191.1	8.70	221.1	9.89	251.1
Braked Length	A	12.56	319.1	13.74	349.1	16.11	409.1
	B	11.40	289.6	12.58	319.6	14.94	379.6
Flange Dimensions		(in)		(mm)			
Flange Thickness	K	0.728		18.5			
Pilot Thickness	L	0.154		3.9			
Pilot Diameter	M	7.090		180.0			
Overall Height	N	9.940		252.5			
Flange Square	P	7.490		190.3			
Mounting Hole Diameter	R	0.571		14.5			
Mounting Hole BCD	S	8.465		215.0			
Motor Housing	T	7.480		190.0			
Mounting Bolts		M12					
Shaft Dimensions		(in)		(mm)			
Shaft Diameter	C	1.500		38.0			
Shaft Length	D	3.150		80.0			
Key Height	E	1.614		41.0			
Key Length	F	2.760		70.0			
Key-to-Shaft End	G	0.181		4.6			
Key Width	H	0.394		10.0			
Tapped Hole Thread Size	I	M12 x 1.75					
Tapped Hole Depth	J	1.142		29.0			



# Unimotor hd Selection Considerations

## Feedback Options

Feedback Device Order Code	Feedback Type	Encoder Supply Voltage	SinCos Cycles or Incremental Pulses per Revolution	Resolution Available to Position Loop	Feedback Accuracy
<b>055-067 Motors</b>					
AR	Resolver <sup>1</sup>	7 Vrms	1	<b>Medium</b>	<b>Low</b>
		Excitation 5 kHz		16384 (14 bit)	+/- 600 arc second
CR	Incremental encoder	5 Vdc	4096	<b>Medium</b>	<b>Medium</b>
				16384 (14 bit)	+/- 150 arc second
EM (Multi-Turn) FM (Single-Turn)	Inductive Absolute encoder EnDat <sup>2</sup>	5 Vdc	16	<b>High</b>	<b>Medium</b>
				2.62 x 10 <sup>5</sup> (18 bits)	+/- 480 arc second
<b>089, 115, 142 and 190 Motors</b>					
AE	Resolver <sup>1</sup>	6 Vrms	1	<b>Medium</b>	<b>Medium</b>
		Excitation 6 kHz		16384 (14 bit)	+/- 720 arc second
CA	Incremental encoder	5 Vdc	4096	<b>Medium</b>	<b>High</b>
				16384 (14 bit)	+/- 60 arc second
EC (Multi-Turn) FC (Single-Turn)	Inductive Absolute encoder EnDat <sup>2/3</sup>	7 - 10 Vdc	32	Medium absolute position 524288 (19 bits)	<b>Medium</b>
				+/- 280 arc second	
RA (Multi-Turn) SA (Single-Turn)	Optical SinCos encoder <sup>2</sup> HIPERFACE	7 - 12 Vdc	1024	<b>Very high</b>	<b>High</b>
				1.04 x 10 <sup>6</sup> (20 bits)	For SinCos integral non-linearity +/- 45 arc second For SinCos differential non-linearity +/- 7 arc second (total accuracy +/- 52 arc second)
EB (Multi-Turn) FB (Single-Turn)	Optical Absolute encoder EnDat <sup>2/3</sup>	3.6 - 14 Vdc	2048	<b>Very high</b>	<b>Very high</b>
				2.08 x 10 <sup>6</sup> (21 bits)	+/- 20 arc second (differential non-linearity +/- 1% signal period)

**NOTES:**

<sup>1</sup>Resolution value shown when used with the Unidrive M resolver input or SM-Resolver Option Module (Unidrive SP and Digitax ST)

<sup>2</sup>Resolution 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 - multi-turn devices have 4096 (12 bit) resolution

<sup>3</sup>Optical EnDat encoders are recommended for heavy duty applications. Inductive EnDat encoders are recommended for std duty applications

## Motor Selection

### Motor Derating

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 for motors up to 3000 rpm. Consult factory for higher-speed motor derating information.

New derated torque =

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

\*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.

### Drive Switching Frequency

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

See the table below for motor derating factors (these figures are for guidance only).

Switching Frequency	Motor Type/Frame					
	055	067	089	115	142	190
3 kHz	0.92	0.93	0.89	0.89	0.83	0.90
4 kHz	0.93	0.94	0.91	0.92	0.85	0.95
5/6 kHz	0.95	0.95	0.95	0.96	0.88	1
8 kHz	0.96	0.98	0.97	0.98	0.91	1
10/12/16 kHz	1	1	1	1	1	1

### Mounting Arrangements

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.

## 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  $I^2t$  (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.

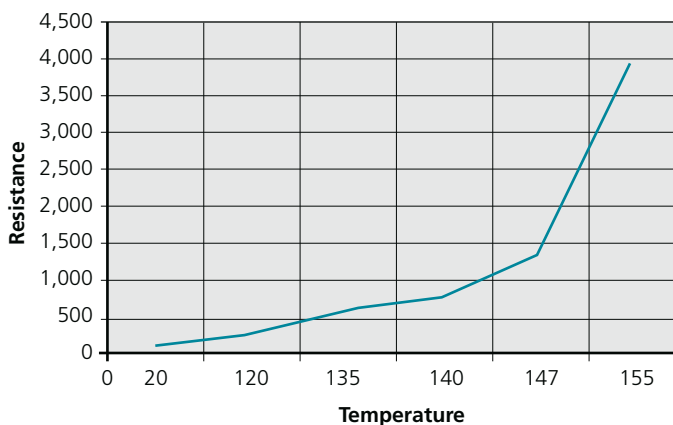
The installer must connect the motor thermistor to the drive to cause motor power shutdown in the event of overheating.

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

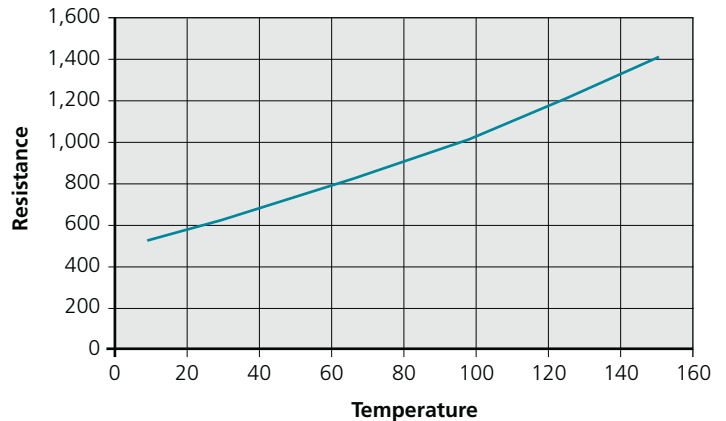


## Standard Thermistor protection

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.

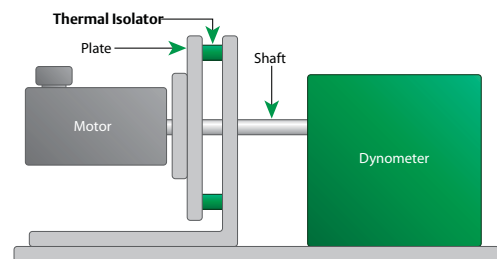
## Brake Operation

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

The performance data shown was recorded with an ambient temperature of 68 °F (20 °C) and the motor mounted on a thermally-isolated aluminum plate.

Thermal motor mounting arrangement test example:



Motor Type/Frame	Aluminum Heatsink Plate	
	(in)	(mm)
055	4.3 x 4.3 x 1.06	110 x 110 x 27
067, 089	9.8 x 9.8 x 0.6	250 x 250 x 15
115 to 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 hd Holding Brake Specifications

Motor Frame Size	Power Supply	Power	Static Torque		Release Time	Added Inertia		Backlash	Added Weight	
(mm)	(Vdc)	(W)	(lb-in)	(Nm)	(ms) nom.	(lb-in-sec <sup>2</sup> )	(kgcm <sup>2</sup> )	Degrees*	(lbs)	(kg)
055	24	6.3	15.9	1.8	22	0.00003	0.03	0.73	0.88	0.4
067	24	10.2	35.4	4	<50	0.00006	0.073	0.75	1.1	0.5
089	24	23.4	88.5	10	<50	0.00010	0.115	0.75	1.3	0.6
115	24	19.5	117	20	120	0.00029	0.327	0.75	2.6	1.2
142	24	25	371	42	95	0.00225	2.54	0.77	6.2	2.8
190 C-D	24	25	592	67	120	0.00404	4.57	0.77	11.7	5.3
190 F	24	54.5	885	100	CF	0.00683	7.72	0.75	11.7	5.3

**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

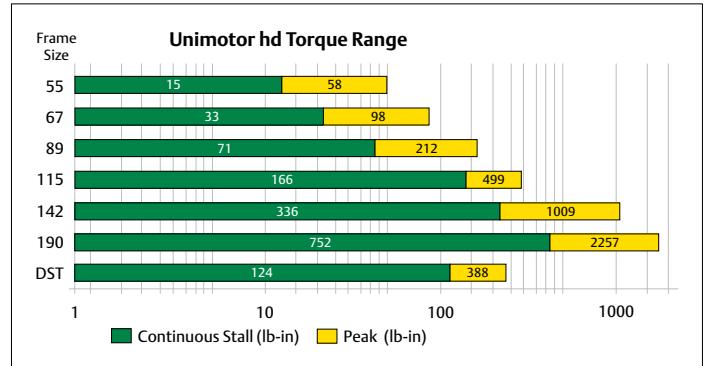


## Unimotor hd 230 V | 460 V

The Unimotor hd is a high-dynamic servo motor range designed for maximum torque density. This brushless AC servo motor range provides an exceptionally compact, low-inertia solution for applications where very high torque is required during rapid acceleration and deceleration profiles.

The Unimotor sd torque profile is ideally matched to Digitax ST servo drives providing up to 300% peak overload for maximum dynamic performance. Unimotor hd incorporates a number of unique performance-enhancing design features.

- High torque-to-inertia ratio for high-dynamic performance
- High-energy dissipation brakes
- Compact and powerful
- IP65, rating, UL, CE and RoHS compliant
- Supported by rigorous testing for performance and reliability



## Sample Motor and Drive Combinations

Digitax ST and Unimotor hd – 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 <sup>2</sup>	kgm <sup>2</sup>	lb-in/Arms	Nm/Arms
DST1202	12	055EDC300	14.60	1.65	58.41	6.60	13.10	1.48	0.60	0.46	3000	0.0003186	0.000036	8.05	0.91
DST1203	12	055EDC600	14.60	1.65	58.41	6.60	10.62	1.20	1.00	0.75	6000	0.0003186	0.000036	4.25	0.48
DST1204	12	067EDB600	22.57	2.55	67.70	7.65	19.47	2.20	1.81	1.38	6000	0.0004691	0.000053	4.16	0.47
DST1204	12	089EDB300	48.68	5.50	146.03	16.50	42.93	4.85	1.81	1.52	3000	0.0014249	0.000161	8.23	0.93
Digitax ST and Unimotor hd – 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 <sup>2</sup>	kgm <sup>2</sup>	lb-in/Arms	Nm/Arms
DST1402	12	055UDC300	14.60	1.65	58.41	6.60	13.10	1.48	0.60	0.46	3000	0.0003186	0.000036	14.60	1.65
DST1403	12	067UDB300	22.57	2.55	67.70	7.65	21.68	2.45	1.03	0.77	3000	0.0004691	0.000053	14.16	1.60
DST1404	8	089UDB300	46.91	5.30	146.03	16.50	41.60	4.70	1.98	1.48	3000	0.0014249	0.000161	14.16	1.60
DST1405	6	115UDC200	123.90	14.00	387.63	43.80	100.89	11.40	1.98	2.39	2000	0.0014868	0.000168	21.24	2.40