

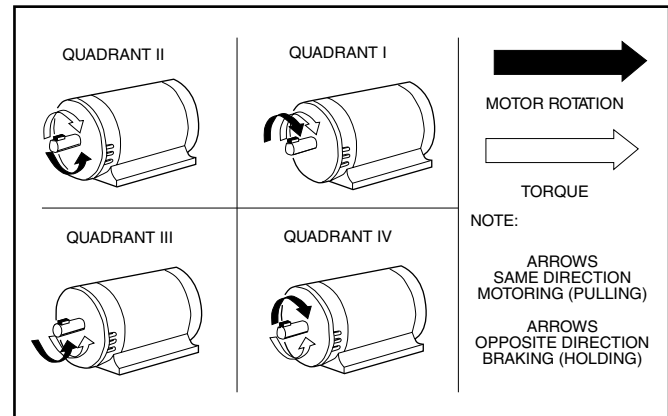
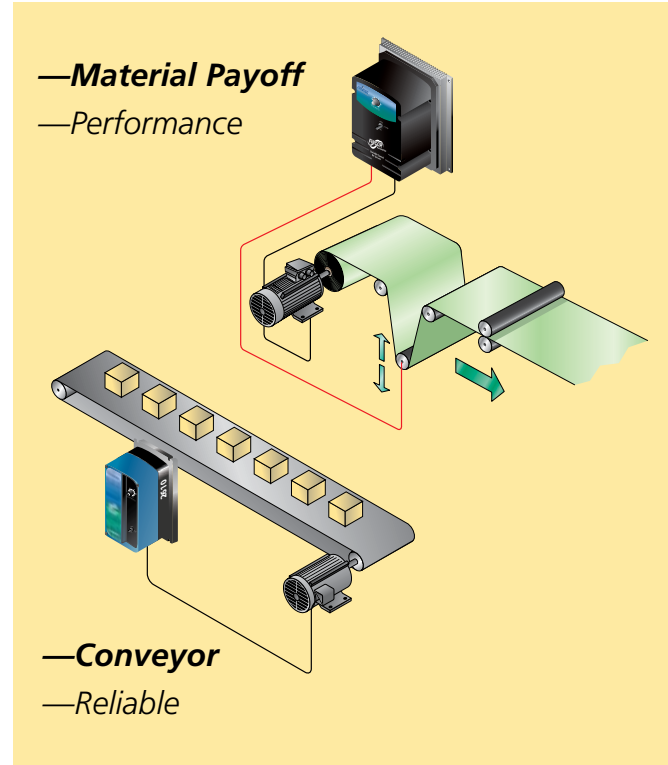
Fincor Regenerative DC Drives

Regenerative adjustable speed drives also known as four-quadrant drives, are capable of controlling not only the speed and direction of motor rotation, but also the direction of motor torque. This is illustrated below.

The term regenerative describes the ability of the drive under braking conditions to convert the mechanical energy of the motor and connected load into electrical energy which is returned (or regenerated) to the AC power source.

When the drive is operating in Quadrants I & III, both motor rotation and torque are in the same direction and it functions as a conventional non-regenerative drive. The unique characteristics of a regenerative drive are apparent in Quadrants II & IV. In these quadrants, the motor torque opposes the direction of motor rotation which provides a controlled braking or retarding force. A high performance regenerative drive, such as the Series 2230, is able to switch rapidly from motoring to braking modes while simultaneously controlling the direction of motor rotation.

TYPICAL APPLICATIONS



Regenerative drives provide reversing without the use of a contactor. This reduces system cost while eliminating moving parts and greatly improving reversing and braking performance.

Although the regenerative drive eliminates the requirement of a contactor for reversing or normal operational braking, a contactor is used if dynamic braking is still required. Although regenerative braking stops the motor and its load faster under normal conditions, a dynamic brake may be required to stop the motor and its connected load in emergency stop conditions such as drive failure or if the drive enable is removed before the motor comes to a complete stop.

Fincor Series 2230

Fincor Series 2230 regenerative drives are ideal for your more demanding application with ratings up to 5 horsepower. Regenerative drives handle reversing without contactors and are able to stop faster. They feature a fully isolated regulator using surface mount technology.

- 1/8 to 5 hp (115-230V)
- Fully Isolated Regulator
- Speed or Torque Control
- 0-10 VDC or +/- 10 VDC Input Signal
- PID / Speed Trim Control
- Current Stability Adjust
- Speed or Current Monitoring (0-10 VDC or 4-20 mA)
- Fused Input
- Line Start / Auto Restart Enable / Disable
- Dual Field Supply
- DC Tachometer Input
- Diagnostic LED

2230 Enclosed



Open Chassis

Bookcase

RATINGS: 1/8 TO 5 hp (115-230 VAC)

Series 2230 Regenerative DC Drives									
Model	Motor HP	Input		Output				Run-Stop- Jog *	Run-Stop-Jog, DB **
		AC Volts	Amps	DC Volts		Amps		Order Code	Order Code
				Arm	Field	Arm	Field		
Chassis w/o Integral Operator Controls	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2231	2231B
	1/2 - 2.0	230	15.8	180	100/200	11.6	1.0		
	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2232	2232B
	1/2 - 3.0	230	22	180	100/200	15.1	1.0		
	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2233	2233B
	1/2 - 5.0	230	32	180	100/200	25	2.0		
Book Case w/o Integral Operator Controls	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2235	2235B
	1/2 - 2.0	230	15.8	180	100/200	11.6	1.0		
	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2236	2236B
	1/2 - 3.0	230	22	180	100/200	15.1	1.0		
NEMA 4/12 w/o Operator Controls	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2231P0	2231BP0
	1/2 - 2.0	230	15.8	180	100/200	11.6	1.0		
	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2233P0	2233BP0
	1/2 - 5.0	230	32	180	100/200	25	2.0		
NEMA 4/12 with Integral Operator Controls	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2231P1	2231BP1
	1/2 - 2.0	230	15.8	180	100/200	11.6	1.0		
	1/8 - 1.0	115	15.8	90	50/100	10.5	1.0	2233P1	2233BP1
	1/2 - 5.0	230	32	180	100/200	25	2.0		

Units shipped calibrated for desired hp rating but jumpers can be adjusted for others. Units shipped ready for 230 VAC but may be reconnected for 115 VAC.

* Run-Stop-Jog with Static (Contactor-less) Reversing using -100 to 100% Speed Potentiometer

** Run-Stop-Jog with Armature Contactor and Dynamic Braking. Reversing uses -100 to 100% Speed Potentiometer

Fincor Series 2230

SPECIFICATIONS:

Operating Conditions

Horsepower	1/8 thru 5 hp, Jumper Selectable
Line Voltage	115-230 VAC ±10%, Jumper Selectable
Enclosure	Chassis, Bookcase, NEMA 4/12
Rated Frequency	50/60 Hz ±2% Selectable
Ambient Temperature	0 – 40°C (32°F - 104°F) (<i>Enclosed</i>) 0 – 55°C (32°F - 131°F) (<i>Chassis</i>)
Altitude	1000 m (3,300 ft)
Relative Humidity	95% Non condensing
Overload Capacity	150% for 1 minute (UL Listed Motor Overload Protection – File # E184521) (120% Timing Threshold)

Standard Features

Isolated Regulator Circuit	Grounded I/O signals possible
Regulator Function	Speed or Torque selectable
Power Conversion	8 SCR Full Wave - Four Quadrant
Field Supply Protection	Full Wave MOV Voltage Transient Suppression High Interrupting Capacity Line Fuse
Speed Regulation	Armature or DC Tach Feedback
Line Start	Selectable for Auto-Restart
Controlled Stop	Provides Ramp to Stop Function
Zero Speed Deadband	Selectable 2% or Off
Zero Speed Indication	Open Collector – Active Low
Direction Indication	Open Collector – Active Low = FWD
Speed Regulator Node	External PID Input or Speed Trim
Speed Outputs	-10 – 10 VDC and 4 – 20 mA
Torque Outputs	-10 – 10 VDC and 4 – 20 mA
Diagnostic LED	Green Normal – Red Current Limit
Option Connector	Connects Additional Option Boards

Control

Control Logic Power	24 VDC for Maintained Switch or Push button Operation
Speed Potentiometer	5 kOhms, ½ Watt
Input Reference	0 – 10 VDC or -10 – +10 VDC
Speed Regulation (95% Load Change)	2% with Armature Feedback 0.5% with Tachometer Feedback

Adjustments

Maximum Speed	50% – 100% of Motor Base Speed
Current Limit FWD	0 – 150% of Full Load
Current Limit REV	0 – 150% of Full Load
IR Comp/Tach Scaling	0 – 10% IR or 0 – 100% Tach
Acceleration/Deceleration	0.1 – 30 Seconds
Voltage (Speed) Stability	Speed Gain Fine Tune
Current Stability FWD	Current Gain FWD Fine Tune
Current Stability REV	Current Gain REV Fine Tune

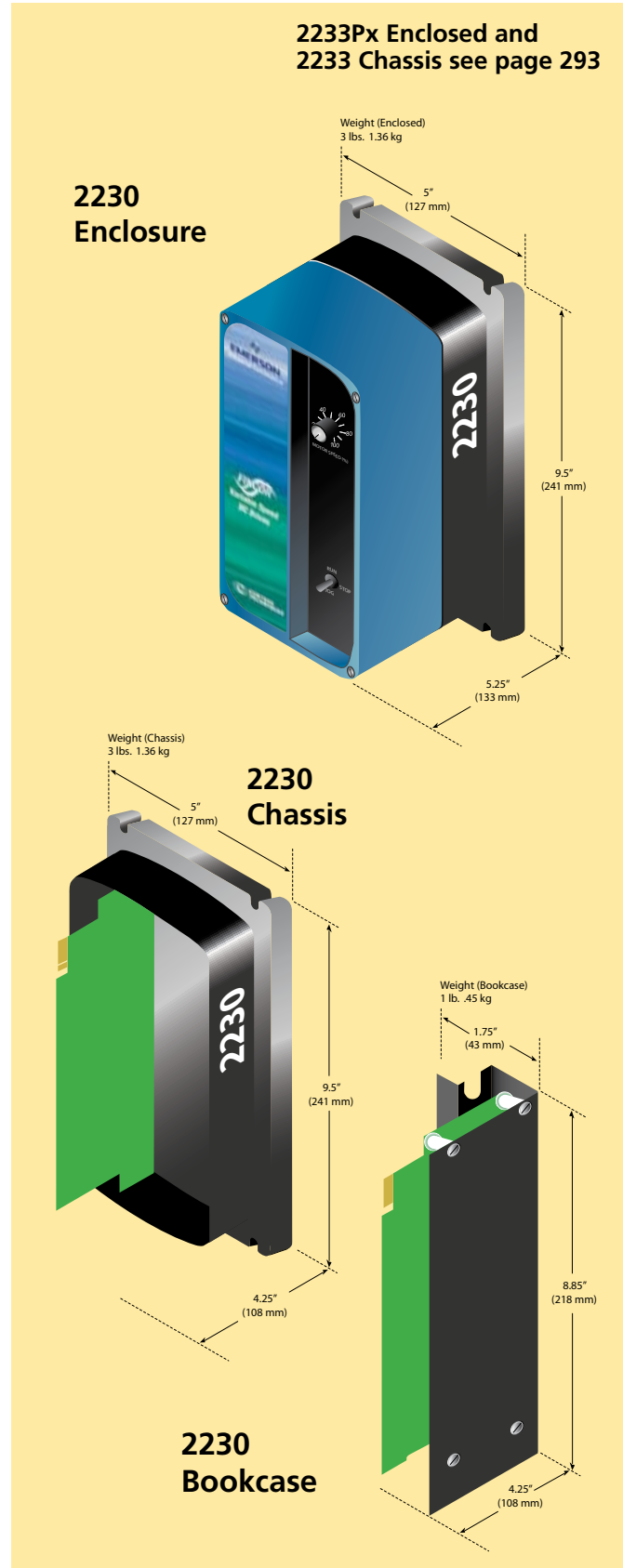
Efficiency

Controller (only)	98%
With Motor (typical)	85%

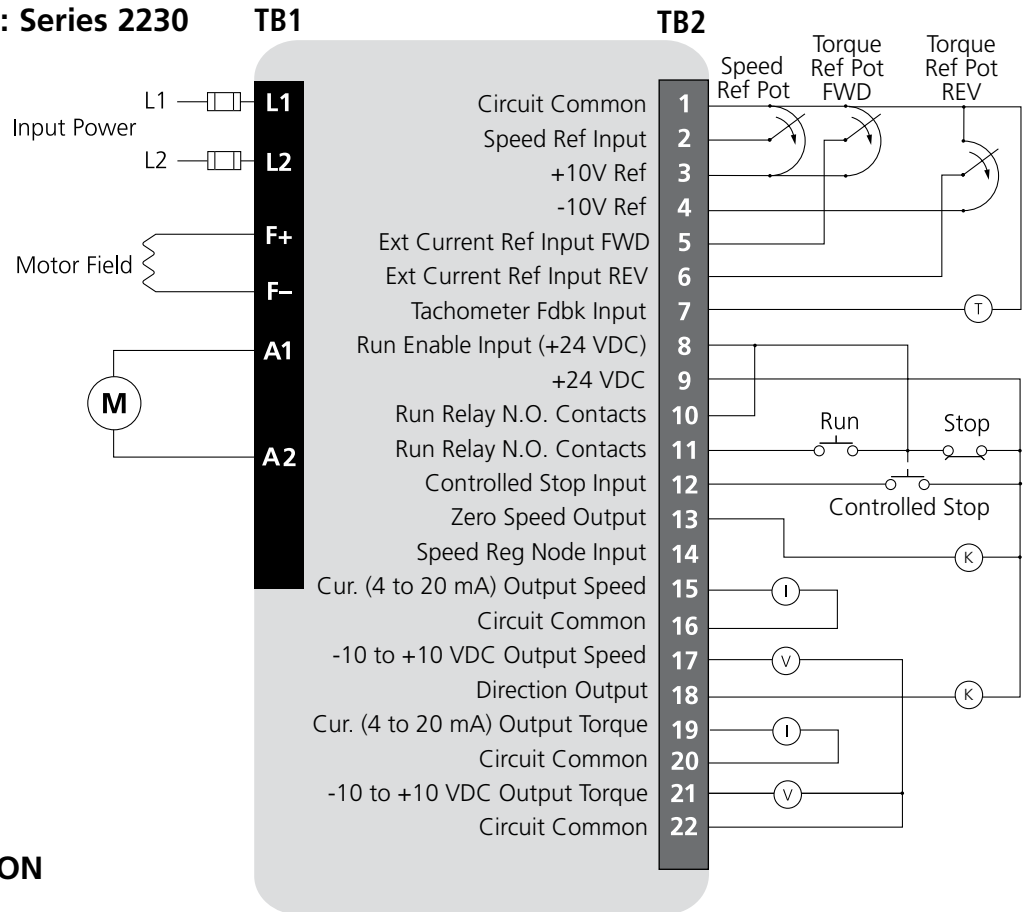
Approvals & Listings

UL and cUL

DIMENSIONS



TERMINAL DIAGRAM: Series 2230



TERMINAL DESCRIPTION

TB1

Pin#	Type	Notes
L1	Line Voltage Input	115 or 230 VAC J1 Selectable
L2	Line Voltage Input	115 or 230 VAC J1 Selectable
F+	Field Voltage Output	+100 VDC @ 115 VAC or +200 VDC @230 VAC Input
F/2	Field Voltage (Half-Wave) Output	+50 VDC @ 115 VAC or +100 VDC @230 VAC Input
F-	Field Voltage Output	Field Minus Output
A1	Armature Output	-90 to +90 VDC @ 115 VAC or -180 to +180 VDC @ 230 VAC Input
A2	Armature Output	

TB2

Pin#	Type	Notes
1	Speed Reference Pot '0' End	Speed Pot Common for Unidirectional Operation
2	Speed Reference Input	200 KΩ Input Resistance
3	+10V Reference Output	5 mA max
4	-10V Reference Output	5 mA max
5	External Current Reference Input FWD	Refer to DIP Switch SW3-2
6	External Current Reference Input REV	Refer to DIP Switch SW3-7
7	Tachometer Input (Speed Feedback)	3-30 VDC, 31-175 VDC

TB2 Continued

Pin#	Type	Notes
8	Enable Input (+24 VDC) – Run Relay	24 VDC @ 6 mA Input
9	+24 VDC	For drive enable use only
10	Run Relay N.O. Contacts	Form A Contact Rated 0.5A @ 115 VAC or 2A @ 30 VDC
11	Run Relay N.O. Contacts	
12	Controlled Stop Input (+24 VDC)	Momentary +24 VDC Input to Initiate Controlled (Ramp) to Stop
13	Zero Speed Indication Output	Open Collector, Active Low, Rated 24 VDC @ 50ma
14	Speed Regulator Node Input	Speed Trim or External PID Input (Bypasses Accel/Decel Ramps)
15	Current Loop Output	4 to 20 mA – Speed (Arm Volts)
16	Current Loop Output	4 to 20 mA – Speed (Arm Volts)
17	Voltage Output	-10 to 10 VDC – Speed (Arm Volts)
18	Direction Indicator Output	Open Collector, Active Low for FWD; Rated 24 VDC @ 50 mA
19	Current Loop	Output 4 to 20 mA – Torque (Arm Amps)
20	Current Loop	
21	Voltage Output	-10 to 10 VDC – Load (Arm Amps)
22	Voltage Output Common	Isolated From Line – Can be connected to Earth

Fincor DC Motors

Shunt Wound DC Motors - Series 9200

Fincor Series 9200 motors are industrial rated general purpose DC motors designed for use with single-phase DC drives. Series 9200 motors are shunt-wound, or stabilized shunt-wound and are suitable for constant torque-adjustable speed operation by armature voltage control to base speed. The field winding is typically excited by a separate power supply. With constant armature voltage and field excitation, a shunt-wound motor offers relatively flat speed-torque characteristics.



Shunt Wound DC Motors - Series 9200

HP	Base Speed	Armature Volts	Armature Amps	Field Volts	Enclosure	Frame	Stock Number	Order Code	Weight (lbs)
1/6	1750	90	2	50/100	TEFC	56C	5002698	9201609TFB	23
1/4	1750	90	2.8	50/100	TEFC	56C	5002319	9202509TFB	24
1/3	1750	90	3.5	50/100	TEFC	56C	5002396	9203309TFB	24
1/2	1750	90	5.4	50/100	TEFC	56C	5002291	9205009TFB	29
		180	2.6	100/200	TEFC	56C	5002454	9205018TFB	29
3/4	1750	90	8.1	50/100	TEFC	56C	5002320	9207509TFB	34
		180	3.8	100/200	TEFC	56C	5002292	9207518TFB	34
1	1750	90	10.5	50/100	TEFC	56C	5002401	9210009TFB	52
		180	5.5	100/200	TEFC	56C	5002649	9210018TFB	53
1.5	1750	180	8.2	100/200	DPG	184C	5002378	9215018DPB	84
					TEFC	184C	5002648	9215018TFB	84
2	1750	180	11.6	100/200	DPG	184C	5002631	9220018DPB	98
					TEFC	184C	5002632	9220018TFB	98
3	1750	180	15.1	100/200	DPG	215C	5002248	9230018DPB	137
					TEFC	215C	5002284	9230018TFB	137
5	1750	180	24	100/200	DPG	256UC	5002297	9250018DPB	304
					TEFC	256UC	5002296	9250018TFB	304

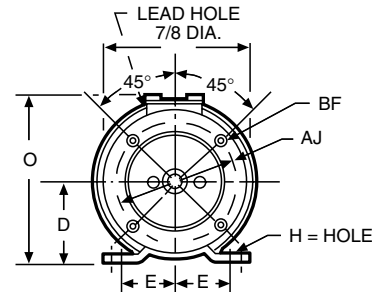
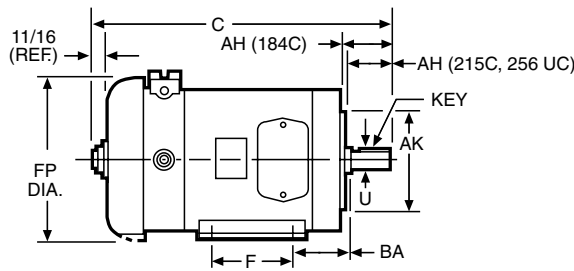
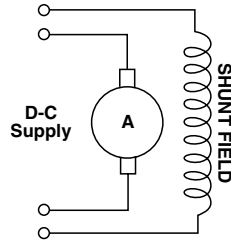
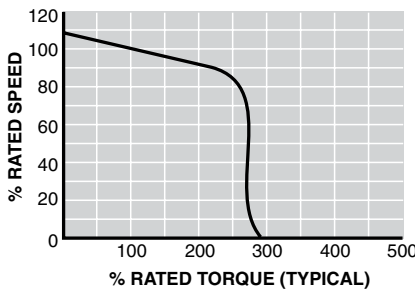
Fincor

Options for Model TFB & DPB Series 9200 DC Motors

Description	Field Installed Order Code	Factory Installed Order Suffix
DC Tachometer Generator Type XPY, 50V/1000 rpm with mounting hardware	1/6 to 3/4 hp	106343222
	1 hp	106343223
	1.5 to 2 hp	106343224
	3 hp DPG	106343225
	3 hp TEFC	106343226
	5 hp DPG	106343227
Mounting Hardware Only for XPY or Fincor DC Tachometer Generator for	5 hp TEFC	106343228
	1/6 to 3/4 hp	104355801
	1 hp	104355809
	1.5 to 2 hp	104355808
	3 hp DPG	104355804
	3 hp TEFC	104355805
Thermostats	5 hp DPG	104355806
	5 hp TEFC	104355807

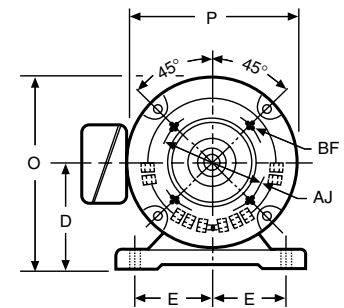
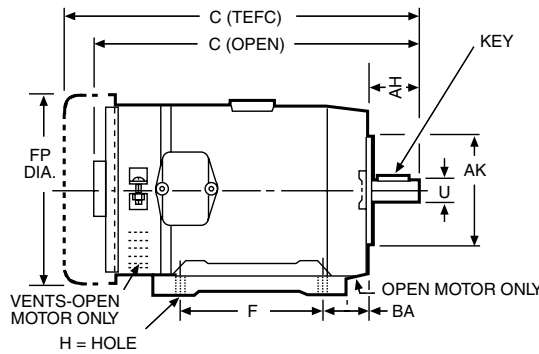
Field Installed items are shipped "loose" for customer mounting
Consult Factory for Availability

SPEED TORQUE CURVE



TBF Models

HP	Frame Size ¹	Model Number	Dimensions, Inches ²														
			C	D	E	F	H	Key	O	P	U	AH	AJ	AK	BA	BF(tap)	FP
1/6	56C	9201609TFB	13.25	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
1/4		9202509TFB	13.25	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
1/3		9203309TFB	13.25	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
1/2		9205009TFB	14.25	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
		9205018TFB	14.25	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
3/4		9207509TFB	14.75	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
		9207518TFB	14.75	3.5	2.438	3.0 or 4.0	0.344 slot	0.188	7.25	5.688	0.625	2.06	5.875	4.5	2.75	3/8-16	6.125
1		9210009TFB	16.125	3.5	2.438	3.0	0.406 slot	0.188	7.75	6.625	0.625	2.06	5.875	4.5	2.75	3/8-16	7.188
	9210018TFB	16.125	3.5	2.438	3.0	0.406 slot	0.188	7.75	6.625	0.625	2.06	5.875	4.5	2.75	3/8-16	7.188	



TBF & DPB Models

HP	Frame Size ¹	Model Number	Dimensions, Inches ²														
			C	D	E	F	H	Key	O	P	U	AH	AJ	AK	BA	BF(tap)	FP
1-1/2	184C	9215018DPB	15.438	4.5	3.75	5.5	0.406	0.188	8.375	7.75	0.875	2.125	5.875	4.5	2.75	3/8-16	-
		9215018TFB	17.375	4.5	3.75	5.5	0.406	0.188	8.375	7.75	0.875	2.125	5.875	4.5	2.75	3/8-16	8.5
2	184C	9220018DPB	18.625	4.5	3.75	5.5	0.406	0.188	8.375	7.875	0.875	2.125	5.875	4.5	2.75	3/8-16	8.5
		9220018TFB	18.625	4.5	3.75	5.5	0.406	0.188	8.375	7.75	0.875	2.125	5.875	4.5	2.75	3/8-16	8.5
3	215C	9230018DPB	20.938	5.25	4.25	7.0	0.406	0.25	9.938	9.375	1.125	2.75	7.25	8.5	3.5	1/2-13	-
		9230018TFB	21.188	5.25	4.25	7.0	0.406	0.25	9.938	9.375	1.125	2.75	7.25	8.5	3.5	1/2-13	10.188
5	256UC	9250018DPB	24.75	6.25	5.0	10.0	0.531	0.313	11.938	11.375	1.375	3.50	7.25	8.5	4.25	1/2-13	-
		9250018TFB	25.875	6.25	5.0	10.0	0.531	0.313	11.938	11.375	1.375	3.50	7.25	8.5	4.25	1/2-13	12.375

Notes:

- 1 1750 RPM Base Speed only.
- 2 Dimensions for estimating only.

Fincor DC Motors

Permanent Magnet DC Motors

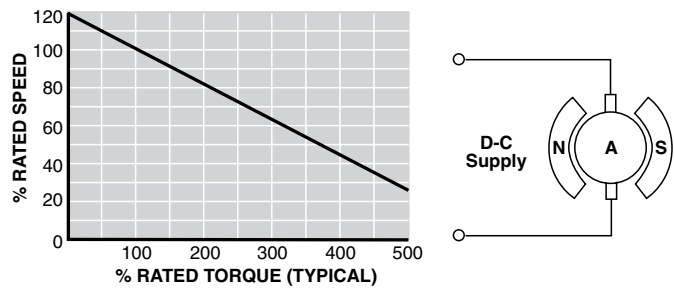
Series 9300

Fincor Series 9300 permanent magnet motors are industrial rated general purpose DC motors designed for use with single-phase DC drives. They provide constant-torque adjustable-speed operation by armature voltage control to base speed. The motors are suitable for a wide range of applications including full power start-stop conditions, continuous high speed operation, precision speed regulation, regenerative braking and reversing, low speed contactor reversing, power off dynamic braking, and crawling duty.

Series 9300 motors feature a permanent magnet field with a conventional wound armature and feature excellent starting torque, speed regulation, dynamic response, and heat dissipation. Series 9300 motors should only be plug reversed when reversing currents are limited to less than locked rotor current.



SPEED TORQUE CURVE



Permanent Magnet DC Motors - Series 9300

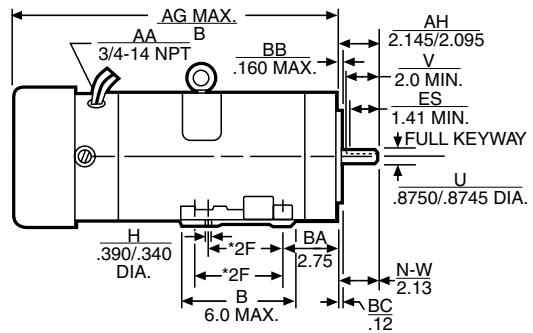
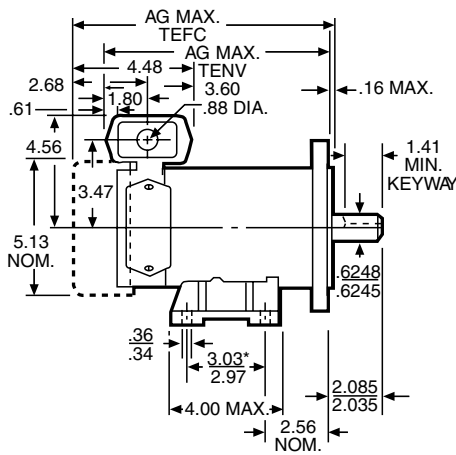
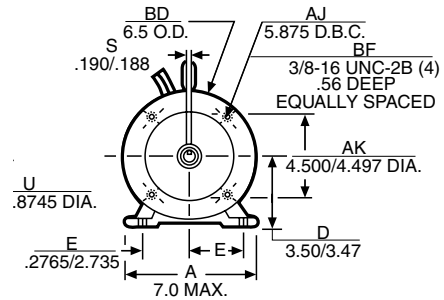
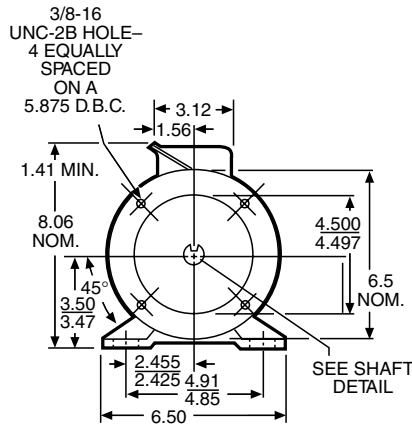
HP	Base Speed	Armature Volts	Armature Amps	Enclosure	Frame	Stock Number	Order Code	Weight (lbs)
1/6	1725	90	2.2	TENV	56C	5009322	9301609TNL	15
1/4	1725	90	2.5	TENV	56C	5009323	9302509TNL	17
1/3	1725	90	3.5	TENV	56C	5009324	9303309TNL	21
1/2	1725	90	5	TEFC	56C	5009325	9305009TFL	25
		180	2.5	TEFC	56C	5009326	9305018TFL	25
3/4	1725	90	7.3	TEFC	56C	5009327	9307509TFL	32
		180	3.8	TEFC	56C	5009328	9307518TFL	32
1	1725	90	10.6	TEFC	56C	5009329	9310009TFL	39
		180	5	TEFC	56C	5009330	9310018TFL	39
1.5	1750	180	7.5	TEFC	145TC	5009331	9315018TFL	68
2	1750	180	9.5	TEFC	145TC	5009332	9320018TFL	73
3	1750	180	12.9	TEFC	182/45TC	5009333	9330018TFL	93
5	1750	180	19.6	TEFC	1810ATC	5008070	9350018TFB	157

Removable Mounting Feet are Included
All items normally stocked

Options for Model TNL, TFL Series 9300 DC Motors

Description		Field Installed Order Code	Factory Installed Order Code
DC Tachometer Generator Type XPY, 50V/1000 rpm with mounting hardware	1/6 to 3/4 hp	106890101	-5056
	1 hp	106890102	
	182/145TC motor frames	106890103	
Mounting Hardware Only for XPY or DC Tachometer	1/6 to 3/4 hp	106890301	-5063A
	1 hp	106890302	
	182/145TC motor frames	106890303	
Thermostat			-5064A

All motors are designed to comply with standard NEMA mounting dimensions, and manufactured to meet or exceed NEMA electrical and mechanical specifications and test procedures.



*The optional mounting feet have six mounting holes for mounting either the 143TC or 145TC Frame.
 2F: 143TC Frame 4.030/3.970
 2F: 145TC Frame 5.030/4.970

* MOUNTING FEET ARE OPTIONAL.

TNL & TFL Models

HP	Model Number	AG Maximum ¹		Wt. (lbs.) ²	Enclosure
		^a A°	^a B°		
1/6	9301609TNL	7.13	—	15	TENV
1/4	9302509TNL	7.66	—	17	
1/3	9303309TNL	8.16	—	21	
1/2	9305009TFL	—	9.875	25	TEFC
	9305018TFL	—	9.875		
3/4	9307509TFL	—	12.375	32	
	9307518TFL	—	12.375		
1	9310009TFL	—	14.375	39	
	9310018TFL	—	14.375		

TFL Models

HP	Model Number	AG Maximum ¹		Wt. (lbs.) ²	Enclosure
		^a B°			
1 1/2	9315018TFL	16.35		68	TEFC
2	9320018TFL	17.35		73	
3	9330018TFL	19.75		93	

Notes:

- To convert dimension figures shown to metric equivalents (mm) multiply by 25.4.
- To convert weights shown to metric equivalents (kgs) multiply by 0.45.