

Brushless DC Motors/Gearmotors/Controls

BRUSHLESS DC MOTORS

GENERAL INFORMATION

BRUSHLESS MOTOR CONSTRUCTION

Because most people who work with motors are familiar with brush-type permanent magnet (PM) motors, it is helpful to explain the construction of a brushless DC (BLDC) motor by comparing it to the PM motor. BLDC motors are sometimes referred to as “inside-out PM motors” because their speed-torque curves are very similar to those of PM motors. However, BLDC motors have their magnets on the rotating part of the motor instead of on the stationary part. Accordingly, they have their windings on the stationary part of the motor instead of on the rotating part, as in a PM motor. **Figure 1** shows the construction differences between the BLDC and the PM motors.

The other major construction difference is the means for switching winding phases on and off, as shown in **Figure 2**. A PM motor uses brushes that press against a commutator attached to the armature. As the armature turns, the brushes come into contact with different segments of the commutator and change the current path through the winding. The interaction between the magnetic field created in the armature and the permanent magnet field in the stationary part of the motor results in rotation of the armature. Operation of a

BLDC motor is similar except that the winding phases are switched on and off electronically by means of a control device. The control “knows” when to switch the windings because of feedback it receives from rotor position Hall effect sensors.

BENEFITS OF BRUSHLESS MOTORS

- Having the winding, which is the heat-generating part of the motor, closer to the outside surface of the motor results in a motor that dissipates heat well and that can therefore handle higher continuous loads without exceeding its temperature limit.
- Having no brushes results in a motor that requires less maintenance and that has a longer life because there are no brushes or commutator to wear out.
- The absence of brushes also results in a motor that is quieter because there is no sliding friction to create audible noise and no current arcing across an air gap to create electrical noise.
- There is also no brush dust generated by a brushless motor, so they won't contaminate a clean room environment.
- The lower inertia of a brushless rotor, compared to a wound armature, results in a motor that can accelerate and decelerate quickly.

TYPICAL APPLICATIONS

Brushless DC motors are well-suited for applications that require very high speeds, where a brush-type motor would generate a loud noise and wear out brushes very quickly. Examples include centrifuges, grinders, and fans.

Because brushless DC motor speed controls rely on hall sensor feedback for speed regulation instead of back-EMF, there is only minimal speed drift as the motor warms up. This is beneficial in applications where the speed can't deviate from its setting from the time the machine is turned on until the time it is turned off. Examples include film processors, commercial food ovens, and medical pumps.

The low inertia of the brushless DC motor, coupled with the high peak torque capacity, result in a motor capable of quick accelerations and decelerations. This makes them an excellent choice in “servo” type applications where quick and precise positioning is needed. Examples include screen printing machinery, material handling equipment, and office machinery.

FIGURE 1: Basic Motor Construction

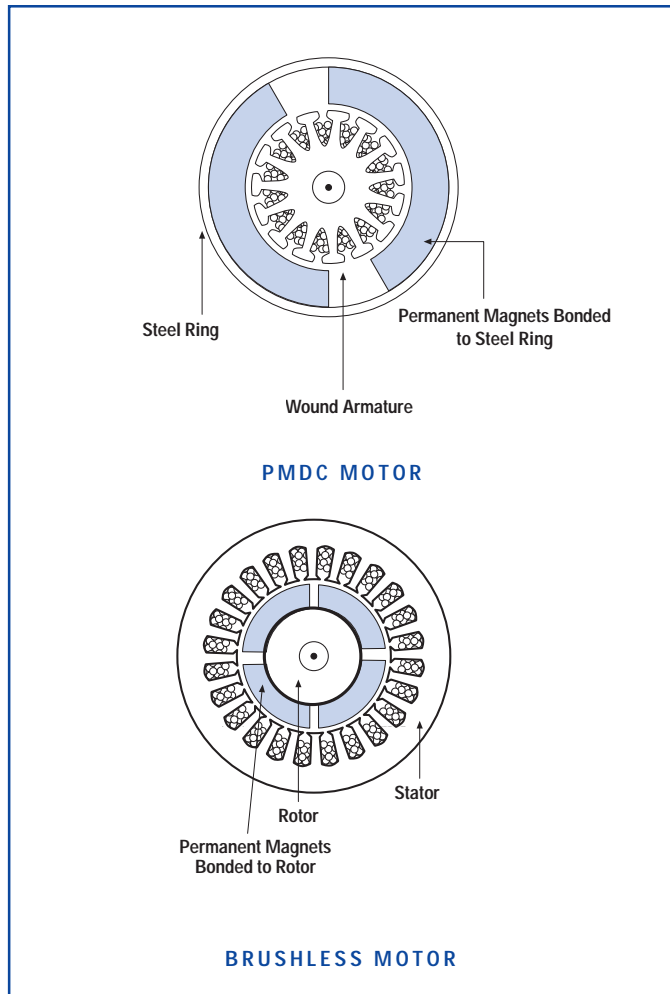
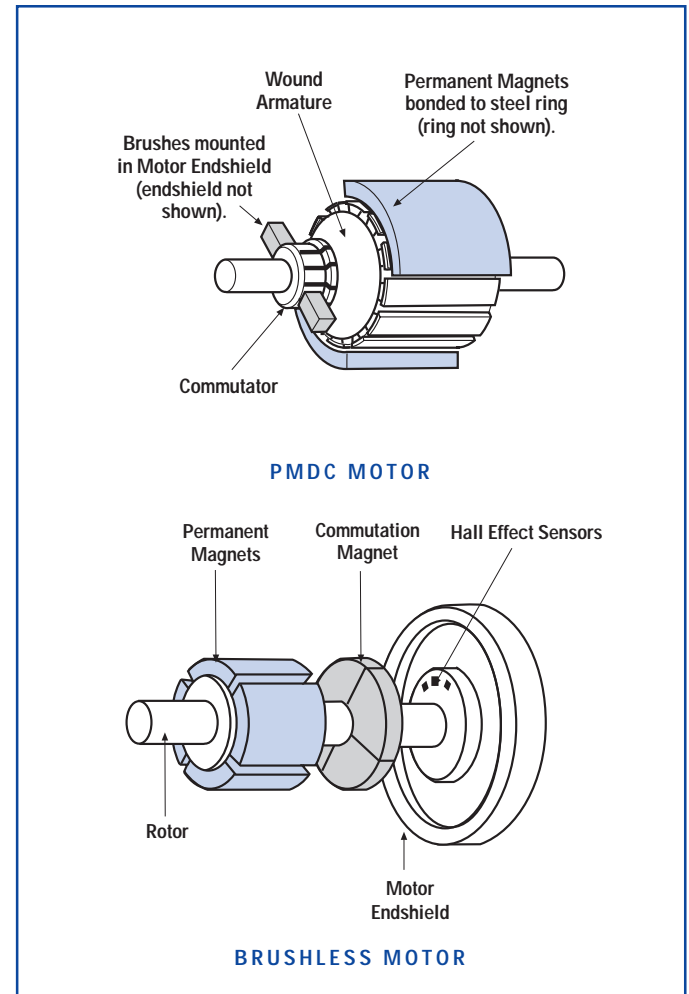


FIGURE 2: Commutation Methods



BRUSHLESS DC MOTORS

ELECTRICAL CONNECTIONS

WIRING HARNESS FOR 24 VOLT MOTORS AND GEARMOTORS

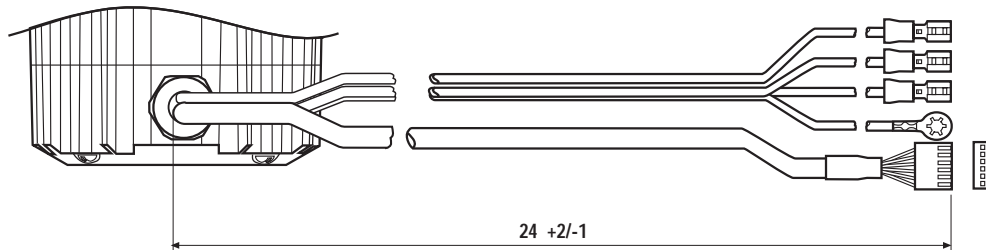
Bodine 24 Volt motors and gearmotors have four 18 AWG wires and a five-conductor shielded cable for connection to a Bodine 24 Volt control. The three motor phase connections are made with .250" quick

connect receptacles. The ground lead is terminated with a ring terminal and the 24 AWG commutation leads inside the 5-conductor shielded cable are terminated in a 6-pin in-line connector

with 0.1" center distances. The harness is a nominal 24" long from the motor housing to the end of the connections.

Pin Location	Wire Color & Size	Pin Part No.	Connector Part No.	Function
-	Red, 18 AWG	-	AMP 640902-1	Phase B
-	Brown, 18 AWG	-	AMP 640902-1	Phase A
-	Orange, 18 AWG	-	AMP 640902-1	Phase C
-	Green/Yellow, 18 AWG	-	AMP 640204-1	Earth /Ground
1	Drain Wire	MOLEX 08-50-0113	MOLEX 22-01-3067	Shield Drain
2	Black, 24 AWG	MOLEX 08-50-0113		Sensor Common
3	Green, 24 AWG	MOLEX 08-50-0113		Hall C
4	White, 24 AWG	MOLEX 08-50-0113		Hall B
5	Brown, 24 AWG	MOLEX 08-50-0113		Hall A
6	Red, 24 AWG	MOLEX 08-50-0113		Sensor Power

Wiring harness for 24 Volt motors and gearmotors



WIRING HARNESS FOR 130 VOLT MOTORS AND GEARMOTORS

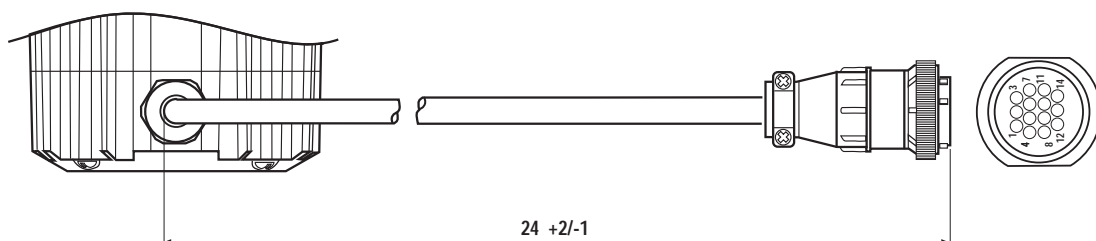
Bodine 130 Volt motors and gearmotors have a single 14-pin plug & twist connector at the end of a nominal 12" long harness. This provides a quick and easy means of connecting the motor or gearmotor to a Bodine 115 VAC control. An interface cable is needed

between the motor and the control. This cable may be supplied by the customer or it can be purchased from Bodine Electric. Model 3983 is a 6' long cable that can be used to connect 130 Volt motors and gearmotors to Bodine control models 3910, 3911, and

3921. Model 3982 is a 6' long cable that can be used to connect 130 Volt motors and gearmotors to Bodine control model 3912. It can also be used as an extension cable for use with any of the above mentioned controls. Encased model 3912 includes a 6' cable.

Pin Location	Wire Color & Size	Pin Part No.	Connector Part No.	Function
2	Red, 18 AWG	AMP 66098-7	AMP 206044-1	Phase B
1	Brown, 18 AWG	AMP 66098-7		Phase A
3	Orange, 18 AWG	AMP 66098-7		Phase C
4	Green/Yellow, 18 AWG	AMP 66098-7		Earth Ground
11	Drain Wire	AMP 66102-7		Shield Drain
10	Black, 24 AWG	AMP 66102-7		Sensor Common
14	Green, 24 AWG	AMP 66102-7	Hall C	
13	White, 24 AWG	AMP 66102-7	Hall B	
12	Brown, 24 AWG	AMP 66102-7	Hall A	
9	Red, 24 AWG	AMP 66102-7	Sensor Power	

Wiring harness for 130 Volt motors and gearmotors





BRUSHLESS DC MOTORS

1/16 - 1/5 HP

22B

STANDARD FEATURES

- Totally Enclosed, Non-Ventilated (IP-44)
- Plug-in connectors facilitate electrical connections
- Electronic commutation provides quiet operation and low electro-magnetic interference (EMI) while eliminating brush maintenance and contamination from brush dust
- Molded hall sensor assembly for accurate commutation

- Wound stator with exposed laminations provides excellent heat transfer and allows maximum power per motor frame size
- Rare earth magnets on the rotor provide high torque and low rotor inertia

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63
- Performance ratings based on 115° C winding, 25° C ambient, and no heat sink
- May have to be operated below ratings if unfiltered control is used and if duty is continuous (see page 78 for specific unfiltered ratings)
- May be operated above ratings if duty is intermittent and/or if heat sink is provided (consult a Bodine applications engineer first)
- Face mounting is standard

- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

OPTIONAL ACCESSORIES

- 360 pulse/revolution optical encoder model 0940, see page 79 (requires adaptor plate model 0993 also)
- Cable model 3983 for connecting 130V motors to Bodine chassis controls, see page 79
- Adaptor model 0993 for mounting encoder, see page 79

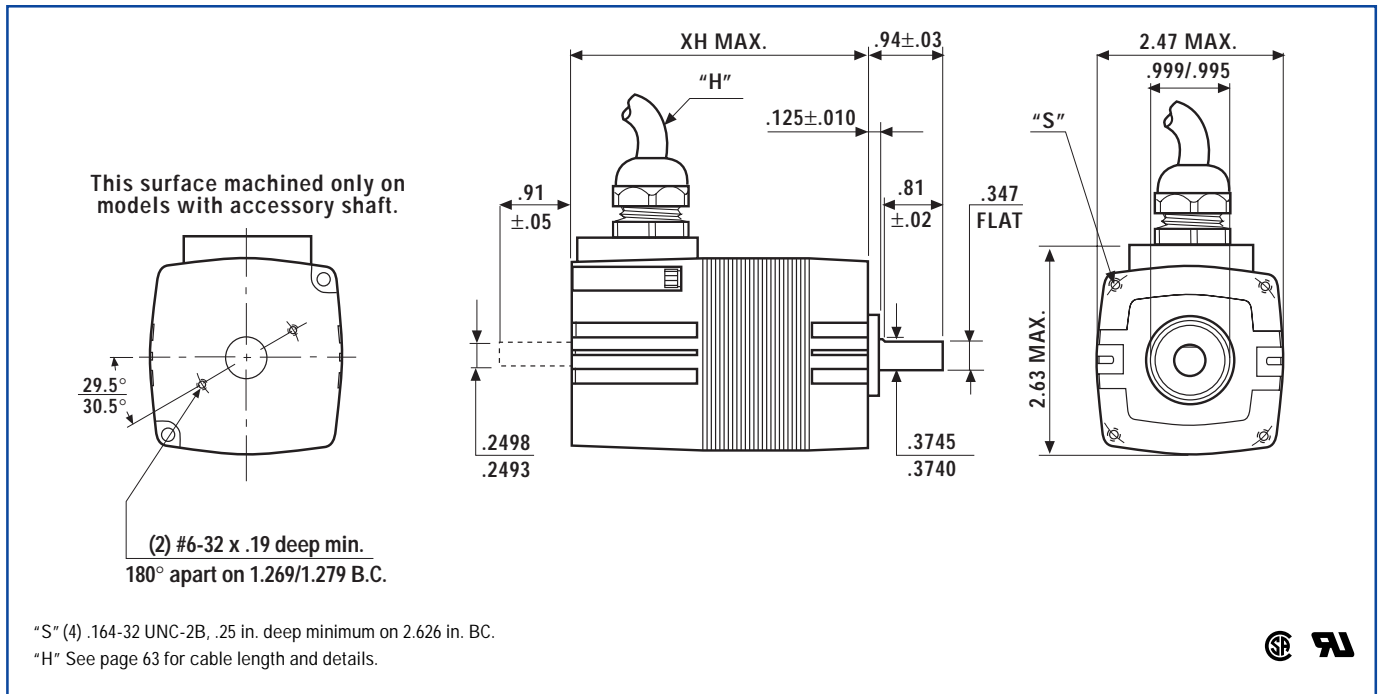
MATCHING CONTROLS

- Motors may be used with a variety of controls, including servo amplifiers, that produce square-wave current for 3-phase, 4-pole brushless motors with 60° commutation
- Bodine stocks a full line of single-quadrant speed controls ideally matched for Bodine's brushless motors, see pages 72-78

Speed (rpm)	Rated Torque (oz-in.)	Motor HP	Torque Constant (oz-in./A)	Voltage Constant (V/krpm)	Winding Res. (ohms)	Winding Induct. (mH)	Rotor Inertia (oz-in.-sec. ²)	Radial Load (lbs.)	Length XH (inch)	Wt. (lbs.)	Product Type	Model Number ¹			
												24 Volt Winding		130 Volt Winding	
												Acc'y. Shaft	No Acc'y. Shaft	Acc'y. Shaft	No Acc'y. Shaft
2500	25	1/16	8.4	5.8	1.2	2.1	.0036	25	3.67	2.5	22B2BEBL	-	3502	-	-
2500	25	1/16	47	35	40	70	.0036	25	3.67	2.5	22B2BEBL	-	-	-	3302
2500	50	1/8	9.0	6.7	.52	1.1	.0072	25	4.63	3.5	22B4BEBL	3604	N3504	-	-
2500	50	1/8	50	37	15	40	.0072	25	4.63	3.5	22B4BEBL	-	-	N3404	3304
10,000	20	1/5	14	9.8	4.8	10	.0072	25	4.63	3.5	22B4BEBL	-	-	-	3314

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

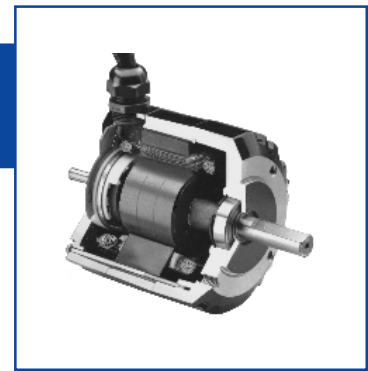
22B MOTOR shown with optional "accessory ready" mounting holes



BRUSHLESS DC MOTORS

1/5 - 3/8 HP

34B



STANDARD FEATURES

- Totally Enclosed, Non-Ventilated (IP-44)
- Plug-in connectors facilitate electrical connections
- Electronic commutation provides quiet operation and low electromagnetic interference (EMI) while eliminating brush maintenance and contamination from brush dust
- Molded hall sensor assembly for accurate commutation
- Wound stator with integrally cast cooling fins provides excellent heat transfer and allows maximum power per motor frame size
- Rare earth magnets on the rotor provide high torque and low rotor inertia

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63
- Performance ratings based on 115° C winding, 25° C ambient, and no heat sink

- May have to be operated below ratings if unfiltered control is used and if duty is continuous (see page 78 for specific unfiltered ratings)
- May be operated above ratings if duty is intermittent and/or if heat sink is provided (consult a Bodine applications engineer first)
- Face mounting is standard
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

OPTIONAL ACCESSORIES

- 360 pulse/revolution optical encoder model 0940, see page 79
- Cable model 3983 for connecting 130V motors to Bodine chassis controls, see page 79
- "L" bracket kit model 0979 permits base, ceiling, and sidewall mounting, see page 79

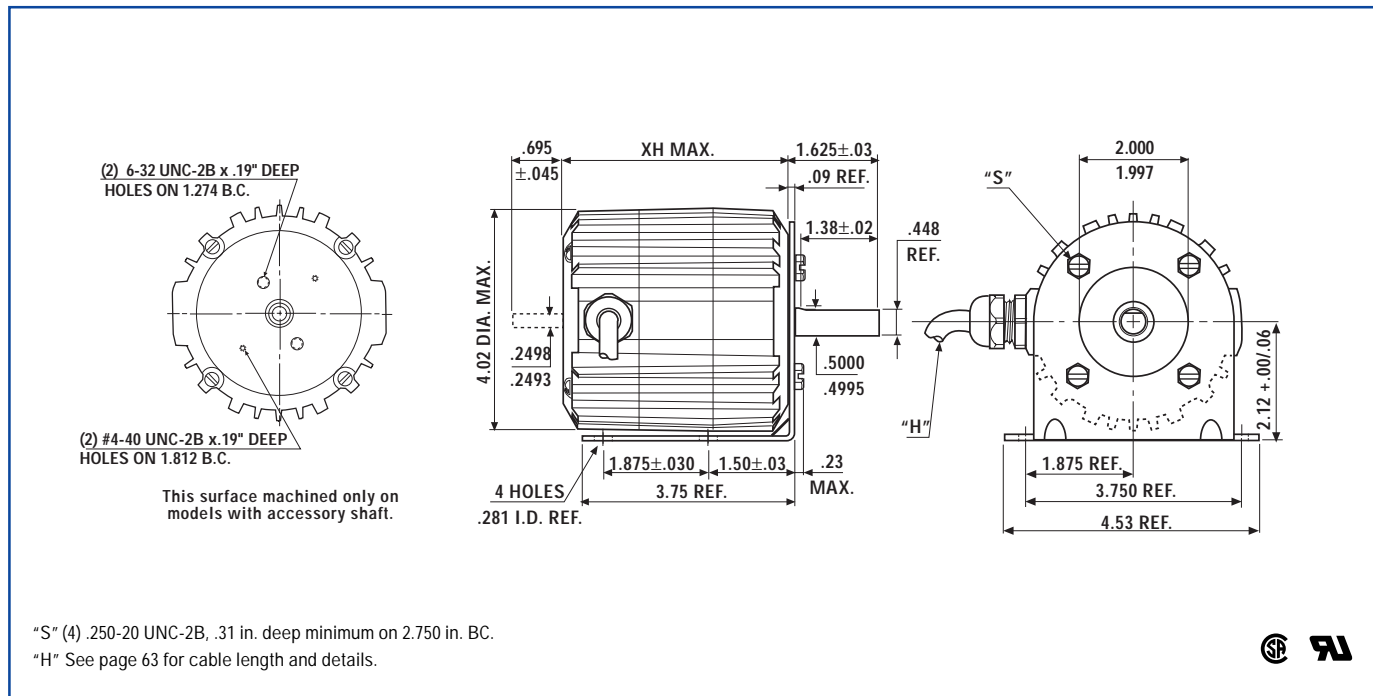
MATCHING CONTROLS

- Motors may be used with a variety of controls, including servo amplifiers, that produce square-wave current for 3-phase, 4-pole brushless motors with 60° commutation
- Bodine stocks a full line of single-quadrant speed controls ideally matched for Bodine's brushless motors, see pages 72-78

Speed (rpm)	Rated Torque (oz-in.)	Motor HP	Torque Constant (oz-in./A)	Voltage Constant (V/krpm)	Winding Res. (ohms)	Winding Induct. (mH)	Rotor Inertia (oz-in.-sec. ²)	Radial Load (lbs.)	Length XH (inch)	Wt. (lbs.)	Product Type	Model Number ¹			
												24 Volt Winding		130 Volt Winding	
												Acc'y. Shaft	No Acc'y. Shaft	Acc'y. Shaft	No Acc'y. Shaft
2500	81	1/5	8.8	6.6	.3	.54	.0115	42	4.06	6.0	34B3BEBL	3600	N3500	-	-
2500	81	1/5	51	38	9.2	24	.0115	42	4.06	6.0	34B3BEBL	-	-	N3406	3306
2500	101	1/4	9.0	6.7	.17	.40	.0154	42	4.56	7.0	34B4BEBL	-	N3507	-	-
2500	101	1/4	51	38	5.8	14	.0154	42	4.56	7.0	34B4BEBL	-	-	-	N3307
2500	151	3/8	57	42	3.4	11	.0215	42	5.56	9.0	34B6BEBL	-	-	3409	3309
10,000	33	1/3	14.5	10.7	1.7	4.6	.0154	42	4.56	7.0	34B4BEBL	-	-	-	3317

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

34B MOTOR shown with optional "L" bracket (model 0979) and optional "accessory ready" mounting holes





PARALLEL SHAFT BLDC GEARMOTORS

UP TO 40 LB-IN. CONTINUOUS

22B-D

- Needle bearings on output shaft for increased radial load capacity and long life
- Permanently lubricated gearing utilizing oil for long life
- Reinforced thermoplastic helical gear on input stage for quietness and hardened steel spur gears on subsequent stages for high output torque and long life
- Helical pinion accurately cut on motor shaft for maximum strength and minimum noise

OPTIONAL ACCESSORIES

- Encoder model 0940, see page 79 (requires adaptor plate model 0993 also)
- Cable model 3983 for connection to chassis controls, see page 79
- Adaptor model 0993 for encoders, see page 79
- "L" bracket kit model 5968 permits alternate mounting, see page 79

STANDARD FEATURES

- Brushless motor for higher torque, smaller size and no maintenance, see page 64
- Vented gearhousing for extended seal life
- Industrial lip type seals on motor and output shafts

APPLICATION INFORMATION

- Brushless motors require a control.
- Electrical connections shown on page 63
- Performance ratings based on 115° C winding, 25° C ambient, and no heat sink
- Face mounting is standard
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

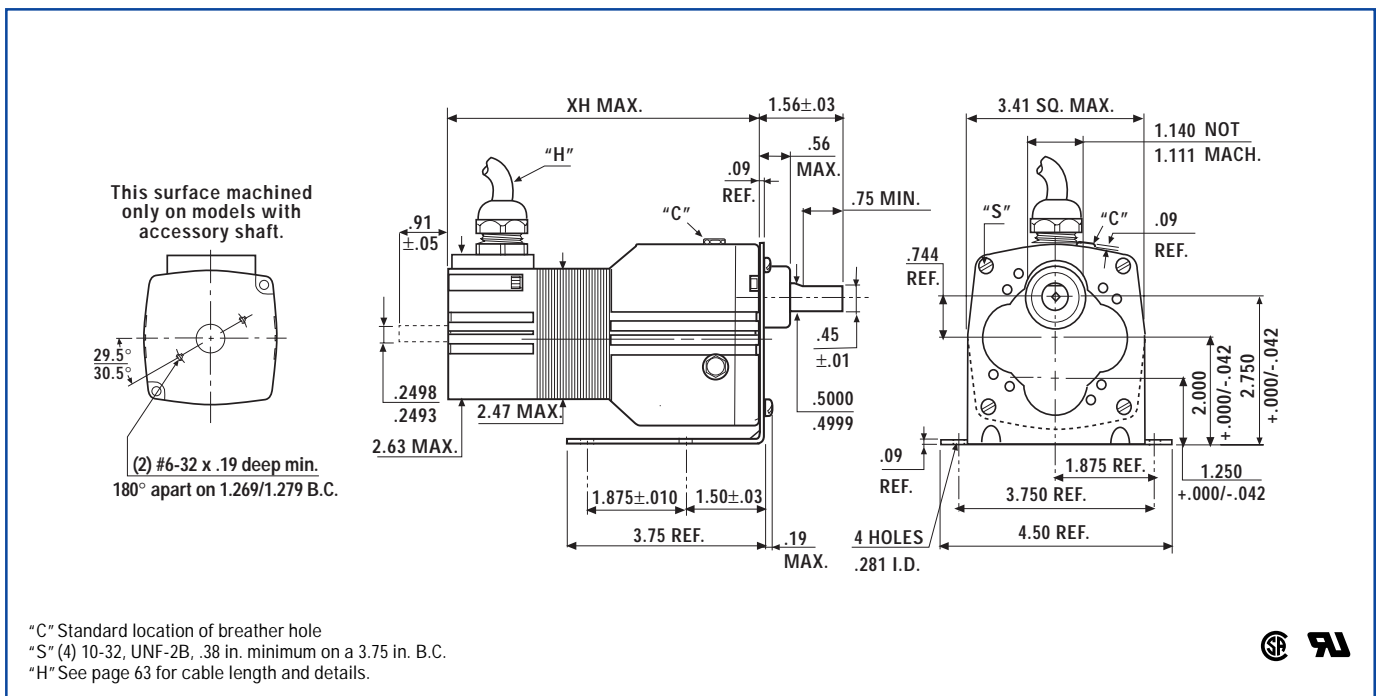
MATCHING CONTROLS

- Bodine stocks a full line of speed controls for Bodine's brushless motors, see pages 72-78

		Current @ Rated Torque (Amps)										Model Number ¹			
Speed (rpm)	Rated Torque (lb-in.)	24 Volt Winding	130 Volt Winding	Peak Torque (lb-in.)	Motor HP	Gear Ratio	Radial Load (lbs.)	Length, XH (inch)	Weight (lbs.)	Product Type	24 Volt Winding		130 Volt Winding		
											Accessory Shaft	No Accessory Shaft	Accessory Shaft	No Accessory Shaft	
14	40	3.3	.53	55	1/16	180	60	5.58	3.75	22B2BEBL-D4	N3636	N3536	N3433	3333	
28	40	3.3	.53	55	1/16	90	60	5.58	3.75	22B2BEBL-D4	N3635	N3535	N3431	N3331	
42	40	3.3	.53	55	1/16	60	60	5.58	3.75	22B2BEBL-D3	N3634	N3534	N3430	N3330	
83	29	3.3	.53	33	1/16	30	60	5.58	3.75	22B2BEBL-D3	3629	N3529	N3429	3329	
139	17	3.3	.53	20	1/16	18	60	5.58	3.75	22B2BEBL-D3	N3628	N3528	N3428	N3328	
208	12	3.3	.53	13	1/16	12	60	5.58	3.75	22B2BEBL-D3	N3627	N3527	N3427	3327	
417	5.8	3.3	.53	6.2	1/16	6	60	5.58	3.75	22B2BEBL-D3	N3626	N3526	N3426	3326	

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

22B-D GEARMOTOR shown with optional "L" bracket (model 5968) and optional "accessory ready" mounting holes



PARALLEL SHAFT BLDC GEARMOTORS

UP TO 100 LB-IN. CONTINUOUS

22B-Z



STANDARD FEATURES

- Brushless motor for higher torque, smaller size and no maintenance, see page 64
- Vented gearhousing for extended seal life
- Industrial lip type seals on motor and output shafts
- Needle bearings on output shaft for increased radial load capacity and long life
- Permanently lubricated gearing utilizing oil for long life
- Wide reinforced thermoplastic helical gear on input stage for quietness and wide hardened steel spur gears on subsequent stages for high output torque and long life
- Helical pinion accurately cut on motor shaft for maximum strength and minimum noise

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63
- Performance ratings based on 115° C winding, 25° C ambient, and no heat sink
- Face mounting is standard
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

OPTIONAL ACCESSORIES

- Encoder model 0940, see page 79 (requires adaptor plate model 0993 also)
- Cable model 3983 for connection to chassis controls, see page 79
- Adaptor model 0993 for encoders, see page 79
- "L" bracket kit model 5968 permits alternate mounting, see page 79

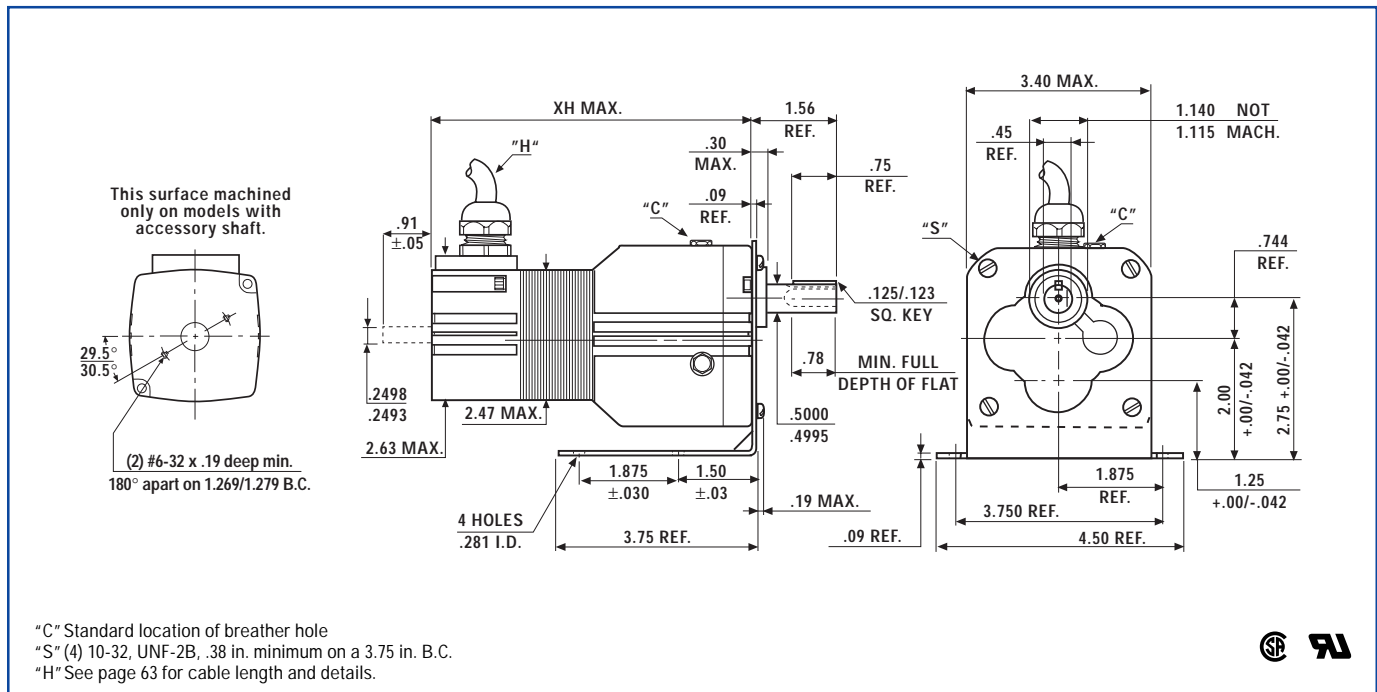
MATCHING CONTROLS

- Bodine stocks a full line of speed controls for Bodine's brushless motors, see pages 72-78

Speed (rpm)	Rated Torque (lb-in.)	Current @ Rated Torque (Amps)		Peak Torque (lb-in.)	Motor HP	Gear Ratio	Radial Load (lbs.)	Length, XH (inch)	Weight (lbs.)	Product Type	Model Number ¹			
		24 Volt Winding	130 Volt Winding								24 Volt Winding		130 Volt Winding	
											Accessory Shaft	No Accessory Shaft	Accessory Shaft	No Accessory Shaft
14	100	-	.76	115	1/11	180	110	7.29	5.25	22B3BEBL-Z4	-	-	N3463	3363
14	100	3.3	.53	115	1/16	180	110	6.81	4.75	22B2BEBL-Z4	-	N3563	-	-
21	100	3.3	.53	115	1/16	120	110	6.81	4.75	22B2BEBL-Z4	-	N3564	-	N3364
28	100	4.4	.76	115	1/11	90	110	7.29	5.25	22B3BEBL-Z4	-	-	N3462	N3362
28	97	3.3	.53	115	1/16	90	110	6.81	4.75	22B2BEBL-Z4	-	N3562	-	-
42	95	4.4	.76	115	1/11	60	110	7.29	5.25	22B3BEBL-Z3	3661	N3561	N3461	N3361
83	52	4.4	.76	59	1/11	30	125	7.29	5.25	22B3BEBL-Z3	N3660	N3560	N3460	N3360
139	31	4.4	.76	38	1/11	18	125	6.39	5.25	22B3BEBL-Z2	N3659	N3559	N3459	N3359
208	20	4.4	.76	25	1/11	12	120	6.39	5.25	22B3BEBL-Z2	N3658	N3558	N3458	3358
417	10	4.4	.76	13	1/11	6	100	6.39	5.25	22B3BEBL-Z2	N3657	N3557	N3457	3357

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

22B-Z GEARMOTOR shown with optional "L" bracket (model 5968) and optional "accessory ready" mounting holes





PARALLEL SHAFT BLDC GEARMOTORS

UP TO 175 LB-IN. CONTINUOUS

34B-W

- Permanently lubricated gearing utilizing semi-fluid grease for long life
- Nylon helical gear on input stage for quietness and hardened steel spur gears on subsequent stages for high output torque and long life
- Helical pinion accurately cut on motor shaft for maximum strength and minimum noise

OPTIONAL ACCESSORIES

- Encoder model 0940, see page 79
- Cable model 3983 for connection to chassis controls, see page 79
- L-Bracket kit model 0970 permits alternate mounting, see page 79
- Adaptor plate kit model 0995 provides for drop-in replacement of competitive gearmotors, see page 79

STANDARD FEATURES

- Brushless motor for higher torque, smaller size and no maintenance, see page 65
- Vented gearhousing for extended seal life
- Industrial lip type seals on motor and output shafts
- Needle bearings on output shaft for increased radial load capacity and long life

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63
- Performance ratings based on 115° C winding, 25° C ambient, and no heat sink
- Face mounting is standard
- Model numbers shown in bold type are in stock.
- "N" model numbers require lead time and minimum quantities.

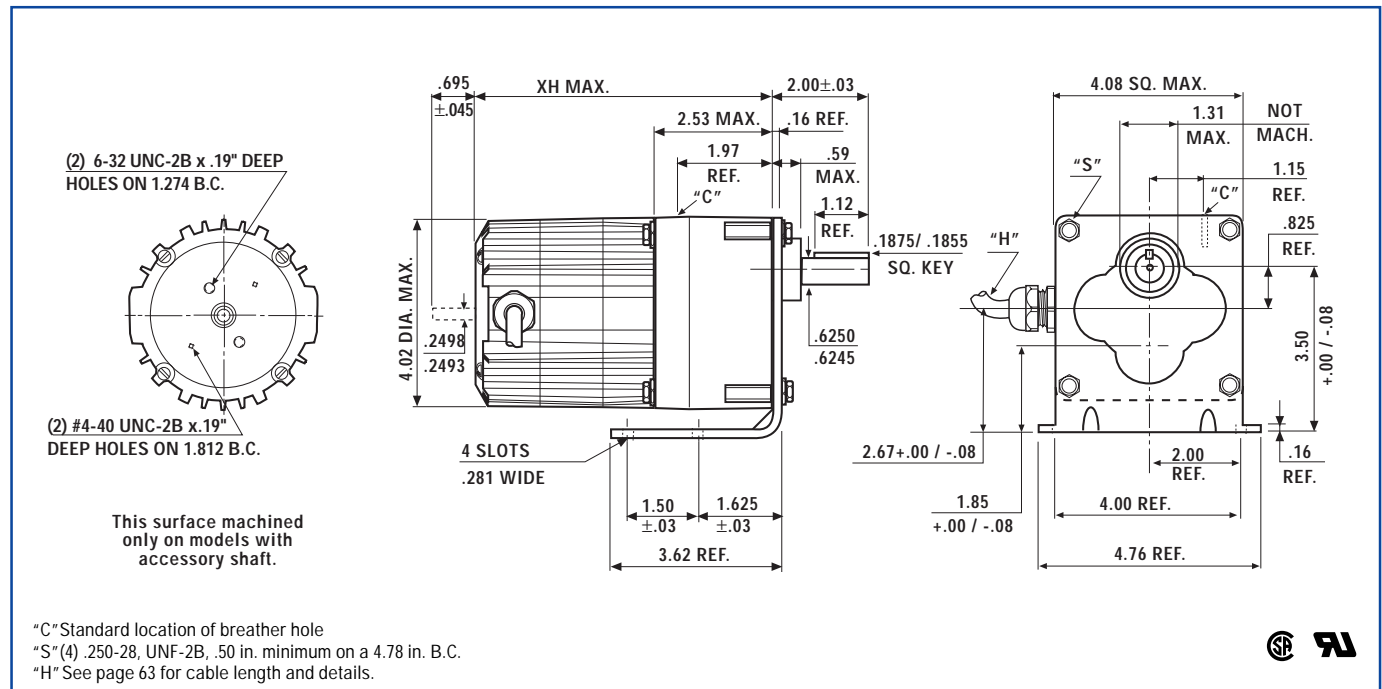
MATCHING CONTROLS

- Bodine stocks a full line of speed controls for Bodine's brushless motors, see pages 72-78

Speed (rpm)	Rated Torque (lb-in.)	Current @ Rated Torque (Amps)		Peak Torque (lb-in.)	Motor HP	Gear Ratio	Radial Load (lbs.)	Length, XH (inch)	Weight (lbs.)	Product Type	Model Number ¹			
		24 Volt Winding	130 Volt Winding								24 Volt Winding		130 Volt Winding	
											Accessory Shaft	No Accessory Shaft	Accessory Shaft	No Accessory Shaft
8	175	9.6	1.6	210	1/5	312.4	130	6.54	9.0	34B3BEBL-W4	N3647	N3547	N3447	N3347
14	166	9.6	1.6	207	1/5	172.1	130	6.54	9.0	34B3BEBL-W4	N3624	N3524	N3446	3346
26	154	9.6	1.6	190	1/5	97.5	140	6.54	9.0	34B3BEBL-W4	N3656	N3556	N3456	N3356
38	143	9.6	1.6	157	1/5	65.5	140	6.54	9.0	34B3BEBL-W3	N3617	N3517	N3455	N3355
84	65	9.6	1.6	71	1/5	29.7	160	6.54	9.0	34B3BEBL-W3	N3653	N3553	N3453	3353
122	46	9.6	1.6	52	1/5	20.4	60	6.54	9.0	34B3BEBL-W2	N3652	N3552	N3452	3352
266	21	9.6	1.6	24	1/5	9.4	80	6.54	9.0	34B3BEBL-W2	N3623	N3523	N3450	N3350
456	12	9.6	1.6	14	1/5	5.5	90	6.54	9.0	34B3BEBL-W2	3611	N3522	N3449	N3349

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

34B-W GEARMOTOR shown with optional "L" bracket (model 0970) and optional "accessory ready" mounting holes



PARALLEL SHAFT BLDC GEARMOTORS

UP TO 350 LB-IN. CONTINUOUS

34B-E AND 34B-F



STANDARD FEATURES

- Brushless motor for higher torque, smaller size and no maintenance, see page 65
- Vented gearhousing for extended seal life
- Industrial lip type seals on motor and output shafts
- Needle bearings throughout for increased radial load capacity and long life
- Permanently lubricated gearing utilizing semi-fluid grease for long life
- Selectively hardened all steel helical gearing for quietness and high output to size ratio

- Performance ratings based on 115° C winding, 25° C ambient, and no heat sink
- Face mounting is standard
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63

OPTIONAL ACCESSORIES

- Encoder model 0940, see page 79
- Cable model 3983 for connection to chassis controls, see page 79
- L-Bracket kit model 0969 permits alternate mounting, see page 79
- Adaptor plate kit model 0995 provides for drop-in replacement of competitive gearmotors, see page 79

MATCHING CONTROLS

- Bodine stocks a full line of speed controls for Bodine's brushless motors, see pages 72-78

INTRODUCTION

INDUCTION AC

PERMANENT MAGNET DC

BRUSHLESS DC

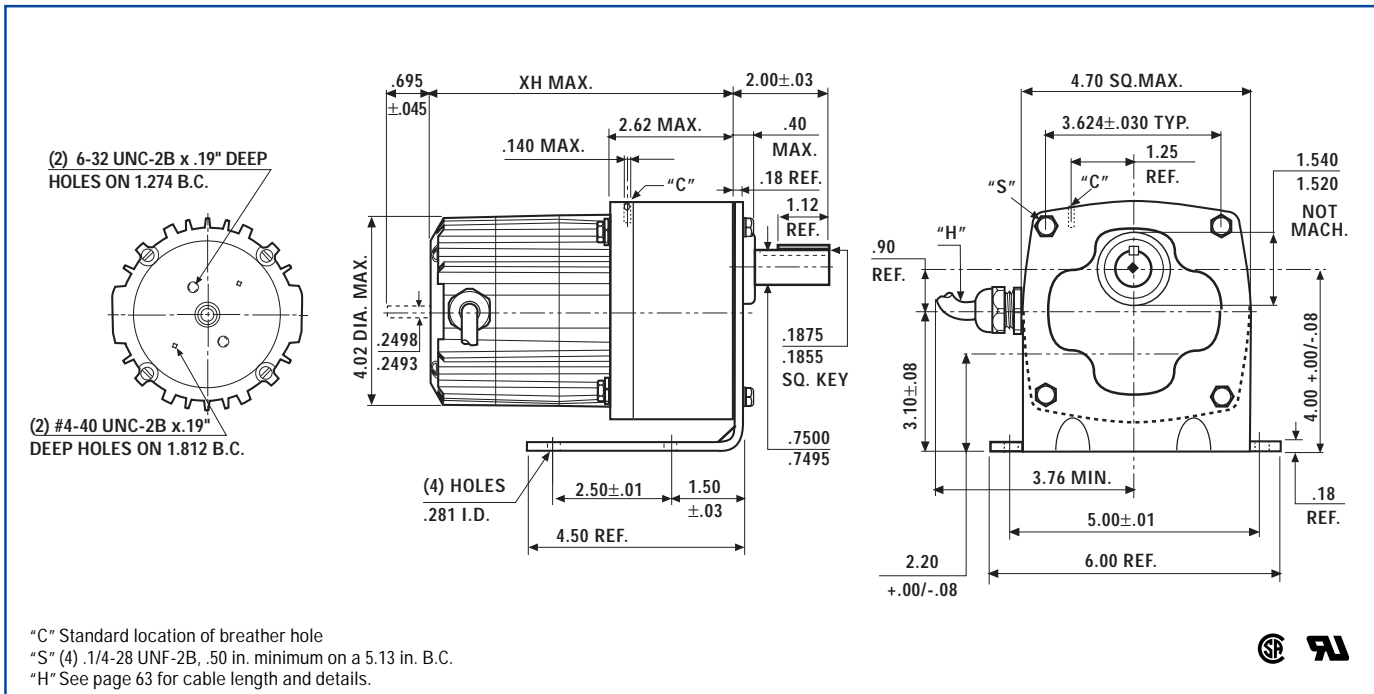
INTERNATIONAL

INDEX

Speed (rpm)	Rated Torque (lb-in.)	Current @ Rated Torque (Amps)		Peak Torque (lb-in.)	Motor HP	Gear Ratio	Radial Load (lbs.)	Length, XH (inch)	Weight (lbs.)	Product Type	Model Number ¹			
		24 Volt Winding	130 Volt Winding								24 Volt Winding		130 Volt Winding	
											Accessory Shaft	No Accessory Shaft	Accessory Shaft	No Accessory Shaft
8.3	310	9.6	1.6	475	1/5	300	220	6.689	11.0	34B3BEBL-E4	-	N3575	-	N3375
14	341	9.6	1.6	475	1/5	180	200	6.689	11.0	34B3BEBL-E4	-	N3574	-	3374
21	350	9.6	1.6	475	1/5	120	195	6.689	11.0	34B3BEBL-E4	-	N3573	-	3373
42	270	12	2.0	421	1/4	60	240	7.189	12.0	34B4BEBL-E3	N3685	3585	N3485	3385
83	245	-	2.6	475	3/8	30	250	8.189	14.0	34B6BEBL-F3	-	-	-	N3372
83	135	12	2.0	318	1/4	30	300	7.189	12.0	34B4BEBL-E3	N3683	N3583	3483	3383
125	163	-	2.6	333	3/8	20	290	8.189	14.0	34B6BEBL-F3	-	-	-	N3371
125	90	12	2.0	220	1/4	20	300	7.189	12.0	34B4BEBL-E3	N3682	N3582	N3482	N3382
250	82	-	2.6	166	3/8	10	300	8.189	14.0	34B6BEBL-F2	-	-	-	N3370
250	45	12	2.0	106	1/4	10	300	7.189	12.0	34B4BEBL-E2	N3680	N3580	N3480	3380
500	42	-	2.6	86	3/8	5	60	8.189	14.0	34B6BEBL-F1	-	-	-	3369
500	25	12	2.0	55	1/4	5	60	7.189	12.0	34B4BEBL-E1	-	N3579	-	3379

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

34B-E GEARMOTOR shown with optional "L" bracket (model 0969) and optional "accessory ready" mounting holes





RIGHT ANGLE BLDC GEARMOTORS

UP TO 37 LB-IN. CONTINUOUS

22B-3N

- Permanently lubricated gearing utilizing semi-fluid grease for long life
- Bronze gear for high shock load capability
- Hardened and ground worm for high strength and long life

OPTIONAL ACCESSORIES

- Encoder model 0940, see page 79 (requires adaptor plate model 0993 also)
- Cable model 3983 for connection to chassis controls, see page 79
- Baseplate kit model 0967, see page 79

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63
- Performance ratings are based on 115° C winding, 25° C ambient, and no heat sink
- Mounting holes are on gearhousing
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

MATCHING CONTROLS

- Bodine stocks a full line of speed controls for Bodine's brushless motors, see pages 72-78

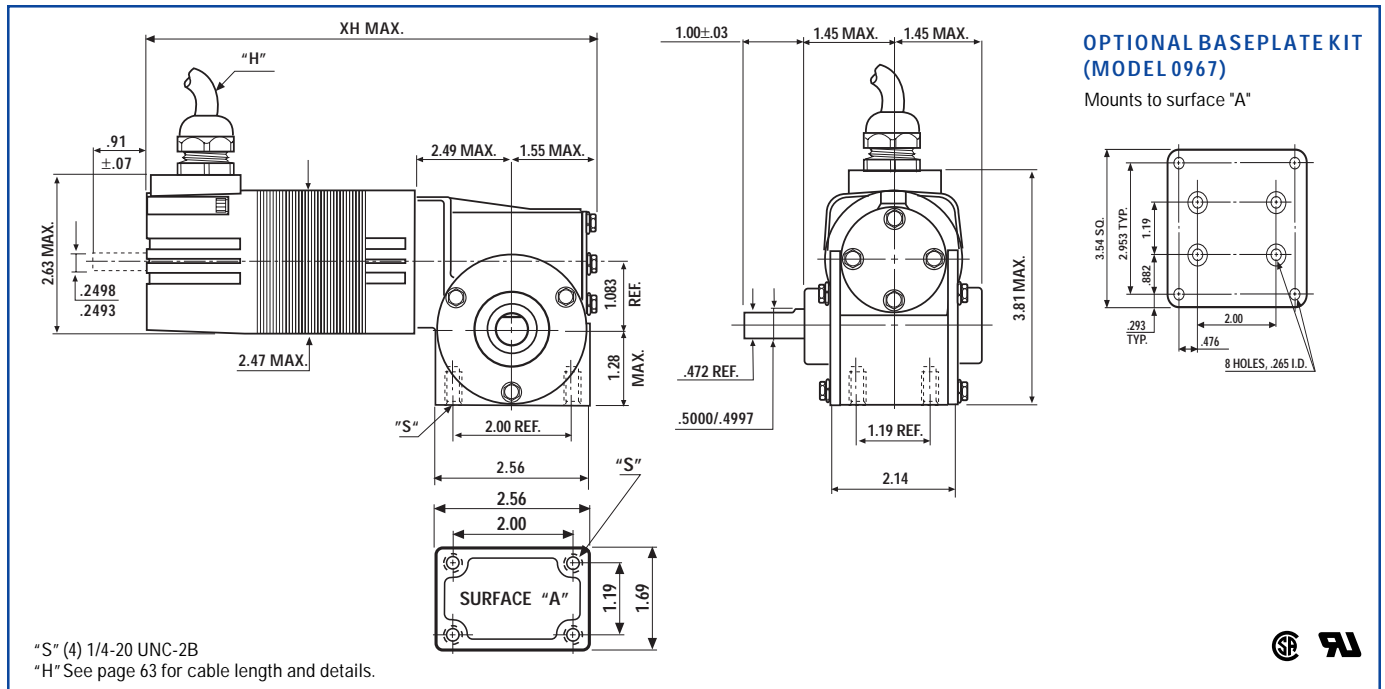
STANDARD FEATURES

- Brushless motor for higher torque, smaller size and no maintenance, see page 64
- Industrial lip type seals on motor and output shafts
- Needle bearings on output shaft for increased radial load capacity and long life

		Current @ Rated Torque (Amps)										Model Number ¹			
Speed (rpm)	Rated Torque (lb-in.)	24 Volt Winding	130 Volt Winding	Peak Torque (lb-in.)	Motor HP	Gear Ratio	Radial Load (lbs.)	Length, XH (inch)	Weight (lbs.)	Product Type	24 Volt Winding		130 Volt Winding		
											Accessory Shaft	No Accessory Shaft	Accessory Shaft	No Accessory Shaft	
42	37	5.9	1.0	147	1/8	60	100	8.75	5.4	22B4BEBL-3N	N3665	3565	N3421	N3321	
62	37	5.9	1.0	123	1/8	40	90	8.75	5.4	22B4BEBL-3N	N3666	N3566	N3422	3322	
125	35	5.9	1.0	74	1/8	20	80	8.75	5.4	22B4BEBL-3N	3667	N3567	N3423	N3323	
250	22	5.9	1.0	46	1/8	10	70	8.75	5.4	22B4BEBL-3N	N3668	N3568	3424	N3324	
500	11	5.9	1.0	23	1/8	5	60	8.75	5.4	22B4BEBL-3N	N3669	N3569	N3425	3325	

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

22B-3N GEARMOTOR



RIGHT ANGLE BLDC GEARMOTORS

UP TO 109 LB-IN. CONTINUOUS

34B-5N



STANDARD FEATURES

- Brushless motor for higher torque, smaller size and no maintenance, see page 65
- Vented gearhousing for extended seal life
- Industrial lip type seals on motor and output shafts
- Needle bearings on output shaft for increased radial load capacity and long life
- Permanently lubricated gearing utilizing oil for long life
- Bronze gear for high shock load capability
- Hardened and ground worm for strength and long life

APPLICATION INFORMATION

- Brushless motors require a control
- Electrical connections shown on page 63
- Performance ratings are based on 115° C winding, 25° C ambient, and no heat sink
- Mounting feet are on gearhousing, horizontal orientation is recommended
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

MATCHING CONTROLS

- Bodine stocks a full line of speed controls for Bodine's brushless motors, see pages 72-78

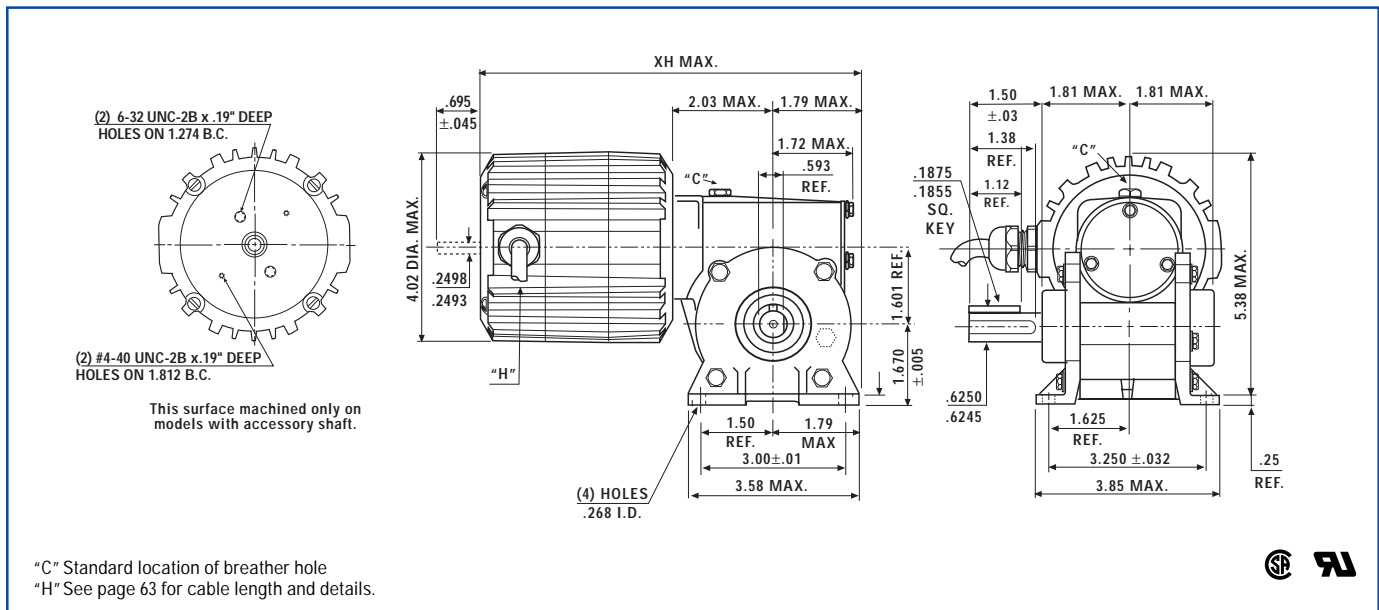
OPTIONAL ACCESSORIES

- Encoder model 0940, see page 79
- Cable model 3983 for connection to chassis controls, see page 79

Speed (rpm)	Rated Torque (lb-in.)	Current @ Rated Torque (Amps)		Peak Torque (lb-in.)	Motor HP	Gear Ratio	Radial Load (lbs.)	Length, XH (inch)	Weight (lbs.)	Product Type	Model Number ¹			
		24 Volt Winding	130 Volt Winding								24 Volt Winding		130 Volt Winding	
											Accessory Shaft	No Accessory Shaft	Accessory Shaft	No Accessory Shaft
62	109	-	2.6	174	3/8	40	220	9.38	12	34B6BEBL-5N	-	-	-	N3396
62	79	12	2.0	174	1/4	40	230	8.38	10	34B4BEBL-5N	N3691	N3591	N3491	N3391
62	74	9.6	1.6	174	1/5	40	230	7.88	9	34B3BEBL-5N	-	N3586	-	3386
83	104	-	2.6	166	3/8	30	210	9.38	12	34B6BEBL-5N	-	-	-	N3397
83	75	12	2.0	166	1/4	30	210	8.38	10	34B4BEBL-5N	N3692	N3592	N3492	N3392
83	70	9.6	1.6	166	1/5	30	210	7.88	9	34B3BEBL-5N	-	N3587	-	N3387
125	98	-	2.6	156	3/8	20	180	9.38	12	34B6BEBL-5N	-	-	-	N3398
125	75	12	2.0	156	1/4	20	180	8.38	10	34B4BEBL-5N	N3693	N3593	3493	N3393
125	59	9.6	1.6	156	1/5	20	180	7.88	9	34B3BEBL-5N	-	N3588	-	N3388
250	64	-	2.6	161	3/8	10	140	9.38	12	34B6BEBL-5N	-	-	-	3399
250	42	12	2.0	161	1/4	10	140	8.38	10	34B4BEBL-5N	N3694	N3594	N3494	N3394
250	33	9.6	1.6	140	1/5	10	150	7.88	9	34B3BEBL-5N	-	N3589	-	N3389
500	36	-	2.6	142	3/8	5	120	9.38	12	34B6BEBL-5N	-	-	-	N3378
500	24	12	2.0	94	1/4	5	120	8.38	10	34B4BEBL-5N	N3695	N3595	N3495	N3395
500	18.6	9.6	1.6	74	1/5	5	120	7.88	9	34B3BEBL-5N	-	N3590	-	N3390

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

34B-5N GEARMOTOR shown with optional "accessory ready" mounting holes





LOW VOLTAGE PWM BLDC CONTROLS

CHASSIS, SPEED AND DIRECTION CONTROL

ABL

- Accepts 0-5 VDC analog signal for remote operation
- Unique Smart Reverse™ circuit provides quick reversing and prevents motor plugging
- Dynamic braking for quicker stops
- 12 pulse/revolution tach output provides indication of motor speed
- Logic output indicates control shutdown due to a motor overload
- Speed can be adjusted manually or by remote control over a range of 30:1
- Inherent closed loop system maintains a 2% maximum change in motor speed from 0 - 100% of rated load when operated at rated speed

APPLICATION INFORMATION

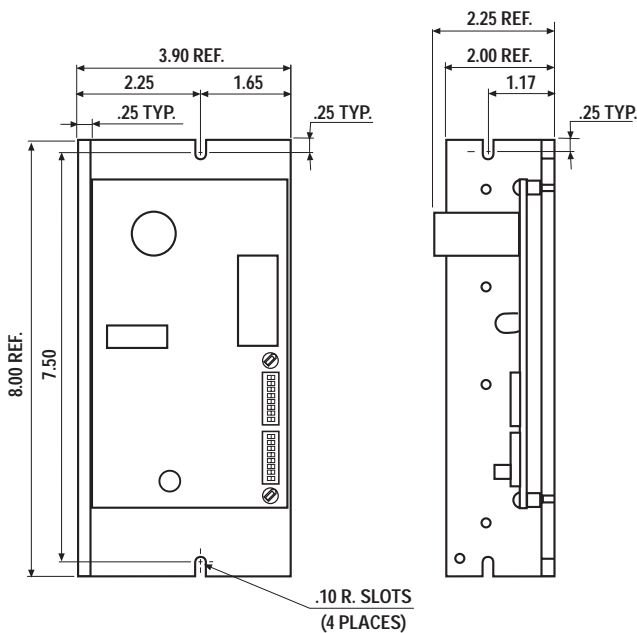
- Rated for 50° C ambient.
- To be mounted in separate enclosure supplied by user
- Drives 24 volt Bodine brushless motors shown on pages 64-71
- Requires an unregulated 24 VDC power supply with a minimum 5000 MFD capacitance
- 20 kHz PWM switching frequency
- For selection table, see page 76

STANDARD FEATURES

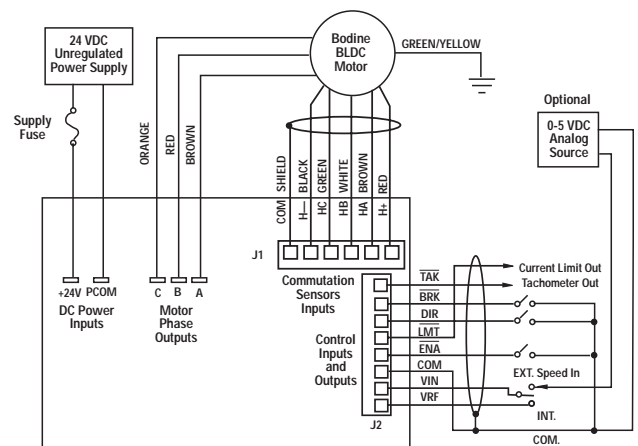
- 24 Volt power requirement makes this control ideal for portable, battery-operated applications or applications where safety standards dictate a low operating voltage
- On-board speed potentiometer for manual adjustment

HP Rating	Input Voltage (VDC)	Output Voltage (VDC)	Continuous Output Current (Amps)	Peak Output Current (Amps)	Form Factor	Weight (lbs.)	Product Type	Model Number
1/10	24-35	0-24	5.0	7.5	1.0	2.0	ABL-3905C	3905
1/6	24-35	0-24	10.0	13.5	1.0	2.0	ABL-3906C	3906
1/4	24-35	0-24	15.0	22	1.0	2.0	ABL-3907C	3907

DIMENSIONS



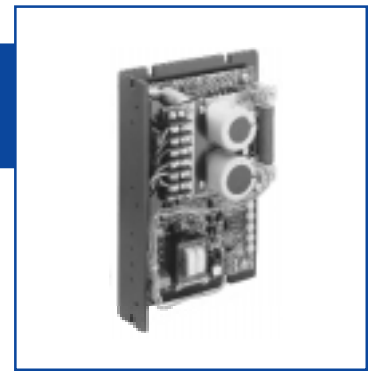
CONNECTION DIAGRAM



FILTERED SCR BLDC CONTROLS

CHASSIS, SPEED AND DIRECTION CONTROL

ABL



STANDARD FEATURES

- Operates from 115 Volt AC line
- Filtered DC output results in cooler operation of the motor
- Unique Smart Reverse™ circuit for remote control of motor direction
- Dynamic braking for quicker stops
- 12 pulse/revolution tach output provides indication of motor speed
- Green LED indicates AC power on
- Red LED indicates control shutdown due to a fault condition
- Speed can be adjusted manually with a remote 10K ohm potentiometer (included)
- DIP switches set the current limit so that the same control model can drive any size Bodine motor
- Five onboard user-adjustable pots for torque limit, minimum speed limit, maximum speed limit, acceleration time and deceleration time

- Fuseholders for line and motor fuses (fuses included)
- Inherent closed loop system maintains a 1% maximum change in motor speed from 0 - 100% of rated load when operated at rated speed

APPLICATION INFORMATION

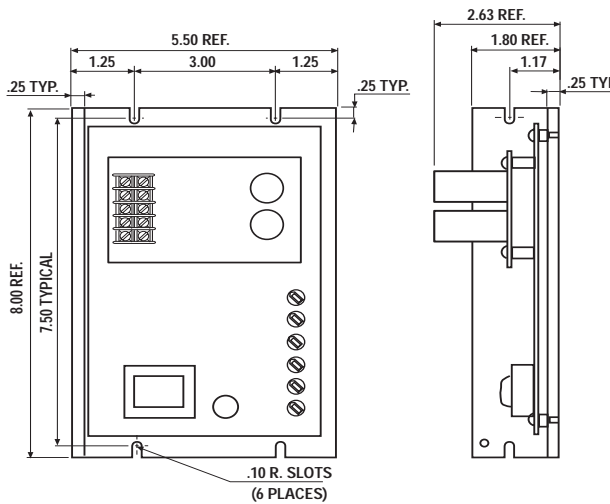
- Rated for 50° C ambient
- Intended to be mounted in separate enclosure supplied by user
- Drives 130 V brushless motors shown on page 64-71
- Screw terminal block for line and motor connections
- Plug-in connector for commutation connections
- .25" quick connect tabs for user interface connections
- Model 3911 for 2500 rpm motors. Model 3921 for 10,000 rpm motors
- See page 77 for selection tables

OPTIONAL ACCESSORIES

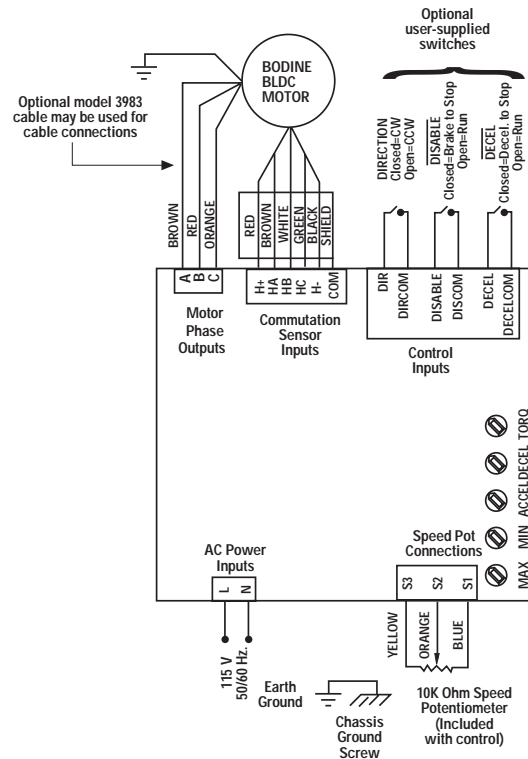
- Model 3983 cable connection assembly, see page 79
- Model 3982 cable extension, see page 79
- Model 3984 analog interface and isolation module, see page 79

HP Rating	Input Voltage (VAC, 50/60 Hz)	Output Voltage (VDC)	Continuous Output Current (Amps)	Peak Output Current (Amps)	Form Factor	Weight (lbs.)	Product Type	Model Number
3/8 @ 2500 rpm	115	0-130	3.0	6.0	1.0	2.5	ABL-3911C	3911
1/3 @ 10,000 rpm	115	0-130	3.0	6.0	1.0	2.5	ABL-3921C	3921

DIMENSIONS



CONNECTION DIAGRAM





FILTERED SCR BLDC CONTROLS

NEMA 12, SPEED AND DIRECTION CONTROL

ABL

STANDARD FEATURES

- Operates from 115 Volt AC line
- Filtered DC output results in cooler operation of the motor
- Unique Smart Reverse™ circuit allows remote control of motor direction
- NEMA 12 enclosure for environmental protection
- Dynamic braking for quicker stops

- 12 pulse/revolution tach output provides indication of motor speed
- Red LED indicates control shutdown due to a fault condition
- Speed can be adjusted manually using potentiometer on enclosure
- DIP switches set the current limit so that the same control model can drive any size Bodine motor
- Inherent closed loop system maintains a 1% maximum change in motor speed from 0 - 100% of rated load when operated at rated speed
- Toggle switch on enclosure to turn AC power on/off
- Lamp on enclosure indicates AC power on
- Rotary switch on enclosure to select motor direction
- Fuseholders for line and motor fuses (included)
- AC line cable and motor cable factory-installed

APPLICATION INFORMATION

- Rated for 40° C ambient
- Drives 130 V brushless motors shown on page 64-71
- Two means of mounting: face mounting using self-tapping screws on back surface, or flange mounting by installing four brackets (included)
- Model 3912 for 2500 rpm motors. Model 3913 for 10,000 rpm motors.
- For selection tables, see page 77
- Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

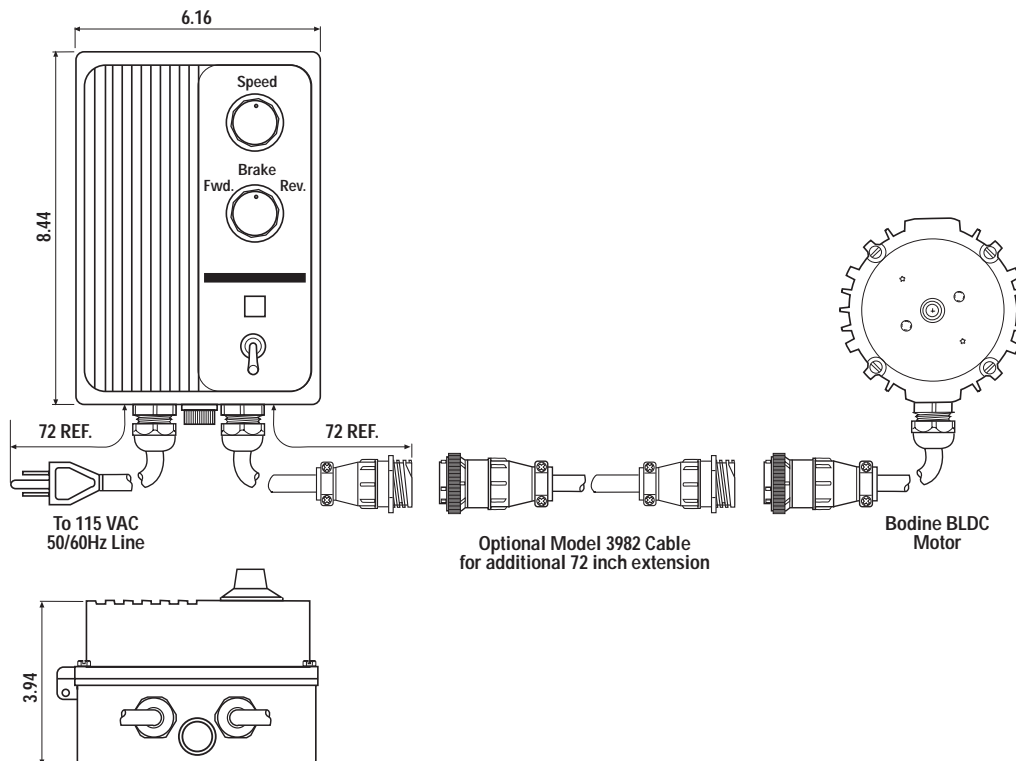
OPTIONAL ACCESSORIES

- Model 3982 cable extension, see page 79
- IP44 sealing kit model 0895 for protection against splashing water, see page 79

HP Rating	Input Voltage (VAC, 50/60 Hz)	Output Voltage (VDC)	Continuous Output Current (Amps)	Peak Output Current (Amps)	Form Factor	Weight (lbs.)	Product Type	Model Number ¹
3/8 @ 2500 rpm	115	0-130	3.0	6.0	1.0	7.5	ABL-3912E	3912
1/3 @ 10,000 rpm	115	0-130	3.0	6.0	1.0	7.5	ABL-3913E	N3913

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

DIMENSIONS AND CONNECTIONS



UNFILTERED SCR BLDC CONTROLS

CHASSIS, SPEED AND DIRECTION CONTROL

ABL



STANDARD FEATURES

- Operates from 115 Volt AC line
- Unique Smart Reverse™ circuit allows remote control of motor direction
- 12 pulse/revolution tach output provides indication of motor speed
- Green LED indicates AC power on
- Red LED indicates control shutdown due to a fault condition
- Speed can be adjusted manually with a remote 10K ohm potentiometer (not included)
- DIP switches set the current limit so that the same control model can drive any size Bodine motor

- Inherent closed loop system maintains a 1% maximum change in motor speed from 0 - 100% of rated load when operated at rated speed
- Fuseholder for line and motor fuses (line fuse only included)

APPLICATION INFORMATION

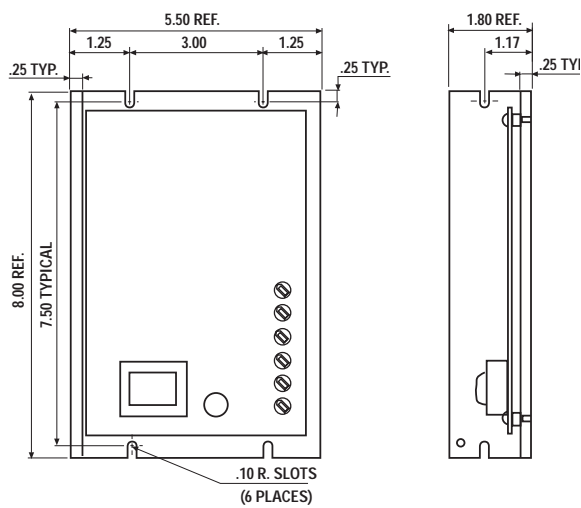
- Rated for 50° C ambient
- Intended to be mounted in separate enclosure supplied by user
- Drives 130 V brushless motors shown on page 64-71
- .25 inch quick connect tabs for line, motor connections, and user interface connections
- Plug-in connector for commutation connections
- For selection table, see page 78

OPTIONAL ACCESSORIES

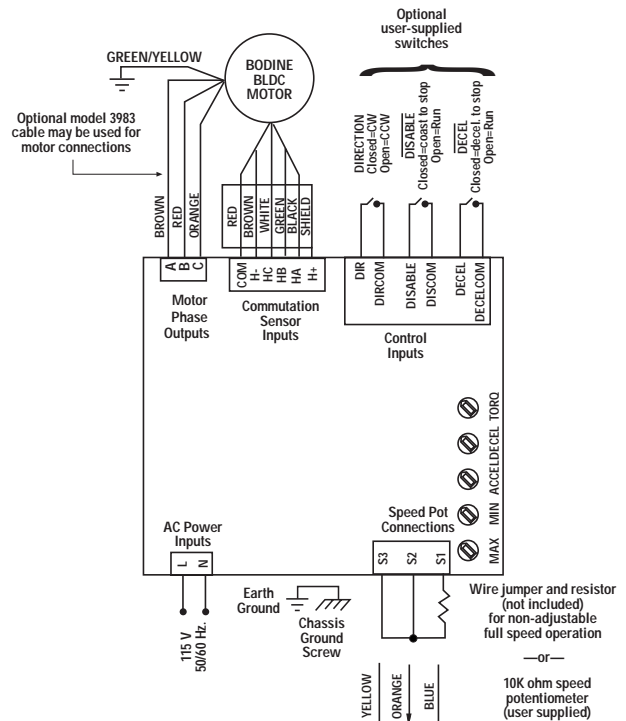
- Model 3983 cable connection assembly, see page 79
- Model 3982 cable extension, see page 79
- Model 3984 analog interface and isolation module, see page 79
- Fuse and speed potentiometer kit (part number 433 00270), see page 79

HP Rating	Input Voltage (VAC, 50/60 Hz)	Output Voltage (VDC)	Continuous Output Current (Amps)	Peak Output Current (Amps)	Form Factor	Weight (lbs.)	Product Type	Model Number
3/8	115	0-90	3.0	6.0	1.6	2.5	ABL-3910C	3910

DIMENSIONS



CONNECTION DIAGRAM



User must supply wire for all external connections

LOW VOLTAGE CHASSIS BLDC CONTROLS

SELECTION TABLE

ABL

SYSTEM PERFORMANCE WHEN USING BODINE 24V BLDC MOTORS WITH BODINE LOW VOLTAGE BLDC CONTROLS

Motor/Gearmotor Specifications							Matching Control Model Numbers
		Model Number ¹		Product Type	Nameplate Rating (HP)	Reference Page	
Speed Range (rpm)	Continuous Torque (lb-in.)	Accessory Shaft ¹	No Accessory Shaft ¹				Chassis
MOTORS WITHOUT GEAR REDUCERS							
100 - 2500	1.6	-	3502	22B2BEBL	1/16	64	3905
100 - 2500	3.1	3604	N3504	22B4BEBL	1/8	64	3906
100 - 2500	5.1	3600	N3500	34B3BEBL	1/5	65	3907
100 - 2500	6.3	-	N3507	34B4BEBL	1/4	65	3907
PARALLEL SHAFT GEARMOTORS							
0.6 - 14	40	N3636	N3536	22B2BEBL-D4	1/16	66	3905
0.6 - 14	100	-	N3563	22B2BEBL-Z4	1/16	67	3905
0.8 - 21	100	-	N3564	22B2BEBL-Z4	1/16	67	3905
1.2 - 28	40	N3635	N3535	22B2BEBL-D4	1/16	66	3905
1.2 - 28	100	-	N3562	22B2BEBL-Z4	1/16	67	3905
1.7 - 42	40	N3634	N3534	22B2BEBL-D3	1/16	66	3905
3.3 - 83	29	3629	N3529	22B2BEBL-D3	1/16	66	3905
5.6 - 139	17	N3628	N3528	22B2BEBL-D3	1/16	66	3905
8.3 - 208	12	N3627	N3527	22B2BEBL-D3	1/16	66	3905
17 - 417	5.8	N3626	N3526	22B2BEBL-D3	1/16	66	3905
1.7 - 42	95	3661	N3561	22B3BEBL-Z3	1/11	67	3905
3.3 - 83	52	N3660	N3560	22B3BEBL-Z3	1/11	67	3905
5.6 - 139	31	N3659	N3559	22B3BEBL-Z2	1/11	67	3905
8.3 - 208	20	N3658	N3558	22B3BEBL-Z2	1/11	67	3905
17 - 417	10	N3657	N3557	22B3BEBL-Z2	1/11	67	3905
0.3 - 8	175	N3647	N3547	34B3BEBL-W4	1/5	68	3906
0.3 - 8.3	310	-	N3575	34B3BEBL-E4	1/5	69	3906
0.6 - 14	166	N3624	N3524	34B3BEBL-W4	1/5	68	3906
0.6 - 14	341	-	N3574	34B3BEBL-E4	1/5	69	3906
1.0 - 26	154	N3656	N3556	34B3BEBL-W4	1/5	68	3906
1.5 - 38	143	N3617	N3517	34B3BEBL-W3	1/5	68	3906
3.3 - 84	65	N3653	N3553	34B3BEBL-W3	1/5	68	3906
4.9 - 122	46	N3652	N3552	34B3BEBL-W2	1/5	68	3906
11 - 266	21	N3623	N3523	34B3BEBL-W2	1/5	68	3906
18 - 456	12	3611	N3522	34B3BEBL-W2	1/5	68	3906
0.8 - 21	350	-	N3573	34B4BEBL-E4	1/4	69	3907
1.7 - 42	270	N3685	3585	34B4BEBL-E3	1/4	69	3907
3 - 83	135	N3683	N3583	34B4BEBL-E3	1/4	69	3907
5 - 125	90	N3682	N3582	34B4BEBL-E3	1/4	69	3907
10 - 250	45	N3680	N3580	34B4BEBL-E2	1/4	69	3907
20 - 500	25	-	N3579	34B4BEBL-E1	1/4	69	3907
RIGHT ANGLE GEARMOTORS							
1.7 - 42	37	N3665	3565	22B4BEBL-3N	1/8	70	3906
2.5 - 62	37	N3666	N3566	22B4BEBL-3N	1/8	70	3906
5 - 125	35	3667	N3567	22B4BEBL-3N	1/8	70	3906
10 - 250	22	N3668	N3568	22B4BEBL-3N	1/8	70	3906
20 - 500	11	N3669	N3569	22B4BEBL-3N	1/8	70	3906
2.5 - 62	74	-	N3586	34B3BEBL-5N	1/5	71	3907
3.3 - 83	70	-	N3587	34B3BEBL-5N	1/5	71	3907
5 - 125	67	-	N3588	34B3BEBL-5N	1/5	71	3907
10 - 250	33	-	N3589	34B3BEBL-5N	1/5	71	3907
20 - 500	18.6	-	N3590	34B3BEBL-5N	1/5	71	3907
2.5 - 62	79	N3691	N3591	34B4BEBL-5N	1/4	71	3907
3.3 - 83	75	N3692	N3592	34B4BEBL-5N	1/4	71	3907
5 - 125	75	N3693	N3593	34B4BEBL-5N	1/4	71	3907
10 - 250	42	N3694	N3594	34B4BEBL-5N	1/4	71	3907
20 - 500	24	N3695	N3595	34B4BEBL-5N	1/4	71	3907

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

FILTERED CHASSIS BLDC CONTROLS

SELECTION TABLE

ABL

SYSTEM PERFORMANCE WHEN USING BODINE 130V BLDC MOTORS WITH BODINE FILTERED BLDC CONTROLS (130 VDC OUTPUT)

Motor/Gearmotor Specifications							Matching Control Model Numbers	
Speed Range (rpm)	Cont. Torque (lb-in.)	Model Number ¹		Product Type	Nameplate Rating (HP)	Reference Page	Encased	Chassis
		Accessory Shaft ¹	No Accessory Shaft ¹					
MOTORS WITHOUT GEAR REDUCER								
100 - 2500	1.6	-	3302	22B2BEBL	1/16	64	3912	3911
100 - 2500	3.1	N3404	3304	22B4BEBL	1/8	64	3912	3911
100 - 2500	5.1	N3406	3306	34B3BEBL	1/5	65	3912	3911
400 - 10,000	1.2	-	3314	22B4BEBL	1/5	64	N3913	3921
100 - 2500	6.3	-	N3307	34B4BEBL	1/4	65	3912	3911
400 - 10,000	2.1	-	3317	34B4BEBL	1/3	65	N3913	3921
100 - 2500	9.4	3409	3309	34B6BEBL	3/8	65	3912	3911
PARALLEL SHAFT GEARMOTORS								
0.6 - 14	40	N3433	3333	22B2BEBL-D4	1/16	66	3912	3911
0.8 - 21	100	-	N3364	22B2BEBL-Z4	1/16	67	3912	3911
1.2 - 28	40	N3431	N3331	22B2BEBL-D4	1/16	66	3912	3911
1.7 - 42	40	N3430	N3330	22B2BEBL-D3	1/16	66	3912	3911
3 - 83	29	N3429	3329	22B2BEBL-D3	1/16	66	3912	3911
5.6 - 139	17	N3428	N3328	22B2BEBL-D3	1/16	66	3912	3911
8.3 - 208	12	N3427	3327	22B2BEBL-D3	1/16	66	3912	3911
17 - 417	5.8	N3426	3326	22B2BEBL-D3	1/16	66	3912	3911
0.6 - 14	100	N3463	3363	22B3BEBL-Z4	1/11	67	3912	3911
1.2 - 28	100	N3462	N3362	22B3BEBL-Z4	1/11	67	3912	3911
1.7 - 42	95	N3461	N3361	22B3BEBL-Z3	1/11	67	3912	3911
3 - 83	52	N3460	N3360	22B3BEBL-Z3	1/11	67	3912	3911
5.6 - 139	31	N3459	N3359	22B3BEBL-Z2	1/11	67	3912	3911
8.3 - 208	20	N3458	3358	22B3BEBL-Z2	1/11	67	3912	3911
17 - 417	10	N3457	3357	22B3BEBL-Z2	1/11	67	3912	3911
0.3 - 8	175	N3447	N3347	34B3BEBL-W4	1/5	68	3912	3911
0.3 - 8.3	310	-	N3375	34B3BEBL-E4	1/5	69	3912	3911
0.6 - 14	341	-	3374	34B3BEBL-E4	1/5	69	3912	3911
0.6 - 14	166	N3446	3346	34B3BEBL-W4	1/5	68	3912	3911
0.8 - 21	350	-	3373	34B3BEBL-E4	1/5	69	3912	3911
1 - 26	154	N3456	N3356	34B3BEBL-W4	1/5	68	3912	3911
1.5 - 38	143	N3455	N3355	34B3BEBL-W3	1/5	68	3912	3911
3.3 - 84	65	N3453	3353	34B3BEBL-W3	1/5	68	3912	3911
4.9 - 122	46	N3452	3352	34B3BEBL-W2	1/5	68	3912	3911
11 - 266	21	N3450	N3350	34B3BEBL-W2	1/5	68	3912	3911
18 - 456	12	N3449	N3349	34B3BEBL-W2	1/5	68	3912	3911
1.7 - 42	270	N3485	3385	34B4BEBL-E3	1/4	69	3912	3911
3 - 83	135	3483	3383	34B4BEBL-E3	1/4	69	3912	3911
5 - 125	90	N3482	N3382	34B4BEBL-E3	1/4	69	3912	3911
10 - 250	45	N3480	3380	34B4BEBL-E2	1/4	69	3912	3911
20 - 500	25	-	3379	34B4BEPM-E1	1/4	69	3912	3911
3 - 83	245	-	N3372	34B6BEBL-F3	3/8	69	3912	3911
5 - 125	163	-	N3371	34B6BEBL-F3	3/8	69	3912	3911
10 - 250	82	-	N3370	34B6BEBL-F2	3/8	69	3912	3911
20 - 500	42	-	3369	34B6BEBL-F1	3/8	69	3912	3911
RIGHT ANGLE GEARMOTORS								
1.7 - 42	37	N3421	N3321	22B4BEBL-3N	1/8	70	3912	3911
2.5 - 62	37	N3422	3322	22B4BEBL-3N	1/8	70	3912	3911
5 - 125	35	N3423	N3323	22B4BEBL-3N	1/8	70	3912	3911
10 - 250	22	3424	N3324	22B4BEBL-3N	1/8	70	3912	3911
20 - 500	11	N3425	3325	22B4BEBL-3N	1/8	70	3912	3911
2.5 - 62	74	-	3386	34B3BEBL-5N	1/5	71	3912	3911
3 - 83	70	-	N3387	34B3BEBL-5N	1/5	71	3912	3911
5 - 125	59	-	N3388	34B3BEBL-5N	1/5	71	3912	3911
10 - 250	33	-	N3389	34B3BEBL-5N	1/5	71	3912	3911
20 - 500	18.6	-	N3390	34B3BEBL-5N	1/5	71	3912	3911
2.5 - 62	79	N3491	N3391	34B4BEBL-5N	1/4	71	3912	3911
3 - 83	75	N3492	N3392	34B4BEBL-5N	1/4	71	3912	3911
5 - 125	75	3493	N3393	34B4BEBL-5N	1/4	71	3912	3911
10 - 250	42	N3494	N3394	34B4BEBL-5N	1/4	71	3912	3911
20 - 500	24	N3495	N3395	34B4BEBL-5N	1/4	71	3912	3911
2.5 - 62	109	-	N3396	34B6BEBL-5N	3/8	71	3912	3911
3 - 83	104	-	N3397	34B6BEBL-5N	3/8	71	3912	3911
5 - 125	98	-	N3398	34B6BEBL-5N	3/8	71	3912	3911
10 - 250	64	-	3399	34B6BEBL-5N	3/8	71	3912	3911
20 - 500	36	-	N3378	34B6BEBL-5N	3/8	71	3912	3911

INTRODUCTION

INDUCTION AC

PERMANENT MAGNET DC

BRUSHLESS DC

INTERNATIONAL

INDEX

UNFILTERED CHASSIS BLDC CONTROLS

SELECTION TABLE

ABL

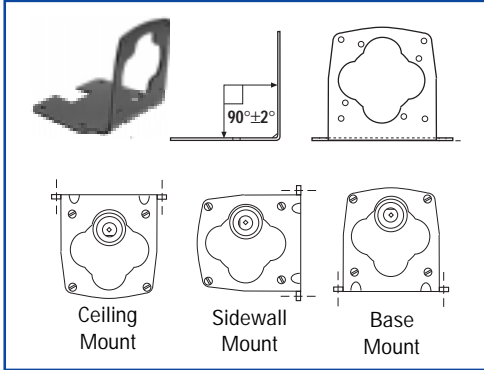
SYSTEM PERFORMANCE WHEN USING BODINE 130V BLDC MOTORS WITH BODINE UNFILTERED BLDC CONTROLS (90 VDC OUTPUT)

Motor or Gearmotor Specifications							Matching Control Model Numbers
Speed Range (rpm)	Cont. Torque (lb-in.)	Model Number ¹		Product Type	Nameplate Rating (HP)	Reference Page	
		Accessory Shaft ¹	No Accessory Shaft ¹				Chassis
MOTORS WITHOUT GEAR REDUCERS							
100 - 1725	1.1	-	3302	22B2BEBL	1/16	64	3910
100 - 1725	2.6	N3404	3304	22B4BEBL	1/8	64	3910
100 - 1725	3.3	N3406	3306	34B3BEBL	1/5	65	3910
100 - 1725	4.1	-	N3307	34B4BEBL	1/4	65	3910
100 - 1725	6.1	3409	3309	34B6BEBL	3/8	65	3910
PARALLEL SHAFT GEARMOTORS							
0.6 - 9.6	40	N3433	3333	22B2BEBL-D4	1/16	66	3910
0.8 - 14	100	-	N3364	22B2BEBL-Z4	1/16	67	3910
1.2 - 20	40	N3431	N3331	22B2BEBL-D4	1/16	66	3910
1.7 - 29	40	N3430	N3330	22B2BEBL-D3	1/16	66	3910
3 - 58	24	N3429	3329	22B2BEBL-D3	1/16	66	3910
5.6 - 96	15	N3428	N3328	22B2BEBL-D3	1/16	66	3910
8.3 - 144	9.8	N3427	3327	22B2BEBL-D3	1/16	66	3910
17 - 288	4.6	N3426	3326	22B2BEBL-D3	1/16	66	3910
0.6 - 9.6	100	N3463	3363	22B3BEBL-Z4	1/11	67	3910
1.2 - 20	100	N3462	N3362	22B3BEBL-Z4	1/11	67	3910
1.7 - 29	95	N3461	N3361	22B3BEBL-Z3	1/11	67	3910
3 - 58	38	N3460	N3360	22B3BEBL-Z3	1/11	67	3910
5.6 - 96	24	N3459	N3359	22B3BEBL-Z2	1/11	67	3910
8.3 - 144	16	N3458	3358	22B3BEBL-Z2	1/11	67	3910
17 - 288	8	N3457	3357	22B3BEBL-Z2	1/11	67	3910
0.3 - 5.6	175	N3447	N3347	34B3BEBL-W4	1/5	68	3910
0.3 - 5.8	310	-	N3375	34B3BEBL-E4	1/5	69	3910
0.6 - 9.6	341	-	3374	34B3BEBL-E4	1/5	69	3910
0.6 - 9.6	166	N3446	3346	34B3BEBL-W4	1/5	68	3910
0.8 - 14	299	-	3373	34B3BEBL-E4	1/5	69	3910
1 - 18	154	N3456	N3356	34B3BEBL-W4	1/5	68	3910
1.5 - 26	143	N3455	N3355	34B3BEBL-W3	1/5	68	3910
3.3 - 58	64	N3453	3353	34B3BEBL-W3	1/5	68	3910
4.9 - 85	46	N3452	3352	34B3BEBL-W2	1/5	68	3910
11 - 184	21	N3450	N3350	34B3BEBL-W2	1/5	68	3910
18 - 315	12	N3449	N3349	34B3BEBL-W2	1/5	68	3910
1.7 - 29	199	N3485	3385	34B4BEBL-E3	1/4	69	3910
3 - 58	100	3483	3383	34B4BEBL-E3	1/4	69	3910
5 - 86	66	N3482	N3382	34B4BEBL-E3	1/4	69	3910
10 - 173	33	N3480	3380	34B4BEBL-E2	1/4	69	3910
20 - 345	17	-	3379	34B4BEPM-E1	1/4	69	3910
3 - 58	153	-	N3372	34B6BEBL-F3	3/8	69	3910
5 - 86	102	-	N3371	34B6BEBL-F3	3/8	69	3910
10 - 173	51	-	N3370	34B6BEBL-F2	3/8	69	3910
20 - 345	26	-	3369	34B6BEBL-F1	3/8	69	3910
RIGHT ANGLE GEARMOTORS							
1.7 - 29	37	N3421	N3321	22B4BEBL-3N	1/8	70	3910
2.5 - 43	37	N3422	3322	22B4BEBL-3N	1/8	70	3910
5 - 86	35	N3423	N3323	22B4BEBL-3N	1/8	70	3910
10 - 173	20	3424	N3324	22B4BEBL-3N	1/8	70	3910
20 - 345	10	N3425	3325	22B4BEBL-3N	1/8	70	3910
2.5 - 43	46	-	3386	34B3BEBL-5N	1/5	71	3910
3 - 58	44	-	N3387	34B3BEBL-5N	1/5	71	3910
5 - 86	37	-	N3388	34B3BEBL-5N	1/5	71	3910
10 - 173	21	-	N3389	34B3BEBL-5N	1/5	71	3910
20 - 345	11.6	-	N3390	34B3BEBL-5N	1/5	71	3910
2.5 - 43	49	N3491	N3391	34B4BEBL-5N	1/4	71	3910
3 - 58	46	N3492	N3392	34B4BEBL-5N	1/4	71	3910
5 - 86	46	3493	N3393	34B4BEBL-5N	1/4	71	3910
10 - 173	26	N3494	N3394	34B4BEBL-5N	1/4	71	3910
20 - 345	14.8	N3495	N3395	34B4BEBL-5N	1/4	71	3910
2.5 - 43	52	-	N3396	34B6BEBL-5N	3/8	71	3910
3 - 58	50	-	N3397	34B6BEBL-5N	3/8	71	3910
5 - 86	52	-	N3398	34B6BEBL-5N	3/8	71	3910
10 - 173	40	-	3399	34B6BEBL-5N	3/8	71	3910
20 - 345	23	-	N3378	34B6BEBL-5N	3/8	71	3910

¹ NOTE: Model numbers shown in bold type are in stock. "N" model numbers require lead time and minimum quantities.

ACCESSORIES

FOR BRUSHLESS DC MOTORS AND CONTROLS



MOTOR AND GEARMOTOR "L" BRACKETS

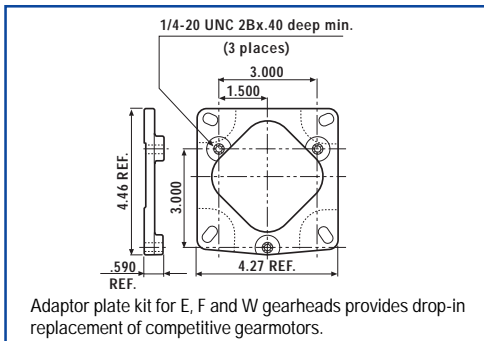
Model No.	Description	lbs.	Dimensions	Deflection lbs.
0969	Kit for "E" and "F" Gearmotors	2.5	Pg. 69	200
0970	Kit for "W" Gearmotors	1.75	Page 68	125
0979	Kit for 34B Motors	1	Page 65	25
5968	22B-D, 22B-Z Gearmotors	1.25	Page 66, 67	50

Most parallel shaft stock gearmotors have a breather hole on top and require that the driveshaft remain at 12 o'clock position with respect to the horizon. See "Mounting Positions" on page 4.

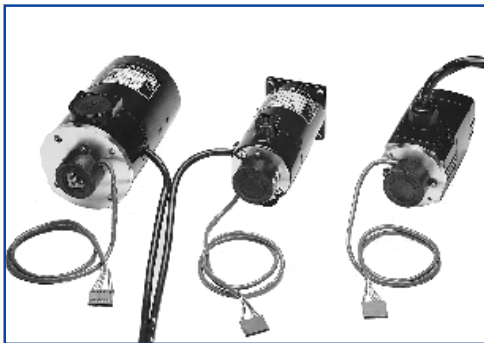
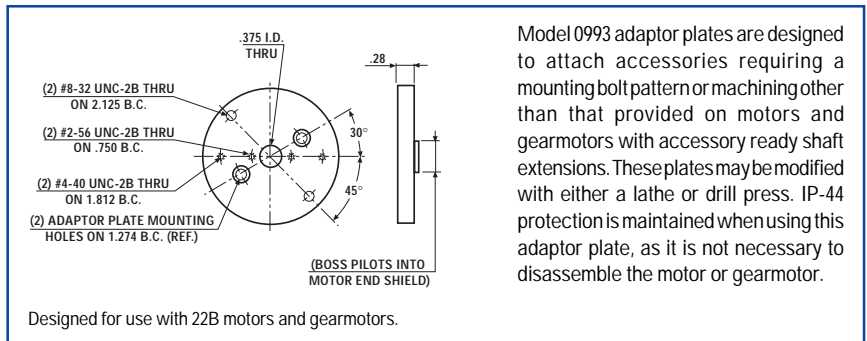
OTHER GEARMOTOR KITS

Model No.	Description	lbs.	Dimensions
0967	Base plate kit for 3F gearmotors	.5	Page 70

MODEL 0995 ADAPTOR PLATE



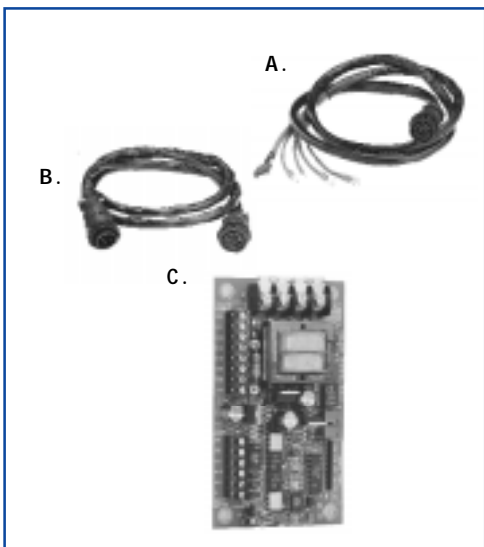
MODEL 0993 ALUMINUM ADAPTOR PLATE



ENCODER KITS

Model Number	Renco Number	Resolution (Pulses per Revolution)	Fits Brushless Bodine Types
0940	RM15D-360-1/4-G6-5CA24-LD-1-C4	360	22B, 34B

- Kits are designed for quick and easy installation to accessory ready models.
- Incremental encoder output may be used for speed verification or motion control.
- 5 VDC, 135 mA Input, TTL/CMOS compatible, 20 mA sink output
- Quadrature, 2 channel output, with 1 index pulse per revolution
- Encoder cable is 24 inches long.
- Terminated with AMP 103650-7 connector.
- 1.50 inch diameter, 0.82 inch long



115V BRUSHLESS CONTROL ACCESSORIES

- A. MODEL 3983 CONNECTION CABLE ASSEMBLY**
for connecting model 3910, 3921 and 3911 controls to stock 130 V motors. One end of the cable is equipped with a circular connector, the other end is equipped with quick disconnects for phase leads, and a molded connector for the commutation leads. Length: 6 feet.
- B. MODEL 3982 EXTENSION CABLE**
for model 3910, 3911, 3921 and 3912 controls. Extends the cable between the motor and control by six feet. Both ends are equipped with circular connections for easy connection between model 3983 cable assembly or encased control and the motor. Length: six feet.
- C. MODEL 3984 ANALOG INTERFACE AND ISOLATION MODULE**
for model 3910, 3911, 3921 and 3912 controls. Provides Analog interface and isolates controls from system controller input signals which may be at different potentials.
- FUSE AND SPEED POTENTIOMETER KIT (NOT SHOWN)**
(Part No. 433 00270)
for use with model 3910 control. Contains potentiometer for manually regulating motor speed and an assortment of fuses to cover the range of motors and gearmotors which can be used with the control.
- MODEL 0895 ENCLOSURE SEALING KIT (NOT SHOWN)**
seals the model 3912 or model N3913 enclosure to provide IP 44 splash-proof protection.

