

### A high performance device for drive applications from 1-15HP and servo applications up to 800in./lbs of stall torque

The HR2000 controller is a high response A-C controller that can be applied to traditional drive or servo applications. The controller's flexibility allows it to be applied as a variable speed drive, servo amplifier or as a stepper. The HR2000 can control a complete line of HR2000 high performance NEMA motors or HR2000 servo motors.

Two types of motors are available for operation on HR2000 controllers. High performance NEMA motors are designed in NEMA frames with NEMA C-faces. These motors also have standard conduit boxes and are foot mounted. Servo motors have higher torque to inertia ratios to provide optimum response. All electrical connections are made through MS connectors.

### Standard Features

- Operation on three-phase 208/230 VAC.
  - 50/60 Hz input.
  - Meets UL508 and IEC 145 standards.
  - Speed, current (torque), or position regulator selectable by dip switch.
  - Precise speed control from base speed down to zero speed.
  - Line-to-line and line-to-ground output short circuit protection.
  - Line transient protection helps prevent power line transients from harming the control.
  - Single board hybrid based regulator for increased reliability.
  - Remote fault contact for customer use.
  - Serial pulse input reference when operating as a position regulator.
- Diagnostic LED's for indication of:
    - Run
    - Base Driver Disable
    - Communication
    - Error
    - CPU Malfunction
    - Overspeed
    - Inverse Time Overload
    - Undervoltage
    - Power On
    - Phase Loss or Ground Fault
    - Ready
    - Regulator not in Steady State Condition
    - Counter Overflow (Position Reg)
    - Overtemperature
    - Overvoltage
  - Regulator / Parameter Setup Via Dip Switch:
    - Speed / Torque
    - Position Regulator
    - Feedback Scaling
    - Maximum Overload
    - Speed Loop
    - Base Drive
    - Normal / Inspection
    - Test Signal
    - Speed Loop Integral
    - Accel / Decel Rate
    - Rotation with Positive Reference
    - Feedback Divider
  - Sequencing connector for Input / Output Signals. Parameters and Signals include:
    - Differential or single Ended Input Reference
    - Current Limit
    - Forward or Reverse Rotation
    - Analog Output Proportional to Speed and Torque
    - Start/Stop Command
    - Reset
    - FWD or REV Direction Inhibit
    - Speed Reference Inhibit



## Standard Features

- Buffered Encoder Output
- Ready Mode
- Position Error
- Serial Pulse Conditioning Command
- Position Move Complete
- Motor Shaft Lock (Position Mode)

## NEMA Motor Features

- Thermally isolated 2500 PPR optical encoder
- NEMA C-face with foot mounting
- TENV construction 1-4 HP
- TEAO-BC enclosure 7.5-15HP
- Winding thermostats
- Mating MS encoder connector

## Available NEMA Motor Options

- Washdown duty enclosures (1-4 HP)
- Class I Group D explosion-proof enclosures (1-4HP)
- Brakemotors with 115V or 230V coils

## Servo Motor Features

- Brushless sinusoidal commutation
- Integrally mounted 2500 PPR incremental optical encoder, 2 channels in quadrature with compliments and channel marker pulse
- IP65 enclosure
- Flange design compatible with typical servo motor offerings
- Mating MS connectors for both power and encoder connectors
- Winding thermostats

## Available Servo Motor Options

- Integrally mounted brakes, 90 VDC or 24 VDC coil voltages available
- Encoder cables stocked in standard lengths up to 100 feet
- Shaft seals

## Available Controller Options

- Input Disconnect
- Dynamic Braking Kit with Output Contactor
- Exercise Module to aid in Startup and Troubleshooting
- Encoder Tester to Troubleshoot and Align Encoders
- Speed meter with 150-0-150% RPM Scale
- Load Meter with 250-0-250% Load Scale
- Complete set of cables for control and encoder functions
- Controller to terminal board cables
- Encoder buffer
- Interface kit allows use of selected FlexPak kits
- External snubber resistors when greater braking power is required

## Controller Ratings

Drive Rating	Input Requirements			Output Rating	
	A-C Supply		12 or 24 VDC Power Supply	Output Amps	
	3-Phase 50/60 HZ			Cont.	Peak (10 sec.)
	Volts	Amps (RMS)			
1 HP	230	3.6	60 mA	3.3	6.6
2 HP	230	6.8	60 mA	6.5	13.0
3 HP	230	9.5	60 mA	9.2	18.4
4 HP	230	13.8	60 mA	13.0	26.0
7.5 HP	230	24.0	60 mA	24.0	48.0
10-15 HP	230	48.0	60 mA	48.0	96.0

## Replacement Modules

HP	Fuse Kit	Power Module Kit	Regulator Card Kit
	contains: Control Fuse	contains: (1) Input Diode Power Code (1) Transistor	contains: (1) Regulator Board
	Kit Number	Kit Number	Kit Number
1	K-676-K	K-677-Q	K-678-P
2	K-676-K	K-677-R	K-677-Q
3	K-676-K	K-677-S	K-677-R
4	K-676-K	K-677-T	K-677-S
7.5	K-679-AK	K-685-AL	K-690-AD
10-15	K-679-AH	K-685-AM	K-690-AD

Call Reliance Electric for pricing on fuse, power module, and regulator card kits.

# HR2000 - High Performance Drives

AC Drives

## Motor

HP	MOTOR PARAMETERS						Chassis Controller Model
	Cont. Torque	Base Speed	Model	Flange Mounting	Inertia (lb. in s <sup>2</sup> )	Enclosure	
	Rating (in. lbs.)	(RPM)					
1	31.5	2000	B14H1050	140TC with feet	0.012	TENV	3RA2001
			B90H1015	FF200 IEC Flange			
2	63	2000	B14H1060	140TC with feet	0.021	TENV	3RA2002
			B90H1025	FF200 IEC Flange			
3	94.5	2000	B18H1070	180TC with feet	0.031	TENV	3RA2003
			B90H1035	FF200 IEC Flange			
4	126	2000	B18H1080	180TC with feet	0.041	TENV	3RA2004
			B90H1045	FF200 IEC Flange			
7.5	270	1750	P21M301	Rigid Foot Mount	0.090	TEAO-BC	3RA2008
			P21M303	C-Face with feet			
10	360	1750	P21M306	C-Face with feet	0.127	TEAO-BC	3RA2015
			P21M302	Rigid Foot Mount			
15	540	1750	P21M304	C-Face with feet	0.164	TEAO-BC	3RA2015

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## Servo Motor

Frame	Motor Parameters						Chassis Controller Model
	Stall Torque Rating	Top Speed Torque Rating	Top Speed (RPM)	Inertia (lb in S <sup>2</sup> ) x 10 <sup>-3</sup>	Enclosure	Model	
H-2005	4.0 in lbs	3.0 in lbs	4000	0.13	TENV	H-2005-O-J00AB	3RA2001
	0.45 Nm	0.34 Nm					
H-4030	29 in lbs	22 in lbs	3000	2.2	TENV	H-4030-P-J00AB	3RA2002
	3.28 Nm	2.49 Nm					
H-4050	54 in lbs	29 in lbs	3000	4.1	TENV	H-4050-P-J00AB	3RA2003
	6.1 Nm	3.28 Nm					
H-4075	76 in lbs	46 in lbs	2500	6.0	TENV	H-4075-R-J00AB	3RA2004
	8.59 Nm	5.20 Nm					
H-6200	175 in lbs	90 in lbs	2000	21.0	TENV	H-6200-R-J00AB	3RA2008
	19.8 Nm	10.1 Nm					
H-6300	250 in lbs	60 in lbs	2000	30.0	TENV	H-6300-S-J00AB	3RA2015
	28.2 Nm	6.7 Nm					
H-8350	317 in lbs	100 in lbs	2000	56.0	TENV	H-8350-S-J00AB	3RA2015
	35.8 Nm	11.3 Nm					
H-8500	421 in lbs	220 in lbs	2000	83.0	TENV	H-8500-S-J00AB	3RA2015
	47.6 Nm	24.8 Nm					

## Shaft Seals

Are not included in the packaged motors listed above. Order the model numbers listed below for the corresponding frame size.

Frame	Shaft Seal Model Number
H-2000	0041-5056
H-4000	0041-5058
H-6000	0041-5059
H-8000	0041-5053-005

## Servo Motor Brakemotors

Are designed with integrally mounted brakes. The brakes are spring set and electrically released. The standard coil voltages are either 24 or 90 VDC. The brake is designed as a holding brake. Revise the motor model number per the chart below to indicate a brakemotor is being ordered.

Frame	Coil Voltage	Brake Static Torque (in lbs)	Change Last 5 Characters of Motor Model Number	List Price Add to Motor Price
H-4030	24 VDC	90	J04AB	\$700
	90 VDC		J01AB	
H-4050	24 VDC	90	J04AB	750
	90 VDC		J01AB	
H-4075	24 VDC	90	J04AB	750
	90 VDC		J01AB	
H-6200	24 VDC	200	J04AB	800
	90 VDC		J01AB	
H-6300	24 VDC	200	J04AB	800
	90 VDC		J01AB	
H-8350	24 VDC	450	J04AB	950
	90 VDC		J01AB	
H-8500	24 VDC	450	J04AB	950
	90 VDC		J01AB	

## Washdown Duty Motors

Are designed to withstand hose pressure, steam, and sanitization procedures as utilized in the food industry. The motor has FDA approved paint, full class "F" insulation, and a stainless steel shaft extension. Available from 1 to 4 HP.

### Washdown Duty<sup>(2)</sup>

(2) Special cables are required for use with Washdown Duty Motors. Consult Reliance Electric for pricing and ordering information.

## Brakemotors

Are designed with integrally mounted brakes. The brakes are AC spring set and electronically released. The standard coil voltage is 208/230 V single-phase. The brake is designed as a holding brake. Specify the motor model number below and add the list price to the package price above.

HP	Brake Static Torque (in. lb.)	C-Face Motor Model
1	72	B14H1056
2	72	B14H1066
3	180	B18H1076
4	180	B18H1086

## Explosion Proof Motors

Rated from 1 through 4 HP. They are labeled for class I Group D environments.

HP	C-Face Motor Model <sup>(3)</sup>	Chassis Controller Model
1	B14J1050	3RA2001
2	B14J1060	3RA2002
3	B18J1070	3RA2003
4	B18J1080	3RA2004

(3) Enclosure is XPNV for 1-2 HP ratings, and XPFC for 3-4 ratings.

## MS Conduit Box Connectors

Have a standard design that includes a conduit box that accepts conduit terminations for power and thermostat leads. When all terminations must be via MS connection specify the following kit. This modification cannot be used with XP motors.

HP	Kit	Mounting
1-4	K14H3545	Loose/ Mounted

## Motor Tach/Commutator Cable

Provides the interconnecting cable between the HR2000 Controller and motor. The Cable includes an MS connector for connection to the motor. The opposite end is terminated with either lugs or a female connector. The connector will connect directly to the controller while the lugs are intended for connection to a terminal board not supplied with this kit.

HP	Length	Controller Connector Wired	Model
1-15	15 Feet	No	4RC151
		Yes	4RC152
	25 Feet	No	4RC251
		Yes	4RC252
	50 Feet	No	4RC501
		Yes	4RC502
	100 Feet	No	4RC001
		Yes	4RC002

## Controller Connector to Terminal Board Cable

Is used to terminate controller feedback and sequencing signal to a terminal board. These kits include the controller connector, cable and terminal board as a single unit.

HP	Length	Controller Connection	Model
1-15	3 Feet	Sequencing (2CN)	4RC034
		Encoder (3CN)	4RC033
	5 Feet	Sequencing (2CN)	4RC054
		Encoder (3CN)	4RC053
	10 Feet	Sequencing (2CN)	4RC104
		Encoder (3CN)	4RC103

## Input Disconnect Kit

Mounts directly to top of controller and provides the ability to disconnect incoming power. A thru the door handle is not available with this option.

HP	Amp Rating	Model
1	7	3CB2007
2	15	3CB2015
3	20	3CB2020
4	30	3CB2030
7.5	50	3CB2050
15	100	3CB2100

## Dynamic Braking Kit

Is used when the stopping time of the motor must be reduced below that obtained by coasting. This kit mounted directly to the bottom of the controller and includes an output contactor and DB resistors. A thermostat mounted to the resistors protects from overheating due to cyclical operation. Contactor coil voltage is either 120 VAC or 230 VAC. Control logic to operate this kit is not included.

HP	Coil Voltage	Model
1-4	120 VAC	3DB1004
	230 VAC	3DB3004

## Encoder Isolation/Buffer Kit

Provides amplification and noise rejection for encoder signal wires longer than 100 feet.

### Model 3EB1

## Encoder Tester

Aids in aligning and troubleshooting the motor mounted encoder when the controller is in the encoder test mode.

### Model 3RE5

## Exercise Module

Aids in the set up and troubleshooting of the controller. This option plugs into the faceplate of the controller and is compatible for all ratings.

### Model 3RE4

## Interface Kit

Allows the HR2000 to utilize the Dancer Position Regulator Kit (14C233), the Instrument Interface/Preset Kit (14C222), the Dancer Follower kit (14C230), and the Voltage/Tach Generator Follower Kit (14C223). This option is designed to be panel mounted external to the HR2000 and has a cable which plugs into the 2CN connector. This kit eliminates the need for a sequencing terminal board cable accessing all 2CN connections through pull apart screw terminal boards. This kit also includes a 24V control power Supply with 100mA capacity to power all kits listed above. 230 VAC power is required to operate this kit.

### Model 3HI2000

## Meters

Are provided in NEMA 1 enclosures for separate mounting. The meters listed below provide indication of the controller output speed (150-0-150%) and output load (250-0-250%).

HP	Meter	Model
1-15	Speed	3SM2000
	Load	3LM2000

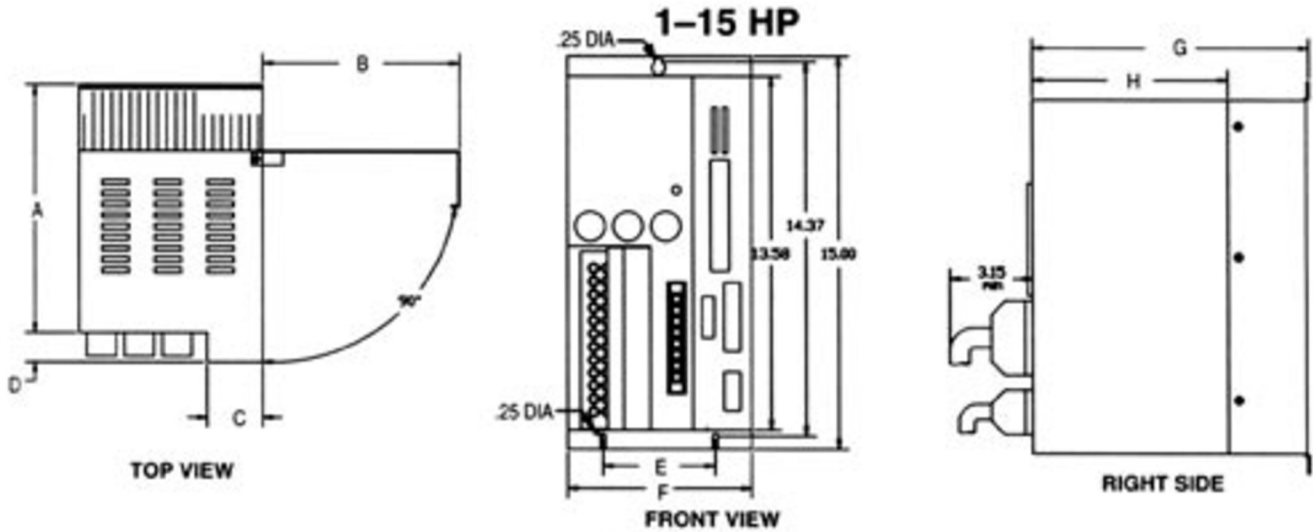
## DC Snubber Resistors

Increase the controller's duty cycle while in the regeneration mode. The added heat produced by this option must be accounted for when sizing enclosures. To select the proper number of resistors determine either the continuous braking power or the duty cycle on intermittent braking applications. Duty cycle is defined as the percentage of total time that the controller is decelerating.

## Snubber Resistors

Controller HP	Continuous Duty	Intermittent Duty		Model Number Resistor	Qty. of Resistors Required
	Power Dissipation (Watts)	Instantaneous Power Dissipation (Watts)	Max. Duty Cycle (% Time)		
1-2	105	3183	7	3RR2001	4
	440	3042	29	3RR2002	6
	145	3111	10	3RR2003	2
	585	3111	38	3RR2003	8
3	290	4560	13	3RR2002	4
	660	4560	29	3RR2002	9
	1170	4560	52	3RR2002	16
	440	4140	22	3RR2003	6
	880	4665	38	3RR2003	12
4	145	9126	4	3RR2002	2
	220	6840	7	3RR2002	6
	880	6234	29	3RR2002	12
	290	6222	10	3RR2003	4
	660	6222	22	3RR2003	9
	1170	6222	38	3RR2003	16
7.5	2250	12000	18	3RR2008	Sep. Mtd. Encl.
15	2250	24000	9	3RR2015	Sep. Mtd. Encl.

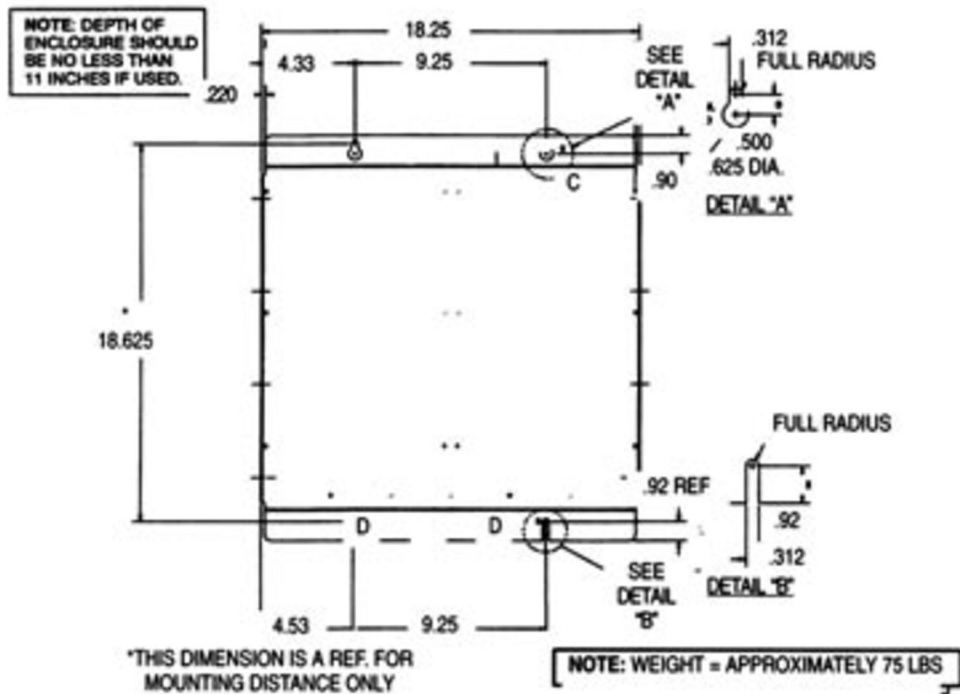
## HR2000 Controller Dimensions



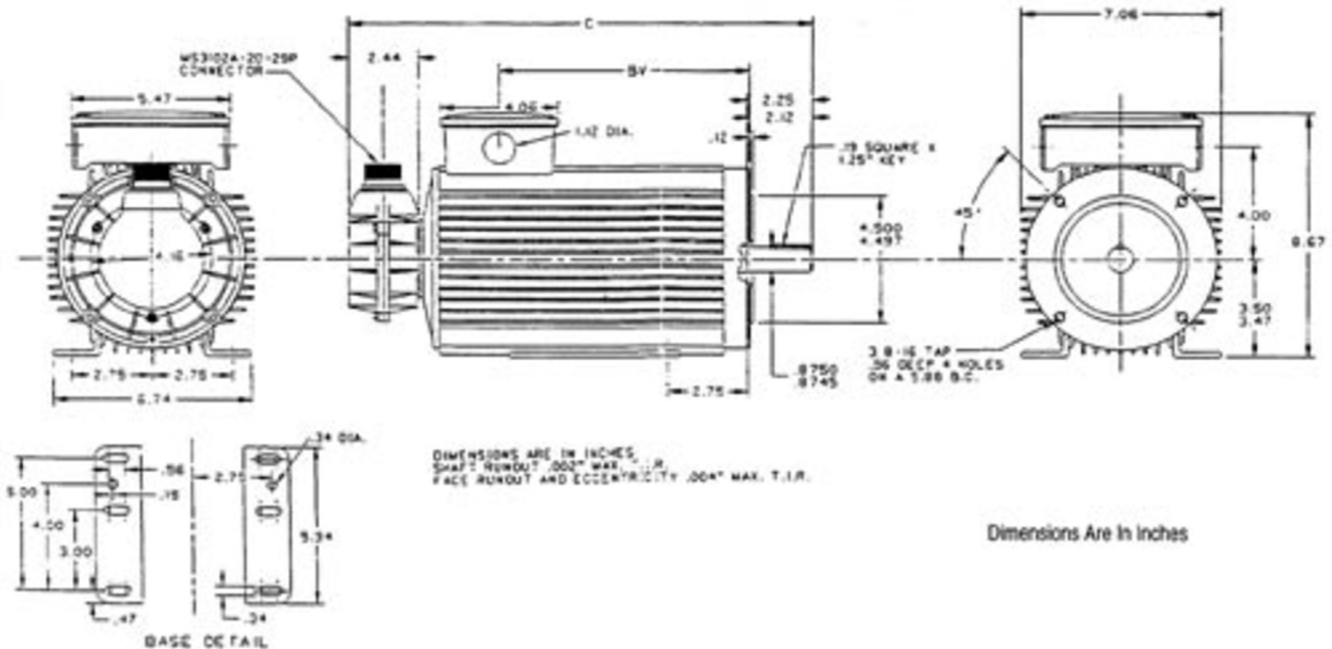
All Dimensions Are in Inches

HP	A	B	C	D	E	F	G	H	Wt. Lbs
1-2	8.39	7.87	2.05	2.16	2.0	3.74	10.55	7.64	14
3-4	8.39	7.87	2.05	2.16	3.0	4.53	10.55	7.64	21
7.5	9.5	7.5	2.12	1.12	4.0	7.0	10.62	7.43	36
10-15	9.5	7.5	2.12	1.12	7.0	10.0	10.62	7.43	42

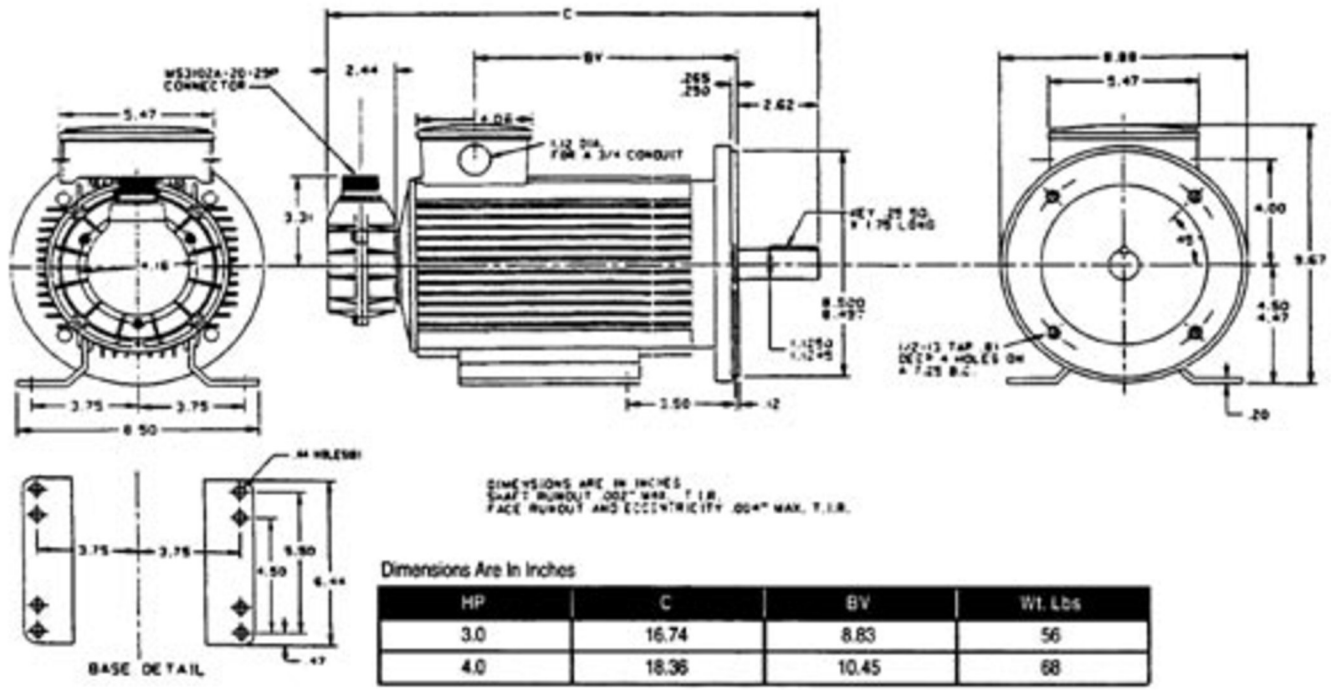
## 7.5-15 HP HR2000 Snubber Resistor Kit



1, 2 HP With 140 C-Face NEMA Motor



3, 4 HP With 180 C-Face NEMA Motors



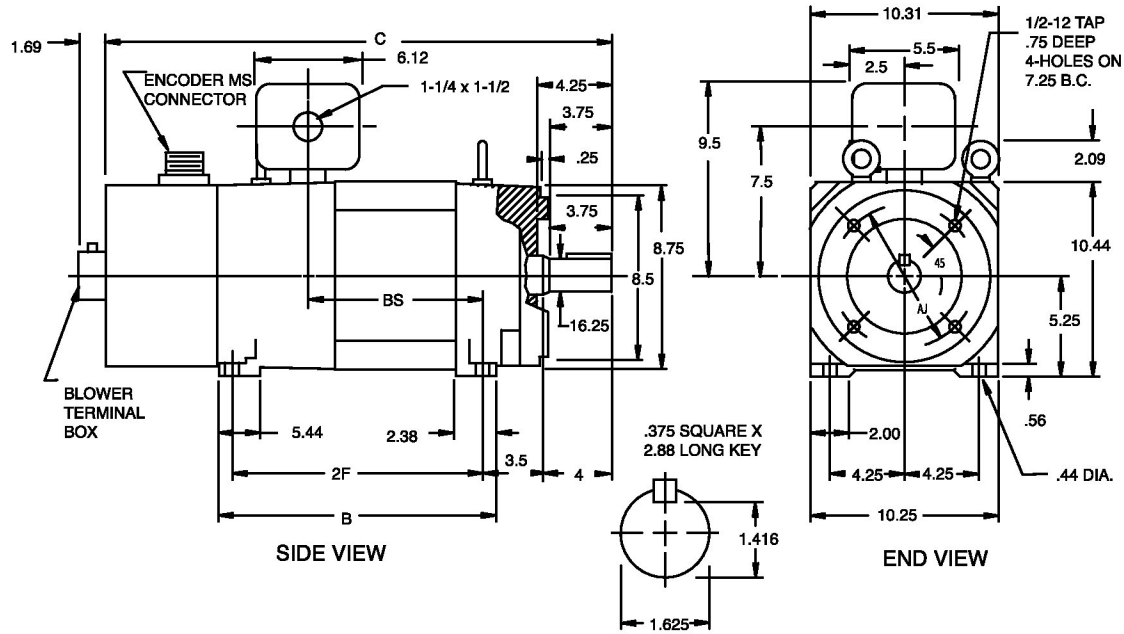


# HR2000 - High Performance Drives

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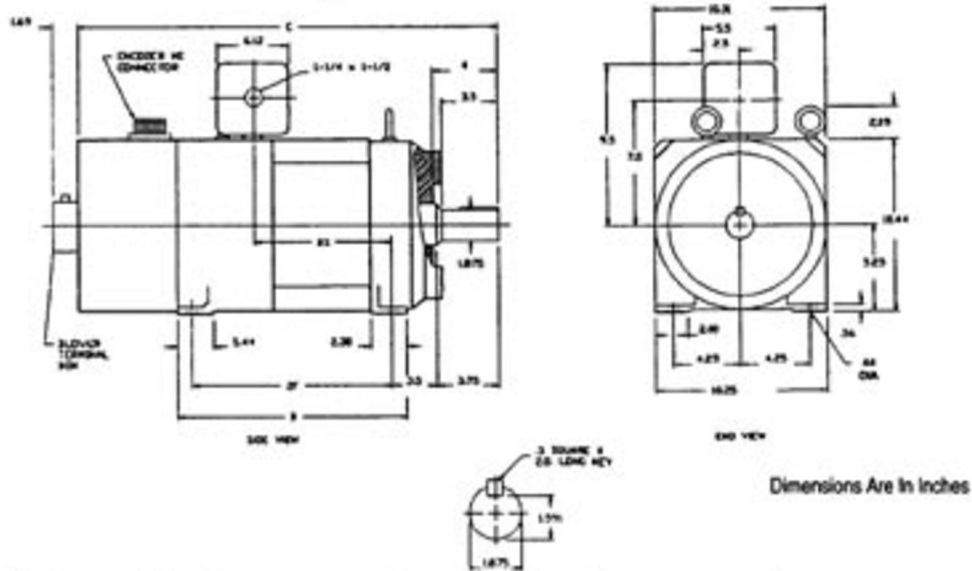
## 7-1/2 - 15 HP Foot With 250 C-Face NEMA Motors



DIMENSIONS ARE IN INCHES

HP	C	B	BS	2F	Wt. Lbs
7.5	25.56	12.69	7.69	11.25	235
10	26.56	13.69	8.69	12.25	250
15	27.56	14.69	9.69	13.25	265

## 7-1/2 - 15 HP Foot Mounted



Dimensions Are In Inches

HP	C	B	BS	2F	Wt. Lbs
7.5	25.31	12.69	7.69	11.25	235
10	26.31	13.69	8.69	12.25	250
15	27.31	14.69	9.69	13.25	265

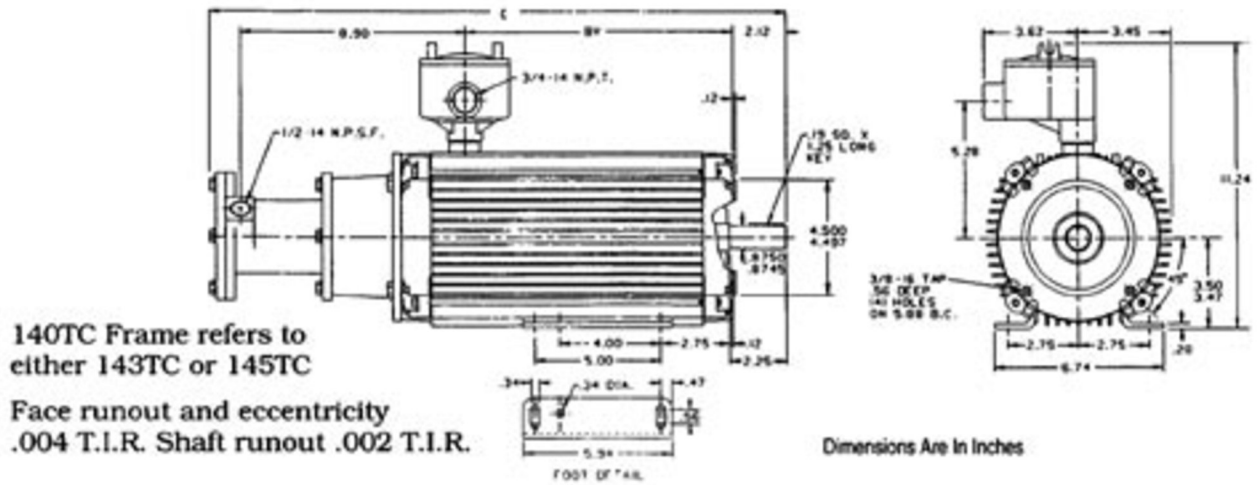


# HR2000 - High Performance Drives

AC Drives

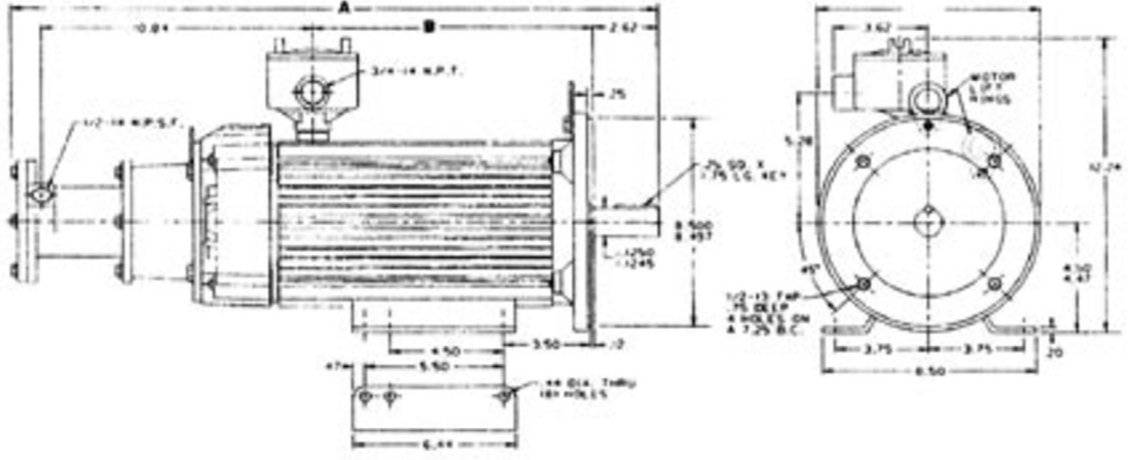
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## 1-2 HP Explosion Proof Motors



HP	C	BV
1 HP	20.93	8.69
2 HP	21.93	9.69

## 3-4 HP Explosion Proof Motors

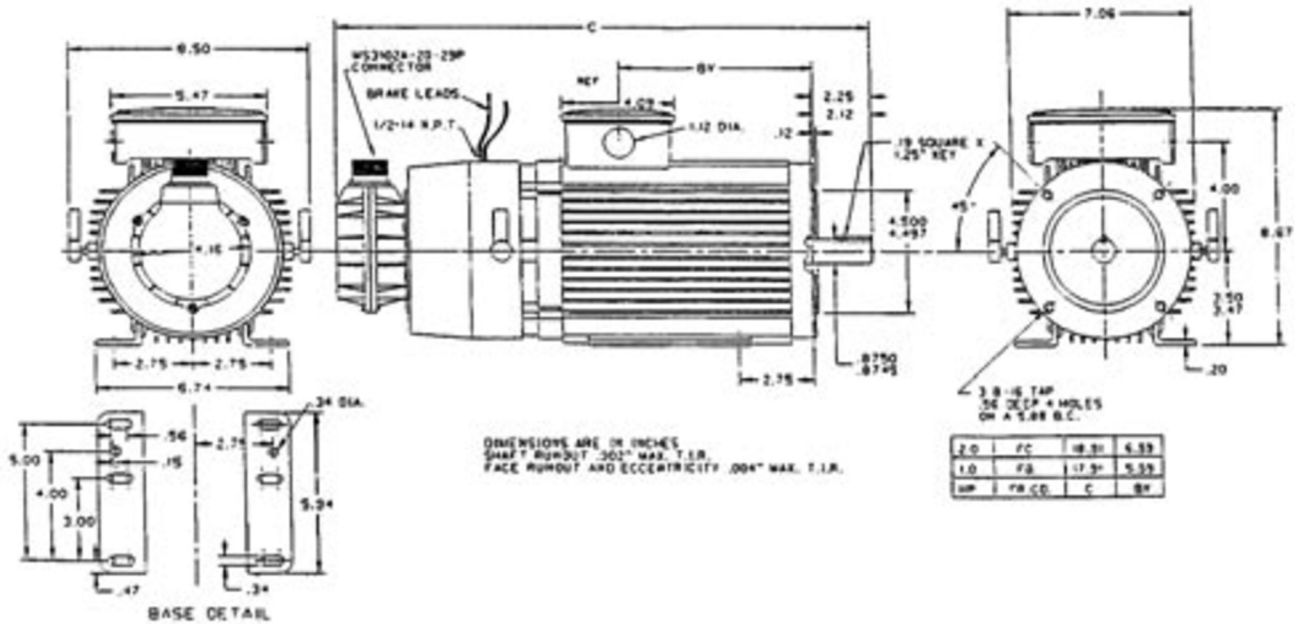


Face runout and eccentricity  
.004 T.I.R. Shaft runout .002 T.I.R.

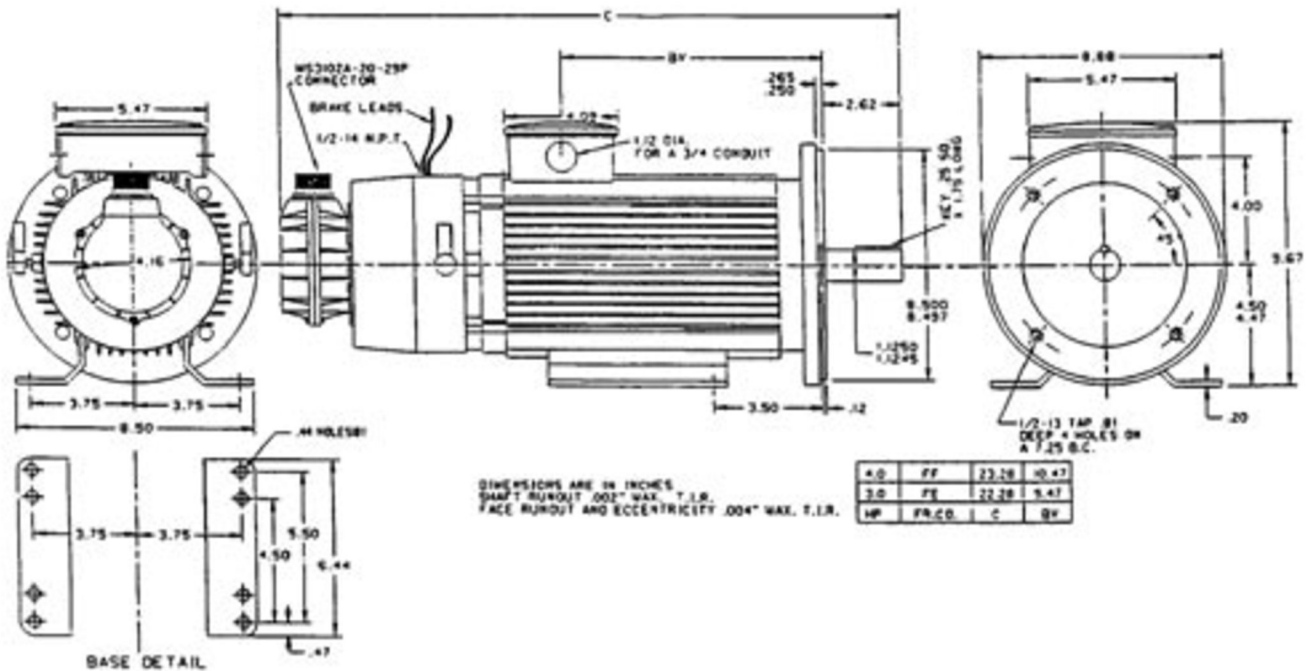
Dimensions Are In Inches

HP	A	B
3 HP	25.85	11.18
4 HP	24.85	10.18

1-2 HP Brake Motors With 140 C-Face



3-4 HP Brakemotors With 180 C-Face



AC Drives

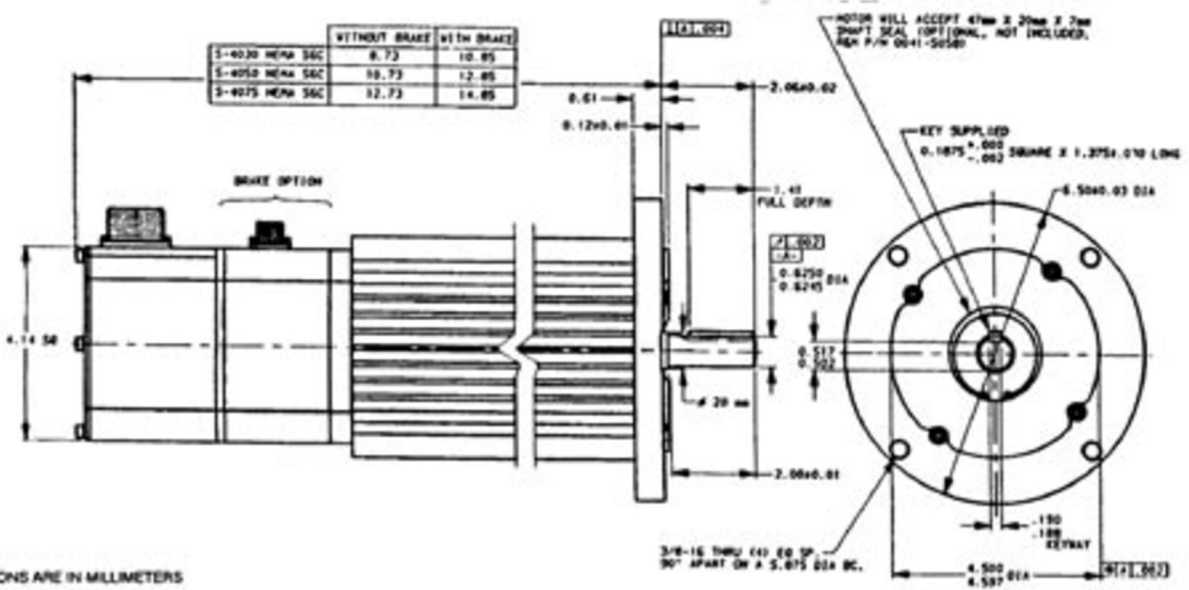
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# HR2000 - High Performance Drives

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## S-4000 Series With C-Face



PRICING

Model Number	Description	List
3CB2007	Circuit Breaker 1HP	(1)
3CB2015	Circuit Breaker 2HP	(1)
3CB2020	Circuit Breaker 3HP	(1)
3CB2030	Circuit Breaker 4HP	(1)
3CB2050	50 AMP Circuit Breaker for 7.5	(1)
3CB2100	100 AMP C/B For 15HP HR2000	(1)
3DB1004	120V Dynamic Braking Kit	(1)
3DB3004	230V Dynamic Braking Kit	(1)
3EB1	Encoder Buffer Isolation Kit	(1)
3HI2000	Interface Kit 1-15HP	(1)
3LM2000	Load Meter	(1)
3RA2001	1HP HR2000 Controller	(1)
3RA2002	2HP HR2000 Controller	(1)
3RA2003	3HP HR2000 Controller	(1)
3RA2004	4HP HR2000 Controller	(1)
3RA2008	7.5 HP HR2000 Controller	(1)
3RA2015	15 HP HR2000 Controller	(1)
3RE4	Exercise Module	(1)
3RE5	Encoder Tester	(1)
3RR2001	DC Snubber Resistor 1H	(1)
3RR2002	DC Snubber Resistor 2H	(1)
3RR2003	DC Snubber Resistor 3H	(1)
3RR2008	DC Snubber Resistor 7.5H HR2000	(1)
3RR2015	DC Snubber Resistor 15H HR2000	(1)
3RS232	RS232 Connector	(1)
3SM2000	Speed Meter	(1)
405504-35C	Encoder Strain Relief	(1)
405504-77A	Encoder Plug	(1)
405504-78A	Encoder Clamp	(1)
4RC001	Encoder Cable w/lug 100	(1)
4RC002	Motor Encoder Cable w/honda	(1)
4RC033	Control Encoder/TB Cable	(1)
4RC034	Control Sequencing/TB C	(1)
4RC053	Control Encoder/TB Cable	(1)
4RC054	Control Sequencing/TB C	(1)
4RC103	Control Encoder/TB Cable	(1)
4RC104	Control Sequencing/TB C	(1)
4RC151	Motor Encoder Cable w/Lug 15 Feet	(1)
4RC152	Motor Encoder Cable w/Lug 15 Feet	(1)
4RC251	Motor Encoder Cable w/Lug 25 Feet	(1)
4RC252	Motor Encoder Cable W/Honda 25 Feet	(1)
4RC501	Motor Encoder Cable W/Lug 50 Feet	(1)
4RC502	Motor Encoder Cable w/Honda 50 Feet	(1)
5RA0100	100W HR500 Amplifier	(1)
5RA0200	200W HR500 Amplifier	(1)
5RA0400	400W HR500 Amplifier	(1)
5RA0750	750W HR500 Amplifier	(1)
5RC001	100 Foot Encoder Cable w/o	(1)
5RC002	100 Ft. Encoder Cable w/c	(1)
5RC033	HR500 Encoder/TB KIT, 3	(1)
5RC034	HR500 Sequence/TB Kit, 3	(1)
5RC053	HR500 Encoder/TB Kit, 5F	(1)

(1) Refer to Numeric Section 1 for Pricing



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## Pricing (continued)

Model Number	Description	List
5RC054	HR500 Sequence/TB Kit, 5	(1)
5RC103	HR500 Encoder/TB Kit, 5F	(1)
5RC104	HR500 Sequence/TB Kit, 1	(1)
5RC151	15 Ft. Encoder Cable w/o	(1)
5RC152	15 Ft. Encoder Cable w/co	-1
5RC251	25 Ft. Encoder Cable w/o	-1
5RC252	25 Ft. Encoder Cable w/co	-1
5RC501	50 Ft. Encoder Cable w/o	-1
5RC502	50 Ft. Encoder Cable w/co	-1
5RD0400	400W HR500 Converter	-1
5RD0401	400W HR500 Converter W/	-1
5RD1600	1600W HR500 Converter	-1
5RD1601	1600W HR500 Converter W/	-1
5RE6	HR500 Exercise Module	-1
5RK1	HR500 Multi-Function Kit	-1
5RK2	HR500 Pulse/Position Kit	-1
5RM2100	100W 2000 RPM HR500 Motor	-1
5RM2200	200W 2000 RPM HR500 Motor	-1
5RM2400	400W 2000 RPM HR500 Motor	-1
5RM2750	750W 2000 RPM HR500 Motor	-1
*B14H1050	1HP 2000 TENV 140TC Brushless	-1
*B14H1056	1HP Brakemotor C-Face	-1
*B14H1060	2HP 2000 TENV 140TC Brushless	-1
*B14H1062	4HP 2000 SPCL MTG Flange	-1
*B14H1066	6FT LB Brakemotor	-1
*B14J1050	1HP C-Face Explosion Proof Motor	-1
*B14J1060	2HP C-Face Explosion Proof Motor	-1
*B18H1070	3HP 2000 TENV 180TC Brushless	-1
*B18H1076	3HP Brake Motor	-1
*B18H1080	4HP 2000 TENV 180TC Brushless	-1
*B18H1086	15 FT LB Brakemotor	-1
*B18J1070	3HP C-Face Explosion Proof Motor	-1
*B18J1080	4HP C-Face Explosion Proof Motor	-1
*B90H1015	1HP 2000 TENV FF200	-1
*B90H1025	2HP 2000 TENV FF200	-1
*B90H1035	3HP 2000 TENV FF200	-1
*B90H1045	4HP 2000 TENV FF200	-1
H20050J00AB	Servo Motor for use with 3RA2001	-1
H4030PJ00AB	Servo Motor for use with 3RA2002	-1
H4050PJ00AB	Servo Motor for use with 3RA2003	-1
H4075RJ00AB	Servo Motor for use with 3RA2004	-1
H6200RJ00AB	Servo Motor for use with 3RA2008	-1
H6300SJ00AB	Servo Motor for use with 3RA2015	-1
H8350SJ00AB	Servo Motor for use with 3RA2015	-1
H8500SJ00AB	Servo Motor for use with 3RA2015	-1
K14H3545	MS Conduit Box Connectors	-1
P21M301	7.5 HP HR2000 Motor	-1
P21M302	15 HP HR2000 Motor	-1
P21M303	7.5 HP HR2000 C-Face Motor	-1
P21M304	15 HP HR2000 C-Face Motor	-1
P21M306	10 HP HR2000 C-Face Motor	-1

(1) Refer to Numeric Section 1 for Pricing