High-Performance Drives

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: - Phase Loss or
- Run
- Base Driver Disable
- Communication
- Error - CPU Malfunction

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- Overspeed - Inverse Time
- Overload
- Undervoltage
- Power On
- Regulator / Parameter Setup Via Dip Switch: - Test Signal
 - Speed / Torque
 - Position Regulator
 - Feedback Scaling
 - Maximum Overload
 - Speed Loop - Base Drive
 - Normal / Inspection
- **Positive Reference** - Feedback Divider

- Rotation with

- Accel / Decel Rate

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

- Regulator not in Steady State Condition

Ground Fault

- Ready

- Counter Overflow
- (Position Reg)
- Overtemperature
- Overvoltage

- Speed Loop

Integral

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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

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- 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

		Input Requir	Output Rating		
	A- C Supply 3-Phase 50/60 HZ			Outp	out Amps
Drive Rating	Volts	Amps (RMS)	12 or 24 VDC Power Supply	Cont.	Peak (10 sec.)
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

	Fuse Kit contains: Control Fuse	Power Module Kit contains: (1) Input Diode Power Code (1) Transistor	Regulator Card Kit contains: (1) Regulator Board
HP	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.

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Motor

	MOTOR PARAMETERS						
HP	Cont.Torque Rating (in. Ibs.)	BaseSpeed (RPM)	Model	Flange Mounting	Inertia (Ib. in s²)	Enclosure	Chassis Controller Model
1	21 5	2000	B14H1050	140TC with feet	0.012		2042001
	31.5	2000	B90H1015	FF200 IEC Flange	0.012	IENV	3NA2001
2	60	2000	B14H1060	140TC with feet	0.021		2042002
2	03	2000	B90H1025	FF200 IEC Flange	0.021	ILINV	31142002
	04 5	2000	B18H1070	180TC with feet	0.021		3042002
3	94.5	2000	B90H1035	FF200 IEC Flange	0.031	IENV	31742003
4	106	2000	B18H1080	180TC with feet	0.041	TENN	3042004
4	120	2000	B90H1045	FF200 IEC Flange	0.041	IEINV	3NA2004
7 5	070	1750	P21M301	Rigid Foot Mount	0.000	TEAO-BC	0.00000
1.5	270	1750	P21M303	C-Face with feet	1 0.090		3042000
10	360	1750	P21M306	C-Face with feet	0.127	TEAO-BC	3RA2015
16	540	E 40 4750	P21M302	Rigid Foot Mount	0.104		2DA001E
15	540	1750	P21M304	C-Face with feet	0.164	TEAU-DU	3NA2015

Servo Motor

Motor Parameters							
Frame	Stall Torque Rating	Top Speed Torque Rating	Top Speed (RPM)	Inertia (Ib in S²) x 10-³	Enclosure	Model	Chassis Controller Model
H-2005	4.0 in lbs	3.0 in lbs	4000	0.13	TENV	H-2005-O-J00AB	3BA2001
	0.45 Nm	0.34 Nm	1000	0.110			5112001
H 4020	29 in lbs	22 in lbs	2000	2.2		H 4020 P 100AB	3842002
114000	3.28 Nm	2.49 Nm	3000	2.2		11-4030-1-300AD	01112002
H 4050	54 in lbs	29 in lbs	2000	4.1		H 1050 D 100AR	20002
114030	6.1 Nm	3.28 Nm	3000	4.1	I LINV	11-4030-1-300AD	31142003
LI 4075	76 in lbs	46 in lbs	2500	6.0		H 1075 D 100AR	200004
114075	8.59 Nm	5.20 Nm	2300	0.0			01012004
H 6200	175 in lbs	90 in Ibs	2000	21.0		H 6200 R 100AR	3042008
110200	19.8 Nm	10.1 Nm	2000	21.0	TLINV	TF0200-TF300AB	31142000
H 6200	250 in lbs	60 in Ibs	2000	20.0		H 6200 S 100AB	2042015
110300	28.2 Nm	6.7 Nm	2000	30.0	TLINV	11-0300-3-300AB	31142013
L 9250	317 in lbs	100 in lbs	2000	56.0		H 9250 C 100AR	2042015
1-0350	35.8 Nm	11.3 Nm	2000	50.0	TEINV	H-0350-3-300AB	3142013
H 8500	421 in lbs	220 in lbs	2000	83.0		H 8500 S 100AR	2042015
1=3500	47.6 Nm	24.8 Nm	2000	63.0	TENV	11-0300-3-300AD	51142015

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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 Ibs)	Change Last 5 Characters of Motor Model Number	List Price Add to Motor Price	
H-4030	24 VDC	90	J04AB	\$700	
11-4030	90 VDC	30	J01AB	\$100	
H-4050	24 VDC	90	J04AB	750	
11-4030	90 VDC	30	J01AB	730	
H-4075	24 VDC	90	J04AB	750	
H-4075	90 VDC	30	J01AB	750	
H-6200	24 VDC	200	J04AB	800	
11-0200	90 VDC	200	J01AB	000	
L 6200	24 VDC	200	J04AB	800	
11-0300	90 VDC	200	J01AB	000	
LI 0250	24 VDC	450	J04AB	050	
H-0350	90 VDC	450	J01AB	930	
H-8500	24 VDC	450	J04AB	950	
11-0500	90 VDC	430	J01AB	950	

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⁽²⁾

(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 ⁽³⁾	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

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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
	1E East	No	4RC151
	TO FEEL	Yes	4RC152
	25 Feet	No	4RC251
1.15		Yes	4RC252
1-15	F0 Foot	No	4RC501
	50 Feet	Yes	4RC502
	100 Foot	No	4RC001
	TOO FEEL	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
	2 East	Sequencing (2CN)	4RC034
	3 Feel	Encoder (3CN)	4RC033
1 15	1-15 5 Feet	Sequencing (2CN)	4RC054
1-15		Encoder (3CN)	4RC053
10 Eest		Sequencing (2CN)	4RC104
	IV FEEL	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
1-4	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

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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
Ĩ	1-15	Speed	3SM2000
	1-15	Load	3LM2000

Snubber Resistors

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.

Controller HP	Continuous Duty Power Dissipation (Watts)	Intermittent Duty			
		Instantaneous Power Dissipation (Watts)	Max. Duty Cycle (% Time)	Model Number Resistor	Qty. of Resistors Required
1-2	105	3183	7	3RR2001	4
	440	3042	29	3RR2002	6
	145	3111	10	3RR2003	2
	585	3111	38	3RR2003	8
	290	4560	13	3RR2002	4
3	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	3BB2015	Sep. Mtd. Encl.

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HR2000 Controller Dimensions



7.5-15 HP HR2000 Snubber Resistor Kit







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