H2 A New Generation in Drive Technology

Reliable. Easy to Use.
High Performance.

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Baldor Drives: Unmatched Quality. Superior Reliability.

Baldor motors are recognized around the world as the standard for quality, reliability, and performance. Since we built our first electric motor in 1920, Baldor has earned a reputation for outstanding quality, unmatched reliability, and unsurpassed customer service.

That same level of commitment became the benchmark for our drives products beginning with the introduction of the "H" Series of inverter and vector drives. These products became known throughout the industry as the simplest drives to program and easiest to operate. The user-friendly approach was a result of developing the first harmonized family of drive products. Harmonized drives act and feel the same regardless of the voltage, power rating, or performance level your application requires. Today, we introduce the newest legacy of Baldor drives…the H2®.

The H2® Series is another example of our commitment to provide every customer with the best industrial drives available, backed by an extensive worldwide network of Baldor professionals. That same commitment drives us to excel with every product we make.

Engineered and Manufactured for Superior Reliability

H2 drives are designed and manufactured in our Drives Center in Fort Smith, Arkansas, USA. Our Drives Center employees are dedicated to making the most reliable, industrial drives you can buy, and they work in one of the most productive manufacturing plants in the industry. Their level of experience, combined with a strict level of product testing, make every drive that leaves the Center one of the best in the world.

Every H2 drive is **stress tested** under rapid temperature excursions to verify the integrity of all components and connections. Circuit boards are **in-circuit tested** at the point of manufacture for 96.3% of all components and 100% of all circuit functions. **Functional testing** of all input and output circuits on all circuit boards is performed at the point of manufacture to verify the integrity and accuracy of all available combinations. Each design has its **operating software tested** for all combinations of parameter values, all combinations of terminal inputs and outputs, and all combinations of keystrokes to verify the code structure and operating efficiency. And, all drives are **dyno tested** at the point of final assembly to certify output power under various load conditions. This final test determines the correct calibration of current and voltage sensing circuitry.

Secure Manufacturing

Consistent product availability is a critical factor when choosing any drives product. Baldor has taken steps to make certain the drives you need are there when you need them:

Secured Second Source of all electrical components and circuit board manufacturing is in place for uninterrupted product availability.

Duplicate Test Fixtures at all manufacturing locations ensure component and subassembly availability in case of natural or man-made disasters.

Single Source Fixture Calibration guarantees tight control of product specifications, mechanical fit and operating functionality.

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Unparalleled Ease of Use

What makes Baldor H2 drives the easiest to program and operate? The answer is simple… our drives are unlike any other because of the harmonized approach used when we began designing the H2 Series. The H2 Series is a family of drives products that share identical operator control, field installed options, programming style, operating characteristics and environmental compatibility. Even with the different technologies involved, the H2 utilizes a **common language**, so when you learn one…you learn them all! The removable keypads are interchangeable, interfacing with all H2 power bases, control boards, and expansion boards. The keypad screen displays the operating conditions and the programming steps in easy to follow text, eliminating the need to look up parameter numbers or program the wrong settings.

Simple to Program and Operate

The Baldor H2 keypad makes operating, programming, and monitoring a snap. The keys on the keypad depress so you "feel" the key has been pushed. We also feature a 128 x 64 graphical display. Best of all, this easy to use keypad is harmonized to operate any H2 product in all power ranges.

Adjusting the control is as simple as it gets because of **block programming.** With the H2, you'll never have to scroll through every parameter to get to the one you need. With block programming, the adjustments are grouped in blocks of like adjustments.

The **H2 keypad** enclosure is rated NEMA 4X when mounted on a panel and is designed for remote mounting up to 100 feet away.

ENGLISH DISPLAY: The keypad displays operating conditions, programming steps, and help text in easy to follow English. **No difficult codes** to understand. Display can also be set to large fonts for the sight impaired.

LED'S ON ACTION KEYS: There is one LED on each of these keys: REV, JOG, FWD, and STOP. These LED's are "ON" whenever the COMMAND is active. The active LED assures the operator that the command has been received and accepted.

NAVIGATION KEYS: Navigation keys are extremely easy to use, allowing complete, full function navigation. Familiar up and down keys along with left and right arrows **navigate effortlessly** through the display and programming functions.

PARAMETER SAVE and COPY: If several drives need to be programmed identically, the keypad can save all the control parameters from one drive and copy those parameters into another drive.

HELP KEYS: Every screen displayed on the keypad has **help text** available to aid the user. Simply press the help key to view the help text.

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High Performance

When we say our H2® Series offers high performance, we can prove it. Every product we make is extensively tested and performance verified. Only Baldor provides **Matched Performance**™ performance data that goes far beyond the "typical" performance curves and instead provides actual laboratory dynamometer tested results. This extra effort, typically requiring 2–4 days of continuous testing, provides the solution to the concern, "What kind of constant torque and constant horsepower speed range will I get with this combination of motor and motor control?" Baldor Matched Performance testing makes it easier for you to match the right motor and control so you get precisely the drive you need.

Proven Performance

The motor and control methods used in the H2 drives have been fine tuned over many years in numerous applications and environmental conditions. Our design strategies of reducing motor stresses while increasing performance are realities in the new H2 drives, especially when matched with Baldor InverterDuty® and VectorDuty® motors. Our AC motor designs include ISR® magnet wire and balance specs that beat industry standards. As a manufacturer of industrial motors and controls, we want to ensure a perfect match when you need a dependable drive for your industrial equipment.

H2® Drives Pass the Environmental Performance Test

When it comes to **environmental compatibility**, Baldor H2 drives pass the test with flying colors. Environmentally sound operation is verified with extensive testing throughout the manufacturing process. All development testing is to extreme operating conditions. Baldor H2 drives surpass all industrial requirements for electromagnetic susceptibility, radiated noise, and conducted emissions. Plus, our drives are built environmentally friendly for future generations through the use of lead-free components and soldering techniques. All H2 drives meet regulations for post-use disposal.

Performance Comparison H2 Control Algorithms	Volts per Hertz Control	Encoderless Vector	Vector Drive	Servo Drive
Velocity Loop bandwidth in Hz without the Dynamic Brake Module (DB)	>1Hz w/o DB	10 Hz w/o DB	50 Hz w/o DB	100 Hz w/o DB
Minimum speed with full load (RPM)	90	20	0	0
Maximum speed with 25% load (RPM)	1.5 X Base Speed	2 X Base Speed	2.5 X Base Speed	2.0 X Base Speed
Minimum acceleration time (seconds)	3	1	0.1	0.01
Minimum deceleration time (seconds)	3	1	0.1 w/DB	0.01
Maximum starting torque (%)	150%	175%	200%	200%
Speed regulation at full load (%)	± 3% (base)	± 1% (base)	± 0.01% (set)	± 0.01% (set)

The numbers above are for comparison only. Specific system dynamics will affect exact data.

Control for Every Application

The Baldor H2 family of drives operate three phase induction motors in several control modes as either an **open or closed loop control.** Open loop speed control is available as Inverter Volts per Hertz and Encoderless Vector. Closed loop Vector control is accomplished using a sophisticated fourth generation **space vector control algorithm** and motor feedback. Additional H2 drive models are available to control closed loop permanent magnet AC servomotors using motor feedback.

Inverter Volts per Hertz is the traditional method to control AC motors in adjustable speed applications. Easy setup and operation right out of the box make this control mode the most popular motor control method today. Used for a variety of applications that require adjustable speed operation and good speed regulation over a limited operating speed range including pumps, fans, and general machinery applications. Volts per Hertz is the control method of choice for applications where multiple motors are operated simultaneously from one motor control.

Encoderless Vector operation is available when tight speed and current control is desired in an open loop control environment. If you need near closed loop performance without the complexity of additional wiring and setup, consider Encoderless Vector control. Using similar control algorithm as closed loop vector drives, low speed operation near zero speed is possible with good motor current control. If you're operating a process such as mixing that needs to detect when the desired viscosity is reached or metering pumps where tight speed control is required, then consider applying the Encoderless Vector control mode available in the H2 drives.

Closed Loop Vector operation is the ultimate control of AC induction motors. Using a motor mounted encoder, or similar feedback sensor, the control is able to precisely control motor torque and associated operating speed. Using fast microprocessors and current sensors, the H2 Vector Drive can segregate motor current into components that produce torque from the currents that produce motor heating. By minimizing the heating component of current and accurately controlling the torque component of applied current, the motor will behave very much like a DC Motor but without the maintenance. Full torque at zero speed, ability to directly command motor torque, tight speed regulation, and high-speed motor operation are all available. Easy setup is accomplished with selectable rotational or stationary auto-tuning. Adaptive tuning will also automatically tweak the control loop adjustments while the motor is operating.

Servo Control of three phase permanent magnet motors is available in the H2 family of drive products. Modified Flux Vector control algorithm and motor mounted feedback sensor provide full AC Servo control with all the advantages of an industrial package and design. Full torque at zero speed, quick acceleration, fast positioning, auto-tuning, and adaptive tuning are available in an industrial rated enclosure.

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H2® Inverter/Encoderless Vector Drive

H2 INVERTER DRIVE

3/4 thru 50 HP	180-264 VAC	3 Phase - 50/60 Hz
3/4 thru 60 HP	340-528 VAC	3 Phase - 50/60 Hz
3/4 thru 60 HP	515-660 VAC	3 Phase - 60 Hz

Features

- NEMA 1 enclosure as standard
- Output frequency 0 to 500 Hz
- Peak overload capacity of 175%
- Separate accel/decel rates
- Controlled reversing
- Two and three input PID process control loop
- Selectable preset speeds
- Jog speed
- Plug-in I/O connectors

Design Specifications

- Process follower 0-5 VDC, 0-10 VDC, 4-20 mA
- Coast or ramp to stop
- Dynamic braking
- DC injection braking
- 2 analog meter outputs
- 2 opto-isolated outputs
- 2 relay outputs
- Energy Optimization
- Adaptive Tuning

Protective Features

- DC bus charge indicator
- Fault indicator
- Adjustable time based overload
- Cause of last 10 trips retained in memory
- Fault trace function
- Digital display for fault conditions with real time clock
- Linear heat sink thermal sensor
- Isolated control circuitry

Output Ratings	Overload Capacity	150% for 60 seconds; 175% for 3 seconds for constant torque
		115% for 60 seconds for variable torque
	Frequency	0-500 Hz standard
	Voltage	0-Maximum input voltage (RMS)
Input Ratings	Frequency	50 or 60 Hz ± 5%
	Voltage	200-240 VAC ± 10%; 380-480 VAC ± 10%; 575-600 ± 10%
	Phase	Three phase (or single phase with derate)
	Impedance	1% minimum from mains connection
Control Spec	Control Method	Sinewave carrier input, Microprocessor controlled PWM output; selectable encoderless vector or V/Hz inverter
	PWM Frequency	Adjustable 1-5 kHz standard, 1-16 kHz quiet
	V/Hz Ratio	Linear to squared reduced, base frequency, output voltage, minimum frequency limit, maximum frequency limit
	Torque Boost	0-30% of input voltage; automatic with manual override
	Brake Torque	20% standard on Sizes AA and B, 1% standard on Size C
	Skip Frequency	Three zones 0-Max frequency
	Frequency Setting	±5 VDC, 0-5 VDC ± 10 VDC, 0-10 VDC, 4-20 mA, 0-20 mA, digital (keypad), Serial Comms/USB 2.0 and ModBus RTU std.
	Accel/Decel	Separate accel/decel rates, 0-3600 sec to maximum frequency, linear, S-curve, C-curve
	PC Setup Software	Workbench Software available via connection to USB 2.0 port for commissioning wizard, firmware download, parameter viewer, scope capture, and cloning
Protective Functions	Inverter Trip	Over voltage, over current, under voltage, external trip, motor overload, over temperature (motor or control), output shorted or grounded
	Stall Prevention	Over voltage suppression, overcurrent suppression
	External Output	LED indicator for trip conditions, 4 assignable logic outputs, 2 assignable analog outputs
	Short Circuit	Phase to phase, phase to ground
Keypad Display	Running	Output frequency, set frequency, output current (%), voltage, motor RPM, custom units, power, energy consumed
	Setting	Parameter values for setup and review
	Trip	Separate message for each trip, last 10 trips retained in memory
	Keys	12 key membrane with tactile response
	Remote Mount	100 feet (30.3m) maximum from control
Ambient Conditions	Temperature	-10 to + 45°C for UL Listing
	Relative Humidity	90% maximum RH non-condensing
	Altitude	3300 feet (1000m) maximum without derating
	Shock	1G
	Vibration	0.5G at 10 to 60 Hz
	Cooling	Forced air included when required

Options: See page 11 for additional Expansion Boards including Ethernet, Isolated Input, etc. See page 12 for optional Dynamic Braking Assemblies.

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H2® Inverter Drive Output Ratings

With Quad Rating, each control can be setup to operate in one of four distinct operating zones. The zones are defined by the PWM frequency, continuous output current, and peak output current.

By selecting the desired Operating Zone, the control will automatically set the PWM frequency, continuous current, and peak current to the proper values for the desired Operating Zone.

			H2 "Standard Drive" 2.5 kHz PWM Frequency								H2 "Quiet Drive" 8.0 kHz PWM Frequency							
Catalog Number	Input Volt	Size	Constant Torque (Heavy Duty)				Variable Torque (Standard)				Constant Torque (Heavy Duty)				Variable Torque (Standard)			
			HP	kW	IC	IP	HP	kW	IC	IP	HP	kW	IC	IP	HP	kW	IC	IP
IHH201-E	230	AA	1	0.75	4.2	7.4	2	1.5	6.8	7.8	0.75	0.56	3.2	5.6	1	0.75	4.2	4.8
IHH202-E	230	AA	2	1.5	6.8	11.9	3	2.2	9.6	11	1	0.75	4.2	7.4	2	1.5	6.8	7.8
IHH203-E	230	AA	3	2.2	9.6	16.8	5	3.7	15.2	17.5	2	1.5	6.8	11.9	3	2.2	9.6	11
IHH205-E	230	AA	5	3.7	15.2	26.6	7.5	5.5	22	25.3	3	2.2	9.6	16.8	5	3.7	15.2	17.5
IHH207-E	230	AA	7.5	5.5	22	38.5	10	7.4	28	32.2	5	3.7	15.2	26.6	7.5	5.5	22	25.3
IHH210-E	230	B	10	7.4	28	49	15	11.1	42	48.3	7.5	5.5	22	38.5	10	7.4	28	32.2
IHH215-E	230	B	15	11.1	42	73.5	20	14.9	54	62.1	10	7.4	28	49	15	11.1	42	48.3
IHH220-E	230	B	20	14.9	54	94.5	20	14.9	54	62.1	15	11.1	42	73.5	20	14.9	54	62.1
IHH225-E	230	C	25	18.6	68	119	30	22.3	80	92	20	14.9	54	94.5	25	18.6	68	78.2
IHH230-E	230	C	30	22.3	80	140	40	29.8	104	120	25	18.6	68	119	30	22.3	80	92
IHH240-M	230	C	40	29.8	104	182	50	37.2	130	150	30	22.3	80	140	40	29.8	104	120
IHH250-M	230	C	50	37.2	130	228	50	37.2	130	150	40	29.8	104	182	50	37.2	130	150
IHH401-E	460	AA	1	0.75	2.1	3.7	2	1.5	3.4	3.9	0.75	0.56	1.6	2.8	1	0.75	2.1	2.4
IHH402-E	460	AA	2	1.5	3.4	6	3	2.2	4.8	5.5	1	0.75	2.1	3.7	2	1.5	3.4	3.9
IHH403-E	460	AA	3	2.2	4.8	8.4	5	3.7	7.6	8.8	2	1.5	3.4	6	3	2.2	4.8	5.5
IHH405-E	460	AA	5	3.7	7.6	13.3	7.5	5.5	11	12.7	3	2.2	4.8	8.4	5	3.7	7.6	8.8
IHH407-E	460	AA	7.5	5.5	11	19.3	10	7.4	14	16.1	5	3.7	7.6	13.3	7.5	5.5	11	12.7
IHH410-E	460	AA	10	7.4	14	24.5	15	11.1	21	24.2	7.5	5.5	11	19.3	10	7.4	14	16.1
IHH415-E	460	B	15	11.1	21	36.8	20	14.9	27	31.1	10	7.4	14	24.5	15	11.1	21	24.2
IHH420-E	460	B	20	14.9	27	47.2	25	18.6	34	39.1	15	11.1	21	36.8	20	14.9	27	31.1
IHH425-E	460	B	25	18.6	34	59.5	30	22.3	40	46	20	14.9	27	47.2	25	18.6	34	39.1
IHH430-E	460	C	30	22.3	40	70	40	29.8	52	60	25	18.6	34	59.5	30	22.3	40	46
IHH440-E	460	C	40	29.8	52	91	50	37.2	65	75	30	22.3	40	70	40	29.8	52	60
IHH450-E	460	C	50	37.2	65	114	60	44.8	77	89	40	29.8	52	91	50	37.2	65	75
IHH501-E	575	AA	1	0.75	1.7	3	2	1.5	2.7	3.1	0.75	0.56	1.3	2.2	1	0.75	1.7	1.9
IHH502-E	575	AA	2	1.5	2.7	4.7	3	2.2	3.9	4.5	1	0.75	1.7	3	2	1.5	2.7	3.1
IHH503-E	575	AA	3	2.2	3.9	6.8	5	3.7	6.1	7	2	1.5	2.7	4.7	3	2.2	3.9	4.5
IHH505-E	575	AA	5	3.7	6.1	10.7	7.5	5.5	9	10.4	3	2.2	3.9	6.8	5	3.7	6.1	7
IHH507-E	575	AA	7.5	5.5	9	15.8	10	7.4	11	12.7	5	3.7	6.1	10.7	7.5	5.5	9	10.4
IHH510-E	575	AA	10	7.4	11	19.3	15	11.1	17	19.6	7.5	5.5	9	15.8	10	7.4	11	12.7
IHH515-E	575	B	15	11.1	17	29.8	20	14.9	22	25.3	10	7.4	11	19.3	15	11.1	17	19.6
IHH520-E	575	B	20	14.9	22	38.5	25	18.6	27	31	15	11.1	17	29.8	20	14.9	22	25.3
IHH525-E	575	B	25	18.6	27	47.2	30	22.3	32	36.8	20	14.9	22	38.5	25	18.6	27	31
IHH530-E	575	C	30	22.3	32	56	40	29.8	41	47	25	18.6	27	47.2	30	22.3	32	36.8
IHH540-E	575	C	40	29.8	41	72	50	37.2	52	60	30	22.3	32	56	40	29.8	41	47
IHH550-E	575	C	50	37.2	52	91	60	44.7	62	71	40	29.8	41	72	50	37.2	52	60

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H2® Vector Drive

H2 VECTOR DRIVE

3/4 thru 50 HP	180-264 VAC	3 Phase - 50/60 Hz
3/4 thru 60 HP	340-528 VAC	3 Phase - 50/60 Hz
3/4 thru 60 HP	515-660 VAC	3 Phase - 60 Hz

Features
- NEMA 1 enclosure as standard
- Output frequency 0 to 500 Hz
- Peak overload capacity of 175%
- Automatic tuning to motor
- Full rated torque down to zero speed
- Digital speed or torque control
- Two and three input PID process control loop
- Linear or S-curve deceleration
- 15 preset speeds
- Plug-in I/O connectors

Design Specifications
- Motor shaft orient to marker
- Process follow ± 5 VDC 0-5 VDC, ± 10 VDC 0-10 VDC, 4-20 mA, digital via keypad or serial
- Coast or ramp to stop
- 2 assignable analog outputs
- 2 assignable opto outputs
- 2 assignable relay outputs
- 2 assignable analog inputs
- Adaptive tuning to load
- USB 2.0 full speed port
- ModBus RTU port

Protective Features
- Adjustable current limit
- Isolated control circuitry
- Digital display for fault conditions with real time clock
- Fault track function
- Selectable automatic restart at momentary power loss
- DC bus charge indicator
- Cause of last 10 trips retained in memory
- 24 VDC isolated user supply
- Isolated encoder power supply

Output Ratings	Overload Capacity	150% for 60 seconds, 175% for 3 seconds for constant torque
		115% for 60 seconds for variable torque
	Frequency	0-500 Hz
	Voltage	0-maximum input voltage (RMS)
Input Ratings	Frequency	50 or 60 Hz ± 5%
	Voltage	200-240 VAC ± 10%, 380-480 VAC ± 10%; 575-600 VAC ± 10%
	Phase	Three phase (or single phase with derate)
	Impedance	1% minimum from mains connection
Control Spec	Control Method	Microprocessor controlled PWM output, selectable closed loop vector; encoderless vector; or V/Hz inverter
	PWM Frequency	Adjustable 1-5 kHz STD, 1-16 kHz quiet
	Speed Setting	± 5 VDC, 0-5 VDC ± 10 VDC, 0-10 VDC, 4-20 mA, 0-20 mA, digital (keypad), Serial Comms/USB 2.0, and ModBus RTU standard
	Accel/Decel	0-3600 sec.
	Motor Matching	Automatic tuning to motor with manual override
	PC Setup Software	Workbench Software available via connection to USB 2.0 port for commissioning wizard, firmware download, parameter viewer, scope capture, and cloning
Motor Feedback	Feedback Type	Incremental encoder coupled to motor shaft; optional resolver feedback
	Pulses/Rev	60-20,000 selectable, 1024 standard
	Voltage Output	2 channel in quadrature, 5 VDC, differential
	Marker Pulse	Required for position orientation
	Power Input	5 VDC, 300 mA maximum
	Max. Frequency	4 MHz
	Positioning	Optional buffered encoder pulse train output for position loop controller
Protective Functions	Vector Trip	Over voltage, over current, under voltage, external trip, motor overload, over temperature (motor or control), Output shorted or grounded, encoder loss
	External Output	LED indicator for trip conditions, 4 assignable logic outputs, 2 assignable analog outputs
	Short Circuit	Phase to phase, phase to ground
LED Display	Running	Output frequency, motor RPM; output current (%), voltage, custom units, power, energy consumed
	Setting	Parameter values for setup and review
	Trip	Separate message for each trip, last 10 trips retained in memory
	Keys	12 key membrane with tactile response
	Remote Mount	100 feet (30.3m) maximum from control
Motor Feedback	Feedback Type	Incremental encoder coupled to motor shaft; optional resolver feedback
	Pulses/Rev	60-20,000 selectable, 1024 standard
	Voltage Output	2 channel in quadrature, 5 VDC, differential
	Marker Pulse	Required for position orientation
	Power Input	5 VDC, 300 mA maximum
	Maximum Frequency	4 MHz
	Positioning	Optional buffered encoder pulse train output for position loop controller
Ambient Conditions	Temperature	-10 to 45°C for UL listing
	Relative Humidity	90% max RH non-condensing
	Altitude	3300 feet max without derate
	Shock	1G
	Vibration	0.5G at 10 to 60 Hz
	Cooling	Forced air included when required

Options: See page 11 for additional Expansion Boards including Ethernet, Isolated Input, etc. See page 12 for optional Dynamic Braking Assemblies.

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H2® Vector Drive Output Ratings

With Quad Rating, each control can be setup to operate in one of four distinct operating zones. The zones are defined by the PWM frequency, continuous output current, and peak output current.

By selecting the desired Operating Zone, the control will automatically set the PWM frequency, continuous current, and peak current to the proper values for the desired Operating Zone.

			H2 "Standard Drive" 2.5 kHz PWM Frequency								H2 "Quiet Drive" 8.0 kHz PWM Frequency							
Catalog Number	Input Volt	Size	Constant Torque (Heavy Duty)				Variable Torque (Standard)				Constant Torque (Heavy Duty)				Variable Torque (Standard)			
			HP	kW	IC	IP	HP	kW	IC	IP	HP	kW	IC	IP	HP	kW	IC	IP
ZHH201-E	230	AA	1	0.75	4.2	7.4	2	1.5	6.8	7.8	0.75	0.56	3.2	5.6	1	0.75	4.2	4.8
ZHH202-E	230	AA	2	1.5	6.8	11.9	3	2.2	9.6	11	1	0.75	4.2	7.4	2	1.5	6.8	7.8
ZHH203-E	230	AA	3	2.2	9.6	16.8	5	3.7	15.2	17.5	2	1.5	6.8	11.9	3	2.2	9.6	11
ZHH205-E	230	AA	5	3.7	15.2	26.6	7.5	5.5	22	25.3	3	2.2	9.6	16.8	5	3.7	15.2	17.5
ZHH207-E	230	AA	7.5	5.5	22	38.5	10	7.4	28	32.2	5	3.7	15.2	26.6	7.5	5.5	22	25.3
ZHH210-E	230	B	10	7.4	28	49	15	11.1	42	48.3	7.5	5.5	22	38.5	10	7.4	28	32.2
ZHH215-E	230	B	15	11.1	42	73.5	20	14.9	54	62.1	10	7.4	28	49	15	11.1	42	48.3
ZHH220-E	230	B	20	14.9	54	94.5	20	14.9	54	62.1	15	11.1	42	73.5	20	14.9	54	62.1
ZHH225-E	230	C	25	18.6	68	119	30	22.3	80	92	20	14.9	54	94.5	25	18.6	68	78.2
ZHH230-E	230	C	30	22.3	80	140	40	29.8	104	120	25	18.6	68	119	30	22.3	80	92
ZHH240-M	230	C	40	29.8	104	182	50	37.2	130	150	30	22.3	80	140	40	29.8	104	120
ZHH250-M	230	C	50	37.2	130	228	50	37.2	130	150	40	29.8	104	182	50	37.2	130	150
ZHH401-E	460	AA	1	0.75	2.1	3.7	2	1.5	3.4	3.9	0.75	0.56	1.6	2.8	1	0.75	2.1	2.4
ZHH402-E	460	AA	2	1.5	3.4	6	3	2.2	4.8	5.5	1	0.75	2.1	3.7	2	1.5	3.4	3.9
ZHH403-E	460	AA	3	2.2	4.8	8.4	5	3.7	7.6	8.8	2	1.5	3.4	6	3	2.2	4.8	5.5
ZHH405-E	460	AA	5	3.7	7.6	13.3	7.5	5.5	11	12.7	3	2.2	4.8	8.4	5	3.7	7.6	8.8
ZHH407-E	460	AA	7.5	5.5	11	19.3	10	7.4	14	16.1	5	3.7	7.6	13.3	7.5	5.5	11	12.7
ZHH410-E	460	AA	10	7.4	14	24.5	15	11.1	21	24.2	7.5	5.5	11	19.3	10	7.4	14	16.1
ZHH415-E	460	B	15	11.1	21	36.8	20	14.9	27	31.1	10	7.4	14	24.5	15	11.1	21	24.2
ZHH420-E	460	B	20	14.9	27	47.2	25	18.6	34	39.1	15	11.1	21	36.8	20	14.9	27	31.1
ZHH425-E	460	B	25	18.6	34	59.5	30	22.3	40	46	20	14.9	27	47.2	25	18.6	34	39.1
ZHH430-E	460	C	30	22.3	40	70	40	29.8	52	60	25	18.6	34	59.5	30	22.3	40	46
ZHH440-E	460	C	40	29.8	52	91	50	37.2	65	75	30	22.3	40	70	40	29.8	52	60
ZHH450-E	460	C	50	37.2	65	114	60	44.8	77	89	40	29.8	52	91	50	37.2	65	75
ZHH501-E	575	AA	1	0.75	1.7	3	2	1.5	2.7	3.1	0.75	0.56	1.3	2.2	1	0.75	1.7	1.9
ZHH502-E	575	AA	2	1.5	2.7	4.7	3	2.2	3.9	4.5	1	0.75	1.7	3	2	1.5	2.7	3.1
ZHH503-E	575	AA	3	2.2	3.9	6.8	5	3.7	6.1	7	2	1.5	2.7	4.7	3	2.2	3.9	4.5
ZHH505-E	575	AA	5	3.7	6.1	10.7	7.5	5.5	9	10.4	3	2.2	3.9	6.8	5	3.7	6.1	7
ZHH507-E	575	AA	7.5	5.5	9	15.8	10	7.4	11	12.7	5	3.7	6.1	10.7	7.5	5.5	9	10.4
ZHH510-E	575	AA	10	7.4	11	19.3	15	11.1	17	19.6	7.5	5.5	9	15.8	10	7.4	11	12.7
ZHH515-E	575	B	15	11.1	17	29.8	20	14.9	22	25.3	10	7.4	11	19.3	15	11.1	17	19.6
ZHH520-E	575	B	20	14.9	22	38.5	25	18.6	27	31	15	11.1	17	29.8	20	14.9	22	25.3
ZHH525-E	575	B	25	18.6	27	47.2	30	22.3	32	36.8	20	14.9	22	38.5	25	18.6	27	31
ZHH530-E	575	C	30	22.3	32	56	40	29.8	41	47	25	18.6	27	47.2	30	22.3	32	36.8
ZHH540-E	575	C	40	29.8	41	72	50	37.2	52	60	30	22.3	32	56	40	29.8	41	47
ZHH550-E	575	C	50	37.2	52	91	60	44.7	62	71	40	29.8	41	72	50	37.2	52	60

BALDOR®
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H2® AC Servo Control

H2 SERVO DRIVE

3 thru 54 Amps	180-264 VAC	3 Phase - 50/60 Hz
3 thru 27 Amps	340-528 VAC	3 Phase - 50/60 Hz

Features

- NEMA 1 enclosure as standard
- Peak overload capacity of 175%
- Industry standard ± 10 VDC input command
- Optional expansion boards
- Digital speed control or torque control
- Auto tuning to motor with manual-override
- Plug-in I/O connectors
- Programmable linear or S-curve acceleration
- Isolated control circuitry
- 24 VDC isolated user supply

Design Specifications

- IGBT power devices
- Process follower capability
- Simulated quadrature encoder output with index pulse
- 9 opto-isolated inputs
- 2 assignable analog outputs
- 2 assignable logic outputs
- 2 assignable relay outputs
- 2 assignable analog inputs
- USB 2.0 full speed port

Protective Features

- Motor overspeed
- Adjustable current limit
- Digital display for fault conditions with real time clock
- Fault trace functions
- Manual restart
- Over/Under voltage
- Line to line and line to ground faults
- Over-temperature
- Motor overload

Output Ratings	Overload Capacity	175% for 3 seconds (constant torque mode)
		150% for 60 seconds (constant torque mode)
	Output Current	See ratings table
	Voltage	0 to maximum input VAC
Input Ratings	Frequency	50 or 60 Hz ± 5%
	Voltage	200-240 VAC ± 10%, 380-480 VAC ± 10%
	Phase	Three phase (or single phase with derate)
	Impedance	1% minimum from mains connection
Control Spec	Control Method	Microprocessor controlled PWM output; field oriented vector control
	PWM Frequency	Standard 8 kHz - Adjustable 1-16 kHz with derating between 8-16 kHz
	Speed Setting	± 5 VDC, 0-5 VDC ± 10 VDC, 0-10 VDC, 4-20 mA, 0-20 mA, digital (keypad), Serial Comms/USB 2.0, and ModBus RTU standard
	Velocity Loop Bandwidth	Theoretical open loop 100 Hz. maximum
	Current Loop Bandwidth	Adjustable to 1500 Hz
	Max. Output Frequency	500 Hz
	Motor Matching	Auto-tuning to motor with manual override
	PC Setup Software	Workbench Software available via connection to USB2.0 port for commissioning wizard, firmware download, parameter viewer, scope capture, and cloning
Protective Functions	Servo Trip	Over voltage, over current, under voltage, external trip, motor overload, over temperature (motor or control), output shorted or grounded, resolver loss
	External Output	LED indicator for trip conditions, 4 assignable logic outputs, 2 assignable analog outputs
	Short Circuit	Phase to phse, phase to ground
LCD Display	Running	Output frequency, set frequency, output current (%), voltage, motor RPM, custom units, power, energy consumed
	Setting	Parameter values for setup and review
	Trip	Separate message for each trip, last 10 trips retained in memory
	Keys	12 key membrane with tactile response
	Display	Backlit LDC; 128 x 64 graphical display
	Remote Mount	100 feet (30.3m) maximum from control
Motor Feedback	Feedback Type	Resolver coupler to motor shaft
	Sine/Cosine Inputs	2 V_{RMS} ± 10% (maximum coupled)
	Excitation (Reference Voltage)	4 V_{RMS} @ 10 kHz
	Transformation Ratio	0.5 only
	Positioning	Output for position loop controller, simulated encoder 1024 ppr quadrature with index
Ambient Conditions	Temperature	-10 to +45°C for UL Listing
	Relative Humidity	90% maximum RH non-condensing
	Altitude	3300 feet (1000m) maximum without derating
	Shock	1G
	Vibration	0.5G at 10 to 60 Hz
	Cooling	Forced air included when required

Options: See page 11 for additional Expansion Boards including Ethernet, Isolated Input, etc. See page 12 for optional Dynamic Braking Assemblies.

H2® AC Servo Control Output Ratings

			2.5 kHz Amps				8 kHz Amps			
	Input		Constant Torque				Constant Torque			
Catalog Number	Volt	Size	Amps	KW	IC	IP	Amps	KW	IC	IP
SHH2A03-E	230	AA	4	0.75	4.2	7.4	3	0.56	3.2	5.6
SHH2A04-E	230	AA	7	1.5	6.8	11.9	4	0.75	4.2	7.4
SHH2A07-E	230	AA	10	2.2	9.6	16.8	7	1.5	6.8	11.9
SHH2A10-E	230	AA	15	3.7	15.2	26.6	10	2.2	9.6	16.8
SHH2A16-E	230	AA	22	5.5	22	38.5	15	3.7	15.2	26.6
SHH2A22-E	230	B	28	7.4	28	49	22	5.5	22	38.5
SHH2A28-E	230	B	42	11.1	42	73.5	28	7.4	28	49
SHH2A42-E	230	B	34	14.9	54	94.5	42	11.1	42	73.5
SHH2A54-E	230	C	68	18.6	68	119	54	14.9	54	94.5
SHH4A04-E	460	AA	4.8	2.2	4.8	8.4	3	1.5	3.4	6
SHH4A05-E	460	AA	7.5	3.7	7.6	13.3	5	2.2	4.8	8.4
SHH4A18-E	460	AA	11	5.5	11	19.3	7.5	3.7	7.6	13.3
SHH4A11-E	460	AA	14	7.4	14	24.5	11	5.5	11	19.3
SHH4A15-E	460	B	21	11.1	21	36.8	14	7.4	14	24.5
SHH4A21-E	460	B	27	14.9	27	47.2	21	11.1	21	36.8
SHH4A27-E	460	B	34	18.6	34	59	27	14.9	27	47.2

Keypad Extension Cables

For the convenience of our customers, we offer a connected plug/cable assembly. This assembly provides the connectors from the keypad to the control for remote keypad operation.

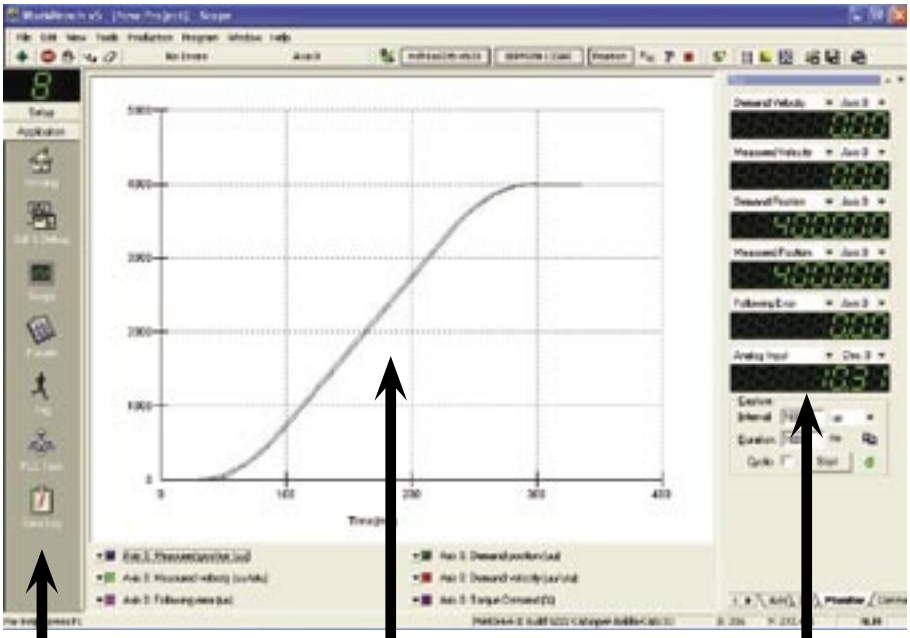
Catalog Number	Cable Extension Length	Ap'x. Shpg. Wgt.
CBLHH015KP	5 feet (1.5 meter)	1
CBLHH030KP	10 feet (3.0 meter)	1
CBLHH046KP	15 feet (4.6 meter)	1
CBLHH061KP	20 feet (6.1 meter)	2
CBLHH091KP	30 feet (9.1 meter)	3
CBLHH152KP	50 feet (15.2 meter)	3
CBLHH229KP	75 feet (22.9 meter)	4
CBLHH305KP	100 feet (30.5 meter)	5

H2® Workbench Application Development Tool

Included as a standard feature with every H2 drive is a copy of H2 Workbench, a PC based application development tool. Workbench is an extremely easy to use programming tool that can be used for a variety of functions:

- Commissioning Wizard
- Software Oscilloscope
- Parameter View/Edit
- Drive Monitoring
- On-Line Help
- Spy Window
- Software Download
- Drive I/O Configuration

An example of the built-in software oscilloscope is shown at right. Real time information can be saved and graphed to give a visual display of the selected control profile. H2 Workbench is also used as the programming interface into the Mint® Expansion Board.



Toolbar:
- Single click navigation
- Quick access to useful tools
- Easy to use graphical prompts

Software Oscilloscope:
- Digitally capture data
- Save and print captured traces
- Commanded and actual values
- User configurable color scheme

Spy Window:
- User selectable
- Velocity
- Bus voltage
- Motor current
- Control temp
- Position
- Position error

Mint®...the Simple Approach to Motion Control

Mint® MOTION PRODUCTS

Originally created over 15 years ago, Baldor's Mint motion language is now available for Baldor H2 drives. The language that made motion control easy to setup and program has been refined and thoroughly tested in thousands of applications. With the addition of a Mint Expansion Board, any H2 Vector or Servo drive is upgraded to include complete position controller capability for a single axis of motor operation.

Positioning capabilities include Master Axis Follower, Electronic Gearbox, Flying Shears, Registration, Virtual Master, and Cam functions. The master encoder input supports differential inputs for A, B, and Z (index pulse). Extension of the control platform using a CANopen channel for connection to an additional I/O breakout box or CAN operator terminals is also possible.

Mint is one of the most widely used motion programming languages in the world. When combined with the reliability and ease of use of a H2 drive, the performance you experience is second to none.

Expansion and Accessory Boards

Baldor H2 drives offer a wide variety of plug-in expansion boards to allow controls to be interfaced with various inputs and outputs. One, two or three expansion boards may be mounted into the control to custom tailor the inputs, outputs, and feedback requirements to the application. Baldor also offers several expansion boards that allow direct interfacing with popular PLC's. Depending on the choice, these may consist of an expansion board, software, or a combination of both.

All H2 drives include a Modbus RTU Communications port as standard.

Ethernet Server Board

Baldor makes remote monitoring and control adjusting easier than ever before with our Ethernet server connection expansion board. This expansion board allows connection with the Ethernet, using a standard web browser, giving the operator point and click setup and monitoring of all Baldor H2 drives. Best of all, no additional program is necessary because the control acts as a server to build HTML pages on your desktop computer screen!

Additional Expansion Boards

Isolated Input Board (90-130 Volts): This board replaces the opto inputs on the main control board with isolated inputs. All inputs must be in the same voltage range and one side of all inputs is common. Screw terminals are provided for easy operation.

Master Pulse Reference/Pulse Follower: This board is jumper selectable to create a master pulse reference based on the controls speed/direction command or can be selected as an isolated pulse follower. The follower can be ratioed up or down to the master pulse through the control keypad. The master or follower pulse train can also be configured as a two channel quadrature pulse with complements or configured as a one channel pulse train for speed and one channel for direction. As a follower, the pulse train will be retransmitted to the next follower as received from the master.

High Resolution Analog: Contains one high resolution input channel to replace Analog Input #2 on the main control board. The resolution will be as follows: ± 10 VDC = 16 bit, 0-10 VDC = 15 bit, ± 5 VDC = 15 bit, 0-5 VDC = 14 bit, 4-20 mA = 15 bit, and 0-20 mA = 15 bit. Also contains two high resolution analog outputs to replace Analog Output #1 and #2 on the main control board. The outputs are selectable for ± 10 VDC, 0-10 VDC and 4-20 mA with inverting capability.

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Bus Communication Expansion Boards

The ability to communicate is important in industrial automation and even more important in the areas of drives and process control. Baldor H2 drives offer a variety of optional plug-in expansion boards that connect directly to several popular PLC and building automation networks including: DeviceNet, Ethernet IP, Profibus DP, and Lonworks.

As a standard feature, the H2 drives include a Modbus RTU communications port. If you need your drives to communicate to cells of larger machines, or large building automation networks, the Baldor H2 drive family can do the talking…and listening too!

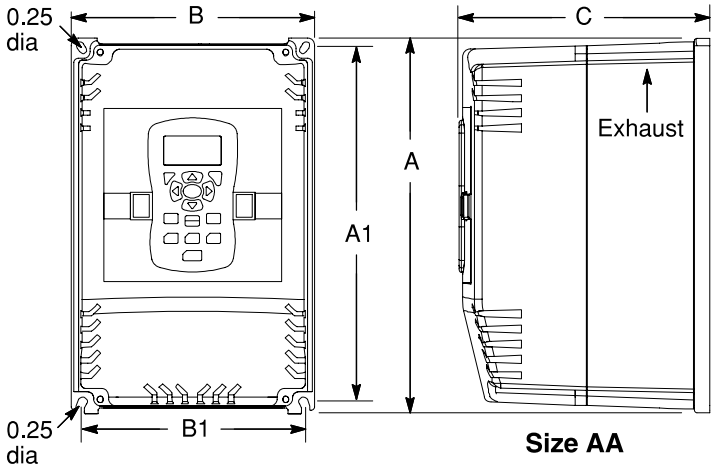
Catalog Number	Description
EXBHH001A01	Ethernet Server Expansion Board
EXBHH002A01	Mint® Expansion Board
EXBHH003A01	Isolated Input Expansion Board
EXBHH005A01	High Resolution Analog Board
EXBHH007A01	Master Pulse Reference / Isolated Pulse Follower
EXBHH012A01	Ethernet IP Communications Expansion Board
EXBHH013A01	DeviceNet Expansion Board
EXBHH014A01	Profibus DP Expansion Board
EXBHH016A01	LonWorks Communications Expansion Board

Dynamic Braking Resistor Assemblies

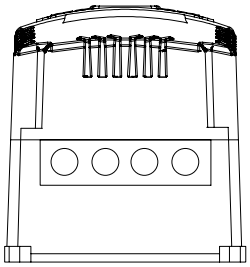
For those applications that require the motor to reverse quickly or stop faster than normal coasting, additional dynamic braking capabilities can be added to any H2 drive. Dynamic Braking Resistor Assemblies include braking resistors completely assembled and mounted into a NEMA 1 enclosure. Selecting the braking resistor is as easy as choosing the correct ohm value for the control and adequate continuous watts capacity to meet load requirements.

Input Volts	Hp	Total Ohms	Continuous Rated Watts			
			600	1200	2400	4800
230	1-2	30	RGA630	RGA1230	RGA243	
	3-7.5	20	RGA620	RGA1220	RGA2420	RGA4820
	10	10		RGA1210	RGA2410	RGA4810
	15-20	6		RGA1206	RGA2406	RGA4806
	25-40	4		RGA1204	RGA2404	RGA4804
	50	2				RGA4802
460	1-3	120	RGA6120	RGA12120	RGA24120	
	5-10	60	RGA660	RGA1260	RGA2460	RGA4860
	15-25	20	RGA620	RGA1220	RGA2420	RGA4820
	30-50	10		RGA1210	RGA2410	RGA4810
575	1-2	200	RGA6200	RGA12200	RGA24200	
	3-5	120	RGA6120	RGA12120	RGA24120	
	7.5-10	60	RGA660	RGA1260	RGA2460	RGA4860
	15-25	30	RGA630	RGA1230	RGA2430	RGA4830
	30	24		RGA1224	RGA2424	RGA4824
	40-50	14				RGA4814

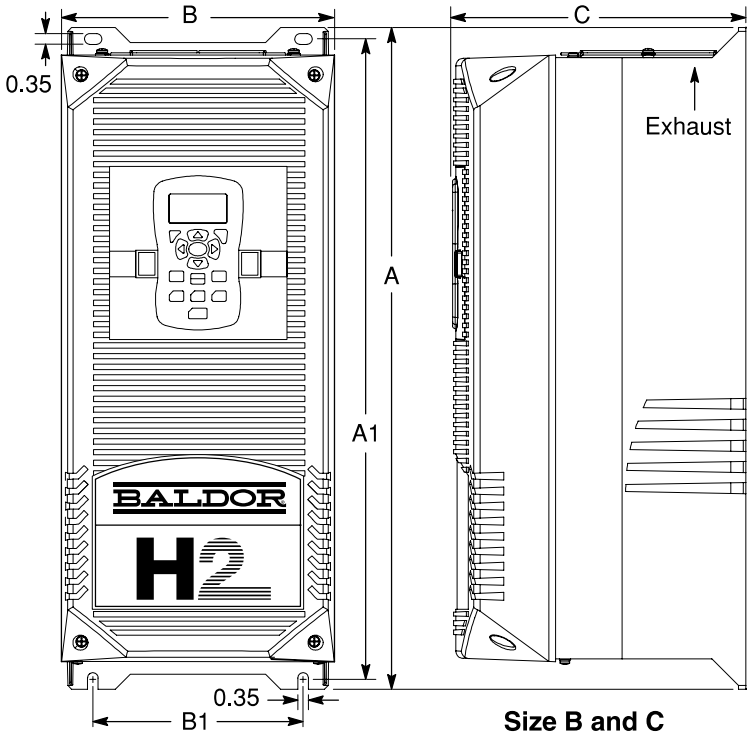
Outline and Dimensions



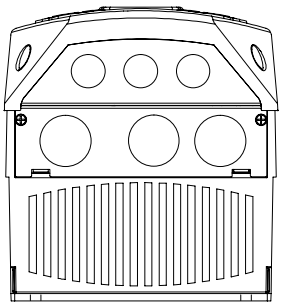
Size AA



Size	# Holes	Diameter
AA	4	0.6 (15)



Size B and C



Size	# Holes	Diameter
B	3	0.6 (15)
	3	1.25 (32)
C	3	0.6 (15)
	3	1.25 (32)

Size	Dimensions inches (mm)				
	Outside			Mounting	
	Height (A)	Width (B)	Depth (C)	Height (A1)	Width (B1)
AA	12.27 (311)	7.97 (202)	8.21 (208)	11.75 (298)	7.38 (187)
B	18.00 (457)	9.10 (231)	9.48 (241)	17.25 (438)	7.00 (178)
C	22.00 (559)	9.10 (231)	9.77 (248)	21.25 (540)	7.00 (178)

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