

Made in the U.S.A.

Series 21H and Series 22H Line Regen AC Motor Controls

BALDOR
MOTORS AND DRIVES

Line regen or dynamic braking?

Whenever a motor is stopped faster than it would were it coasting to a stop, it becomes a generator. The energy or power generated by the motor may be shunted through a dynamic braking resistor or put back onto the incoming power line. Baldor controls which dump the regenerated power to a dynamic braking resistor are the Series 15H Inverter and the Series 18H Vector Control. The Baldor controls which put the power back onto the incoming line are the Series 21H Line Regen Inverter and the Series 22H Line Regen Vector Control.

Which control is best for your application?

In applications where the motor can be allowed to coast to a stop, use the standard Series 15H inverter and 18H vector control with no braking options required. When limited braking is required, external dynamic braking options may be added to these standard controls.

There are many applications where a Series 21H Line Regen Inverter or Series 22H Line Regen Vector Control would be the better choice. These include:

- Applications where reduced energy consumption and eliminating demand charge penalties is important;
- Applications having a duty cycle where a large percentage of the total cycle time is devoted to braking the motor/load to a stop;
- Applications having an overhauling load or;
- Applications which spec. IEEE-519 to limit harmonic voltage and current waveform distortion, including those where the motor can coast to a stop.

What is IEEE-519?

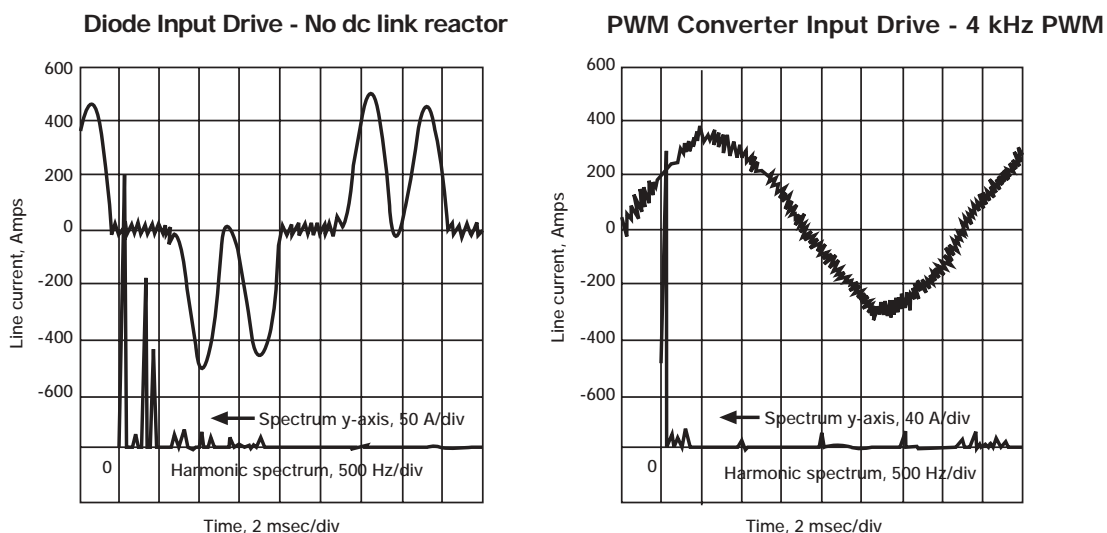
IEEE Std 519-1922 is titled "IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems". This is a recommendation on limits of harmonic current drawn from and fed into utility power lines by customers. It is being adopted by more and more power utilities in response to line harmonic problems they and their customers have experienced.

What is the impact on the customer?

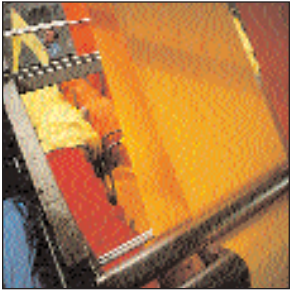
Utility customers who use equipment that produces harmonic currents and subsequent harmonic voltage waveforms will eventually have to reduce the level of waveform distortion to recommended levels. This can be done by using compliant equipment or by securing other devices that decrease the harmonics contribution of existing or new equipment which exceeds the recommended levels.

Baldor Series 21H Line Regen Inverters and Series 22H Vector Controls are IEEE 519 compliant for total harmonic voltage and current distortion at rated load. They eliminate any need for expensive harmonic filtering to meet IEEE 519 recommendations. A comparison of the current waveforms and harmonic spectra for a diode bridge converter control and a Baldor line regen control are provided below.

Comparison of Line Current Waveforms, Harmonics for Diode Bridge and PWM Transistor Bridge AC Controls



Line Regen Applications



Winders / Unwind Stands - Baldor Line Regen AC drives control roll tightness, tension, stretch or draw of the material in web processing systems. They comply with IEEE-519 for THD to protect other on-line equipment including other variable speed drives from harmonic disturbances. Web processing systems are found in paper, textiles, wire, printing and metal manufacturing industries.

Downhill Conveyors - Baldor's Series 21 Line Regen Inverter drives possess full load power regeneration to the incoming AC source. They work well for controlling conveyor speeds either using a potentiometer, a process follower, or switch closures with up to 15 preset speeds. Acceleration and deceleration can be independently set to help to eliminate spillage or material scrap.



HVAC - Series 21H Line Regen inverters are well suited for HVAC applications. They feature: a unity power factor converter section with a sinusoidal input. This provides a higher system efficiency and elimination of utility penalty charges. They comply with IEEE 519 with near zero harmonics to minimize connected equipment disturbances and harmonic line losses. In addition, IGBT power devices provide low audible operating noise.

Hoists / Cranes - The series 22H vector control has many features required in hoisting applications. Included among them are: torque proving to ensure a safe transition from brake set to release; two programmable acceleration and deceleration S-curve and linear profiles to eliminate equipment jerk and load swing; and full load regeneration to the incoming AC source. The Series 22H vector control also complies with IEEE 519 requirements for THD which avoids overloading breakers, transformers, and feeders.



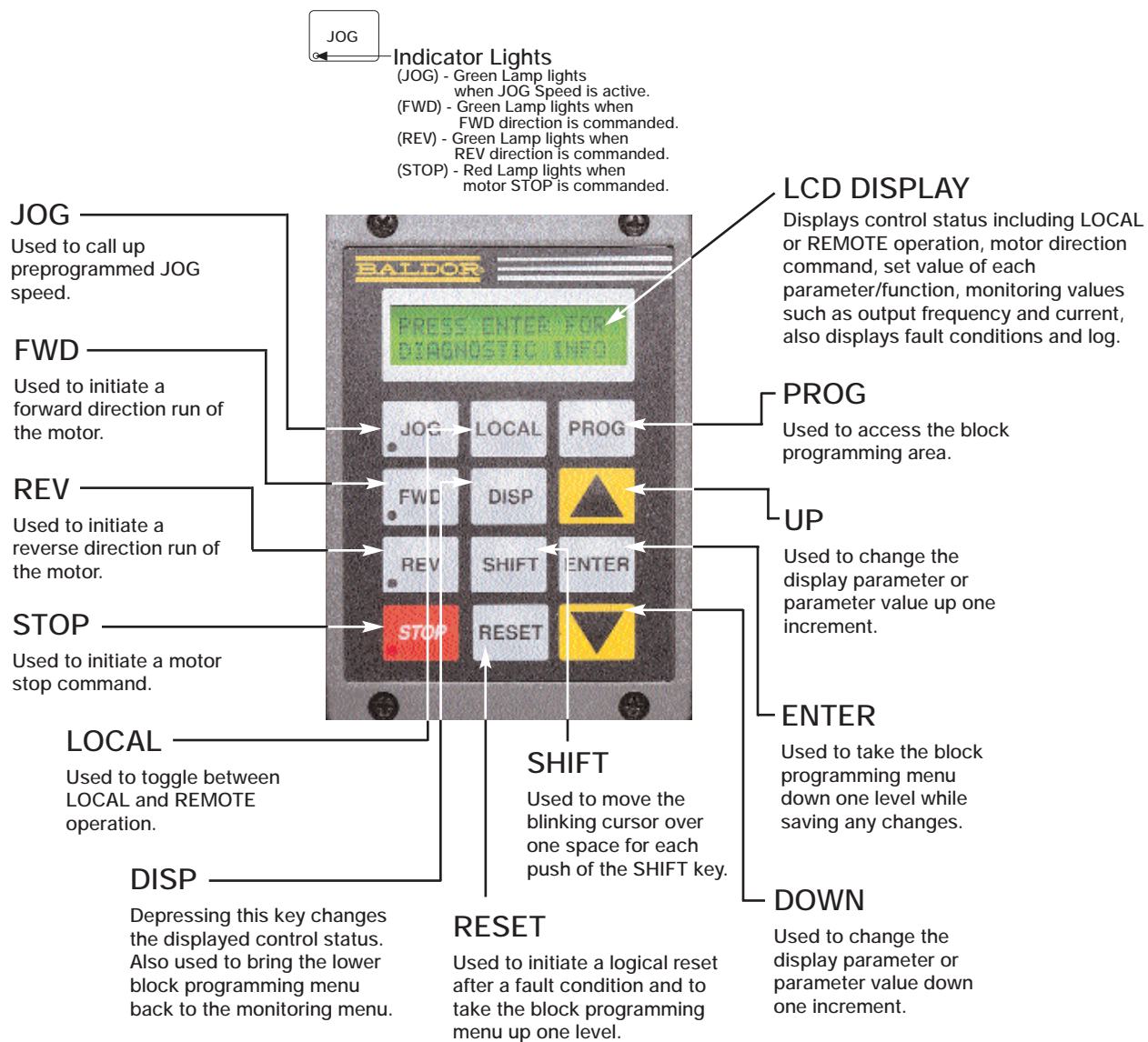
Presses / Cyclic Loads - Baldor Line Regen AC controls accurately control flywheel speed in press and other cyclic load applications. Series 22H controllers are an ideal replacement for eddy current couplings and varidrives.

Test Stands - Baldor vector controls are used extensively in test stands in various industries ranging from automotive chassis dynamometers and engine and transmission stands to turbine engine blade testing. The dynamic response and precise independently adjustable speed and torque control loops provide the required regulation for accurate testing.



The Baldor Keypad

The new Baldor keypad provides the flexibility and ease of use expected in today's controls. The 12 keys provide tactile response so you know a key has been pushed. The 32 character alpha-numeric display provides full parameter names to simplify programming, operation and monitoring. Parameter code number translation is not required. Keypads supplied on NEMA 1 and NEMA 4 controls carry a NEMA 4X rating when remotely mounted. The Baldor keypad is used on a variety of controls so when you know how to work with one you know them all.



Keypad Extension Cable

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.

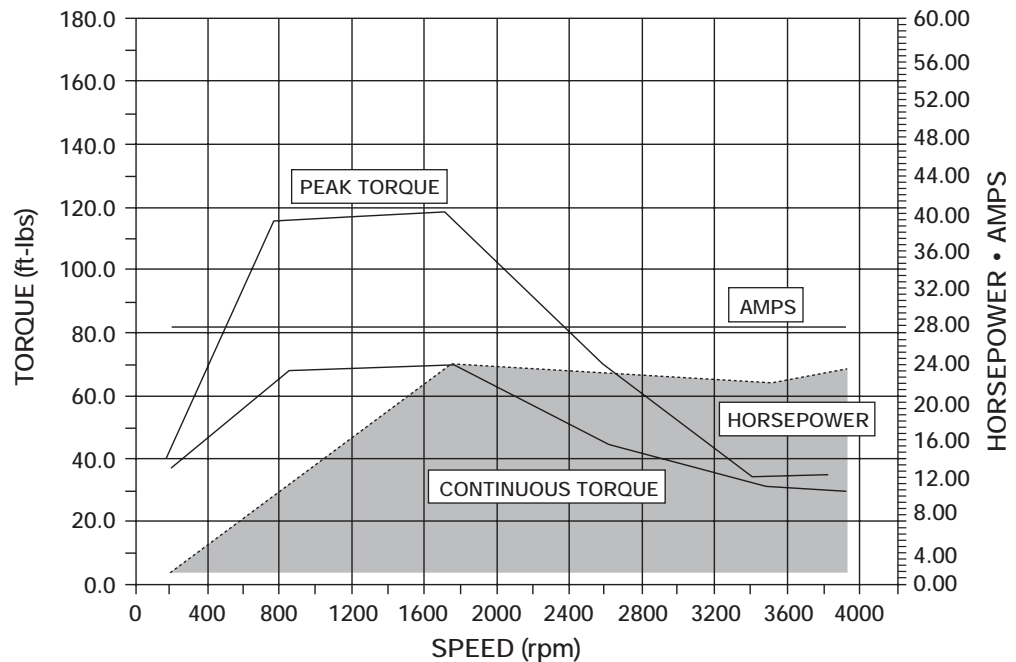
CATALOG NO.	CABLE EXTENSION LENGTH	APPROX SHPG. WGT.
CBLH015KP	5 FEET (1.5 METER)	2
CBLH030KP	10 FEET (3.0 METER)	2.5
CBLH046KP	15 FEET (4.6 METER)	3
CBLH061KP	20 FEET (6.1 METER)	4
CBLH091KP	30 FEET (9.1 METER)	5
CBLH152KP	50 FEET (15.2 METER)	6
CBLH229KP	75 FEET (22.9 METER)	9
CBLH305KP	100 FEET (30.5 METER)	11

Matched Performance™

Baldor's Matched Performance™ curves document actual dynamometer testing. These curves show the continuous operating constant torque range provided without exceeding a Class F temperature rise. This holds true even with Class H insulated inverter and vector motors. Peak torque is the maximum amount the drive can produce. The limit will be the lesser of the breakdown torque of the motor or the controller current limited peak torque. This torque can be used for momentary overloads or acceleration and deceleration requirements. Matched Performance™ testing takes up to 4 days of continuous running for temperature stabilization at thermal limits.

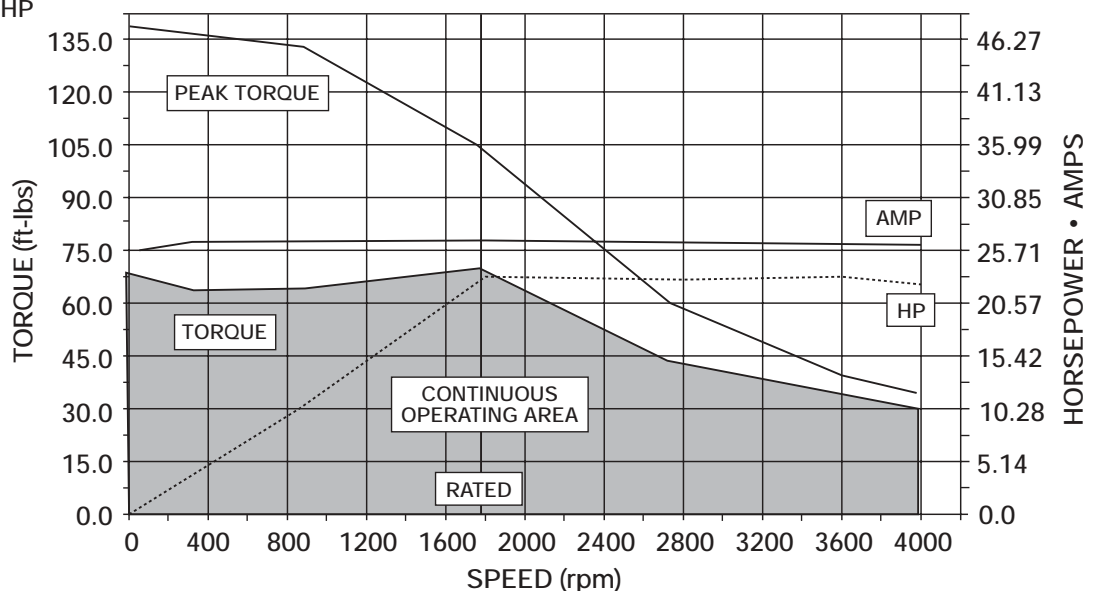
Series 21H Inverter Drive

Motor: IDM2334T 20HP
 Control: ID22H420-EL 20HP



Series 22H Vector Drive

Motor: ZDM2334T 20HP
 Control: ZD18H420-EO 20HP



Series 21H Inverter Specifications

Design Specifications

- 16/32 BIT Microprocessor controlled PWM output
- Free run or ramp stop
- Controlled reversing
- Selectable preset speeds
- Jog speed
- Dynamic braking
- DC Injection Braking
- Bus present and fault trip LED
- Analog meter outputs
- IEEE 519 Compliant for THD
- Triple rated
- UL/cUL listed
- PID Setpoint Control
- Near Unity Power Factor

Environmental and Operating Conditions

- Input voltage - 3 phase 180-264 VAC $\pm 10\%$, 3 phase 342-528 VAC $\pm 10\%$
- Input frequency - 50 or 60HZ $\pm 5\%$
- Service factor - 1.0
- Duty - Continuous
- Humidity - 90% max RH non-condensing
- Altitude - 3300 feet max without derate
- NEMA 1 enclosure - EL versions

Operator Keypad

- Digital speed control
- Forward/Reverse command
- Motor RUN and JOG
- Local/Remote key
- Stop command
- Parameter setting and display
- Display 32 character alpha-numeric on backlit LCD
- Membrane keys with tactile feel
- Remote mount to 100 feet from control
- NEMA 4X enclosure

Protective Features

- Selectable automatic restart at momentary power loss with free setting of maximum number of trips and time between trip and reset
- DC bus charge indicator
- Adjustable time base overload
- Cause of last 31 trips retained in memory
- Digital display for fault conditions
- Linear heatsink thermal sensor

Output Ratings	Overload Capacity	150% for 60 Seconds; 170-200% for 3 Seconds for Constant Torque	
		115% for 60 Seconds for Variable Torque	
	Frequency	2-120 Hz, Optional 2-400 Hz for Variable Torque	
	Voltage	0-Maximum Input Voltage (RMS)	
Input Ratings	Frequency	50 Hz $\pm 5\%$	60 Hz $\pm 5\%$
	Voltage	180-230 VAC, 340-457 VAC	180-264 VAC, 342-528VAC
	Phase	Three Phase	
	Impedance	0.5% Minimum to 10% Maximum Required for IEEE 519 - 1992 Compliance	
Control Spec	Control Method	Sinewave Carrier Input, PWM Output	
	PWM Frequency	Adjustable 1-5kHz STD, 1-15 kHz Quiet	
	V/Hz Ratio	Linear To Squared Reduced, Base Frequency, Output Voltage, Minimum Frequency Limit, Maximum Frequency Limit	
	Torque Boost	0-15% of Input Voltage; Automatic with Manual Override	
	Skip Frequency	Three Zones 0-Max Frequency	
	Frequency Setting	0-5 VDC, 0-10 VDC, 4-20mA, Digital Via Optional RS232/422/485	
	Accel/Decel	Separate Accel/Decel Rates, 0-3600 Sec to Maximum Frequency	
Protective Functions	Inverter Trip	Over Voltage, Over Current, Under Voltage, External Thermal, Heatsink Thermal, Motor Overload	
	Stall Prevention	Over Voltage Suppression, Overcurrent Suppression	
	External Output	Open Collector Transistor Output And LED Indicator For Trip	
	Short Circuit	Phase to Phase, Phase To Ground	
LED Display	Running	Output Frequency, Set Frequency, Output Current(%), Voltage, RPM, Custom Units	
	Setting	Parameter Values For Setup And Review	
	Trip	Separate Message For Each Trip, Cause Of Last 31 Trips Retained In Memory	
Ambient Conditions	Temperature	-10 + 40°C For NEMA 1	
	Cooling	Forced Air Included When Required	

Series 21H Inverter Ratings

CATALOG NO.	INPUT VOLT	ENCLOSURE SIZE	STANDARD 2.5KHZ PWM								8.0KHz PWM							
			CONSTANT TORQUE				VARIABLE TORQUE				CONSTANT TORQUE				VARIABLE TORQUE			
			HP	KW	IC	IP	HP	KW	IC	IP	HP	KW	IC	IP	HP	KW	IC	IP
ID21H210-EL	230	C+	10	7.4	28	56	10	7.4	28	32	10	7.4	28	48	10	7.4	28	32
ID21H215-EL	230	C+	15	11.1	42	72	15	11.1	42	48	10	7.4	30	61	15	11.1	42	48
ID21H220-EL	230	C+	20	14.9	55	100	20	14.9	55	62	15	11.1	42	92	20	14.9	55	62
ID21H225-EL	230	C+	25	18.6	68	116	25	18.6	68	78	20	14.9	52	92	25	18.6	68	78
ID21H230-EL	230	D+	30	22.3	80	140	30	22.3	80	92	25	18.6	70	122	30	22.3	80	92
ID21H240-EL	230	D+	40	29.8	105	200	40	29.8	105	120	30	22.3	80	160	40	29.8	104	120
ID21H250-EL	230	D+	50	37.2	130	225	50	37.2	130	150	40	29.8	105	183	50	37.2	130	150
ID21H410-EL	460	C+	10	7.4	15	30	10	7.4	15	17	10	7.4	15	30	10	7.4	15	17
ID21H415-EL	460	C+	15	11.1	21	36	15	11.1	21	24	10	7.4	15	30	15	11.1	21	24
ID21H420-EL	460	C+	20	14.9	27	54	20	14.9	27	31	15	11.1	21	46	20	14.9	27	31
ID21H425-EL	460	C+	25	18.6	34	58	25	18.6	34	39	20	14.9	27	46	25	18.6	35	39
ID21H430-EL	460	D+	30	22.3	40	70	30	22.3	40	46	25	18.6	35	61	30	22.3	40	46
ID21H440-EL	460	D+	40	29.8	55	100	40	29.8	55	63	30	22.3	40	80	40	29.8	52	60
ID21H450-EL	460	D+	50	37.2	65	115	50	37.2	65	75	40	29.8	55	92	50	37.2	65	75
ID21H460-EK	460	D	60	44.7	80	140	60	44.7	80	92	50	37.2	65	122	60	44.7	80	92
ID21H475-EK	460	E	75	56	100	170	75	56	100	115	60	44.7	80	140	75	56	100	115
ID21H4100-EK	460	E	100	75	125	220	100	75	125	144	75	56	100	183	100	75	125	144
ID21H4150-EK	460	F	150	112	190	380	150	112	190	220	125	93	150	260	150	112	170	200
ID21H4200-EK	460	F	200	149	250	500	200	149	250	290	150	112	190	380	175	130	210	240
ID21H4250-EL	460	G+	250	187	310	620	250	187	310	356								
ID21H4300-EL	460	G+	300	224	370	630	300	224	370	425								
ID21H4350-EL	460	G+	350	261	420	720	350	261	420	480								
ID21H4400-EL	460	G+	400	298	480	820	400	298	480	552								
ID21H4450-EL	460	G+	450	336	540	920	450	336	540	620								
ID21H4500-EL	460	H	500	373	590	1180	600	447	710	820								
ID21H4600-EL	460	H	600	447	710	1210	700	522	830	960								

Refer to Matched Component Matrix for required input line reactor, filter, and boost regulator.

Shaded area= Not available

IC = Continuous Output Current in Amps

IP = Peak Output Current in Amps

EL = Nema 1 enclosure

EK = Control, filter, and boost regulator shipped separately.

Control and filter in Nema 1 enclosure. Boost regulator and 3% line reactor shipped separately.

PWM Frequency Continuous and Peak Current Derating:

2.5 KHz Ratings - Full rating 1-2.5 KHz

Adjustable from 1-5KHz with linear derating to 10% at 5KHz

8.0KHz Ratings - Full rating from 1-8KHz

Adjustable from 1-15KHz with linear derate to 30% at 15KHz

Series 22H Vector Control Specifications

Design Specifications

- IGBT power devices for quiet operation
- Digital speed control or torque control
- 16/32 BIT Microprocessor controlled PWM output
- Output frequency 0-500 Hz
- Full rated torque down to zero speed
- Automatic tuning to motor with manual over-ride
- Motor shaft orient to encoder marker or external switch closure
- Process follower $\pm 5\text{VDC}$ 0-5 VDC, $\pm 10\text{VDC}$, 0-10 VDC, 4-20mA, digital via keypad or optional RS232/422/485
- Triple rated
- Programmable linear or S-curve acceleration to 3600 seconds
- Free run or programmable linear or S-curve deceleration
- Controlled reversing
- 15 preset speeds
- Analog meter outputs
- 9 opto-isolated inputs / 4 assignable logic outputs
- 2 assignable analog outputs / 2 assignable analog inputs
- IEEE 519 Compliant for THD
- UL/cUL listed
- PID Setpoint Control
- Near Unity Power Factor

Environmental and Operating Conditions

- Input voltage
 - Three phase 180-264 VAC $\pm 10\%$
 - Three phase 342-528 VAC $\pm 10\%$
- Input frequency - 50 or 60HZ $\pm 5\%$
- Service factor - 1.0
- Duty - continuous
- Humidity - 90% max RH non condensing
- Altitude - 3300 feet max without derate
- NEMA 1 enclosure - EL versions

Operator Keypad

- Digital speed control
- Forward/Reverse command
- Motor RUN and JOG
- Local/Remote key
- Stop command
- Parameter setting and display
- Display 32 Character alpha-numeric on backlit LCD
- Membrane keys with tactile feel
- Remote mount to 100 feet from control
- NEMA 4X enclosure

Motor Feedback

- Feedback Type: Incremental encoder coupled 1:1 to motor shaft
- Pulse/Rev: 60-15,000 programmable 1024 Standard
- Voltage output: 2 channel in quadrature, 5VDC, differential
- Marker pulse: Required for orientation
- Power: + 5VDC, 300 mA max
- Max frequency: 1 MHz
- Positioning: Buffered encoder pulse train output for position loop controller

Protective Features

- Motor overspeed
- Adjustable current limit
- Isolated control circuitry
- Digital display for fault conditions
- Selectable automatic restart at momentary power loss
- Over/Under Voltage
- Line to line and line to ground faults
- Over-temperature
- Motor overload
- Linear heatsink thermal sensor

Output Ratings	Overload Capacity	150% for 60 seconds, 170-200% 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 Hz $\pm 5\%$	60 Hz $\pm 5\%$
	Voltage	180-230 VAC, 340-457 VAC	180-264 VAC, 342-528 VAC
	Phase	Three Phase	
	Impedance	0.5% Minimum to 10% Maximum Required for IEEE - 519 Compliance	
Control Spec	Control Method	Microprocessor Controlled PWM Output	
	PWM Frequency	Adjustable 1-5kHz STD, 1-16 kHz Quiet	
	Speed Setting	$\pm 5\text{VDC}$, 0-5 VDC $\pm 10\text{VDC}$, 0-10 VDC, 4-20 mA; Digital Via Keypad, RS232/422/485	
	Accel/Decel	Separate Accel/Decel Rates, 0-3600 Seconds to Max RPM	
	Motor Matching	Automatic Tuning To Motor With Manual Override	
Motor Feedback	Feedback Type	Incremental Encoder Coupled To Motor Shaft	
	Pulses/Rev	60-15,000 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	1 MHz	
Protective Functions	Positioning	Optional Buffered Encoder Pulse Train Output For Position Loop Controller	
	Vector Trip	Missing Control Power, Over Current, Over Voltage, Under Voltage, Motor Over Speed	
		Over Temperature (Motor Or Control), Output Shorted Or Grounded, Motor Overload	
	External Output	LED Indicator For Trip Conditions, 4 Assignable Logic Outputs 30 VDC Max, 2 Assignable Analog Outputs 0-5 VDC	
LED Display	Short Circuit	Phase To Phase, Phase To Ground	
	Running	Output Frequency, Motor RPM; Output Current, Voltage (Selectable)	
	Setting	Parameter Values For Setup And Review	
Ambient Conditions	Trip	Separate Message For Each Trip, Last 31 Trips Retained In Memory	
	Temperature	0-40° C For UL Listing	
	Cooling	Forced Air Included When Required	

Series 22H Vector Control Ratings

CATALOG NO.	INPUT VOLT	ENCLOSURE SIZE	STANDARD 2.5KHz PWM								8.0kHz PWM							
			CONSTANT TORQUE				VARIABLE TORQUE				CONSTANT TORQUE				VARIABLE TORQUE			
			HP	KW	IC	IP	HP	KW	IC	IP	HP	KW	IC	IP	HP	KW	IC	IP
ID22H210-EL	230	C+	10	7.4	28	56	10	7.4	28	32	10	7.4	28	48	10	7.4	28	32
ID22H215-EL	230	C+	15	11.1	42	72	15	11.1	42	48	10	7.4	30	61	15	11.1	42	48
ID22H220-EL	230	C+	20	14.9	55	100	20	14.9	55	62	15	11.1	42	92	20	14.9	55	62
ID22H225-EL	230	C+	25	18.6	68	116	25	18.6	68	78	20	14.9	52	92	25	18.6	68	78
ID22H230-EL	230	D+	30	22.3	80	140	30	22.3	80	92	25	18.6	70	122	30	22.3	80	92
ID22H240-EL	230	D+	40	29.8	105	200	40	29.8	105	120	30	22.3	80	160	40	29.8	104	120
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ID22H450-EL	460	D+	50	37.2	65	115	50	37.2	65	75	40	29.8	55	92	50	37.2	65	75
ID22H460-EK	460	D	60	44.7	80	140	60	44.7	80	92	50	37.2	65	122	60	44.7	80	92
ID22H475-EK	460	E	75	56	100	170	75	56	100	115	60	44.7	80	140	75	56	100	115
ID22H4100-EK	460	E	100	75	125	220	100	75	125	144	75	56	100	183	100	75	125	144
ID22H4150-EK	460	F	150	112	190	380	150	112	190	220	125	93	150	260	150	112	170	200
ID22H4200-EK	460	F	200	149	250	500	200	149	250	290	150	112	190	380	175	130	210	240
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Adjustable from 1-5KHz with linear derating to 10% at 5KHz

8.0KHz Ratings - Full rating from 1-8KHz

Adjustable from 1-15KHz with linear derate to 30% at 15KHz

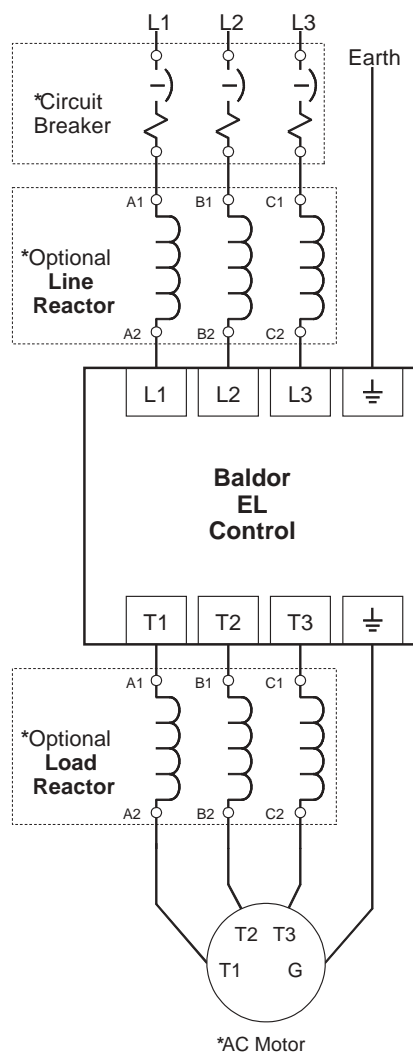
Matched Component Matrix

Control Catalog No.	Control Specification No.	230 VAC 3% Line Reactor Catalog No.	380-415 VAC 4% Line Reactor Catalog No. *	460 VAC 3% Line Reactor Catalog No. *	Boost Regulator Specification No.	Filter Specification No.
ID21H210-EL	IN0376A00	LRAC03501	NA	NA	Inside Control	Inside Control
ZD22H210-EL	VE0574A00	LRAC03501	NA	NA	Inside Control	Inside Control
ID21H215-EL	IN377A00	LRAC04501	NA	NA	Inside Control	Inside Control
ZD22H215-EL	VE0575A00	LRAC04501	NA	NA	Inside Control	Inside Control
ID21H220-EL	IN0378A00	LRAC05501	NA	NA	Inside Control	Inside Control
ZD22H220-EL	VE0576A00	LRAC05501	NA	NA	Inside Control	Inside Control
ID21H225-EL	IN0455A00	LRAC08001	NA	NA	Inside Control	Inside Control
ZD22H225-EL	VE0577A00	LRAC08001	NA	NA	Inside Control	Inside Control
ID21H230-EL	IN0370A00	LRAC08001	NA	NA	Inside Control	Inside Control
ZD22H230-EL	VE0568A00	LRAC08001	NA	NA	Inside Control	Inside Control
ID21H240-EL	IN0371A00	LRAC8001	NA	NA	Inside Control	Inside Control
ZD22H240-EL	VE0569A00	LRAC10001	NA	NA	Inside Control	Inside Control
ID21H250-EL	IN0372A00	LRAC13001	NA	NA	Inside Control	Inside Control
ZD22H250-EL	VE0570A00	LRAC13001	NA	NA	Inside Control	Inside Control
ID21H410-EL	IN0353A00	NA	LRAC01802	LRAC01802	Inside Control	Inside Control
ZD22H410-EL	VE0565A00	NA	LRAC01802	LRAC01802	Inside Control	Inside Control
ID21H415-EL	IN0082A00	NA	LRAC2502	LRAC2502	Inside Control	Inside Control
ZD22H415-EL	VE0082A00	NA	LRAC02502	LRAC02502	Inside Control	Inside Control
ID21H420-EL	IN0086A00	NA	LRAC03502	LRAC03502	Inside Control	Inside Control
ZD22H420-EL	VE0088A00	NA	LRAC03502	LRAC03502	Inside Control	Inside Control
ID21H425-EL	IN0088A00	NA	LRAC4502	LRAC03502	Inside Control	Inside Control
ZD22H425-EL	VE0090A00	NA	LRAC04502	LRAC03502	Inside Control	Inside Control
ID21H430-EL	IN0090A00	NA	LRAC04502	LRAC04502	Inside Control	Inside Control
ZD22H430-EL	VE0092A00	NA	LRAC04502	LRAC04502	Inside Control	Inside Control
ID21H440-EL	IN0092A00	NA	LRAC05502	LRAC05502	Inside Control	Inside Control
ZD22H440-EL	VE0094A00	NA	LRAC05502	LRAC05502	Inside Control	Inside Control
ID21H450-EL	IN0094A00	NA	LRAC08002	LRAC08002	Inside Control	Inside Control
ZD22H450-EL	VE0096A00	NA	LRAC08002	LRAC08002	Inside Control	Inside Control
ID21H460-EK	IN0095A00	NA	LRAC08002	LRAC08002	V2080709	LR1015
ZD22H460-EK	VE0097A00	NA	LRAC08002	LRAC08002	V2080709	LF1015
ID21H475-EK	IN0097A00	NA	LRAC10002	LRAC10002	V2080710	LF1015
ZD22H475-EK	VE0099A00	NA	LRAC10002	LRAC10002	V2080710	LF1015
ID21H4100-EK	IN0077A00	NA	LRAC13002	LRAC13002	V2080711	LF1015
ZD22H4100-EK	VE0077A00	NA	LRAC13002	LRAC13002	V2080711	LF1015
ID21H4150-EK	IN0079A00	NA	LRAC25003	LRAC20002	V2080712	LF2015
ZD22H4150-EK	VE0079A00	NA	LRAC25003	LRAC20002	V2080712	LF2015
ID21H4200-EK	IN0083A00	NA	LRAC32003	LRAC25002	V2080713	LF2015
ZD22H4200-EK	VE0084A00	NA	LRAC32003	LRAC25002	V2080713	LF2015
ID21H4250-EL	IN0571A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4250-EL	VE0671A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ID21H4300-EL	IN0451A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4300-EL	VE0631A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ID21H4350-EL	IN0452A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4350-EL	VE0632A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ID21H4400-EL	IN0453A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4400-EL	VE0633A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ID21H4450-EL	IN0454A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4450-EL	VE0634A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ID21H4500-EL	IN0832A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4500-EL	VE0697A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ID21H4600-EL	IN0833A00	NA	Inside Control	Inside Control	Inside Control	Inside Control
ZD22H4600-EL	VE0696A00	NA	Inside Control	Inside Control	Inside Control	Inside Control

Note: * 3 or 4% line reactor installed depending upon input line voltage.

Series 21H and 22H Line Regen Controls Main Circuit Wiring

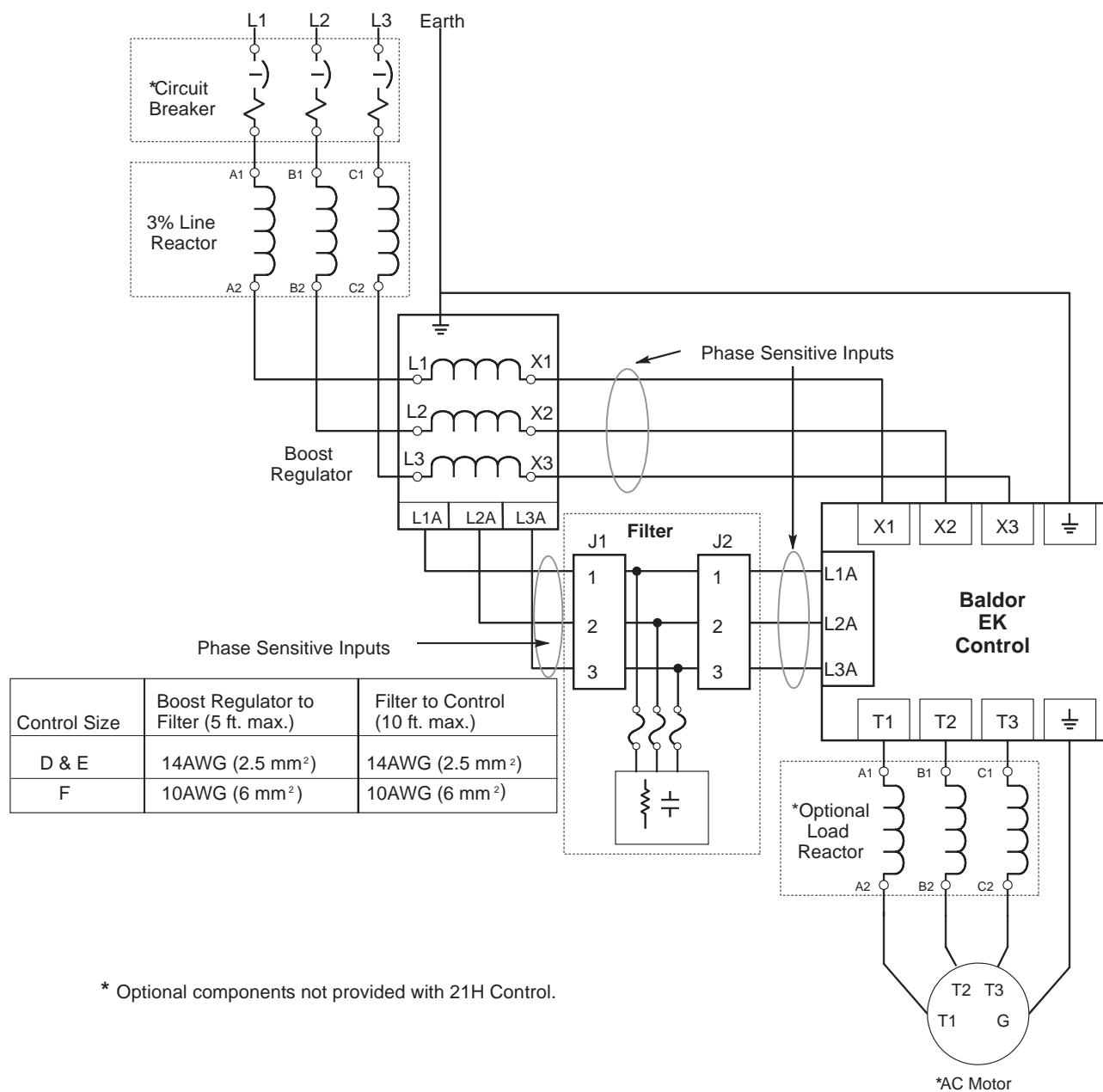
"EL" Controls



* Optional components not provided with the control.

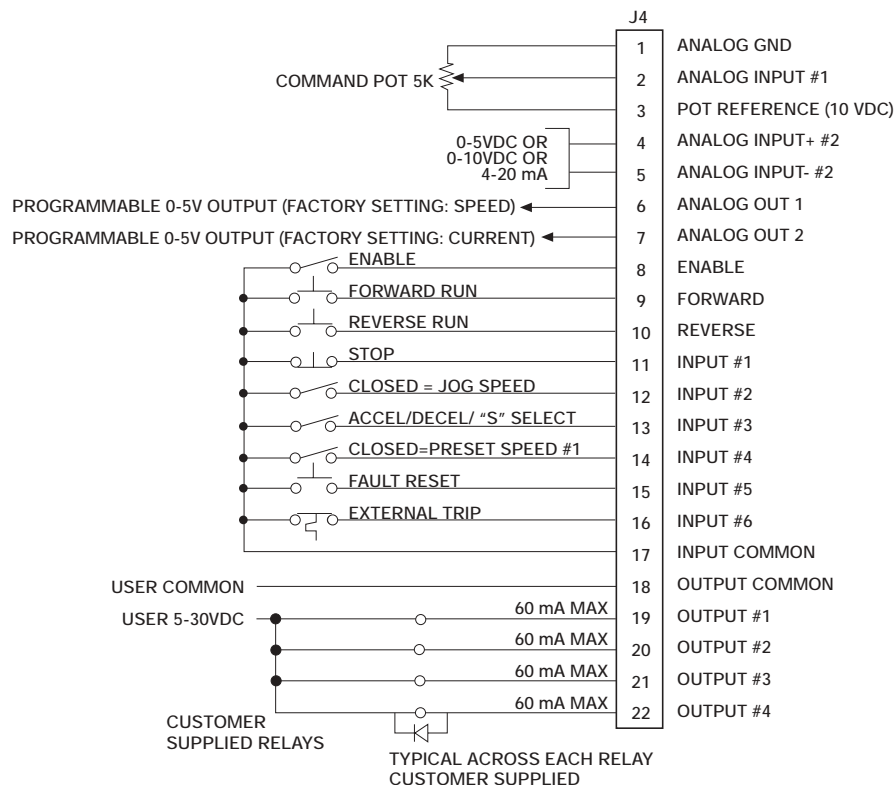
Series 21H and 22H Line Regen Controls Main Circuit Wiring

"EK" Controls

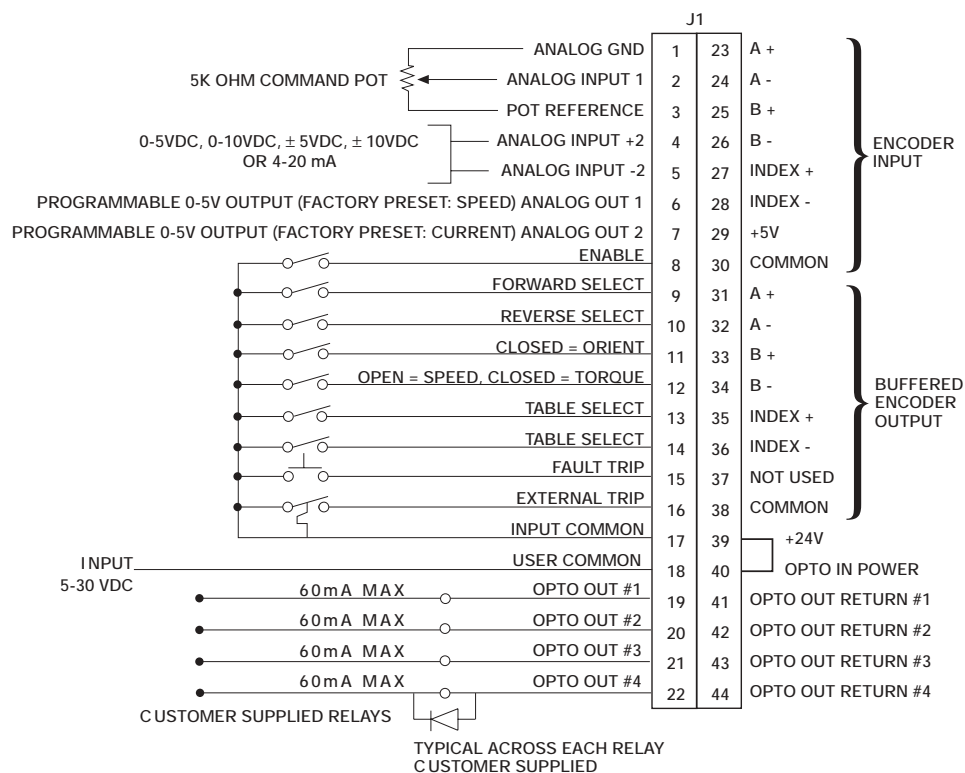


Typical Operating Mode Remote Connections

Series 21H Inverter Standard Run, Three Wire Control

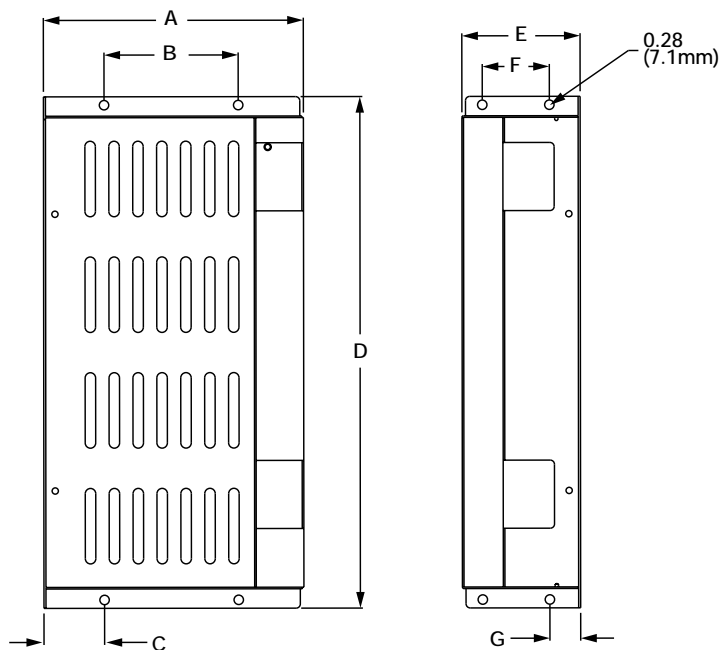


Series 22H Vector Bipolar Speed or Torque Control



Dimensions

Filter Assembly Dimensions For EK Controls



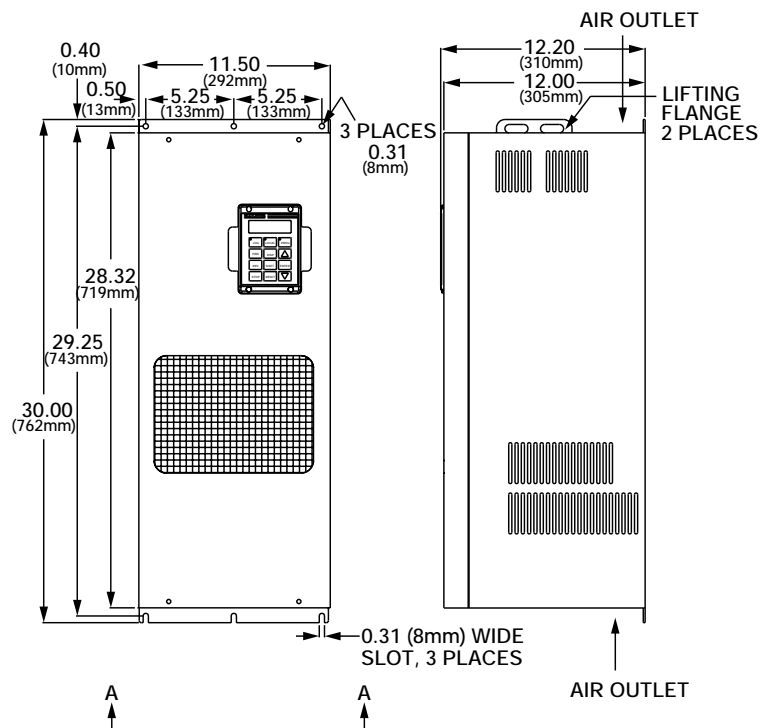
D/E - SIZE FILTER ENCLOSURE

DIM.	INCHES	mm.
A	7.75	196.9
B	4.00	101.6
C	1.81	46.0
D	15.25	387.4
E	3.52	89.4
F	2.00	50.8
G	.92	23.3

F-SIZE FILTER ENCLOSURE

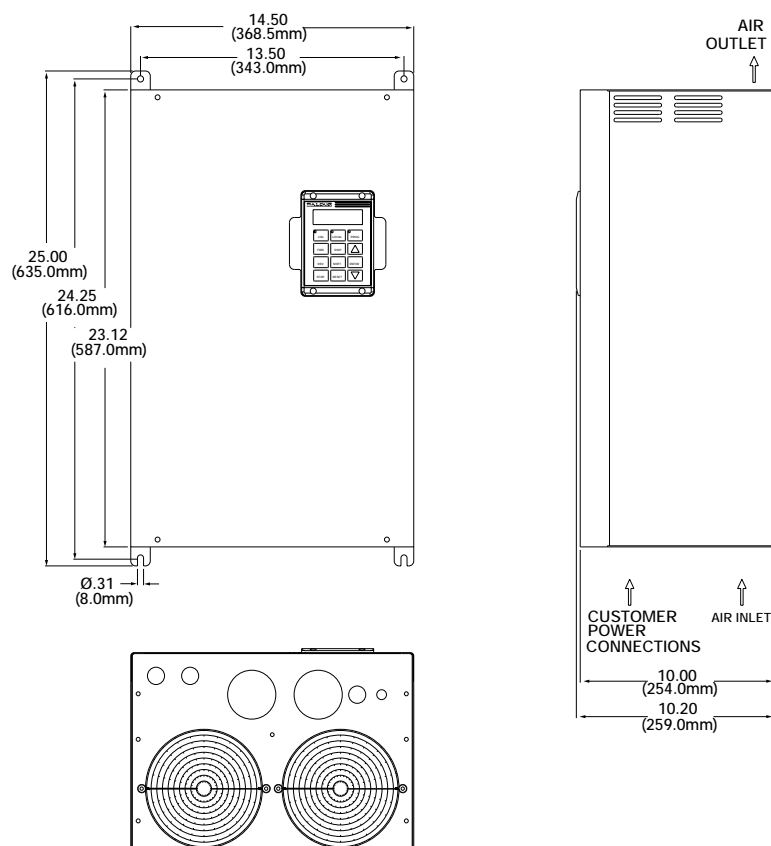
DIM.	INCHES	mm.
A	10.25	260.3
B	5.00	127.0
C	3.31	84.1
D	18.00	457.2
E	3.65	92.7
F	2.00	50.8
G	.92	23.3

Size C+ Controls

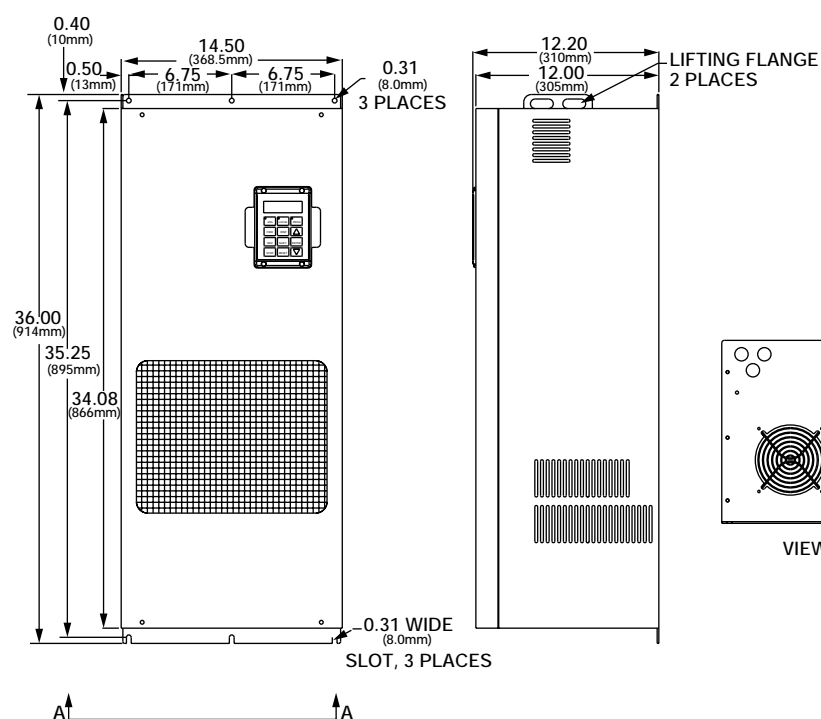


Dimensions

Size D Controls

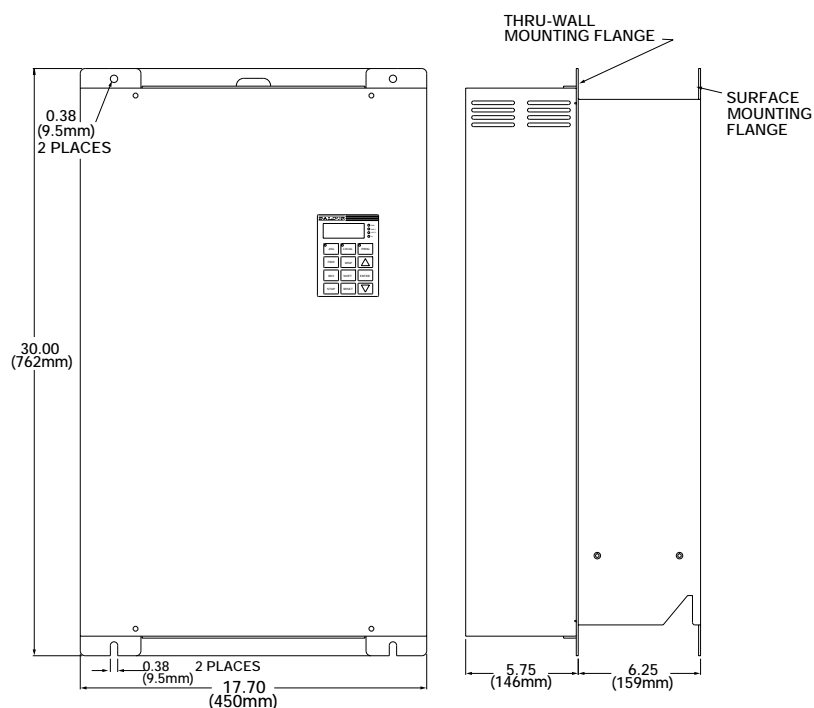


Size D+ Controls

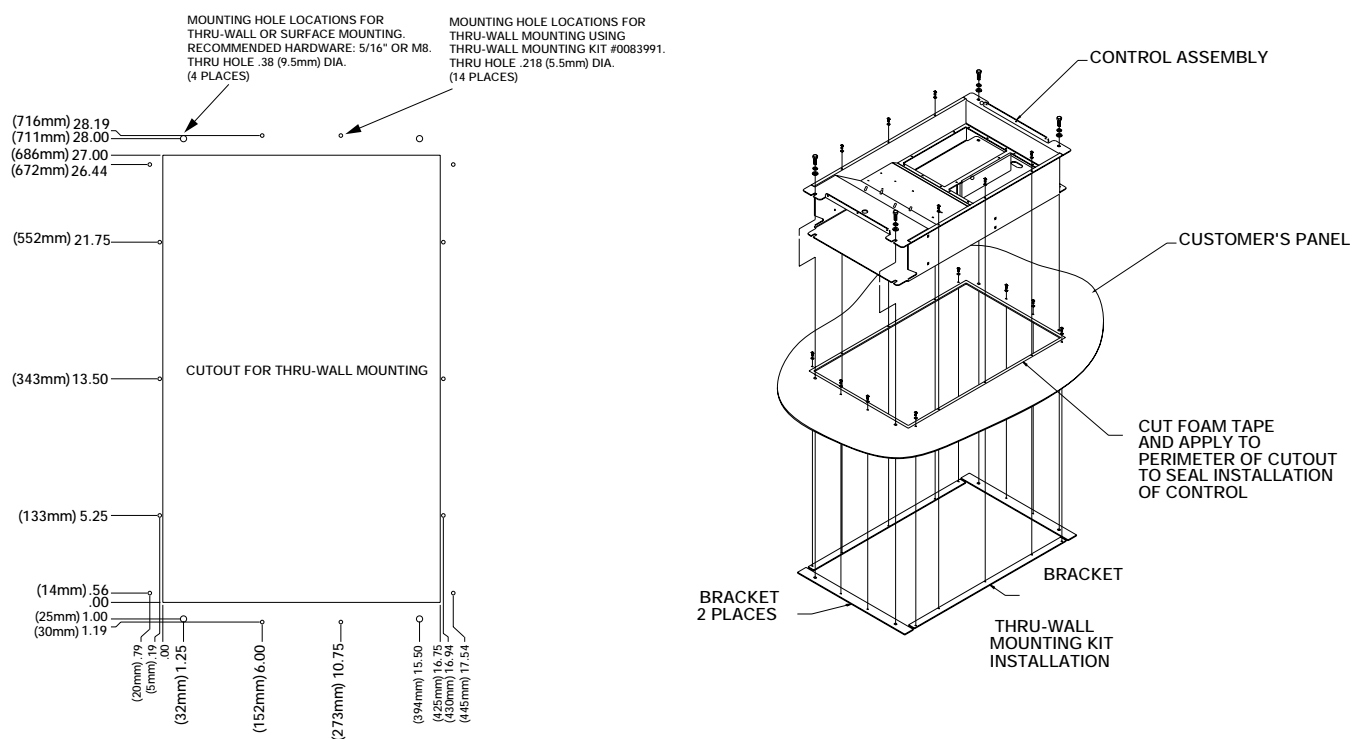


Dimensions

Size E Controls

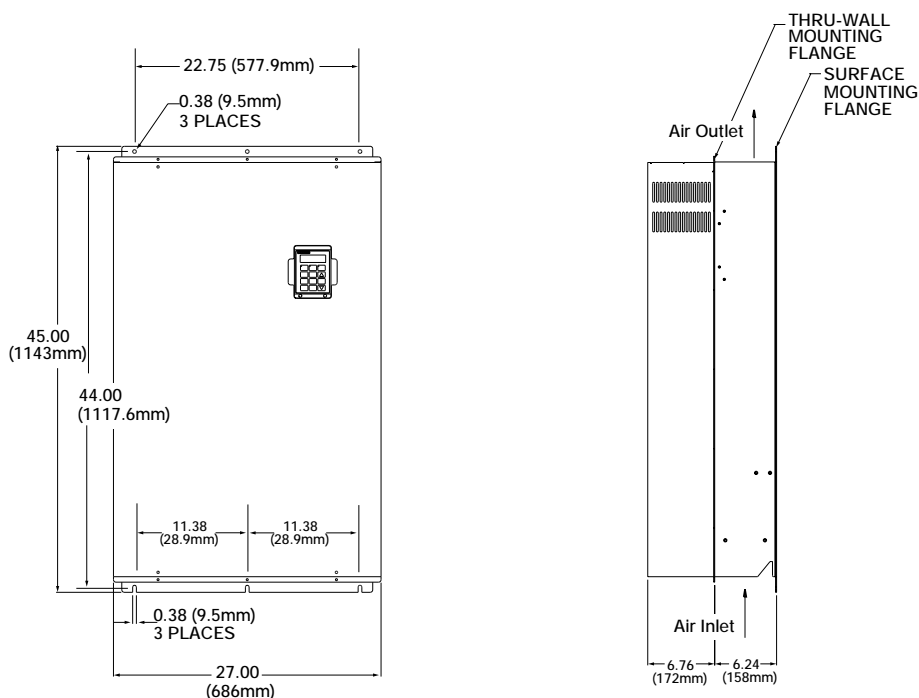


Size E Controls- Through Wall Mounting

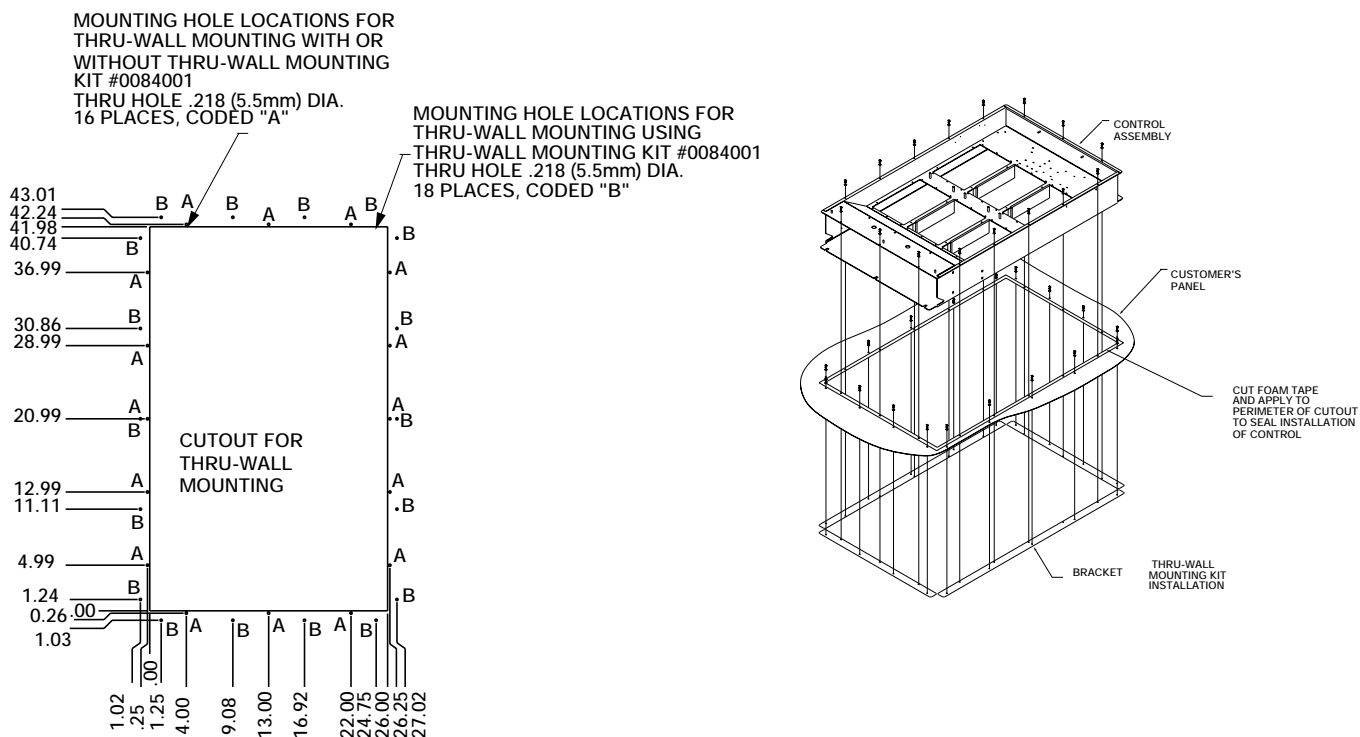


Dimensions

Size F Controls

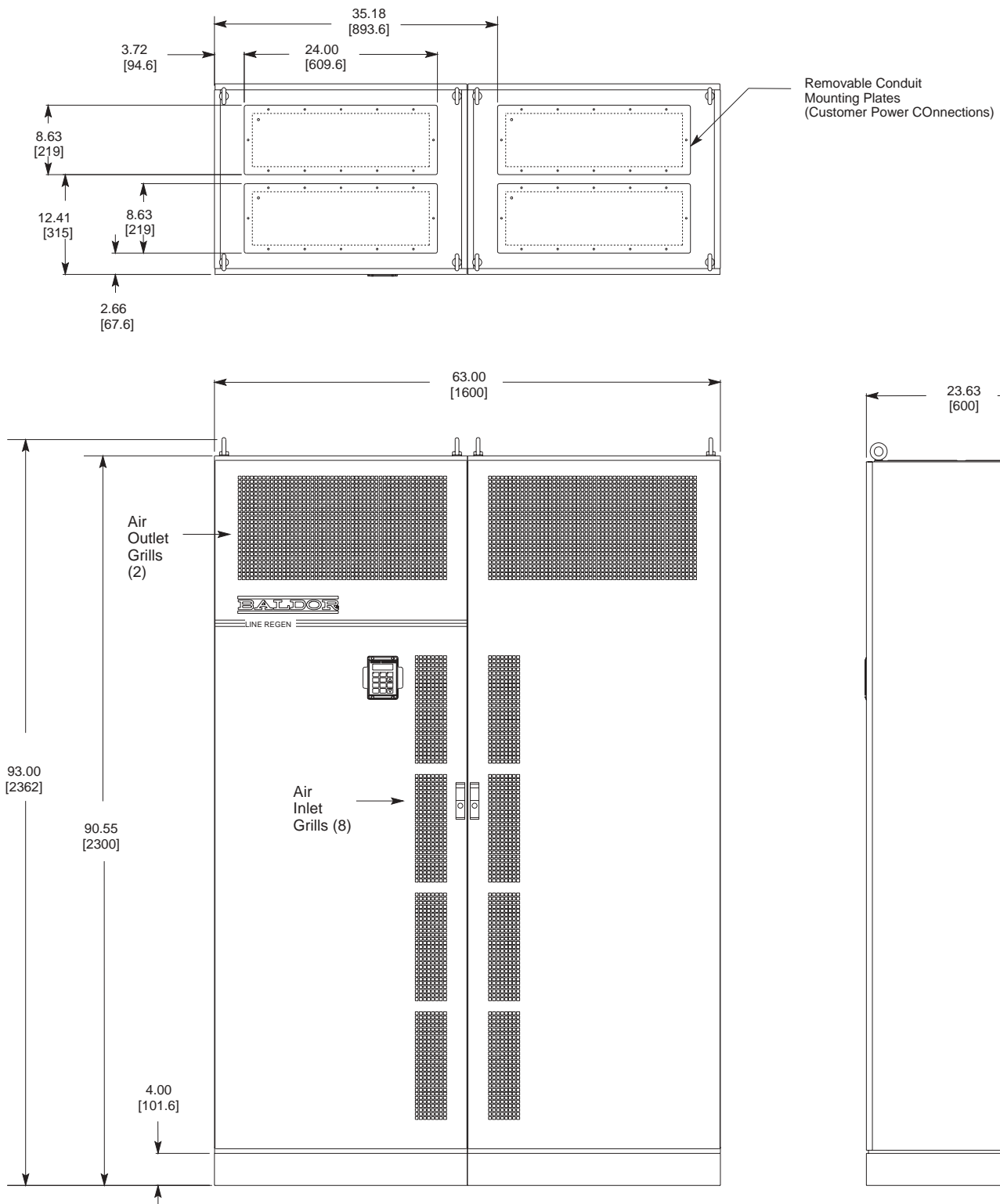


Size F Controls - Through Wall Mounting



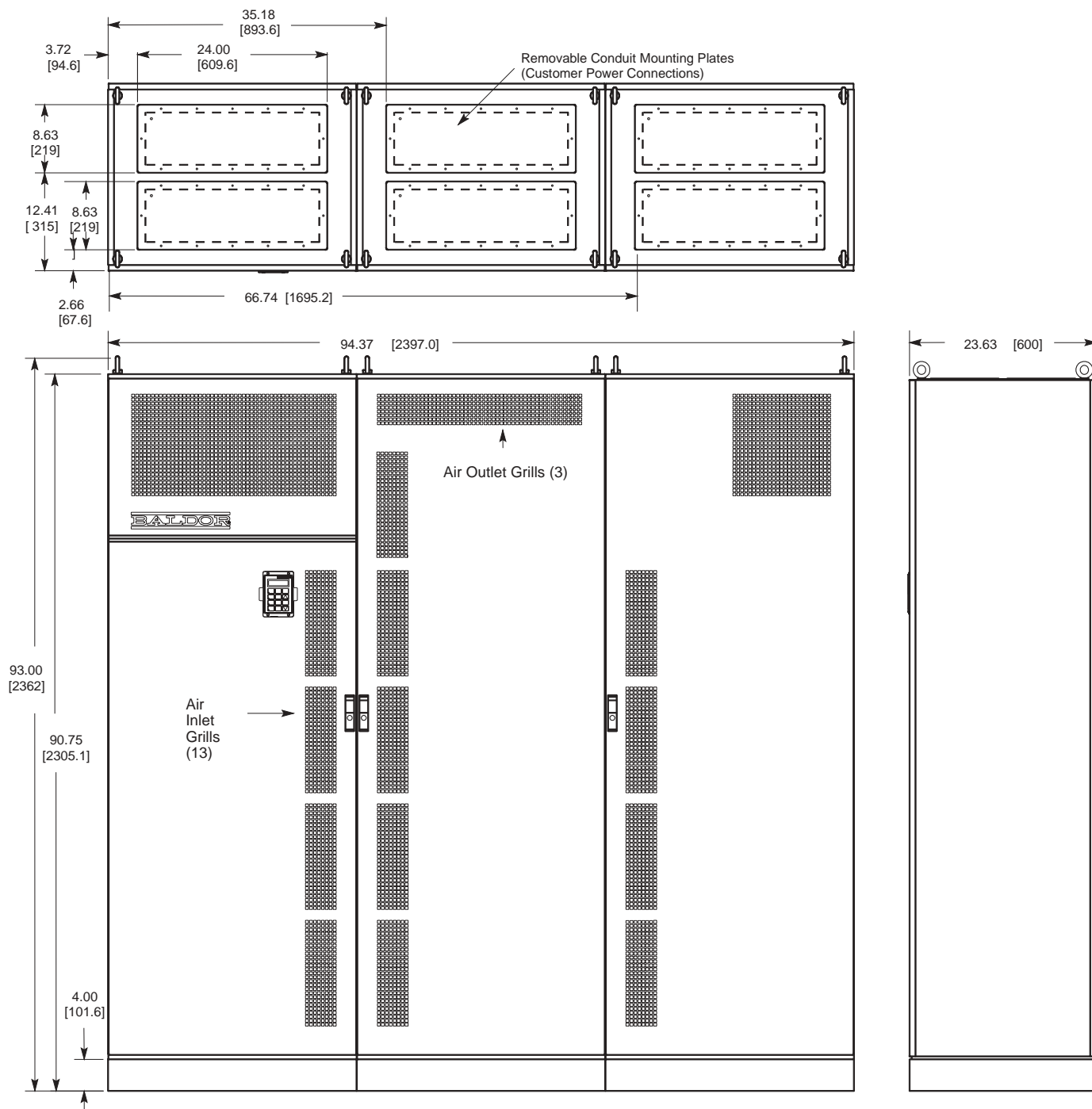
Dimensions

Size G+ Controls

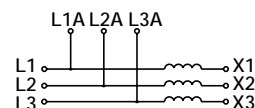
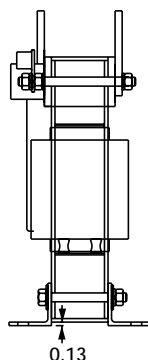
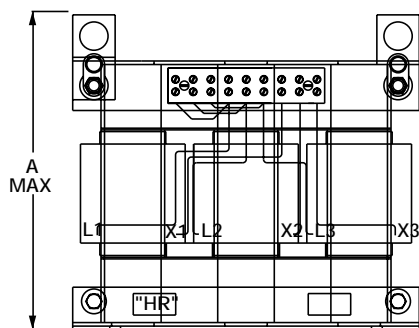
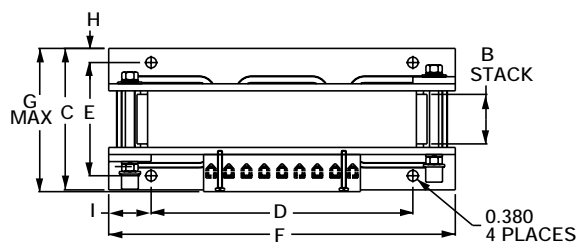


Dimensions

Size H Controls



EK Controls - Line Reactor Dimensions and Weights



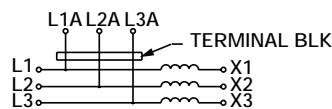
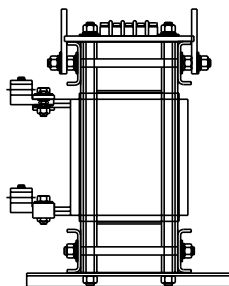
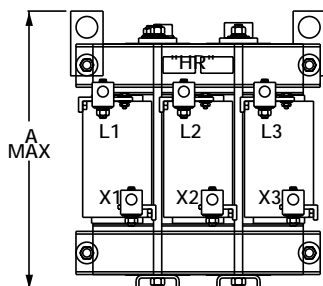
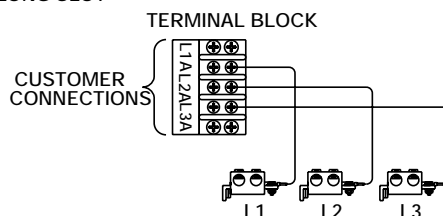
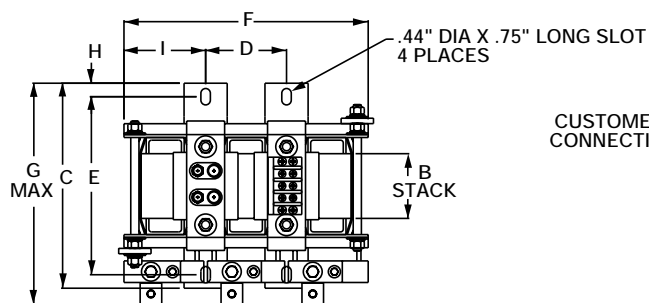
2080708 TEST:

HI-POT: 2500V
 INDUCTANCE: 1.5mH-10% AT 55A, 60HZ.

2080709 TEST:

HI-POT: 2500V
 INDUCTANCE: 1.2mH-10% AT 68A, 60HZ.

ELECTRICAL SPECS/APPROXIMATE WEIGHT					DIMENSIONS (inches)								
HP	BALDOR P/N	mH	AMPS	POUNDS	A	B	C	D	E	F	G	H	I
60	V2080709	1.20	68	80	11.75	2.25	5.50	9.25	4.50	12.25	5.75	0.50	1.50



2080710 TEST:

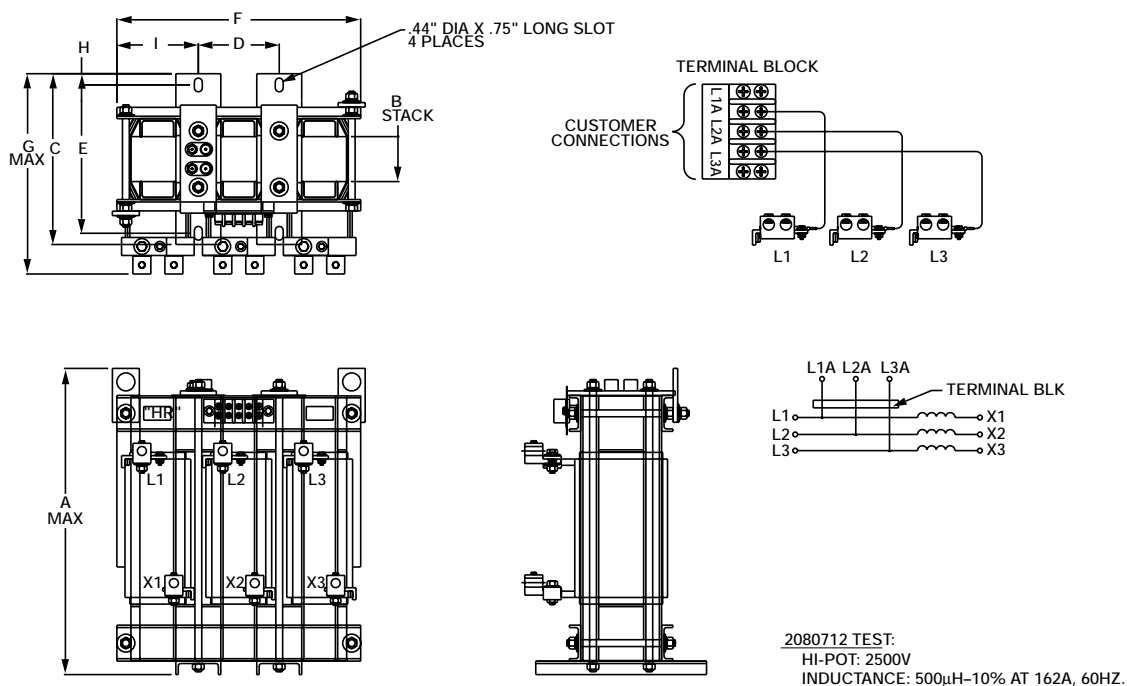
HI-POT: 2500V
 INDUCTANCE: 1mH-10% AT 85A, 60HZ.

2080711 TEST:

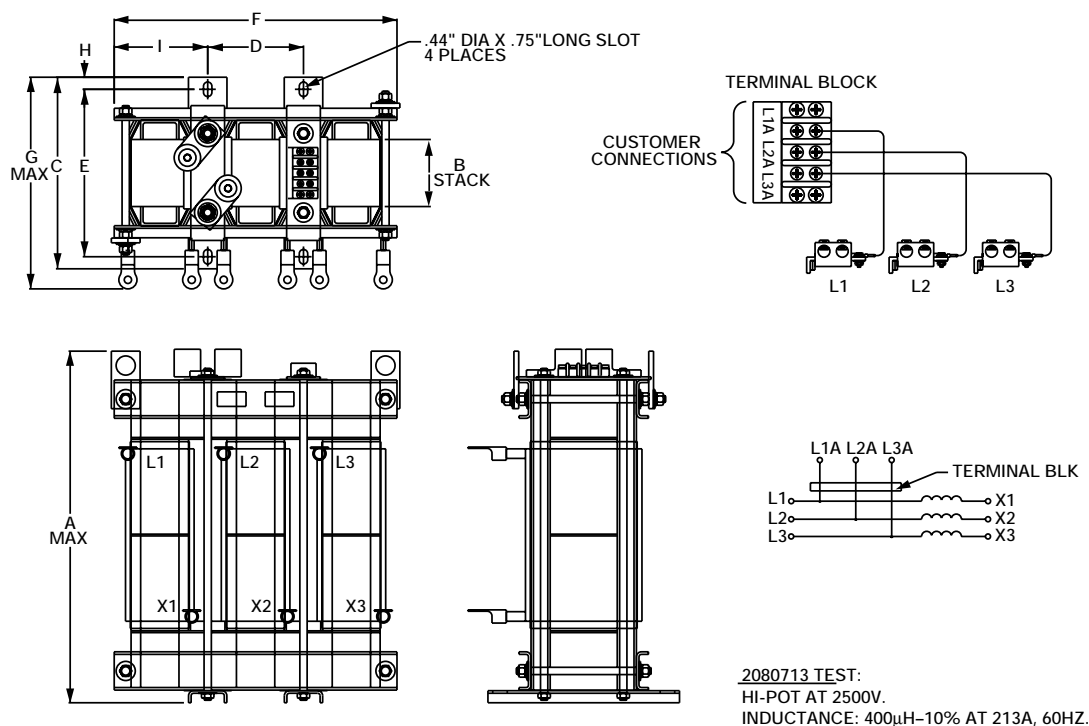
HI-POT: 2500V
 INDUCTANCE: .75mH-10% AT 106A, 60HZ.

ELECTRICAL SPECS/APPROXIMATE WEIGHT					DIMENSIONS (inches)								
HP	BALDOR P/N	mH	AMPS	POUNDS	A	B	C	D	E	F	G	H	I
75	V2080710	1.00	85	100	13.50	3.00	9.50	3.75	8.25	11.32	10.75	0.62	3.79
100	V2080711	0.75	106	125	15.50	3.00	9.25	3.75	8.25	11.32	11.00	0.63	3.79

EK Controls - Line Reactor Dimensions and Weights



ELECTRICAL SPECS/APPROXIMATE WEIGHT					DIMENSIONS (inches)								
HP	BALDOR P/N	mH	AMPS	POUNDS	A	B	C	D	E	F	G	H	I
150	V2080712	0.50	162	155	18.00	2.50	9.50	4.50	8.25	13.56	12.00	0.63	4.53



ELECTRICAL SPECS/APPROXIMATE WEIGHT					DIMENSIONS (inches)								
HP	BALDOR P/N	mH	AMPS	POUNDS	A	B	C	D	E	F	G	H	I
200	V2080713	0.40	213	220	19.00	3.50	10.00	5.00	8.74	14.75	11.75	0.63	4.88

Expansion Boards

Baldor offers a wide variety of plug-in expansion boards to allow Series 21H Inverters and 22H Vector Controls to be interfaced with various inputs and outputs. One or two 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 will allow direct interfacing with popular PLC's.

Group 1 and Group 2 Ordering/Mounting Information

Expansion boards plug into the main control board inside the control. When using one expansion board, either a Group 1 or Group 2, the board will connect to the main control board. When two expansions boards are used, one must be from Group 1 and one from Group 2. The Group 1 board will connect to the main control board and the Group 2 board will connect to a stacking connector on the Group 1 board.

Group 1 Boards

Isolated Input Board - EXB003AXX

This board replaces the opto inputs on the main control board with isolated relay inputs and are jumper configurable for 10-30 VDC, 10-30 VAC, or 90-130 VAC. All inputs must be in the same voltage range and one side of all inputs is common. Screw terminals are provided for easy connection.

Master Pulse Reference/Isolated Pulse Follower - EXB005AXX

This board is jumper selectable to create a master pulse reference based on the controls speed/direction command or 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.

DC Tach Interface - EXB006AXX

Allows a DC Tachometer to be used as a feedback or command signal to the controls built-in PID Set Point Controller. Jumper selectable for 7, 10, 15, 20, 30, 50, 60, 100, 200, 250 VDC per 1000 RPM tachometers with a software trim for 10% tolerance. Screw terminals are provided for easy connection.

Isolated Encoder Feedback - EXB008AXX

Allows an encoder to be used as a feedback or command signal to the controls built-in PID Set Point Controller. An isolated power supply is jumper selectable to provide 5, 12, and 15 VDC to power the encoder. A retransmit signal is also provided to retransmit two channels in quadrature with complements or jumper selectable for one channel and index channel both with complements.

Resolver to Digital Interface - EXB009AXX

Allows use of a single speed (two pole) resolver as motor feedback instead of an encoder. The board has a dip switch to change from 10 through 16 bit. The resolution limits the maximum speed as shown below. The bandwidths are also lower as the resolution increases. Uses screw terminals for connection.

<u>Resolution</u>	<u>Max Speed (2 pole Resolver)</u>
10 bit	62,400 RPM
12 bit	15,600 RPM
14 bit	3,900 RPM
16 bit	975 RPM

Group 2 Boards

RS232 Serial Communication - EXB001AXX

Allows serial communication for commands and monitoring using half of full duplex with up to 19.2K baud maximum. A DB-9 connector is supplied for easy connection to expansion board.

RS422/RS485 Serial Communication - EXB002AXX

Allows serial communication for commands and monitoring. RS422 can be transmitted in half or full duplex. RS485 is transmitted in half duplex. 115.2K baud maximum transmission rate. Screw terminals are provided for easy connection.

RS232/RS485 High Speed Serial Communication - EXB012AXX

Allows high speed communications for commands and monitoring. 230.4k baud maximum communication speed. Uses a DB-9 connector for RS232 and screw terminals for RS485.

Four Output Relay/3-15 PSI Pneumatic Interface - EXB004AXX

Converts 3-15 PSI air pressure to 0-10 VDC or 10-0 VDC (inverted) to be used as a command or feedback signal. Also includes four output relays to replace the four opto outputs on the main control board. Two relays are jumper selectable for N.O. or N.C., rated for 115 VAC, 3 Amps max and two form "C" relays (N.O. and N.C.). Screw terminals are provided for relay connections and air hose connects to 1/8" O.D. nipple on expansion board.

High Resolution Analog Board - EXB007AXX

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. 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. Screw terminals are provided for easy connection.

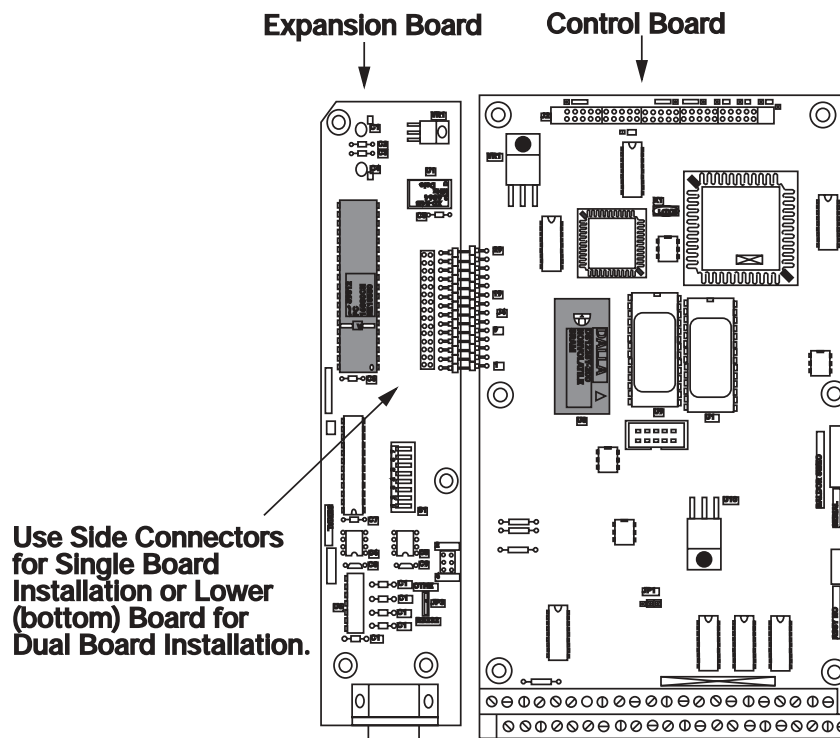
Two Isolated Analog Output/Three Relay Output - EXB010AXX

Provides two isolated analog outputs for remote process measurement and display. Also three dry contact relay outputs are provided and each is rated at 230vac, 5 amp maximum (these outputs replace opto outputs 1-3).

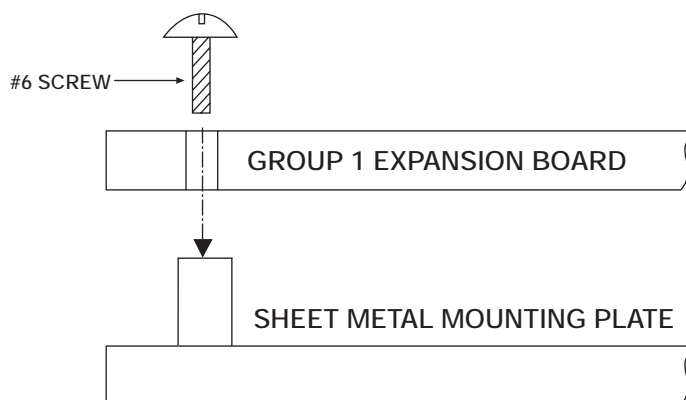
DeviceNet Communications - EXB013AXX

Allows an H series control to be connected and communicate on a DeviceNet bus. Uses plug in terminals for connection.

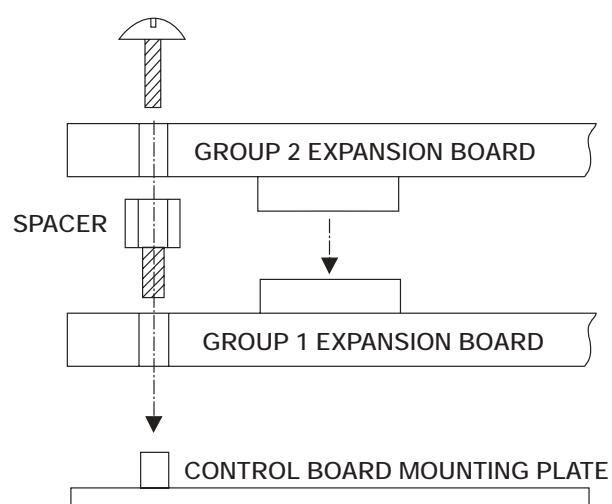
Expansion Board Installation



Single Board Installation



Dual Board Installation



Other quality products from Baldor to serve your Processing Industry needs.

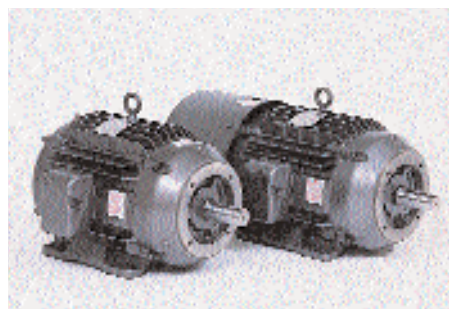
No one offers a broader line of motors and drives than Baldor-no one!

Control Engineering Article

In the November 1994 edition of Control Engineering Magazine, Baldor's line of Regenerative AC Drives was featured as a solution to limiting harmonic distortion to comply with IEEE Std. 519-1992. The article provides answers to many questions concerning the harmonic current and voltage waveforms reflected back to the power line on non-regenerative and line regenerative motor controls. If you would like a copy of this article reprint, please contact your local Baldor office or call our literature hotline at 1-800-828-4920.

Machine Design and Baldor Address IEEE Std. 519-1992

In 1992 a recommended practice dealing specifically with the limitation of line harmonics was adopted. This "standard", now referred to as IEEE 519-1992 lists the maximum allowable harmonic current distortion value as a percentage of demand current. This recommended practice is being adopted by more and more utility companies in response to problems experienced by the power companies and their customers. In today's industrial environment many power companies and equipment manufacturers including Baldor are cooperating to meet this new "standard". If you would like information on combating harmonics in variable speed drive applications, contact your local Baldor office or call our literature hotline at 1-800-828-4920.



Baldor Vector Drive Motors

Baldor Vector Drive Motors are designed for the tough applications found in today's industrial environments. Premium efficiency designs increase energy savings, lower the motor's operating temperature and increase the motor's life. Standard features include:

- TENV and TEBC enclosures
- Full class F insulation system
- Stock ratings from .5 to 200hp
- Precision balanced to 6000 RPM (.5-10HP) and 4000 RPM (15-200HP)
- 1024 Line count encoder standard

Baldor Electric Company

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International Fax (501) 648-5895