

**Description**

The AZBDC10A4 PWM servo drive is designed to drive brushless and brushed DC motors at a high switching frequency. To increase system reliability and to reduce cabling costs, the drive is designed for direct integration into your PCB. The AZBDC10A4 is fully protected against over-voltage, under-voltage, over-current, over-heating, and short-circuits. A single digital output indicates operating status. The drive interfaces with digital controllers that have digital PWM output. The PWM IN duty cycle determines the output current and DIR input determines the direction of rotation. This servo drive requires only a single unregulated isolated DC power supply, and is fully RoHS (Reduction of Hazardous Substances) compliant.

See Part Numbering Information on last page of datasheet for additional ordering options.

**Power Range**

Peak Current	10 A
Continuous Current	5 A
Supply Voltage	10 - 36 VDC



**Features**

- ▲ Four Quadrant Regenerative Operation
- ▲ Direct Board-to-Board Integration
- ▲ Lightweight
- ▲ High Switching Frequency
- ▲ Wide Temperature Range
- ▲ Differential Input Command
- ▲ Digital Fault Output Monitor
- ▲ Current Monitor Output
- ▲ Single Supply Operation
- ▲ Compact Size
- ▲ High Power Density
- ▲ 12VDC Operation

**HARDWARE PROTECTION**

- Over-Voltage
- Under-Voltage
- Over-Current
- Over-Temperature
- Short-circuit (phase-phase)
- Short-circuit (phase-ground)

**INPUTS/OUTPUTS**

- Digital Fault Output
- Digital Inhibit Input
- Analog Current Monitor
- Analog Command Input

**FEEDBACK SUPPORTED**

- Hall Sensors

**MODES OF OPERATION**

- Current

**COMMUTATION**

- Trapezoidal

**MOTORS SUPPORTED**

- Three Phase (Brushless)
- Single Phase (Brushed, Voice Coil, Inductive Load)

**COMMAND SOURCE**

- PWM

**COMPLIANCES & AGENCY APPROVALS**

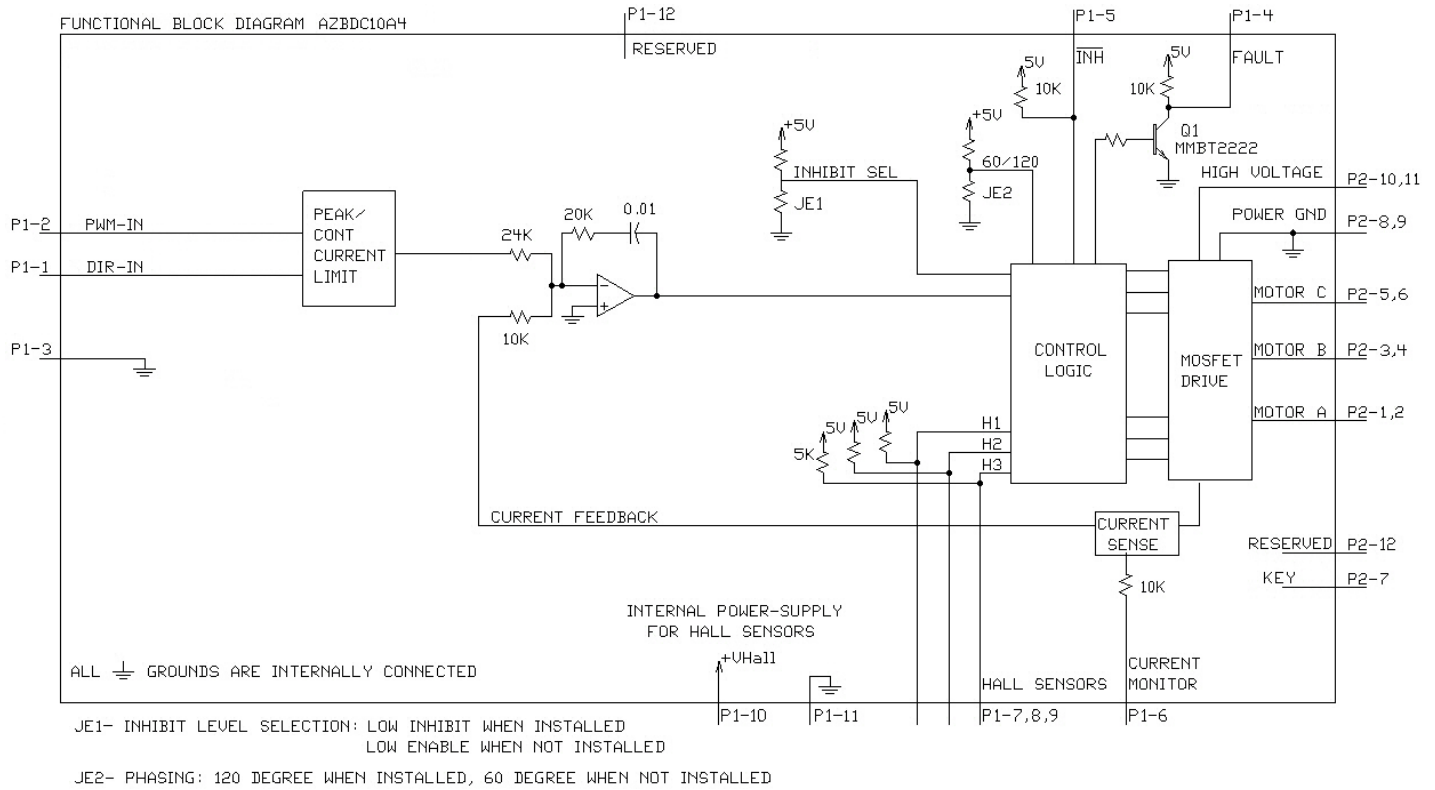
- RoHS
- UL/cUL Pending
- CE Pending

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**BLOCK DIAGRAM**



**Information on Approvals and Compliances**



RoHS (Reduction of Hazardous Substances) is intended to prevent hazardous substances such as lead from being manufactured in electrical and electronic equipment.

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**SPECIFICATIONS**

Power Specifications		
Description	Units	Value
DC Supply Voltage Range	VDC	10 - 36
DC Bus Under Voltage Limit	VDC	8
DC Bus Over Voltage Limit	VDC	40
Maximum Peak Output Current <sup>1</sup>	A	10
Maximum Continuous Output Current	A	5
Maximum Continuous Output Power	W	171
Maximum Power Dissipation at Continuous Current	W	9
Minimum Load Inductance (Line-To-Line) <sup>2</sup>	μH	100
Internal Bus Capacitance <sup>3</sup>	μF	23.5
Low Voltage Supply Outputs	-	+5 VDC (30 mA)
Switching Frequency	kHz	40
Control Specifications		
Description	Units	Value
Command Sources	-	PWM
PWM Input Frequency Range	-	10 - 25
Feedback Supported	-	Halls
Commutation Methods	-	Trapezoidal
Modes of Operation	-	Current
Motors Supported	-	Three Phase (Brushless), Single Phase (Brushed, Voice Coil, Inductive Load)
Hardware Protection	-	Invalid Commutation Feedback, Over Current, Over Temperature, Over Voltage, Under Voltage, Short Circuit (Phase-Phase & Phase-Ground)
Mechanical Specifications		
Description	Units	Value
Agency Approvals	-	RoHS, UL/cUL Pending, CE Pending
Size (H x W x D)	mm (in)	38.1 x 38.1 x 7.34 (1.50 x 1.50 x 0.29)
Weight	g (oz)	8.5 (0.3)
Operating Temperature Range <sup>4</sup>	°C (°F)	0 - 85 (32 - 185)
Storage Temperature Range	°C (°F)	-40 - 85 (-40 - 185)
Relative Humidity	-	0 - 90% Non-Condensing
Form Factor	-	PCB Mounted
P1 Connector	-	12-pin, 1.27 mm spaced header
P2 Connector	-	12-pin, 1.27 mm spaced header

**Notes**

1. Maximum duration of peak current is ~2 seconds. Peak RMS value must not exceed continuous current rating of the drive.
2. Lower inductance is acceptable for bus voltages well below maximum. Use external inductance to meet requirements.
3. Requires a minimum of 47 μF external bus capacitance between the DC Supply and Power Ground.
4. Additional cooling and/or heatsink may be required to achieve rated performance.

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## PIN FUNCTIONS

P1 - Signal Connector			
Pin	Name	Description / Notes	I/O
1	DIRECTION	Direction Input (+5V)	I
2	PWM / IN	10 – 25 kHz pulse width modulated digital input command (+5V). Input duty cycle commands the output current.	I
3	SIGNAL GND	Signal Ground (Common With Power Ground).	GND
4	FAULT OUT	TTL level (+5 V) output becomes high when power devices are disabled due to at least one of the following conditions: inhibit, invalid Hall state, output short circuit, over voltage, over temperature, power-up reset.	O
5	INHIBIT IN	TTL level (+5 V) inhibit/enable input. Leave open to enable drive. Pull to ground to inhibit drive. Inhibit turns off all power devices.	I
6	CURRENT MONITOR	Current Monitor. Analog output signal proportional to the actual current output. Scaling is 2 A/V. Measure relative to signal ground.	O
7	HALL 3	Single-ended Hall/Commutation Sensor Inputs (+5 V logic level)	I
8	HALL 2*		I
9	HALL 1		I
10	+V HALL OUT	Low Power Supply For Hall Sensors (+5 V @ 30 mA). Referenced to signal ground. Short circuit protected.	O
11	SIGNAL GND	Signal Ground (Common With Power Ground).	GND
12	RESERVED	Reserved	-

P2 - Power Connector			
Pin	Name	Description / Notes	I/O
1	MOTOR A	Motor Phase Outputs. Current output distributed equally across 2 pins per motor phase, 3A continuous current carrying capacity per pin.	O
2	MOTOR A		O
3	MOTOR B		O
4	MOTOR B		O
5	MOTOR C		O
6	MOTOR C		O
7	NC (KEY)	No Connection. Keyed pin.	-
8	PWR GND	Power Ground (Common With Signal Ground). 3A Continuous Current Rating Per Pin	GND
9	PWR GND		GND
10	HV IN	DC Power Input. 3A Continuous Current Rating Per Pin. Requires a minimum of 47 $\mu$ F external capacitance between HV IN and PWR GND pins.	I
11	HV IN		I
12	RESERVED	Reserved	-

\*For use with Single Phase (Brushed) motors, ground Hall 2 and only connect motor leads to Motor A and Motor B.

**Note:** P1 and P2 are identical 12-pin headers. To avoid damage to the drive, be sure when plugging or soldering the drive into a PCB or interface card that the drive orientation is correct. P1 and P2 are labeled on the PCB silkscreen. Pin 7 on P2 is keyed to differentiate it from P1. Consult the mounting dimension drawing on page 6 of this datasheet for an illustration of the locations of P1 and P2.

## HARDWARE SETTINGS

### Jumper Settings

Jumpers are SMT, 0 ohm resistors located on the underside of the drive PCB. By default, the drive is configured with the jumpers installed. Typical drive operation will not require the jumpers to be removed. Please contact the factory before jumper removal.

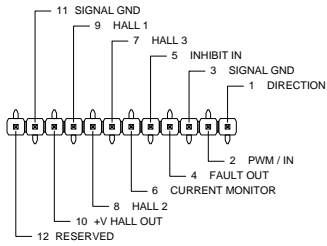
Jumper	Description	Configuration	
		Not Installed	Installed
JE1	Inhibit logic. Sets the logic level of inhibit pins. Labeled JE1 on the PCB of the drive.	Low Enable	Low Inhibit
JE2	Hall sensor phasing. Selects 120 or 60 degree commutation phasing. Labeled JE2 on the PCB of the drive.	60 degree	120 degree

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**MECHANICAL INFORMATION**

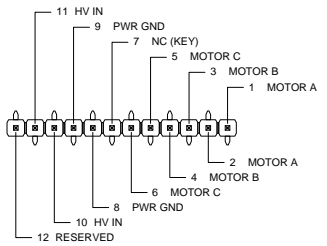
**P1 - Signal Connector**

Connector Information		12-pin, 1.27 mm spaced header
Mating Connector	Details	Samtec: SLM-112-01-L-S
	Included with Drive	No

**P2 - Power Connector**

Connector Information		12-pin, 1.27 mm spaced header
Mating Connector	Details	Samtec: SLM-112-01-L-S
	Included with Drive	No

Sold & Serviced By:



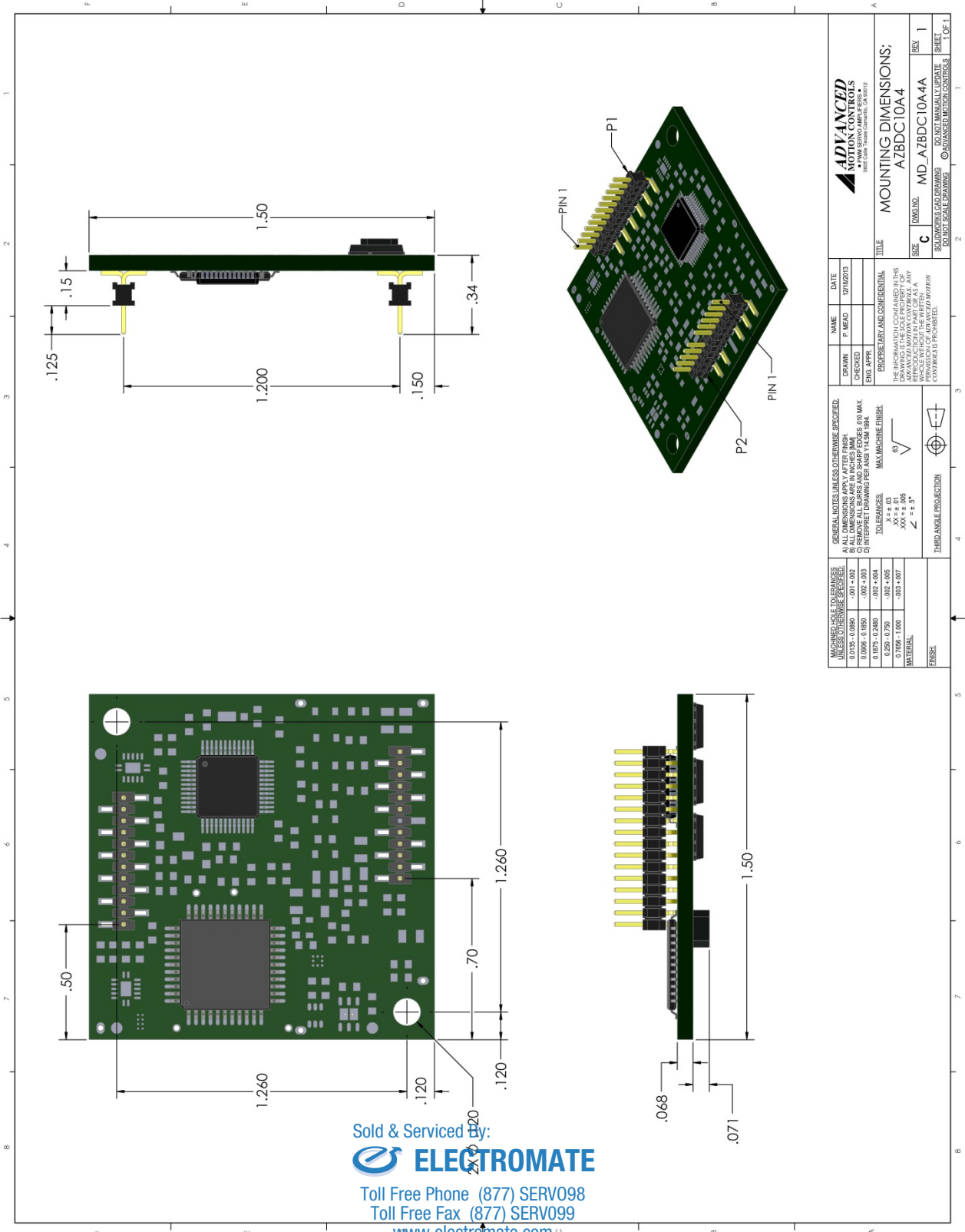
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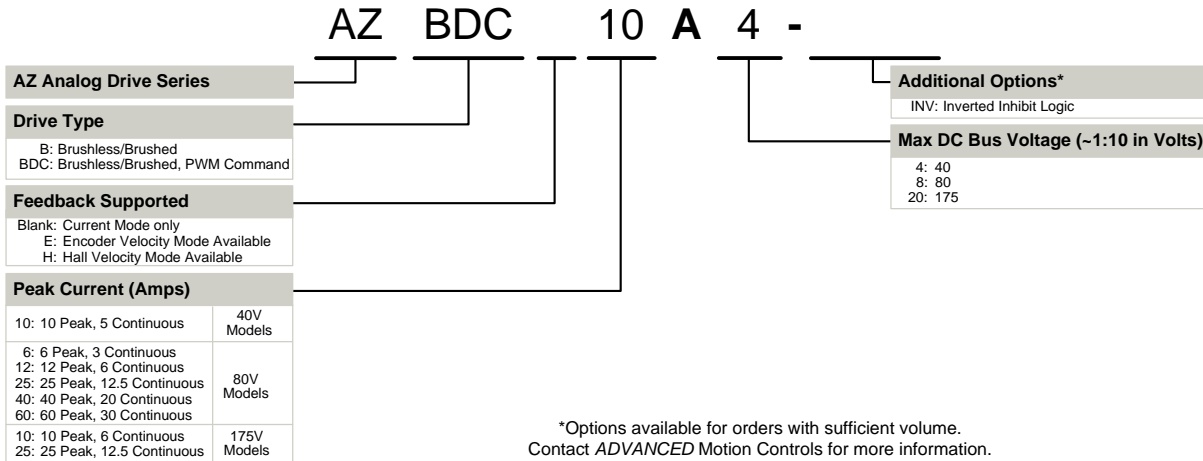
**MOUNTING DIMENSIONS**



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MACHINED/SCALE TOLERANCES UNLESS OTHERWISE SPECIFIED:		NAME		DATE	
0.015 - 0.080	.001 - .002	DRAWN	P. MEAD	CHECKED	12/16/03
0.085 - 0.150	.002 - .003	ENG. APPR.			
0.155 - 0.250	.003 - .005	GENERAL NOTES UNLESS OTHERWISE SPECIFIED:			
0.255 - 0.500	.005 - .010	A) ALL DIMENSIONS APPLY AFTER FINISH.			
0.505 - 1.000	.010 - .015	B) REMOVE ALL BURRS AND SHARP EDGES 010 MAX.			
		C) REMOVE ALL DIMENSIONAL TOLERANCES FROM DIMENSIONS.			
		D) INTERPRET DRAWING PER ANSI Y14.5M 1994.			
TOLERANCES		MAX. MACHINE FINISH		THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF ADVANCED MOTION CONTROLS. ANY REPRODUCTION OR TRANSMISSION IN ANY FORM OR BY ANY MEANS WITHOUT THE WRITTEN PERMISSION OF ADVANCED MOTION CONTROLS IS PROHIBITED.	
±.005	±.005	8/		REV 1	
±.010	±.010	XX ± .01		C	
±.015	±.015	XX ± .015		MD, AZBDC10A4A	
±.020	±.020	XX ± .020		AZBDC10A4	
±.030	±.030	XX ± .030		MOUNTING DIMENSIONS	
±.040	±.040	XX ± .040		REV 1	
±.050	±.050	XX ± .050		SCALE: AS SHOWN	
±.060	±.060	XX ± .060		DATE: 12/16/03	
±.070	±.070	XX ± .070		DRAWN BY: P. MEAD	
±.080	±.080	XX ± .080		CHECKED BY:	
±.090	±.090	XX ± .090		ENG. APPR.:	
±.100	±.100	XX ± .100		TITLE: MOUNTING DIMENSIONS	
±.125	±.125	XX ± .125		SIZE: C	
±.150	±.150	XX ± .150		SCALE: AS SHOWN	
±.175	±.175	XX ± .175		DATE: 12/16/03	
±.200	±.200	XX ± .200		DRAWN BY: P. MEAD	
±.225	±.225	XX ± .225		CHECKED BY:	
±.250	±.250	XX ± .250		ENG. APPR.:	
±.275	±.275	XX ± .275		TITLE: MOUNTING DIMENSIONS	
±.300	±.300	XX ± .300		SIZE: C	
±.325	±.325	XX ± .325		SCALE: AS SHOWN	
±.350	±.350	XX ± .350		DATE: 12/16/03	
±.375	±.375	XX ± .375		DRAWN BY: P. MEAD	
±.400	±.400	XX ± .400		CHECKED BY:	
±.425	±.425	XX ± .425		ENG. APPR.:	
±.450	±.450	XX ± .450		TITLE: MOUNTING DIMENSIONS	
±.475	±.475	XX ± .475		SIZE: C	
±.500	±.500	XX ± .500		SCALE: AS SHOWN	
±.525	±.525	XX ± .525		DATE: 12/16/03	
±.550	±.550	XX ± .550		DRAWN BY: P. MEAD	
±.575	±.575	XX ± .575		CHECKED BY:	
±.600	±.600	XX ± .600		ENG. APPR.:	
±.625	±.625	XX ± .625		TITLE: MOUNTING DIMENSIONS	
±.650	±.650	XX ± .650		SIZE: C	
±.675	±.675	XX ± .675		SCALE: AS SHOWN	
±.700	±.700	XX ± .700		DATE: 12/16/03	
±.725	±.725	XX ± .725		DRAWN BY: P. MEAD	
±.750	±.750	XX ± .750		CHECKED BY:	
±.775	±.775	XX ± .775		ENG. APPR.:	
±.800	±.800	XX ± .800		TITLE: MOUNTING DIMENSIONS	
±.825	±.825	XX ± .825		SIZE: C	
±.850	±.850	XX ± .850		SCALE: AS SHOWN	
±.875	±.875	XX ± .875		DATE: 12/16/03	
±.900	±.900	XX ± .900		DRAWN BY: P. MEAD	
±.925	±.925	XX ± .925		CHECKED BY:	
±.950	±.950	XX ± .950		ENG. APPR.:	
±.975	±.975	XX ± .975		TITLE: MOUNTING DIMENSIONS	
±1.000	±1.000	XX ± 1.000		SIZE: C	
±1.025	±1.025	XX ± 1.025		SCALE: AS SHOWN	
±1.050	±1.050	XX ± 1.050		DATE: 12/16/03	
±1.075	±1.075	XX ± 1.075		DRAWN BY: P. MEAD	
±1.100	±1.100	XX ± 1.100		CHECKED BY:	
±1.125	±1.125	XX ± 1.125		ENG. APPR.:	
±1.150	±1.150	XX ± 1.150		TITLE: MOUNTING DIMENSIONS	
±1.175	±1.175	XX ± 1.175		SIZE: C	
±1.200	±1.200	XX ± 1.200		SCALE: AS SHOWN	
±1.225	±1.225	XX ± 1.225		DATE: 12/16/03	
±1.250	±1.250	XX ± 1.250		DRAWN BY: P. MEAD	
±1.275	±1.275	XX ± 1.275		CHECKED BY:	
±1.300	±1.300	XX ± 1.300		ENG. APPR.:	
±1.325	±1.325	XX ± 1.325		TITLE: MOUNTING DIMENSIONS	
±1.350	±1.350	XX ± 1.350		SIZE: C	
±1.375	±1.375	XX ± 1.375		SCALE: AS SHOWN	
±1.400	±1.400	XX ± 1.400		DATE: 12/16/03	
±1.425	±1.425	XX ± 1.425		DRAWN BY: P. MEAD	
±1.450	±1.450	XX ± 1.450		CHECKED BY:	
±1.475	±1.475	XX ± 1.475		ENG. APPR.:	
±1.500	±1.500	XX ± 1.500		TITLE: MOUNTING DIMENSIONS	
±1.525	±1.525	XX ± 1.525		SIZE: C	
±1.550	±1.550	XX ± 1.550		SCALE: AS SHOWN	
±1.575	±1.575	XX ± 1.575		DATE: 12/16/03	
±1.600	±1.600	XX ± 1.600		DRAWN BY: P. MEAD	
±1.625	±1.625	XX ± 1.625		CHECKED BY:	
±1.650	±1.650	XX ± 1.650		ENG. APPR.:	
±1.675	±1.675	XX ± 1.675		TITLE: MOUNTING DIMENSIONS	
±1.700	±1.700	XX ± 1.700		SIZE: C	
±1.725	±1.725	XX ± 1.725		SCALE: AS SHOWN	
±1.750	±1.750	XX ± 1.750		DATE: 12/16/03	
±1.775	±1.775	XX ± 1.775		DRAWN BY: P. MEAD	
±1.800	±1.800	XX ± 1.800		CHECKED BY:	
±1.825	±1.825	XX ± 1.825		ENG. APPR.:	
±1.850	±1.850	XX ± 1.850		TITLE: MOUNTING DIMENSIONS	
±1.875	±1.875	XX ± 1.875		SIZE: C	
±1.900	±1.900	XX ± 1.900		SCALE: AS SHOWN	
±1.925	±1.925	XX ± 1.925		DATE: 12/16/03	
±1.950	±1.950	XX ± 1.950		DRAWN BY: P. MEAD	
±1.975	±1.975	XX ± 1.975		CHECKED BY:	
±2.000	±2.000	XX ± 2.000		ENG. APPR.:	

**PART NUMBERING INFORMATION**



ADVANCED Motion Controls AZ series of servo drives are available in many configurations. Note that not all possible part number combinations are offered as standard drives. All models listed in the selection tables of the website are readily available, standard product offerings.

ADVANCED Motion Controls also has the capability to promptly develop and deliver specified products for OEMs with volume requests. Our Applications and Engineering Departments will work closely with your design team through all stages of development in order to provide the best servo drive solution for your system. Equipped with on-site manufacturing for quick-turn customs capabilities, ADVANCED Motion Controls utilizes our years of engineering and manufacturing expertise to decrease your costs and time-to-market while increasing system quality and reliability.

**Examples of Modifications and Customized Products**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>▲ Integration of Drive into Motor Housing</li> <li>▲ Mount OEM PCB onto Drive Without Cables</li> <li>▲ Multi-axis Configuration for Compact System</li> <li>▲ Custom PCB and Baseplate for Optimized Footprint</li> <li>▲ RTV/Epoxy Components for High Vibration</li> <li>▲ OEM Specified Connectors for Instant Compatibility</li> <li>▲ OEM Specified Silkscreen for Custom Appearance</li> <li>▲ Increased Thermal Limits for High Temp. Operation</li> </ul> | <ul style="list-style-type: none"> <li>▲ Integrate OEM Circuitry onto Drive PCB</li> <li>▲ Custom Control Loop Tuned to Motor Characteristics</li> <li>▲ Custom I/O Interface for System Compatibility</li> <li>▲ Preset Switches and Pots to Reduce User Setup</li> <li>▲ Optimized Switching Frequency</li> <li>▲ Ramped Velocity Command for Smooth Acceleration</li> <li>▲ Remove Unused Features to Reduce OEM Cost</li> <li>▲ Application Specific Current and Voltage Limits</li> </ul> |
|---|--|

Feel free to contact Applications Engineering for further information and details.

**Available Accessories**

ADVANCED Motion Controls offers a variety of accessories designed to facilitate drive integration into a servo system. Visit [www.a-m-c.com](http://www.a-m-c.com) to see which accessories will assist with your application design and implementation.



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