

EZCTRL17 MODES

MODE1: I/O CONTROLLER
MODE2: 4 AXIS STEPPER CONTROLLER
MODE3: 2 AXIS SERVO CONTROLLER
MODE4: 4 AXIS TEMPERATURE CONTROLLER
MODE3: 3 AXIS RC SERVO CONTROLLER

POWER AND
RS485 / CAN
COMMUNICATIONS
INPUT

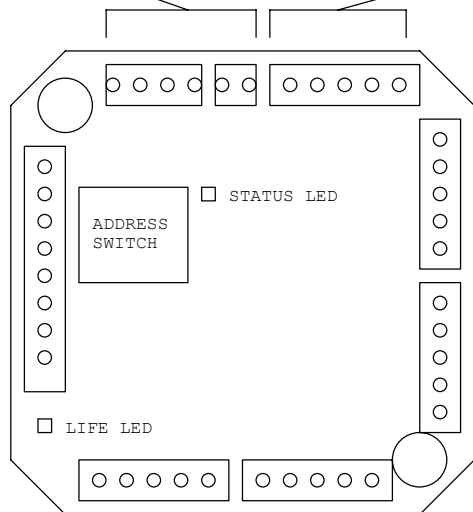
I/O MODE: 3 ANALOG INPUTS / 2 OUTPUTS

4 AXIS CONTROLLER MODE: STEP AND DIR OUTPUT AXIS #1

SERVO CONTROLLER MODE: 3 INPUTS / 2 OUTPUTS

INPUT
CONNECTOR
4
ANALOG
INPUTS

ENCODER
INPUT



I/O MODE: 3 ANALOG INPUTS / 2 OUTPUTS

4 AXIS CONTROLLER MODE: STEP AND DIR OUTPUT AXIS #2

SERVO CONTROLLER MODE: +/- 10V OUTPUT SERVO AXIS #1

I/O MODE: 3 ANALOG INPUTS / 2 OUTPUTS

4 AXIS CONTROLLER MODE: STEP AND DIR OUTPUT AXIS #3

SERVO CONTROLLER MODE: +/- 10V OUTPUT SERVO AXIS #2

ENCODER
INPUT

I/O MODE: 3 ANALOG INPUTS / 2 OUTPUTS

4 AXIS CONTROLLER MODE: STEP AND DIR OUTPUT AXIS #4

SERVO CONTROLLER MODE: 3 INPUTS / 2 OUTPUTS

EZCTRL17 WIRED AS 4 AXIS CONTROLLER

9V TO 28V
POWER
SUPPLY

GROUND
+9V TO +28V

RS485 A
RS485 B
GROUND
+9V TO +28V

RS485 CONVERTER

DB9 TO COM
PORT ON PC

TO PC COM PORT

USE 9600 BAUD
8BIT, NO PARITY,
1 STOP, NO FLOW
CTRL.

AXIS #1 OUTPUT

GROUND
RS485 B
RS485 A
CAN HI
CAN LO
+9V TO +28V
GROUND
STEP OUTPUT
DIRECTION OUT
ANALOG INPUT

TO MOTOR
DRIVER

AXIS #2 OUTPUT

+9V TO +28V
GROUND
STEP OUTPUT
DIRECTION OUT
ANALOG INPUT

TO MOTOR
DRIVER

AXIS #3 OUTPUT

+9V TO +28V
GROUND
STEP OUTPUT
DIRECTION OUT
ANALOG INPUT

TO MOTOR
DRIVER

AXIS #4 OUTPUT

ANALOG INPUT
DIRECTION OUT
STEP OUTPUT
GROUND
+9V TO +28V

TO MOTOR
DRIVER

OPTIONAL ENCODER

PAGE DOWN FOR NEXT MODE

STEP AND DIR MODE	DUAL ENCODER MODE	DEFAULT MODE
		OPTO SENSOR #1 GROUND
		OPTO SENSOR #1 INPUT
		OPTO SENSOR #1 LED
		OPTO SENSOR #2 GROUND
	INDEX 2	OPTO SENSOR #2 INPUT
		OPTO SENSOR #2 LED
STEP IN	CHAN A2	SWITCH #1 INPUT
DIR IN	CHAN B2	SWITCH #2 INPUT

DO NOT UNPLUG LOADS WHILE POWER IS ON

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Size	Document Number	Rev
B	EZ CTRL WIRING	B6
Date:	Monday, October 26, 2009	Sheet 2 of 7

EZCTRL17 WIRED AS 2 AXIS SERVO CONTROLLER

9V TO 28V POWER
SUPPLY

GROUND
+12V to +28V

RS485 CONVERTER

TO PC COM PORT

USE 9600 BAUD
8BIT, NO PARITY,
1 STOP, NO FLOW
CTRL.

RS485 A
RS485 B
GROUND
+9V TO +28V

+9V TO +28V
GROUND
RS485 B
RS485 A
CAN HI
CAN LO
+9V TO +28V
GROUND
0.7A OUTPUT / ANALG IN
2A OUTPUT
ANALOG INPUT

I/O
BLOCK
#1

SERVO
AXIS
#1

+9V TO +28V
GROUND
DRIVER ENABLE OUTPUT
+/- 10V OUT
ANALOG INPUT / AXIS HOME INPUT

SERVO
AMPLIFIER

MOTOR

ENCODER

+9V TO +28V
GROUND
DRIVER ENABLE OUTPUT
+/- 10V OUT
ANALOG INPUT / AXIS HOME INPUT

SERVO
AMPLIFIER

MOTOR

ENCODER

SERVO
AXIS
#2

DO NOT UNPLUG LOADS WHILE POWER IS ON

SERVO
AXIS #1
ENCODER

I/O
BLOCK
#4

OPTIONAL ENCODER

CHAN B
+5V
CHAN A
INDEX
GROUND
ANALOG INPUT
2A OUTPUT
ANALOG INPUT
GROUND
+9V TO +28V

SERVO
AXIS #2
ENCODER

AXIS #2 HOME /AXIS #2 INDEX

AXIS #2 ENCODER CHAN A
AXIS #2 ENCODER CHAN B

GROUND

AXIS #1 HOME

GROUND

ADDRESS SWITCH

STATUS LED

LIFE LED

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PAGE DOWN FOR NEXT MODE

Title		
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Size	Document Number	Rev
B	EZ CTRL WIRING	B6
Date:	Monday, October 26, 2009	Sheet 3 of 7

EZCTRL17 WIRED AS GENERAL PURPOSE I/O BOARD

9V TO 28V
POWER
SUPPLY

GROUND
+9V TO +28V

RS485 A
RS485 B
GROUND
+9V TO +28V

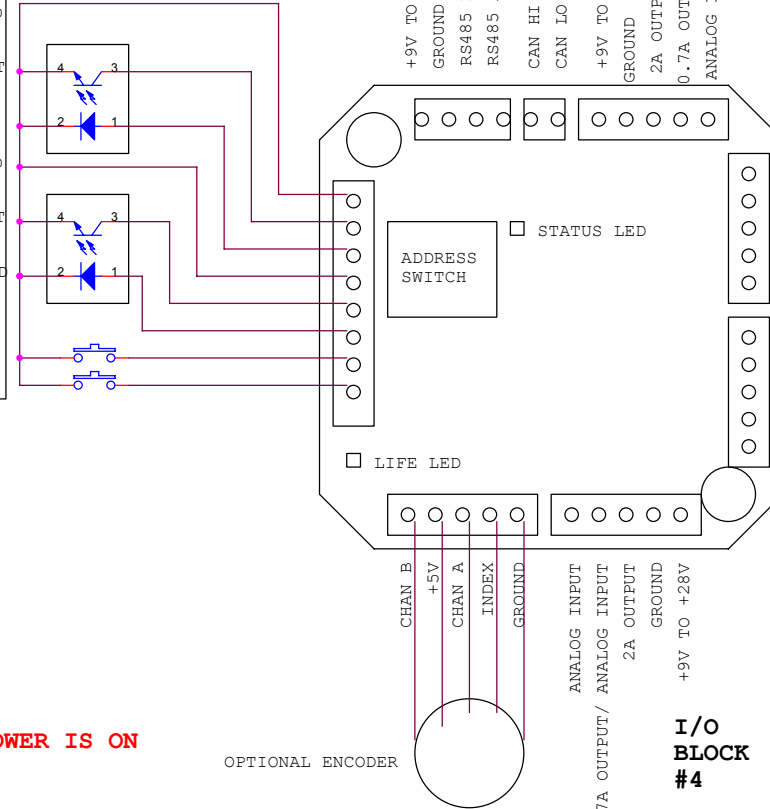
RS485 CONVERTER

DB9 TO COM
PORT ON PC

TO PC COM PORT

USE 9600 BAUD
8BIT, NO PARITY,
1 STOP, NO FLOW
CTRL.

STEP AND DIR COUNTER	DUAL ENCODER MODE	MODE 0
		OPTO SENSOR #1 GROUND
		OPTO SENSOR #1 INPUT
		OPTO SENSOR #1 LED
		OPTO SENSOR #2 GROUND
	INDEX 2	OPTO SENSOR #2 INPUT
		OPTO SENSOR #2 LED
STEP IN	CHAN A2	SWITCH #1 INPUT
DIR IN	CHAN B2	SWITCH #2 INPUT



EXAMPLE I/O BLOCK 1 COMMANDS:
/1J10R TURNS OFF BOTH DRIVERS
/1J11R TURNS ON 0.7A OUTPUT
/1J13R TURNS BOTH OUTPUTS
/1?aa1 READS BACK ANALOG INPUTS

I/O BLOCK #2

+9V TO +28V
GROUND
2A OUTPUT
0.7A OUTPUT/ANALOG INPUT
ANALOG INPUT

EXAMPLE WIRING

MIN 40 OHM
LOAD
MIN 20 OHM
LOAD

I/O BLOCK #3

+9V TO +28V
GROUND
2A OUTPUT
0.7A OUTPUT/ANALOG INPUT
ANALOG INPUT

NOTES:

- 1) ANALOG INPUTS ARE ACCURATE TO 7 BITS AS SOLD, HOWEVER THE RESOLUTION CAN BE IMPROVED TO 10 BITS BY REMOVING INPUT PROTECTION CIRCUITRY. PLEASE CONTACT THE FACTORY FOR DETAILS.
- 2) THE PIN THAT IS BOTH OUTPUT OR INPUT IS AN OUTPUT AS SOLD, BUT CAN BE CHANGED AT THE FACTORY TO BE AN INPUT.
- 3) OUTPUTS ARE OPEN COLLECTOR PULLDOWNS

DO NOT UNPLUG LOADS WHILE POWER IS ON

OPTIONAL ENCODER

PAGE DOWN FOR NEXT MODE

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Title		
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Size	Document Number	Rev
B	EZ CTRL WIRING	B6
Date:	Monday, October 26, 2009	Sheet 4 of 7

EZCTRL17 RC SERVO MODE

7V TO 28V
POWER
SUPPLY

GROUND
+7V TO +28V

RS485 CONVERTER

DB9 TO COM
PORT ON PC

TO PC COM PORT

USE 9600 BAUD
8BIT, NO PARITY,
1 STOP, NO FLOW
CTRL.

RS485 A
RS485 B
GROUND
+7V TO +28V

I/O
BLOCK
#1

GROUND
RS485 B
RS485 A
CAN HI
CAN LO
+7V TO +28V
GROUND
2A OUTPUT

I/O
BLOCK
#2

+7V TO +28V
GROUND
2A OUTPUT

+7V TO +28V
GROUND
2A OUTPUT

I/O
BLOCK
#3

2A OUTPUT
GROUND
+7V TO +28V

I/O
BLOCK
#4

RC SERVO
CHANNEL 1

PROGRAMMABLE
SLOW PWM
/1k100,100R

RC SERVO
CHANNEL 3

RC SERVO
CHANNEL 4

STEP AND DIR COUNTER	DUAL ENCODER MODE	MODE 0
		OPTO SENSOR #1 GROUND
		OPTO SENSOR #1 INPUT
		OPTO SENSOR #1 LED
		OPTO SENSOR #2 GROUND
	INDEX 2	OPTO SENSOR #2 INPUT
		OPTO SENSOR #2 LED
STEP IN	CHAN A2	SWITCH #1 INPUT
DIR IN	CHAN B2	SWITCH #2 INPUT

EXAMPLE RC COMMANDS

CHANNEL ORDER: /1A(ONE), (TWO), (THREE), (FOUR)
/1A100000,100000,100000,100000R APPROX SETS 2mS
/1A-100000,-100000,-100000,-100000R APPROX SETS 1mS
TYPICALLY USE V=ONE MILLION L=TEN THOUSAND
/1V1000000,1000000,1000000,1000000R (ONE MILLION)
/1L10000,10000,10000,10000R

NOTE THAT THE PULLUP RESISTOR IS
REQUIRED, 1K TO 10K IS ACCEPTABLE

DRIVER CAN BE RUN AS LOW AS 7V IN RC MODE

PROGRAMMABLE PWM DRIVER

USE LOWER CASE k COMMAND
NUMBERS AFTER k SEPARATED BY COMMAS SET
ON/OFF TIME IN INCREMENTS OF 50us

DO NOT UNPLUG LOADS WHILE POWER IS ON

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PAGE DOWN FOR NEXT MODE

Title ALLMOTION.COM EZ CONTROLLER WIRING DIAGRAM		
Size B	Document Number EZ CTRL WIRING	Rev B6
Date: Monday, October 26, 2009	Sheet 5	of 7

EZCTRL17 WIRED AS A HEATER CONTROLLER

9V TO 28V
POWER
SUPPLY

RS485 A
RS485 B
GROUND
+12V to +28V

GROUND
+9V to +28V

RS485 CONVERTER

DB9 TO COM
PORT ON PC

TO PC COM PORT

USE 9600 BAUD
8BIT, NO PARITY,
1 STOP, NO FLOW
CTRL.

TEMPERATURE CONTROL BLOCK #1

NOTES:

- 1) USE 0.1C ACCURATE 10K AT 25C THERMISTOR FROM YSITEMPERATURE.COM . EG 44XXX SERIES
- 2) THIS THERMISTOR IS INTERNALLY RATIOED AGAINST A 10K 0.1% RESISTOR
- 3) COMPUTE THE MID POINT ADC READ VALUE ON A FULL SCALE OF 16384
- 4) SET REGULATION VALUE FOR THE CHANNEL TO THIS VALUE.
- 5) FOR HIGHER POWER USE AN EXTERNAL SOLID STATE RELAY
- 6) PLACE THE THERMISTOR AS CLOSE AS POSSIBLE TO THE HEATING ELEMENT, TO MINIMIZE THE PHASE LAG IN THE CONTROL LOOP
- 7) FOR SAFTY IN HIGH POWER APPLICATIONS THE USE OF A THERMAL FUSE IN SERIES WITH THE HEATER POWER IS STRONGLY RECOMMENDED
- 8) ANALOG INPUTS ARE ACCURATE TO 8 BITS AS SOLD, HOWEVER THE RESOLUTION CAN BE IMPROVED TO 10+ BITS BY REMOVING INPUT PROTECTION CIRCUITRY. PLEASE CONTACT THE FACTORY FOR DETAILS.

TEMPERATURE CONTROL BLOCK #2

+9V TO +28V
GROUND
2A OUTPUT
0.7A OUTPUT/ ANALOG IN
ANALOG INPUT

TEMPERATURE CONTROL BLOCK #3

+9V TO +28V
GROUND
2A OUTPUT
0.7A OUTPUT/ ANALOG INPUT
ANALOG INPUT

RT1
THERMISTOR
ABOUT 20 TO 50 OHM
HEATER

DO NOT UNPLUG LOADS WHILE POWER IS ON

TEMPERATURE CONTROL BLOCK #4

ANALOG INPUT
2A OUTPUT
GROUND
+9V TO +28V
0.7A OUTPUT/ ANALOG INPUT

OPTIONAL ENCODER

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PAGE DOWN FOR NEXT MODE

INTERNAL CIRCUIT

NOTES:

TO ADC

OVER
VOLTAGE
PROTECTION

+3.3VD
0.1% 10K RATIOING RESISTOR
INTERNAL RESISTOR
RT1
THERMISTOR
GROUND

Title		
ALLMOTION.COM EZ CONTROLLER WIRING DIAGRAM		
Size	Document Number	Rev
B	EZ CTRL WIRING	B6
Date:	Monday, October 26, 2009	Sheet 6 of 7

EZCTRL ACCESSORIES AND OTHER ELECTRICAL NOTES

MATING CONNECTORS:

AMP MTA 100 SERIES

4PIN 22 GA, AMP PART 3-643813-4

8PIN 22 GA, AMP PART 3-643813-8

8PIN 26 GA, AMP PART 3-643814-8

T HANDLE CRIMP TOOL DIGIKEY P/N A9982

PISTOL GRIP TOOL DIGIKEY P/N A1998 + A2031

OPTO HOME SWITCH:

- 1) "Z" OR HOME COMMAND RUNS MOTOR UNTIL OPTO #1 IS ON FLAG EDGE.
- 2) AN OPTO SWITCH PROVIDED WITH EACH STARTER KIT
- 3) USE TRANSISTOR OPTO THAT HAS $I_c > 1\text{mA}$ @ $I_F = 20\text{mA}$.
- 4) EXAMPLES OF ACCEPTABLE OPTOS ARE:

DIGIKEY P/N QVA11134

DIGIKEY P/N H21A1

HONEYWELL HOA1887-012 (IS PREWIRED)

HONEYWELL HOA1870-33 (IS PREWIRED)

OPTEK OPB830W11 (IS PREWIRED)

5) THE OPTO COUPLER LED PIN HAS 200 OHM TO 5V IN SERIES ON THE BOARD. THE 150 OHM CAN BE REMOVED IF DESIRED FOR RUNNING SENSORS THAT REQUIRE DIRECT ACCESS TO 5V. THE COLLECTOR OF THE TRANSISTOR HAS A 10K PULLUP TO 5V.

6) ALL INPUTS ARE 3.3V MAX

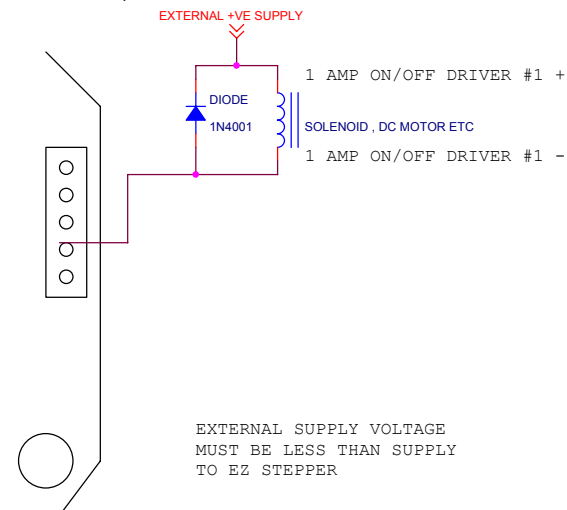
ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM

1) ON/OFF DRIVERS RATED AT 0.7A / 2A AMPS.

2) THE NEGATIVE PIN OF THESE DRIVERS IS ACTUALLY AN OPEN COLLECTOR TYPE OUTPUT THAT PULLS DOWN TO GROUND. IT IS POSSIBLE TO DRIVE LOADS THAT ARE OF A DIFFERENT VOLTAGE THAN THE SUPPLY VOLTAGE, BY CONNECTING THE POSITIVE SIDE OF THE LOAD TO AN EXTERNAL SUPPLY, AND THE NEGATIVE SIDE TO THE -VE OUTPUT PIN. HOWEVER, IN CASE THIS IS DONE IT IS NECESSARY TO PLACE AN EXTERNAL "FREE WHEELING" DIODE ACROSS ANY INDUCTIVE LOADS. EXTERNAL SUPPLY VOLTAGE MUST BE LESS THAN SUPPLY VOLTAGE TO EZ STEPPER

3) EXTERNAL DIODE IS NOT NECESSARY IF BOTH SIDES OF LOAD ARE WIRED BACK TO THE EZ STEPPER.

ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM



SUITABLE POWER SUPPLIES:

1) FOR FIRST TIME USERS, TO GUARD AGAINST A POSSIBLE MISWIRE, A CURRENT LIMITED LAB SUPPLY SET TO 12V AND 0.5A IS RECOMMENDED.

2) A SUPPLY OF 24V AND 2A CAPABILITY IS GOOD FOR MOST PURPOSES. POSSIBLE CHOICES ARE:

DIGIKEY P/N 271-1112

DIGIKEY P/N Z1158 (ENCLOSED)

SEE NEXT PAGE FOR DIMENSIONAL INFO

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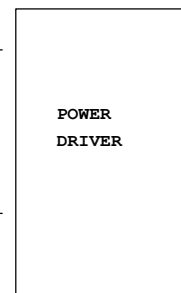
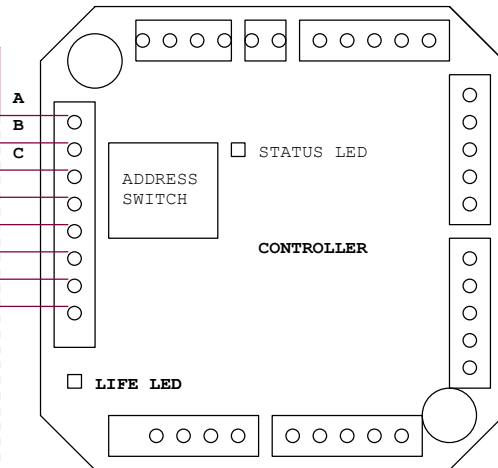
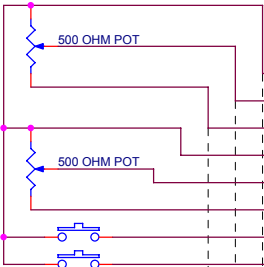
Title			
ALLMOTION.COM EZ CONTROLLER WIRING DIAGRAM			
Size	Document Number		Rev
B	EZ CTRL WIRING		B6
Date:	Monday, October 26, 2009	Sheet	7 of 7

FEEDBACK POT1 GROUND
FEEDBACK POT1 WIPER
FEEDBACK POT1 POWER

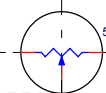
POSITION COMMAND POT2 GROUND
POSITION COMMAND POT2 WIPER
POSITION COMMAND POT2 POWER

SWITCH #1 CLOSURE TO GROUND INPUT
SWITCH #2 CLOSURE TO GROUND INPUT

SIMPLE CIRCUIT,
7 BIT ACCURACY



STEPPER MOTOR WINDING A
STEPPER MOTOR WINDING A
STEPPER MOTOR WINDING B
STEPPER MOTOR WINDING B



NOTES:

1) ALL 4 INPUTS ARE ANALOG INPUTS

2) ADC's VALUES RANGE FROM 0-16368. THE ACCURACY AS SHIPPED IS 7 BIT BUT CAN BE IMPROVED TO >10BIT WITH THE REMOVAL OF THE INPUT PROTECTION CIRCUITRY, CONTACT FACTORY FOR DETAILS

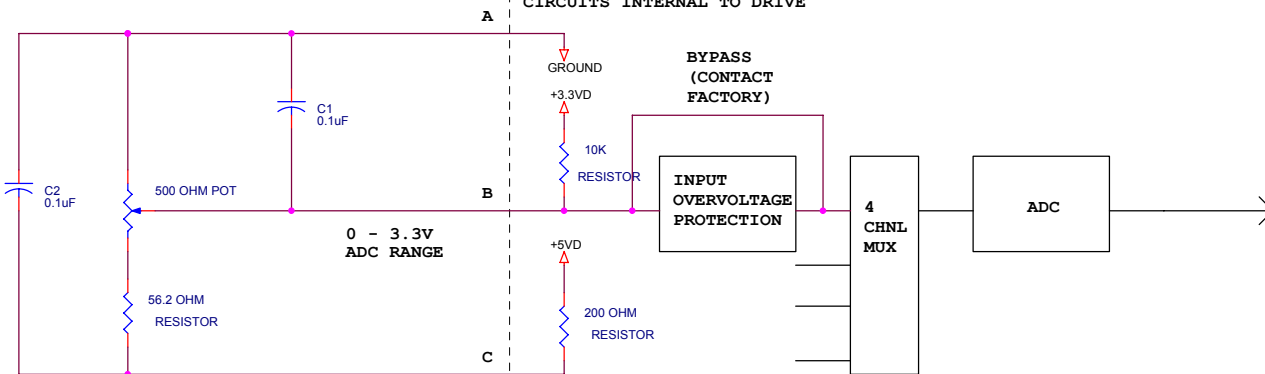
3) POTS IN THE RANGE OF 500 OHM - 10K ARE SUGGESTED, LOWER VALUES ARE LESS AFFECTED BY INTERNAL 10K PULLUP. 500 OHM RECOMMENDED.

4) IF USING POT FOR POSITION FEED BACK WITH /1N3R MODE, IF MOTOR EXHIBITS POSITIVE FEEDBACK, SWITCH ENDS OF POT

5) 10K INTERNAL PULLUP WILL INTERFERE WITH LINEARITY OF POT VOLTAGE, AND MAY NEED TO BE REMOVED - CONTACT FACTORY.

6) INPUT OVERVOLTAGE PROTECTION CIRCUITRY MAY NEED TO BE REMOVED FOR >7BIT ACCURACY - CONTACT FACTORY.

CIRCUITS INTERNAL TO DRIVE

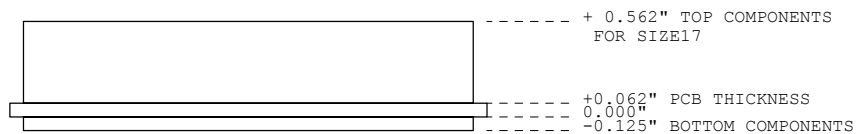
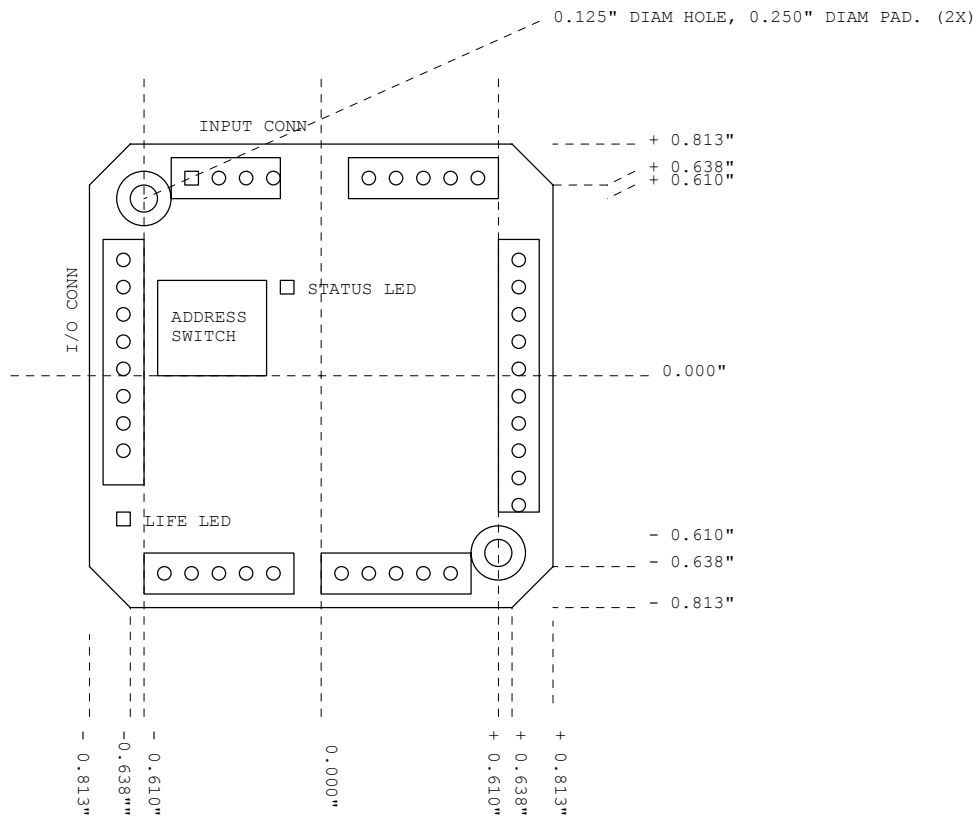


ENHANCED EXTERNAL CIRCUIT FOR > 10BIT ACCURACY

WIRING DIAGRAM ANALOG INPUT OR POTENTIOMETER FEEDBACK

Title		ALLMOTION.COM EZ CONTROLLER WIRING DIAGRAM	
Size	Document Number	Rev	
B	EZ CTRL WIRING	B6	
Date:	Monday, October 26, 2009	Sheet	8 of 7

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DESIGN USES THE NEMA 17 SIZE
STANDARD 1.22" SQUARE BOLT PATTERN

EZCTRL DIMENSIONAL INFORMATION

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Title		
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Size	Document Number	Rev
B	EZCTRL	B6
Date:	Monday, October 26, 2009	Sheet 9 of 7