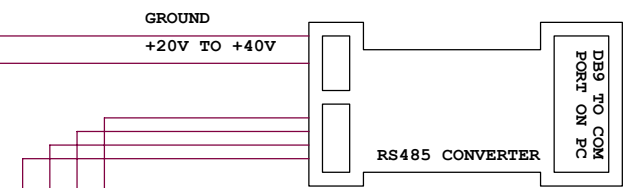


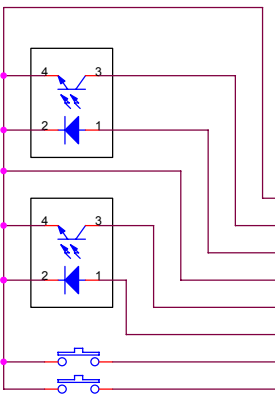
NOTE:
 INSTALL SHORTING JUMPER ON J3 FOR 12V-15V OPERATION.
 JUMPER MUST BE REMOVED FOR VOLTAGES >15V



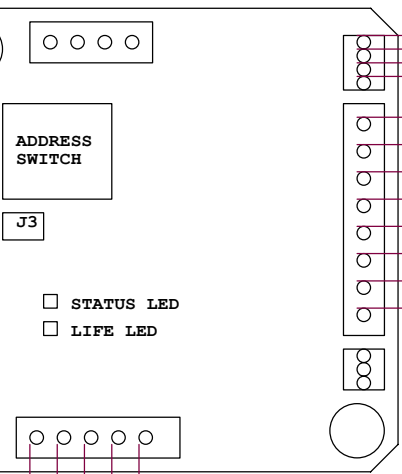
TO PC COM PORT
 USE 9600 BAUD
 8BIT, NO PARITY,
 1 STOP, NO FLOW
 CTRL.

TO OTHER EZ SERVOS
 OR EZ STEPPERS

- OPTO SENSOR #1 GROUND
- OPTO SENSOR #1 PHOTO TRANSISTOR
- OPTO SENSOR #1 LED
- OPTO SENSOR #2 GROUND
- OPTO SENSOR #2 PHOTO TRANSISTOR
- OPTO SENSOR #2 LED
- SWITCH #1 CLOSURE TO GROUND INPUT
- SWITCH #2 CLOSURE TO GROUND INPUT

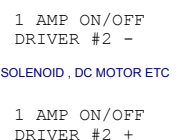
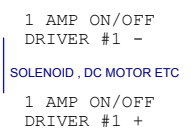


- +12V TO +40V
- GROUND
- RS485 B
- RS485 A

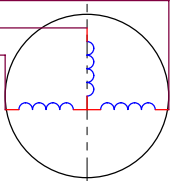


- GROUND
- INDEX
- CHAN A
- +5V
- CHAN B

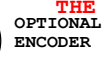
NOTE: ENCODER SIGNALS MUST BE >4.5V HIGH LEVEL.
 THIS MAY REQUIRE EXTERNAL PULLUPS.



- HALL A
- HALL B
- HALL C
- +5V HALL SENSOR POWER
- HALL SENSOR GROUND
- PHASE A POWER DRIVER
- PHASE B POWER DRIVER
- PHASE C POWER DRIVER



**DO NOT UNPLUG LOADS WHILE
 POWER IS ON. BREAKING OF
 CURRENT IN THE INDUCTANCE OF
 THE MOTOR GENERATES A HIGH
 VOLTAGE ARC, WHICH DAMAGES
 THE DRIVE.**



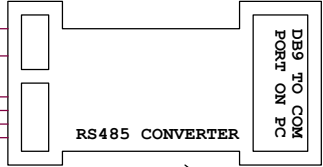
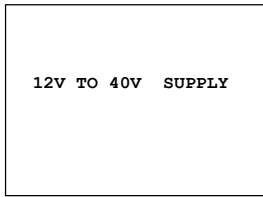
- NOTES:
- 1) INSTALL SHORTING JUMPER ON J3 FOR 12V-15V OPERATION.
 JUMPER MUST BE REMOVED FOR VOLTAGES >15V
 - 2) WHEN IN STEP AND DIRECTION MODE (/ln32R):
 SWITCH1 INPUT BECOMES THE STEP INPUT
 SWITCH2 INPUT BECOMES THE DIRECTION INPUT.
 - 3) IF MOTOR EXHIBITS POSITIVE FEEDBACK, SWITCH ENCODER A,B LINES
 - 4) KEEP ENCODER / INPUTS AWAY FROM NOISEY MOTOR POWER WIRES.

SEE PAGE 2 FOR BRUSH MOTOR WIRING
 SEE PAGE 3 FOR MANUFACTURER SPECIFIC
 BLDC MOTOR WIRING EXAMPLES

**EZSV23 SERVO WIRING
 DIAGRAM FOR BLDC MOTOR**

Title		ALLMOTION.COM EZSV23 WIRING DIAGRAM	
Size	Document Number		Rev
B			A6
Date:	Tuesday, July 28, 2009	Sheet	1 of 6

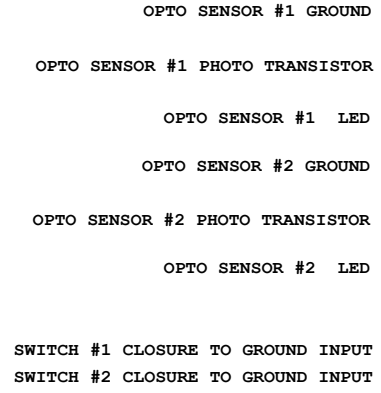
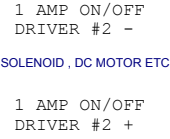
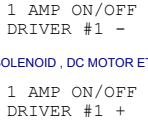
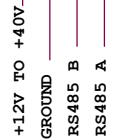
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TO PC COM PORT
USE 9600 BAUD
8BIT, NO PARITY,
1 STOP, NO FLOW
CTRL.

NOTE:
INSTALL SHORTING JUMPER ON J3 FOR 12V-15V OPERATION.
JUMPER MUST BE REMOVED FOR VOLTAGES >15V

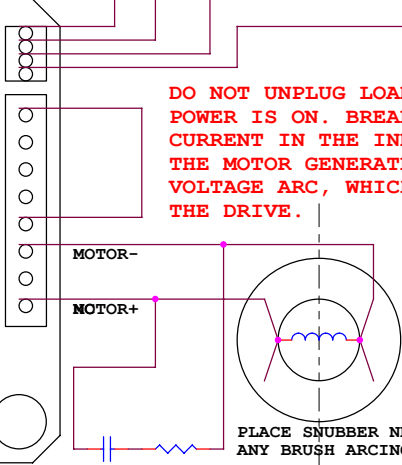
TO OTHER EZ SERVOS
OR EZ STEPPERS



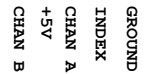
- STATUS LED
- LIFE LED

**DO NOT UNPLUG LOADS WHILE
POWER IS ON. BREAKING OF
CURRENT IN THE INDUCTANCE OF
THE MOTOR GENERATES A HIGH
VOLTAGE ARC, WHICH DAMAGES
THE DRIVE.**

- HALL A
- HALL B
- HALL C
- HALL SENSOR POWER
- HALL SENSOR GROUND
- PHASE A POWER DRIVER
- PHASE B POWER DRIVER
- PHASE C POWER DRIVER



0.1uF, 100V 100 OHM, 1WATT



NOTE: ENCODER SIGNALS MUST BE >4.5V HIGH LEVEL.
THIS MAY REQUIRE EXTERNAL PULLUPS.

- NOTES:
- 1) IF MOTOR EXHIBITS POSITIVE FEEDBACK, SWITCH MOTOR POWER LEADS. OR SWITCH ENCODER A, B LINES
 - 2) WHEN IN STEP AND DIRECTION MODE (/in160R): SWITCH1 INPUT BECOMES THE STEP INPUT SWITCH2 INPUT BECOMES THE DIRECTION INPUT.
 - 3) KEEP ENCODER / INPUTS AWAY FROM NOISEY MOTOR POWER WIRES.

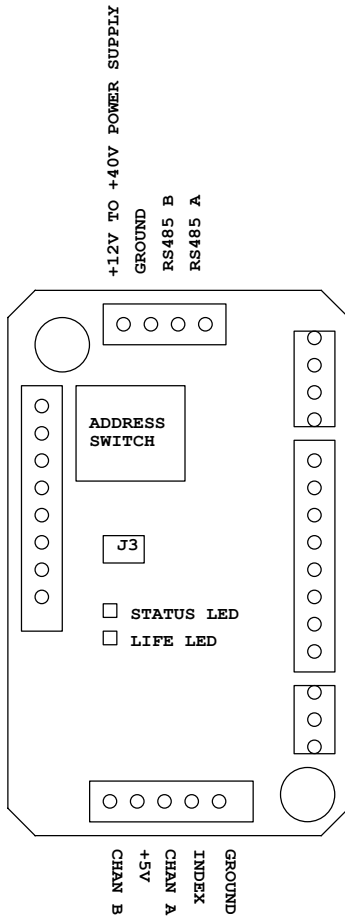
SEE PAGE 1 FOR BRUSHLESS MOTOR WIRING
SEE PAGE 3 FOR MANUFACTURER SPECIFIC
BLDC MOTOR WIRING EXAMPLES

**EZ SERVO WIRING DIAGRAM
FOR BRUSH MOTOR**

Title		ALLMOTION.COM EZSV23 WIRING DIAGRAM	
Size	Document Number	Rev	
B		A6	
Date:	Tuesday, July 28, 2009	Sheet	2 of 6

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POWER INPUT AND COMMUNICATION



+12V TO +40V POWER SUPPLY
GROUND
RS485 B
RS485 A

On/Off Drivers deliver same voltage as input voltage.

- 1AMP ON/OFF DRIVER 1 -
- 1AMP ON/OFF DRIVER 1 +
- 1AMP ON/OFF DRIVER 2 -
- 1AMP ON/OFF DRIVER 2 +

POPULAR MANUFACTURER WIRE COLORS

	PITTMAN	MAXON	MAXON	EAD OPTICAL HALL	EAD MAGNETIC HALL	FAULHARBER	ANAHEIM AUTOMATION	HARMONIC DRIVES RSF8B	PORTESCAP NUVODISC 32BF	MAXON EC-max
HALL A	WHITE	BLUE	RED/GREY	BROWN	YELLOW	GREEN	WHITE	YELLOW	SENSOR1	GREY
HALL B	GREY	GREY	WHITE/GREY	WHITE	GREEN	BLUE	BLUE	BROWN	SENSOR3	BROWN
HALL C	BLUE	VIOLET	BLACK/GREY	GREEN	GREY	GREY	GREEN	RED	SENSOR2	YELLOW
+5V HALL SENSOR POWER	PURPLE	YELLOW	GREEN	NC	ORANGE	RED	RED	WHITE (PINK)	VDD	GREEN
HALL SENSOR GROUND	BLACK	GREEN	BLUE	NC	BLACK	BLACK	BLACK	BLACK	GROUND	BLUE
PHASE A POWER DRIVER	BROWN	ORANGE	WHITE	BROWN	BROWN	BROWN	BLACK (M)	BLACK (M)	PHASE 3	BLACK
PHASE B POWER DRIVER	RED	RED	BLACK	WHITE	WHITE	ORANGE	YELLOW (M)	RED (M)	PHASE 2	RED
PHASE C POWER DRIVER	ORANGE	BROWN	RED	BLUE	BLUE	YELLOW	RED (M)	WHITE (M)	PHASE 1	WHITE

PHASE A POWER DRIVER HIGH CURRENT SCREW TERMINAL
PHASE B POWER DRIVER HIGH CURRENT SCREW TERMINAL
PHASE C POWER DRIVER HIGH CURRENT SCREW TERMINAL

Use screw terminal if > 3 Amp Current

GROUND BLACK
INDEX ORANGE
CHAN A YELLOW
+5V RED
CHAN B BLUE

FROM OPTICAL ENCODER + HALL

DO NOT CONNECT ORANGE BLUE GREEN

NOTE: MOTORS WITHOUT ENCODERS CAN BE RUN IN THE "N0" VELOCITY MODE, OR FOR FINER CONTROL THEY CAN BE RUN IN "N1" MODE WITH TWO OF THE HALL SENSOR LINES WIRED TO THE ENCODER CHANNELS A AND B TO ACT AS A ROUGH POSITION ENCODER. THIS WILL ALLOW FINE ACCELERATION CONTROL, OR ROUGH POSITION CONTROL. THE VELOCITY WILL NEED TO BE SET LOW. TRY /1L1V1000R, ENSURE THAT THE ENCODER IS HOOKED UP TO COUNT UP WHEN THE MOTOR MOVES IN THE POSITIVE DIRECTION.

ENCODER CONNECTION

NOTE: ENCODER SIGNALS MUST BE >4.5V HIGH LEVEL. THIS MAY REQUIRE EXTERNAL PULLUPS.

SIZE: 2.25" X 2.25" X 1.00" THICK

PLEASE NOTE: FOR OTHER MOTORS, ALLMOTION WILL BE PLEASED TO WORK OUT THE WIRING FOR NO CHARGE.

EZSV23 SERVO WIRING DIAGRAM

Title ALLMOTION.COM EZSV23 WIRING DIAGRAM		
Size B	Document Number	Rev A6
Date: Tuesday, July 28, 2009	Sheet 3	of 6

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EZSV23 ACCESSORIES AND OTHER ELECTRICAL NOTES

MATING CONNECTORS:

- AMP MTA 100 SERIES
- 4PIN 22 GA DIGIKEY P/N A31108 (INPUT CONNECTOR)
- 8PIN 22 GA DIGIKEY P/N A31111 (NEMA23 MOTOR)
- 8PIN 24 GA DIGIKEY P/N A31023 (NEMA17 MOTOR)
- 8PIN 26 GA DIGIKEY P/N A31030 (FOR OPTOS)
- 5PIN 26 GA DIGIKEY P/N A31027 (FOR ENCODER)
- 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 $I_c > 1mA$ @ $I_F = 20mA$.
- 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 200 OHM CAN BE REMOVED IF DESIRED FOR RUNNING SENSORS THAT REQUIRE DIRECT ACCESS TO 5V. (OR USE ENCODER 5V POWER) THE COLLECTOR OF THE TRANSISTOR HAS A 10K PULLUP TO 5V. THE TOTAL CURRENT DRAWN FROM THE 5V SUPPLY (INCLUDING OPTOS) MUST BE LESS THAN 200mA.
- 6) ALL INPUTS ARE 0-3.3V ADC INPUTS, THE ONE/ZERO THRESHOLD IS FACTORY SET TO 1.23V, TO BE TTL COMPATIBLE, AND CAN BE CHANGED BY SOFTWARE COMMAND.

ENCODERLESS OPERATION:

- 1) THE EZSERVO CAN PERFORM VELOCITY MODE CONTROL OF A MOTOR THAT DOES NOT HAVE AN ENCODER BY USING THE HALL SENSORS AS A GAGE OF SPEED. (N=0 MODE)
- 2) IT IS POSSIBLE TO USE THE N=1 POSITION CONTROL MODE BY WIRING TWO OF THE HALL SENSOR LINES TO THE ENCODER A AND B INPUTS IN ADDITION. THIS ALLOWS A CRUDE POSITION CONTROL MODE. IN THIS MODE THE VELOCITY CONTROL IS SUPERIOR TO THE N=0 MODE. USE SMALL ACCELEARTIONS AND VELOCITIES IN THIS MODE. Eg TRY /1L1V10000P0R
- 3) THE RESPONSE CAN ALSO BE "STIFFENED" BY INCREASING THE PID GAIN CONSTANTS eg /1L10w3000y3000V10000P0R
- 4) IF WIRING HALL SENSORS AS ENCODERS , USE THE ENCODER 5 V TO POWER THE HALL SENSORS.

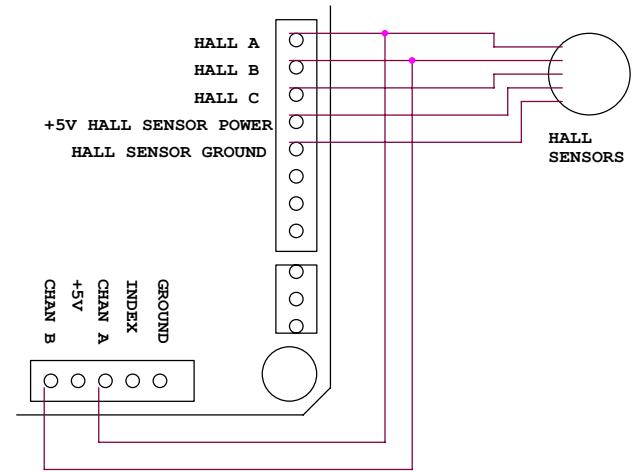
MOTORS :

- 1) THE EZ SERVO WILL DRIVE MOST SERVO MOTORS
- 2) FOR BEST PERFORMANCE SELECT A MOTOR THAT HAS A BACK EMF OF ABOUT 1/2 OF THE SUPPLY VOLTAGE, AT THE MAX SPEED DESIRED TO RUN AT. (Eg USE A 12V MOTOR WITH A 24V SUPPLY).
- 3) TYPICALLY A MOTOR THAT HAS AN INDUCTANCE OF AROUND 1mH AND A RESISTANCE OF AROUND 1 OHM WORKS WELL. BUT OTHER VALUES ARE ALSO OK. (0.1mH MINIMUM)

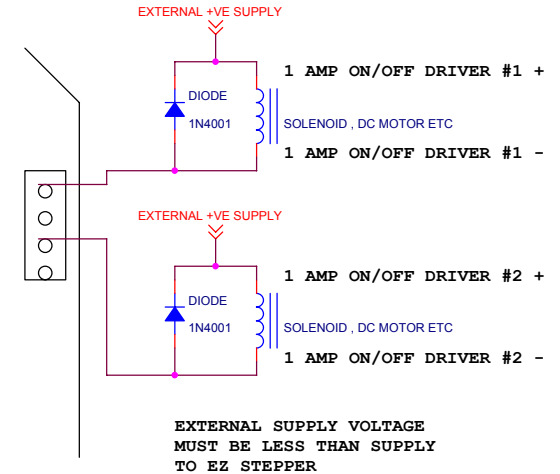
ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM

- 1) ON/OFF DRIVERS RATED AT 2 AMPS PEAK, 1 AMP CONTINUOUS.
- 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.

USE OF HALL SENSORS AS ENCODERS



ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM



EXTERNAL SUPPLY VOLTAGE MUST BE LESS THAN SUPPLY TO EZ STEPPER

SEE NEXT PAGE FOR DIMENSIONAL INFO

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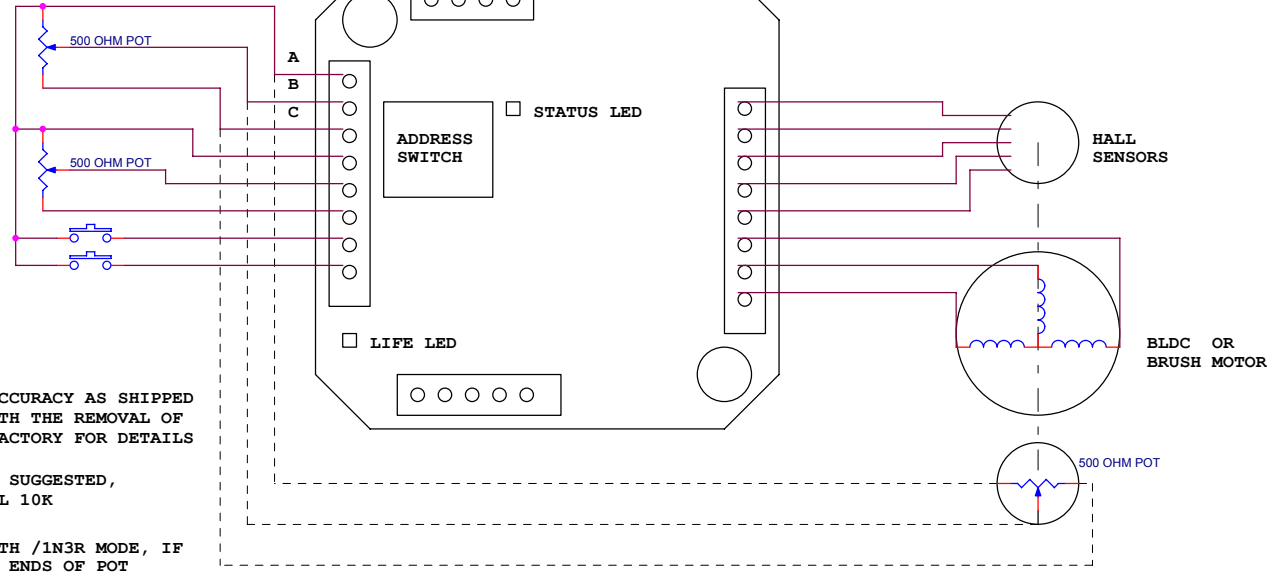
Title		
ALLMOTION.COM	EZSV23 WIRING DIAGRAM	
Size B	Document Number	Rev A6
Date:	Tuesday, July 28, 2009	Sheet 4 of 6

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**

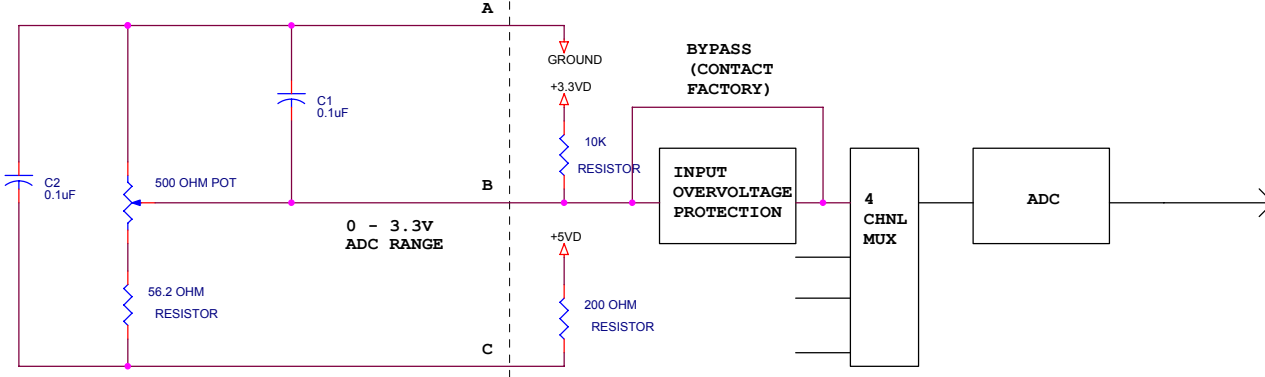


HALL A
 HALL B
 HALL C
 HALL SENSOR POWER
 HALL SENSOR GROUND
 PHASE A POWER DRIVER
 PHASE B POWER DRIVER
 PHASE C POWER DRIVER

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

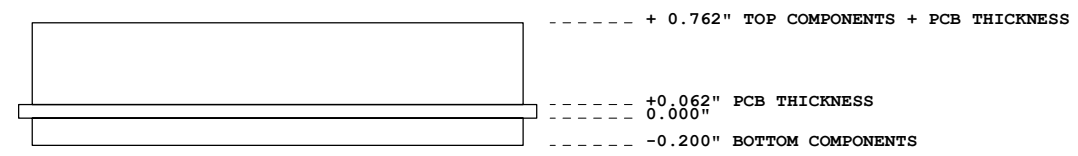
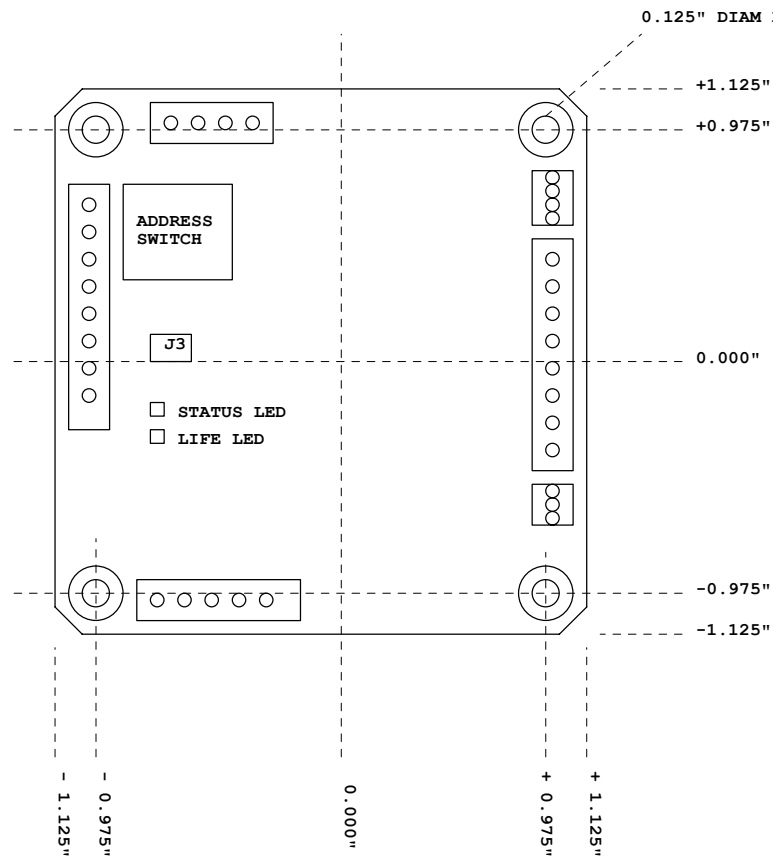


ENHANCED EXTERNAL CIRCUIT FOR > 10BIT ACCURACY

WIRING DIAGRAM ANALOG INPUT OR POTENTIOMETER FEEDBACK

Title		
ALLMOTION.COM EZ SERVO WIRING DIAGRAM		
Size	Document Number	Rev
B		A6
Date: Tuesday, July 28, 2009		
Sheet		of
5		6

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Title		
ALLMOTION.COM EZ SV23 DIMENSIONAL INFO		
Size	Document Number	Rev
B		A6
Date:	Tuesday, July 28, 2009	Sheet 6 of 6