

16 SERVO DRIVER

USER MANUAL

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Servo motors are an integral part of all kind of robotic structures. Hexapod, spider robot all requires servo motors. But when the number of servo motors increases it becomes really difficult to control them. The new **Servo controller board** by Elementz can be used to control a total of 16 servos at the same time. Well not just 16 servos, if necessary you can connect multiple boards and use them together by “*board addressing*” feature introduced in these boards. Well that’s good news.



The input for the Servo controller board is given serially using UART communication. The design of the board enables the user to plug in the servos directly to the board.

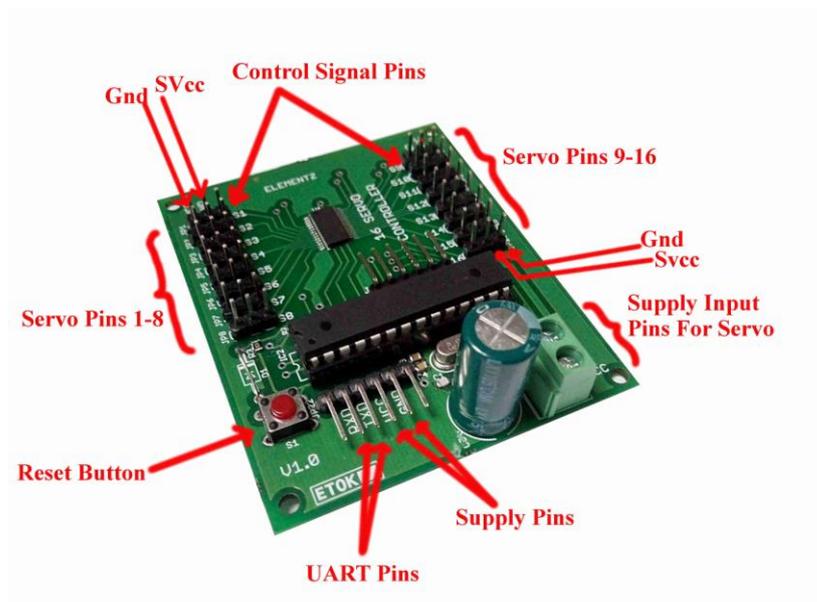
Features

- Offers a resolution less than 0.5° .
- Can connect and control 16 Servo motors at the same time.
- Board addressing feature is introduced for use of multiple boards at the same time.
- The input is given serially (UART: baud rate 9600, 8 Data bits, 1 Stop bit, No Parity.)
- Servos with any time range can be connected to the same board.



Pin out and Description

- Supply pins: Power supply input pins for the controller. 5V DC supply is to be given
- Supply input pins for servo: This is the supply pins for servo motor. 5V DC supply is to be given.



- Servo Pins 1-16: This is where we connect the servo motors. They can be directly plugged in to the board. The servo pins consists of a set of three pins they are
 - SVcc: The VCC pin of servomotor is connected here
 - Gnd: The Ground pin of servo motor is connected here
 - Control signal pins: The signal pin of servo motor is connected here.

These pins are arranged such that the servo motor can be directly connected to the board.

- UART pins: These are the pins used for giving input to the servo board.
- Reset Button: Used for resetting the board. Resetting does not change the address set and the last output written to the servo.



How to use the Servo Control Board

Some commands are used for setting up the Servo Control board. The format of the command used for giving instructions is as below

ADDR<Address of the Board>**C**<Servo number>**P**<Required position>**cr+lf**

If correct values are given, then an “OK” response will be obtained from the Controller board after pressing Enter key.

- **ADDR:** Address of the board. The default address of every servo controller board is set to be ‘0’.

How to change the address is explained later.

- **C:** Channel or Servo number. There are sixteen channels in the servo controller board. Which servo is to be controlled is specified at this portion. This value ranges from 1 to 16.
- **P:** Position to which the servo to be moved. This value varies depending upon the type of servo you are using. The value here is to be specified in “micro seconds” (μ s).
- **‘cr+lf’:** Carriage return and line feed (equivalent to pressing Enter key . Represented as 0x0D (cr) and 0x0A (lf) in hexadecimal representation. i.e. if you are using the instruction in a code then you have to send either of these values to the servo board at the end of the instruction to replace ‘Enter’ key).

Example: TOWER PRO MICRO SERVO SG90 has an input pulse range of 600 μ s to 2400 μ s. This means the servo rotates 180° when the input pulse (control signal) width is 2400 μ s and rotates 0° when the input pulse width to the



servo is 600µs. If we want the servo to rotate 90° we need to give the position as 1500µs and so on.

Note: for all the examples the address of the board is set to be '0' and we are using TOWER PRO MICRO SERVO SG90.

Note: Entering a position value out of the range for any servo could damage the servo. So care must be taken while entering the position data

Example1: For rotating the 7th servo (channel 7) to 90°

`ADDR0C7P1500cr+lf`

Example2: To move the 13th servo to 180°

`ADDR0C13P2400cr+lf`

Example3: Instructions for control multiple servos at the same time. Move the 1st servo 180° and the 9th servo 90° and 15th servo also to 90°

`ADDR0C1P2400C9P1500C15P1500cr+lf`

NB: We only need to call the address of the board once.

Changing the address of a Servo Controller Board

Use the following AT command to change the address of the board.

`AT+ADDR=<Address to be set>cr+lf`

Address value can vary from 0-254. If a right address is set then an "OK" response will be obtained.

Example4: Setting an address 15 for a board.

`AT+ADDR=15cr+lf`

Now the address of the board changes to 15 and will be the same until you change it again. Resetting won't change the address of the board.



Multiple boards at the same time

The board addressing feature enables us to connect and communicate to more than one board at the same time. Some important instructions in this mode are

- Change the address of the servo controller board individually by connecting one board at a time.
- While using multiple boards the usual responses obtained from the board will not be available, i.e. the board acts only as a receiver.

Example5: Using two servo controller boards with addresses 0 and 15 for the same function in example3.

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ADDR0C1P2400C9P1500C15P1500cr+lf
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```
ADDR15C1P2400C9P1500C15P1500cr+lf
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Note: The instruction for each board should be given in separate lines.

Power Considerations

Most servos are designed to run on about 5 or 6v. Keep in mind that a lot of servos moving at the same time (particularly large powerful ones) will need a lot of current. Even micro servos will draw several hundred mA when moving. Some High-torque servos will draw more than 1A each under load. So select the power source wisely.