

A quick guide to the EZServo®

Revision D1

This guide applies using the USB-to-RS485 Converter or RS232-to-RS485 Converter.

For these products

- EZSV17
- EZSV23

Encoder Note

An encoder of 400-1000 lines/channel, giving 1600-4000 quadrature encoder counts per revolution, is recommended. (Other line counts could require changing PID coefficients.)

You will need:

- ▶ Your EZServo® Controller/Driver, servo motor, and encoder.
- ▶ A motor 2" (SV17) or 3" (SV23) or smaller rated at about 1/2 of supply voltage is best. Also see Encoder Note.
- ▶ RS485 Converter: USB-to-RS485 or RS232-to-RS485, with cable supplied.
- ▶ PC with port to match RS485 Converter being used (USB or serial D).
- ▶ Power supply, 12 to 40V. For first-time EZServo users we recommend a current-limited power supply set to 20V, 1A to protect against miswiring.
- ▶ Crimp tool (recommended): Digikey part H9924-ND. Otherwise, soldering equipment.
- ▶ Small Philips screwdriver for operating address switch
- ▶ If troubleshooting is required: ohmmeter, oscilloscope

Precautions

- ▶ Observe all electrostatic discharge precautions to avoid damaging circuit boards.
- ▶ Allow at least 0.1" air gap when bolting EZServo to motor, for cooling (larger version of the board).
- ▶ Use 4-40 round standoffs to bolt EZServo to motor, NOT hex (Hex standoffs will touch components).
- ▶ DO NOT disconnect motor wires while power is on, to avoid damage to circuit board.
- ▶ DO NOT place EZServo board or RS485 Converter on metal surface when powered (to prevent shorts).
- ▶ Avoid bundling encoder or IO wires with motor power wires, as this may cause noise pickup from motor wires. If bundling is necessary, put motor wires in a separate shielded twisted-pair cable.
- For 10' or longer, shield each IO line individually.
- If using ribbon cable, add grounds between signal wires and motor wires.

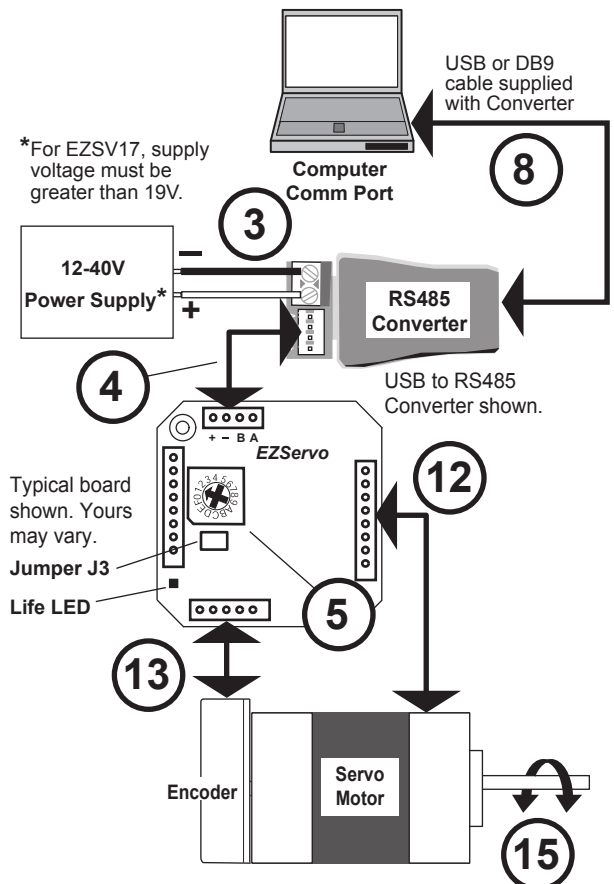
Starting up

Start with power supply OFF.

NOTE: If using RS232 Converter, disregard instructions for USB.

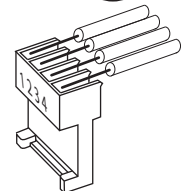
1. Download and install the EZCommander™ application from www.allmotion.com/support.
2. If using USB-to-RS485 Converter, download and install appropriate USB driver from www.allmotion.com/support.
3. Connect power supply to RS485 Converter. Ensure power is OFF. ▶
▶ Important! On SV23 model, install J3 if power is less than 15V.
4. Connect EZ Servo to RS485 Converter. ▶
▶ If using EZ Start kit, use cable provided. If not using kit, wire mating 4-pin connectors pin-to-pin, for example pin 1 to pin 1, per markings on the connector. (See Wiring Note below.)
▶ Turn power ON. Confirm that green Life LED slowly blinks. *If not, look for bad power connection.*
5. Set address switch firmly to number 1 with Philips screwdriver. ▶
6. Cycle power OFF/ON if address switch was moved in preceding step.
7. *With USB cable from Converter to PC unplugged:* Start the EZCommander application (see other side of sheet for instructions if needed). Click Settings, then Re-scan Ports. Note available ports, then click OK.
8. Connect RS485 Converter to a PC USB port with the cable supplied. ▶
9. In EZCommander, click Settings, then Re-Scan Ports. Select the new port that becomes available, and click OK. (For RS232 converter, the new port will be com1.) *If no new port appears, a problem with the USB driver is indicated. Re-install the driver for your system.*
10. In EZCommander, click Send String 0 to issue the command /1&. Confirm return message showing product name and firmware version. *If return message says "No EZStepper (or EZServo) Found", troubleshoot communications (page 3) before connecting motor.*
11. Turn power OFF.

Procedure continued next page.



Wiring Note

Always wire to the mating connectors supplied on circuit board. Use crimp tool if you have it, or else solder. (DO NOT solder to circuit board; damage is likely. Also, DO NOT press in with a screwdriver, because this makes unreliable connections.)



Starting up

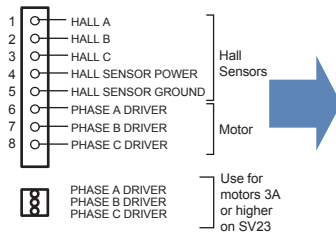
(continued)

12. *With power OFF*, connect EZServo to motor.

▶ **BLDC motors:** Connect servo motor and Hall sensors to the eight pins of the motor connector as shown in diagram: (See Wiring Note on preceding page and Hall sensor phasing instructions on this page.)

On SV23 models, use 3-pin screw terminal for high-current motors.

NOTE: If you send your motor to us, we will be happy to work out the correct Hall sensor phasing for you.

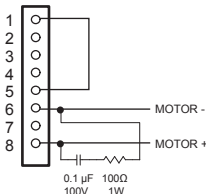


NOTE
On SV17, Hall Sensor power is +15V. If +5V is needed, obtain from encoder connector pin 4.

CAUTION!
Always turn off power before connecting or disconnecting motor to avoid damaging circuit board.

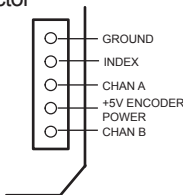
▶ **Brush motors:** Connect brush servo motor to the eight pins of the motor connector as shown in diagram: (See Wiring Note on preceding page.)

CAUTION!
Always turn off power before connecting or disconnecting motor to avoid damaging circuit board.



13. *With power OFF*, connect encoder to 5-pin connector as shown in diagram:

(Also see Wiring Note on preceding page.)



14. Turn power ON.

15. In EZ Commander, click Send String 2 to issue the command /1A1000A0R. Confirm that motor goes back and forth.

▶ If motor spins without stopping, reverse the CHA and CHB connections.

You're on your way! For other commands and hookups, see the full command set and wiring diagram on our website.

Hall Sensor Phasing (BLDC motors)

This is a trial-and-error method for finding the correct hookup for your Hall sensor. (The correct hookup for many Hall sensors can be found in the EZSV17 or EZSV23 wiring diagram on our Web site.)

NOTE: For Hall sensor phasing by trial and error, you **MUST** use a current-limited lab supply set to the lesser value of 1/2A or 1/4 of the maximum current rating of the motor.

1. With power OFF and the encoder disconnected, wire Hall sensors to pins 1, 2, and 3 in any order.
2. Do the following as you try each of the 6 possible wiring combinations (123,132, 213, 231, 312, 321): **ALWAYS DISCONNECT POWER BEFORE CHANGING WIRES**

- ▶ Issue command /1h5R. The motor should spin smoothly in one direction.
- ▶ While the motor spins, hold its shaft lightly and observe any "dead spots" that you feel. **DO THIS ONLY IF YOU CAN DO IT SAFELY!**
- ▶ Four combinations will produce dead spots or positions at which the rotor locks.
- ▶ One combination will produce dead spots or positions at which the rotor locks that are less obvious.
- ▶ One combination will produce very smooth motion with no dead spots or rotor locking points. This is the correct wiring combination for your Hall sensors.

NOTE: Don't switch power wires to the motor; only switch Hall sensor wires.

Motor Tuning (BLDC motors)

If motor behavior is oscillatory:

- ▶ Increase the value of the differential gain constant, for example /1y3000R.
- ▶ If oscillatory behavior continues, motor is noisy, and encoder ticks can be heard, reduce both the proportional and the differential constants until satisfactory performance is obtained. For example, /1w250y500R works well, especially with high (4000) line-count encoders.

(The larger the line count, the smaller the w, x, and y values.)

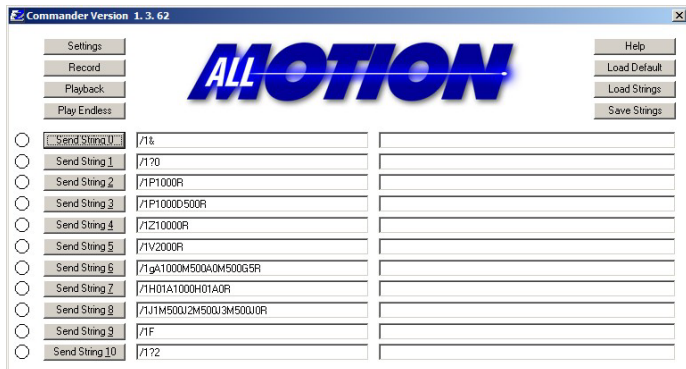
Troubleshooting: See page 3. →

Using EZCommander™

Start with USB cable unplugged.

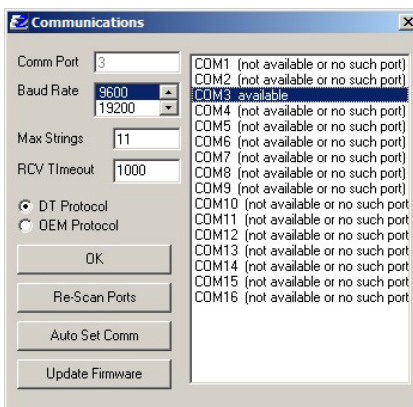
NOTE: If using RS232 Converter, disregard instructions for USB.

1 Open EZCommander.



2 Click the **Settings** button to open the Communications window.

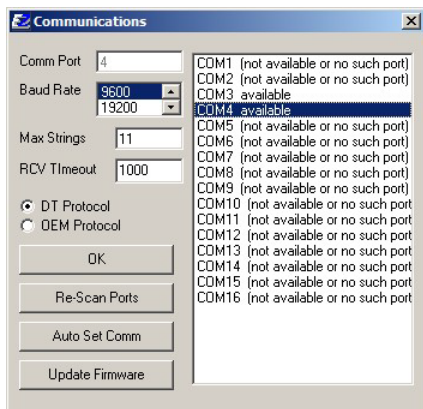
- Click Re-Scan Ports; note available ports; then click OK to close.



NOTE: USB cable is disconnected for this step.

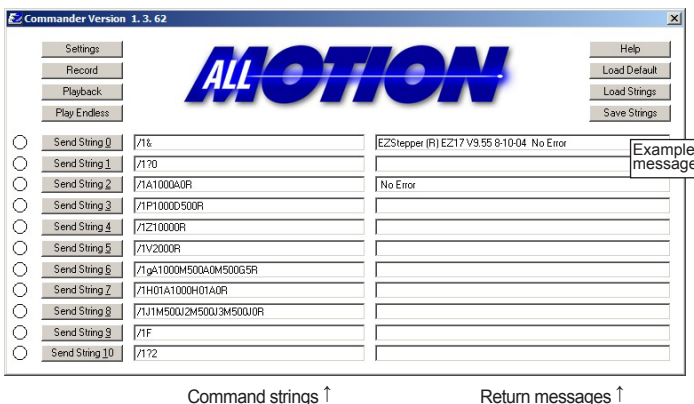
3 Plug USB cable into the PC.

- Click Settings button, then Re-scan Ports. A new comm port will become available (will be com1 if using RS232 Converter).
- Select the newly available comm port and click OK to close the Communications Window.



4 Issue commands :

- Enter string in a left-hand field.
- Press adjacent **Send String** button to issue command.
- See return message in field to right.



Command strings ↑

Return messages ↑

Troubleshooting

If motor does not respond to commands:

NOTE: If using RS232 Converter, disregard instructions for USB.

- Make sure address switch is detented exactly on position number 1. (After resetting, power must be cycled to establish new address.)
- Brush motors: confirm that jumper is installed between pins 1 and 5 on motor connector.
- EZSV17: confirm that supply voltage is greater than 19V.
- Re-check that correct comm port is selected.
- Confirm good ground between PC and negative terminal of power supply. First measure resistance with power off; then check for voltage drop with power on. Repair poor ground connections.
- Issue command /1& and verify that a response identifying the product and firmware version is received. If ok, motor connection may be miswired or loose. If not ok, re-install USB driver. Continue to next item if not resolved.
- Check continuity of communication data to AllMotion circuit board at

point 1 in diagram below. If not present, check at other points indicated. Suspect failed component or faulty wiring/connector between point where signal is absent and last point where signal is present.

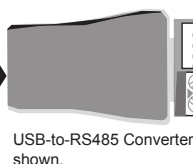
If motor gives up partway through a move:

Query by issuing command /1Q. Overload error will be returned (Error 9 in EZCommander). Motor cannot keep up with the trajectory specified in the command. Try the following:

- Increase maximum move current with the "m" command to allow the motor to move faster. For example /1m100R allows 100% current.
- Reduce the velocity (V) and/or acceleration (L).

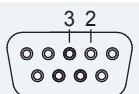
If motor cannot reach specified speed:

- Increase supply voltage.
- Increase maximum move current with the "m" command to allow the motor to move faster. For example /1m100R allows 100% current.



If using RS232-to-485 Converter

At DB9 connectors pins 3 and 2, see 12V P-P pulses 100 μsec wide (@9600 baud). Check at cable end and at Converter connector.



At both sets of A & B pins, confirm 3V P-P pulses centered on +2.5V. See points 1 and 2.

NOTE: Signal presence at point 1 suggests problem in motor, EZServo board, or wiring to motor.