ZABER

VSR Product
User's Manual
Firmware 5.00 and up

Last Update: December 10 2015
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Disclaimer

Zaber’s devices are not intended for use in any critical medical, aviation, or military applications or situations where a product's use or failure could cause personal injury, death, or damage to property. Zaber disclaims any and all liability for injury or other damages resulting from the use of our products.

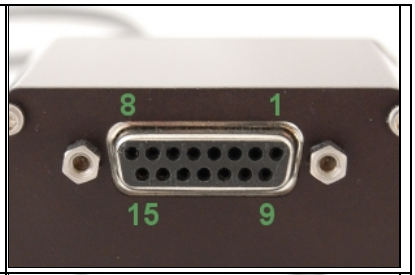
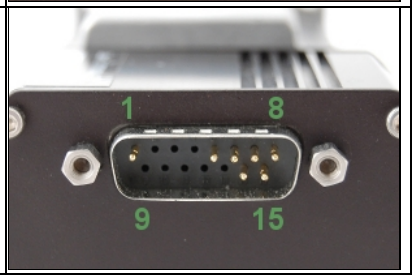
Conventions used throughout this document

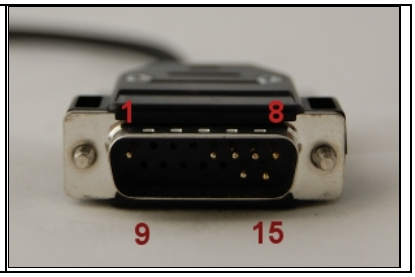
- `Fixed width` type indicates communication to and from a device. The symbol indicates a carriage return, which can be achieved by pressing enter when using a terminal program.
- An ASCII command followed by (T:xx) indicates a legacy T-Series Binary Protocol command that achieves the same result. Not all ASCII commands have an equivalent legacy counterpart. e.g.:
  `move abs 10000 (T:20:10000)` shows that a move abs ASCII command can also be achieved with binary command number 20.
- All devices support the Binary Protocol, however the ASCII Protocol is only supported in devices with firmware version (T:51) 6.06 and above.

Operation

The VSR-T3 stages are designed to be controlled with any of Zaber's X-Series or A-Series Stepper Motor Controllers. Zaber's controllers and peripherals are designed for ease of use when used together. Optimal settings for each peripheral (such as the default current, speed, acceleration, and limit settings) can be loaded by setting the peripheralid (T:66) on the controller. The peripheral ID is listed as the ID on the peripheral's label. A list of IDs is also available on the ID Mapping page. For more information on device operation, refer to the controller's user manual.

Pinout for D-sub 15 Connectors (A-series and X-Series controllers and peripherals)

A- or X-series controller (female)	
T3 Peripheral (male)	

T4 Peripheral (male)	

Pin #	Function
1	+5V
2	Encoder Error ****
3	*reserved*
4	Away Sensor ***
5	Home Sensor
6	Ground
7	Motor B1
8	Motor A1
9	+5V *
10	Encoder A *
11	Encoder B *
12	Encoder Index **
13	Ground *
14	Motor B2
15	Motor A2

** encoder embedded peripherals only*
*** devices with encoders with index only*
**** devices with away sensors only*
***** devices with linear or direct-reading encoders only*

Alternate Controllers

The device may be controlled by any 2-phase stepper motor controller with home sensor input. **Warning: Operating the unit without correctly wiring up the home sensor can cause permanent damage to the unit. We do not recommend using your own controller unless you are familiar with how to control a stepper motor with a hall sensor limit switch.** The following information is provided for reference only. Damage to the actuator or hall sensor due to incorrect wiring is not covered by warranty.

Motor

The VSR uses a NEMA stepper motor.

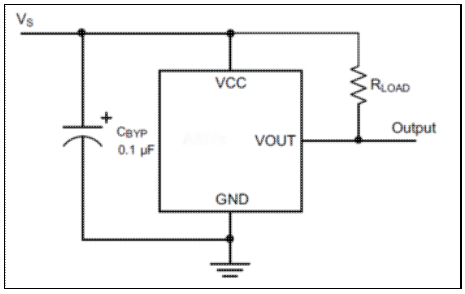
- 1.5 A / Phase
- 1.9 mH / phase

Home Sensor Wiring

A Hall effect sensor is mounted in the device for use as a home sensor. It is part number A1120LLHLT-T made by Allegro. Click here for data sheet. Your controller should be configured so the stage stops immediately (little deceleration) when the home sensor is triggered.

- Wire colour code:
  - ♦ 3.6-24 Vdc input - red
  - ♦ Home signal - yellow
  - ♦ Ground - black

The Hall sensor has an open-collector output. The default output is high impedance when the Hall sensor is not active. When the sensor detects a magnet, the Hall sensor pulls the output low to ground.



If you are not using a Zaber controller, ensure that your controller has a pull-up resistor on the output line of the Hall sensor as shown in the diagram. The bypass capacitor is optional, but may help to eliminate false triggering in noisy environments. The typical value for the pull-up resistor (R_{LOAD}) is 10k and for the bypass capacitor is 0.1uF to 1uF. The larger the capacitance, the better the noise filtering but the slower the response time.

Warranty and Repair

For Zaber's policies on warranty and repair, please refer to the Ordering Policies

Standard products

Standard products are any part numbers that do not contain the suffix ENG followed by a 4 digit number. Most, but not all, standard products are listed for sale on our website. All standard Zaber products are backed by a one-month satisfaction guarantee. If you are not satisfied with your purchase, we will refund your payment minus any shipping charges. Goods must be in brand new saleable condition with no marks. Zaber products are guaranteed for one year. During this period Zaber will repair any products with faults due to manufacturing defects, free of charge.

Custom products

Custom products are any part numbers containing the suffix ENG followed by a 4 digit number. Each of these products has been designed for a custom application for a particular customer. Custom products are guaranteed for one year, unless explicitly stated otherwise. During this period Zaber will repair any products with faults due to manufacturing defects, free of charge.

How to return products

Customers with devices in need of return or repair should contact Zaber to obtain an RMA form which must be filled out and sent back to us to receive an RMA number. The RMA form contains instructions for packing and returning the device. The specified RMA number must be included on the shipment to ensure timely processing.

Email Updates

If you would like to receive our periodic email newsletter including product updates and promotions, please sign up online at www.zaber.com (news section). Newsletters typically include a promotional offer worth at least $100.

Contact Information

Contact Zaber Technologies Inc by any of the following methods:

Phone	1-604-569-3780 (direct) 1-888-276-8033 (toll free in North America)
Fax	1-604-648-8033
Mail	#2 - 605 West Kent Ave. N., Vancouver, British Columbia, Canada, V6P 6T7
Web	www.zaber.com
Email	Please visit our website for up to date email contact information.

The original instructions for this product are available at http://www.zaber.com/wiki/Manuals/VSR.

Appendix A: Default Settings

Please see the Zaber Support Page for default settings for this device.

Specification	Value	Alternate Unit
Microstep Size (Default Resolution)	0.09525 µm	
Recommended Controller	X-MCB1 (48 V) Recommended	
Accuracy (unidirectional)	35 µm	0.001378 "
Repeatability	< 1 µm	< 0.000039 "
Loaded Backlash (10 N)	< 10 µm	< 0.000394 "
Maximum Speed	48 mm/s	1.890 "/s
Peak Thrust	200 N	44.9 lb
Maximum Continuous Thrust	100 N	22.4 lb
Maximum Centered Load	100 N	22.4 lb
Maximum Cantilever Load	300 N-cm	424.8 oz-in
Pitch	0.08 degrees	1.396 mrad
Roll	0.08 degrees	1.396 mrad
Maximum Current Draw	950 mA	
Linear Motion Per Motor Rev	1.2192 mm	0.048 "
Motor Steps Per Rev	200	
Motor Type	Stepper (2 phase)	
Motor Rated Current	1500 mA/phase	
Inductance	1.9 mH/phase	
Motor Connection	D-sub 15	
Default Resolution	1/64 of a step	
Mechanical Drive System	Precision Lead Screw	
Limit or Home Sensing	Magnetic home sensor	
Axes of Motion	1	
Mounting Interface	M6 and M3 threaded holes	
Operating Temperature Range	0-50 degrees C	
RoHS Compliant	Yes	
CE Compliant	Yes	

Comparison - VSR Series

Part Number	Travel Range	Backlash	Guide Type
VSR20A-T3	20 mm (0.787 ")	< 35 µm (< 0.001378 ")	Ball Bearing
VSR40A-T3	40 mm (1.575 ")	< 120 µm (< 0.004724 ")	Crossed-Roller Bearing

Part Number	Horizontal Runout	Weight
VSR20A-T3	< 30 µm (< 0.001181 ")	0.55 kg
VSR40A-T3	< 35 µm (< 0.001378 ")	0.76 kg