

## **1291BL Series Technical Specification Single Axis Position and Rate Table System**

### **DESCRIPTION**

The Model 1291BL Single Axis Position and Rate Table System is designed to provide precise position, rate and acceleration motion for development or production testing of commercial or military inertial sensors. The 1291BL was specifically designed for testing today's considerably smaller inertial sensors and systems.

Accurate and reliable motion control of the 1291BL test table is achieved with a servo controlled system consisting of a direct drive brushless torque motor, a precision absolute optical encoder, and an internal microprocessor-based motion control card. Position, rate, and acceleration, as well as motion profiles, are commanded remotely from a host PC (not provided) via the standard RS-232 communication interface. The user can utilize an Ideal-provided LabVIEW Application Program or their own communication software package with Ideal's software command set to precisely control the 1291BL. The 1291BL utilizes the latest controller technology, configured in a 19 inch rack-mountable servo controller that interfaces to the host PC.

### **STANDARD FEATURES**

- Position Accuracy:  $\pm 15$  Arc Sec
- Rate Accuracy:  $\pm 0.001\%$
- Maximum Rate: 3,000 deg/sec
- Position Repeatability:  $\pm 3$  Arc Sec
- Tabletop Diameter: 8 inches (203 mm)
- 21 lbf-ft Direct drive brushless motor
- 34 user lines to tabletop (2A per line)
- Digital closed loop servo control
- RS-232 Remote Interface
- LabVIEW Interface
- Electric fail-safe brake
- Brake release switch located on the table
- Axis Active LED
- User-friendly Ideal Aerosmith Table Language (ATL)
- Tests in a Vertical or Horizontal Axis Configuration
- Precision-ground anodized aluminum tabletop
- Trapezoidal motion profiles with programmable velocity and acceleration
- Sinusoidal Motion with programmable frequency and amplitude
- Capable of querying the current position, velocity, and acceleration
- Configurable and scalable Analog Input
- Configurable and scalable Analog Output (1 KHz update frequency)
- CE Mark

### **OPTIONS**

- 64 line slip ring package
- Mating connector kit
- Wire-wrap option available for limited rotation applications
- Heavy duty maximum payload option (200 lbs)
- Vacuum line
- Position Accuracy:  $\pm 8$  Arc Sec
- 14, 18 or 24 inch (356, 457 or 610 mm) diameter tabletops
- Pedestal for floor mounting
- Custom mounting hole patterns
- Tilt stand
- Temperature Chamber (see separate section on Page 5)
- RF and Fiber Optic rotary joints



1291BL in vertical  
axis configuration



1291BL in horizontal  
axis configuration



1291BL in horizontal axis  
configuration with L-bracket



1291BL with pedestal



1291BL with tilt stand  
mounted on a pedestal

## Physical Configuration and Specifications

<b>Tabletop Surface Characteristics:</b>	
• Diameter	Std: 8 inches (203 mm) Optional: 14, 18 or 24 inch (356, 457 or 610 mm)
• Hole Pattern: Standard for 8 inch diameter Standard for 14, 18 or 24 inch diameter	1/4-20 threaded holes on a one-inch (25 mm) grid pattern. 1/4-20 threaded holes on a two-inch (51 mm) grid pattern. (Other interface patterns available upon request.)
• Face Flatness	0.002 inches (0.051 mm) TIR
• Face Runout	0.002 inches (0.051 mm) @ 3 inch (76.2 mm) Radius
• Material	Aluminum, black anodized
• Surface Finish	63 RMS
• Usable tabletop surface:	Due to the location of the connectors, not all the tabletop surface is usable. For details, request tabletop drawings from Ideal Aerosmith
• Axis Wobble, arc sec	3
<b>Test Load Capacity:</b>	
• Height	11 inches (279 mm)
• Weight: (vertical or horizontal axis)	Vertical axis configuration: 125 lbs (56 Kg) centered Horizontal axis configuration: 50 lbs. (23 Kg) centered Optional: Heavy Duty (HD) 200 lbs. (91 Kg) Centered (vertical axis)
<b>Electrical Access to the UUT:</b>	
• Slip ring lines	Standard: 34 lines at 2A each (16 twisted shielded pair, 2 shielded singles) Optional: 64 lines (26 twisted shielded pair at 3A per line, 2 singles at 3A per line, 10 singles at 5A per line)
• Slip ring resistance variation per line, with table rotating at 30 deg/sec.	60 milliohms for 34 line slip ring 10 milliohms for 64 line slip ring
• Connectors	Tabletop: (2) 37 pin Female D-sub connectors Base: (2) 37 pin Male D-sub connectors
<b>Test Table (34 line slip ring, 8" tabletop)</b>	
• Dimensions	10.2 x 10.8 x 14.8 inches Height (259 x 274 x 376 mm height)
• Weight, approximate, without Tilt Stand	95 lbs. (43.1 Kg)
• Weight, approximate, with Tilt Stand	260 lbs. (118 Kg) <i>including counterweights</i>
• Leveling Range	+/- 1 degree
<b>Control Chassis:</b>	
• Dimensions	19.0 x 18.6 x 7.0 inches Height (483 x 472 x 178 mm height)
• Weight	50 lbs. (23 Kg)
<b>Controller:</b>	
• Type	Internal
• Communication Interface	RS-232 standard (Max 115,200 Baud)
• Analog Input	Rate or Position. Two $\pm 10V$ 16 Bit Inputs, scalable
• Analog Output	Position, Velocity, Rate or Position Error $\pm 10V$ = full scale, scalable, 16 bit resolution. Update Rate is 1 KHz
• Software Control	Uses simple software command set (ATL) via host PC
<b>Operating Environment:</b>	
• Temperature	50 to 95° F (10 to 35° C)
• Relative Humidity	20% to 85% non-condensing
<b>Non-Operating Environment:</b>	
• Temperature	-20 to 120° F (-29 to 49° C)
<b>Power Requirements:</b>	
IEC 60320 Power Entry Connection 115/230VAC $\pm 10\%$ , 1Ø, 50/60 Hz, 5A(FLA), 10A BREAKER, 5kA SCCR (230VAC Required for speeds over 2000 deg/sec)	

Performance Specifications Common for all 1291BL Systems	
Range of Motion, Degrees	Unlimited or $\pm 370$
Position	
• Accuracy (absolute), arc sec (deg)	$\pm 15$ (0.00417); $\pm 8$ (0.00222) Optional
• Repeatability, arc sec (deg)	$\pm 3$ (0.00083)
• Initialization Accuracy, arc sec (deg)	$\pm 3$ (0.00083)
• Command/Display Resolution, deg	0.0001
• System Resolution (approx), deg	0.000043
• Encoder Resolution, counts per rev	8,388,608
Rate	
• Maximum, deg/sec	2,000 @ 115VAC; 3,000 @ 230VAC
• Command/Display Resolution, deg/sec	0.0001
• System Resolution (approx), deg/sec	0.000172
• Accuracy (average of 10 readings, measured over 1 revolution)	0.001% of commanded rate $\pm$ resolution
• Stability (measured over 1 revolution)	0.001% of commanded rate up to 1080 deg/sec 0.005% of commanded rate above 1080 deg/sec
Acceleration, Min. for Trapezoidal move	0.176 deg/sec/sec

Acceleration Performance Specifications for 1291BL System		
Motor Torque	21 lbf-ft (28.5 Nm)	
Acceleration, Maximum for Sinusoidal move, deg/sec/sec (no load) **	2 Second Peak	Continuous
• 8 inch (203 mm) tabletop	90,000	40,000
• 14 inch (356 mm) tabletop	22,400	9,500
• 18 inch (457 mm) tabletop	9,450	4,000
• 24 inch (611 mm) tabletop	3,250	1,400
Tare Inertia, lbm in <sup>2</sup> (kg m <sup>2</sup> )		
• 8 inch tabletop	55 (0.016)	
• 14 inch tabletop	247 (0.072)	
• 18 inch tabletop	583 (0.171)	
• 24 inch tabletop	1,681 (0.492)	
Frequency, Maximum, -3dB (no load):***	8 inch or 14 inch table top (with or without tilt stand): 100 Hz 18 inch table top (with or without tilt stand): 75 Hz Optional: 8 inch without tilt stand: 150 Hz	

\*Minimum payload inertia of 88.7 lbm-in<sup>2</sup> (0.026 kg-m<sup>2</sup>) is required to meet the 0.005% stability spec on table with 8 inch diameter table top

\*\*Peak acceleration up to 1200 deg/sec

\*\*\*Other factors may affect bandwidth performance including use of the Tilt Stand, Pedestal and/or Thermal Chamber options.

## LIST OF DELIVERABLES

### Documentation

One distribution CD to include;

1. Owner's manual which includes, but is not limited to, proper facility preparation, operation, maintenance, troubleshooting, mechanical and wiring schematics, spare parts list and remote interface instructions.
2. One (1) Acceptance Test Procedure including In-process and Factory Acceptance Test results

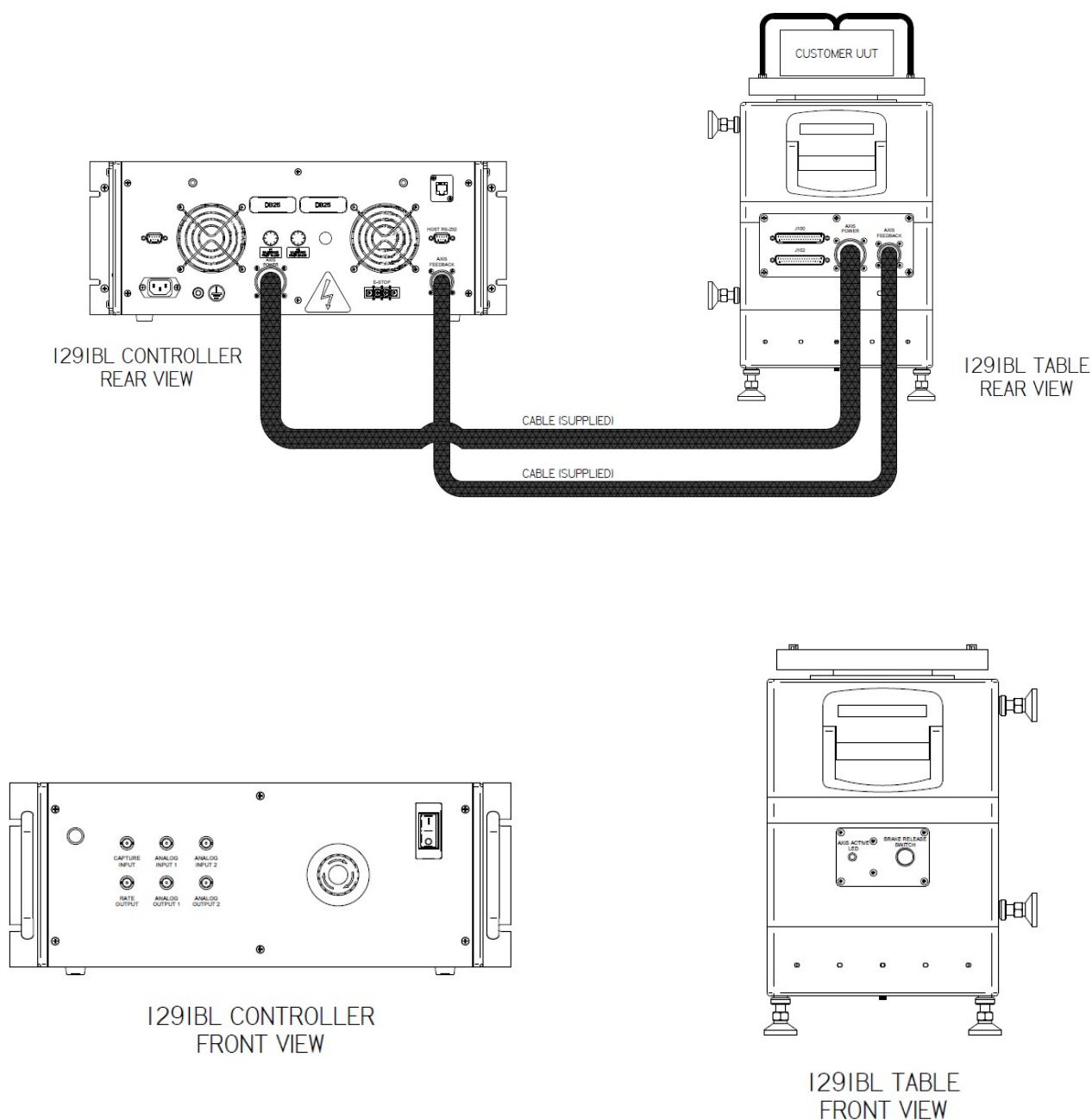
### Standard Hardware

1. Model 1291BL Single Axis Automatic Positioning and Rate Table
2. 1291BL Controller
3. Leveling feet
4. Interconnecting Cables (1 set) (between table and control chassis)
5. Fuse Kit

## SYSTEM MAINTENANCE AND CALIBRATION

The 1291BL Series Tables Systems are virtually maintenance free. There is no regularly scheduled maintenance activity other than calibration. Customers should verify system performance on a periodic basis at a frequency determined by their internal quality procedure, although Ideal does recommend the calibration procedure be performed annually. Items typically checked for the calibration include position accuracy, rate accuracy and slip ring resistance variation. Ideal Aerosmith can be contracted to provide calibration service on-site or the table can be returned to our facility for the calibration procedure.

## TABLE SYSTEM LAYOUT



# 1291BL TEMPERATURE CHAMBER (OPTIONAL)

## Model 1291BL Temperature Chamber for use with 1291BL Series Single Axis Rate Table

The 1291BL-TC is a mechanical refrigeration temperature chamber option for the 1291BL Single Axis Positioning and Rate Table. The temperature chamber can be ordered with a new 1291BL, or it can be integrated with a 1291BL already in service.

The 1291BL rate table can be positioned underneath (vertical axis configuration) or to the side (horizontal axis configuration) of the temperature chamber. A shaft extension passes through a seal in the floor of the temperature chamber; the table is mechanically separated from the temperature chamber in order to reduce vibration transfer. The table shaft extension is insulated, heated, and cooled, to protect the table from the temperature extremes in the chamber, and from condensation damage.



1291BL temperature chamber with 18 inch table top in vertical axis configuration

Made with a steel exterior and a stainless steel interior, the 1291BL thermal chamber comes with an integral microprocessor temperature controller, controllable via RS-232 interface. A stand-alone PC application program and drivers for use in test application programs are available with the system.

1291BL Thermal Chamber Specifications		
Chamber Usable Interior Size, in (mm)	20 W x 22 H x 19.25 D (508 x 559 x 489)	
Exterior Size (including stand), in. (mm)	70.1W x 76.3H x 32.6D (1,781 x 1,938 x 828)	
Temperature Range, °C (°F)	-65 to +150 (-85 to 302)	
Temperature Ramp Rate, °C (°F)/minute		
• Ambient to upper limit	5 (9)	
• Ambient to lower limit	1 (1.8)	
Temperature Stability, °C (°F)	+/- 1 (1.8)	
Heating Method	Electrical heaters with forced air circulation. Proportioning Control.	
Cooling Method	Mechanical Refrigeration: Two Stage Cascade, Air Cooled 1.0 HP compressors	
Primary Temperature Controller	Watlow F4T Programmable Controller with RS232 and Ethernet Communication	
UUT Access	Front door with 6 x 8 in. (152 x 203 mm) multi-pane window 3 in. (76mm) access port with plug on right side wall Internal Light with External Switch	
Secondary Temperature Protection	Digital Set - Digital Indicating High and Low Temperature Safety	
Electrical Power (Chamber only)	190-240 VAC, 1Ø, 50/60 Hz, 24A(FLA), 30A BREAKER, 5kA SCCR (Transformer taps provide full range)	
Chamber insulation	Fiberglass insulated 4 in. (102 mm) walls No exterior condensation over the temperature range (in typical laboratory environments)	
Door Interlock Switch	Shuts down thermal operation when door opens	
Vibration Isolation	Table is mechanically isolated from chamber	
Acceleration for the 1291BL is reduced when it is coupled with the thermal chamber as follows:		
Acceleration, Maximum, for sinusoidal move:	<u>2 Second Peak</u>	<u>Continuous</u>
• 8" tabletop:	40,000	14,500
• 14" tabletop:	15,900	5,700
• 18" tabletop:	7,750	2,800

## MODEL NUMBER AND OPTIONS GUIDELINE

STANDARD 1291BL TABLE SYSTEM		
Model Number	Specifications for Standard 1291BL Table System	Standard Leadtime
1291BL	Includes the following characteristics: <ul style="list-style-type: none"> <li>• 21 lbf-ft (28.5 Nm) motor torque</li> <li>• 8 inch (203 mm) diameter tabletop</li> <li>• 34 line slip ring package, 2A per line</li> <li>• RS-232 communication interface</li> </ul>	8-10 weeks
		<i>An expedited delivery option may be available, please contact Ideal</i>

MODEL NUMBERING GUIDELINE			
Base Model	Tabletop Size	Slipring package	Custom Requirements
1291BL	Blank = 8 inch	blank = 34 lines	-SPL = special
1291BL-TC	-14 = 14 inch diameter	-SR64 = 64 lines	
	-18 = 18 inch diameter		
	-24 = 24 inch diameter		

### Model Numbering Examples:

8 inch diameter tabletop, 64 line slip ring package = Model 1291BL-SR64

34 slip ring lines, 18 inch tabletop with custom mounting hole pattern = Model 1291BL-18-SPL

TABLE SYSTEM OPTIONS		
Model No. Suffix Code	Description	Standard Leadtime
-14 -18 -24	<u>Tabletop upgrades:</u> 14 inch (356mm) diameter 18 inch (457mm) diameter 24 inch (610 mm) diameter (not available with TC)	10 weeks 10 weeks 10 weeks
-SR64	<u>Slip ring upgrades:</u> 64 lines. 10 lines at 5 Amps per line, 54 lines at 3 Amps per line	Contact Ideal
---	± 8 Arc Sec Position Accuracy	+1 week
---	150 Hz Bandwidth (8" tabletop, no load, without tilt stand)	---
---	Heavy Duty (HD). Increased maximum payload of 200 lbs. (91 Kg) Centered (vertical axis)	Contact Ideal
---	Vacuum Line - Pneumatic air line for testing vacuum instruments 1/4 NPT male on base, 1/8 NPT female on tabletop. <b>Note</b> max rate is decreased to 500 deg/sec with this option and can only be used with 34 line slip ring.	10 weeks
-SPL	<u>Special customization:</u> Any other customized feature Example: Custom tabletop size or mounting hole pattern (metric)	Contact Ideal
1291BL-TC	Mechanical thermal chamber (when purchased with new 1291BL table)	Contact Ideal
1291BL-TC	Mechanical thermal chamber (integrated with existing 1291BL table)	Contact Ideal

---	Turn-key system for 1291BL (includes PC and monitor, software installed, RS-232 cabling, RS-232 port & USB 2.0 ports) 1. Desktop configuration – P/N: 230470-61 2. Laptop configuration - P/N: 230470-59	Contact Ideal
231150-406 & 231150-407	Harnesses, short version – This option includes a 6 ft. Axis Power Harness (23150-406) and a 6 ft. Axis Feedback Harness (23150-407).	4 weeks
230470-52	IEEE-488 communication interface converter and harness This device allows for communication to controller via an IEEE-488 (GPIB) interface	3 weeks
230110-34	IEEE-488 communication interface converter for thermal chamber This device allows for communication to controller via an IEEE-488 (GPIB) interface	3 weeks
230470-69	USB to RS-232 converter kit - This device allows for communication to motion controller or thermal controller via USB interface.	3 weeks
231150-980	Mating Connector Kit; includes connectors and backshells for 37-pin tabletop and base connectors	1 week
---	Temperature recording software Includes software and one USB Key	5 weeks
231410-43	<b><u>PEDESTALS</u></b> -- Can be used in lieu of a lab bench (dimensions approximate) 1. Short: Pedestal height 14 inches a. With 34 line slip ring package: to top of table = 27 inches b. With 64 line slip ring package: to top of table = 32 inches 2. Medium: Pedestal height 18.5 inches a. With 34 line slip ring package: to top of table = 32 inches b. With 64 line slip ring package: to top of table = 36 inches 3. Custom table height	4 weeks
231410-42		4 weeks
TBD		6 weeks
231150-45 231150-46	<b><u>TILT STANDS*</u></b> <ul style="list-style-type: none"> <li>Position accuracy: <math>\pm 45</math> arc secs</li> <li>Repeatability: <math>\pm 30</math> arc secs</li> <li>Wobble: <math>\pm 15</math> arc secs</li> <li>Orthogonality: <math>\pm 30</math> arc secs</li> </ul> 1. Tilt positions of $\pm 90$ , $\pm 45$ , & 0 degrees 2. Tilt positions of 0, $\pm 30$ , $\pm 60$ , & $\pm 90$ degree *Note: Optional anchoring/leveling kit P/N 230630-925; not necessary if used with pedestal as pedestal contains this kit	8-10 weeks
230630-925	Anchoring/leveling kit for tilt stand.	Contact Ideal
TBD	Protective Cases for transporting 1291BL and controller – One case for the table up to 18 inch diameter table top and 64 line slip ring. One case for the controller. Cases are stackable and include foam packing	Contact Ideal
LEASING	Lease a 1291BL with the option to purchase the table.	Contact Ideal
231150-982	Kit, 1291BL Transformer, 100V/115V to 200/230V, 50/60Hz - This kit allows for step-up of customers 100V or 115V power to 230V power, providing the ability for table rates above 2,000°/sec, maximum of up to 3,000°/sec. Plugs into standard 115V NEMA 5-15 receptacle. Cords included.	3 weeks

An expedited lead-time may be available on any of the tables and options. Please contact Ideal.  
Specifications, options and pricing are subject to change without notice.

1291BL Rev L2