

1291BLX Series Technical Specification Single Axis Position and Rate Table System

DESCRIPTION

The Model 1291BLX 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 1291BLX was specifically designed for testing today's considerably smaller inertial sensors and systems.

Accurate and reliable motion control of the 1291BLX test table is achieved with a 19 inch rack-mountable servo controlled system consisting of a direct drive brushless torque motor, a precision absolute optical encoder, and a motion controller and amplifier synced digitally on a 10 MHz bus.

Position, rate, and acceleration, as well as motion profiles, are commanded remotely from a host PC (not provided) via the standard RS-232 or Ethernet communication interface. The user can utilize an Ideal Aerosmith-provided TypeScript-based application (ATL Client) or their own communication software package with Ideal's software command set to precisely control the 1291BLX. The 1291BLX utilizes the latest controller technology with faster processing speed than its predecessor, the 1291BL series. ATL Client, included standard with all 1291BLX systems, provides easy graphing and data export for various control loop signals, an integrated javascript engine/editor for ATL scripting, and a simulated view of the table; as well as the familiar command-line-style ATL control (now with integrated documentation) and configurable readouts for table position, velocity, acceleration, or interlock status.

STANDARD FEATURES

- System Bandwidth: 300 Hz
- Position Accuracy: ± 15 Arc Sec
- Rate Accuracy: $\pm 0.001\%$
- Maximum Rate: 3,000 deg/sec
- Position Repeatability: ± 3 Arc Sec
- Tabletop Diameter: 8 inches (203 mm)
- 21 lbf-ft Direct drive brushless motor
- 54 user lines to tabletop (2A per line)
- Digital closed loop servo control
- RS-232 and Ethernet Remote 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 (20 kHz update frequency, approx. 1 kHz bandwidth)



1291BLX in vertical axis configuration

OPTIONS

- 400 Hz system bandwidth
- 4,000 deg/sec max rate
- 64 line slip ring package with lower resistance variation
- 1 or 2 1000BaseT Ethernet channels
- Wire-wrap option available for limited rotation applications
- Heavy duty maximum payload option (200 lbs)
- Position Accuracy: ± 8 Arc Sec
- 14, 18 or 24 inch (356, 457 or 610 mm) diameter tabletops
- Pedestal for floor mounting
- Tilt stand
- Temperature Chamber (see separate section on Page 5)
- RF and Fiber Optic rotary joints



1291BLX with pedestal



1291BLX with tilt stand mounted on a pedestal

| Physical Configuration and Specifications | |
|--|--|
| Tabletop Surface Characteristics: | |
| • 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 |
| Test Load Capacity: | |
| • 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) |
| Electrical Access to the UUT: | |
| • Slip ring lines | Standard: 54 lines at 2A each (27 twisted shielded pair). The 54 line Slip Ring is capable of the following on all lines: AC > 0 to 240 Volts, 0 to 2 Amps. DC > 0 to 340 Volts, 0 to 2 Amps. Optional: 64 lines (26 twisted shielded pair at 3A per line, 2 singles at 3A per line, 10 singles at 5A per line) |
| • Optional user signal lines | Single Channel Gigabit Ethernet slip ring Dual channel Gigabit Ethernet slip ring |
| • Slip ring resistance variation per line, with table rotating at 30 deg/sec. | 60 milliohms for 54 line slip ring 10 milliohms for 64 line slip ring |
| • Connectors | Tabletop: (1) 78-pin female High-Density D-sub connector Base: (1) 78-pin male High-Density D-sub connector Optional Ethernet: Tabletop: 1 (single channel) or 2 (dual channel) 10-pin female LEMO 2B.310 connectors Base: 1 (single channel) or 2 (dual channel) RJ45 jacks |
| Test Table (54 line slip ring, 8" tabletop) | |
| • Dimensions | 10.2 x 10.8 x 15.3 inches height (259 x 274 x 376 mm height) |
| • Weight, approximate, without Tilt Stand | 85 lbs. (38.5 Kg) |
| • Weight, approximate, with Tilt Stand | 260 lbs. (118 Kg) <i>including counterweights</i> |
| • Leveling Range | +/- 1 degree |
| Control Chassis: | |
| • Dimensions | 19.0 x 20.4 x 7.0 inches Height (483 x 518 x 178 mm height) |
| • Weight | 33 lbs. (15 Kg) |
| Controller: | |
| NOTE: A user-supplied PC with RS-232, Ethernet or IEEE-488 is required | |
| • Type | Internal |
| • Communication Interface | Ethernet and RS-232 standard (Max 115,200 Baud) |
| • Analog Input | Rate or Position control. One ±10V 16 Bit Input, scalable Analog Input Bandwidth approximately 2.5 kHz |
| • Analog Output | One output. Position, Velocity, Acceleration, or Position Error. ±10V = full scale, scalable, 16 bit resolution. Analog Output Bandwidth approximately 1 kHz |
| • Software Control | Uses simple software command set (ATL) via host PC |
| Operating Environment: | |
| • Temperature | 50 to 95° F (10 to 35° C) |
| • Relative Humidity | 20% to 85% non-condensing |

| | |
|-----------------------------------|--|
| Non-Operating Environment: | |
| • Temperature | -20 to 120° F (-29 to 49° C) |
| Power Requirements: | IEC 60320 Power Entry Connection 115/230VAC ± 10%, 1Ø, 50/60 Hz, 8A(FLA), 10A BREAKER, 5kA SCCR |

| Performance Specifications Common for all 1291BLX Systems | |
|--|---------------------------------------|
| Range of Motion, Degrees | Unlimited or ±370 |
| Position | |
| • Accuracy (absolute), arc sec (deg) | ±15 (0.00417); ±8 (0.00222) Optional |
| • Repeatability, arc sec (deg) | ±3 (0.00083) |
| • Initialization Accuracy, arc sec (deg) | ±3 (0.00083) |
| • Command/Display Resolution, deg | 0.00001 |
| • System Resolution (approx), deg | 0.00001 |
| • Encoder Resolution, counts per rev | 8,388,608 |
| Rate | |
| • Maximum, deg/sec | Standard: 3,000; Optional: 4,000 |
| • Command/Display Resolution, deg/sec | 0.00001 |
| • System Resolution (approx), deg/sec | 0.00001 |
| • Accuracy (average of 10 readings, measured over 1 revolution) | 0.001% of commanded rate ± resolution |
| • Stability (measured over 1 revolution) | 0.001% of commanded rate |
| Acceleration, Min. for Trapezoidal move | 0.00001 deg/sec ² |

| Acceleration Performance Specifications for 1291BLX 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 | 100,000 | 40,000 |
| • 14 inch (356 mm) tabletop | 25,000 | 9,500 |
| • 18 inch (457 mm) tabletop | 10,000 | 4,000 |
| • 24 inch (611 mm) tabletop | 3,500 | 1,400 |
| Tare Inertia, lbm in² (kg m²) | | |
| • 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) | |
| System Bandwidth, Maximum, -3dB (no load):*** | 8 or 14 inch tabletop (without tilt stand or pedestal): 300 Hz 18 inch tabletop (without tilt stand or pedestal): 200 Hz 24 inch tabletop (without tilt stand or pedestal): 100 Hz 8 inch table top (with tilt stand or pedestal): 150 Hz 14 inch tabletop (with tilt stand or pedestal): 70 Hz 18 inch (with tilt stand or pedestal): 60 Hz 24 inch (with tilt stand or pedestal): 50 Hz Optional: 8 inch without tilt stand: 400 Hz | |

**With 115 VAC input power: peak acceleration available up to 1600 deg/sec; 15.0 N*m torque up to 3000 deg/sec. No restrictions for 230 VAC. For 4,000 deg/sec, 19.9 of N*m torque for 230VAC or 14.2 N*m torque with 115V input power.

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

LIST OF DELIVERABLES

Documentation

Digital media files including pdf versions of the following:

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

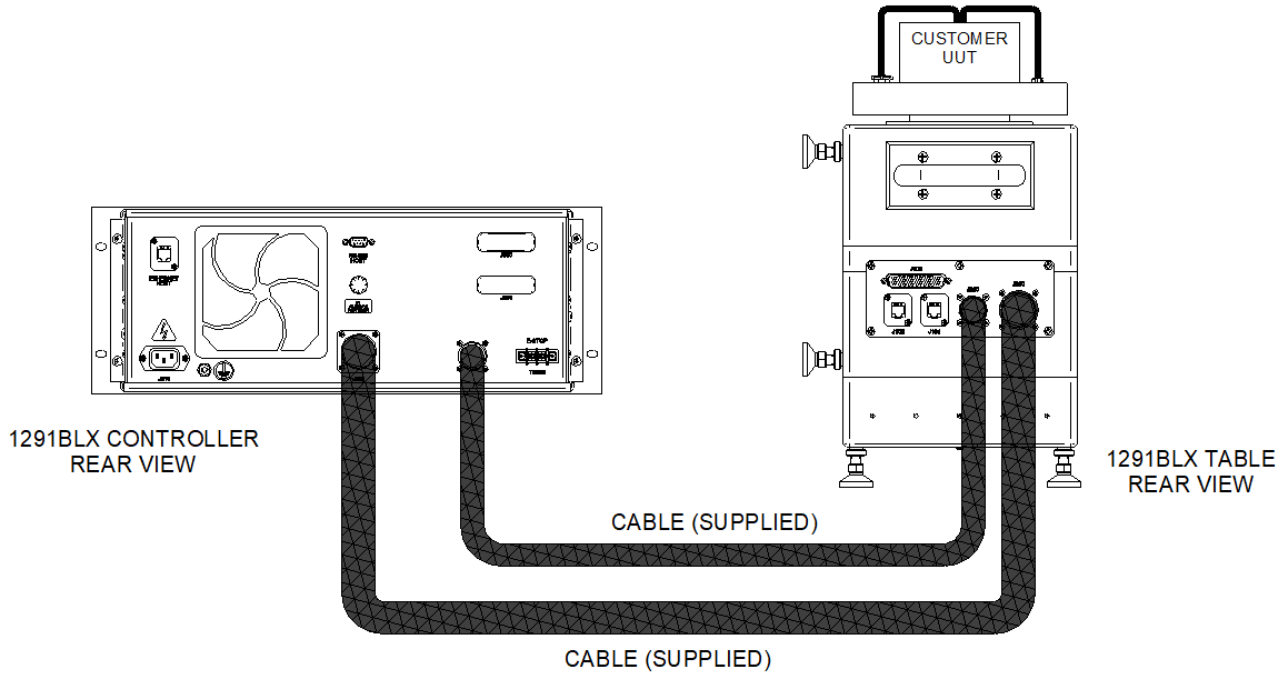
Standard Hardware

1. Model 1291BLX Single Axis Automatic Positioning and Rate Table and controller
2. Leveling feet
3. One set of Interconnecting Cables (between table and control chassis)
4. Fuse Kit
5. Two input power cables: one with a L6-15 plug for 230 VAC, one with a NEMA 5-15 plug for 115 VAC
6. RS232 cable

SYSTEM MAINTENANCE AND CALIBRATION

The 1291BLX 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 Aeromsmith 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



1291BLX TEMPERATURE CHAMBER (OPTIONAL)

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

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

The 1291BLX 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.

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



1291BLX temperature chamber with 18 inch tabletop in vertical axis configuration

| 1291BLX 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 inch (152 x 203mm) multi-pane window 3 inch (76mm) access port with plug on left side wall and | |
| Secondary Temperature Protection | Digital Set - Digital Indicating High and Low Temperature Safety | |
| Electrical Power (Chamber only) | 230VAC ±10%, 1Ø, 60 Hz, 29A(FLA), 40A Fuse. All Benchmaster Series Units come standard with a Nema 6-50 plug | |
| 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 Performance Specifications for 1291BLX With Thermal Chamber | | |
| Acceleration, Maximum, for sinusoidal move: | 2 Second Peak | Continuous |
| • 8" tabletop: | 40,000 | 14,500 |
| • 14" tabletop: | 15,900 | 5,700 |
| • 18" tabletop: | 7,750 | 2,800 |
| System Bandwidth, Maximum, -3dB (no load, with thermal chamber): | 8 inch tabletop: 200 Hz | |

MODEL NUMBER AND OPTIONS GUIDELINE

| STANDARD 1291BLX TABLE SYSTEM | | |
|-------------------------------|--|--|
| Model Number | Specifications for Standard 1291BLX Table System | Standard Leadtime |
| 1291BLX | Includes the following characteristics: <ul style="list-style-type: none"> • 21 lbf-ft (28.5 Nm) motor torque • 8 inch (203 mm) diameter tabletop • 54 line slip ring package, 2A per line • RS-232 and Ethernet communication interface | 8-10 weeks <i>An expedited delivery option may be available, please contact Ideal</i> |

| 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 |
| TBD | L-Bracket Kit | Consult Ideal |
| --- | 400 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 |
| -SPL | <u>Special customization:</u> Any other customized feature Example: Custom tabletop size or mounting hole pattern (metric) | Contact Ideal |
| 1291BLX-TC | Mechanical thermal chamber (when purchased with new 1291BLX table) | Contact Ideal |
| 1291BLX-TC | Mechanical thermal chamber (integrated with existing 1291BLX table) | Contact Ideal |
| 1291BLX-TL | LN2 cooled thermal chamber (when purchased with new 1291BLX table) | Contact Ideal |
| --- | Turn-key system for 1291BLX (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 (231150-406) and a 6 ft. Axis Feedback Harness (231150-407). | 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 |
| 231410-906 | Mating Connector Kit; includes connectors and backshells for 78-pin tabletop and base connectors | 1 week |
| --- | Temperature recording software -- Includes software and one USB Key | 5 weeks |

| | | |
|--|---|---------------|
| 231410-43 | PEDESTALS -- Can be used in lieu of a lab bench (dimensions approximate) 1. Short: Pedestal height 12.8 inches a. With 54 line slip ring package: to top of table = 29.5 inches b. With 64 line slip ring package: to top of table = 36.2 inches 2. Medium: Pedestal height 17.4 inches a. With 54 line slip ring package: to top of table = 34.1 inches b. With 64 line slip ring package: to top of table = 40.8 inches 3. Custom table height | 4 weeks |
| 231410-42 | | 4 weeks |
| TBD | | 6 weeks |
| 231150-45 231150-46 231150-47 231150-48 | TILT STANDS* <ul style="list-style-type: none"> • Position accuracy: ± 45 arc secs • Repeatability: ± 30 arc secs • Wobble: ± 15 arc secs • Orthogonality: ± 30 arc secs • Test Load capacity: <ul style="list-style-type: none"> o Height: 11 inches (279 mm) o Weight: 50 lbs (23 Kg) centered 1291BLX with 54 line slip ring <ol style="list-style-type: none"> 1. Tilt positions of ± 90, ± 45, & 0 degrees 2. Tilt positions of 0, ± 30, ± 60, & ± 90 degree 1291BXL with 64 line slip ring <ol style="list-style-type: none"> 1. Tilt positions of ± 90, ± 45, & 0 degrees 2. Tilt positions of 0, ± 30, ± 60, & ± 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 1291BLX and controller – One case for the table up to 18 inch diameter tabletop and 64 line slip ring. One case for the controller. Cases are stackable and include foam packing | Contact Ideal |
| LEASING | Lease a 1291BLX with the option to purchase the table. | Contact Ideal |

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.

1291BLX Rev C