

1291BR Series Technical Specification Single-Axis Rate and Positioning Table System

DESCRIPTION

The Model 1291BR Single Axis Positioning 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 1291BR was specifically designed for testing today's considerably smaller inertial sensors and systems.

Accurate and reliable motion control of the 1291BR test table is achieved with a servo controlled system consisting of a direct drive DC torque motor, a precision 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 1291BR. The table system includes a 19 inch rack-mountable servo controller that interfaces to the host PC.

STANDARD FEATURES

- Rate Accuracy: 0.01% (Over 1 revolution)
- Rate Range:
 - Setting 1: 0.000125 to 500 deg/sec
 - Setting 2: 0.0005 to 2,000 deg/sec
- Position Accuracy: ± 15 Arc Sec
- Position Repeatability: ± 3 Arc Sec
- Tabletop Diameter: 8 inches (203 mm)
- Payload Capacity: 50 lbs (23 Kg)
- 5 lbf-ft direct drive DC torque motor
- 34 user lines to tabletop (2A per line)
- Digital closed loop servo control
- RS-232 Remote Interface
- LabVIEW Interface
- 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
- Configurable and scalable Analog Input
- Configurable and scalable Analog Output (1 KHz update frequency)



1291BR in vertical axis configuration



1291BR in horizontal axis configuration



1291BR with Pedestal

OPTIONS

- 20 lbf-ft motor, provides better acceleration/bandwidth performance for larger payloads
- 64 line slip ring package
- IEEE-488 (GPIB) Communication Interface, via external converter harness
- 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)
- Analog Output at 8 KHz update frequency (see separate section on page 6)
- CE Mark available with table and chamber



1291BR with Tilt Stand

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 of the tabletop surface is usable. For details, request tabletop drawings from Ideal Aerosmith
• Axis Wobble, arc sec	10
Test Load Capacity:	
• Height	11 inches (279 mm)
• Weight: (vertical or horizontal axis)	50 lbs. (23 Kg) centered
Electrical Access to the UUT:	
• Slip ring lines	Standard: 34 lines at 2A each (16 twisted shielded pair, 2 shielded singles) Optional: 64 lines (26 twisted shielded pair at 2A per line, 2 singles at 2A 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
Test Table (34 line slip ring, 8" tabletop)	
• Dimensions	10.2 x 10.8 x 12.3 inches Height (259 x 274 x 312 mm Height)
• Weight, approximate, without Tilt Stand	65 lbs. (29.5 Kg)
• Weight, approximate, with Tilt Stand	230 lbs. (104 Kg) <i>including counterweights</i>
• Leveling Range	+/- 1 degree
Control Chassis:	
• Dimensions	19.0 x 18.6 x 7.0 inches Height (483 x 472 x 178 mm Height)
• Weight	50 lbs. (23 Kg)
Controller:	
• Type	Internal
• Communication Interface	RS-232 standard (Max 19200 Baud)
• Analog Input	Rate or Position. Two $\pm 10V$ 12 Bit Inputs, scalable
• Analog Output	Rate. $\pm 10V$ = full scale, scalable. Update Rate is 1 KHz (standard), 8 KHz (optional). 16 bits resolution.
• 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:	
Standard: 115 VAC, 50/60 Hz, 6.25 A IEC 60320 Power Entry Module Optional: 230 VAC, 50/60Hz, 3.25 A	

NOTE:

Please specify your voltage requirement when ordering. 1291BR can be configured for 115 or 230 VAC.
Please specify your Resolution Setting when ordering.

Resolution Setting 1: Max Rate of 500 deg/sec; Rate resolution of 0.000125 deg/sec

Resolution Setting 2: Max Rate of 2,000 deg/sec; Rate resolution of 0.0005 deg/sec

Performance Specifications Common for all 1291BR Systems

Rotational Freedom			Unlimited
Positioning		Resolution Setting 1*	Resolution Setting 2*
• Range, deg		0.0000000 to 359.9999375	0.00000 to 359.99975
• Accuracy, arc sec (deg)		± 15 (0.00417)	± 15 (0.00417)
• Display Resolution, deg		0.0000625	0.00025
• Repeatability, arc sec (deg)		± 3 (0.00083)	± 3 (0.00083)
• Homing		Index Mark	Index Mark
Rate			
• Maximum, deg/sec		500	2,000
• Minimum, deg/sec		0.000125	0.0005
• Display Resolution, deg/sec		0.000125	0.0005
• Accuracy (measured over 360 deg), % ± Resolution		0.01 %	0.01 %
Acceleration, Min. for Trapezoidal move		0.064 deg/sec/sec	0.256 deg/sec/sec
Acceleration, Max. for Trapezoidal move (no load)		Lesser of 4,194 deg/sec/sec or sinusoidal value below	Lesser of 16,776 deg/sec/sec or sinusoidal value below

*The 1291BR Series Tables can be operated in either of two resolution settings. The system is initially configured at Ideal per customer's preference, but can be changed in the field as required.

Acceleration Performance Specs. for 1291BR and 1291BR-T20 Systems

Model	1291BR	1291BR-T20
Motor Torque	5 lbf-ft (6.8 Nm)	20 lbf-ft (27.1 Nm)
Acceleration, Maximum for Sinusoidal move, deg/sec/sec (no load)		
• 8 inch tabletop	20,000	>20,000
• 14 inch tabletop	4,500	18,000
• 18 inch tabletop	1,800	7,200
• 24 inch tabletop	625	2,500
Tare Inertia, lbf in ² (kg m ²)		
• 8 inch tabletop	63 (0.0184)	81 (0.0237)
• 14 inch tabletop	254 (0.0743)	272 (0.0796)
• 18 inch tabletop	589 (0.1724)	607 (0.1776)
• 24 inch tabletop	1,692 (0.4951)	1,710 (0.5004)
Frequency, Maximum, -3dB (no load):**	(8 or 14 inch tabletop)***	(8 or 14 inch tabletop)***
• Resolution Setting 1	100 Hz	100 Hz
• Resolution Setting 2	75 Hz	75 Hz

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

***As the payload size increases, the -T20 will exhibit higher acceleration and bandwidth characteristics than the Model 1291BR (-T5 motor).

LIST OF DELIVERABLES

Documentation

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
3. One (1) distribution CD

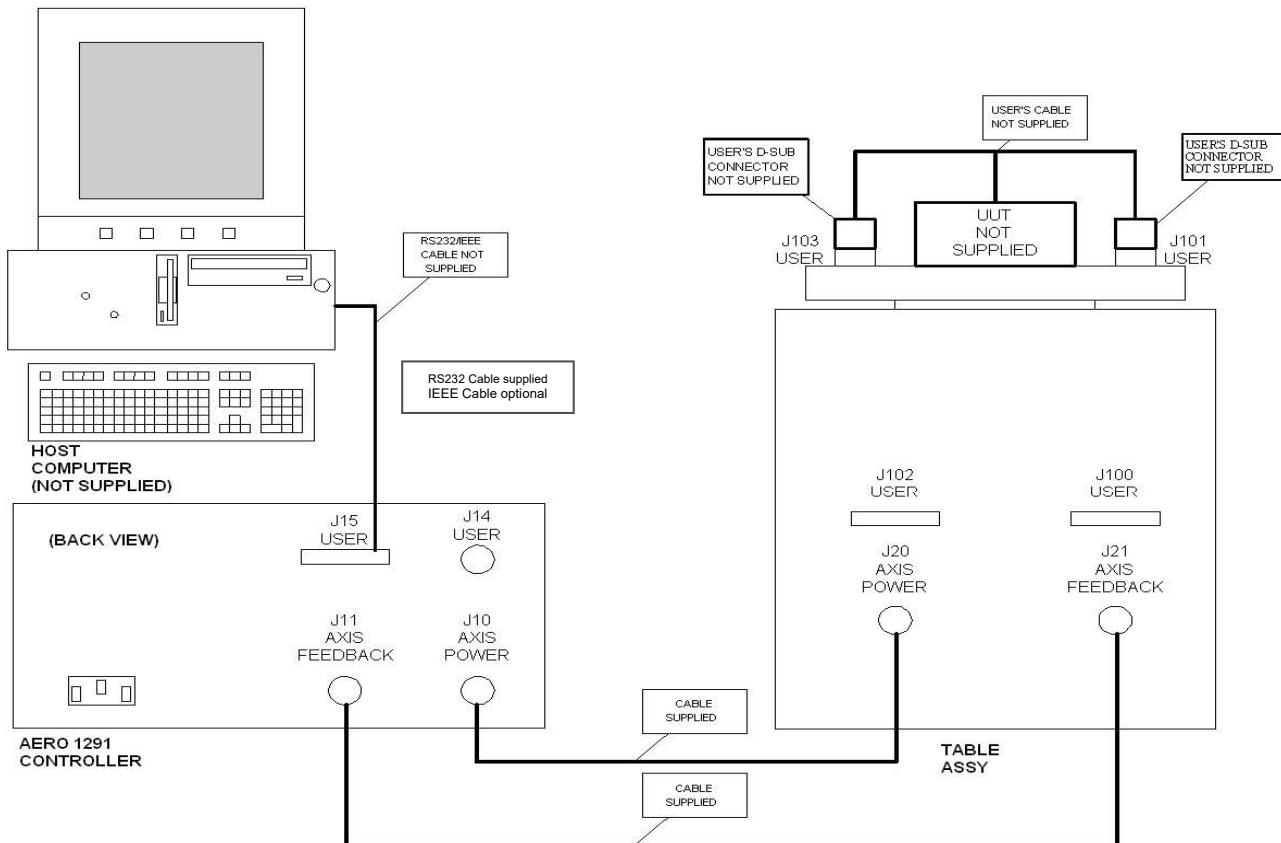
Standard Hardware

1. Model 1291BR-T5 or 1291BR-T20 Single Axis Automatic Positioning and Rate Table
2. Leveling and Anchoring Hardware
3. Controller
4. Interconnecting Cables (1 set) (between table and control chassis)
5. Accessory Kit (includes fuses and mating connector for "user" connector on rear of controller)

SYSTEM MAINTENANCE AND CALIBRATION

The 1291BR 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. Ideal can also provide calibration training for a customer so that they can self-certify.

TABLE SYSTEM LAYOUT



1291TC TEMPERATURE CHAMBER (OPTIONAL)

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

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

The 1291BR 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 thermal chamber, the table is mechanically separated from the thermal 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 1291TC comes with an integral microprocessor temperature controller, controllable via a standard RS-232 interface. A stand-alone PC application program and drivers for use in test application programs are provided with the system.



1291TC with 18 inch table top and vertical axis configuration

1291TC Specifications		
Chamber Usable Interior Size, in (mm)	20 W x 18 H x 22 D (508 x 457 x 559)	
Exterior Size (including stand), in. (mm)	49.4 W x 62.2 H x 35.5 D (1,254 x 1,580 x 901)	
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 1.5 HP compressors	
Primary Temperature Controller	Watlow F4 Programmable Controller with RS232 Communication	
UUT Access	Front door with 8 x 8 in. (203 x 203 mm) multi-pane window 2 in. (51mm) 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		
• Standard	220VAC, 1 phase, 60 Hz, 26A	
• Optional	208VAC, 1 phase, 60 Hz, 26A 220VAC, 1 phase, 50 Hz, 26A 200VAC, 1 phase, 50 Hz, 26A	
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 is opened	
Vibration Isolation	Table is mechanically isolated from chamber	
Acceleration for the 1291BR is reduced when it is coupled with the 1291TC Thermal Chamber as follows:		
Acceleration, Maximum, for sinusoidal move:	-T5 motor	-T20 motor
• 8" tabletop:	7,000 deg/sec ²	>20,000 deg/sec ²
• 14" tabletop:	3,250 deg/sec ²	12,500 deg/sec ²
• 18" tabletop:	1,600 deg/sec ²	6,250 deg/sec ²

1291T-TL TEMPERATURE CHAMBER AND TILT STAND (OPTIONAL)

Model 1291T-TL Temperature Chamber and Tilt Stand for use with 1291BR Series Single Axis Rate Table

The 1291T-TL is an option for the 1291BR Series that adds an LN2-cooled temperature chamber on a tilt stand. The 1291T-TL can be ordered with a new 1291BR, or it can be integrated with a 1291BR already in service.

The tilt stand feature allows the user to test the test article in a vertical or horizontal axis configuration, while under temperature or at an ambient condition.

The table shaft extension is insulated, heated, and cooled, to protect the table from the temperature extremes in the chamber, and from potential damage caused by condensation.

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



1291T-TL

1291T-TL Specifications		
Chamber Usable Interior Size, in (mm)		20 W x 19 D x 18 H (508 x 483 x 457)
Temperature Range, °C (°F)		-65 to +100 (-85 to 212)
Temperature Ramp Rate, °C (°F)/minute		
• Ambient to upper limit	5 (9)	
• Ambient to lower limit	5 (9)	
Temperature Stability, °C (°F)		+/- 1 (1.8)
Temperature Resolution, °C (°F)		+/- 0.1 (0.18)
Heating Method		Electrical Heaters with forced air circulation. Proportioning Control.
Cooling Method		LN2 Cooling at 20-40 psig, with a 3/8 Male NPT connection. Redundant solenoid assemblies.
Primary Temperature Controller		Watlow F4 Programmable Controller with RS232 Communication
Secondary Temperature Protection		Digital Set - Digital Indicating High and Low Temperature Safety
Door Interlock Switch		Shuts down thermal operation when door is opened
Tilt Stand		
• Outer Axis Locking Mechanism	Manual shotpin	
• Tilt Range, degrees	± 180 (table axis vertical at 0 degrees)	
• Position resolution	Shotpin locations at 0, ± 45 , ± 90 , ± 135 , ± 180 degrees	
• Position accuracy (for manual tilt stand)	± 60 arcsec	
• Position repeatability (for manual tilt stand)	± 30 arcsec	
Electrical Power Options		220VAC, 1 phase, 60 Hz 208VAC, 1 phase, 60 Hz 220VAC, 1 phase, 50 Hz 200VAC, 1 phase, 50 Hz
Acceleration for the 1291BR is reduced when it is coupled with the 1291T-TL Thermal Chamber/Tilt Stand as follows:		
Acceleration, Maximum, for sinusoidal move:		-T5 motor -T20 motor
• 8" tabletop:	7,000 deg/sec ²	>20,000 deg/sec ²
• 14" tabletop:	3,250 deg/sec ²	12,500 deg/sec ²
• 18" tabletop:	1,600 deg/sec ²	6,250 deg/sec ²

1291BR 8 KHz ANALOG VELOCITY OUTPUT KIT (OPTIONAL)

The Analog Velocity Output Kit consists of an Ideal Aerosmith custom built harness and a motion controller unit that is installed with the Ideal Aerosmith special firmware. The Ideal Aerosmith special firmware provides an interface layer to the motion controller unit that is used for capturing the user specified parameters. The motion controller generates the analog velocity output based on the user specified parameters and the encoder input signals. The user specified parameters are sent to the motion controller unit via the RS232 interface using the Ideal Aerosmith ASCII based 3 letters commands.

Specifications

Specifications of the Analog Velocity Output Kit are as follows:

Operating Temperature	0 ~ 60 °C
Operating Humidity	20 ~ 95% RH, non-condensing
Input Signal Type	TTL Quadrature
Input Signal Max Frequency	12 MHz
Maximum Servo Frequency	8 KHz
Input to Output Delay	2 Servo Periods
Output Signal Type	±10V, Analog
Output Signal Max Resolution	16-Bit, DAC
Output Signal Max Slew Rate	40,000 Volts/sec
User Interface Type	RS232 – 9600 baud, 8 data bit, 1 stop bit, No Parity
User Interface Command	ASCII based 3-letter commands

MODEL NUMBER AND OPTIONS GUIDELINE

Please call Ideal Aerosmith and Request Current Price List!

STANDARD 1291BR TABLE SYSTEM		
Model Number	Specifications for Standard 1291BR Table System	Standard Leadtime
1291BR	<p>Includes the following characteristics:</p> <ul style="list-style-type: none">• 5 lbf-ft (6.78 Nm) motor torque• 8 inch (203 mm) diameter tabletop• 34 line slip ring package, 2A per line• RS-232 communication interface	<p>8-10 weeks</p> <p><i>An expedited delivery option may be available, please contact Ideal</i></p>

MODEL NUMBERING GUIDELINE				
Base Model	Motor Torque	Tabletop Size	Slipring package	Custom Requirements
1291BR	blank = 5 lbf-ft	Blank = 8 inch	blank = 34 lines	-SPL = special
1291TC	-T20 = 20 lbf-ft	-14 = 14 inch dia	-SR64 = 64 lines	
		-18 = 18 inch dia		
		-24 = 24 inch dia		

Model Numbering Examples:

20 lbf-ft Motor, 8 inch diameter tabletop, 64 line slip ring package = Model 1291BR-T20-SR64
5 lbf-ft Motor, 34 slip ring lines, 18 inch tabletop with custom mounting hole pattern = Model 1291BR-18-SPL

TABLE SYSTEM OPTIONS

Model No. Suffix Code	Description	Standard Leadtime
-T20	20 lbf-ft (27.11 Nm) Motor	16 weeks
-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 2 Amps per line	12 weeks
-CE	CE Mark for table and/or thermal chamber	12 weeks
-SPL	<u>Special customization:</u> Any other customized feature Example: Custom tabletop size or mounting hole pattern	Contact Ideal
1291TC	Mechanical thermal chamber (when purchased with new 1291BR table)	Contact Ideal
1291TC	Mechanical thermal chamber (integrated with existing 1291BR table)	Contact Ideal
1291T-TL	LN ₂ -cooled thermal chamber with tilt stand (when purchased with new 1291BR table)	Contact Ideal
1291T-TL	LN ₂ -cooled thermal chamber with tilt stand (integrated with existing 1291BR table)	Contact Ideal
---	Turn-key system for 1291BR (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
230470-949 & 230470-950	Harnesses, short version – This option includes a 6 ft. Axis Power Harness (230470-949) and a 6 ft. Axis Feedback Harness (230470-950).	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
---	Temperature recording software Includes software and one USB Key	5 weeks
230470-32	Enhanced Analog Output (upgrades frequency response rate to 8 KHz)	5 weeks

230470-2	<p>PEDESTALS -- Can be used in lieu of a lab bench</p> <ol style="list-style-type: none"> 1. <u>Normal. Nominal height from floor to tabletop:</u> (Ht of pedestal is 21.2") <ol style="list-style-type: none"> a. With 34 line slip ring package: 31.9 inches b. With 64 line slip ring package: 35.8 inches 2. <u>Short. Nominal height from floor to tabletop:</u> (Ht of pedestal is 11.7") <ol style="list-style-type: none"> a. With 34 line slip ring package: 22.4 inches b. With 64 line slip ring package: 26.3 inches 3. Custom table height 	4 weeks
230470-3		4 weeks
TBD		6 weeks
230470-50 230470-51	<p>TILT STANDS -- Position accuracy of ± 30 arc secs</p> <ol style="list-style-type: none"> 1) Tilt positions of ± 90, ± 45, & 0 degrees <ol style="list-style-type: none"> a. 1291BR with 34 line slipring package b. 1291BR with 64 line slipring package 2) Tilt positions every 0, ± 30, ± 60, & ± 90 degree <ol style="list-style-type: none"> a. 1291BR with 34 line slipring package b. 1291BR with 64 line slipring package 	
230470-63 TBD		4 weeks 4 weeks
TBD	<p>Protective Cases for transporting 1291BR and controller –</p> <p>One case for the table up to 18 inch diameter table top and 64 line slip ring.</p> <p>One case for the controller. Cases are stackable and include foam packing</p>	Contact Ideal
LEASING	Lease a 1291BR with the option to purchase the table. Contact Ideal Aerosmith for more details.	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.

1291BR TS Rev V