

ADVANCED ILLUMINATED SHAKER INCUBATOR



Advanced Illuminated Shaker Incubator - ToronShake™ HS-A Series

Illuminated Horizontal Shaking Incubation for Light-Dependent Laboratory Protocols

ToronShake™ HS-A Series is an Advanced Illuminated Shaker Incubator engineered for laboratory workflows that require simultaneous control of temperature, orbital agitation, and illumination in a single integrated instrument. Available in three chamber volumes 200 L, 280 L, and 350 L this lab shaker incubator builds on the full-featured foundation of the ToronShake™ HS-B platform and adds full-spectrum, high-intensity LED lighting with infinitely adjustable illuminance from 0 to 20,000 Lux making it the correct incubator shaker choice for photosynthesis research, algae cultivation, plant tissue culture, and any protocol where defined light exposure is a controlled experimental variable alongside temperature and agitation.

The ToronShake™ HS-A Series is offered in two sub-series. The ToronShake™ HS-A2 operates across a temperature range of 4–60 °C with compressor refrigeration, without humidity control suited to illuminated shaking incubation protocols where moisture management is not a protocol requirement. The ToronShake™ HS-A1 adds humidity control from ambient levels up to 95% RH on top of the same 4–60 °C refrigerated range and full-spectrum LED illumination providing the most complete environmental control available in the ToronShake™ horizontal laboratory shaker incubator lineup for moisture-sensitive, light-dependent incubation workflows.

Both sub-series share the BRIGHT I intelligent operating system, a 7-inch color touch screen, 30-segment programmable profiles across 999 repeatable cycles, high-quality compressor refrigeration, and 1,000,000-record USB data management delivering the same control platform and data integrity capabilities as the broader ToronShake™ shaker incubator range, with full-spectrum illumination as the defining additional capability.

APPLICATIONS

Advanced Illuminated Shaker Incubator - ToronShake™ HS-A Series Applications

The ToronShake™ HS-A Series laboratory shaker incubator is suited to research, quality control, and production-support applications where controlled illumination is required alongside temperature management and continuous orbital agitation.

- **Algae & Photosynthetic Organism Culture:** The primary application for this illuminated shaker incubator microalgae cultivation, cyanobacterial growth studies, and photosynthetic organism propagation requiring defined, adjustable light intensity alongside temperature control and orbital aeration. The 0–20,000 Lux adjustable illuminance range covers both low-light acclimation protocols and high-intensity growth phase conditions within a single laboratory shaker incubator platform.
- **Plant Tissue Culture & Seed Germination:** Callus induction, shoot proliferation, rooting protocols, and seed germination trials requiring defined photoperiod conditions at controlled temperatures. The adjustable LED illuminance and programmable temperature profiles of this lab shaker incubator support multi-phase plant tissue culture workflows without requiring separate incubation and lighting equipment.
- **Photobiology Research:** Light-dependent enzyme activity assays, chlorophyll extraction and quantification, photoreceptor studies, and circadian rhythm research requiring reproducible, quantified light exposure combined with precise temperature and agitation control throughout the incubation period.
- **Microbiology & Cell Culture:** Bacterial culture incubation, yeast propagation, and cell growth studies requiring consistent aeration, temperature control, and where the protocol requires it defined illumination conditions. The 30–300 rpm rotation range and large tray surface area of this incubator shaker accommodate a wide variety of flask sizes and culture volumes for both standard and light-supplemented microbiological workflows.
- **Biochemical & Enzyme Research:** Light-activated enzyme kinetics, photocatalytic reaction incubation, and light-dependent biochemical assays requiring programmable temperature profiles combined with controlled, quantified illumination from a single shaker incubator instrument.
- **Pharmaceutical Research & QC:** Photostability testing of drug substances and formulations, light-dependent biological sample conditioning, and in-process QC incubation at defined temperatures, agitation rates, and illumination levels. Multi-level permission management and USB data export support audit trail requirements in regulated pharmaceutical

laboratory environments.

- Food Science & Agricultural Research: Photosynthetic microorganism shelf-life evaluation, light-influenced fermentation studies, plant pathogen incubation under defined photoperiod conditions, and soil microbiology research requiring reproducible combined agitation, temperature, and illumination control.
- Environmental Science: Aquatic organism culture, phytoplankton growth studies, bioluminescence research, and environmental sample incubation under controlled light and temperature conditions supported by the programmable multi-segment profile capability of the ToronShake™ HS-A lab shaker incubator.



FEATURES

Advanced Illuminated Shaker Incubator - ToronShake™ HS-A Series Key Features



Intelligent Control System

- BRIGHT I intelligent operating system with automatic environmental compensation of control parameters maintains setpoint accuracy under varying ambient laboratory conditions without manual recalibration
- 7-inch color touch screen with real-time display of temperature, agitation rate, illuminance level, program status, and elapsed run time
- Multi-segment programmable design supporting up to 30 segments and 999 repeatable cycles for complex, multi-phase illuminated shaking incubation protocols
- Reservation function for delayed-start scheduling supporting photoperiod simulation and timed incubation cycle management
- Multi-level permission management for access control in shared or regulated laboratory shaker incubator environments
- Event recording function with real-time curve and data viewing directly on the touch screen display

Full-Spectrum LED Illumination

- Full-spectrum high-intensity LED lighting system providing illuminance from 0 to 20,000 Lux with infinite, continuous adjustment the defining feature that distinguishes this incubator shaker from standard non-illuminated horizontal shaker incubator platforms
- Full-spectrum output replicates natural daylight wavelength distribution for photosynthetically active radiation (PAR) suitable for algae, plant tissue culture, and photobiology applications
- Infinitely adjustable illuminance allows precise light intensity setpoints for different protocol phases without changing light sources or adding external equipment

Shaking Performance

- Horizontal orbital shaking mechanism with a fixed Ø26 mm vibration amplitude for consistent, reproducible fluid agitation and homogeneous light exposure across all vessel positions
- Rotation rate range of 30–300 rpm with ± 1 rpm accuracy covering gentle rocking through vigorous aeration on a single lab shaker incubator platform

- DC motor drive for low-noise, stable long-duration shaking performance throughout extended illuminated incubation runs

Temperature & Refrigeration

- High-quality compressor refrigeration enabling temperature control from 4 °C compensating for heat generated by the LED system and maintaining setpoint accuracy under high-illuminance operating conditions
- Temperature resolution of 0.1 °C across the full 4-60 °C operating range
- Temperature fluctuation of ± 0.3 °C at 37 °C and uniformity of ± 1 °C at 37 °C

Humidity Control (ToronShake™ HS-A1)

- Internal water tank-based humidification system delivering humidity control from ambient levels up to 95% RH
- Humidity fluctuation maintained within $\pm 3\%$ RH particularly relevant under high-illuminance conditions where radiant energy can accelerate evaporation within the chamber

Data Management & Connectivity

- Onboard data storage supporting up to 1,000,000 records without SD card dependency
- USB interface for data export; timestamped records suitable for audit trail and compliance documentation
- Event recording with real-time curve viewing directly on the touch screen

Chamber & Physical Design

- Tempered glass door with mechanical lock for chamber security and sample observation between access events
- Single-tray configuration accommodating flask sizes from 50 mL to 5,000 mL across a wide range of loading configurations
- Three chamber volumes (200 L, 280 L, 350 L) providing scalable capacity from focused research setups to high-throughput institutional lab shaker incubator workflows
- Mobile caster base for easy repositioning within the laboratory

THEORY & METHOD

Theory and Method

Horizontal Orbital Shaking Mechanism The ToronShake™ HS-A operates on a horizontal orbital shaking principle in which the tray platform moves in a circular, fixed-radius orbit of Ø26 mm. This orbital motion generates consistent fluid movement within culture vessels promoting dissolved oxygen transfer, nutrient distribution, and homogeneous light exposure across the culture volume simultaneously. The DC motor driving the orbital mechanism delivers rotation rates from 30 to 300 rpm with an accuracy of ± 1 rpm, maintaining the programmed agitation setpoint with precision across the full speed range and throughout extended incubation runs.

Full-Spectrum LED Illumination System The defining feature of the ToronShake™ HS-A is its full-spectrum, high-intensity LED lighting system. Full-spectrum output closely replicates the wavelength distribution of natural daylight across the visible spectrum providing photosynthetically active radiation (PAR) suitable for algae cultivation, plant tissue culture, and photobiology research. Illuminance is infinitely adjustable from 0 to 20,000 Lux, allowing researchers to set precise light intensity setpoints for different growth phases, photoperiod cycles, or light-response protocols without changing light sources or adding external equipment. LED lighting technology provides long service life, low heat generation relative to output intensity, and consistent spectral output across the full illuminance adjustment range.

BRIGHT I Intelligent Temperature Control Temperature is governed by the BRIGHT I intelligent operating system, which continuously monitors the internal chamber sensor and modulates output from the heating and refrigeration systems to maintain the programmed setpoint. BRIGHT I automatically compensates control parameter values in response to real-time ambient environmental changes maintaining setpoint accuracy without manual recalibration when laboratory conditions shift. Temperature resolution is 0.1 °C across the full 4–60 °C operating range, with fluctuation held to ± 0.3 °C and spatial uniformity within ± 1 °C, both measured at 37 °C.

Compressor Refrigeration Both the ToronShake™ HS-A2 and ToronShake™ HS-A1 sub-series incorporate a high-quality compressor refrigeration system that extends temperature control below room temperature down to 4 °C enabling

illuminated shaking incubation protocols that require controlled cooling alongside active orbital agitation and light exposure. This is particularly relevant for cold-adapted organism culture, low-temperature photosynthesis research, and protocols where heat generated by the LED system must be actively compensated by the refrigeration circuit to maintain setpoint accuracy.

Humidity Control (ToronShake™ HS-A1) The ToronShake™ HS-A1 configuration adds an internal water tank-based humidification system that controls relative humidity from ambient levels up to 95% RH, with fluctuation maintained within $\pm 3\%$ RH. This provides a stable moisture environment for protocols where evaporative loss from culture vessels particularly relevant under high-illuminance conditions where radiant energy can accelerate evaporation affects culture volume, concentration, or experimental outcomes.

Programmable Multi-Segment Profiles The BRIGHT I platform supports up to 30 programmable segments arranged across 999 repeatable cycles. Operators can define ramp rates, target temperatures, agitation speeds, illumination levels, soak durations, and step transitions to create complex environmental profiles that run automatically. The reservation function allows delayed-start scheduling, enabling incubation and lighting cycles to begin at a predetermined time without manual initiation supporting photoperiod simulation and circadian rhythm research protocols.

Data Management and Access Control All operational events are recorded continuously in onboard memory capable of storing up to 1,000,000 data records. Real-time temperature, agitation, and illumination data are viewable directly on the 7-inch touch screen as curves and numerical readouts. USB export transfers timestamped data files to external drives for documentation and audit trail purposes. Multi-level permission management restricts parameter access to authorized users in shared laboratory shaker incubator environments.

TECHNICAL SPECIFICATIONS

Advanced Illuminated Shaker Incubator – ToronShake™ HS-A Series

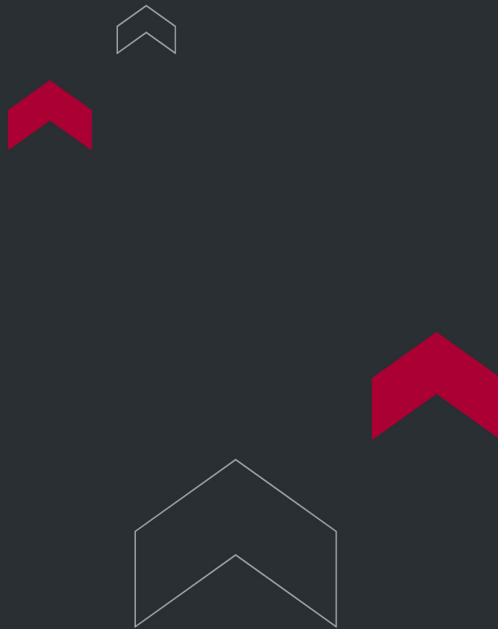
Technical Specifications

Parameter	ToronShake™ HS-2350A/ ToronShake™ HS-2280A/ ToronShake™ HS-2200A	ToronShake™ HS-1350A/ ToronShake™ HS-1280A
Temperature Range (°F / °C)	39-140 °F (4-60 °C)	
Temperature Resolution (°F / °C)	0.18 °F (0.1 °C)	
Temp. Fluctuation at 98.6 °F / 37 °C	±0.54 °F (±0.3 °C)	
Temp. Uniformity at 98.6 °F / 37 °C	±1.8 °F (±1 °C)	
Humidity Range (%)	Ambient to 95% RH	
Humidity Fluctuation (%)	-	±3
Illuminance (Lux)	0-20,000	
Rotation Rate (rpm)	30-300	
Rotation Accuracy (rpm)	±1	
Vibration Amplitude (in / mm)	1.02 in (Ø26 mm)	
Timer Range (h)	0-999	
Voltage	220V, 50/60 Hz (110V is also available)	
Rated Power (W)	1,800 / 1,600 / 1,500	2,800 / 2,400
Internal Dimensions W×D×H (in)	40.7×26.6×18.5 / 39.8×23.2×18.5 / 39.8×23.2×12.2	40.7×26.6×18.5 / 39.8×23.2×18.5
Housing Dimensions W×D×H (in)	54.3×31.5×39.8 / 53.1×27.6×39.4 / 49.6×28.7×33.5	54.3×31.5×39.8 / 53.1×27.6×39.4
Tray Size W×D (in)	38.2×23.8 / 37.4×20.9 / 37.4×20.9	38.2×23.8 / 37.4×20.9

Parameter	ToronShake™ HS-2350A/ ToronShake™ HS-2280A/ ToronShake™ HS-2200A	ToronShake™ HS-1350A/ ToronShake™ HS-1280A
Standard Configuration	2000 mL×8 / 2000 mL×6 / 500 mL×20	2000 mL×8 / 2000 mL×6
Full Load Config. 350 L (mL×flasks)	50×103 / 100×103 / 250×63 / 500×41 / 1000×22 / 2000×15 / 3000×11 / 5000×7	50×103 / 100×103 / 250×63 / 500×41 / 1000×22 / 2000×15 / 3000×11 / 5000×7
Full Load Config. 280 L (mL×flasks)	50×71 / 100×71 / 250×45 / 500×37 / 1000×18 / 2000×15 / 3000×8 / 5000×7	50×71 / 100×71 / 250×45 / 500×37 / 1000×18 / 2000×15 / 3000×8 / 5000×7
Full Load Config. 200 L (mL×flasks)	50×71 / 100×71 / 250×45 / 500×37 / 1000×18	
Net Weight (lb)	613 / 578 / 503	622 / 587
Gross Weight (lb)	790 / 710 / 565	799 / 723
Package Size (in)	60.6×39.4×48.8 / 59.4×35.8×46.9 / 55.1×35.4×40.6	60.6×39.4×48.8 / 59.4×35.8×46.9

Full load configuration format: flask volume (mL) × number of flasks per tray. Internal and housing dimensions converted from mm to inches. Net and gross weights converted from kg to lb. Package dimensions converted from mm to inches.

Note: The HS-A1 humidity control variant includes an internal water tank. The HS-A2 is the standard non-humidity configuration. CO₂ control is not available on the HS-A Series see the ToronShake™ HS-C Series for CO₂-controlled horizontal shaker incubator configurations.



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