



NATURAL CONVECTION ELECTRIC HEATING INCUBATOR

Natural Convection Electric Heating Incubator - ToronCubator™ EH-N Series

ToronCubator™ EH-N is a natural convection electric heating incubator engineered for laboratory applications where fan-free, undisturbed thermal incubation is the priority. Without a forced-air circulation fan, this laboratory incubator relies entirely on gravity-driven natural convection to distribute heat throughout the working chamber making it the preferred choice for protocols involving agar plates, open culture vessels, delicate biological specimens, and any sample type where airflow-induced surface drying or physical disturbance would compromise results.

Available in three chamber volumes (70 L, 140 L, and 300 L) the ToronCubator™ EH-N series covers compact benchtop through mid-capacity laboratory applications. The BRIGHT I intelligent control system governs all thermal operations, automatically compensating operating parameters based on ambient environmental conditions to maintain consistent setpoint accuracy. Programmable multi-segment operation supports up to 10 segments across 100 repeatable cycles, and a countdown reservation function allows delayed-start scheduling up to 99 hours 59 minutes in advance.

The double-door design with a glass inner door supports sample observation without chamber access. A preheating chamber design accelerates initial heat-up and supports good heat distribution despite the absence of forced airflow. One RS-485 interface provides connectivity to external laboratory data systems or monitoring platforms. As a fan-free laboratory incubator, the ToronCubator™ EH-N is the right fit for biochemical incubator workflows, microbiology protocols, and any application where sample integrity under still-air conditions matters more than the rapid temperature recovery that fan-equipped incubators provide.

APPLICATIONS

Natural Convection Electric Heating Incubator - ToronCubator™ EH-N

Series Applications

The ToronCubator™ EH-N is specifically suited to laboratory applications where natural convection heating and the absence of forced airflow are either preferred or required by the protocol:

- Agar Plate Incubation the primary use case for natural convection laboratory incubators; still-air conditions prevent surface drying on culture media and support even colony development without disruption
- Microbiology and Cell Culture bacterial and fungal culture incubation in open or loosely covered vessels where airflow would disturb or desiccate samples during extended runs
- Biochemical Research enzyme activity assays, protein studies, and temperature-sensitive biochemical incubator applications requiring stable, gentle heat without convective interference
- Mould and Fungal Cultivation controlled thermal incubation for mould incubator protocols where still-air conditions support natural spore development and colony morphology assessment
- Pharmaceutical QC sterility testing, bioburden incubation, and microbial environmental monitoring plates that require undisturbed incubation in regulated laboratory incubators
- Clinical and Diagnostic Laboratories diagnostic culture plates, sensitivity testing, and sample preparation at precise setpoint temperatures without airflow-related variable introduction
- Histology and Tissue Processing low-disturbance warming of tissue samples, slides, and reagents where fan-induced air movement would affect results
- Academic and Teaching Laboratories general-purpose incubators for microbiology coursework, undergraduate research, and shared-facility use where simple, reliable natural convection heating is the operational requirement



FEATURES

Natural Convection Electric Heating Incubator - ToronCubator™ EH-N Series Key Features

Control System and Interface

- LCD display with real-time readout of working status, setpoint, and current chamber temperature
- BRIGHT I intelligent control system with automatic environmental parameter compensation for consistent setpoint accuracy under varying ambient conditions
- Programmable multi-segment design: 10 segments per cycle, 100 repeatable cycles for structured heating profile protocols
- Countdown reservation function supporting delayed-start scheduling up to 99 hours 59 minutes

Natural Convection Design

- Fan-free natural convection operation no mechanical airflow inside the working chamber, preserving still-air conditions for airflow-sensitive samples
- Preheating chamber design for efficient heat-up and stable thermal distribution throughout the working volume under gravity convection conditions
- Temperature operating range: RT+5°C to 100°C
- Temperature fluctuation at 37°C: $\pm 0.5^{\circ}\text{C}$
- Temperature uniformity at 37°C: $\pm 0.6^{\circ}\text{C}$

Safety and Alarm Systems

- Dual over-temperature alarm protection: primary sensor-controlled alarm circuit plus a fully independent hardware-level temperature control switch as a separate backup safety layer

- Two-layer redundant protection architecture designed for unattended incubation safety

Chamber and Physical Design



- Double-door construction with glass inner door for non-intrusive sample observation without opening the main chamber and disrupting the still-air internal environment
- Adjustable shelving to accommodate samples of varying height and configuration
- Mechanical lock for chamber security between access events

Connectivity

- One RS-485 interface for integration with external data acquisition systems, laboratory networks, or centralized monitoring platforms

Theory and Method

Natural Convection Heat Distribution

The ToronCubator™ EH-N operates on a gravity convection principle the deliberate absence of any mechanical fan means that heated air rises naturally from the heating elements at the base of the chamber and distributes upward through the working volume by buoyancy-driven convection. This creates a still-air environment within the chamber that closely replicates the undisturbed thermal conditions many biological protocols require. Temperature fluctuation at 37°C is rated at $\pm 0.5^{\circ}\text{C}$, and spatial uniformity at 37°C is within $\pm 0.6^{\circ}\text{C}$ performance that reflects the stability achievable through well-designed natural convection architecture rather than forced airflow.

The practical implication for laboratory use is significant. Many standard incubators equipped with circulation fans introduce low-level airflow across culture surfaces during operation. For agar plates, open petri dishes, and moisture-sensitive biological samples, this airflow can accelerate surface evaporation, disrupt colony development, and introduce edge-drying effects that complicate result interpretation. The ToronCubator™ EH-N removes this variable entirely, making it the technically correct choice for these applications among available laboratory incubators.

BRIGHT I Control System and Preheating Architecture

The BRIGHT I intelligent control system continuously monitors the internal temperature sensor and adjusts output from the electric resistance heating elements to maintain the programmed setpoint across the RT+5°C to 100°C operating range. Temperature resolution is 0.1°C. The system automatically compensates control parameters based on ambient room temperature variations, reducing setpoint drift between seasonal temperature changes or shifts in laboratory HVAC conditions without requiring manual recalibration.

A preheating chamber design supports efficient thermal transfer into the working volume despite the absence of forced-air distribution. The preheating zone accelerates initial heat-up and helps establish stable thermal stratification within the

chamber, improving the working uniformity achievable under natural convection conditions. This architecture distinguishes the ToronCubator™ EH-N from simpler gravity convection incubators that rely solely on heating element placement without a dedicated thermal transfer design.

Dual Over-Temperature Protection

The ToronCubator™ EH-N incorporates a two-layer over-temperature alarm system. The primary protection layer is managed by the BRIGHT I temperature sensor control circuit, which activates an alarm when the measured chamber temperature exceeds the programmed threshold. The secondary protection layer is a completely independent hardware-level temperature control switch that operates separately from the main control system and sensor circuit. This hardware switch activates independently if the primary circuit fails to respond providing a redundant safety mechanism for unattended natural convection incubation runs where operator presence between door access intervals may be limited.

Programmable Profiles and Reservation Scheduling

Test protocols are programmed as multi-segment sequences supporting up to 10 configurable segments across 100 repeatable cycles sufficient for ramp-and-soak profiles, step gradients, and multi-phase incubation sequences common in biochemical incubator and microbiological workflows. A countdown reservation function supports delayed-start scheduling up to 99 hours 59 minutes in advance, enabling operators to program an incubation cycle to begin at a specific time without manual intervention at the start point. The RS-485 interface supports integration with external data acquisition platforms and laboratory network monitoring systems.

TECHNICAL SPECIFICATIONS

Natural Convection Electric Heating Incubator - ToronCubator™ EH-N Series Technical Specifications

Parameter	ToronCubator™ EH-70N	ToronCubator™ EH-140N	ToronCubator™ EH-300N
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Chamber Volume (L)	70	140	300
Temp. Range (°C)	RT+5 to 100		
Temp. Fluctuation at 37°C (°C)	±0.5		
Temp. Uniformity at 37°C (°C)	±0.6		
Rated Power (W)	300	480	800
Internal Dimensions W×D×H (mm)	410 × 390 × 450	570 × 440 × 570	720 × 570 × 745
External Dimensions W×D×H (mm)	575 × 566 × 776	735 × 616 × 896	885 × 746 × 1071
Number of Shelves (Std./Max.)	2/5	2/7	3/9
Net Weight / Gross Weight (kg)	46/64	57/75	97/118
Package Size (mm)	695 × 726 × 926	855 × 776 × 1046	1005 × 906 × 1221



Torontech Inc.

251 Consumers Road, Suite 1200
Toronto, Ontario, M2J 4R3, Canada 

Phone: +1 416 368 2721 | Fax: +1 416 981 7652
Email: info@torontech.com

Torontech, LLC

601 Brickell Key Drive, Suite 700
Miami, FL 33131, USA 

Toll-Free: 1-866-383-7919
Email: sales@torontech.com

Torontech ME FZE

Meydan Grandstand, 6th Floor,
Meydan Road, Nad Al Sheba,
Dubai-261440, UAE 

Phone: +971 488 19252
Email: me@torontech.com

