BCO-3000 & 6000 RPL SERIES

X86 INDUSTRIAL EDGE
C O M P U T E R S

REAL-TIME DATA
PROCESSING FOR RUGGED
EDGE COMPUTING

COMPACT INDUSTRIAL COMPUTERS

The BCO Series are designed and built to withstand deployment in challenging environments, managing workloads at the rugged edge for processing, storage, connectivity, and machine learning. The BCO-3000 and BCO-6000 Series can accommodate various edge workloads from small form factor to scalable GPU computers.

Deployment
Ready Solution

Industrial-Grade
Reliability

Fast Time To
Market

Compact &
Ruggedized Design

Semi-Rugged, Fanless Industrial Computers for Industrial Edge IoT

Revolutionizing Industrial Edge IoT with BCO-3000&6000-RPL Series

An embedded industrial computer does not need to break the bank to deliver the necessary performance at the rugged edge. Finding the right industrial solution that strikes the perfect balance between size, performance, and cost efficiency is a steep challenge for many rugged edge applications. Achieving operational objectives can often present a dilemma, having to decide which of the three are a priority over another.

The BCO Series is designed to take a robust approach to provide essential edge computing features into the rugged edge that will not compromise on performance or reliability. The BCO-3000-RPL and BCO-6000-RPL Series are designed with a semi-rugged chassis to shield against the harsh conditions at the edge.

▼ BCO-3000&6000-RPL Key Features

- Intel 12th/13th Gen ADL/RPL CPU
- Triple Display (4K)
- Industrial-Grade Design

- DDR4 Memory
- PCIe 4.0 Slot Expansion
- World-Class Certification: CE, FCC, UL 62368 Ed. 3

Industrial Automation & Robotics

Security and Surveillance

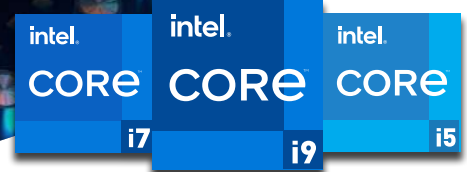Retail & Kiosk Machines

IoT and Edge Computer

Rugged Edge Computing

Rugged Edge AI

Powered by 12th/13th Generation Intel Core Processors

The BCO-3000-RPL & BCO-6000-RPL Series deliver powerful processing power by supporting 12th and 13th generation Intel Core TE processors. These chips leverage Intel's latest hybrid P&E architecture, delivering the perfect balance between high performance and energy efficiency. The TE models are tailored for embedded use cases with low-power efficiency and a 15-year embedded product support lifecycle.

▶ Leveraging Intel's Hybrid-Architecture

Deliver the optimal edge AI performance with the BCO-RPL Series, featuring the advanced LGA 1700 socket. This zero-insertion force, flip-chip land grid array (FCLGA/LGA) socket with 1700 contact points takes center stage, enabling seamless compatibility for Intel® Raptor Lake (13th Gen) and Intel® Alder Lake (12th Gen) processors. Intel's 13th Gen. and 12th Gen CPUs leverage the new Performance Cores (P-core) and Efficient Cores (E-core), delivering unprecedented performance with the new hybrid architecture.

Intel® P&E Cores Technology

▶ Meeting Edge Processing Performance & Power Efficiency Needs

At the heart of these processors lies the groundbreaking P&E cores technology. This innovative hybrid design adopts a two-core strategy. The larger, performance-driven cores (P-core) handle compute-intensive and AI workloads, while the smaller, energy-efficient cores take care of high-density and scale-out workloads in the background. Designed to strike the perfect balance between high performance and energy efficiency, the BCO-RPL Series excels across various industrial applications.

Key Advantages:

• Intel Thread Director: Optimizes OS workload to cores distribution
• Up to 24 Cores: 8 Performance-cores, 16 Efficient-cores
• Up to 32 Threads: P-cores up to 5.8 GHz
• Increased L2 & L3 Cache: compared to the previous generation

▶ Harnessing the Full Power of P&E Cores with Windows 11

Intel's 13th Gen Core features a unique dual-core design, featuring P-cores, E-cores, and hyper-threads on P-cores, which introduces a new dimension in multi-core optimization. In response, Intel collaborated with Microsoft to introduce a hybrid-aware scheduler in Windows 11. This allows the operating system (OS) to prioritize fresh cores before tapping into hyper-threads. At the heart of this breakthrough is Intel's Thread Director, a microcontroller within the CPU. It uses machine learning to optimally schedule tasks on the right core at the right time. This allows us to ensure that P-core and E-core are working in synergy. With Windows 11, users can further enhance the performance and efficiency of the BCO-RPL Fanless Industrial Computer.


▶ High Capacity DDR4 RAM

The BCO-3000-RPL and BCO-6000-RPL manage high demand, multi-task workloads in many modern industrial applications. These semi-rugged industrial computers support DDR4 SODIMM at frequencies of 3200 MT/s, with up to a maximum capacity of 64GB. DDR4 memory combines speed, efficiency, and flexibility for highly responsive productivity and data-driven decision-making in dynamic edge computing environments.
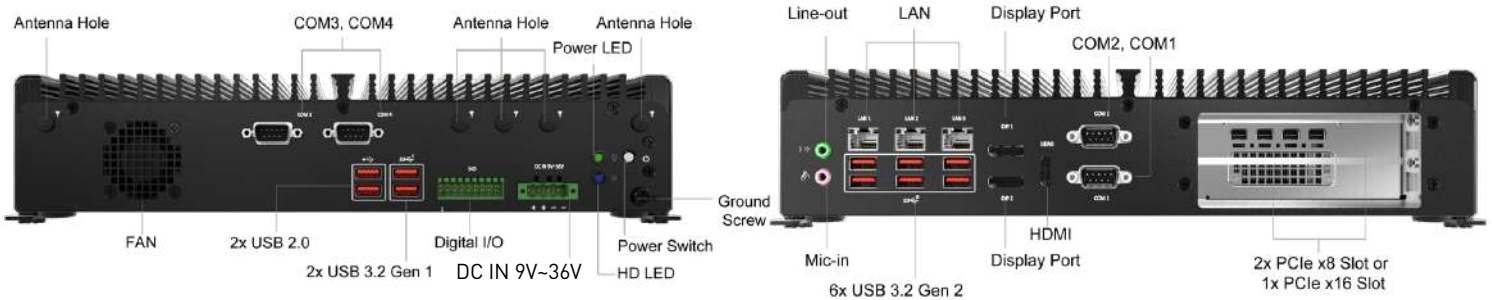
▶ Rich IIoT-Centric Connectivity

The BCO-3000-RPL and BCO-6000-RPL offer rich and essential amounts of I/O to bring unmatched connectivity at the rugged edge, without the need for further expansion. Both models of the BCO Series support legacy and high-speed I/O on-board.

BCO-3000-RPL
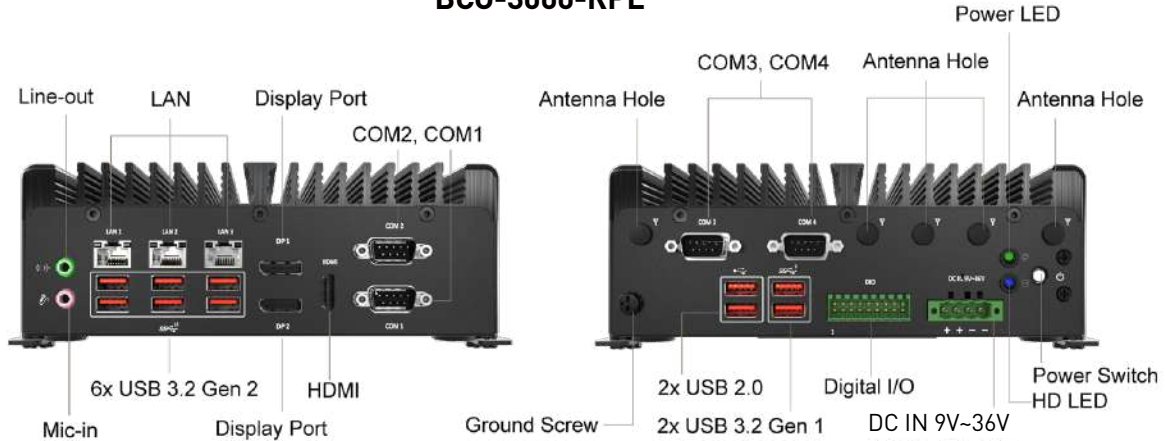
BCO-6000-RPL

▶ Immersive 4K Independent Display

Maximum high-resolution visuals simultaneously for a variety of applications. The BCO-3000-RPL and BCO-6000-RPL support up to three 4K independent displays for clear visualization with the available HDMI and DisplayPort on-board. Powered by Intel UHD graphics, both BCO Series ensure bright and vibrant visuals for various display applications.

▶ Isolated DIO

A 16 channel (8 in/ 8 out) isolated digital I/O allow system integrators to seamlessly connect and send automation signals to IoT devices and sensors.

▶ High Speed 5G & Wireless Connectivity

Industrial edge applications are typically deployed into remote locations. Wireless technologies deliver seamless communication and connectivity for mobile IIoT solutions. The BCO-3000-RPL and BCO-6000-RPL utilize its on-board M.2 B & E Keys to provide fully configurable 4G/LTE connectivity and Wi-Fi 6 and Bluetooth 5 options.
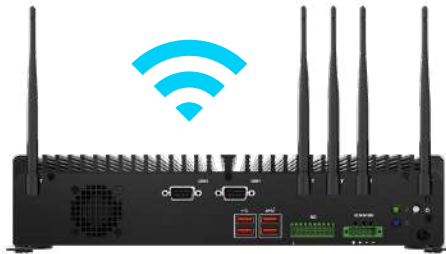
• M.2 E-Key for Wi-Fi 6, BT
• M.2 B-Key for 4G/LTE and 5G

▶ Edge AI Ready

Enable real-time AI inferencing capabilities with TPU supported in the BCO-3000-RPL and BCO-6000-RPL. The Hailo-8 M.2 AI Accelerator delivers lite AI performance to execute on-premises inferencing while maintaining an ultra-compact form factor and minimal power consumption.

EMPOWERED BY
HAILO

▶ GPU Integration for Enhanced Processing (BCO-6000-RPL Exclusive)

Optimized for high demand workloads, the BCO-6000-RPL features compatibility for a dedicated GPU to enable real-time edge AI inferencing. This PCIe expansion also gives the ability to support various add-on cards such as high-speed networking and capture cards.

• 1 PCIe x16 Gen4 or 2x PCIe x8 Gen4
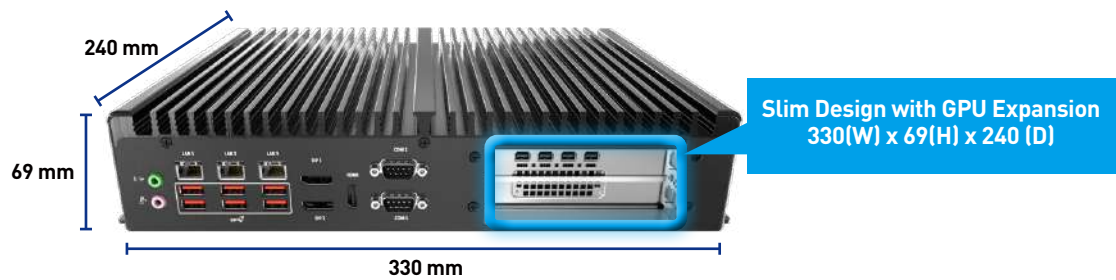**• Supports GPU Expansion (NVIDIA RTX A2000)**

▶ Industrial-Grade Design

The BCO-3000-RPL and BCO-6000-RPL are engineered to bring the most performance and connectivity while maintaining the smallest possible form factor for the most space-constrained applications. Its fanless design allows the BCO Series to deliver optimal ruggedness for 24/7 operational reliability.

BCO-3000-RPL (Small Form Factor)

240 mm · 69 mm · 192 mm

BCO-6000-RPL (Low-Profile Slim Design)

240 mm · 69 mm · 330 mm

**Slim Design with GPU Expansion
330(W) x 69(H) x 240 (D)**

▶ Wide Operating Temperature

The BCO-3000 & BCO-6000 are both able to remain in operation for ultimate industrial reliability with an operating temperature range of 0 – 50C.

0°C   10   20   30   40   50°C

▶ Shock and Vibration

The rugged edge brings unfavorable conditions for many systems. Constant shock and vibration can bring about system failures and detrimental downtime for many industrial deployments. The BCO Series has been tested and validated under MIL-STD 810G Method 514.7 to withstand up to 50G of shock and 5Grms of vibrations.
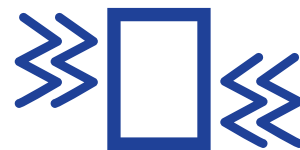
50G | 5Grms
Shock & Vibration Resistance

▶ Wide Power Input Range

- The BCO Series effectively operates across a wide power range of 9 to 36 VDC, covering many compatibilities across multiple power sources and has support for both AT and ATX modes.
- 9 – 36 VDC
- 24 – 36 VDC with GPU (BCO-6000-RPL)

BCO-3000-RPL

BCO-6000-RPL

DC IN 9V ~ 36V
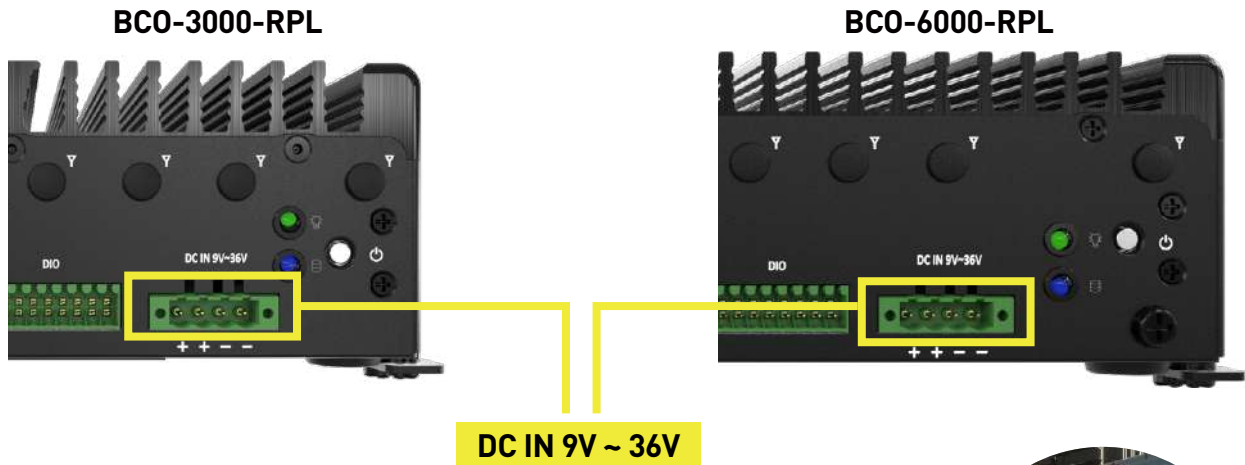
▶ Tamper-Proof Security

The BCO Series is optimally fitted with TPM 2.0 to safeguard from malicious intrusions and safeguards mission-critical data at a root level.

▶ World-Class Certification

The BCO-3000-RPL and BCO-6000-RPL are certified under industry standard safety regulations to offer ultimate reliability and peace of mind throughout deployment.

- **CE**
- **FCC Class A (47 CFR part 15.109 and part 15.107)**
- **UL 62368 Ed. 3**

BCO-3000&6000-RPL SERIES

intel®
Alder Lake/ Raptor Lake

Model	BCO-3000-RPL	BCO-6000-RPL
CPU Support	Support Intel® IOTG Raptor Lake-S/ Alder Lake-S Processor Core i9/i7/i5/i3, Pentium, Celeron (35W only)	
Memory	DDR4 SODIMM. Max. up to 64GB (Default: 8GB)	
Graphic Output	Triple Independent Display by 2x Display Port, 1x HDMI	
I/O	6x Intel® I225-V/ l225LM/ l225LV 2.5GbE LAN 4x COM, 6x USB 3.2 Gen2, 2x USB 3.2 Gen1, 2x USB 2.0	
Storage	**1x M.2 M-key Type (2242/2280):** Support 1x PCIe x4 Gen 3 NVMe SSD From PCH (Default 128GB SSD) Support B+M Key, AI/Storage Module (Pending)	
Expansion	**1x M.2 B-key (3042)** Support 1x Nano SIM Holder Support 1x PCIe x1, 1x USB 3.2 Gen 2, 1x USB 2.0, 5G/4G/LTE Module Optional 5G/4G/LTE Module **1x M.2 E-key (2230)** Support 1x PCIe x1, 1x USB 2.0; Support CNVi Devices Supported: Intel® AX210 Wi-Fi 6E & BT-5.1 (vPro Supported)	
M.2	1x M.2 E Key slot (2230) (Support PCIe x1 & USB 2.0; Support CNVi), Devices Supported: Intel® AX210 Wi-Fi 6E & BT-5.1 (vPro Supported)	1 x M.2 (E key, 2230, USB 2.0, Support PCIe x1) 1 x M.2 (B key, 2242/3042/2280, Support PCIe x1/ SATA signal, Support B+M Key PCIe x1 Module, for 4G/LTE/AI/Storage, 1x Dual SIM Socket (SIM1/ SIM2 on the M.2 B Key slot)
PCIe	(none)	2x PCIe x8 Slot or 1x PCIe x16 Slot 1x Default Industrial Fan
Power	9 to 36VDC Wide Range Power Input Supporting AT/ATX Mode	9 to 36VDC Wide Range Power Input Supporting AT/ATX Mode (24~36VDC for add GPU Card)
Certification	CE, FCC, UL 62368 Ed. 3	
Operating Temperature	0 °C to 50 °C (35W CPU)	
Dimensions (WxDxH)	192 x 240 x 69mm	330 x 240 x 69mm