C&T SOLUTION INC.

Rugged Edge Computing - Powerful, Fanless, and Modular
Empower Data Acquisition and Inference Analysis for Machine Intelligence

Powerful Machine Learning (ML) and Artificial Intelligence (AI) workloads are the key driving forces behind the future of automation. To implement AI applications at the rugged edge, businesses and organizations require more computing power to train machines and enable real-time intelligence through neural networks. To meet the demands of growing complex AI models, powerful AI edge inference computers are being deployed in close proximity to data sensors to enable automation and machine intelligence with incredible processing speeds.   These AI edge inference computers process the high influx of data and make critical decisions in real-time to enable organizations to respond to situational data, providing the basis for reducing downtime, achieving low-latency data processing, and optimizing mission critical business insights with actionable intelligence.

The RCO-6000-CML Series AI Edge Inference Computer incorporates advanced performance with Intel's 10th Generation Core processors, an advanced GPU accelerator, and expandable, hot-swappable NVMe SSDs with its modular EDGEBoost Nodes. As processing power shifts away from resources in the cloud, deployments in remote and mobile environments require ruggedized systems that can withstand exposure to environmental factors such as dust, debris, shock, vibration, and extreme temperatures. Premio's AI Edge Inference Computers are tested and validated to ensure reliable performance amid deployments in the harshest environmental settings.

Premio has engineered the RCO-6000-CML with the latest processing technologies, including multi-core processors, ultra-fast storage, and AI accelerators, to push real-time processing to new boundaries at the rugged edge.

Key Applications

AI & ML	Machine Vision	Industrial Automation	Telematics & Transportation	Metrology & Defect Detection	Security Surveillance	Smart Retail and Kiosks	ADAS and Autonomous Vehicle Data Capture & Storage

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Powerful Multi-Core Processing for Intelligent Edge

The RCO-6000-CML AI Edge Inference Computer leverages rich performance enhancements provided by 10th Generation Intel CML S Processors and W480E Chipset support. Intel technology enables 16-way multitasking through hyperthreading of all ten cores. The processor supports DDR4 RAM for up to 64GB of memory and 2933 MT/s transfer speed, while UHD graphics offer rich visual output for many applications using optical data.

The LGA1200 socket design is combined with Intel's W480E chipset to deliver augmented peripheral performance for low latency edge responsiveness. Gigabit wireless speeds, PCIe 3.0 lanes, SATA ports, and high-speed USB 3.2 Gen 2 enable the RCO-6000-CML AI Edge Inference Computers with excellent I/O integration options for transmitting data to and from sensory devices sitting at the edge.

Another key feature for these AI Edge Inference Computers is their ability to support Intel XEON processors for server-grade performance in an embedded thermal profile. The Intel XEON W-1290TE is a 35W TDP processor that delivers 10 cores for multitasking through hyperthreading and even supports error correction code (ECC) memory for data redundancy. Implementing Intel XEON processors ensures powerful and reliable performance benchmarks amid the most computing-intensive applications for data acquisition and telemetry.

Inference Analysis at the Rugged Edge

The RCO-6000-CML AI Edge Inference Computers supports GPUs (graphic processing units), allowing systems to process and analyze large volumes of complex data to drive AI functions at the edge. AI edge inference computers are purpose-built for deployment in either controlled or dynamic environments to capture data from sensors, high-resolution cameras, and other devices and peripherals that use real-time data for machine intelligence.

These ruggedized computers are capable of processing data in real-time from a variety of IoT sensor inputs at the edge so that such data can be stored for training machine learning and deep learning models. Training a neural network involves feeding the collected data to the neural network, allowing the algorithm to predict what the data represents. These AI Edge inference computers are designed to streamline data acquisition by providing access to blazing fast NVMe technology as well as delivering real-time inference with performance acceleration modules. System integrators can leverage GPU and/or domain-specific acceleration cards to push AI algorithms directly for inference analysis at the rugged edge.

Performance Acceleration: EDGEBoost Nodes

[Top Node] Industrial Fanless PC

The RCO-6000-CML is extremely modular and comes configurable with EDGEBoost Nodes for performance-driven building blocks. The Base Model RCO-6000-CML Series is a fanless, rugged computing solution capable of performing powerful computing at the edge while enduring harsh environmental conditions. The base system can be configured with x3 2.5" SATA SSDs, 1x internal 2.5" SATA SSDs at 9mm height, and 2x external hot-swappable SATA SSDs at 7mm height. Several optimized technologies have converged to promote real-time, in-depth responsiveness at the edge. Multi-core CPUs and advanced GPUs stand ready to perform numerous parallel processes, while 5G, 10GbE, and speedier I/O technologies wait to receive and offload volumes of rich data. SSD (solid-state drive) storage offers a vastly quicker and structurally more rugged data repository than its HDD (hard disk drive) cousin.

[Top] Industrial Fanless PC

[Bottom] EdgeBoost Performance Nodes (GPU and/or NVMe SSD)

[Bottom Node] Mix and Match "EDGEBoost Nodes"

A key differentiator of Premio's RCO-6000-CML AI Edge Inference Computer is its modular add-on nodes for powerful inferencing capabilities and high-performance NVMe storage. Users can select specific nodes that provide high-speed NVMe storage, high-density SATA storage, and even GPU acceleration. This innovative mechanical design provides the ability for a rugged and fanless industrial computer that pairs with performance acceleration nodes, or "EDGEBoost Nodes" dedicated for specific workloads at the edge.

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Premio currently offers various configurations of EDGEBoost Nodes that can expand the capabilities of the RCO-6000-CML Series AI Edge Inference Computers:

EDGEBoost Nodes: GPU Acceleration and NVMe Storage

RCO-6000-CML-2060S

- RCO-6000-CML Industrial Fanless PC
- PCIe x16 expansion slot for NVDIA RTX 2060 Super GPU

RCO-6000-CML-4N-2060S

- RCO-6000-CML Industrial Fanless PC
- 4x lockable and hot swappable 2.5" U.2 NVMe SSDs in 7mm height
- PCIe x16 expansion slot for NVDIA 2060 Super GPU
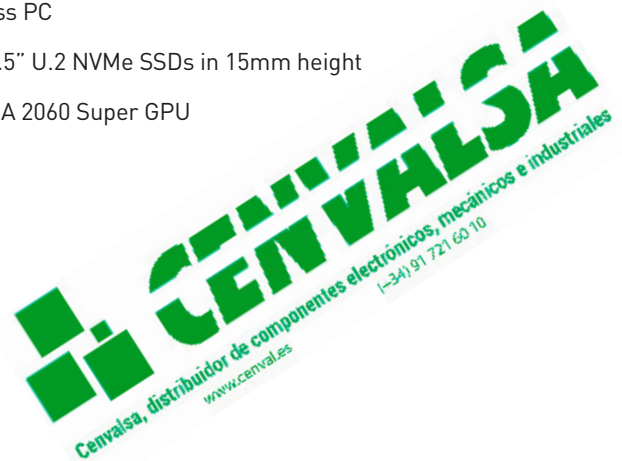- Hot-swappable Smart Fan

RCO-6000-CML-2N-2060S

- RCO-6000-CML Industrial Fanless PC
- 2x lockable and hot swappable 2.5" U.2 NVMe SSDs in 15mm height
- PCIe x16 expansion slot for NVDIA 2060 Super GPU
- Hot-swappable Smart Fan

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EDGEBoost Nodes: High-Speed NVMe

RCO-6000-CML-8NS

- RCO-6000-CML Industrial Fanless PC

- 8x lockable and hot swappable 2.5" U.2 NVMe SSDs in 7mm height

- Software Raid Options in 0, 1, 5, and 10

- Hot-swappable Smart Fan

RCO-6000-CML-4NS

- RCO-6000-CML Industrial Fanless PC

- 4x lockable and hot swappable 2.5" U.2 NVMe SSDs in 15mm height

- Software Raid Options in 0, 1, 5, and 10

- Hot-swappable Smart Fan

RCO-6000-CML-4NH

- RCO-6000-CML Industrial Fanless PC

- 4x lockable and hot swappable 2.5" U.2 NVMe SSDs in 15mm height

- Hardware Raid Options in 0, 1, 5, 6, and 10

- Hot-swappable Smart Fan

EDGEBoost Nodes: High-Capacity SATA Storage

RCO-6000-CML-2C-4B7M

- RCO-6000-CML Industrial Fanless PC

- 4x lockable and hot swappable 2.5" U.2 SATA SSDs in 7mm height

RCO-6000-CML-2C-2B15M

- RCO-6000-CML Industrial Fanless PC

- 2x lockable and hot swappable 2.5" U.2 SATA SSDs in 15mm height

SSD Data Protection and Redundancy

Safety Storage Ejection Button

Adding to the ease of offloading data from the RCO-6000-CML Series to the cloud is the availability of a physical button on the system that initiates the ejection of storage media for the safe removal of the SSD canister or individual SSDs. Pressing the button suspends all I/O operations and read/write operations to the storage devices to prevent the loss or corruption of data. Having a robust and scalable data storage solution is a growing concern for today's hardware users. So, we've added the ability to hot-swap not only for each individual NVMe drive, but multiple drives can be hot-swapped thanks to the availability of hot-swappable drive canisters. Drive canisters streamline the process of accessing and moving data from the Edge AI Inference computer to a central computer, especially for users that need to offload data from the PC frequently.


Configurable RAID

The Edge AI Inference computer comes with both software and hardware RAID, offering RAID 0, 1, 5, and 10. Configuring your system with a dedicated RAID controller can boost the performance of your system by offloading RAID functions from the host system's CPU to the RAID controller. Offloading RAID functions to a dedicated RAID controller allows the CPU to focus on running enterprise applications.

High-Speed Storage Primed for Edge Intelligence

NVME. Informing the Rugged Edge

Two removable canisters can be populated with up to four hot swappable U.2 NVMe SSDs, providing organizations with ultrahigh- speed, solid-state storage at the edge and the ability to load and offload canisters for extremely quick data transfers. NVMe enables data-center equivalent data read/write speeds at the edge. High-speed data storage efficiently feeds integrated CPUs and GPUs with large volumes of data for complex applications. Additionally, rapid data speeds enable more reflexive inference analysis at the edge.

In the past, the main obstacle to immediate intelligence at the edge was the inability of storage technologies to efficiently read/write data beyond the inherent limitation in the connective architecture. This is where NVMe comes in and carries the day over more traditional data transfer protocols found in legacy products.
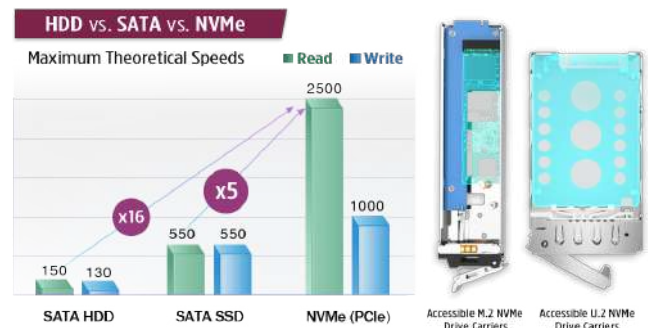
NVMe, or Non-Volatile Memory Express, is an SSD protocol that focuses on efficiency. As an SSD, it relies on NAND flash chips without moving parts to store and access data. NVMe's delivery system is via PCIe lanes. This streamlined interface alleviates data bottlenecking that can occur with other SSD technologies using legacy SATA protocols.

Connecting From the Rugged Edge

Workload Consolidation Ready at the Rugged Edge

The RCO-6000-CML Series supports two universal I/O brackets expansion to enable high-speed connections with low-latency data transmission for advanced industrial applications at the rugged edge. With the diverse modular daughterboards' configurations, the computer's wired and wireless I/O flexibility allows workload consolidation for handling various digital and analog sensors.

10GbE I/O Ready

The rugged edge inference computer supports two 10 Gigabit Ethernet Ports (Intel x710-AT2 Chipset) through its universal I/O bracket. The high-speed connections enable low-latency data transmission for advanced industrial inference analysis applications. The system supports up to x2 Dual 10GbE expansion, providing a total of x4 10GbE ports for even fast wired connectivity.

LAN/PoE Options

The RCO-6000-CML Series comes configured with dual Gigabit Ethernet Ports. Four additional Gigabit Ethernet or PoE ports can be added to the system via expansion daughterboards. PoE supplies power and data to peripherals via a single ethernet cable. Optional locking M12 connectors ensure secure coupling in moving, volatile environments. The system supports up to x8 LAN/PoE expansion with a total of ten 1GbE RJ45 LAN ports on the overall system.

High-Speed USB Integration

Rugged Edge AI Inference PCs are equipped with several generations of USB connections to accommodate data traffic needs for various peripheral technologies. Systems come configured with three USB 3.2 Gen 1, offering 5 Gbps data transfer speed, and six USB 3.2 Gen 2, offering rapid 10Gbps data transfer speed. The two universal I/O brackets allow up to eight additional USB 3.2 Gen 1 ports, providing scalable USB connections for a variety of IoT sensors.

CAN Bus for Vehicle Insights

The RCO-6000-CML Series supports a two-channel, two-pin CAN Bus I/O and Protocol embedded on the motherboard. The CAN Bus support allows the computer to leverage vehicle telematics data for intelligent transportation systems, fleet management, process analytics, and system optimization.

| 4x LAN Module | 4x LAN & PoE Module | 4x Port M12 Module | 4x Port M12 & PoE Module |

| Dual 10G Module | Dual-SIM 5G Module |

Built Rugged. Built Ready.

Wide Operating Temperature Range

The RCO-6000-CML Series has a wide operating temperature range, ranging from -25°C up to 70°C for 35W CPUs and up to 60°C for 65W CPUs, accommodating a wide range of challenging thermal conditions at the rugged edge.

Shock & Vibration Resistance

The RCO-6000-CML Series is also hardened to endure exposure to impact and vibrations, common in rugged industrial environments. Moreover, the fanless system complies with the military standard MIL-STD-810G in shock and vibration, enabling deployment in environments where the system is exposed to frequent shock and vibration.

• 50G Shock and 5 Grms Vibration Resistant

• 20G Shock and 3 Grms Vibration Resistant [With GPU]

Wide Voltage Input

The RCO-6000-CML Series is outfitted with a wide voltage input range, ranging from 9 to 48VDC, accepting a wide range of available power voltages. Additionally, the system supports AT/ATX power modes according to deployment requirements.

Power Ignition Management

The power ignition management feature delays the system shutdown after engine shutoff for a pre-determined, programmable interval to ensure that no data corruption occurs as a result of a sudden and abrupt shutdown. The feature ensures that applications close properly, avoiding data loss or corruption.

Hot-swappable Blower

When the RCO-6000-CML Series is equipped with an edge boost node, the enclosure housing the NVMe SSD storage drives and/ or GPU comes with a hot-swappable blower fan, delivering cooling where it counts. The integrated blower fan is necessary to remove the heat generated from the GPU and NVMe storage devices, neutralizing temperature spikes often experienced from high-performance NVMe and GPU technologies. The hot swappable nature of the fans makes cleaning them and replacing them super easy and quick to eliminate unwanted downtime.

TPM 2.0 Security

An integrated trust platform module applies the TPM 2.0 standard to safeguard the RCO-6000-CML Series. The microprocessor's root keys enable password protection, device authentication, and future-ready cybersecurity. The TPM defends the device, data, and transmission against malicious actors.

Certifications Ready

The RCO-6000-CML AI Edge Inference Computers are validated by various certifications to ensure their reliability amid industrial deployments while obtaining optimal performance. The AI Edge Inference Computers provide a global standard for rugged edge applications.

NEW

RCO-6000-CML GPU SERIES

	RCO-6000-CML-2060S	RCO-6000-CML-4N-2060S	RCO-6000-CML-2N-2060S
Processor	Support 10th Gen Intel® CML S Processor (LGA 1200, 65W/35W TDP) or Optional Intel XEON-W Processors		
Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)		
GPU	RTX 2060S		
Display	3x DisplayPort, 1x DVI-I, 1x DVI-D, 1x HDMI		
SATA Storage	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10		
NVMe Storage	-	1x Removable Module with 2.5" 4 Bay U.2 NVMe SSD (7mm) *Patented NVMe drives trays are tooless and hot-swappable	1x Removable Module with 2.5" 2 Bay U.2 NVMe SSD (15mm) *Patented NVMe drives trays are tooless and hot-swappable
Internal Expansion Slot	2x Full-size Mini PCIe, 1x PCIe x16 (occupied by GPU)	2x Full-size mini-PCIe (1 shared by 1x mSATA), 1x M.2 E Key	
I/O	6x USB 3.2 Gen 2 (10 Gbps), 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal), 2x USB 2.0 header (internal), 8x RS-232/422/485 (6x internal), 16x isolated digital I/O, 2x GbE RJ45 (Support Wake-on-LAN and PXE)		
Power	9 to 48 VDC and 12~48VDC for GPU/Card Expansion, AT/ATX Select, 5-pin Terminal Block, 4-pin Terminal Block for GPU Expansion	9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block, 4-pin Terminal Block for GPU and Storage (12V requires 4-pin terminal block)	
Operating Temperature	-25°C to 60°C (35W/65W CPU)		
Certification	CE, FCC Class A		

NEW

RCO-6000-CML NVMe SERIES

	RCO-6000-CML-8NS	RCO-6000-CML-4NS	RCO-6000-CML-4NH
Processor	Support 10th Gen Intel® CML S Processor (LGA 1200, 65W/35W TDP) or Optional Intel XEON-W Processors		
Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)		
Display	1x DVI-I, 2x DisplayPort		
SATA Storage	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10		
NVMe Storage	2x Removable 4 Bay NVMe SSD Module (7mm) with RAID 0, 1, 5, 10 support *Patented NVMe drives trays are tooless and hot-swappable	2x Removable 2 Bay NVMe SSD Module (15mm) with RAID 0, 1, 5, 10 support *Patented NVMe drives trays are tooless and hot-swappable	2x Removable 2 Bay NVMe SSD Module (15mm) with Hardware RAID 0, 1, 5, 6, 10 support *Patented NVMe drives trays are tooless and hot-swappable
Internal Expansion Slot	2x Full-size mini-PCIe (1 shared by 1x mSATA), 1x M.2 E Key		
I/O	6x USB 3.2 Gen 2 (10 Gbps), 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal), 2x USB 2.0 header (internal), 8x RS-232/422/485 (6x internal), 16x isolated digital I/O, 2x GbE RJ45 (Support Wake-on-LAN and PXE)		
Power	9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block, 4-pin Terminal Block for Storage (12V requires 4-pin terminal block)		
Operating Temperature	-25°C to 60°C (35W/65W CPU)		
Certification	CE, FCC Class A		

NEW

RCO-6000-CML SATA SERIES

	RCO-6000-CML	RCO-6000-CML-2C-4B7M	RCO-6000-CML-2C-2B15M
Processor	Support 10th Gen Intel® CML S Processor (LGA 1200, 65W/35W TDP) or Optional Intel XEON-W Processors		
Memory	2x 260-Pin DDR4 2666 /2933MHz SODIMM. Max. up to 64GB (ECC and Non-ECC)		
Display	1x DVI-I, 2x DisplayPort		
SATA Storage	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 6x Removable 2.5" SATA HDD Bay (support H=7mm, Hot-swappable) Support RAID 0, 1, 5, 10	2x External SIM socket (Mini PCIE attached) 1x Internal 2.5" SATA/SSD HDD Bay (support H=9mm) 2x 7mm, 2x 15mm Hot-swappable 2.5" SATA HDD/SSD Bay, Support RAID 0, 1, 5, 10
Internal Expansion Slot	2x Full-size Mini PCIe	2x Full-size Mini PCIe, 1x PCI and 1x PCIe optional:2x PCI (Model 2I), 2x PCIe x16 (8-lane) (Model 2E)	
I/O	6x USB 3.2 Gen 2 (10 Gbps), 3x USB 3.2 Gen 1 (5 Gbps, 1x Internal), 2x USB 2.0 header (internal), 8x RS-232/422/485 (6x internal), 16x isolated digital I/O, 2x GbE RJ45 (Support Wake-on-LAN and PXE)		
Power	9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block	9 to 48 VDC, AT/ATX Select, 5-pin Terminal Block	
Operating Temperature	-25°C to 70°C (35W/65W CPU)		
Certification	CE, FCC Class A		