



National Centre for Physics

Detailed specification Document

Annex-B

Title of the Project – TRL Augmentation				
Sr. #	Item	Specification	A/U	QTY
1.	1TB PCIe 4.0 NVMe™ M.2 SSD 990 PRO	1TB PCIe 4.0 NVMe™ M.2 SSD 990 PRO or equivalent • Specifications: ○ General ▪ Product Type: Internal SSD ▪ Capacity: 1,000 GB (1GB = 1 billion bytes by IDEMA) — actual usable capacity may be less (formatting, OS, apps, etc.) ▪ Interface: PCIe Gen 4.0 x4, NVMe 2.0 ▪ Form Factor: M.2 (2280) ▪ Applications: Client PCs, Game Consoles ○ Physical ▪ Dimensions (W × H × D): 80 × 22 × 2.3 mm ▪ Weight: Max 9.0 g ▪ Shipping Weight: 0.584 (unit not specified in provided materials) ○ Storage Architecture ▪ NAND: Samsung V-NAND 3-bit MLC ▪ Controller: Samsung in-house controller ▪ DRAM Cache: 1 GB Low-Power DDR4 SDRAM ○ Performance* ▪ Sequential Read: Up to 7,450 MB/s ▪ Sequential Write: Up to 6,900 MB/s ▪ Random Read (4 KB, QD32): Up to 1,200,000 IOPS ▪ Random Write (4 KB, QD32): Up to 1,550,000 IOPS ▪ Random Read (4 KB, QD1): Up to 22,000 IOPS ▪ Random Write (4 KB, QD1): Up to 80,000 IOPS ○ Power & Environment** ▪ Operating Temperature: 0 – 70 °C ▪ Shock: 1,500 G, 0.5 ms (half-sine) ▪ Average Power (system level): ~5.4 W ▪ Peak/Burst Power: Up to 7.8 W ▪ Idle Power: Max 50 mW ▪ Supply Voltage: 3.3 V ± 5% ▪ Reliability (MTBF): 1.5 million hours ○ Software ▪ Management: Samsung Magician Software (SSD management) ○ Security & Features ▪ TRIM: Supported ▪ S.M.A.R.T.: Supported ▪ Garbage Collection: Auto GC algorithm ▪ Encryption: AES 256-bit (Class 0), TCG/Opal, IEEE 1667 (Encrypted drive) ▪ Device Sleep Mode: Supported	No.	04
2.	2TB PCIe 4.0	2TB PCIe 4.0 NVMe™ M.2 SSD — Samsung 990 PRO or	No.	02

	NVMe™ M.2 SSD — Samsung 990 PRO	equivalent • General ◦ Capacity: 2 TB (2,000 GB; usable less after formatting) ◦ Interface / Protocol: PCIe Gen 4.0 x4, NVMe 2.0 • Physical ◦ Form Factor: M.2 2280 (80 × 22 × 2.3 mm), ≤9 g • Storage Architecture ◦ NAND: Samsung V-NAND 3-bit MLC (TLC) ◦ Cache Memory: Samsung 2GB Low Power DDR4 SDRAM • Performance ◦ Sequential: Up to 7,450 MB/s read; up to 6,900 MB/s write ◦ Random (QD32): Up to 1,400,000 IOPS read; up to 1,550,000 IOPS write ◦ Random (QD1): Up to 22,000 IOPS read; up to 80,000 IOPS write • Endurance & Reliability ◦ Endurance: 1,200 TBW ◦ MTBF: 1.5 million hours • Power & Environment ◦ Power (system level): Average 5.5 W; Maximum 8.5 W ◦ Idle Power: ≤55 mW ◦ Operating Temperature: 0 °C to 70 °C ◦ Shock Resistance: 1,500 G, 0.5 ms (half-sine) • Features ◦ TRIM, S.M.A.R.T., Auto Garbage Collection, Device Sleep • Security ◦ AES-256, TCG/Opal, IEEE 1667 (Encrypted drive) • Software ◦ Samsung Magician (SSD management)		
3.	ORICO M.2 NVMe SSD Enclosure, USB 3.1 Gen 2 (10 Gbps) - ORICO-M2PV-C3	ORICO M.2 NVMe SSD Enclosure, USB 3.1 Gen 2 (10 Gbps) - ORICO-M2PV-C3 or equivalent • Product Identifiers ◦ Model: ORICO-M2PV-C3 ◦ Color: Black ◦ Materials: Aluminum alloy (top) + ABS (bottom) ◦ Dimensions: 108 × 29.5 × 13.5 mm • Interface & Performance ◦ USB Interface: USB 3.1 Gen 2 Type-C (10 Gbps) ◦ Bridge Chip: Realtek RTL9210 ◦ Protocol Support: UASP (USB Attached SCSI) ◦ Throughput (theoretical): Up to 10 Gbps • Drive Compatibility ◦ Supported Drives: PCIe NVMe M.2, M-Key, sizes 2230 / 2242 / 2260 / 2280 ◦ Max Capacity: Up to 2 TB • Host Compatibility ◦ OS: Windows / macOS / Linux (plug-and-play, no driver) ◦ Devices: PCs, laptops, smartphones (USB-C OTG), game consoles (e.g., PS4), and other USB-A/USB-C hosts ◦ Hot-Swap: Supported	No.	05

		• Thermals & Build ○ Cooling: Aluminum shell + included thermal pad for passive heat dissipation ○ Mounting: Tool-free with rubber fasteners (screwless) • Power ○ Power Source: Bus-powered via USB-C • Ports & Cables ○ Port: 1× USB-C (on enclosure) ○ Cables Included: ▪ 1× USB-C ↔ USB-C ▪ 1× USB-A ↔ USB-C or 1× new 2-in-1 data cable (varies by package) • What's in the Box ○ 1× M.2 NVMe SSD enclosure ○ 1× USB-C↔USB-C cable + 1× USB-A↔USB-C cable or 1× 2-in-1 data cable ○ 1× Thermal pad ○ 2× Rubber fasteners		
4.	COWGENIC Collar AI Device with Central Router	COWGENIC Collar AI Device with Central Router • Package Contents ○ 5× Collar AI devices ○ 1× Base station / central router • Base Station / Central Router ○ Supported Collars: up to 250 ○ Distance Applicable: 100 m • Software & Services ○ 1 year free diary farm management system ○ Software app for Cowgenic	Kit	1
5.	Kingston 32GB DDR4-2933 ECC UDIMM — DELL OEM (MPN: XWM8G1MIE)	Kingston 32GB DDR4-2933 ECC UDIMM — DELL OEM (MPN: XWM8G1MIE) or Equivalent • Product Identifiers ○ Brand: Kingston ○ MPN: XWM8G1MIE • Capacity & Kit ○ Total Capacity: 32 GB ○ Kit Configuration: 1 × 32 GB (single module) • Performance ○ Speed Rating: DDR4-2933 (PC4-23400) ○ JEDEC/Operating Voltage: 1.20 V (typical for DDR4) • Module Architecture ○ Type: DDR4 SDRAM ○ Form Factor: UDIMM ○ ECC: Yes (72-bit) ○ Pins: 288-pin ○ Rank/Organization: 2Rx8 DRAM Manufacturer: Micron Technology	No.	02
6.	CORSAIR VENGEANCE® DDR5 64GB (2×32GB) 5200 MT/s CL40 — Black	CORSAIR VENGEANCE® DDR5 64GB (2×32GB) 5200 MT/s CL40 — Black or Equivalent • Capacity & Kit ○ Total Capacity: 64 GB ○ Kit Configuration: 2 × 32 GB (dual-channel kit) • Performance (XMP Tested) ○ Rated Speed: 5200 MT/s (PC5-41600)	Kit.	01

	○ Primary Timings: CL40-40-40-77 ○ Tested Voltage: 1.25 V ○ Performance Profile: Intel XMP 3.0 • SPD / JEDEC Baseline ○ SPD Speed: 4000 MHz ○ SPD Timings: 32-32-32-64 ○ SPD Voltage: 1.10 V • Form Factor & Physical ○ Module Type: UDIMM (Unbuffered, non-ECC) ○ Pins: 288-pin ○ Heat Spreader: Aluminum ○ Color: Black ○ Weight (package): ~0.13 kg ○ Fan Included: No • Compatibility ○ Platforms: Intel 600 / 700 / 800 Series chipsets ○ Use Case: Desktop client systems requiring DDR5 UDIMMs ○ Notes: Enable XMP in BIOS to achieve 5200 MT/s; otherwise memory will default to SPD settings. • Power & Management ○ On-module PMIC: Overclock-capable PMIC (DDR5 power management) • What's in the Box 2 × 32 GB DDR5 UDIMM modules (black, heat-spreader)		
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Note: All the components installed should be compatible with the system and each other.
Please tick the relevant box

- ☐ Installation
 ☐ Testing
 ☐ Commissioning
 ☐ Training
☐ Warranty requirement
 ☐ Any other please specify _____