

# Nuvo-9000 Series

Intel® 13th/12th-Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, Patented Cassette & MeziO® Interface



## Key Features

- Supports Intel® 13<sup>th</sup>/12<sup>th</sup>-Gen Core™ 24C/ 32T 35W/ 65W CPU
- Patented Cassette for PCI/PCIe add-on card accommodation
- Rugged, -25°C to 70°C fanless operation
- Up to 5x 2.5GbE and 1x GigE ports with optional PoE+, supporting 9.5 KB jumbo frame
- 1x USB 3.2 Gen2x2 type-C and 8x USB 3.2/ 2.0 type-A ports
- Supports M.2 Gen4x4 NVMe and 2x SATA ports
- MeziO® interface for easy function expansion
- VGA/ DVI/ DP triple independent display, supporting 4K2K resolution

\*R.O.C Patent No. M456527

## Introduction

Nuvo-9000 series is Neosys' new rugged embedded computer based on Intel® 13th/12th-Gen platform. Benefiting from cutting-edge Intel® 7 photolithography, the latest Core™ desktop processor comes with up to 24 cores and 32 threads and presents an incredible boost of computational performance. Combining the increase of DDR5 memory bandwidth and PCIe Gen4 NVMe high-speed disk read/write, users can expect an overall system performance improvement of up to 2x when compared to previous 10th or 11th- Gen platforms.

Nuvo-9000 series inherits Neosys' patented expansion Cassette design to provide great versatility by allowing additional installation of PCIe or PCI add-on cards. There are three expansion Cassette options available for Nuvo-9000 series, the Nuvo-9000E features a single x16 Gen3 PCIe slot; Nuvo-9000DE has dual x16 PCIe slots, and Nuvo-9000P has a single PCI slot. For users who need more flexible storage, Nuvo-9000LP has a 2.5" HDD tray instead of an expansion Cassette to support a hot-swappable 2.5" HDD/SSD.

I/O functions are also comprehensively enhanced. In addition to six 2.5G and Gigabit Ethernet ports with PoE+ PSE option, Nuvo-9000 series features a USB 3.2 Gen2x2 type-C port offering 20 Gbps bandwidth for data exchange with external devices, plus another six USB 3.2 type-A ports for USB3 camera connectivity. It also has an upgraded M.2 Gen4x4 slot to support the latest NVMe SSD to boost disk read/write speed up to 7000 MB/s. For unfulfilled I/O requirements, users can utilize the expansion Cassette to add on function-specific PCIe/ PCI card, the proprietary MeziO® interface, and internal mini-PCIe/M.2 interfaces.

With its field-proven thermal design, significant CPU and I/O upgrades, and multiple expansion methods, the Neosys Nuvo-9000 series fits your need for ruggedness, performance, and versatility for a variety of applications.

## Specifications

System Core		Internal Expansion Bus	
Processor	Supporting Intel® 13th-Gen Core™ CPU <sup>(1)</sup> (LGA1700 socket, 65W/ 35W TDP)	PCI/PCI Express	
	- Intel® Core™ i9-13900E/ i9-13900TE - Intel® Core™ i7-13700E/ i7-13700TE - Intel® Core™ i5-13500E/ i5-13400E/ i5-13500TE - Intel® Core™ i3-13100E/ i3-13100TE	1x PCIe x16 slot@Gen3, 8-lanes PCIe signals in Cassette (Nuvo-9002E/ 9006E) 2x PCIe x16 slots@Gen3, 8-lanes PCIe signals in Cassette (Nuvo-9002DE/ 9006DE) 1x PCI slot in Cassette (Nuvo-9002P/ 9006P)	
Chipset	Intel® Q670E platform controller hub	Mini PCI Express	1x full-size mini PCI Express socket
Graphics	Integrated Intel® UHD Graphics 770 (32EU) / 730 (24EU)	M.2	1x M.2 2242/3052 B key socket with SIM slot for M.2 5G/ 4G module
Memory	Up to 64 GB DDR5 4800 SDRAM (two SODIMM slots)	Expandable I/O	1x MeziO® expansion port for Neosys MeziO® modules
AMT	Supports Intel® vPro/ AMT 16.0	Power Supply	
TPM	Supports dTPM 2.0	DC Input	1x 3-pin pluggable terminal block for 8 to 48V DC input 1x 3-pin pluggable terminal block for 24V DC input (UL series)
I/O Interface		Remote Ctrl. & LED Output	1x 3-pin pluggable terminal block for remote control and PWR LED output (Ctrl_In/ GND/ LED_Out)
Ethernet Port <sup>(2)</sup>	1x 2.5G Ethernet by I225-IT and 1x Gigabit Ethernet by I219-LM (Nuvo-9002E/ P/ DE/ LP) with screw-lock	Mechanical	
	5x 2.5G Ethernet by I225-IT and 1x Gigabit Ethernet by I219-LM (Nuvo-9006E/ P/ DE/ LP) with screw-lock	Dimension	240 mm (W) x 225 mm (D) x 90 mm (H) (Nuvo-9000E/ P series) 240 mm (W) x 225 mm (D) x 110.5 mm (H) (Nuvo-9000DE series) 240 mm (W) x 225 mm (D) x 79 mm (H) (Nuvo-9000LP series)
PoE+	Optional IEEE 802.3at PoE+ PSE for Port 3 ~ Port 6 (2.5GbE) 100 W total power budget	Weight	3.58 kg (Nuvo-9000E/ P series)/ 3.89 kg (Nuvo-9000DE series) 3.36 kg (Nuvo-9000LP series)
USB 3.2	1x USB 3.2 Gen2x2 (20 Gbps) port in type-C connector with screw-lock 4x USB 3.2 Gen2x1 (10 Gbps) ports in type-A connectors 2x USB 3.2 Gen1x1 (5 Gbps) ports in type-A connectors	Mounting	Wall-mount (standard) or DIN-rail mount (optional)
USB 2.0	2x USB 2.0 ports	Environmental	
Video Port (Integrated Graphics)	1x VGA, supporting 1920 x 1200 resolution	Operating Temperature	with 35W CPU -25°C ~ 70°C <sup>(3)</sup>
	1x DVI-D, supporting 1920 x 1200 resolution 1x DisplayPort, supporting 4096 x 2304 resolution		with 65W CPU -25°C ~ 70°C <sup>(3)/(4)</sup> (configured as 35W TDP) -25°C ~ 50°C <sup>(3)/(4)</sup> (configured as 65W TDP)
Serial Port	2x software-programmable RS-232/ 422/ 485 ports (COM1/ COM2) 2x RS-232 ports (COM3/ COM4)	Storage Temperature	-40°C ~ 85°C
Audio	1x 3.5 mm jack for mic-in and speaker-out	Humidity	10%~90% , non-condensing
Storage Interface		Vibration	MIL-STD-810H, Method 514.8, Category 4
SATA HDD	2x internal SATA port for 2.5" HDD/ SSD installation, supporting RAID 0/ 1 (Nuvo-9000E/ 9000P/ 9000DE) 1x hot-swappable 2.5" HDD tray (7mm HDD/ SSD) and 1x internal 2.5" SATA port, supporting RAID 0/ 1 (Nuvo-9000LP)	Shock	MIL-STD-810H, Method 516.8, Procedure I
M.2 NVMe	1x M.2 2280 M key NVMe socket (PCIe Gen4x4) for NVMe SSD	EMC	CE/FCC Class A, according to EN 55032 & EN 55035
		Safety	UL 62368-1, IEC62368-1 (UL series only)

<sup>(1)</sup>A BIOS update may be required for the system to recognize 13th-Gen processors. Please contact Neosys Technology for more information.

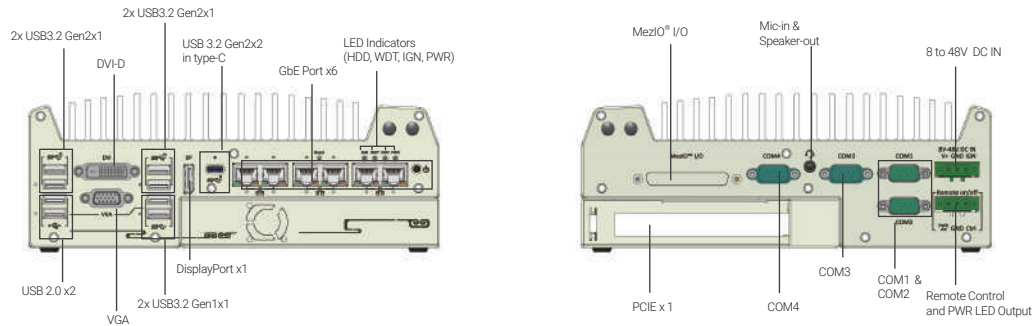
<sup>(2)</sup>Due to I225-IT specification limitation, for systems running 2.5G Ethernet link speeds, please limit the operating temperature to 60°C.

<sup>(3)</sup>For sub-zero operating temperature, a wide temperature HDD or Solid State Disk (SSD) is required.

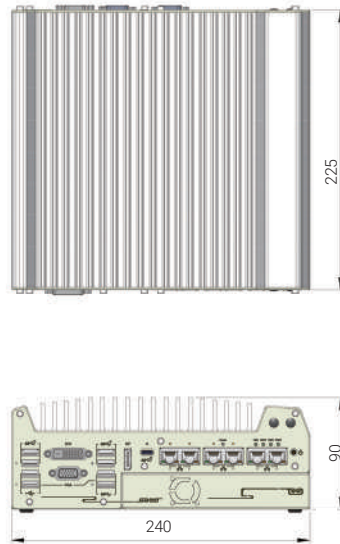
<sup>(4)</sup>For CPU operating at 65W mode, the highest operating temperature shall be limited to 50°C and thermal throttling may occur when sustained full-loading applied. Users can configure CPU power in BIOS to allow higher operating temperature.

## Appearance

### Nuvo-9000E/P



## Dimensions



Unit : mm

## Ordering Information

Model No.	Product Description
<b>Nuvo-9002E</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCIe Cassette & MeziO® Interface
<b>Nuvo-9002P</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCI Cassette & MeziO® Interface
<b>Nuvo-9006E</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCIe Cassette & MeziO® Interface
<b>Nuvo-9006P</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCI Cassette & MeziO® Interface
<b>Nuvo-9002E-UL</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCIe Cassette, MeziO® Interface & UL certified
<b>Nuvo-9002P-UL</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCI Cassette, MeziO® Interface & UL certified
<b>Nuvo-9006E-UL</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCIe Cassette, MeziO® Interface & UL certified
<b>Nuvo-9006P-UL</b>	Intel® 13 <sup>th</sup> /12 <sup>th</sup> -Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, single-slot PCI Cassette, MeziO® Interface & UL certified
<b>PoE+ Option</b>	Option of 802.3at PoE+ PSE for 2.5GbE port 3 ~ port 6

## Optional Accessories

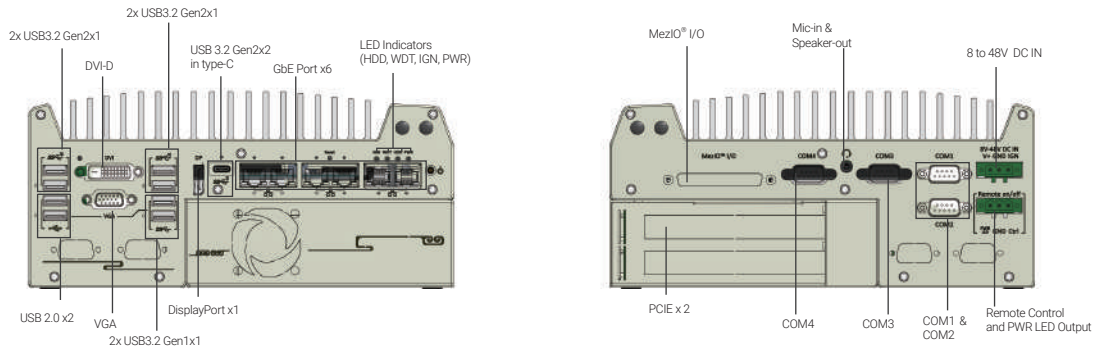
<b>DINRAIL-O</b>	DIN-rail mount assembly for Nuvo-9000 series
<b>Dmpbr-Nuvo5000_7000</b>	Neosys' patented damping brackets assembly for Nuvo-9000 Series
<b>Fankit-25</b>	Fan assembly for 1-slot Cassette, 25x25x10 mm
<b>PA-160W-OW</b>	160W AC-DC power adapter 20V/8A; 18AWG/120cm; cord end terminals for terminal block, operating temperature: -30°C to 70°C. (recommended for 35W CPU)
<b>PA-280W-ET2</b>	280W AC/DC power adapter 24V/ 11.67A; 16AWG/ 100cm; cord end terminals for terminal block, operating temperature : -30°C to 60°C. (recommended for 65W CPU or 35W CPU with PoE+ option)

### MeziO® Modules

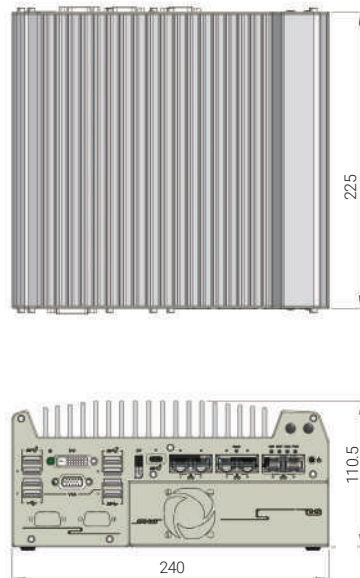
<b>MeziO®-C180</b>	MeziO® module with 4x RS-232/ 422/ 485 ports and 4x RS-232 ports	<b>MeziO®-V20-EP</b>	MeziO® module with ignition power control function for in-vehicle application
<b>MeziO®-C181</b>	MeziO® module with 4x RS-232/ 422/ 485 ports and 4x RS-422/ 485 ports	<b>MeziO®-U4</b>	MeziO® module with 4x USB 3.1 ports
<b>MeziO®-D220</b>	MeziO® module with 8-CH isolated digital input and 8-CH isolated digital output	<b>MeziO®-G4</b>	MeziO® module with 4x GigE ports
<b>MeziO®-D230</b>	MeziO® module with 16-CH isolated digital input and 16-CH isolated digital output	<b>MeziO®-G4P</b>	MeziO® module with 4x IEEE 802.3at PoE+ ports <small>Only Nuvo-9006E/P-PoE support MeziO-G4P</small>

## Appearance

### Nuvo-9000DE



## Dimensions



Unit : mm

## Ordering Information

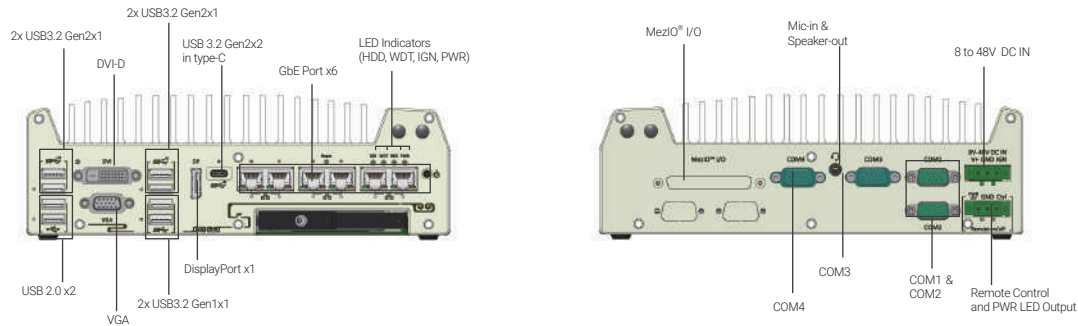
Model No.	Product Description
<b>Nuvo-9002DE</b>	Intel® 13th/12th -Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, dual-slot PCIe Cassette & MeziO® Interface
<b>Nuvo-9006DE</b>	Intel® 13th/12th -Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, dual-slot PCIe Cassette & MeziO® Interface
<b>Nuvo-9002DE-UL</b>	Intel® 13th/12th -Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, dual-slot PCIe Cassette, MeziO® Interface & UL certified
<b>Nuvo-9006DE-UL</b>	Intel® 13th/12th -Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, dual-slot PCIe Cassette, MeziO® Interface & UL certified
<b>PoE+ Option</b>	Option of 802.3at PoE+ PSE for 2.5GbE port 3 ~ port 6

## Optional Accessories

<b>DINRAIL-O</b>	DIN-rail mount assembly for Nuvo-9000 series	
<b>Dmpbr-Nuvo5000_7000</b>	Neosys' patented damping brackets assembly for Nuvo-9000 Series	
<b>PA-160W-OW</b>	160W AC-DC power adapter 20V/8A; 18AWG/120cm; cord end terminals for terminal block, operating temperature: -30°C to 70°C. (recommended for 35W CPU)	
<b>PA-280W-ET2</b>	280W AC/DC power adapter 24V/ 11.67A ; 16AWG/ 100cm; cord end terminals for terminal block, operating temperature : -30°C to 60°C. (recommended for 65W CPU or 35W CPU with PoE+ option)	
<b>MeziO® Modules</b>		
<b>MeziO®-C180</b>	MeziO® module with 4x RS-232/ 422/ 485 ports and 4x RS-232 ports	<b>MeziO®-V20-EP</b> MeziO® module with ignition power control function for in-vehicle application
<b>MeziO®-C181</b>	MeziO® module with 4x RS-232/ 422/ 485 ports and 4x RS-422/ 485 ports	<b>MeziO®-U4</b> MeziO® module with 4x USB 3.1 ports
<b>MeziO®-D220</b>	MeziO® module with 8-CH isolated digital input and 8-CH isolated digital output	<b>MeziO®-G4</b> MeziO® module with 4x GigE ports
<b>MeziO®-D230</b>	MeziO® module with 16-CH isolated digital input and 16-CH isolated digital output	<b>MeziO®-G4P</b> MeziO® module with 4x IEEE 802.3at PoE+ ports <small>Only Nuvo-9006DE-PoE support MeziO-G4P</small>

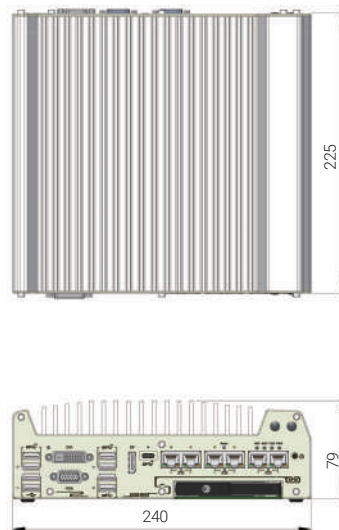
## Appearance

### Nuvo-9000LP



## Dimensions

Unit : mm



## Ordering Information

Model No.	Product Description
<b>Nuvo-9002LP</b>	Intel® 13th/12th-Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, MeziO® Interface & 2.5" HDD tray
<b>Nuvo-9006LP</b>	Intel® 13th/12th-Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, MeziO® Interface & 2.5" HDD tray
<b>Nuvo-9002LP-UL</b>	Intel® 13th/12th-Gen Core™ Rugged Embedded Computer with 2x 2.5GbE/ GbE, USB 3.2 Type-C, MeziO® Interface, 2.5" HDD tray & UL certified
<b>Nuvo-9006LP-UL</b>	Intel® 13th/12th-Gen Core™ Rugged Embedded Computer with 6x 2.5GbE/ GbE, USB 3.2 Type-C, MeziO® Interface, 2.5" HDD tray & UL certified
<b>PoE+ Option</b>	Option of 802.3at PoE+ PSE for 2.5GbE port 3 ~ port 6

## Optional Accessories

<b>DINRAIL-O</b>	DIN-rail mount assembly for Nuvo-9000 series	
<b>Dmpbr-Nuvo5000_7000</b>	Neosys' patented damping brackets assembly for Nuvo-9000 Series	
<b>PA-160W-OW</b>	160W AC-DC power adapter 20V/8A; 18AWG/120cm; cord end terminals for terminal block, operating temperature: -30°C to 70°C. (recommended for 35W CPU)	
<b>PA-280W-ET2</b>	280W AC/DC power adapter 24V/ 11.67A ; 16AWG/ 100cm; cord end terminals for terminal block, operating temperature : -30°C to 60°C. (recommended for 65W CPU or 35W CPU with PoE+ option)	
<b>MeziO® Modules</b>		
<b>MeziO®-C180</b>	MeziO® module with 4x RS-232/ 422/ 485 ports and 4x RS-232 ports	<b>MeziO®-V20-EP</b> MeziO® module with ignition power control function for in-vehicle application
<b>MeziO®-C181</b>	MeziO® module with 4x RS-232/ 422/ 485 ports and 4x RS-422/ 485 ports	<b>MeziO®-U4</b> MeziO® module with 4x USB 3.1 ports
<b>MeziO®-D220</b>	MeziO® module with 8-CH isolated digital input and 8-CH isolated digital output	<b>MeziO®-G4</b> MeziO® module with 4x GigE ports
<b>MeziO®-D230</b>	MeziO® module with 16-CH isolated digital input and 16-CH isolated digital output	<b>MeziO®-G4P</b> MeziO® module with 4x IEEE 802.3at PoE+ ports

Only Nuvo-9006LP-PoE support MeziO-G4P