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NVIDIA® Jetson Rugged Computer

NRU-160-AWP Series

IP66 Waterproof Jetson Orin™ NX/ Nano AI Computer with 6x GMSL2 or 4x PoE+ GbE Ports

Key Features

- **Powered by NVIDIA® Orin™ NX or Orin™ Nano SoM bundled with JetPack**
- **IP66 waterproof and dustproof**
- **-25°C to 70°C fanless operation** (No throttling at 70°C with 20W TDP Mode)
- **6x GMSL2 automotive cameras via FAKRA Z connectors** (NRU-161V-AWP)
- **4x PoE+ GbE via M12 X-coded connectors** (NRU-162S-AWP)
- **1x CAN FD and 1x RS232 via M12 A-coded connectors**
- **225 x 136 x 55 mm low-profile design**
- **8V to 35V wide-range DC input with built-in ignition power control**

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Introduction

The NRU-160-AWP series is a rugged, IP66 waterproof edge AI computer driven by an NVIDIA® Jetson Orin™ NX or Orin™ Nano. Its target applications include smart city roadside installations, AI inspection in food factories, perception units for outdoor robots, and ADAS for off-highway vehicles. Furthermore, it aims to redefine rugged, wide-temperature edge AI with its waterproof features at an affordable cost, achieved through a streamlined mechanical design, carefully selected waterproof connectors and standardized cable kit.

Powered by NVIDIA® Jetson Orin™ NX, the NRU-160-AWP delivers superior AI inference with up to 100 sparse TOPS (INT8) and can transcode up to eighteen 1080P video streams simultaneously. Designed to accommodate various camera requirements for vision-based AI applications, the NRU-160-AWP comes in two models: the NRU-161V-AWP, which supports up to 6x GMSL2 automotive cameras with pre-built drivers for selected cameras with IMX390, ISX031, and IMX490 CMOS sensors; and the NRU-162S-AWP, which offers 4x PoE+ GbE ports for IP or industrial GigE cameras. Additionally, a waterproof GbE port is provided for data transmission with other computers or LiDAR.

The NRU-160-AWP is designed for edge deployment, whether in-cabinet, in-vehicle, or in-robot. Its compact 225 x 136 x 55 mm profile makes it ideal for confined spaces. It is equipped with an 8V to 35V wide DC input range, ignition power control, 1x CAN FD bus port, and 1x RS232 port. It also features one mini-PCIe socket for CAN/ COM/ WiFi modules and one M.2 B-key socket for 4G LTE/ 5G NR mobile communication modules.

The integration of IP66 waterproof capability, Orin NX AI performance, and rich onboard camera connectivity strikes a balance between ruggedness, performance, and cost. It is a ready-to-deploy waterproof edge AI platform for smart agriculture, mining, construction, roadside applications, edge inspection, and outdoor AMRs.

Specifications

System Core		
Processor	NVIDIA® Jetson Orin™ NX system-on-module (SOM), comprising NVIDIA® Ampere GPU and ARM Cortex CPU	NVIDIA® Jetson Orin™ Nano system-on-module (SOM), comprising NVIDIA® Ampere GPU and ARM Cortex CPU
Memory	16GB/ 8GB LPDDR5 @ 3200 MHz on SOM	8GB/ 4GB LPDDR5 @ 2133 MHz on SOM
eMMC	N/A	

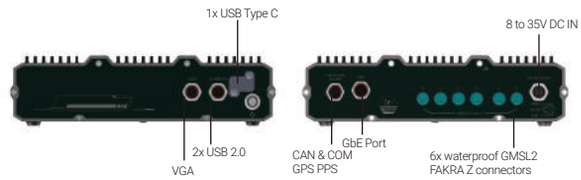
Panel I/O Interface		
GMSL2	**NRU-161V-AWP**	
	6x waterproof GMSL2 FAKRA Z connectors, supporting multiple configurations: Configuration A. 6x AC-IMX390 (2MP@30FPS) Configuration B. 6x AC-ISX031 (3MP@30FPS) Configuration C. 4x AC-IMX490 (5MP@30FPS)	
Ethernet Port	**NRU-161V-AWP**	
	1x Gigabit Ethernet port via M12 X-coded 8-pin connector	
	NRU-162S-AWP	
	Port 0: 1x Gigabit Ethernet port via M12 X-coded 8-pin connector Port 1 to Port 4: 4x GbE ports by Intel® I350-AM4 via M12 X-coded 8-pin connector	
PoE+	**NRU-162S-AWP**	
	IEEE 802.3at PoE+ PSE for Port 1 to Port 4 with 50W total power budget	
USB	2x USB 2.0 ports via M12 A-coded 8-pin connector 1x USB Type C port (for system flashing and OTG, under service door)	
Video Port	1x VGA, supporting 1920x1080 at 60Hz via M12 A-coded 17-pin connector	
Serial Port	1x RS-232 port via M12 A-coded 8-pin connector	
CAN bus	1x CAN FD port via M12 A-coded 8-pin connector	
Isolated DIO	1x isolated GPS PPS input via M12 A-coded 8-pin connector	

Internal I/O Interface	
Mini PCI Express	1x full-size mini PCI Express socket (PCIe + USB 2.0)
M.2	1x M.2 3042/3052 B key (USB 3.2 Gen 1 + USB 2.0) for LTE/5G module with dual micro SIM support
Storage	
M.2 NVMe	1x M.2 2242 M key socket (PCIe Gen 3x1) for NVMe SSD
Power Supply	
DC Input	8V to 35V DC input and ignition power control via M12 A-coded, 5-pin connector (IGN/ GND/ V+) [1]
Mechanical	
Dimension	225 mm (W) x 136 mm (D) x 55 mm (H) (excluding wall-mount)
Weight	3.0 kg (excluding wall-mount)
Mounting	VESA 75 mount (standard) Wall-mount (standard)
Environmental	
Operating Temperature	-25°C to 70°C with passive cooling (20W TDP mode) [2]
	With full CPU+GPU stressing: 1. NRU-160-AWP non-throttling at 70°C with 20W TDP mode 2. NRU-160-AWP non-throttling at 60°C with 25W TDP mode (Orin NX MAXN)
Storage Temperature	-40°C to 85°C
Humidity	10% to 90%, non-condensing
Vibration	MIL-STD-810H, Method 514.8, Category 4
Shock	MIL-STD-810H, Method 516.8, Procedure I
EMC	CE/ FCC Class A, according to EN 55032 & EN 55035 EN 50121-3 (EN 50155:2017, Clause 13.4.8) (NRU-162S-AWP only)

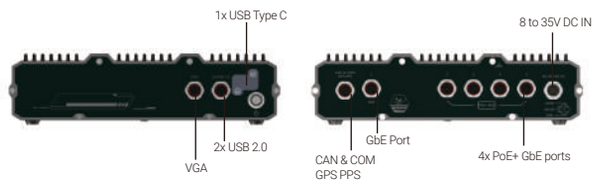
[1]The required DC input range is 8V to 35V when the system load is under 60W. The required DC input range is 12V to 35V when the system load is between 60W to 96W. The required DC input range is 20V to 35V when the system load is between 96W to 160W.
[2]For sub-zero and over 60°C operating temperature, a wide temperature HDD or Solid State Disk (SSD) is required.

Last updated: 22 - Oct 2024

Appearance



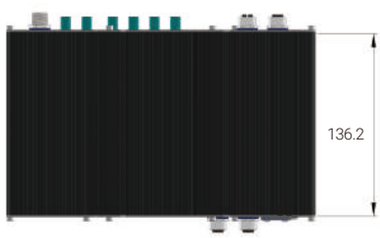
NRU-161V-AWP

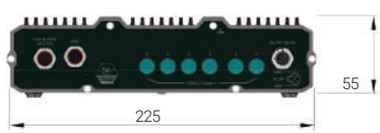


NRU-162S-AWP

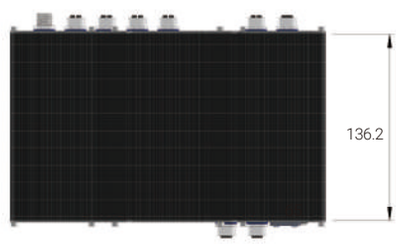
Dimensions

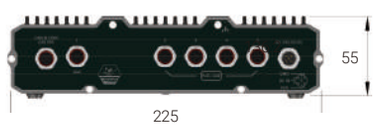
Unit : mm





NRU-161V-AWP





NRU-162S-AWP

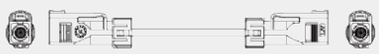
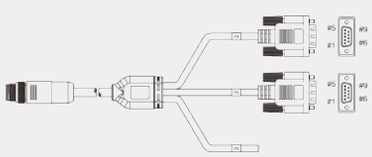
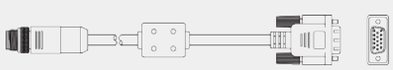
Ordering Information

Model No.	Product Description
NRU-161V-AWP	IP66 Waterproof Jetson Orin™ NX/ Nano Edge AI Computer with 6x GMSL2 Ports
NRU-162S-AWP	IP66 Waterproof Jetson Orin™ NX/ Nano Edge AI Computer with 4x PoE+ GbE Ports
Jetson Module Option	Options for Different Jetson Orin™ NX and Jetson Orin™ Nano SKUs
NVMe Option	Options for Different Capacities of M.2 2242 NVMe Storage

Optional Accessories

PA-60W-OW	60W AC/ DC power adapter 12V/ 5A; cord end terminals for terminal block, operating temperature: -30 to 60°C
PA-160W-OW	160W AC/ DC power adapter 20V/ 8A; 18AWG/ 120cm; cord end terminals for terminal block, operating temperature: -30 to 70°C
AC-ISX031-H60	Sony ISX031 CMOS sensor w/ built-in ISP; 1920x1536 @30fps, HFOV H63.9°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-ISX031-H120	Sony ISX031 CMOS sensor w/ built-in ISP; 1920x1536 @30fps, HFOV H120.6°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-ISX031-H190	Sony ISX031 CMOS sensor w/ built-in ISP; 1920x1536 @30fps, HFOV H195.9°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-IMX390-H60	Sony IMX390 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 63.9°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-IMX390-H120	Sony IMX390 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 120.6°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-IMX390-H190	Sony IMX390 CMOS sensor camera; 1920x1080 @ 30fps; LFM; HFOV 186°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-IMX490-H30	Sony IMX490 CMOS sensor camera; 2880x1860 @30fps; LFM; HFOV 30.0°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-IMX490-H60	Sony IMX490 CMOS sensor camera; 2880x1860 @30fps; LFM; HFOV 62.5°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap
AC-IMX490-H120	Sony IMX490 CMOS sensor camera; 2880x1860 @30fps; LFM; HFOV 120°; IP67+IP69K; -40°C to 85°C operating temperature; male FAKRA connector; active alignment; without lens cap

NRU-160-AWP Series

Type	Model Name	Description
	Cbl-FAKRA-ZFM-ZFM-12M	Waterproof FAKRA Z-code Female to Waterproof FAKRA Z-code Female, Length: 12M
	Cbl-M12X8M-RJ45F-100CM	Waterproof M12 (8-pole-X-coded) to RJ45 Female, CAT6A, Length: 100CM
	Cbl-M12A8M-2U2TA-180CM1	Waterproof M12 (8-pole-A-coded) to 2x USB 2.0 type A (female), Length: 180CM
	Cbl-M12A8M-2DB9M_OW2-180CM1	M12 A-Code Male 8P to x2 DB9 Male+2P, Length: 180CM
	Cbl-M12A17M-VGA-180CM2	M12 (17-pole-A-coded-S) to VGA (male), Length : 180CM

Cable Kit

NRU-160-AWP Series cable kit		
Cblkit-NRU-161V-AWP	6xCbl-FAKRA-ZFM-ZFM-12M	1xCbl-M12X8M-RJ45F-100CM
	1xCbl-M12A8M-2U2TA-180CM1	1xCbl-M12A8M-2DB9M_OW2-180CM1
	1xCbl-M12A17M-VGA-180CM2	
Cblkit-NRU-162S-AWP	5xCbl-M12X8M-RJ45F-100CM	1xCbl-M12A8M-2U2TA-180CM1
	1xCbl-M12A8M-2DB9M_OW2-180CM1	1xCbl-M12A17M-VGA-180CM2