Industrial PC Platform NY-series IPC Programmable Multi-Axis Controller

NY51□-A

CSM_NY51_-A_DS_E_4_2

High-speed, high-precision motion controller plus PC - in one box

The IPC Programmable Multi-Axes Controller offers exceptionally precise motion control, with proven technology from Omron's Delta Tau Data Systems, Inc. It was developed to help manufacturers boost both their productivity and their manufacturing quality, delivering world-beating∗1 output speeds allied to exception precision. It comes equipped with Windows real-time operating systems which, combined with powerful control capability, provides great flexibility.



Features

High-speed multi-axis control

- Up to 128 axes of control
- Motion control period: 250 μs/16 axes ✻2

Flexibility

- Flexible function development capability (G-Code/ANSI C/original programming language)
- EtherCAT for flexible system configuration

Reliability

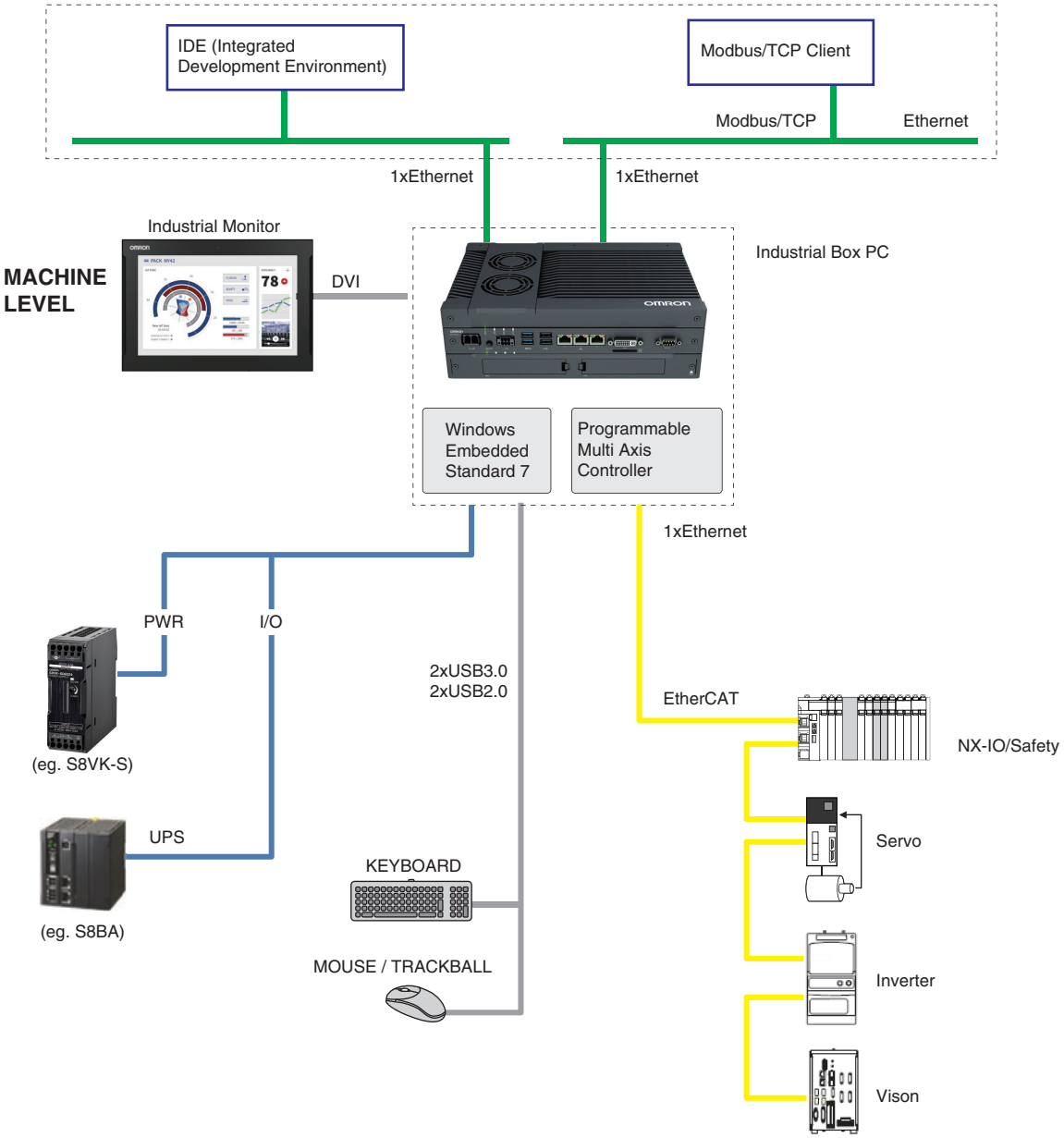
- Multi-tasking of Motion Control and Windows/Linux applications
- Hypervisor allows to continue to control even if OS crashes

✻1. Refers to the motion control performance of 16.6 μs/1 axes or 50 μs/8 axes (Omron survey as of July 2016).
✻2. Reference value.

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System Configuration



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Model Number Structure

NY 5 □ □ - □ □ 0 0 - □ □ □ □ □ □ □ □ □
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Item	Description	Option
1	Series name	NY-series
2	Controller series	5: "5" series
3	Model type	1: Industrial Box PC
4	Sequential number	2 or later
5	Function module	A: Programmable Multi Axis Controller
6	Number of axes for motion control	6: 128 axes
7	Additional function software module	0: ---
8	Reserved	0: ---
9	Expansion slots	1: 1 PCIe slots
10	Frame type	X: No display (Industrial Box PC)
11	Display size	X: No display (Industrial Box PC)
12	Operating system	1: Windows Embedded Standard 7 - 32 bit 2: Windows Embedded Standard 7 - 64 bit
13	Processor	1: Intel® Core™ i7-4700EQ 4th generation CPU with Fan Unit for active cooling
14	Main memory	3: 8 GB, non-ECC
15	Storage size	9: 64 GB, SSD SLC
16	Optional interface	1: RS-232C
17	Logo	X: No display (Industrial Box PC)

Ordering Information

Product name	Specifications				Model
	Processor type	Main memory	Storage size	OS	
Industrial Box PC	Intel® Core™ i7-4700EQ 4th generation CPU with Fan module for active cooling	8 GB, non-ECC	64 GB SSD SLC	Windows Embedded Standard 7 32 bit	NY512-A600-1XX11391X
				Windows Embedded Standard 7 64 bit	NY512-A600-1XX21391X

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Accessories

Optional Hardware

Product name	Specifications	Model
Mounting Brackets ✻1	Book mount	NY000-AB00
	Wall mount	NY000-AB01
SD Memory Cards	Card type: SD Card Capacity: 2 GB Format: FAT16	HMC-SD291
	Card type: SDHC Card Capacity: 4 GB Format: FAT32	HMC-SD491
USB Flash Drives	Capacity: 2 GB	FZ-MEM2G
	Capacity: 8 GB	FZ-MEM8G
Storage Devices	Storage type: HDD Capacity: 320 GB	NY000-AH00
	Storage type: SSD SLC Capacity: 32 GB	NY000-AS00
	Storage type: SSD SLC Capacity: 64 GB	NY000-AS01
	Storage type: SSD MLC Capacity: 128 GB	NY000-AS04
USB Type-A to USB Type-B Cables	Cable length: 2 m USB 2.0 Minimum bend radius: 25 mm	FH-VUAB 2M
	Cable length: 5 m USB 2.0 Minimum bend radius: 25 mm	FH-VUAB 5M
DVI Cables	Cable length: 2 m Supports DVI-D Minimum bend radius: 36 mm	NY000-AC00 2M
	Cable length: 5 m Supports DVI-D Minimum bend radius: 36 mm	NY000-AC00 5M
Industrial Monitor	• LCD touchscreen • Multi-touch functionality • Supply voltage: 24 VDC • Up to 1,280 x 800 pixels at 60 Hz • 2 USB Type-A Connectors • Programmable brightness control	NYM1□W-C100□
Power Supply	• Output voltage: 24 VDC • Push-In Plus terminal blocks	S8VK-S□□□24
UPS ✻2	Output voltage during backup operation: 24 VDC ± 5%	S8BA
UPS Communication Cable	Cable length: 2 m Signals for • Signal output (BL, TR, BU, WB) • Remote ON/OFF input • UPS Stop Signal input (BS)	S8BW-C02

Note: Orders for NY000-AS02 are no longer accepted, as of November 30, 2018.
✻1. Select the required type.
✻2. Revision number 04 or higher.

The revision number of the UPS can be retrieved from the serial number label on the product and the product packaging.

A3□ □□□□□□□□□ □□ □
1 2 3 4

Item	Description
1	Product code
2	Product period and sequential number
3	Revision number
4	RoHS status

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Spare Parts

The following spare parts for the Industrial Box PC are available.

Product name	Specifications	Model
Battery	One battery is supplied with the Industrial Box PC. The battery supplies power to the real-time clock. The battery is located inside the Industrial Box PC. Service life: 5 years at 25°C	CJ1W-BAT01
Fan Unit	The Fan Unit is available for the Industrial Box PC that has active cooling. Service life: 70,000 hours of continuous operation at 40°C with 15% to 65% relative humidity. Shelf life: 6 months This is the storage limitation with no power supplied.	NY000-AF00
Accessory Kit	Accessory Kit containing all accessories supplied with the Industrial Box PC. • Power connector • I/O connector • Drive bracket for drive installation • 4 mounting screws for drive installation • PCIe Card support for PCIe Card installation • PCIe Card clip for PCIe Card installation	NY000-AK00

Installed Support Software

Item	Specifications
Industrial PC Support Utility	The Industrial PC Support Utility is a software utility to assist in diagnosing and resolving problems of the Industrial Box PC. It is pre-installed on the Industrial Box PC and the Industrial Panel PC.
Industrial PC Tray Utility	The Industrial PC Tray Utility is a software utility that provides information about the current state of the Industrial PC, its related devices, and associated software. It is pre-installed on the Industrial Box PC and the Industrial Panel PC.
Industrial PC System API	The Industrial PC System API allows programmers to create programs that can retrieve information or set an indicator status of the Industrial Box PC. The API makes use of the included IPC System Service to manage the hardware. It is pre-installed on the Industrial Box PC and the Industrial Panel PC.
Industrial Monitor Utility	For the optional OMRON Industrial Monitor. The Industrial Monitor Utility provides a user interface to control settings and display details of connected Industrial Monitors. It is pre-installed on the Industrial Box PC and the Industrial Panel PC.
Industrial Monitor Brightness Utility	For the optional OMRON Industrial Monitor. The Industrial Monitor Brightness Utility is a small software utility that allows you to control the brightness of the screen backlight of all connected Industrial Monitors. It is pre-installed on the Industrial Box PC and the Industrial Panel PC.
Industrial Monitor API	For the optional OMRON Industrial Monitor. The Industrial Monitor API allows programmers to create applications that can control the hardware features and retrieve information from connected Industrial Monitors. It is pre-installed on the Industrial Box PC and the Industrial Panel PC.

Support Software

The following table shows the Support Software used to configure, monitor, program, and debug the Programmable Multi-Axis Controller.

Software Name		Application	How to Procure
Power PMAC IDE		This computer software is used to configure the Controller, create user programs, and debug the programs.	This is free software. Contact your OMRON representative for information on how to procure.
Power PMAC NC16	Power PMAC-NC16 SDK	This computer software is used to control working machines and other CNC machines with the Controller. Use this software when you want to customize the HMI screen. The product contains extension source codes used for customization.	This is non-free software. Contact your OMRON representative for information on how to procure.
	Power PMAC-NC16 Runtime	This computer software is used to control working machines and other CNC machines with the Controller. Use this software when you do not customize the HMI screen.	This is non-free software. Contact your OMRON representative for information on how to procure.
Acontis EC Engineer		This computer software is used to configure and monitor the EtherCAT network by using the Controller as the EtherCAT master.	This is free software. Contact your OMRON representative for information on how to procure.

Note: PMAC is an abbreviation for Programmable Multi Axis Controller.

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Recommended EtherCAT and Ethernet Communications Cables

Use Straight STP (shielded twisted-pair) cable of category 5 or higher with double shielding (braiding and aluminum foil tape) for EtherCAT.
For EtherCAT, use a shielded twisted-pair cable (double shielding with aluminum tape and braiding) of Ethernet category 5 (100BASETX) or higher, and use straight wiring.
For Ethernet, required specification for the communications cables varies depending on the baud rate.
For 100BASE-TX/10BASE-T, use an STP (shielded twisted-pair) cable of Ethernet category 5 or higher. You can use either a straight or cross cable.
For 1000BASE-T, use an STP (double shielding with aluminum tape and braiding) cable of Ethernet category 5e or higher. You can use either a straight or cross cable.
In the table, materials indicated available for Ethernet 100BASE-TX are available for both of 100BASE-TX and 10BASE-T.

Cable with Connectors

Item		Appearance	Recommended manufacturer	Cable length (m)	Model
Products for EtherCAT	Cable with Connectors on Both Ends (RJ45/RJ45) Standard RJ45 plugs type ✻1 Wire Gauge and Number of Pairs: AWG26, 4-pair Cable Cable Sheath material: LSZH ✻2 Cable color: Yellow ✻3		OMRON	0.3	**XS6W-6LSZH8SS30CM-Y**
				0.5	**XS6W-6LSZH8SS50CM-Y**
				1	**XS6W-6LSZH8SS100CM-Y**
				2	**XS6W-6LSZH8SS200CM-Y**
				3	**XS6W-6LSZH8SS300CM-Y**
				5	**XS6W-6LSZH8SS500CM-Y**
	Cable with Connectors on Both Ends (RJ45/RJ45) Rugged RJ45 plugs type ✻1 Wire Gauge and Number of Pairs: AWG22, 2-pair Cable Cable color: Right blue		OMRON	0.3	**XS5W-T421-AMD-K**
				0.5	**XS5W-T421-BMD-K**
				1	**XS5W-T421-CMD-K**
				2	**XS5W-T421-DMD-K**
				5	**XS5W-T421-GMD-K**
				10	**XS5W-T421-JMD-K**
	Cable with Connectors on Both Ends (M12 Straight/M12 Straight) Shield Strengthening Connector cable ✻4 M12/Smartclick Connectors Wire Gauge and Number of Pairs: AWG22, 2-pair Cable Cable color: Black		OMRON	0.5	**XS5W-T421-BM2-SS**
				1	**XS5W-T421-CM2-SS**
				2	**XS5W-T421-DM2-SS**
				3	**XS5W-T421-EM2-SS**
				5	**XS5W-T421-GM2-SS**
				10	**XS5W-T421-JM2-SS**
	Cable with Connectors on Both Ends (M12 Straight/RJ45) Shield Strengthening Connector cable ✻4 M12/Smartclick Connectors Rugged RJ45 plugs type Wire Gauge and Number of Pairs: AWG22, 2-pair Cable Cable color: Black		OMRON	0.5	**XS5W-T421-BMC-SS**
				1	**XS5W-T421-CMC-SS**
				2	**XS5W-T421-DMC-SS**
				3	**XS5W-T421-EMC-SS**
				5	**XS5W-T421-GMC-SS**
				10	**XS5W-T421-JMC-SS**

✻1. Standard type cables length 0.2, 0.3, 0.5, 1, 1.5, 2, 3, 5, 7.5, 10, 15 and 20 m are available.
Rugged type cables length 0.3, 0.5, 1, 2, 3, 5, 10 and 15 m are available.
For details, refer to Cat.No.G019.
✻2. The lineup features Low Smoke Zero Halogen cables for in-cabinet use and PUR cables for out-of-cabinet use. Although the LSZH cable is single shielded, its communications and noise characteristics meet the standards.
✻3. Cables colors are available in blue, yellow, or Green.
✻4. For details, contact your OMRON representative.

Cables / Connectors

Item			Recommended manufacturer	Model
Products for EtherCAT or Ethernet (1000BASE-T/100BASE-TX)	Wire Gauge and Number of Pairs: AWG24, 4-pair Cable	Cables	Hitachi Metals, Ltd.	**NETSTAR-C5E SAB 0.5 × 4P CP** ✻1
			Kuramo Electric Co.	**KETH-SB** ✻1
			SWCC Showa Cable Systems Co.	**FAE-5004** ✻1
		RJ45 Connectors	Panduit Corporation	**MPS588-C** ✻1
Products for EtherCAT or Ethernet (100BASE-TX)	Wire Gauge and Number of Pairs: AWG22, 2-pair Cable	Cables	Kuramo Electric Co.	**KETH-PSB-OMR** ✻2
			JMACS Japan Co., Ltd.	**PNET/B** ✻2
		RJ45 Assembly Connector 	OMRON	**XS6G-T421-1** ✻2

✻1. We recommend you to use above cable for EtherCAT and Ethernet, and RJ45 Connector together.
✻2. We recommend you to use above cable for EtherCAT and Ethernet, and RJ45 Assembly Connector together.
Note: Connect both ends of cable shielded wires to the connector hoods.

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Specifications

Performance/Function Specifications Supported by NY51□-A

Item		NY51□-A
External terminals		Communications Connector For EtherCAT communications. • RJ45 × 1 For Ethernet communications on Windows side. • RJ45 × 1 For Ethernet communications on Programmable Multi Axis Controller side. • RJ45 × 1
Motion control	Maximum Number of Controlled Axes	128 axes
	Motion control period	250 μ or more
	Control method	Issuing control commands using EtherCAT communications
EtherCAT communications specifications	Communications protocol	EtherCAT protocol
	Baud rate	100 Mbps
	Physical layer	100BASE-TX (IEEE 802.3)
	Topology	Line, daisy chain, and branching
	Transmission media	Twisted-pair cable of category 5 or higher (double-shielded cable with aluminum tape and braiding)
	Transmission distance	Distance between nodes: 100 m or less
	Maximum number of slaves	128
	Range of node addresses that can be set	1 to 128
Ethernet Port	Number of available ports	3
	Physical Layer	1000BASE-T/100BASE-TX
	Frame length	1,514 bytes max.
	Media access method	CSMA/CD
	Modulation	Baseband
	Topology	Star
	Transmission Media	Twisted-pair cable of category 5, 5e, or higher (shielded cable)
	Maximum Transmission Distance between Ethernet Switch and Node	100 m
	Maximum number of cascade connections	There are no restrictions if an Ethernet switch is used.
USB port	Physical layer	USB 3.0-compliant A-type connector, Output voltage 5 V, 0.9 A max.
	Transmission distance	3 m

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Performance Specifications

Item				NY51□-A
Main system	CPU	CPU type		Intel® Core™ i7-4700EQ
		Cores / Threads		4 / 8
		CPU base frequency		2.4 GHz
		Maximum turbo frequency		3.4 GHz
		Cache		6 MB
		Cooling details		Requires active cooling (fan)
	Memory	Memory size		8 GB
		Memory type		DDR3L (non ECC)
	Trusted platform module (TPM)			• Ensure the integrity of the platform • Disk encryption • Password protection and other uses of encryption
	Graphics controller			Intel® HD Graphics. Up to two independent screens.
				Intel® HD Graphics 4600
	Watchdog			Yes
Operating system	Windows OS			Windows Embedded Standard 7 - 32 bit Windows Embedded Standard 7 - 64 bit
Storage devices	Drives	Hard disk drive		• 320 GB Serial ATA 3.0
		Solid state drive	SLC type	• 64 GB Serial ATA 3.1
			MLC type	• 128 GB Serial ATA 3.1
	Drive bays (HDD/SSD) ✻1			2
Connectors	Power connector			• 24 VDC
	I/O connector			2 inputs (UPS signal and power OFF control) and 1 output (Industrial Box PC power state)
	USB2.0 Type-A	Number of ports		2
		Maximum current		500 mA
		Maximum cable length		5 m
	USB3.0 Type-A	Number of ports		2
		Maximum current		900 mA
		Maximum cable length		3 m
	Ethernet connectors	Number of available ports		3
		Physical layer		10BASE-T, 100BASE-TX or 1000BASE-T
	DVI-I connector	Video interface		Digital or analog
		Resolution		Up to 1,920 x 1,200 pixels at 60 Hz
		Maximum DVI cable length		Dependent upon connected monitor type and resolution
Optional connector (select one per system)	RS-232C			Standard DSUB9 connector (Non-Isolated)
PCIe Card Slot	Configuration			X4 (4 lanes) up to Gen 3
	Card height			Standard height cards, 4.20 inches (106.7 mm) ✻2
	Card length			Half length cards, 6.6 inches (167.65 mm)
Battery	Model			CJ1W-BAT01
	Service life			5 years at 25°C
Fan unit	Model			NY000-AF00
	Service life			70,000 hours of continuous operation at 40°C with 15% to 65% relative humidity
LED				PWR, ERR, HDD, RUN

✻1. Depending on the model one or two drives are supported.
✻2. Low profile cards, 2.536 inches (64.4 mm) are not supported.

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Electrical Specifications

Item			NY51□-A
Rated power supply voltage			24 VDC, non-isolated
Allowable power supply voltage range			20.4 to 28.8 VDC
Grounding method			Ground to less than 100 Ω
Inrush current			At 24 VDC: 12 A / 6 ms max. for cold start at room temperature
Overvoltage category			Meets IEC 61010-2-201: Category II
EMC immunity level			IEC 61132-2: Zone B
RTC accuracy			At ambient temperature of 55°C: -3.5 to +0.5 min error per month At ambient temperature of 25°C: -1.5 to +1.5 min error per month At ambient temperature of 0°C: -3 to +1 min error per month
Power button life			100,000 operations
Battery life			5 years at 25°C (for battery CJ1W-BAT01)
Fan life			8 years of continuous operation at 40°C
Power consumption ✻	**Maximum power consumption including drives and expansions**		114 W
	Maximum power consumption excluding drives and expansions		81 W
	Drives	**SSD SLC 64 GB**	2 W
		SSD MLC 500 GB	3 W
	Expansions	**USB**	14 W max. ((2 x 500 mA at 5 V) + (2 x 900 mA at 5 V))
		PCIe	15 W max.

Note: Refer to the *Industrial PC Platform NYseries IPC Programmable Controller Industrial Box PC Hardware User's Manual* (W580) for detail.

✻ The total power consumption is the sum of the power consumption of all items that are installed in your Industrial Box PC.
To guarantee S8BA UPS operation in combination with our IPC, the specified combination of UPS and power-supply must be used.
The required supply specifications for an Industrial Box PC with an Intel® Core™ i7-4700EQ CPU.

Item	Minimum power requirements
Power supply	240 W
UPS	120 W

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Environmental Specifications

Item		Specifications
Operation environment	Ambient operating temperature ✻1	0 to 55°C
	Ambient storage temperature ✻1	-20 to 70°C
	Ambient operating humidity ✻1	10% to 90% with no condensation
	Ambient storage humidity ✻1	10% to 90% with no condensation
	Operating atmosphere	No corrosive gases
	Altitude	2,000 m max.
	Noise resistance (during operation)	Conforms to IEC61000-4-4, 2kV (power lines)
	Vibration resistance (during operation)	Conforms to IEC 60068-2-6. For a product with an SSD: 5 to 8.4 Hz with 3.5 mm single amplitude and 8.4 to 150 Hz with 9.8 m/s^2 for 10 times each in X, Y and Z directions. For a product with a HDD the vibration resistance depends on the mounting orientation ✻2.
	Shock resistance (during operation)	Conforms to IEC 60068-2-27. 147 m/s^2, 3 times in each X, Y and Z directions
	Installation method	Book mount, Wall mount
	Pollution degree	2 or less: Meets IEC 61010-2-201.
Applicable standards ✻3		EU Directives: EMC Directive 2014/30/EU (EN 61131-2), and RoHS Directive KC Registration, RCM, cULus, EAC

✻1. The allowed ambient operating temperature and ambient humidity depend on product type, CPU type, mounting orientation, and storage device type.

✻2. Vibration resistance depends on the Industrial Box PC's mounting orientation and storage device type:

Mounting orientation	SSD	HDD
Book	9.8 m/s^2	2.5 m/s^2
Wall		4.9 m/s^2

✻3. Refer to the OMRON website (www.ia.omron.com) or contact your OMRON representative for the most recent applicable standards for each model.

Storage Device Specifications

Item	Specifications			
Model	NY000-AS00	NY000-AS01	NY000-AS04	NY000-AH00
Capacity	32 GB	64 GB	128 GB	320 GB
Type	SSD (SLC)		SSD (MLC)	HDD
S.M.A.R.T. support	Yes			
Rotation speed	–	–	–	5,400 r/min
Interface	Serial ATA 3.1			Serial ATA 3.0
Sustained standard read speed	Up to 160 MB/s		Up to 530 MB/s	–
Sustained standard write speed	Up to 150 MB/s		Up to 190 MB/s	–
Operating temperature	0 to 70°C			5 to 55°C
Operating humidity	10% to 95% (with no condensation)			• 10% to 95% (with no condensation) • 29°C wet-bulb temperature max.
Storage temperature	-40 to 100°C		-55 to 95°C	-40 to 65°C
Storage humidity	10% to 95% (with no condensation)			• 8% to 90% (with no condensation) • 40°C wet-bulb temperature max.
Life	1,500 TB written / 11 years at a daily workload of 350 GB	3,000 TB written / 23 years at a daily workload of 350 GB	208 TB written / 5 years at a daily workload of 100 GB	Approximately 5 years or 20,000 powered-ON hours (whichever comes first) under the following conditions: • 25°C at 101.3 kPa • Less than 333 powered-ON hours/month ✻1 • Less than 20% operation while powered-ON ✻2 • Less than 1.30 x 10^6 seeks/month

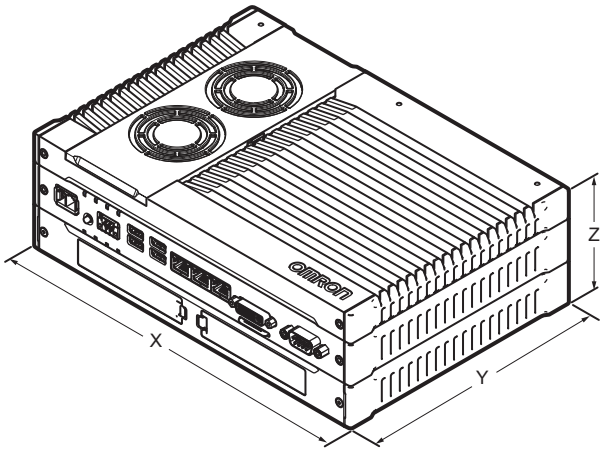
Note: Orders for NY000-AS02 are no longer accepted, as of November 30, 2018.

✻1. Powered-ON hours include sleep and standby modes.

✻2. Operation includes seeking, writing, and reading functions.

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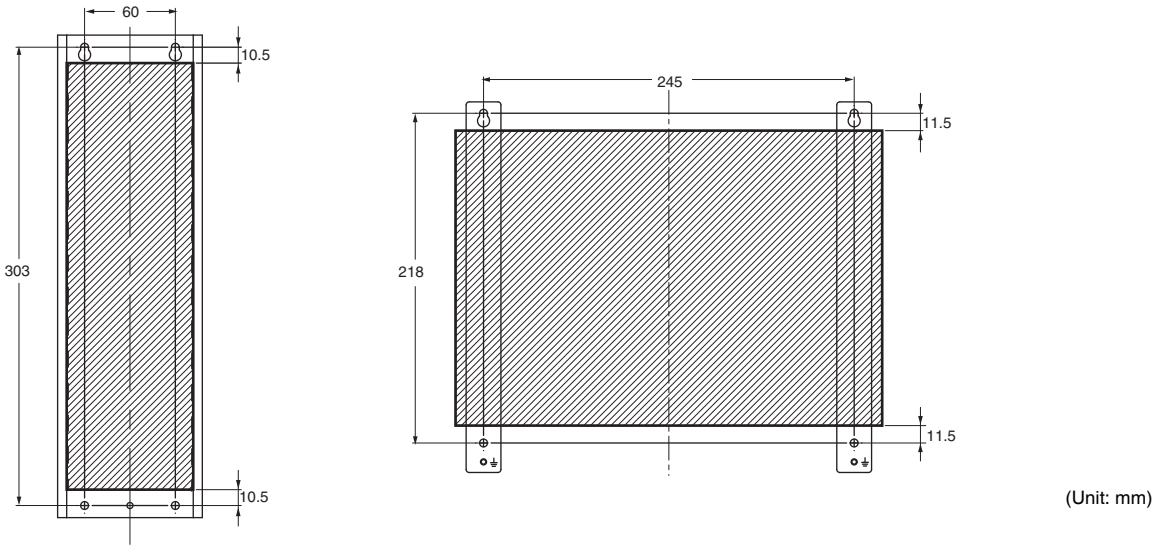
Dimensions



Item	Specifications
Dimensions	Width X = 282 mm Depth Y = 195 mm. Y = 200 mm including the DVI connectors. Height Z = 88.75 mm
Weight	3.8 kg

Bracket Specifications

The metal mounting brackets mount your Industrial Box PC and they are the connection for the functional ground.
Use metal screws with a diameter of 4 mm or 5 mm to mount the brackets.
Mounting screw locations for book mount and wall mount orientation:



(Unit: mm)

Version Information

Unit Versions

Units	Models	Unit Version
NY-series Programmable Multi-Axis Controller	**NY512-A**	1.12

Unit Versions and Programming Devices Supported by NY51□-A

The following tables show the relationship between unit versions and Power PMAC IDE versions.

Unit Versions and Programming Devices

Unit Version	Corresponding version of Power PMAC IDE
1.12	Version 2.2 or higher

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Related Manuals

Contact your OMRON representative for details.

Manual name	Cat.No.	Model numbers	Application	Description
Industrial PC Platform NY-series IPC Programmable Multi-Axis Controller Industrial Box PC Hardware User's Manual	W580	NY51□-A	Hardware information on IPC Programmable Multi-Axis Controller	An introduction to the IPC Programmable Multi-Axis Controller is provided along with the following information: • Basic features of the IPC Programmable Multi-Axis Controller • Setup examples

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Terms and Conditions Agreement

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NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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Change in Specifications.
Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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In the interest of product improvement, specifications are subject to change without notice.

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