KYAC Series Smart Controllers
User Hardware Manual

KYLAND

Preface

This manual serves as a comprehensive guide, detailing the parameters, utilization, and configuration procedures for the Kyland KYAC series of smart controllers.

Legal Disclaimer

Beijing Kyland Technology Co., Ltd. urges users to carefully review and fully comprehend this legal disclaimer prior to utilizing this document. By engaging with this document, you implicitly agree to all its terms and conditions. Obtain this document exclusively through legally approved channels as provided by Beijing Kyland Technology Co., Ltd., and use it solely for lawful and compliant business activities. This document contains confidential information, and as such, you are obligated to adhere strictly to confidentiality requirements.

1. The copyright of this manual is solely owned by Beijing Kyland Technology Co., Ltd. Unauthorized reproduction, translation, or distribution of any portion or the entirety of this document, as well as any commercial use, is strictly prohibited without prior written approval.

2. Beijing Kyland Technology Co., Ltd. reserves the right to amend this document without prior notice. You are advised to stay updated on document revisions by monitoring authorized channels.

3. This document is intended for reference purposes for users of Beijing Kyland Technology Co., Ltd.'s products and services. While efforts are made to ensure accuracy and reliability, no warranties, either expressed or implied, are offered regarding the document's content. Beijing Kyland Technology Co., Ltd. disclaims any legal liability for errors or losses incurred due to reliance on this document.

4. Should you discover any technical inaccuracies or typographical errors within this document, please directly contact Beijing Kyland Technology Co., Ltd.

5. Legal action will be taken against infringements.

Safety Guidelines

To ensure both user safety and equipment integrity, please review this manual comprehensively before operating the equipment. Violation of these safety instructions absolves our company from any responsibility for resultant injuries or damages.

- Avoid installing the equipment near water sources or damp areas. Maintain a relative humidity of 5% to 95% to deter condensation.
- Do not place the equipment in areas with high magnetic fields, strong vibrations, or elevated temperatures.
- Ensure that the equipment is securely positioned to avoid falls and slippage.
- Keep the equipment and its vicinity clean; when necessary, use a dry, soft cotton cloth for cleaning.

- Do not obstruct the equipment or cables. Ensure smooth heat dissipation and untangled cables.
- Utilize anti-static gloves or adopt other safety measures when handling the equipment.
- Avoid exposed wiring to prevent the risk of short circuits or oxidation.
- Abide by national and local electrical codes when installing the equipment.
- Prior to powering up, verify the equipment's voltage requirements to avoid damage.
- Ensure connectors, including the power plug, are securely attached to prevent contact issues.
- Avoid handling the equipment with wet hands.
- Remove all metallic objects, such as jewelry, when operating the equipment to prevent electrical shocks or burns.
- Refrain from operating the equipment or manipulating cables during thunderstorms.
- Use only company-approved connectors and cables; consult our technical staff for advice.
- Do not attempt to disassemble the equipment. For malfunctions, contact our technical support team.
- If parts are lost, acquire replacements only under guidance from our technical team.
- Dispose of the equipment in accordance with national regulations to minimize environmental impact.

In case of emergencies, immediately disconnect the power and contact our company.

Version Information

| Date	Version	Revised Content	Author
2023-08-08	V1.1	Version Release	Smart Control Products Division

Catalogs

Chapter 1: KYAC311 Series

This chapter primarily focuses on the specifications and interface-related content of the KYAC311 series products.

1.1.1 **Product Features**

◆ 2 x Intel Gigabit Ethernet ports;
◆ 4 x USB ports, 1 USB port built-in on board for hardware dongle installation;
◆ 2 x RS232/485, RS485 supports automatic flow control;
◆ 1 x miniPCIe expansion slot for Wifi, 3G/4G modules;
◆ DC12~24V wide voltage input with over-current, over-voltage and anti-reverse connection protection;
◆ Optional wall mounting or DIN-Rail mounting is available;
◆ Fully enclosed aluminum profile housing, fanless and cable-free design;

1.1.2 **Product Size**

Unit: millimeters
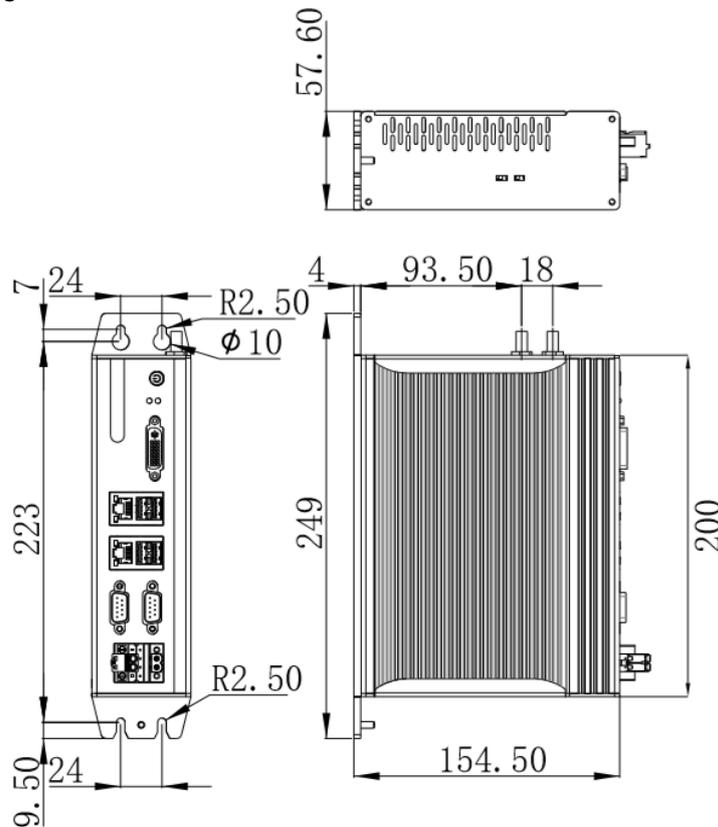
1.1.3 **Product Specification**

Model		KYAC311-E3MA
Hardware configuration	CPU	Intel® Celeron J1900, 2.0GHz, 4-core/4-thread, 2MB L2 cache
	TDP	10W
	BIOS (software)	AMI UEFI 64Mbit
	RAM	1 x SO-DIMM DDR3L-1333MHz 8GB
	Storage	1 x mSATA 128GB
	USB	1 x USB3.0, 3 x USB2.0
		On-board built-in 1 USB2.0 hardware dongle can be installed
	COM	2 x COM (DB9 male), configurable via toggle switch in RS232 or RS485 mode. RS485 support automatic flow control, RS232 with ESD protection (air discharge: ±8KV, contact discharge: ±6KV)
	Ethernet	2 x Intel Gigabit Ethernet ports

	DVI-D	Maximum resolution 1920 x 1080
	Extended Interface	1 x full-size miniPCIe card slot with SIM card slot
	Watchdog	1~255 level programmable setting
Software Configuration	OS	Windows 10 IoT
	Real time environment	CODESYS RTE 3.5.18
Power Supply	Input Voltage	DC12~24V ±10%, over-current, over-voltage and anti-reverse connection protection
	Power Consumption	Maximum power consumption 45W
Mechanical Parameters	Framework	Fully enclosed aluminum enclosure, fanless design, supports wall mounting or DIN-Rail mounting
	Sizes	(L)200mm x (W)154.5mm x (H)57.6mm
	Net weight	1.6Kg
Others	Operating temperature	-20ºC ~ 60ºC (with SSD)
	Storage temperature	-40ºC ~ 80ºC (with SSD)
	Relative humidity	5~95% (non-condensing)
	Vibration	Use of SSD: 5~500Hz, 1.5Grms, following IEC60068-2-64
	Shock	Using SSD: 20G (duration 11ms, half sine wave), following IEC60068-2-27
	EMC	CE/FCC Class A

1.1.4 **Product Interface Definition**
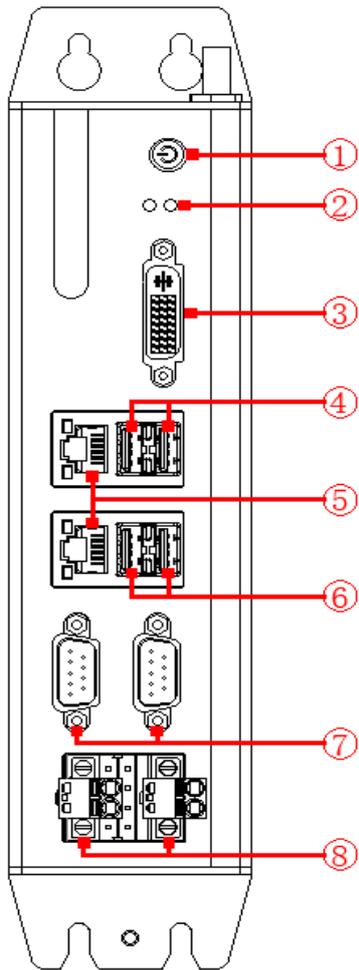
Serial Number	Name
1	switch button
2	status light
3	DVI-D display interface
4	USB port
5	network port
6	USB port
7	serial port (computing)
8	Power Input Connector

1.1.4.1 switch button

The front panel features a power activation button that serves the dual purpose of powering the machine on when it is off and shutting it down when it is on.

1.1.4.2 status light

The front panel has 2 status LEDs that respectively indicate the power status and the hard disk status.

LED Name	Status	Description
Power status light	OFF	Indicates that no power is applied to the product
	ON	Indicates that power has been applied to the product
Hard disk status light	Blinking (Orange)	Indicates that the hard disk is being accessed by read/write

1.1.4.3 display interface

The unit comes equipped with a DVI-D video interface that conforms to the standard DVI interface connector. The specifications of this connector are as follows:

DVI-D 24pin terminal (female)					
Pin No.	Signal Name	Pin No.	Signal Name	Pin No.	Signal Name
1	DATA2-	11	DATA1 SHIELD	21	N.C.

2	DATA2+	12	N.C.	22	DATA0 SHIELD
3	DATA2 SHIELD	13	N.C.	23	CLK+
4	N.C.	14	+5V	24	CLK-
5	N.C.	15	GND	C1	N.C.
6	DDC CLK	16	HPD		
7	DDC DATA	17	DATA0-		
8	N.C.	18	DATA0+		
9	DATA1-	19	DATA0 SHIELD		
10	DATA1+	20	N.C.		

⚠ ::
1. When the DVI-D monitor is not connected before starting BIOS settings, the monitor may not display relevant content. After connecting the monitor properly, the system will display boot information during startup. monitor may not display relevant content. After connecting the monitor properly, the system will display boot information during startup.
2. If you use DVI-D to VGA, you need to use the corresponding DVI-D to VGA converter.
3. The operating ambient temperature should be between 0 and + 45°C when using DVI-D.

1.1.4.4 USB port

1.1.4.4.1 The front panel houses four independent USB Type-A ports. Additionally, the carrier board incorporates an internal USB 2.0 interface to facilitate the straightforward installation of USB hardware security keys by end-users.

1.1.4.4.2 Front panel USB port

Depending on the CPU variant installed in this unit, the quantity of available USB 3.0 interfaces may differ. For more specific details, please refer to the technical specifications. These ports are physically USB 3.0 interfaces but are limited to USB 2.0 signaling capabilities.

USB3.0 connector pin definitions:

Pin No.	code
1	VCC5
2	DATA-
3	DATA+
4	GND
5	SSRX-
6	SSRX+
7	GND
8	SSTX-
9	SSTX+
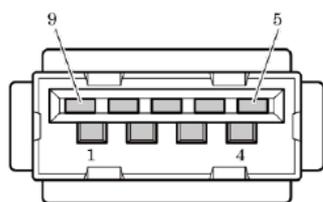
ⓘ ::
1. When it is USB2.0 signal, only Pin 1~Pin4 pins are USB2.0;

1.1.4.4.3 Internal USB 2.0

The motherboard of this product series includes a pre-configured USB 2.0 Type-A port for customer convenience in connecting USB security dongles or other USB devices. To install a USB device, you are required to remove the protective cover as per the illustrated guidelines.

USB2.0 on Board
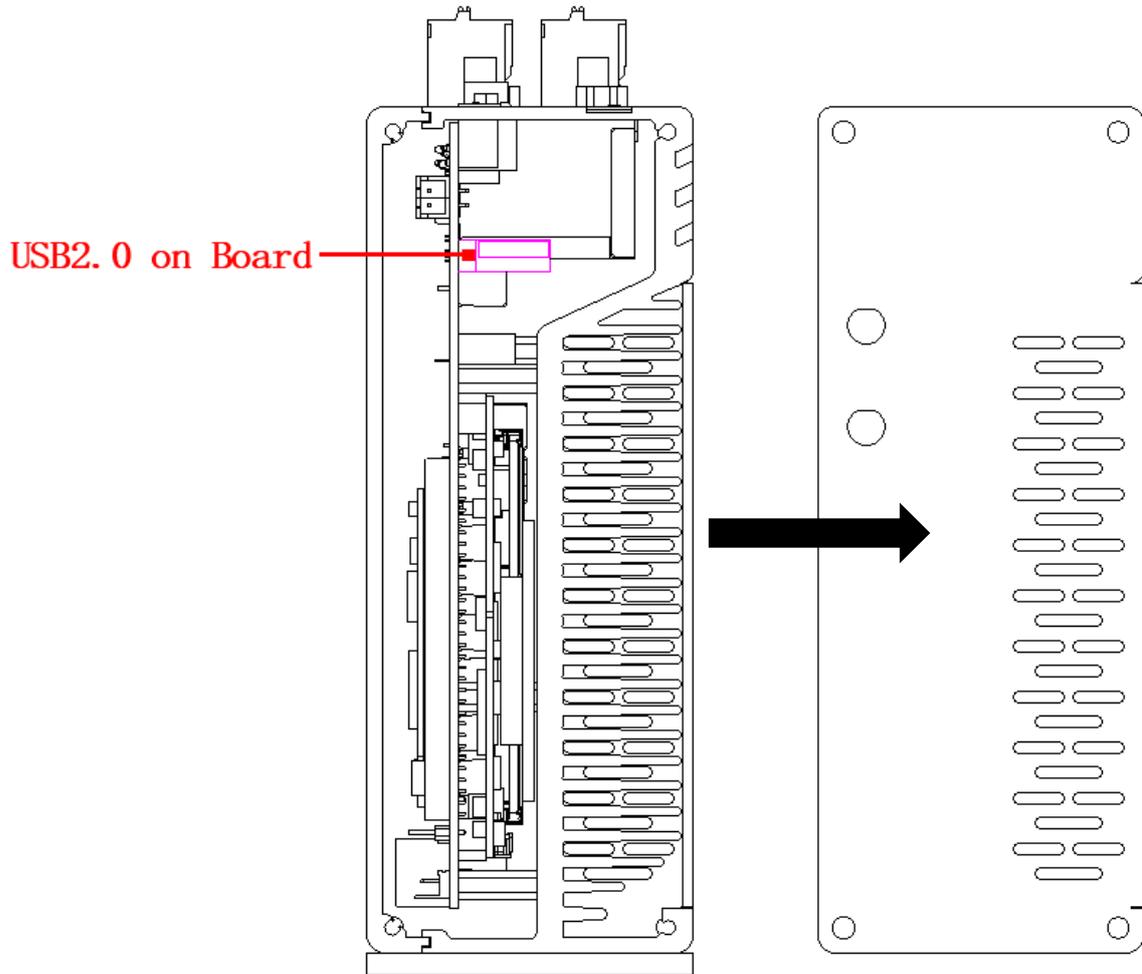
USB2.0 connector pin definitions:

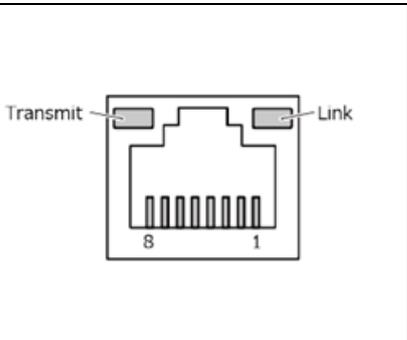| Pin No.	code
1	VCC5
2	DATA-
3	DATA+
4	GND

1.1.4.5 network port

This series of motherboards is outfitted with two Gigabit Ethernet ports, identified as LAN1 and LAN2, and utilizes standard RJ45 connectors. The signal protocol for these Ethernet ports is detailed below.

Pin No.	Signal Name	
	100BASE-TX	1000BASE-T
1	TX+	TRD+(0)
2	TX-	TRD-(0)
3	RX+	TRD+(1)
4	N.C.	TRD+(2)
5	N.C.	TRD-(2)
6	RX-	TRD-(1)
7	N.C.	TRD+(3)
8	N.C.	TRD-(3)

The RJ45 connector features two LED indicators that separately signify network linkage and data transmission statuses. A steady green light indicates a stable network connection, while a blinking green light denotes data transmission at 100 Mbps. For data transmission at 1000 Mbps, the light blinks orange.

typology	Parameters
Network type	1000base-t/100base-tx/10base-t
Transmission speed*	1000M/100M/10M bps
Maximum Cable Distance	100m/segment
NIC Type	Intel® Ethernet Controller

*When the transmission speed is 1000Mbps, a cable of at least CAT 5e and above is required.

1.1.4.6 serial port (computing)

The front panel accommodates two serial ports, designated as COM1 and COM2, which employ standard DB9 male connectors. These ports are compatible with either RS232 or RS485 communication protocols, selectable via the DIP switch located at the base of the unit.
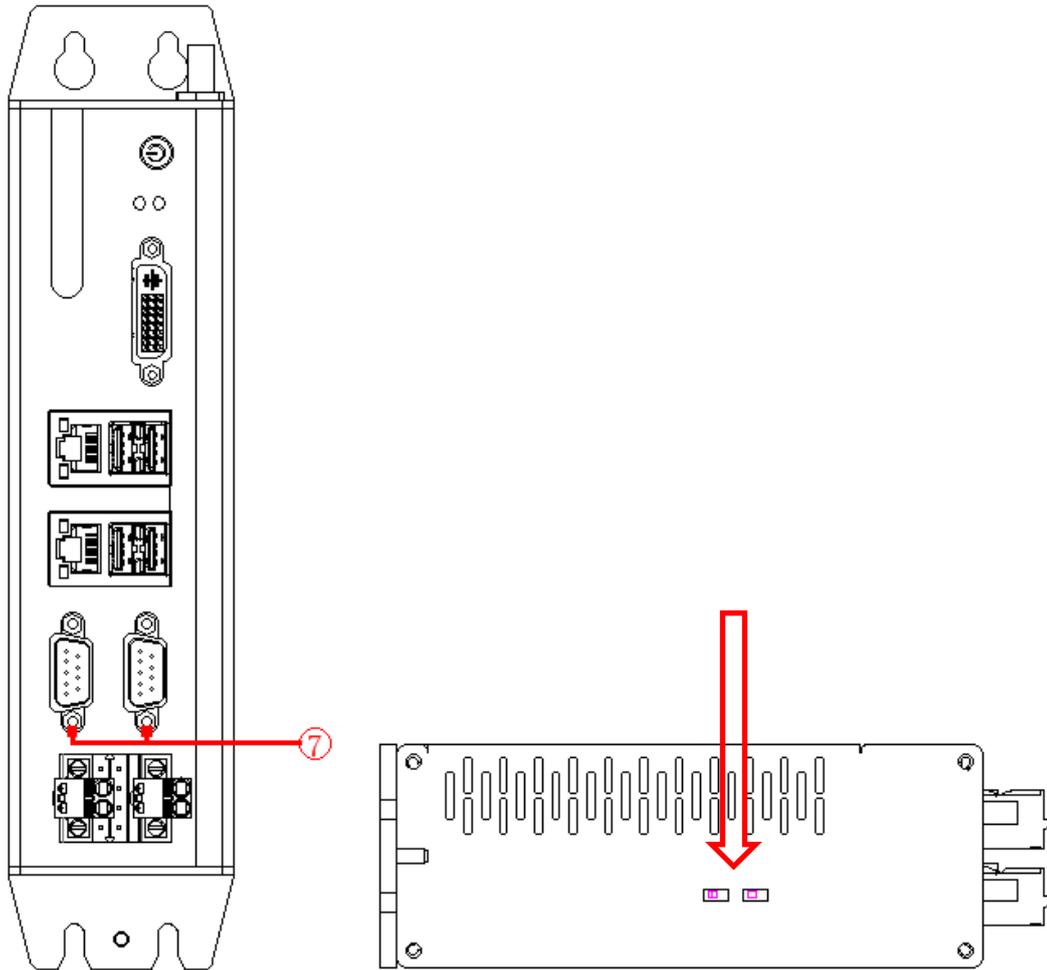

The serial signals for the DB9 male terminals of COM1 and COM2 are defined as follows:

	Pin No.	Signal Name	
		RS232	RS485
	1	N.C.	B
	2	RXD	A
	3	TXD	N.C.
	4	DTR	N.C.
	5	GND	GND
DB9 Male	6	DSR	N.C.
	7	RTS	N.C.
	8	CTS	N.C.
	9	RI	N.C.

1.1.4.7 Power connector

For secure power connectivity, two 2-pin power input interfaces are presented on the front panel. Either interface can be utilized to power the industrial computer, which accepts a broad input voltage range from DC 12V to 24V. The pinout configuration for these power inputs is specified below.
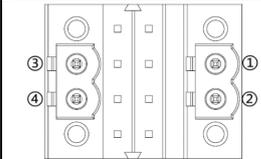
	Pin No.	code	Pin No.	code
	1	DC 12~24V	3	DC 12~24V
	2	GND	4	GND

Note: pin1 and pin3 are shorted on the motherboard wiring, pin2 and pin4 are shorted, and the maximum allowable current for a single terminal is 8A.

1. When connecting the power supply, please make sure that the output voltage the power supply matches the power supply voltage of the PC. voltage of the PC.
2. Pay attention to the positive and negative polarity markings on the casing. Do not connect them in reverse, as it may result in hardware damage or electric shock. Do not connect them in reverse, as it may result in hardware damage or electric shock.
3. For normal use, a good grounding of the PE is required.
4. Do not use mains power (220V) to connect directly to this terminal.

Chapter 2: KYAC323 Series

This chapter mainly elaborates on the specifications and interface-related content of the KYAC323 series products.

1.1.5 **Product Features**

◆ 4 x Intel Gigabit Ethernet ports
◆ 4 x USB3.0 ports, 1 USB port on board for hardware dongle installation
◆ 1 x RS232/RS485, RS485 supports automatic flow control
◆ Support VGA and HDMI dual display interface
◆ 2 x miniPCIe expansion slots for expandable Wifi, 3G/4G modules
◆ DC12~24V wide-voltage input with over-current, over-voltage and anti-reverse connection protection.
◆ Optional wall mounting or DIN-Rail mounting.
◆ Supports -20 ~ 60°C wide temperature operating environment

### 1.1.6 **Product Size**

Unit: millimeters
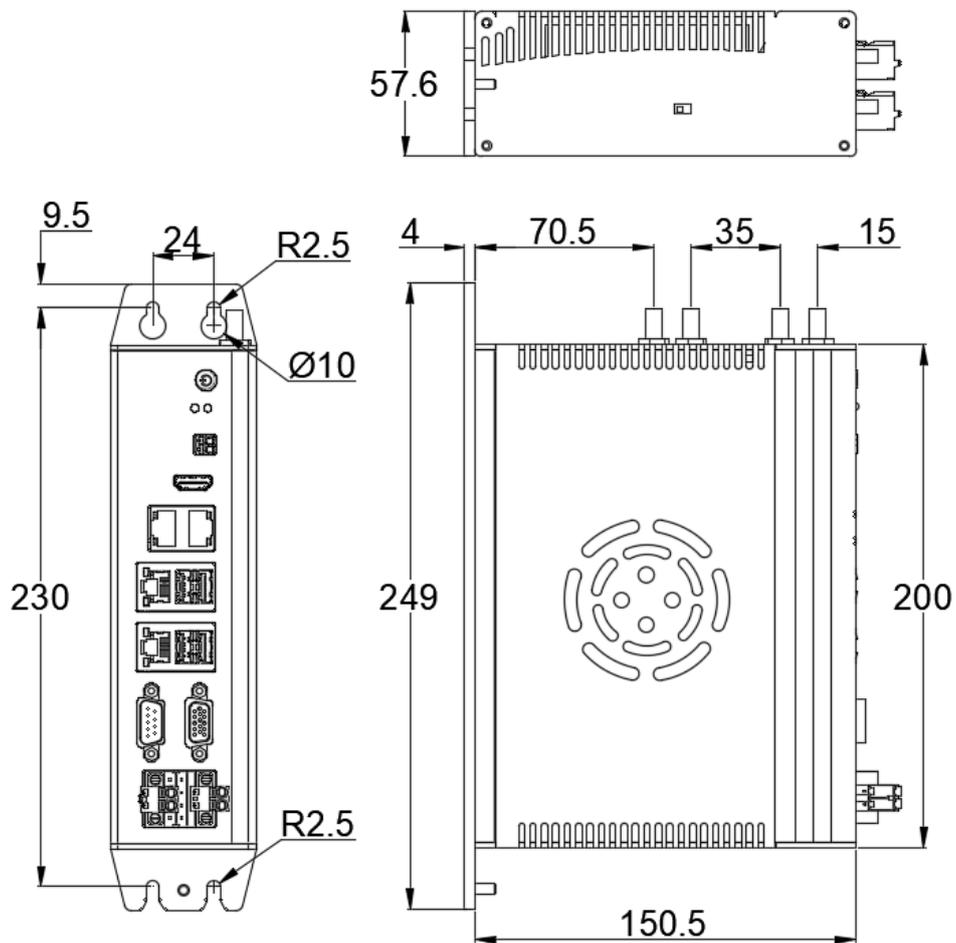
1.1.7 **Product Specification**

Pseudolaric acid		KYAC323-33MB	KYAC323-341B	KYAC323-53MA	KYAC323-541B	KYAC323-73MB	KYAC323-741B	KYAC323-752B
Hardware configuration	CPU	I3-8100		I5-6400		I7-8700		
	TDP	Maximum 65W						
	bios (software)	AMI UEFI 64Mbit						
	random access memory (RAM)	8GB	16GB	8GB	16GB	8GB	16GB	32GB
	stockpile	128GB	256GB	128GB	256GB	128GB	256GB	512GB
	USB	4 x USB3.0, 1 x USB2.0 onboard for hardware dongle installation						

	COM	1 x COM (DB9 male) configurable via toggle switch in RS232 or RS485 mode. RS485 support automatic flow control, RS232 with ESD protection (air discharge: ±8KV, contact discharge: ±6KV)
	Ethernet	4 x Intel Gigabit Ethernet ports
	VGA	Maximum resolution 1920 x 1200
	HDMI	Maximum resolution 3840 x 2160
	Extended Interface	2 x full-size miniPCIe card slots with SIM slot
	watchdog	1~255 level programmable setting
	Remote switch on/off	1 x Remote Switch Interface
operating system	Microsoft Windows	Windows 10 IoT
	Linux	Ubuntu, CentOS, Debian
power supply	Input Voltage	DC12~24V ±10%, over-current, over-voltage and anti-reverse connection protection
	Power Consumption	Maximum power consumption 120W
Mechanical parameters	framework	Fully enclosed aluminum housing, embedded fan for intelligent cooling, supports wall-mounting or DIN-Rail mounting.
	sizes	(L)200mm x (W)154.5mm x (H)57.6mm
	net weight	1.9Kg
matrix	operating temperature	-20ºC ~ 60ºC (with SSD)
	Storage temperature	-40ºC ~ 80ºC (with SSD)
	relative humidity	5~95% (non-condensing)
	vibratory	Use of SSD: 5~500Hz, 1.5Grms, following IEC60068-2-64
	under attack	Using SSD: 20G (duration 11ms, half sine wave), following IEC60068-2-27
	EMC	CE/FCC Class A

1.1.8 **Product Interface Definition**
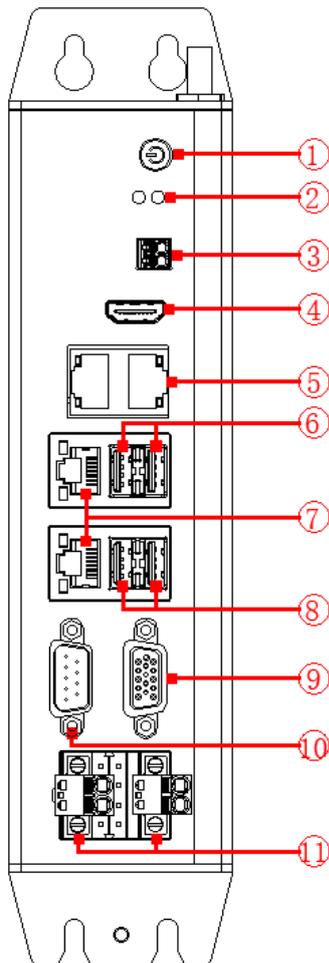
serial number	name (of a thing)
1	switch button
2	status light
3	remote switch
4	HDMI display interface
5	network port
6	USB port
7	network port
8	USB port
9	VGA Display Interface
10	serial port (computing)
11	Power Input Connector

1.1.8.1 switch button

The front panel is equipped with a Power Activation Button, which serves the dual purpose of initializing the device when it is in an off state, as well as deactivating it when it is on.

1.1.8.2 status light

The front panel has 2 status LEDs that indicate the power status and hard disk status respectively.

LED Name	Status	Description
Power status light	OFF	Indicates that no power is applied to the product
	ON	Indicates that power has been applied to the product
Hard disk status light	Blinking (Orange)	Indicates that the hard disk is being accessed by read/write

1.1.8.3 remote switch

The front panel provides a remote power on/off interface, which can be used to remotely power on or off The terminal definitions are as follows:
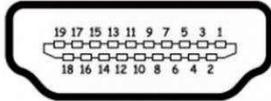
	Pin No.	code
	1	Power_ON
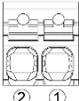
| | 2 | GND |

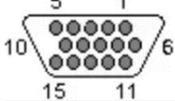### 1.1.8.4 display interface

1.1.8.4.1 HDMI

This product offers an HDMI High-Definition Multimedia Video Display Interface, employing a standard HDMI-A Interface Connector. The technical specifications of this connector are detailed below.

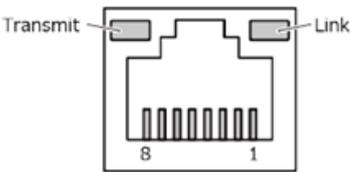| HDMI-A terminal			
Pin No.	Signal Name	Pin No.	Signal Name
1	TMDS DATA 2+	11	TMDS CLOCK SHIELD
2	TMDS DATA 2 SHIELD	12	TMDS CLOCK-
3	TMDS DATA 2-	13	CEC
4	TMDS DATA 1+	14	N.C.
5	TMDS DATA 1 SHIELD	15	DDC CLOCK
6	TMDS DATA 1-	16	DDC DATA
7	TMDS DATA 0+	17	GND
8	TMDS DATA 0 SHIELD	18	+5V PWR
9	TMDS DATA 0-	19	HOT PLUG DETECT
10	TMDS CLOCK+		

1.1.8.4.2 VGA

The device also features a VGA Video Display Interface, which utilizes a Standard DB-15 Interface Connector. Further specifications of this connector are delineated below.

DB-15 Terminal			
Pin No.	Signal Name	Pin No.	Signal Name
1	RED	2	GREEN
3	BLUE	4	N.C.
5	GND	6	RGND
7	GGND	8	BGND
9	+5V	10	GND
11	N.C.	12	SDA
13	H SYNC	14	V SYNC
15	SCL		

1.1.8.5 network port

The motherboard series incorporates four Gigabit Ethernet Ports, utilizing industry-standard RJ45 connectors. Signal specifications for these Ethernet ports are as follows.

Pin No.	Signal Name	
	100BASE-TX	1000BASE-T
1	TX+	TRD+(0)
2	TX-	TRD-(0)
3	RX+	TRD+(1)
4	N.C.	TRD+(2)
5	N.C.	TRD-(2)
6	RX-	TRD-(1)
7	N.C.	TRD+(3)
8	N.C.	TRD-(3)

The RJ45 connectors are equipped with dual LED indicators. The 'Link' LED remains steady yellow to signify an active network connection, while the 'Transmit' LED flashes green at 100 Mbps data transmission and orange at 1 Gbps data transmission rates.

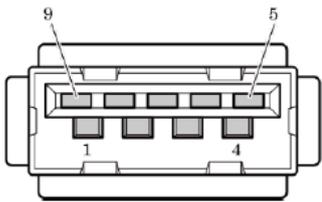| typology	parameters
Network type	1000base-t/100base-tx/10base-t
Transmission speed*	1000M/100M/10M bps
Maximum Cable Distance	100m/segment
NIC Type	Intel® Ethernet Controller

*When the transmission speed is 1000Mbps, a cable of at least CAT 5e and above is required.

1.1.8.6 USB port

The front panel provides four stand-alone USB 3.0 Type-A Interfaces. Additionally, an Internal USB 2.0 Interface is integrated into the carrier board to facilitate the seamless installation of USB Hardware Encryption Keys.

1.1.8.6.1 Front panel USB port

USB3.0 connector pin definitions:

Pin No.	code
1	VCC5
2	DATA-
3	DATA+
4	GND
5	SSRX-
6	SSRX+
7	GND
8	SSTX-
9	SSTX+

1.1.8.6.2 Internal USB 2.0

The motherboard series features a dedicated USB 2.0 Type-A Interface, designed for user-convenient placements of USB dongles and other related devices. To install any USB devices, the protective cover must be removed as per the guidelines outlined in the subsequent diagram.
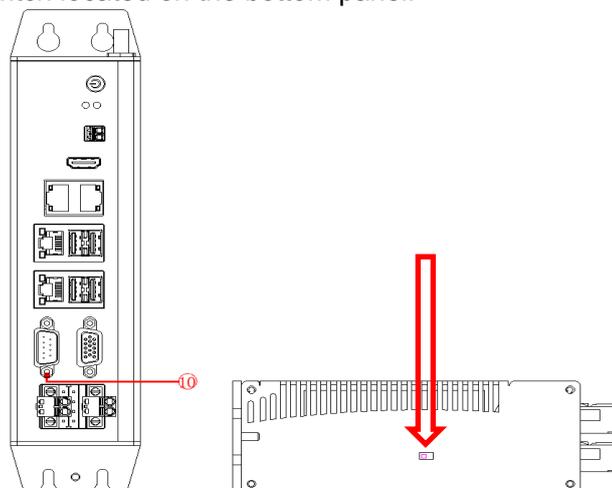

USB2.0 on Board
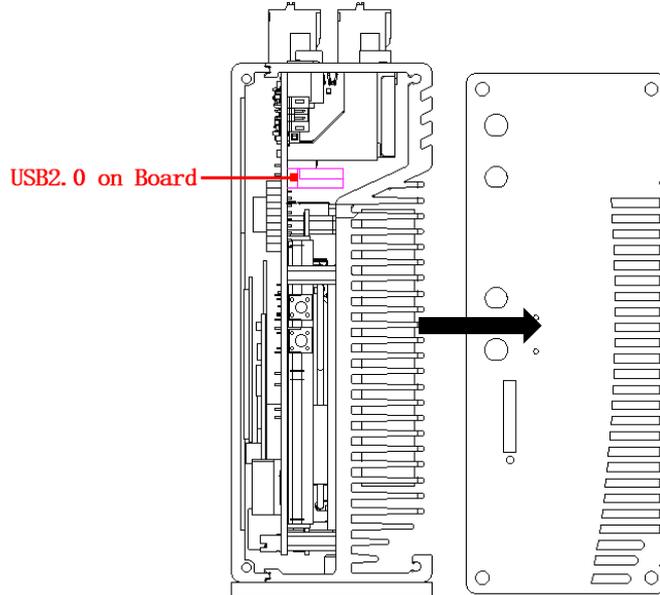
USB2.0 connector pin definitions:

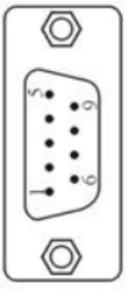| Pin No.	code
1	VCC5
2	DATA-
3	DATA+
4	GND

1.1.8.7 serial port (computing)

The front panel hosts a single Serial Port, identified as COM1, employing a standard DB9 Male Connector. This port supports both RS232 and RS485 communication protocols, which can be selected via the DIP switch located on the bottom panel.


The serial port signals for the COM1 DB9 male terminal are defined as follows:

Pin No.	Signal Name	
	RS232	RS485
1	N.C.	B
2	RXD	A

	3	TXD	N.C.
	4	N.C.	N.C.
	5	GND	GND
	6	N.C.	N.C.
	7	RTS	N.C.
	8	CTS	N.C.
DB9 Male	9	N.C.	N.C.

1.1.8.8 Power connector

To ensure a robust power connection, the front panel houses dual 2-Pin Power Input Connectors. Either of these connectors can be employed to supply power to the industrial computer, compatible with a wide voltage input range spanning from DC 12V to DC 24V. The pinout definitions for these power input connectors are specified below.
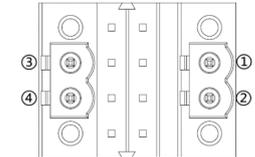
Pin No.	code	Pin No.	code
1	DC 12~24V	3	DC 12~24V
2	GND	4	GND

Note: pin1 and pin3 are shorted on the motherboard wiring, pin2 and pin4 are shorted, and the maximum allowable current for a single terminal is 8A.

⚡::	5. When the power is turned on, please confirm whether the output voltage of the power supply matches the supply voltage of the PC. of the PC.
	6. Pay attention to the positive and negative polarity markings on the chassis, do not reverse connect, otherwise it may cause hardware damage or electric shock. may cause hardware damage or electric shock.
	7. For normal use, a good grounding of the PE is required.
	8. Do not use mains power (220V) to connect directly to this terminal.

Chapter 3: System Installation

This chapter primarily introduces the hardware installation of the system and the installation of the related driver software.

KYLAND

1.2 Hardware Installation

Installation protocols for the KYAC Series hardware modules are generally uniform. For installation or removal of the Function Expansion Board, ensure to detach the board vertically in alignment with the connection terminals prior to the installation of other modules. Failure to properly align and secure the connectors before fastening the screws may result in hardware damage.
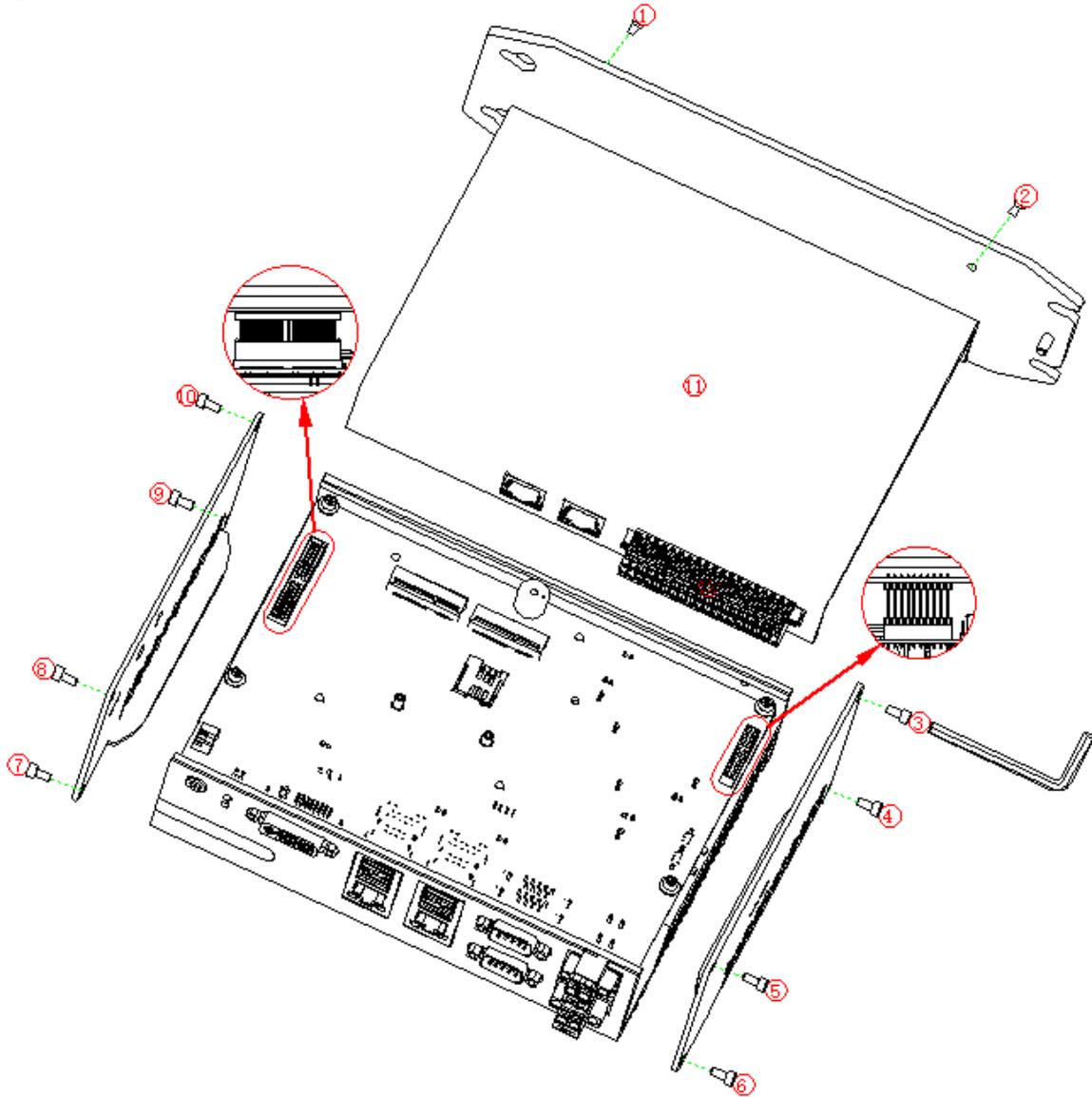
1.2.1 **Installation of Fixed Hanging Plates**

KYAC Series products are compatible with wall-mounted installations. The mounting bracket should be affixed to the product casing utilizing either 2 or 4 screws. To install or replace, simply remove these screws.
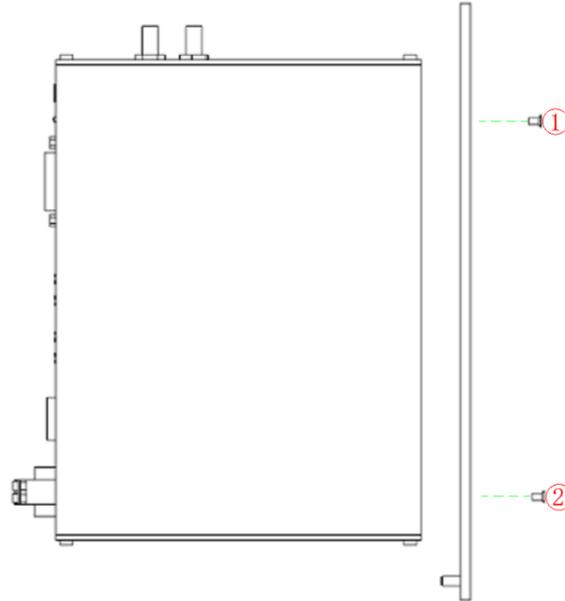
1.2.2 **Fixed rail mounting**

KYAC Series products are engineered for rail installation. The rail mounting bracket is secured to the product's housing using four screws. Installation or replacement requires the removal of these screws.
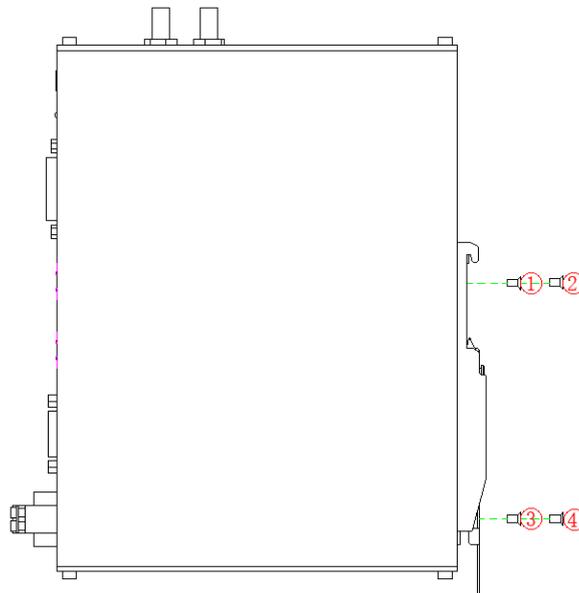
1.2.3 **USB dongle installation**

Inside the carrier board, a USB slot (Designated as ⑦) is available for the installation of USB dongles and other USB devices. To access this slot, remove the four screws (Marked as ①, ②, ③, and ④) and open the side cover (Marked as ⑤). The internal USB slot is accessible from this point for the installation of an encryption key module (Designated as ⑥).
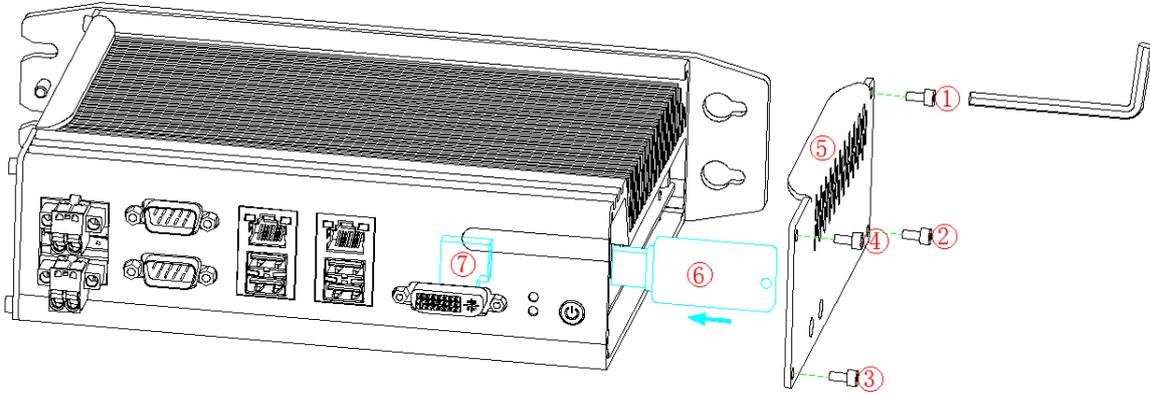
1.3 Security precautions

Please follow the safety precautions outlined in this section and summarized in the text below.

1.3.1 Universal safety precautions

Please ensure that the following safety precautions are always followed.
● Observe the outlined static electricity precautions with the machine operational.
● Prior to any installation, modification, or movement of the machine, ensure it is powered off and the power cord is disconnected.
● Exceeding the specified voltage range is strictly prohibited and may result in fire or electric shock.
● Do not open the machine chassis while the machine is operational to prevent electric shock.
● Inserting objects into the machine's ventilation openings is prohibited.
● In case of contamination by dust, water, or other liquids, immediately power off the machine, disconnect the power, and contact the machine supplier.

The following activities are prohibited:
● When opening the machine, always follow the electrostatic prevention measures outlined below.
● If installation, movement, or modification of the machine is required, make sure to turn off the power and disconnect the power cord.
● It is prohibited to apply voltage levels exceeding the specified voltage range, as this may result in fire or electric shock.
● When the machine is in operation, electric shock may occur if the machine chassis is opened.
● It is prohibited to drop any objects or insert them into the ventilation openings of the machine.
● If a large amount of dust, water, or liquid enters the machine, immediately turn off the power, unplug the power cord, and then contact the machine supplier. .

The following activities are prohibited.
■ It is prohibited to drop the machine onto a hard surface.
■ It is prohibited to strike the machine or apply excessive force to it.
■ It is prohibited to use the machine in places where the ambient temperature exceeds the rated temperature.
■ Do not drop the machine onto a hard surface.
■ Do not strike the machine or apply excessive force to it.
■ Do not use the machine in places where the ambient temperature exceeds the rated temperature.

1.3.2 Anti-static precautions

Failure to follow ESD precautions can cause irreversible damage to the machine and severe injury to the user. Dry climates are particularly susceptible to ESD; thus, the following precautions must be strictly adhered to when handling electrical components:

- **Wrist Strap**: Always wear an antistatic wrist strap to mitigate the risk of ESD damage.
- **Grounding**: Prior to and during the handling of electrical components, periodically touch a grounded conductive material.
- **Anti-Static Mat**: Use an anti-static mat when configuring electrical components to minimize the potential of ESD damage.

- **Component Handling**: When handling electrical components, always hold them by their edges to prevent ESD damage.

1.3.3 Product Disposal Methods

- Replacing the onboard battery with an incompatible type poses an explosion risk. Battery replacement is restricted to certified engineers. Dispose of used batteries as per local laws and regulations.
- Outside the European Union: To dispose of waste electrical and electronic products, consult your local competent authorities to ensure proper disposal methods.
- Within the European Union: Legislation mandates the separate disposal of used electrical and electronic equipment marked with the indicated symbol. This includes, but is not limited to, monitors and electrical accessories like signal and power cables. Consult local authorities or the place of purchase for disposal guidance.

1.4 Maintenance and Cleaning Precautions
Please follow the following guidelines to maintain or clean the machine.

1.4.1 Maintenance and Cleaning
Before cleaning any components or parts of the cleaning machine, please read the following details.

It is prohibited to directly spray or inject liquid onto any other components.

Never spray or inject liquids directly onto any internal components.

Exercise caution to prevent damaging small, removable parts inside the machine.

Power off the machine before commencing the cleaning process.

Avoid allowing foreign objects or liquids to enter the machine through any openings.

Be vigilant for any allergic reactions to solvents or chemicals used in the cleaning process.

Refrain from eating, drinking, or smoking in proximity to the work area.

Regularly remove dust accumulations from the fan and its surroundings.

1.4.2 Cleaning Tools
Only specially designed and dedicated products can be used to clean certain components. In such cases, the cleaning instructions will clearly state the use of such products. In such cases, the cleaning instructions will clearly state the use of such products. The following is a list of items that can be used for cleaning.

- **Cloth-** Although paper towels or facial tissues can be used, a soft, clean cloth is recommended.

- **Water or Topical Alcohol-** A cloth moistened with water or topical alcohol should be used.
- **Use of solvents -** It is recommended that solvents not be used as they may cause damage to the plastic parts.
- **Vacuum Cleaners -** Using a vacuum cleaner designed for computers is one of the best cleaning methods. Dust and dirt can restrict airflow and cause corrosion of the circuitry.
- **Cotton swabs-** Cotton swabs dipped in topical alcohol or water are excellent for wiping down hard-to-reach areas of equipment.
- **Foam swabs - Whenever** possible, it is best to use a lint-free swab such as a foam swab for the cleaning process.