



# Heavy Industrial PC KUBE-5000 series

User Manual

Version 1.0

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# Overview

## 1.1 Description

MiTwel's new KUBE series of embedded automation computers are highly rugged design for heavy industrial application. KUBE series including pocket size, small size and regular size with different level of processors to meet different kinds of application in the Industry such as Equipment connectivity, Production process monitoring, Environment Management, Process Visualization...etc. All models provides flexible and time-to-market support in variety of applications.

### 1.1.1 KUBE-5000 series

High Performance Box PC designed for heavy industrial application with Intel® Kaby Lake family processor



## Futures

- High performance Intel Kaby Lake family processor
- Support Heavy Industrial EMC
- Diverse system I/O support
- Easy for PPC integration by LVDS
- Edge LED indication design
- Expandable design by multiple interface
- Support DIN-Rail, Wall Mounting, VESA Scheme
- Removable service panel for easy maintenance

## 1.2 Ordering data

### 1.2.1 Product

<b>Model No.</b>	<b>Description</b>	<b>Ordering No.</b>
KUBE-5500	Intel® Kabylake i5-7442EQ, 4xUSB, 3xCOM, 2xLAN, 24VDC	AS7-3039

### 1.2.2 Accessories

<b>Catagory</b>	<b>Description</b>	<b>Ordering No.</b>
Video adaptor	DP to VGA video adapter	<b>TBD</b>
	DP to DVI-I video adapter	<b>TBD</b>
Mass Storage (Wide Temp.)	M.2 SSD: 64GB	<b>TBD</b>
	M.2 SSD: 128GB	<b>TBD</b>
	M.2 SSD: 256GB	<b>TBD</b>
Memory	DDR4 SO-DIMM : 8G	B473G690
	DDR4 SO-DIMM : 16G	B473K0E0
Mounting kit	Universal DIN rail adapter	<b>TBD</b>
	Wall mounting kit	<b>TBD</b>

## 2 Installation

KUBE series IPC support varies way to mount. Please use the appropriate section below to mount the IPC.

When installing the KUBE IPC in a cabinet, follow these general rules:

- Verify clearances within the cabinet. Typically, leave at least 5 cm (2 in.) on each side, with 12.7 cm (5 in.) on the connector side.
- Drill all holes and make all cuts before beginning installation. Be sure to protect already
- Installed components from shavings during this procedure.
- Supporting panels must be at least 14 gauge to provide proper support.
- Make sure that there is adequate space around the heat sink to provide sufficient cooling.



### **NOTE:**

Exceeding the system temperature limits can result in performance degradation of any or all components. It is therefore important that the ambient temperature of the installation environment is kept within the system temperature limits of your KUBE IPC.

## 2.1 Wall mount

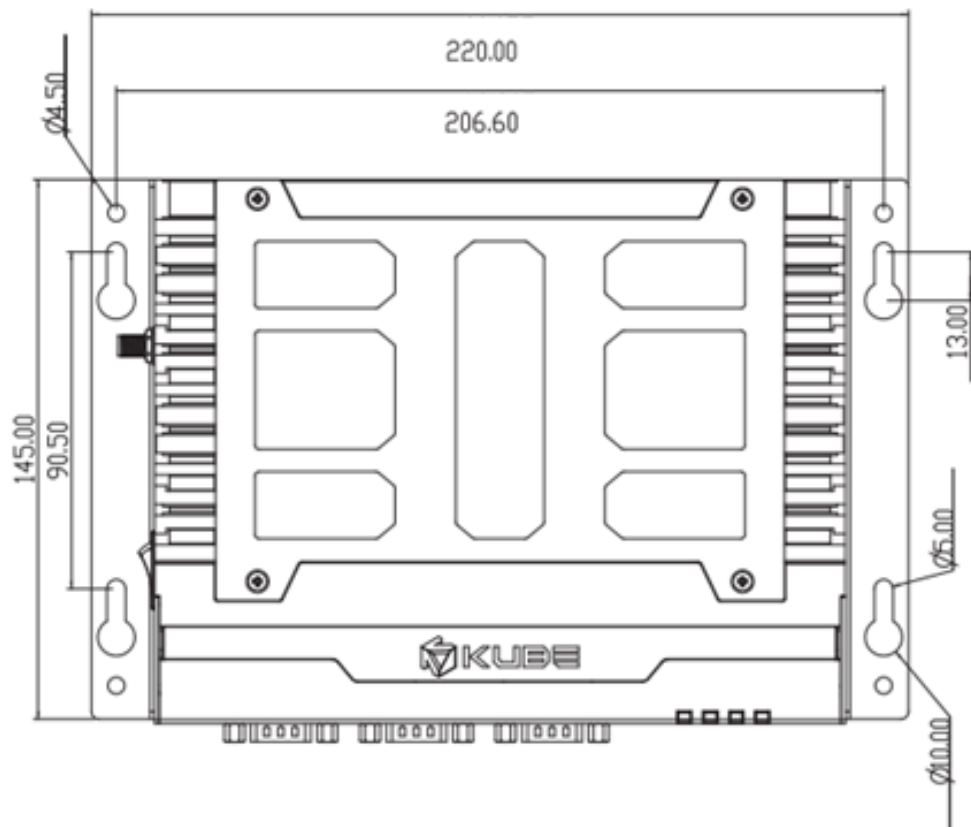
### Installation

1. See the dimensions as below, and mark the locations of the holes on the mounting surface.
2. Use the correct anchor type for the mounting surface and securely attach the KUBE IPC to the wall. Ensure that the attaching hardware is in the small section of the keyholes.

### Removal

1. Remove power and disconnect cables to the IPC.
2. Loosen and remove the screws securing the IPC to the mounting surface.

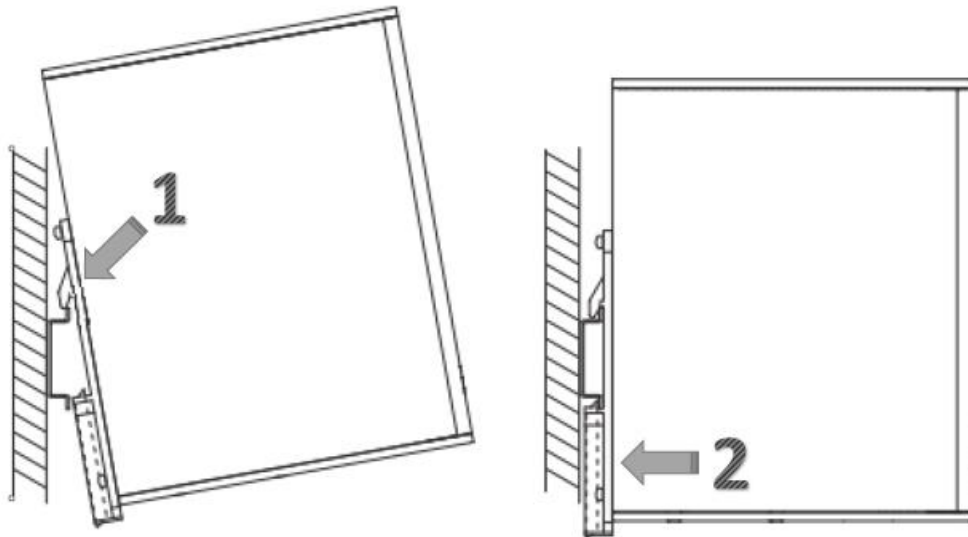
### 2.1.1 Wall mount



## 2.2 Din rail mount

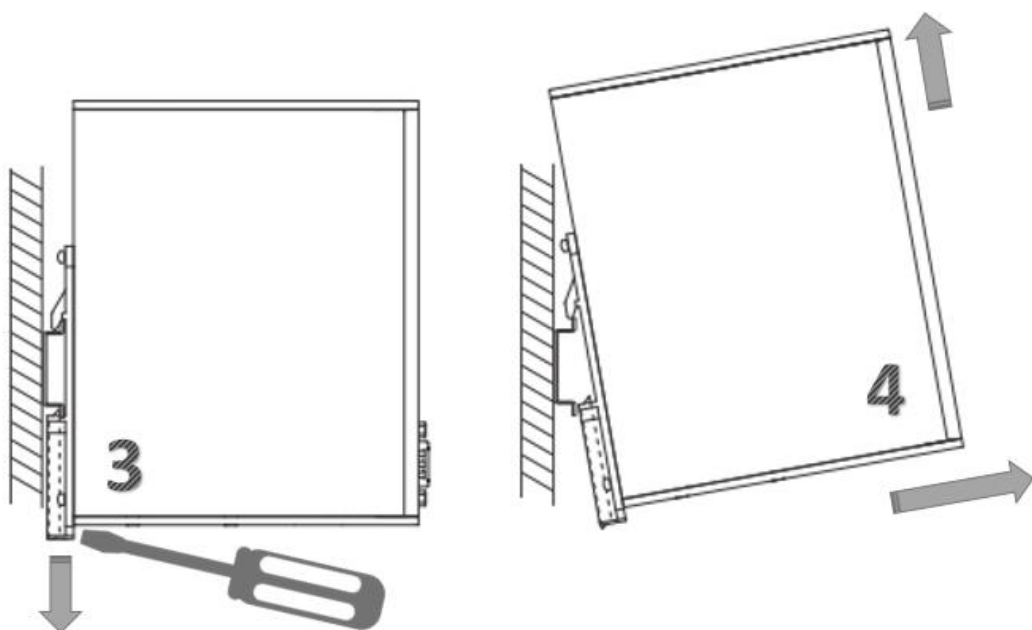
### Install

1. Angle the KUBE IPC so the top edge of the mounting plate hangs on the top edge of the DIN rail.
2. Rotate the KUBE IPC down against the lower edge of the DIN rail. Press in until the latch snaps closed.

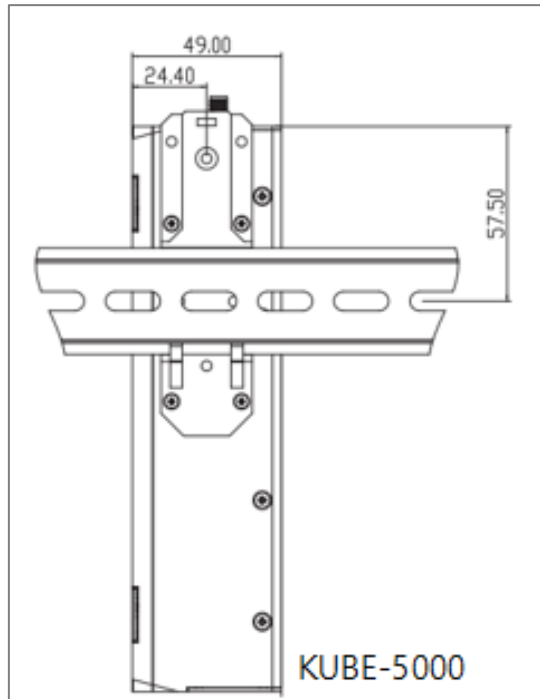


### Remove

3. Secure the device on the rail with clamps.
4. If necessary to remove, use a screwdriver to release the latch and rotate the device away from the rail.



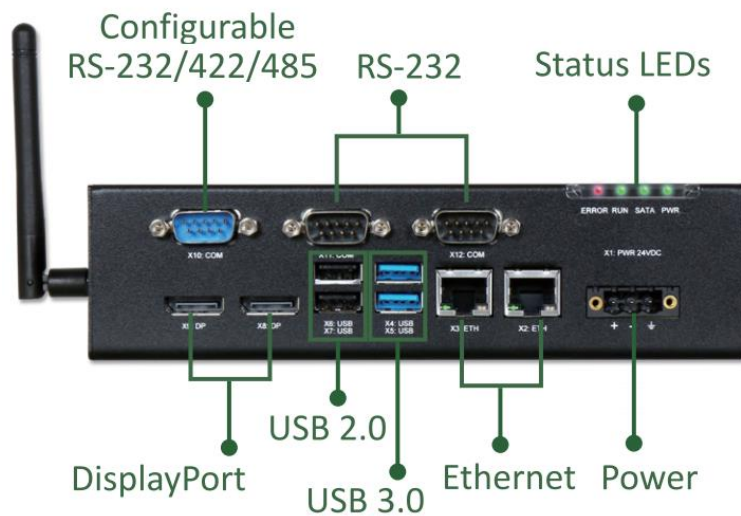
## 2.2.1 Din rail mount dimension



Above Din rail mount dimension follow by the Phoenix Contact UTA 107/30

## 2.3 Interface

### 2.3.1 I/O port





After mounting KUBE IPC, make any necessary cable connections.

The available connectors are:

- Ethernet (ETH): Two RJ45 connectors allow the computer to communicate on a 10/100/1000 Base-T Ethernet network.
- Serial (COM): Three D-SUB 9 serial ports are available for use. Two ports are set as RS-232 while one port is configurable as either RS-232, RS-422, or RS-485.
- USB (USB): USB devices connect using Type-A connectors. Two ports are USB 2.0 and two are USB 3.0 ports



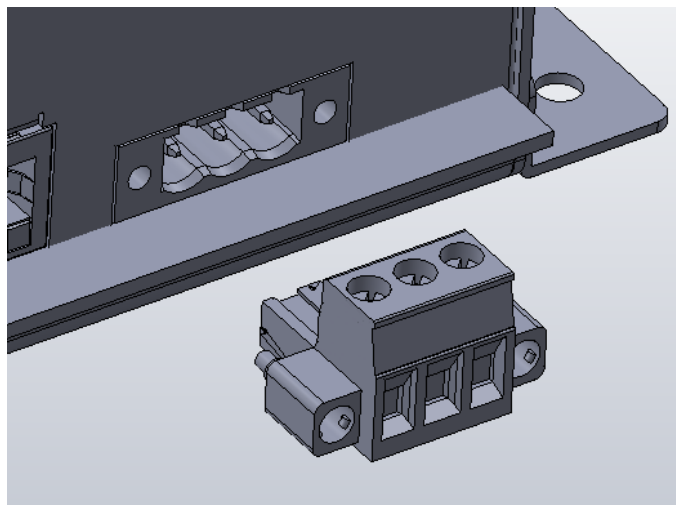
USB 3.0 ports utilize a blue connector. USB 2.0 ports are black.

- DisplayPort (DP): These ports connect the KUBE IPC to external digital displays with a corresponding DisplayPort connector. If needed, you also can use Video adaptor to other video interface, like DVI, HDMI...etc.
- Mini PCIe: This internal slot allows installation of a mini PCIe card (see “Mass storage” )

## 2.3.2 Power connection


A three-position, screw-type connector is provided for connecting power to the KUBE 5000 series IPC.

Connect a power source to the included power connector. This connector supports wire sizes from 0.2 to 2.5 mm<sup>2</sup> (24 to 12 AWG). Torque the wire-retaining screws in the connector to 0.5 Nm (4.4 lbf-in.). Secure the connector to the KUBE IPC chassis.






Pin No.	Description
⏏	Ground
-	0 V DC
+	24V DC $\pm$ 20 %

 **NOTE:**  
 BIOS is set to boot on power, allowing the system to boot as soon as the power plug is installed. This can be changed in the BIOS.

### 2.3.3 Serial Communication

One D-SUB 9 connector can be configured to communicate on the RS-232, RS-422, or RS-485 physical layer. The physical layer is set using the BIOS. The remaining connectors are limited to RS-232 only. The KUBE-IPC is capable of the following communication parameters:

	Data bits	Parity	Stop bits
RS-232	7/8	None/Even/Odd	1/2
RS-422/485 Autotoggle RTS	8	None	2
RS-422/485 Autotoggle RTS	8	Even/Odd	1/2
RS-422/485 Manual RTS	7/8	None/Even/Odd	1/2

 The table shows the capabilities of the IPC. Configuration of parameters to communicate with a specific device is typically part of the software tool performing the communication

The function of the pins in the D-SUB 9 connector varies with the different configuration settings.

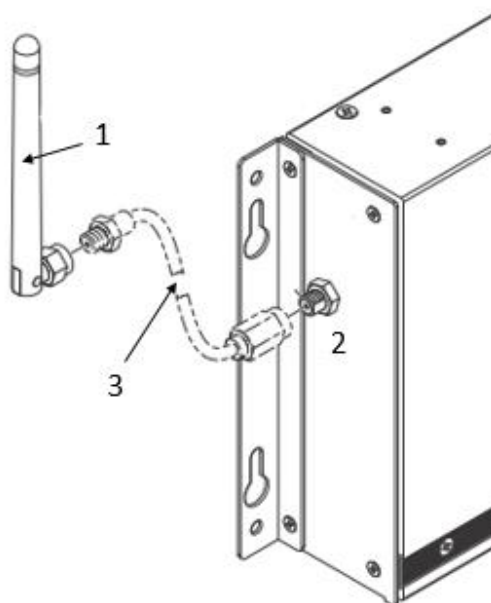
D-SUB 9 pin	RS-232	RS-422	RS-485
1	DCD	TXD-	TXD-/RXD-
2	RXD	TXD+	TXD+/RXD+
3	TXD	RXD+	-
4	DTR	RXD-	-
5	GND	GND	GND
6	DSR	-	-
7	RTS	-	-
8	CTS	-	-
9	Ring indicator	-	-

## 2.4 Antenna

An optional factory-installed mini PCIe card is available to allow the KUBE-IPC to be placed on a wireless network. Included with the installed card is an antenna (1) that attaches to a connector on the side of the unit (2).

Since the KUBE IPC is often installed within an enclosure, it may be advisable to install the antenna on the exterior of the enclosure rather than directly to the IPC. To do this, an appropriate length antenna cable (3) must be purchased separately.

The antenna or antenna threads onto the KUBE IPC. For external antenna mounting, route and secure the antenna cable appropriately within the enclosure.



## 3 Operation

### 3.1 LED status



Four LEDs are provided on the KUBE IPC. These LEDs provide operating information

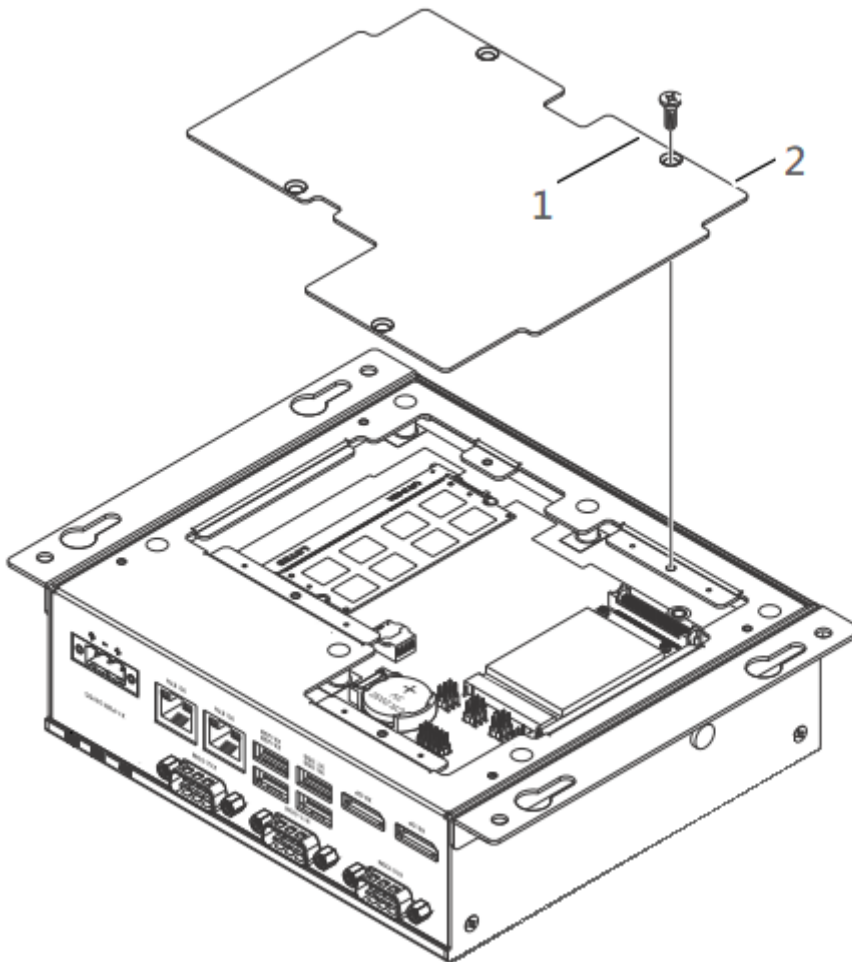
LED	Indication	Description
PWR	Green	Power on
SATA	Flashes green	Data storage activity
RUN	Green	Reserved LED for future use
ERROR	Orange / Red	Orange: indicates processor is actively thermal throttling Red: indicates processor has shut down due to overheating.

## 4 Maintenance

The KUBE-3000/5000 IPC has a removable service panel that allows access to the mini PCIe card slot, configuration jumpers, and battery.

### 4.1 Service panel

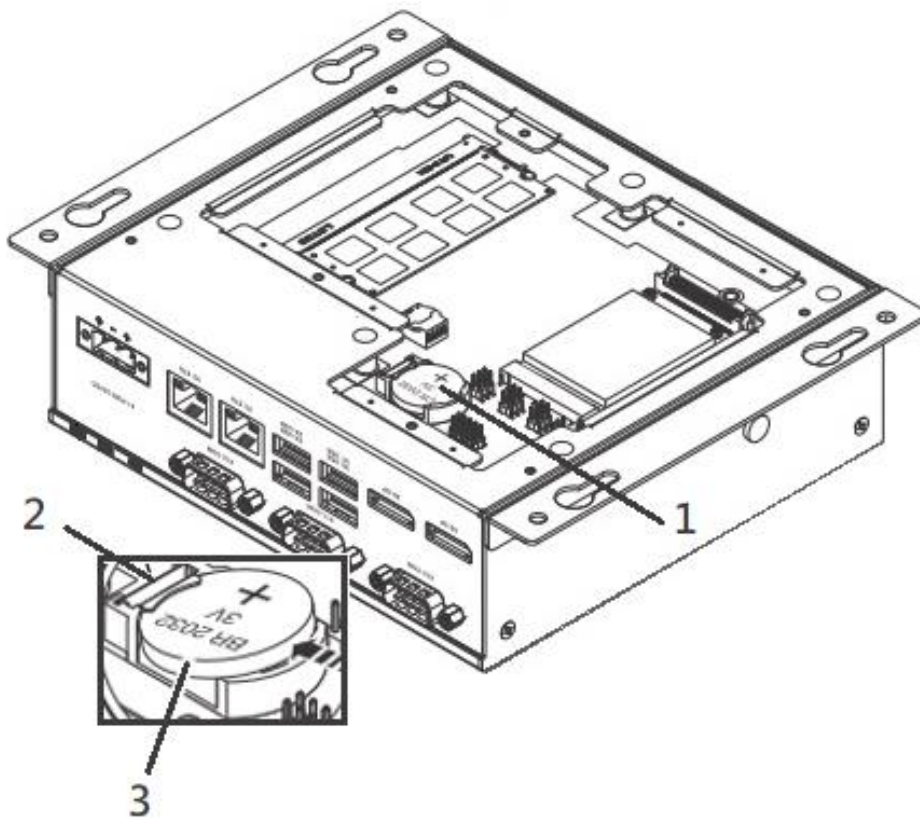
1. Remove power from the KUBE IPC
2. Disconnect any cables, such as USB, Ethernet, etc., attached to the unit.
3. Place the unit on a flat surface with the heat sink down.
4. Loosen and remove the four screws (1) that hold the service panel (2) to the case and remove the panel.



## 4.2 Real time clock battery

The battery supplies power to the real-time clock (RTC) and maintains the BIOS settings in the KUBE IPC when the system is not connected to a 24 V DC power source. If power is removed while the battery is discharged or removed, any user-defined BIOS settings will be lost, and a “CMOS checksum error” message appears once power is restored.

To account for user-defined BIOS settings, it is recommended that they be recorded through photos or a separate document before the battery is depleted or removed. Store the photos or documents on a different device so they are accessible in the event of a boot failure. The battery is type BR2032. The battery has a typical life of five years and may require replacement.



### NOTE:

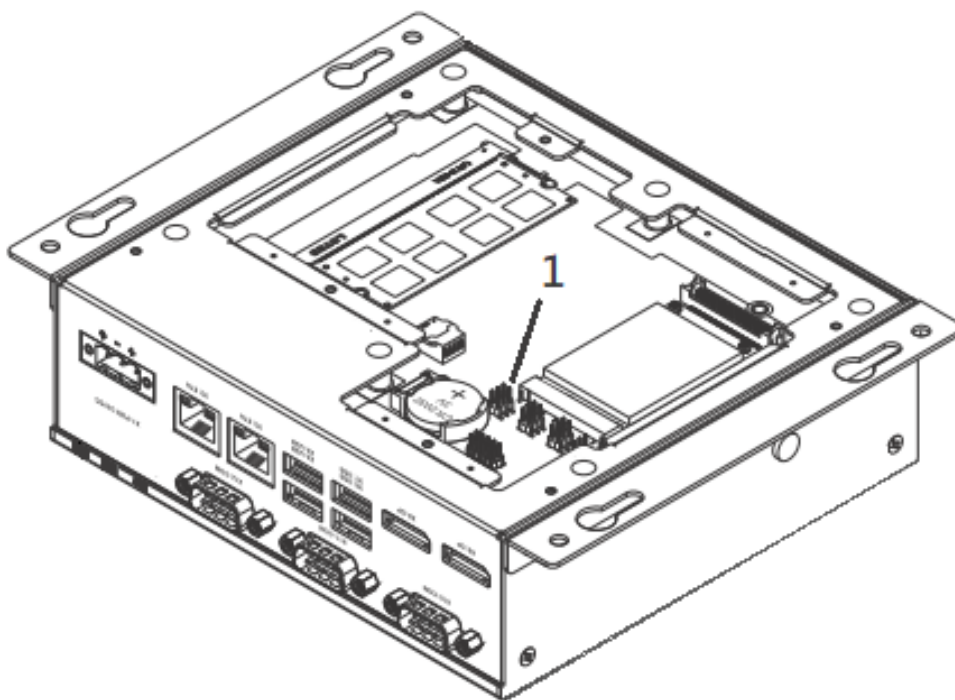
Note the orientation of the battery. One side should have a plus (+) symbol. The replacement battery must be installed the same way.

To replace the battery:

1. Access the battery by removing the service panel.
2. Locate the battery holder (1).
3. To remove the battery, pull the retention clip (2) at the bottom of the battery housing and the battery (3) will release from the housing.
4. To install a new battery, insert one end under the retention clip. Push the battery toward the clip until the battery fully drops into the housing.
5. Reset the CMOS and BIOS using the appropriate jumpers
6. Reinstall the service panel or reattach the case to the display panel.
7. Reconnect the power connector and apply power. During the boot process, a message will appear notifying the user that the CMOS and BIOS settings have been reset to the factory defaults.
8. During the boot process, press the <F2> key to access the BIOS settings
9. Update the BIOS configuration with any appropriate user-defined requirements.

### 4.3 CMOS/BIOS reset

The CMOS is a small chip that stores the BIOS settings, date and time, and other items of the IPC. It is powered by the real-time clock battery and, if the battery is removed, will likely lose its settings. It can be reset to the factory defaults using a reset button.



To reset the CMOS:

1. Remove the service panel
2. Remove the jumper JPA (1) from pins 1 and 2.
3. Place jumper between pins 2 and 3 for 3 seconds (reset position).
4. Remove jumper from pins 2 and 3, and reinstall on pins 1 and 2 (the run position).
5. Reinstall the service panel or reattach the case to the display panel.
6. Reconnect the power connector and apply power. During the boot process, a message will appear notifying the user that the CMOS and BIOS settings have been reset to the factory defaults.
7. During the boot process, press the <F2> key to access the BIOS settings
8. Update the BIOS configuration with any appropriate user-defined requirements.

## 4.4 Mass Storage (M.2)

The mass storage device is a solid-state drive (SSD) with an M.2 interface in the chassis. You need to open the cover heatsink to install it.

To replace a drive:

1. Turn off the IPC and disconnect power.
2. Remove the screws on the heat sink



Thermal pads between the board and heat sink may cause resistance when removing the service panel.

- 3: Locate the M.2 SSD (2260) and secures the drive in the socket.
4. To install, insert the drive into the connector and secure with the hardware previously removed.
5. Position the heat sink in place and secure with the hardware previously removed.



### **NOTE:**

Failure to ensure thermal pads are properly positioned may result in performance loss.



## 4.5 Mass Storage (mSATA)

There is another mass storage option, solid-state drive (SSD) with an mSATA interface (1) in the back of chassis. You need to open the service panel to install it.

To replace a drive:

1. Turn off the IPC and disconnect power.
2. Remove the screws of back service panel
- 3: You can see the mSATA socket.
- 4: Locate the mSATA SSD and secures the drive in the socket.
5. Position the service panel back in place and secure with the hardware previously removed.

