Fomax P1501
Fomax P1502
Fomax P1503

Industrial Panel PCs

User Manual

Ver. 1.0

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Fomax User's Guide

The Nematron Fomax Industrial Panel PC Users Guide describes the installation and operation of the Nematron Fomax PC models.   This document is based on information available at the time of its publication. While every effort has been made to be accurate, the information contained herein does not purport to cover all details or variations in hardware or software.   Nematron makes no warranty and assumes no responsibility for the completeness, accuracy or usefulness of the information found in these pages. Nematron further assumes no liability or responsibility for loss or damage, direct or indirect, arising from the use of this product.   No warranties of documentation or product fitness apply.

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Electrical Shock Hazard! Do not operate the unit with its back cover removed. There are hazardous voltages inside.   Servicing of the equipment should only be done by qualified and authorized personnel.

Note: This equipment has been tested and found to to comply with the limits for the FCC Rules.   These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.   This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION! Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Note: The unit must be mounted in a grounded metal enclosure that provides a clean and dry environment.

Transport and Unpacking

Transport

Despite the robust design of the Fomax Industrial Panel PC, the components are sensitive to strong vibrations and impacts. During transport, your Fomax should therefore be protected from excessive mechanical stress. Therefore, please use the original packaging.

Danger of damage to the Fomax! If the Fomax is transported in cold weather or is exposed to extreme variations in temperature, make sure that moisture (condensation) does not form on or inside the Fomax.

Prior to operation, the Fomax must be al owed to slowly adjust to room temperature. Should condensation occur, a delay time of approximately 12 hours must be al owed before the Fomax is switched on.

Unpacking

Proceed as follows to unpack the Fomax:
1. Remove packaging.
2. Do not discard the original packaging. Keep it for future relocation.
3. Check the delivery for completeness by comparing it with your order.
4. Please keep the associated paperwork.
5. Check the contents for visible shipping damage.
6. If you notice any shipping damage or inconsistencies between the contents and your order, you should notify the supplier.

Table of Contents

Chapter 1 Product Overview

1.1 General Information

This product is a high-performance, high-reliability, fan-free, industrial-grade fanless panel with CPU module and module extension I/O board combination. The main functions are as follows:

➢   Configuration CPU module

➢   DDR3 system memory

➢   Supports 8 USB2.0 high speed interfaces;

➢   Onboard 2 10/100/1000Mbps adaptive network interface, support for network boot and boot (PXE), network Wake-on-LAN (WOL) function;

➢   Supports a 2W amplifier SPK-Out output interface, a MIC input interface;

➢   Support CRT, LVDS display output function;

➢   One 2.5" SATA bay, one mSATA slot, and one mPCIE slot;

➢   4-wire isolation (RX, TX, GND) with 2500VDC using iCoupler magnetic coupling isolation design Isolated voltage protection serial port (COM1~4), Pin9 of COM3 provides optional application of +5V, +12V power supply;1 PS/2 mouse/keyboard interface,

➢   The 256-level watchdog timer;

➢   Provide an external 3-pin spacing 5.08mm terminal DC power socket;

➢   Support hardware forced power-on automatic boot function setting;

➢   Support DC 12V ~ 24V power input, support ACPI power management function;

1.2 Environmental and mechanical dimensions

◆ Operating temperature: -20°C～60°C (wide temperature hard disk, wide temperature power supply required)

◆ Relative Humidity: 5%～95%, Non-condensate

◆ Storage temperature: -40°C～80°C

◆ Overall size (W*D*H): 396mm*310mm*52mm

Chapter 2 Expansion I/O Construction Diagram

## 2.1 Expansion I/O carrier board Interface/pin identification

Note: The location of the functional interface in the following architectural drawings may be slightly different from your current product (The same bit number of the interface) but does not affect your use. Please refer to the actual product.

Unit: mm
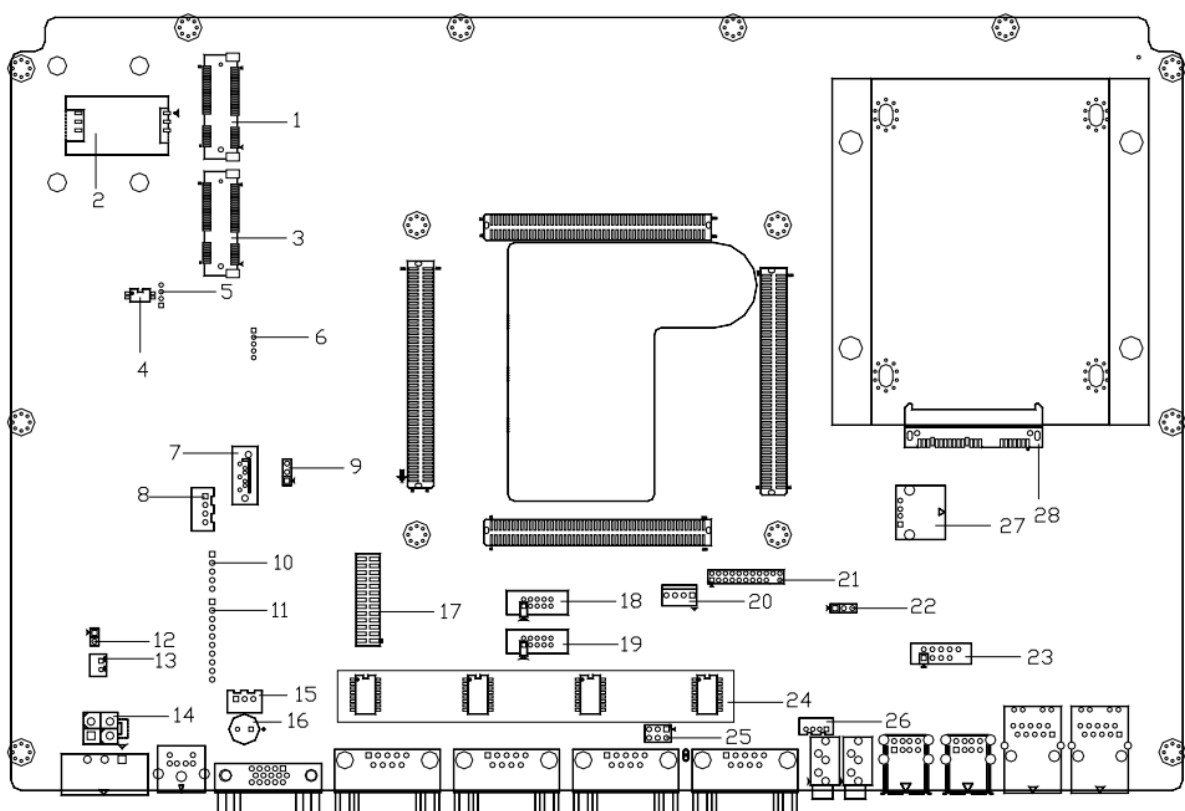
1	Mini_PCIE Connector (mPCIE1)	15	PS_ON Reset Header(PRT1)
2	SIM Card Connnector(SIM1)	16	Speaker (SPK1)
3	Mini_SATA Connector (mSATA1)	17	LPT Header(LPT1)
4	Front panel USB	18	COM Connector (COM6)
5	Front panel USB Header (USB5)	19	COM Connector (COM5)
6	LVDS Backlight Connector (BL1)	20	FAN Header(CPUFAN1)
7	SATA Connector(SATA2)	21	DIO Connector(DIO1)
8	SATA Power Connector(SATA_PW1)	22	AUDIO Voltage Setting(AUD_SET1)
9	LVDS Power Setting (LCDV1)	23	USB Header (USB3)
10	Touch screen Header(PANEL1)	24	COM Port
11	System Panel Header(PVC_CN1)	25	COM3 Pin9 defined Header(JP1)
12	POWER Setting(PSJ1)	26	AMP output standby
13	Power switch Header(PWR_BUT1)	27	USB Connector(USB4)
14	DC Input Connector(PWR1)	28	7+15Pin SATA Connector(SATA1)

2.2 Onboard exposed I/O interface
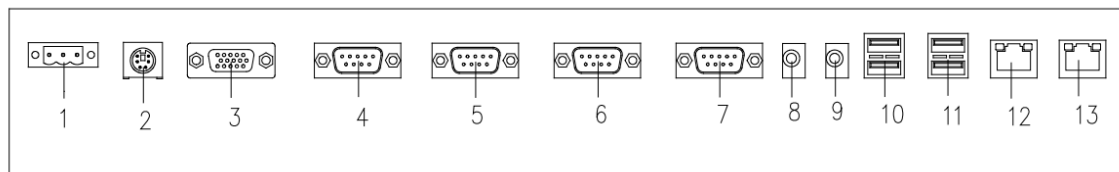
1	DC Input Connector (DC12~24V)	8	Audio Output (SPK OUT)
2	PS/2 KB & Mouse Port (KB/MS)	9	MIC Input (MIC_IN)
3	VGA Port (VGA)	10	USB Port (USB1)
4	COM1 Port (COM1)	11	USB Port (USB2)
5	COM2 Port (COM2)	12	LAN RJ45 Port (LAN1)
6	COM3 Port (COM3)	13	LAN RJ45 Port (LAN2)
7	COM4 Port (COM4)		

Chapter 3 Motherboard/Interface Expansion Board Installation

3.1 Safety instructions

1) Please read this safety instruction carefully and pay attention to all precautions and warnings stated in the equipment and manual.

2) Please keep the manual in a safe place for future reference;

3) Please keep the device dry to keep it away from the humid environment;

4) The open slot of the chassis is used for ventilation to avoid overheating of components in the chassis. Do not cover such openings or blockage.

5) Before connecting this equipment to the power supply, check the voltage value of the power supply and correctly adjust the voltage accordingly.

6) Please place the power cord where it will not be trampled and do not stack anything on the power cord;

7) The equipment must have a good grounding wire to avoid electrostatic damage. Please disconnect the power supply before installation. Oherwise the motherboard will be damaged.

8) In order to prevent the components on the motherboard from being damaged by static electricity, never put the motherboard directly on the carpet, etc. Also, remember to use an electrostatic wrist strap or contact metal before touching the motherboard.

9) Hold the whole board through the edge to install and cut the contact chip;

10) Pull out the power cord from the socket before inserting or removing any expansion card or memory module.

11) Do not inject any liquid from the opening. Otherwise, it may cause serious damage or even cause electric shock.

12) If any of the following situations occurs, please contact technical service personnel:

    Damaged power cord or plug

    Liquid infiltrates the device

    The equipment is exposed to damp conditions

    The equipment is not working properly or the user cannot follow the instructions of the user manual to make it work

    Equipment has been dropped or damaged, showing obvious signs of damage.
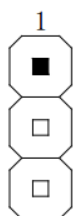
 NOTE: Risk of explosion if the battery is replaced incorrectly. Always use batteries of the same type or type and recommended by the manufacturer.

3.2 Jump caps and switch settings on the expansion I/O board

Jumper setting(LCDV1)	LCD screen operating voltage setting
Pin 1-2 Short/Closed	3.3V(default)
Pin 3-4 Short/Closed	5V

NOTE: Before using the LCD screen, please understand its required operating voltage, and then select the LCD panel's operating voltage by changing the state of the LCDV1 pin jumper to ensure the stability of the LCD screen.

Jumper setting(AUD_SET1)	AUDIO operating voltage setting
Pin 1-2 Short/Closed (Support HDMI)	1.5V
Pin 3-4 Short/Closed (NO HDMI)	3.3V(default)

NOTE: Before installing the CPU module, please understand whether it supports the HDMI function, and then select the working voltage of the AUDIO by changing the state of the AUD_SET1 pin jumper to ensure that the AUDIO audio is output normally.
If you install GM45, HM55 chipset module, select 1-2 short;
If you install the D525 chipset module, select 2-3 short;

Jumper setting(JP1)	COM3 pin 9 definition
Pin 1-2 Short/Closed	RI(default)
Pin 3-4 Short/Closed	+5V
Pin 5-6 Short/Closed	+12V
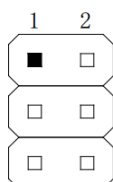
NOTE: Before using the COM3 port, please understand its required pin 9 function, and then select the corresponding function by changing the jumper cap state of JP1 pin.

Jumper setting(PSJ1)	Power mode setting
Short	ATX(default)
Open	AT

NOTE: The board supports powered-on power-on function (AT power mode). This function can be achieved by shorting the PSJ1 pin before the motherboard is powered on. The BIOS will automatically set the AT power mode for you. After using the AT power mode, if you want to change the power mode of the ATX power supply, please wait for five seconds and then leave the PSJ1 bit open after normal system shutdown.

COM Serial Ports DIP Switch

The following is a comparison table for COM1 ～ COM4 port communication mode selection. When selecting the COM communication mode, dial the DIP switch. When dialed to the digits "1, 2, 3..", it is OFF; when dialed to the "ON", it is ON.

COM1~COM4 communication mode selection					
DIP switch selection mode			RS-232(default)	RS-485	RS-422
DIP SWITCH	COM1_SW1 ～ COM4_SW1	Pin1	ON	OFF	
		Pin2	ON	OFF	
		Pin3	OFF	ON	
		Pin4	OFF	OFF	
		Pin5	ON	OFF	
		Pin6	OFF	ON	
		Pin7	ON	OFF	
		Pin8	OFF	ON	

Front panel USB port enable DIP switch

The FP_USB_SW1 flat-dial switch is used to enable the function of the front panel USB port. The illustration shows the method of toggling the flat-dial switch. When the toggle code is dialed to the digits "1, 2," it is OFF; when toggle When the code is turned to the "ON" bit, it is ON.

```
O N  K E

   │  │
   │  │

   1    2
```
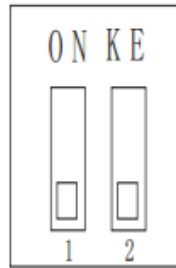
FP_USB_SW1

DIP switch selection mode	Enable USB	Disable USB
Pin1	ON	OFF
Pin2	ON	OFF

## 3.3 Expansion I/O board pins and sockets/control pins, status indication

NOTE: The onboard pins and sockets are not jumpers. Do not place jumper caps on these pins and sockets. Placing the jumper cap on pins and sockets will cause permanent damage to the motherboard!

USB 2.0 pin (USB5, this connector is located on the back of the carrier board)

The 4Pin Wafer Header Spacer 2.0mm (USB5) connector is designed specifically for the front panel USB function.

```
+5V   — 1 ■
Data- —   □
Data+ —   □
GND   —   □
```
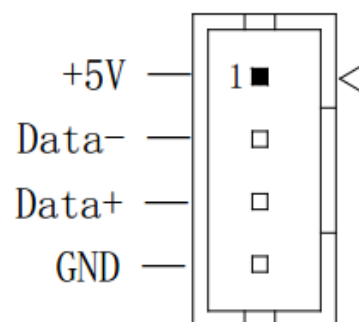
**LCD backlight connector
(BL1, connector on the back of the board)**

The user can choose to use this interface as needed, this interface is used to connect the LCD backlight device.

```
+12V     — ■
             1
+12V     — □
LBKLT_EN — □
LBKLT_CTL— □
GND      — □
```

10
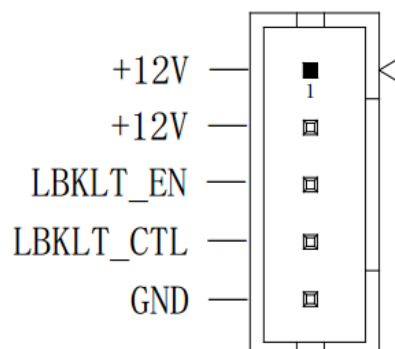
## LVDS display output connector (LVDS1, connector on the back of the board)

A group of LVDS screen connector headers (LVDS1), model number "HRS DF13-40DP-1.25V" dual-row 40Pin, are available for connecting 18-bit/24-bit single and dual channel LVDS LCD screens.
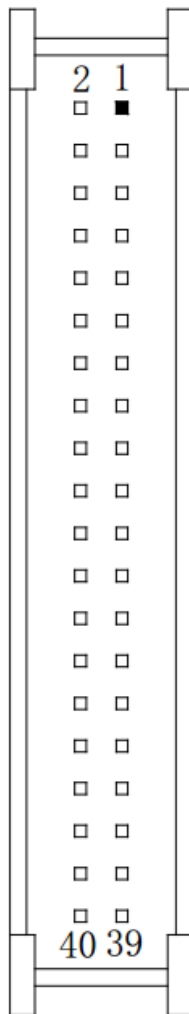
1	VDD	2	VDD
3	GND	4	GND
5	VDD	6	VDD
7	Data_A0-	8	Data_B0-
9	Data_A0+	10	Data_B0+
11	GND	12	GND
13	Data_A1-	14	Data_B1-
15	Data_A1+	16	Data_B1+
17	GND	18	GND
19	Data_A2-	20	Data_B2-
21	Data_A2+	22	Data_B2+
23	GND	24	GND
25	CLK_A-	26	CLK_B-
27	CLK_A+	28	CLK_B+
29	GND	30	GND
31	DDCPCLK	32	DDCPDATA
33	GND	34	GND
35	Data_A3-	36	Data_B3-
37	Data_A3+	38	Data_B3+
39	NA	40	NA

Touch screen control pins (PANEL1, this connector is located on the back of the board)

```
                        1
Y+, UR (H)  —  [ ■ ]
X+, LR (X)  —  [ □ ]
      NC    —  [ □ ]
Y−, UL (Y)  —  [ □ ]
X−, LL (L)  —  [ □ ]
```
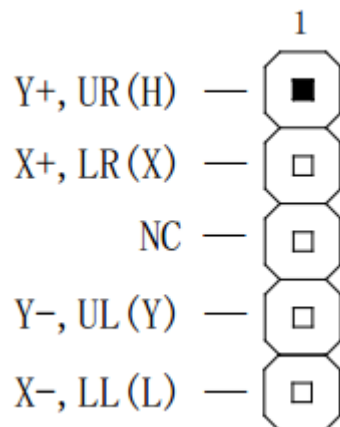
Front panel control pins (PVC_CN1, this connector is located on the back of the board)

The PVC_CN1 pin is used to connect the control panel on the front panel of the whole unit. It can realize the host switch, bright and dark screen adjustment, power indication, and HDD working instructions. The definition of the pin is given.

```
                           1
     Brightness  —  [ ■ ]
           GND   —  [ □ ]
      HDD LED+   —  [ □ ]
      HDD LED−   —  [ □ ]
        Darker   —  [ □ ]
           GND   —  [ □ ]
      PWR LED+   —  [ □ ]
      PWR LED−   —  [ □ ]
 PWR_Button_up   —  [ □ ]
   PWR_Button    —  [ □ ]
```
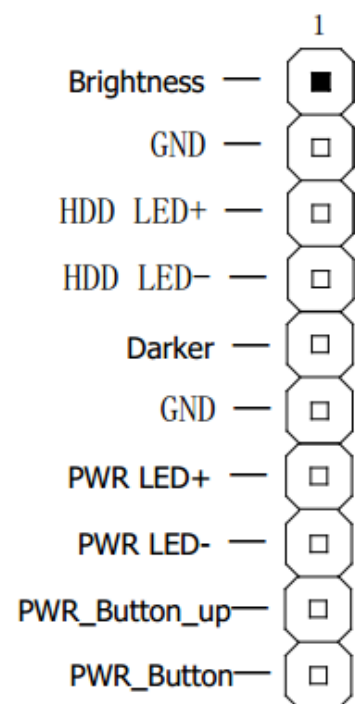
Mini SATA Slot (MSATA1)

Used to install Mini SATA storage devices that meet regulatory requirements. The pin definitions for the slots are given below:
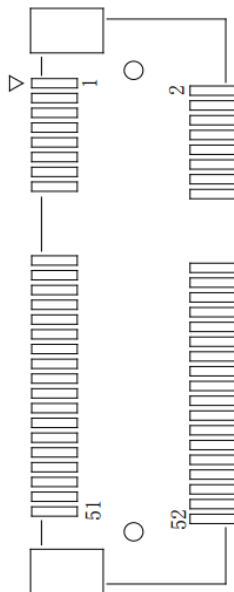
1	NC	2	+3.3V
3	NC	4	GND
5	NC	6	+1.5V
7	NC	8	NC
9	GND	10	NC
11	NC	12	NC
13	NC	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	NC
21	GND	22	PERST#
23	SATA_RX+	24	+3.3V
25	SATA_RX-	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	SATA_TX-	32	SMB_DATA
33	SATA_TX+	34	GND
35	GND	36	NC
37	GND	38	NC
39	+3.3V	40	GND
41	+3.3V	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3V

## Mini PCI-E Slot（MPCIE1）

Used to install Mini PCI-E X1 bus devices that meet the specification requirements. The pin definitions for the slots are given below:
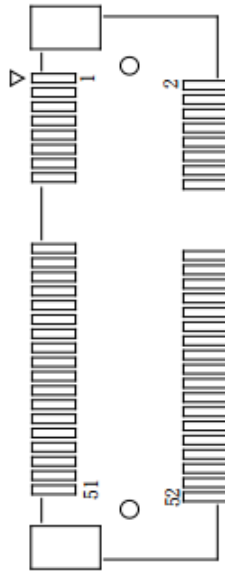
1	Wake#	2	+3.3VSB
3	NC	4	GND
5	NC	6	+1.5V
7	CLKREQ	8	SIM_POWER
9	GND	10	SIM_DATA
11	CLK-	12	SIM_CLK
13	CLK+	14	SIM_REST
15	GND	16	SIM_VCCP
17	NC	18	GND
19	NC	20	NC
21	GND	22	PERST#
23	PER_N0	24	+3.3VSB
25	PER_P0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PET_N0	32	SMB_DATA
33	PET_P0	34	GND
35	GND	36	USB-
37	GND	38	USB+
39	+3.3VSB	40	GND
41	+3.3VSB	42	NC
43	GND	44	NC
45	NC	46	NC
47	NC	48	+1.5V
49	NC	50	GND
51	NC	52	+3.3VSB

2.5" SATA (SATA1)
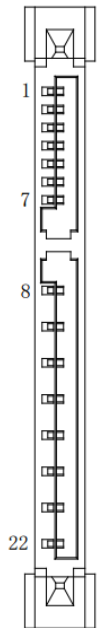
| 管脚	信号名称	管脚	信号名称
1	GND	2	TX+
3	TX-	4	GND
5	RX-	6	RX+
7	GND	8	3.3V
9	3.3V	10	3.3V
11	GND	12	GND
13	GND	14	5V
15	5V	16	5V
17	GND	18	GND
19	GND	20	12V
21	12V	22	12V

USB interface (USB4)

One standard single-layer USB interface is provided in the board and can be used to connect a USB device.
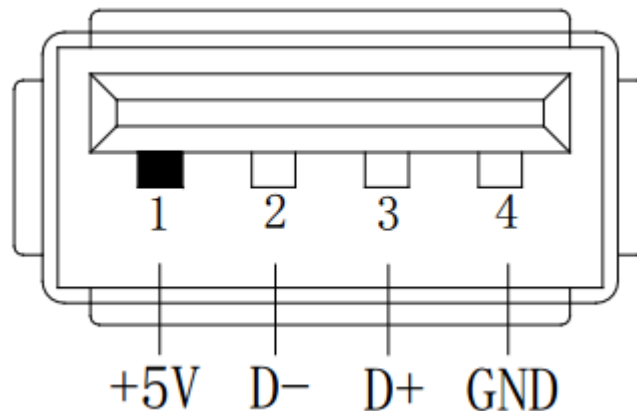
Fan connector（CPUFAN1）

Used to connect the CPU fan to connect the black wire to the ground pin. The fan connector on the motherboard is also compatible with the original 3-pin fan.
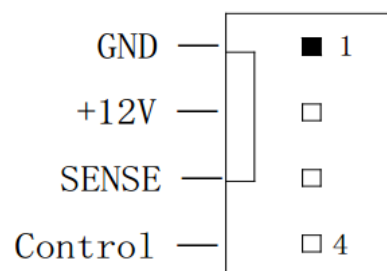
Chapter 4 The whole machine exposes the functional interface of the I/O panel

Power connection port (DC_IN1)

The exposed I/O panel provides a 3P spacing 5.08mm terminal power input socket. Before connecting the power supply, please confirm the insertion direction of the power cable, and check that the positive and negative poles of the power cable are consistent with the power connection port.
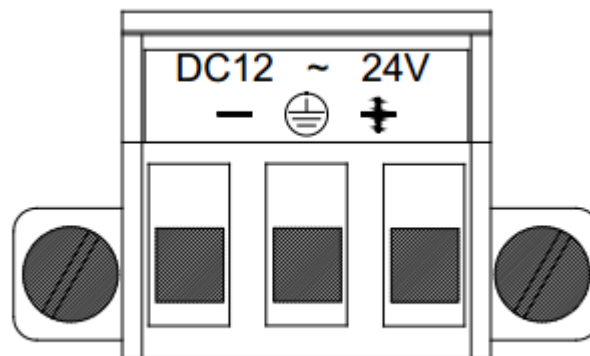

PS/2 Keyboard & Mouse Interface (KM1)

The exposed I/O panel provides a standard miniDIN socket that requires simultaneous connection of a PS/2 keyboard and mouse via a 2-conductor cable, or direct connection to a PS/2 keyboard without an adapter cable. The PS/2 keyboard & mouse interface interface definitions are given below:
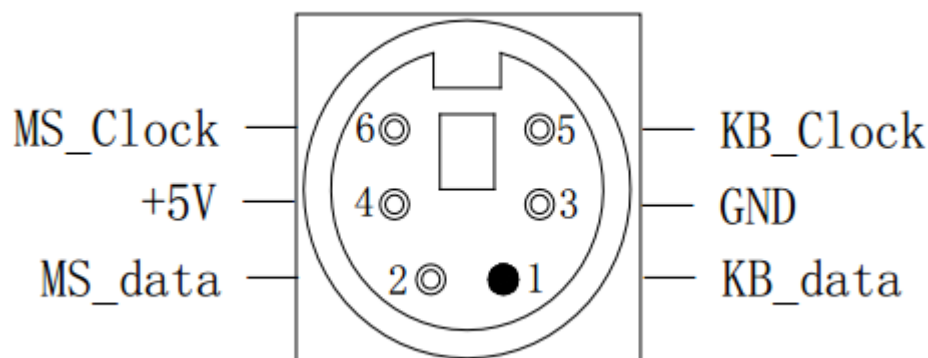
CRT display output interface (VGA1)

The exposed I/O panel provides a standard DB15 display output interface, allowing users to connect directly to a CRT display device. The interface pin definitions are given below:
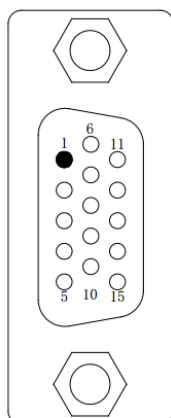
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	+5V	10	GND
11	NC	12	DDCD_ATA
13	HSYNC	14	VSYNC
15	DDC_CLK		

Serial socket (COM1~COM4)

The exposed I/O panel provides four DB9 serial ports with iCoupler magnetic isolation design to achieve 3-wire (RX, TX, GND) isolation and 2500VDC isolation voltage protection. The COM1-COM4 ports support the optional RS-232/485 mode.

The COM3 port Pin9 supports +5V and +12V power options (refer to JP1 settings).

The following is the DB9 serial port pin definition:

Pin	Signal Name	
	RS-232 (default)	RS-485
1		Isolated_DATA-
2	Isolated_RXD	Isolated_DATA+
3	Isolated_TXD	
4		
5	Isolated_GND	Isolated_GND
6		
7		
8		
9		

NOTE: The COM1~COM4 port is a 3-wire isolated port. Refer to the description and definition of the serial port socket before use!

Audio interface (SPK_OUT、 MIC_IN)

The exposed I/O panel provides a standard Ø3.5 PhoneJack audio output (SPK_OUT) and a Ø3.5PhoneJack MIC input (MIC_IN), allowing customers to connect directly to audio devices.

USB interface（USB1、 USB2）

The exposed I/O panel provides 2 sets of standard dual USB ports for connecting 4 USB devices.
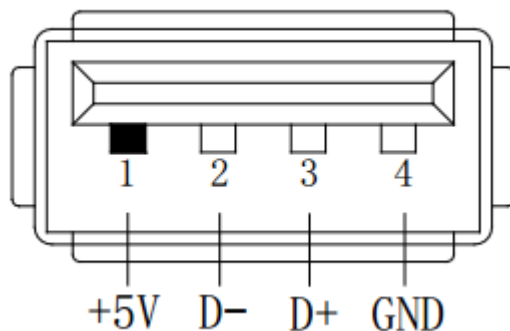
Network Interface (LAN1, LAN2)

The exposed I/O panel provides two standard 10/100/1000Mbps RJ-45 Ethernet interfaces that can be used by the user directly plugging in the network adapter cable.

There are two status indicators on both sides of the RJ-45 Ethernet interface:
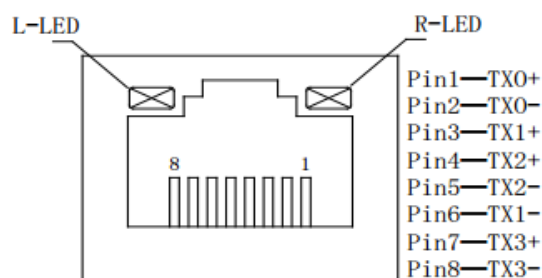
Left - link status indicator
Right - data transmission indicator

network status	Left (LILED) bicolor (orange/green light)		Right (ACTLED) monochrome (yellow light)	
1000M				
100M				
10M				

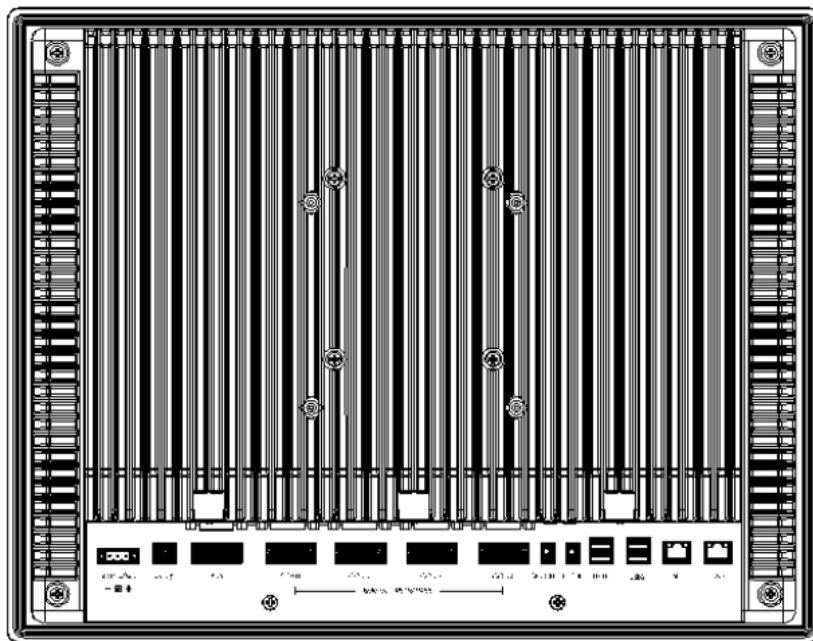| 网络状态	左(LILED)双色(橙/绿色灯)		右(ACTLED)单色(黄色灯)	
1000M		常亮	闪烁	灭
100M	常亮		闪烁	灭
10M	灭	灭	闪烁	灭
活动描述	绿色	橙色	数据传输	无数据传输
	已连接状态指示灯		活动状态指示灯	

Chapter 5　Machine introduction

5.1 Machine renderings
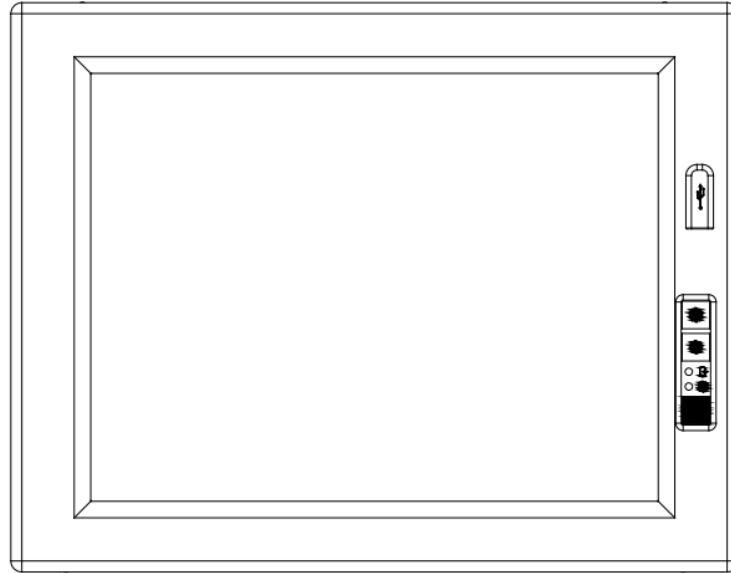
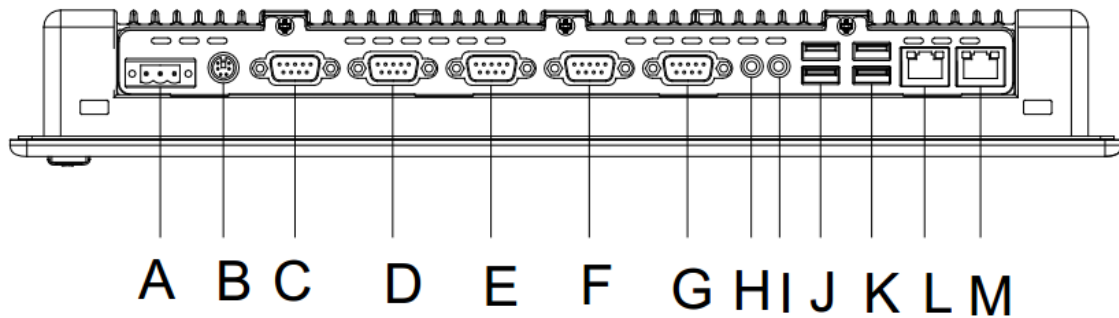**Front IO**

Rear IO

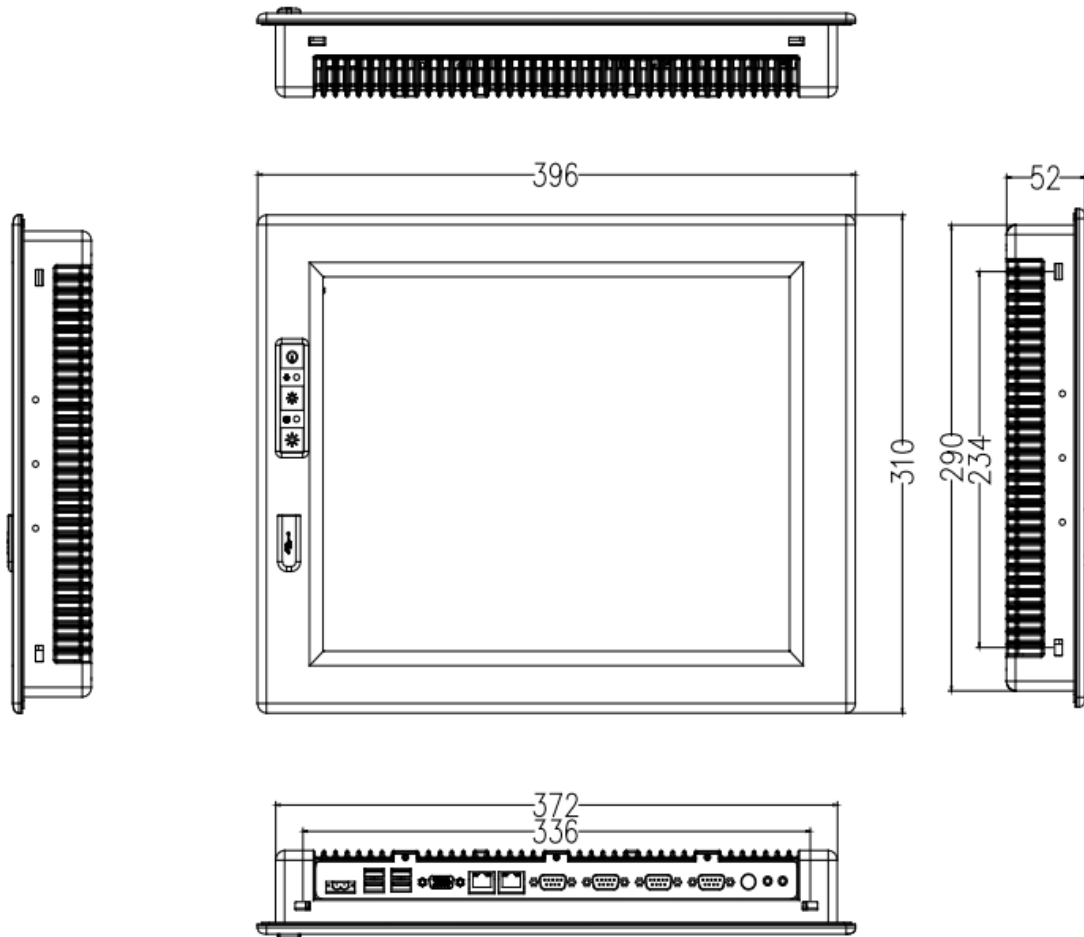## 5.2 Panel function interface identifier

Interface definition:

A: 12~ 24V DC interface

B: PS/2 keyboard/mouse

C: VGA Port

D: COM1

E: COM2

F: COM3

G: COM4

H: MC IN

I: SPK OUT

J: USB2.0×2

K: USB2.0×2

L: 10/100/ 1000 Base-T Ethernet port
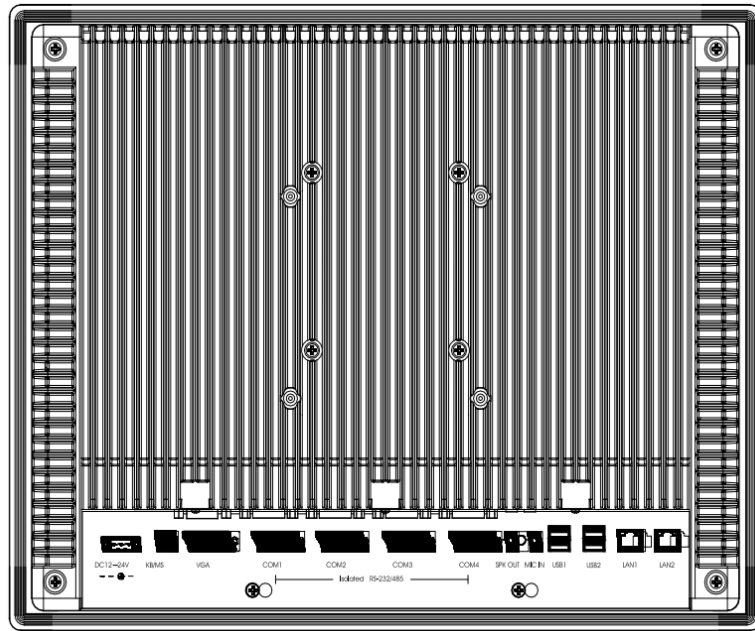
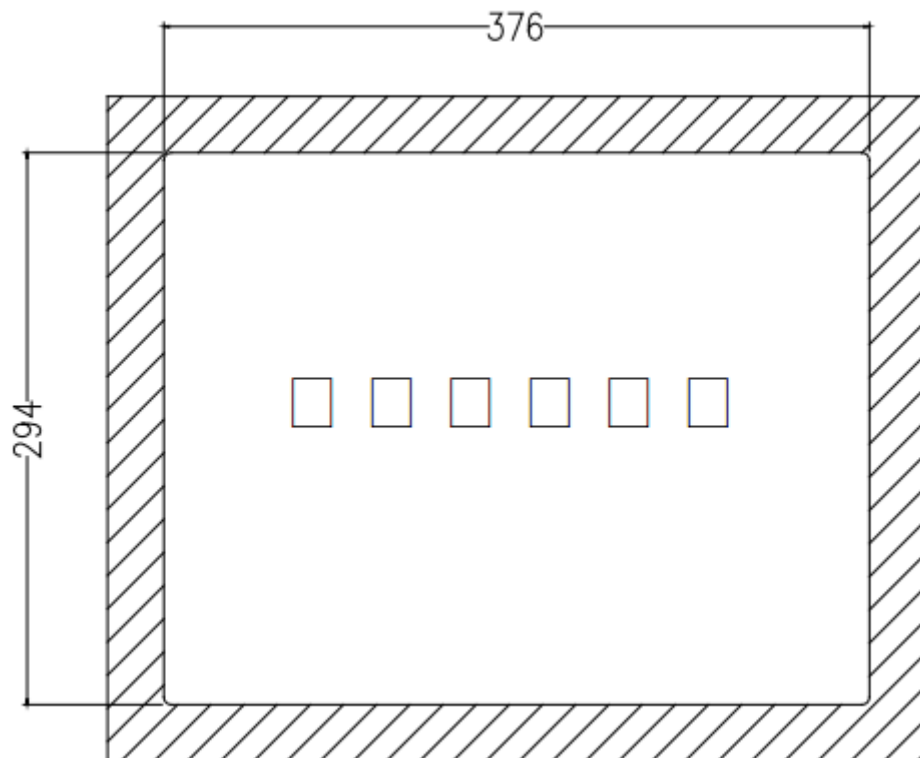M: 10/100/ 1000 Base-T Ethernet port

Chapter 6 Machine installation
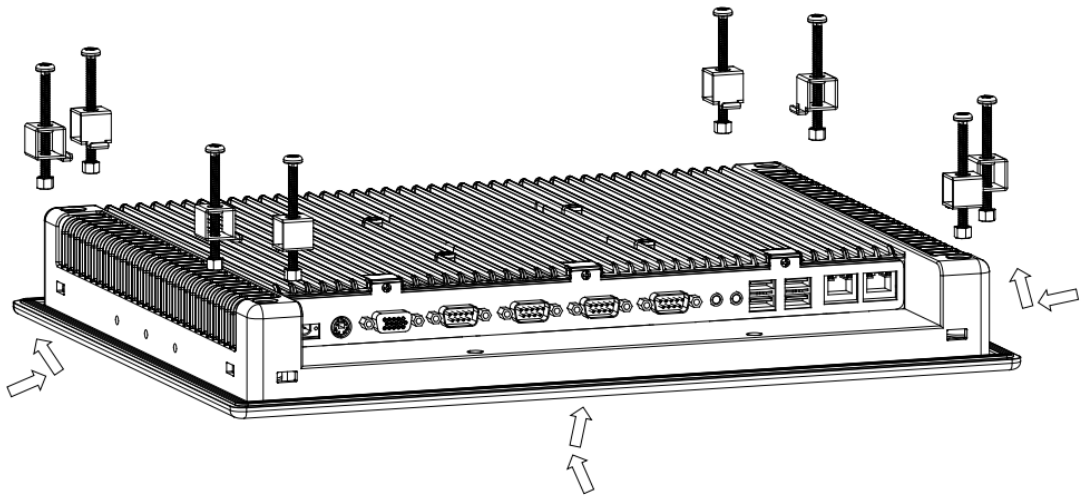
6.1 Panel embedded installation

6.1.1 Dimensions

6.1.2 In order to facilitate the installation of the whole machine, please check the opening size of the cabinet before installation.
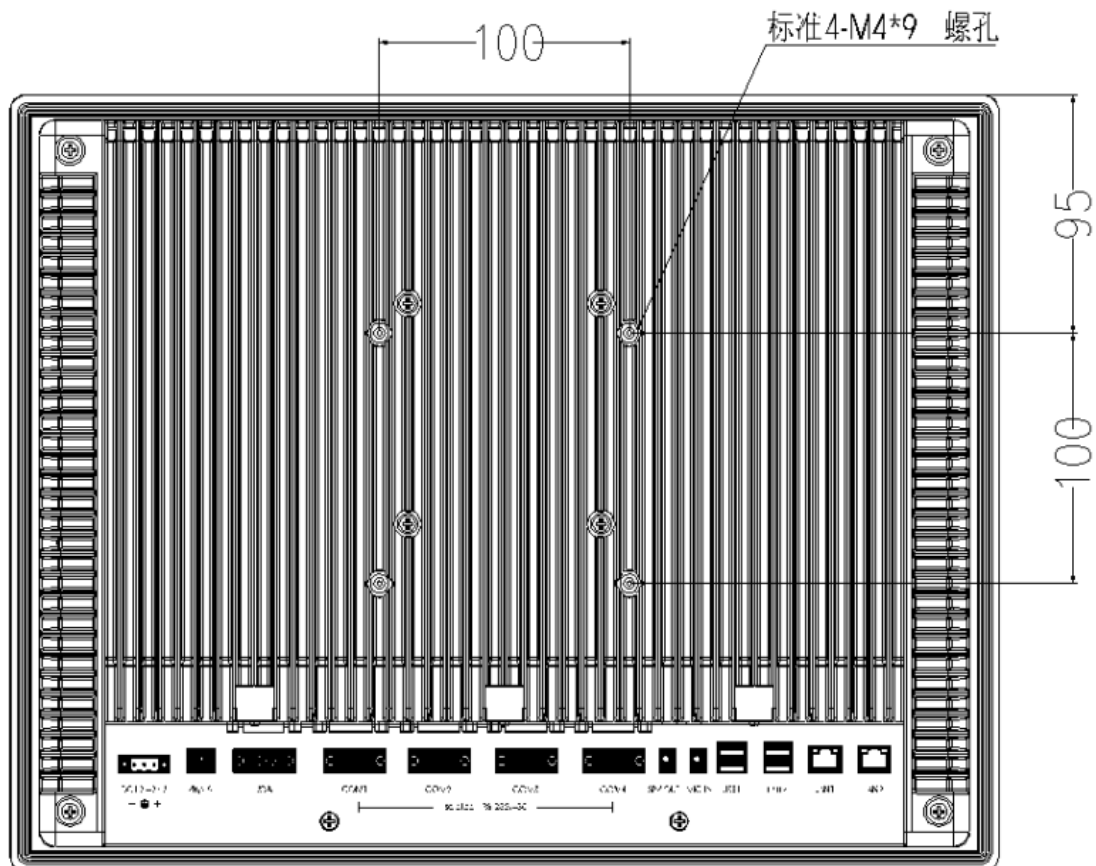
6.1.3 To install into the cabinet, use 8 suspensions for support, as shown below;

6.2 VESA installation

6.2.1 Supports mounting with 100mm arm interface pad, in line with VESA standard specifications

Chapter 7 Hard disk/MINI PCIE installation

7.1 Remove the pane Remove the panel

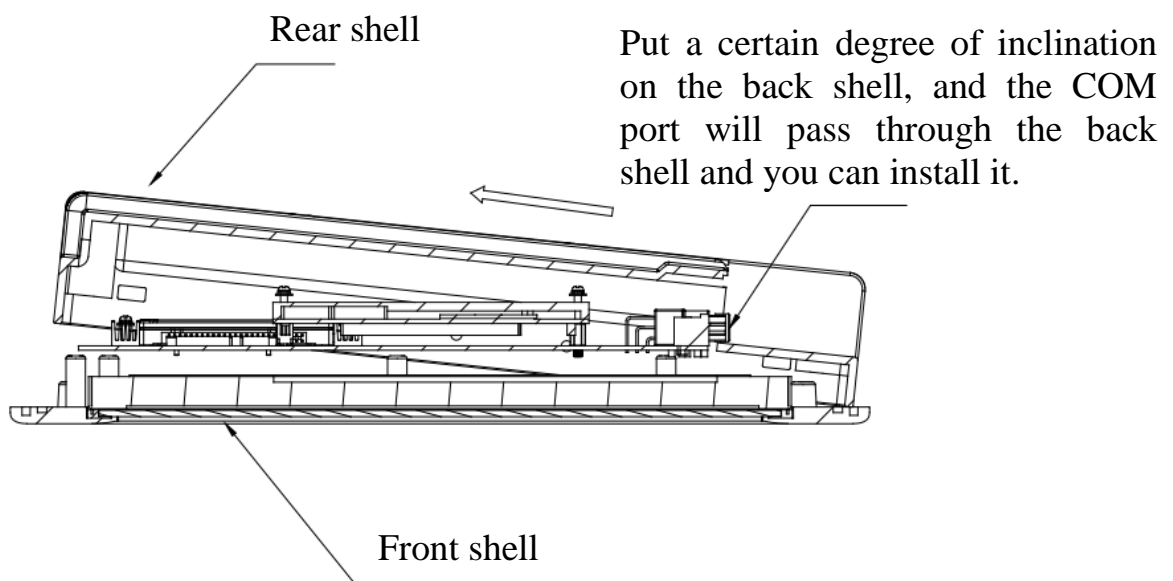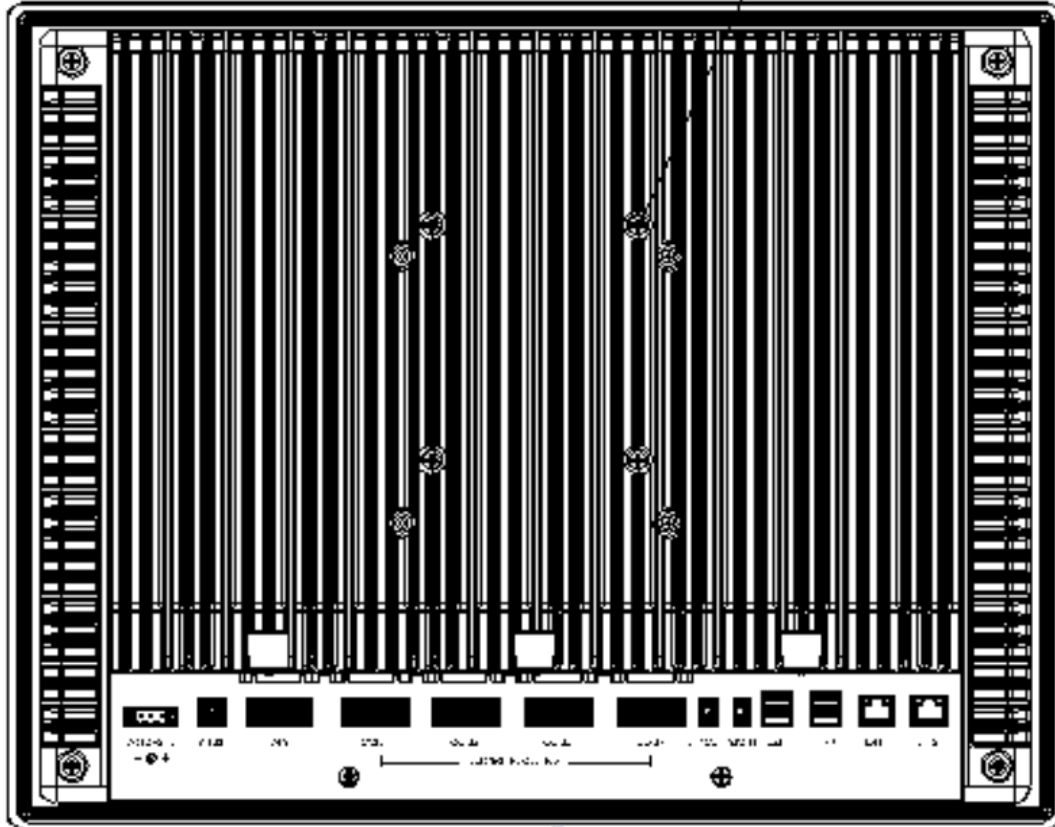**NOTE:** Before disassembling or installing the device, make sure it is turned off or unplugged.

7.1.1 Twist out the panel 3PCS #6-32*7 Phillips B head screws and take out the panel diagonally to remove it from the slot.


3PCS #6-32*7十字槽B头螺钉

4个插槽
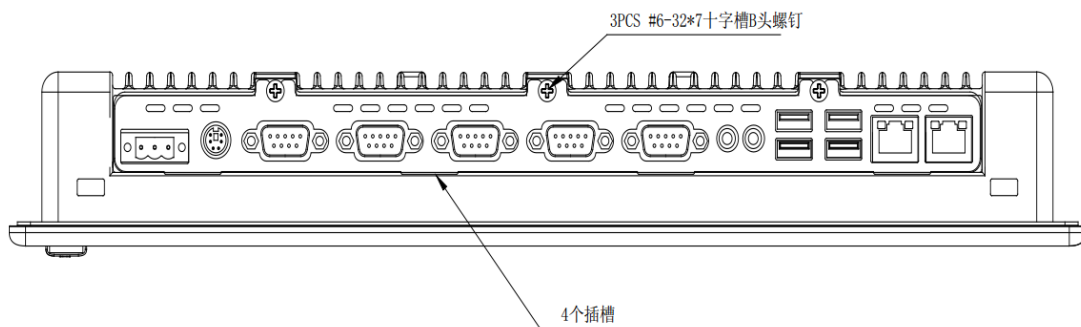
7.2　Disassemble the shell

7.2.1 Unscrew the 6PCS #6-32*10 and 4PCS#6-32*7 Phillips B head screws
from the rear shell, as shown in the figure.

Rear shell

Front shell

Put a certain degree of inclination on the back shell, and the COM port will pass through the back shell and you can install it.
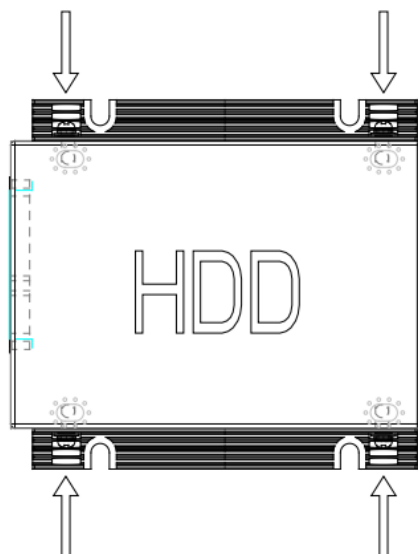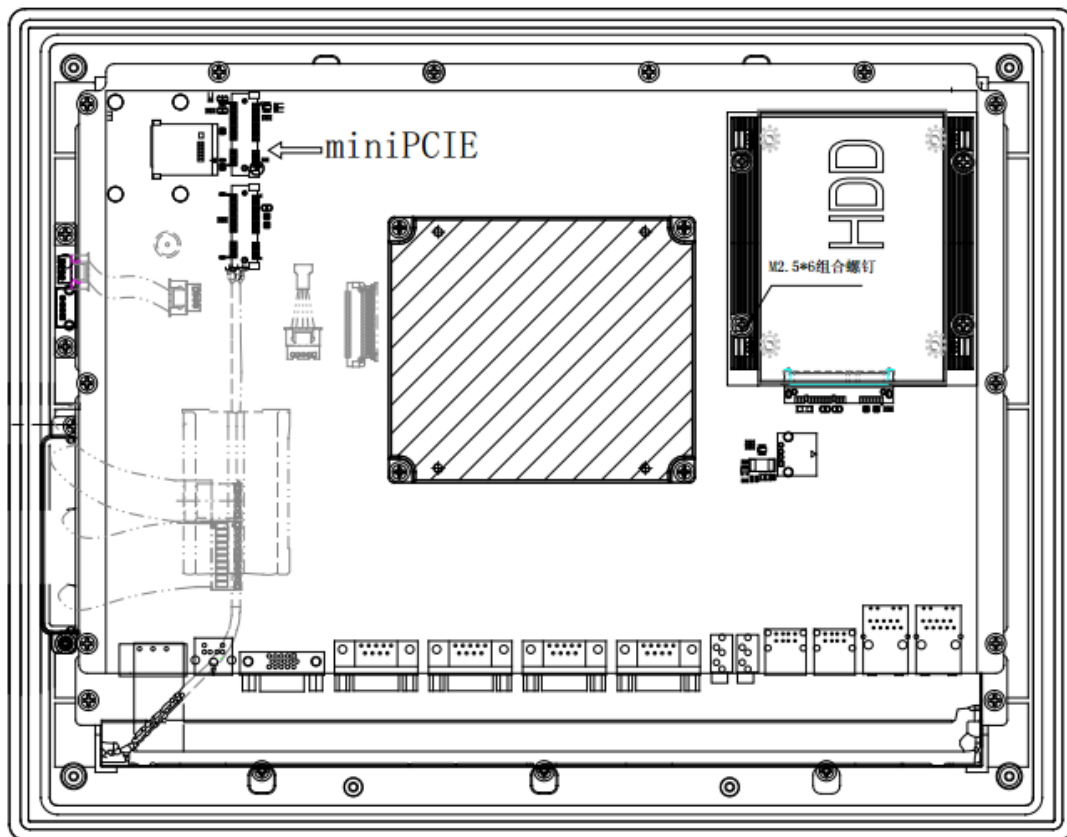
7.3 Hard disk installation

7.3.1 After the rear shell is removed, there is miniPCIE slot/SATA hard disk socket on the board
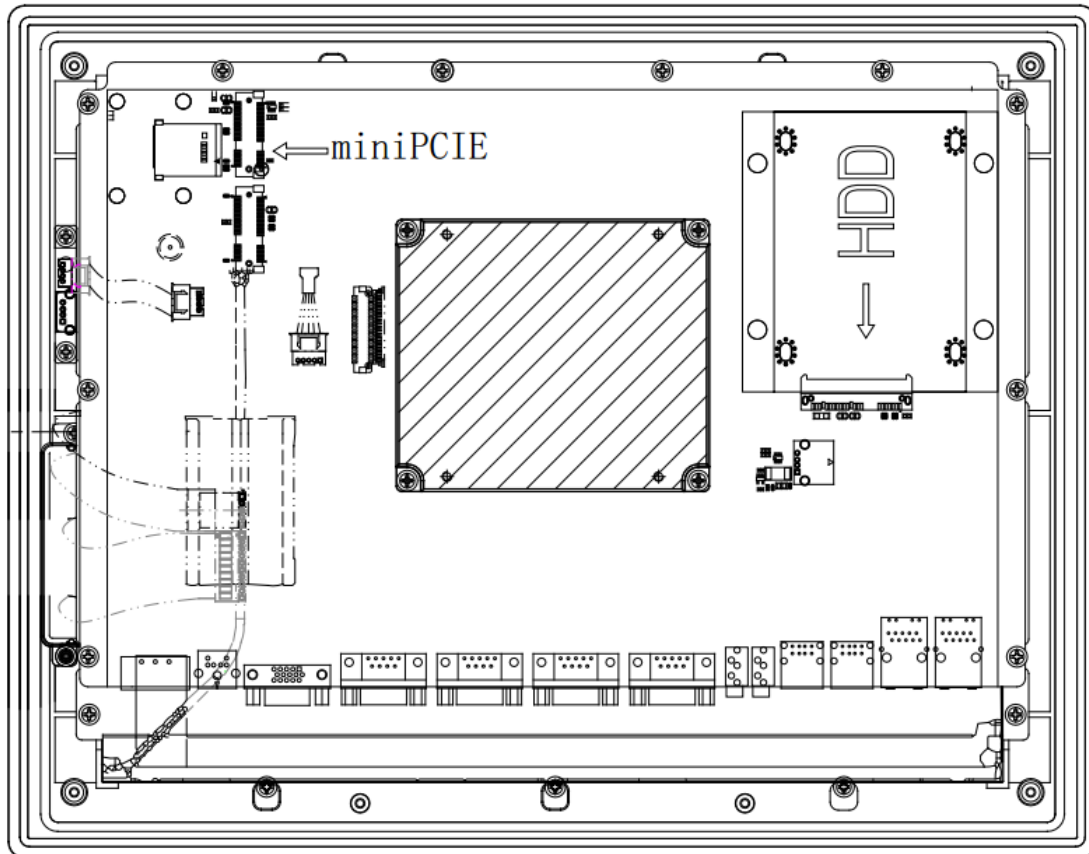
7.3.2 Remove the 2PCS HDD mount from the kit and install the disk tray as shown below. Lock the 2PCS M3*6 Phillips Disc Head with Spring Washer Screws.

7.3.3   Insert the hard disk with the hard disk tray into the SATA socket as shown in the figure below; lock the 2PCS M2.5*6 pan head combination screws on the left and right.

7.3.4   Insert the miniPCIE card into the corresponding slot as shown in the figure below. Use the 1PCS M2*4 Phillips pan head screw to lock the miniPCIE card.
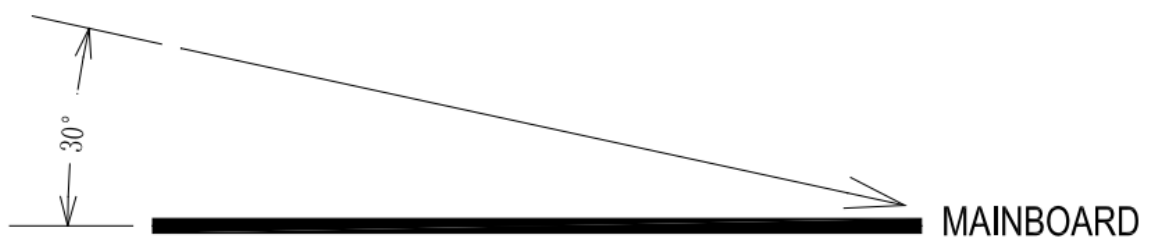
7.4 The installation is complete.

7.4.1 In summary, the hard disk and miniPCIE card are installed.