



Panel PC PSG2-FM series

Celeron J1900

Capacitive touchscreen



User's manual

Version 1.1

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Chapter 1: Preface

1.1 Safety rules

All the Panel PC PSG2 series have been designed and built taking into account all the issues associated with an industrial environment such as that where it is necessary to ensure the operation of the system in the presence of vibration, moisture, dust and critical heat conditions.

Only skilled staff must make any job on the device, only after having fully read and understood the safety instructions. Before installing and using the device, note the following precautions:

- Read all instructions carefully.
- Do not place the unit on an unstable surface, cart, or stand.
- Avoid using the system near water, in direct sunlight, or near a heating device.
- To prevent electrical shock or equipment damage, unplug the power cord from the power supply prior to installing or wiring the PC.
- Do not disassemble or modify the Panel PC. Doing so may cause a fire or an electric shock.

All tasks such as the installation, commissioning and servicing of devices are only permitted to be carried out by qualified personnel. Qualified personnel are those familiar with the transport, mounting, installation, commissioning and operation of devices who also have the appropriate qualifications. National accident prevention regulations must be observed.

1.2 Product checking

Preliminary operations to be made as soon as you receive the PANEL product:

- Check if the packing hasn't undergone any damage due to transport.
- Verify if the packing contents correspond to the delivery note.

The product model, code and serial number are shown on the identification plate which is positioned on the rear.

 Model PSG217 Input AC 110-230 / 1,0A max S/N 4415319 Code PC#392918 Made in Italy	 "CAUTION : risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions." "ATTENZIONE : rischio di esplosione se la batteria è sostituita da un tipo errato. Smaltire le batterie usate in base alle istruzioni"
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If serious damages or inconsistency are found between the packing contents and the delivery note, please contact the PANEL SRL sales department immediately.

It's advisable to keep the original packing in order to use it for possible transports back in assistance.

1.3 Package contents

The following items are included in the PSG2 unit's package. Before using the PSG2, please check all the items match the manual list.

PSG212/227 DC power supply

Qty 1 Panel PC
Qty 1 Quick guide
Qty 1 Connector DC supply
Qty 4 Retaining clips (with size up to 17")
Qty 6 Retaining clips (with size 18.5" / 21.5")
Qty 8 Retaining clips (with size 27")

PSG212/227 AC power supply

Qty 1 Panel PC
Qty 1 Quick guide
Qty 1 Power cable (IT) 1.8m
Qty 4 Retaining clips (with size up to 17")
Qty 6 Retaining clips (with size 18.5" / 21.5")
Qty 8 Retaining clips (with size 27")

1.4 Declaration of conformity

CE Mark, product complies with all applicable directives and their harmonized EN standards.



Doc. Int. Panel: 29102014

The products herewith complies to the requirements of:

- Low voltage directive 2006/95/EC
- EMC Directive 2004/108/EC
- RoHS Directive 2011/65/EU
- Carries **CE** marking

- EMC: EN 55022:2010 Class B
- EMC: EN 55024:2010 Class B
- LVD: EN 60950-1:2006+A11:2009+A1:2010+A12:2011
- LVD: EN 62311:2008
- LVD: EN 62479:2010

- RoHS EN 50581:2012

- Energy Use: Regulation (EC) no. 617/2013
- Energy Use: Regulation (EC) EN 62623:2013

1.5 Warranty and RMA

Panel manufactures new products that are in accordance with industry standard. Panel warrants that products will be free from defect in material and workmanship for 2 years, beginning on the date of invoice by Panel.

PANEL will engage to repair or eventually replace, at its discretion, the whole device or its components, which show construction defects or malfunction if these are pointed out in writing during the warranty period.

The warranty is limited to the repairing of the defective product at our headquarters or, according to PANEL indisputable judgment, to the replacement of the product itself.

The product under warranty must reach our headquarters equipped with the indication of the anomaly found and with the relevant authorization number (RMA form). PANEL, doesn't carry out any repair of products if this has not been previously authorized by the company itself.

The transport charges must be borne by the customer.

Customers must collect all the information about the problems encountered and note anything abnormal or, print out any on-screen messages, and describe the problems at Panel RMA Service. Contact Panel service at: support@panel.it

1.6 Technical Support and Assistance

About technical support and assistance, visit Panel's website at www.panel.it

Chapter 2: Technical data

2.1 Introduction

Panel PC fanless extremely compact. The PSG2-FM is provided with Intel® Bay Trail Celeron Quad Core 2.0 GHz CPU. The front panel is a tempered IP66 glass supplied with projected capacitive multi-touch screen.

2.2 Products specifications

Models	PSG212	PSG215	PSG216	PSG217	PSG218	PSG222	PSG227
Technology construction	Projected capacitive						
Display size	12.1"	15.0"	15.6"	17.0"	18.5"	21.5"	27.0"
Resolution	800x600	1024x768	1366x768	1280x1024	1366x768	1920x1080	1920x1080
Brightness	450 cd/m ²	500 cd/m ²	300 cd/m ²	350 cd/m ²	300 cd/m ²	250 cd/m ²	350 cd/m ²
Contrast	700:1	1500:1	500:1	1000:1	1000:1	1000:1	3000:1
Max colors	16.7 millions	16.7 millions	16.7 millions	16.7 millions	16.7 millions	16.7 millions	16.7 millions
Touchscreen	Projected capacitive						
FM board	Chipset	Intel® Bay trail					
	CPU	Celeron Quad Core J1900 2.0 GHz					
	RAM	up to 8GB DDR3L DDR3L sodimm 1600 MHz					
	I/O ports	1x VGA, 2x Gigabit LAN, 1x HDMI 3x RS232, 1xRS232/422/485, 2x USB 2.0, 2x USB 3.0, 1x Line out					
	Expansions	1x Mini PCI-E full size			1x Mini PCI-E half size		
Storage	C-Fast cards	-----					
	SSD	32, 64, 128, 256 GB size: 2.5"					
Operating System	Windows 7 SP1, 7 Embedded Standard, 10 Enterprise LTSB 2016, 10 Enterprise LTSC 2019, 10 PRO, Linux						
Mounting	Panel mounting						
Protection grade	IP 66 (frontal)						
Dimensions (WxHxD) mm	335x270x95	390x315x95	430x275x100	455x355x100	500x320x100	579x367x97	675x415x102
Weight	4,5 Kg	5,5 Kg	7 Kg	7 Kg	8,5 Kg	9 Kg	11 Kg
Rated input voltage	24 VDC			110 – 230 VAC			
Input voltage limits	9.....36 VDC			90.....264 VAC			
Typical Power	32 W	35 W	35 W	42 W	42 W	42 W	50 W
Operating Temperature	0° ÷ 50 °C						
Cooling Type	Fanless						
Conformity	CE						

2.3 Bespoke front graphics customization

Optional, provided on request

2.4 Touchscreen specifications

Scope: The specification is for projected capacitive touchscreen

Features

Type: Projected capacitive

Input Mode: Finger

Environmental Characteristics

Operation temperature: -20 °C ~ +70 °C; Humidity 20% RH ~ 85% RH Non Condensing

Storage temperature: -40 °C ~ +80 °C; Humidity 10% RH ~ 90% RH Non Condensing

Optical Characteristics

Transparency: 90% ± 3% (Measured by BYK-Gardner)

Haze: < 2%

Electrical Characteristics

Linearity: $X \leq 1.0\%$, $Y \leq 1.0\%$

Insulation: $\geq 100M\Omega/25V(DC)$

Response: According to Integration time of controller

Mechanical Characteristics

Total Thickness: 2.45±0.30 mm

Operating force specifications: Finger= $\leq 10g$

Impact: 25.0 mm DIA. Steel Ball/67g, height=30 cm, 1 time, impact at center area

Static Load: 5000g within 10cm² area for 30 sec

Hardness: 7H pencil, pressure 750g/45°

Tail peeling: 800g/cm by vertical 90° for 30sec

Reliability

Constant temperature /Humidity: 70°C X 90%RH, 120 hrs and normalized for 4 hrs

Heat cycle: 70°C /120 hrs and normalized for 4 hrs

Cold cycle: -40°C /120 hrs and normalized for 4 hrs

Thermal Cycle: -40°C ~80°C [60 min./cycle] *10 cycles and normalized for 4 hrs

Durability

Knock Test: 100,000,000 times

PSG2 projected capacitive touch controller

Tecnology: allow 10 finger multi-touch

Power Requirements: 3.5V~5.5V typical 5V, 100mA max.

Operating Temperature: -25 to 85 °C

Storage Temperature: -25 to 85 °C

Relative Humidity: 95% at 60 °C, RH Non-condensing

Interface: USB: 1.1 Full Speed

Resolution: 4096×4096 resolution

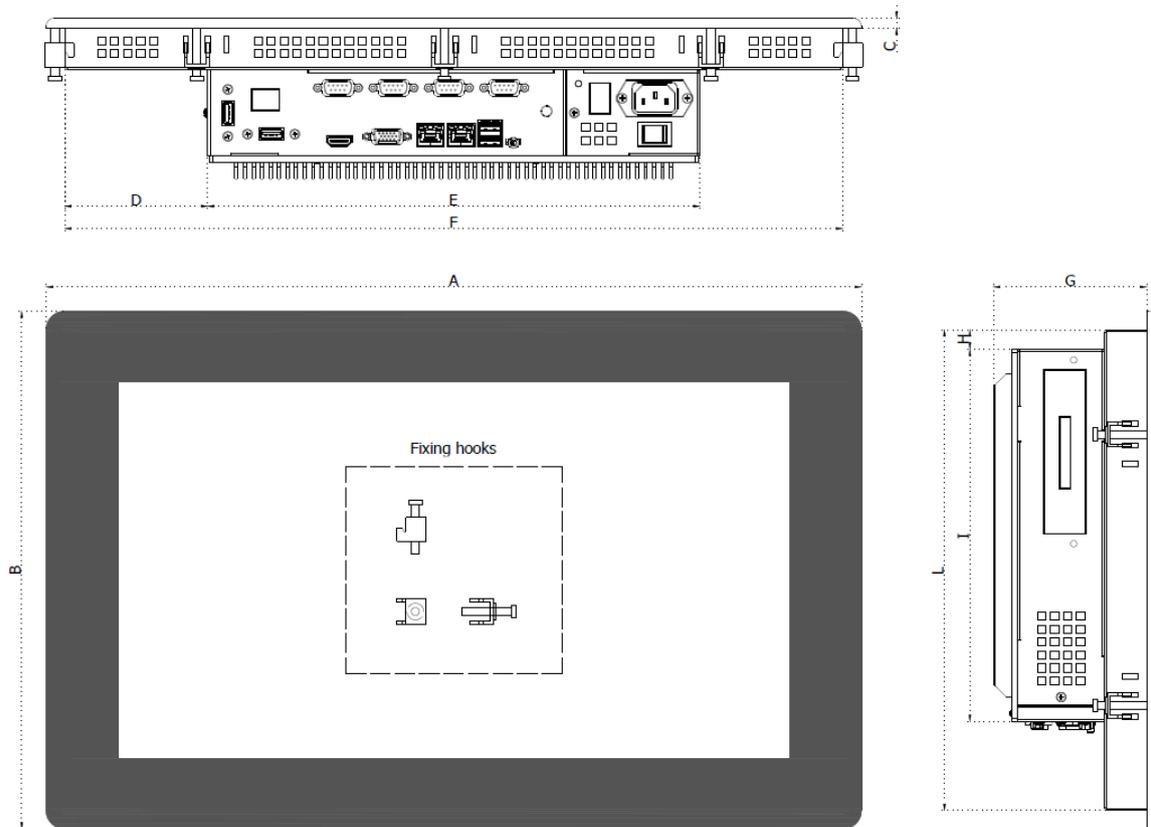
Report rate: USB: Max. 100 points/sec

Response time: Max. 25 ms

MTBF: 200,000 hrs

2.5 Mechanical dimensions

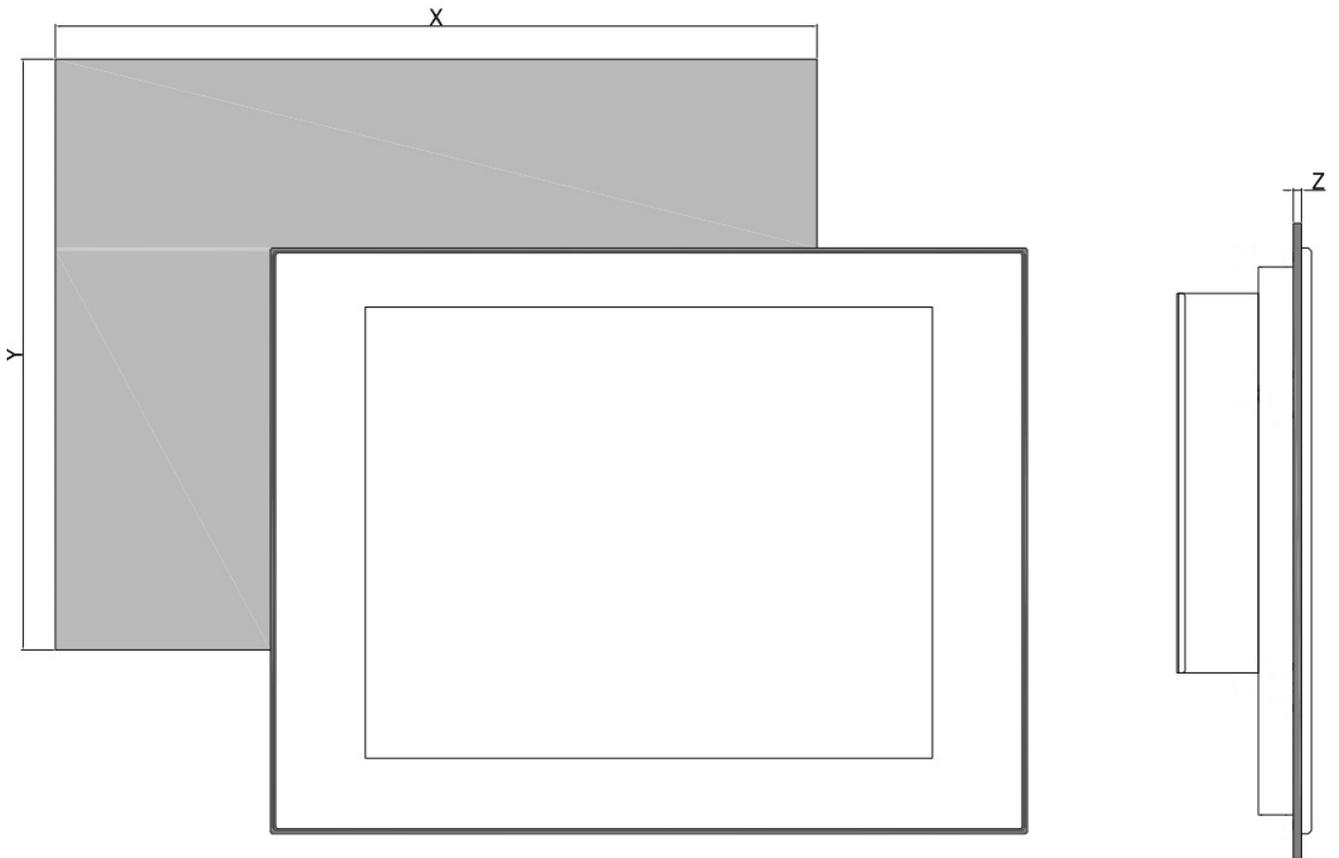
PSG2 display units with retaining clips



All dimensions are specified in mm

Display size	Model	A	B	C	D	E	F	G	H	I	L
12.1" projected capacitive touch	PSG212	335	270	6	5	302	312	89	0	230	247
15.0" projected capacitive touch	PSG215	390	315	6	32.5	302	367	89	0	230	292
15.6" projected capacitive touch	PSG216	430	275	6	52.5	302	407	94	0	230	252
17.0" projected capacitive touch	PSG217	455	355	6	65	302	432	94	16	230	332
18.5" projected capacitive touch	PSG218	500	320	6	87.5	302	477	94	12	230	297
21.5" projected capacitive touch	PSG222	579	367	8	127	302	556	89	16	230	344
27.0" projected capacitive touch	PSG227	675	415	8	174	302	650	94	80	230	390

2.6 Mechanical cut-out



All dimensions are specified in mm

The cut-out tolerance values are +1 mm / -1 mm

Display size	Model	X	Y	Zmin	Zmax	Number of retaining clips
12.1" projected capacitive touch	PSG212	315	250	2	6	4
15.0" projected capacitive touch	PSG215	370	295	2	6	4
15.6" projected capacitive touch	PSG216	410	255	2	6	4
17.0" projected capacitive touch	PSG217	435	335	2	6	4
18.5" projected capacitive touch	PSG218	480	300	2	6	6
21.5" projected capacitive touch	PSG222	559	347	2	6	6
27" projected capacitive touch	PSG227	653	393	2	6	8

2.7 Chemical and solvent resistance

Aluminum panel overlay

The panel overlay withstands 24 hours exposure to the following reagents at 50 °C without visible staining

1.1.1. Trichloroethane
Aliphatic hydrocarbons
Benzene
Cyclohexanol
Diethyl ether
Ethanol
Acetaldehyde
Acetone
Acetic acid <50%
Battery acid
Diacetone Alcohol
Dioxan
DS2 Decontamination fluid
Fabric conditioner
Acetonitrile
Alkalicarbonate
Ammonia <40%
Bichromate
Blown castor oil

Ethylacetate
Fluorochlorohydrocarbons
Glycerine
Glycol
Isopropanol
Methanol
Ferric chloride <30%
Formic acid <50%
Hydrochloric acid <10%
Hydrogen peroxide <25%
Isophorone
Lactic acid
Methylethylketone
Nitric acid <10%
Linseed oil
Paraffin oil
Petrol
Potassium
Ferrocyanide/ferricyanide
Silicone oil

Perchloroethylene
Toluene
Triacetin
Trichloroethylene
Xylene
Phosphoric acid <30%
Potassium carbonate
Sodium hypochlorite <20%
Sulphuric acid <10%
Washing powders
Water
Sea water
Cutting oil (Hysol X)
Diesel oil
Turpentine substitute
Universal brake fluid
Caustic soda <2%

The panel overlay is **not** resistant to the following chemicals:

Concentrated mineral acids
Concentrated caustic solution
High pressure steam at over 100 °C
Benzyl alcohol
Methylene chloride

Projected capacitive touchscreen

The touch panel is securely affixed onto the frontal glass. The glass is much more resistant to corrosion than most materials, so much so that it is easy to think of it as corrosion-proof.

Optional graphic customization

The graphic painted customization is **not** resistant to the following chemicals:

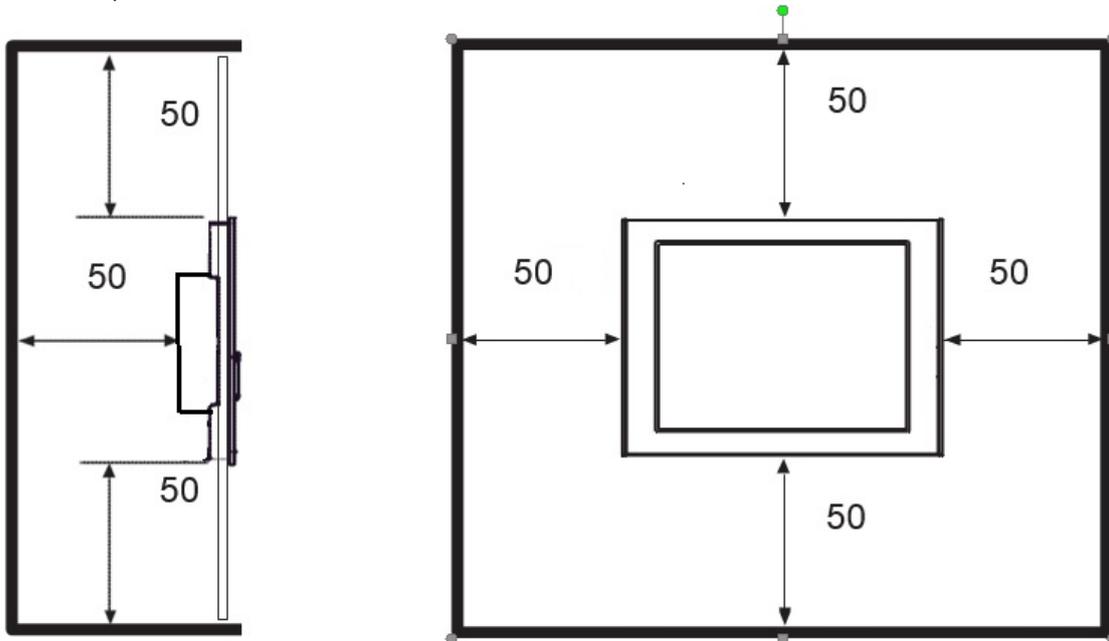
Concentrated mineral acids
Concentrated caustic solution
High pressure steam at over 100 °C
Benzyl alcohol
Methylene chloride

Chapter 3: Installation and wiring

3.1 Mounting distance

For easier maintenance, operation, and improved ventilation, be sure to install the PSG2 away from adjacent structures and other equipment. See the following drawings. Be sure that the ambient operation temperature and the ambient humidity are within their designated ranges.

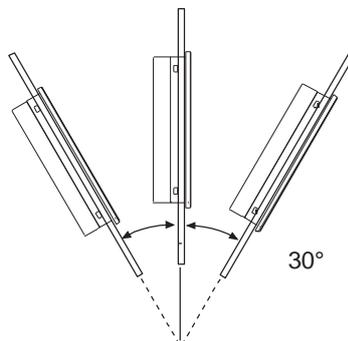
All dimensions are specified in mm



- PSG212: 110mm reserved for the extraction of the removable SSD
- PSG215: 80mm reserved for the extraction of the removable SSD

3.2 Inclined mounting

When installing the PSG2 in a slanted panel, the panel face should not incline more than 30°

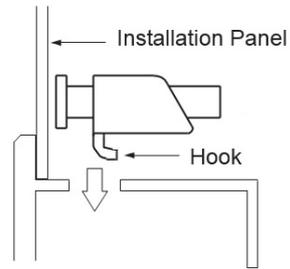


When installing the PSG2 in a slanted panel, and the panel face inclines more than 30°, the surrounding air temperature must not exceed 40°C. You may need to use forced air cooling (fan, A/C) to ensure the surrounding air temperature is 40°C or below.

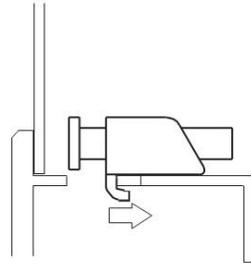
3.3 Fasten PSG2

Insert the PSG2 into the panel cut. When inserted, fix the Panel PC as shown:

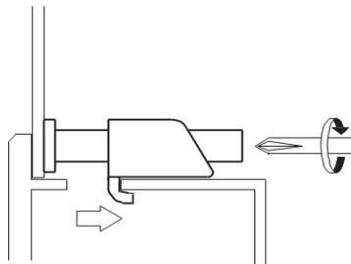
- (1) Insert each of the fasteners, as shown.



- (2) Be sure to pull the fastener back until it is flush with the rear of the attachment hole.



- (3) Tightening the screws with too much force can damage the PSG2 unit's case
The torque required to tighten these screws is 0.5 Nm.



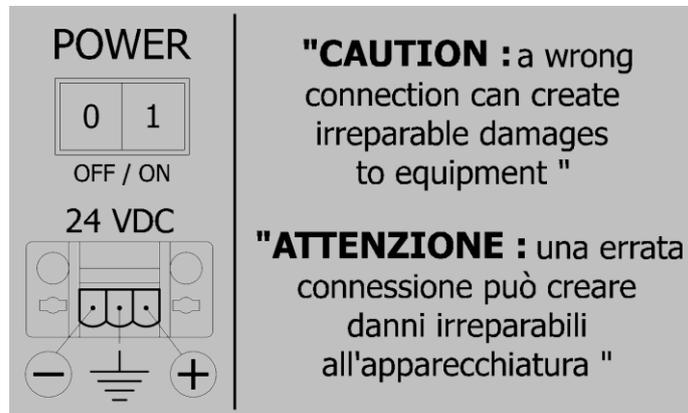
3.4 Connecting DC power

Warning!

All supplied power must be disconnected before removing device covers or components or installing/removing accessories, hardware or cables.

The power cable must be disconnected from the device and from the voltage supply.

Verify the correct rated input 24 VDC, input voltage limits 9.....36 VDC.



The DC power cable must be secured in the terminal block (power connector) as shown in the image. Wires with a cross section of 0.75 mm² to 2.5 mm².

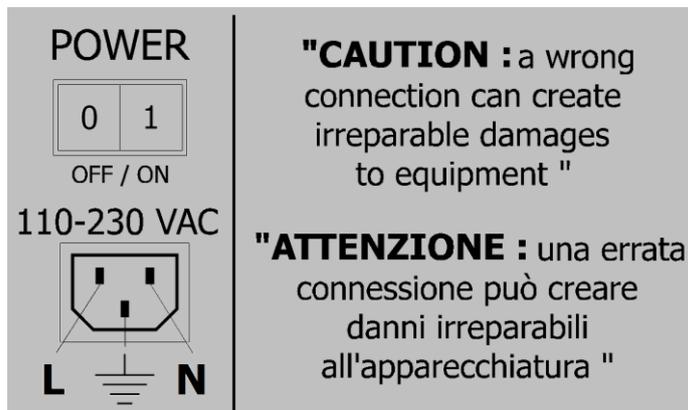
3.5 Connecting AC power

Warning!

All supplied power must be disconnected before removing device covers or components or installing/removing accessories, hardware or cables.

The power cable must be disconnected from the device and from the voltage supply.

Verify the correct rated input 110 - 230 VAC, input voltage limits 90.....264 VAC.



3.6 Functional ground

Grounding concept Functional ground is a current path of low impedance between electrical circuits and ground. It is used, for example, to improve immunity to disturbances and not necessarily as a protective measure. It therefore serves only to deflect disturbances, not to provide any kind of protection against electric shock.

This device comes equipped with two functional ground connections:

- Power supply
- Ground connection

To guarantee safe conductance of electric disturbances, the following points must be observed:

The device must be connected to the central grounding point in the control cabinet using the shortest route possible.

A cable with a minimum cross section of 2.5 mm² per connection should be used.

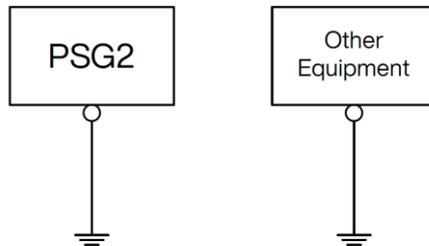
All data cables connected to the device must be shielded.

For between the line and ground, select a power supply that is low in noise. If there is an excess amount of noise, connect an insulating transformer.

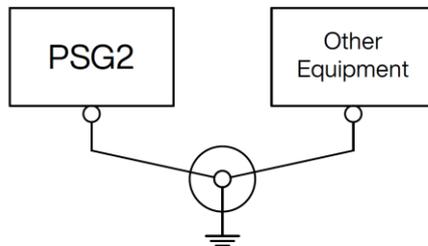
To increase the noise resistance quality of the power cord, simply twist each power wire before attaching the ring terminal. To avoid excess noise, make the power cord as short as possible.

This section describes the precautions for grounding the PSG2 unit:

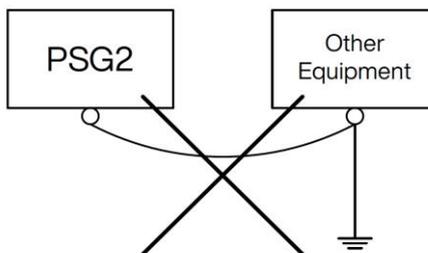
1) Exclusive grounding (BEST)



2) Exclusive grounding (OK)



3) Common grounding (NOT OK)



Important!

The motherboard ground and others devices is connected with PSG2 ground.

Chapter 4: Hardware upgrade

4.1 Removing the rear cover

Warning!

Disconnect the power supply to the Panel PC (disconnect the power cable).

Isolate the system from all potential sources of electrical power!

Discharge any electrostatic charge on the ground connection

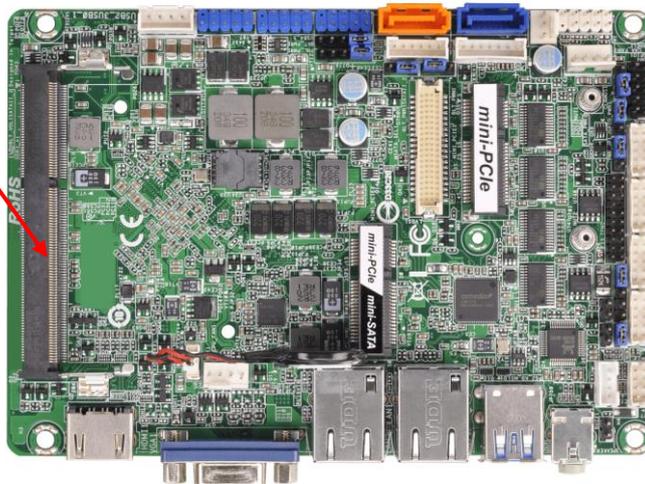


Unscrew the six screws used to hold the rear cover in place. Unscrew the two VGA connector screws.

Pull up the rear cover and disconnect all the cables from the motherboard. Now it's possible to remove the rear cover and the motherboard.

4.2 RAM installation

RAM Memory slot

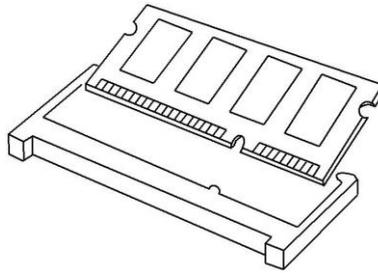


RAM slot installation area

SO-DIMM slot supports one 204-pin DDR3 (Double Data Rate 3) single channel DDR3L SDRAM only.

Step.1)

Align a SO-DIMM on the slot such that the notch on the SO-DIMM matches the break on the slot.

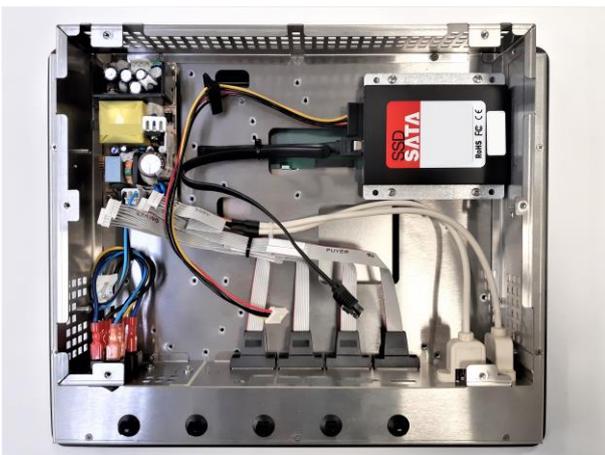


The SO-DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the SO-DIMM if you force the SO-DIMM into the slot at incorrect orientation.

Step.2)

Firmly insert the SO-DIMM into the slot until the retaining clips at both ends fully snap back in place and the SO-DIMM is properly seated.

4.3 HDD-SSD installation



SATA SSD installation area



Unscrew the four screws marked above then unplug the two SATA cables. On the rear of the drive bay there are further four screws that lock the SSD unit.

4.4 Removable HDD-SSD installation

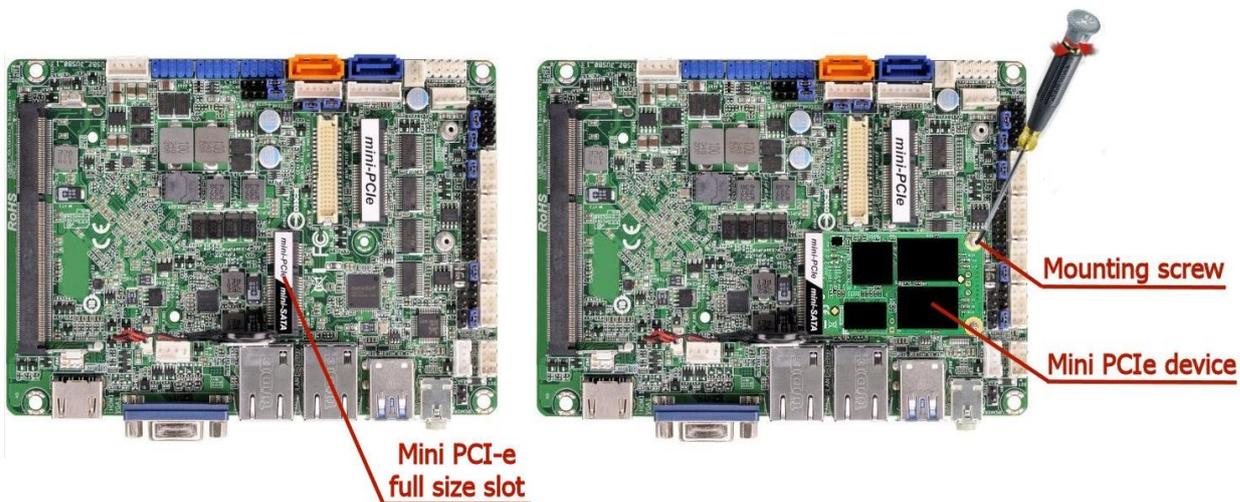


To remove the SSD, push the door drive bay button and pull the unit out.



SSD replacement

4.5 Mini PCI-E and mSATA module installation



Mini PCI-E / mSATA socket installation area

Mini PCI-E / mSATA module mounting

There is 1 mini-PCIe slot and 1 mini-PCIe/mini-SATA slot on this motherboard.

mini-PCIe half size slot:

MINI_PCIE1 (mini-PCIe slot; half size) is used for PCI Express mini cards.

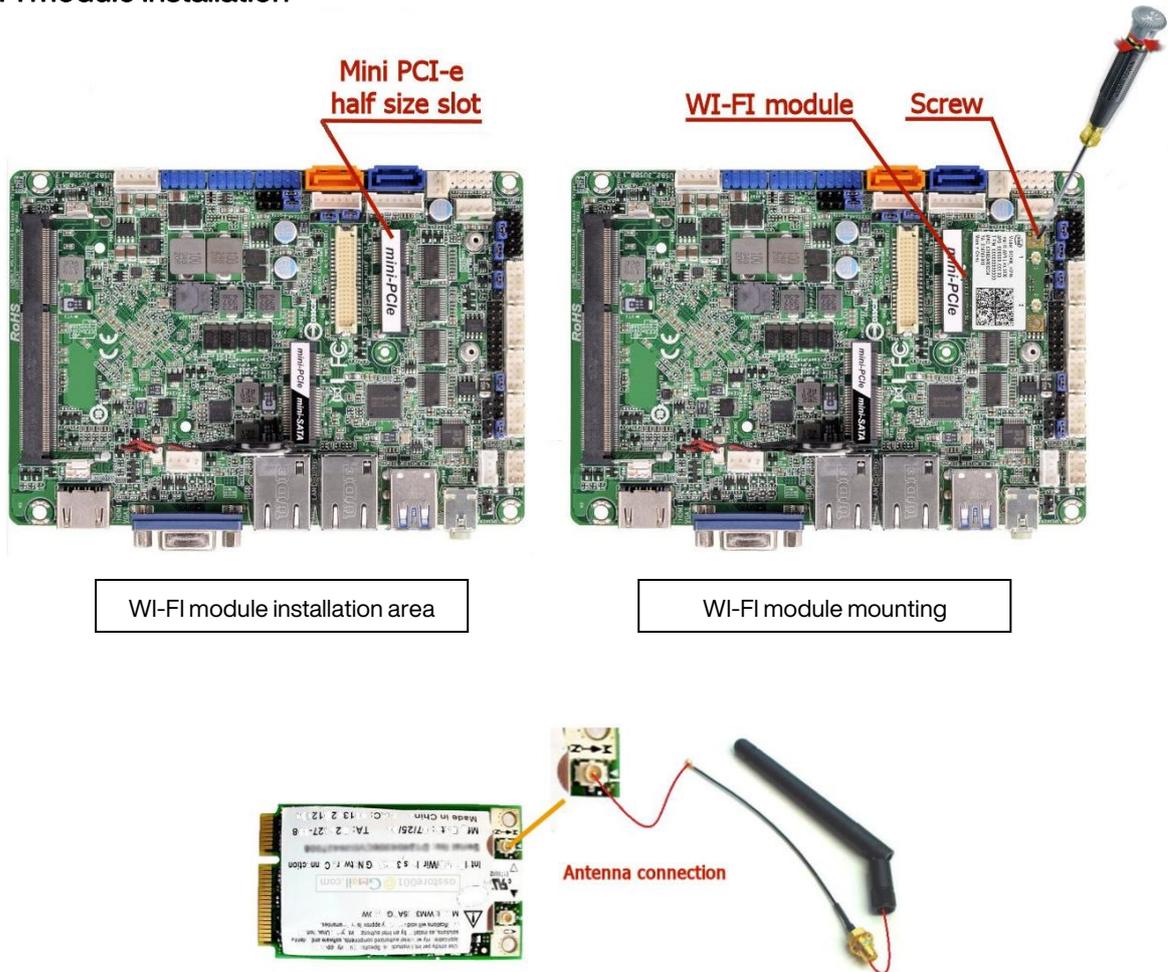
mini-PCIe/mini-SATA full size slot:

MINI_PCIE2 (mini-PCIe/mini-SATA slot; full size) is used for PCI Express mini cards or mSATA card

Installing an expansion card

- 1) Before installing the expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before you start the installation.
- 2) Remove the system unit cover (if your motherboard is already installed in a chassis).
- 3) Remove the bracket facing the slot that you intend to use. Keep the screws for later use.
- 4) Align the card connector with the slot and press firmly until the card is completely seated on the slot.
- 5) Fasten the card to the chassis with screws.
- 6) Replace the system cover

4.6 WI-FI module installation

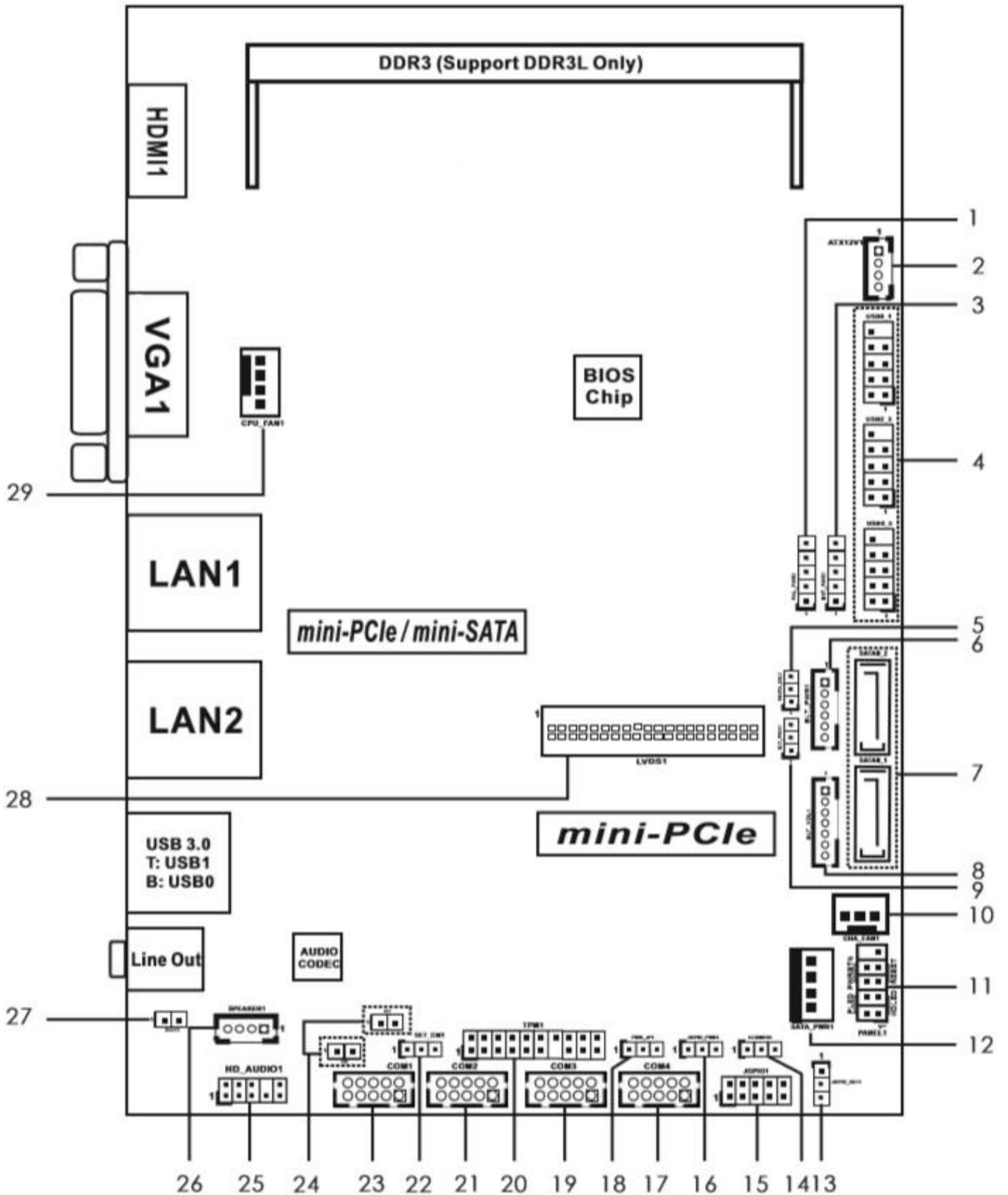


Installing an expansion card

- 1) Before installing the expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before you start the installation.
- 2) Remove the system unit cover (if your motherboard is already installed in a chassis).
- 3) Remove the bracket facing the slot that you intend to use. Keep the screws for later use.
- 4) Align the card connector with the slot and press firmly until the card is completely seated on the slot.
- 5) Fasten the card to the chassis with screws.
- 6) Connect the antenna cable to the main connector of the device:
- 7) Replace the system cover

Chapter 5: jumpers and connectors

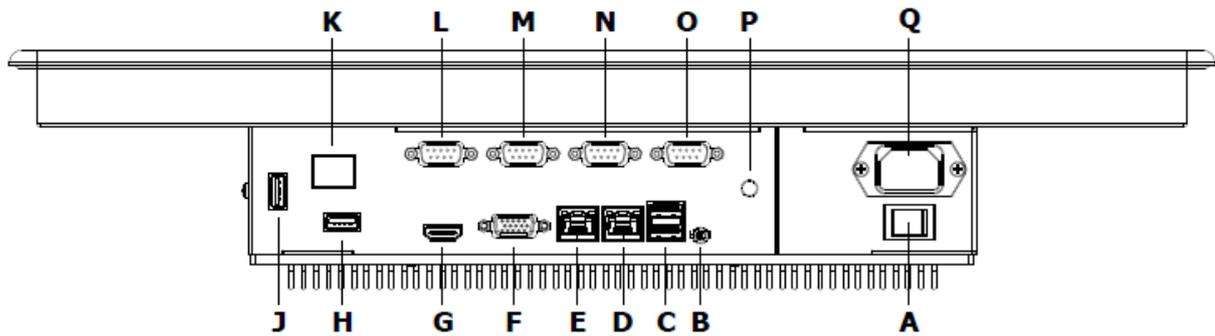
5.1 Motherboard SBC-210 layout



List of all motherboard connectors and headers:

- 1: Panel Power Selection (PNL_PWR1)
- 2: ATX Power Connector
- 3: Backlight Power Selection (BKT_PWR1)
- 4: USB2.0 Headers (USB0_1, USB2_3, USB4_5)
- 5: m-SATA Selection
- 6: Inverter Power Control Wafer (BLT_PWR1)
- 7: SATA2 Connectors (SATAII_1, SATAII_2)
- 8: Backlight & Amp Volume Control (BLT_VOL1)
- 9: Backlight Control Level (BLT_PWM1)
- 10: 3-Pin Chassis FAN Connector
- 11: System Panel Header
- 12: SATA Power Output Connector
- 13: GPIO Default Setting
- 14: Clear CMOS Header
- 15: Digital Input / Output Pin Header
- 16: Digital Input / Output Power Select
- 17: COM Port Header (COM4)
- 18: ATX/AT Mode Selection
- 19: COM Port Header (COM3)
- 20: TPM Header
- 21: COM Port Header (COM2)
- 22: COM1 Pin9 PWR Setting
- 23: COM Port Header (COM1)
- 24: Chassis Intrusion Headers (CI1, CI2)
- 25: Front Panel Audio Header
- 26: 3W Audio AMP Output Wafer
- 27: 2-Pin Buzzer Header
- 28: LVDS Panel Connector
- 29: 4-Pin CPU FAN Connector

5.2 PSG2 (212÷227) I/O connectors



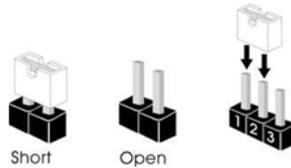
A – Power Switch
B – Audio Output
C – 2x USB 3.0
D – Gigabit LAN 2
E – Gigabit LAN 1
F – VGA
G – HDMI
H – USB 2.0

J – USB 2.0
K – Gigabit LAN 3 (optional)
L – RS232 (COM 4)
M – RS232 (COM 3)
N – RS232 (COM 2)
O – RS232/422/485 (COM 1)
P – WI-FI antenna (optional)
Q – Supply connector

5.3 Motherboard jumpers setup

The system is delivered with the optimized defaults preconfigured state and is operational. Changes in the jumpers settings may only be implemented by appropriately trained staff.

The illustration shows how jumpers are setup. When the jumper cap is placed on pins, the jumper is "Short". If no jumper cap is placed on pins, the jumper is "Open". The illustration shows a 3-pin jumper whose pin1 and pin2 are "Short" when jumper cap is placed on these 2 pins.



Jumper N°14 of the motherboard

CLEAR CMOS

CLRCMOS1 allows you to clear the data in CMOS. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord from the power supply. After waiting for 15 seconds, use a jumper cap to short pin2 and pin3 on CLRCMOS1 for 5 seconds. However, please do not clear the CMOS right after you update the BIOS. If you need to clear the CMOS when you just finish updating the BIOS, you must boot up the system first, and then shut it down before you do the clear-CMOS action. Please be noted that the password, date, time, user default profile and MAC address will be cleared only if the CMOS battery is removed.



Default PSG2 factory setting: 1-2

Chapter 6: System setup

6.1 Installing operating system

The PSG2 series are supplied together with suitable CERTIFICATE OF AUTHENTICITY (COA) related to the operating system you asked for.

The Certificate of Authenticity is the element ensuring the originality of the operating system.

The identification data concerning the type and serial number (PRODUCT KEY) are shown on the label on the side of the device.



The product key code printed on the authenticity certificate, must be specified every time you install the software. No product key is needed for embedded OS and linux.

Warning!

The removal or loss of the authenticity certificate implies the forfeiture of the operating system license contract. Using the software without regular license is a legal offence.

This motherboard supports Microsoft® Windows® operating systems: 7 / 10 (32 bit and 64 bit editions), Windows Embedded 7 and different Linux distros.

Because motherboard settings and hardware options may vary, use the setup procedures in this chapter for general reference only. Refer to your OS documentation for additional informations.

6.2 BIOS Setup

The system is delivered with the optimized defaults preconfigured state and is operational. Changes in the BIOS settings may only be implemented by appropriately trained staff.

6.3 Touchscreen driver and calibration

PSG2 touch screen devices are already calibrated by factory. No calibration is needed.

Chapter 7: maintenance

This chapter describes service/maintenance work that can be carried out by a qualified end user. Only skilled staff must make any job on the device and only after having fully read and understood the safety instructions (chapter 1.1).

7.1 Cleaning

Warning!

This device must be switched off before cleaning in order to prevent unintended functions from being triggered when handling the touch screen or pressing keys.

This device should be cleaned with a moist cloth. The cloth should be moistened with water and detergent, a screen cleaning agent or alcohol (ethanol).

The cleaning agent should be applied to the cloth beforehand, not sprayed directly on the device!

Aggressive solvents, chemicals, scouring agents, pressurized air or steam jets should never be used.

7.2 Lithium battery

The Lithium battery adopted on this motherboard contains Perchlorate, a toxic substance controlled in Perchlorate Best Management Practices (BMP). When you discard the Lithium battery in California, USA and the rest of the world, please follow the related regulations in advance.

7.3 Spare parts

It is recommended to install only original Panel spare parts.

If the customer mount not original spare parts, we can't grant the correct work of the device.