



# E70.C3K Piezo Controller

## User Manual

Version: V1.0



This document describes the following products:

- E70.C3K Piezo Controller Open loop 3 channels

# DECLARATION

## Declaration!

This user manual is a integrated user manual of E70.C3K piezo controller. Please read this user manual carefully before using this controller. Follow the instructions in the manual during use. If there is any problem, please contact us for technical support. If you do not follow this manual or disassemble and modify the product yourself, the company will not be liable for any consequences arising therefrom.

Please read the following to avoid personal injury and to prevent damage to this product or any other product connected to it. In order to avoid possible hazards, this product can only be used within the specified range.

## Notice!

Do not touch any exposed ends of the product and its accessories.

There is high voltage inside. Do not open the case without permission.

Do not connect or disconnect input, output, or sensor cables with power on.

Please keep surface of E70.C3K clean and dry, don't operate in humid or static environment.

After use, output voltage should be cleared to zero before turning off the controller switch, such as switching the servo state to the open-loop state.

## Danger!

The piezo controller described in this manual is a high-voltage device capable of outputting high currents, which can cause serious or even fatal damage if not used properly.

It is strongly recommended that you do not touch any parts that connect to the high voltage output.

Special Note: If you connect it with other products in addition to our company, please follow the general accident prevention procedures.

Operating the high-voltage amplification requires training professional operators.

## Warning!

If the voltage exceeds the PZT's tolerable range, it will cause permanent damage to the PZT. Before adding voltage to the PZT poles, it must be ensured that the positive and negative poles of the PZT are connected correctly and the operating voltage is within the allowable range of this PZT.

## Cautious!

E70.C3K housing should be installed on a horizontal surface in an area with a air flow area to prevent internal convection in the vertical direction.

Insufficient airflow can cause equipment to overheat or premature instrument damage.

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## 1.Security

### 1.1 Features

- ▶ Please keep surface of E70.C3K clean and dry, do't operate in humid or large electrostatic larger environment.
- ▶ E70.C3K is used to drive capacitive loads (such as piezoelectric ceramic actuators).
- ▶ E70.C3K cannot be used in the user manuals of other products with the same name.
- ▶ Pay attention to E70.C3K cannot be used to drive inductive loads.
- ▶ E70.C3K can be used for static and dynamic operating applications.

### 1.2 Safety instructions

E70.C3K is based on nationally recognized safety standards. Improper use may cause personal injury or damage E70.C3K. Operator is responsible for correct installation and operation of it.

- ▶ Please read the user manual in detail.
- ▶ Please immediately eliminate any malfunctions and safety hazards caused by malfunctions.

If the protective grounding wire is not connected or connected incorrectly, there will be possibility of electric leakage. If touch the piezo controller, it can cause serious or even fatal injuries.

If open E70.C3K privately, touching live parts may cause electric shock, resulting in serious or even fatal injury or damage to the E70.C3K series controller.

- ▶ Only authorized professional could open the E70.C3K series controller.
- ▶ When opening E70.C3 controller, please disconnect the power plug.
- ▶ Please do not touch any internal parts when operating in an exposed state.

### 1.3 User Manual Notes

▶ The contents described in user manual are standard product descriptions, special product parameters are not described in detail in this manual.

- ▶ The latest user manual is available for download on CoreMorrow website.
- ▶ When using E70 series piezo controller, the user manual should be placed near the system for easy reference in time. If the user manual is lost or damaged, please contact our customer service department.
  - ▶ Please timely add all the information given in the manufacturer's user manual, such as supplements or technical descriptions.
  - ▶ If your user manual is incomplete, it will miss a lot of important information, cause serious or fatal injuries, and cause property damage. You have read and understood the contents of the user manual before installing and operating the E70.C3K piezo controller.
  - ▶ Only authorized professionals who meet the technical requirements can install, operate, maintain and clean the E70.C3K piezo controller.

## 2. Features and Applications

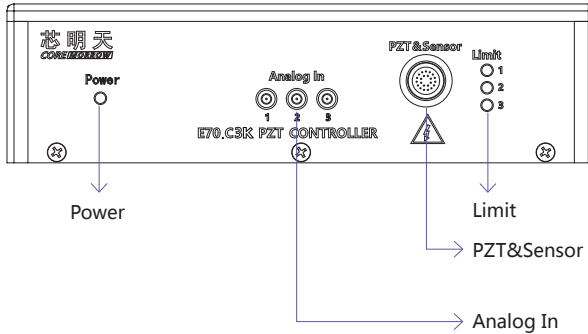
E70.C3K piezo controller is a 3-channel piezo controller with small size, high power, low power consumption, high bandwidth and low ripple noise. The controller uses a dedicated operational amplifier circuit to ensure high-voltage and high-current output capability. The reliable anti-interference design ensures the high-frequency response of the controller.


### 2.1 Series

Model	Description
E70.C3K	<ul style="list-style-type: none"><li>• Piezo controller</li><li>• 3channels</li><li>• Open loop</li><li>• Software control and analog input control</li></ul>

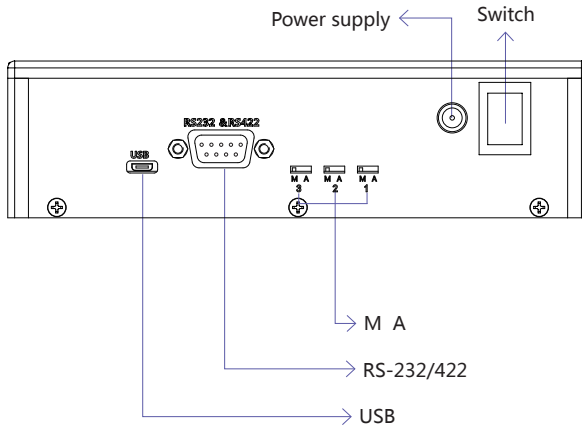
## 2.2 Appearance

### 2.2.1 Front Panel



Symbol	Function	Description
Power 	LED green	Power indicator is always on, the E70 is in working condition.
PZT&Sensor	LEMO-ECG.1B.314	Output voltage to drive piezo actuator(PZT) Sensor input signal
Analog In	SMB	Set DIP switch/software to select control mode. Analog input is used as the target value of the input voltage. The input voltage can be an analog signal generated by computer (such as DA card). You can use signal generator, analog signal source to connect.
Limit	LED red	When output current of channel exceeds set value, the corresponding over-current indicator lights up.

## 2.2.2 Rear Panel



Symbol	Function	Description
RS-232/422	D-SUB 9	Set DIP switch/software to select control mode. Connect the computer with the controller interface module through RS-232/422 port access terminal to realize computer control.
USB	Micro	Set DIP switch/software to select control mode. Connect the computer to the controller interface module through the USB port access terminal to realize computer control.
Power supply	DC-022B (ø2.5)	Power connector socket. Connect via power adapter or DC power supply.
Switch	KCD1-102	Control the power on and off of the piezo controller.
M A 1	MSK-13C01	Toggle switch position to switch digital/analog control. The function description is shown in the table below.
M A 2	MSK-13C01	Toggle switch position to switch digital/analog control. The function description is shown in the table below.
M A 3	MSK-13C01	Toggle switch position to switch digital/analog control. The function description is shown in the table below.

Switch	Position	Function
1	A	Output control analog input
	M	Software control optional digital/analog input
2	A	Output control analog input
	M	Software control optional digital/analog input
3	A	Output control analog input
	M	Software control optional digital/analog input

## 3. Checking

E70.C3K piezo controller has been carefully checked for electrical and mechanical aspects before shipment. When you receive the device, unpack and inspect the surface of the system for any obvious signs of damage. If it is damaged, it may be damaged during transportation, please contact our customer service department in time. Check whether the accessories are complete according to the packing list. Please keep the original packaging materials for subsequent maintenance and using.

## 4. Installation

### 4.1 Installation Precautions

**Note!** Improper installation of the E70.C3K piezo controller may cause personal injury or damage the E70.C3K piezo controller!

- ▶ Installation and using of E70.C3K should be close to the power source, so that the power plug can be easily and quickly disconnected from the main power source.
- ▶ Use included power cord to connect E70.C3K piezo controller system.
- ▶ If power cord provided by our company must be replaced, please use power cord



with large enough size and effective grounding.

## 4.2 Ensure ventilation

**Note!** Overheating of equipment due to high temperature may damage the E70.C3K!

- ▶ Ensure that the cooling area of the controller is sufficiently cooled.
- ▶ Ensure that there is adequate ventilation equipment.
- ▶ Keep ambient temperature to non-critical level( $<50^{\circ}\text{C}$ ).
- ▶ Temperature of cooling surface of controller $>50^{\circ}\text{C}$  , it is recommended to take external heat dissipation measures to improve the stability of the controller.

## 4.3 Connect power

Use power adapter (output range  $+20\text{V}\sim+30\text{V}/3\text{A}$ ) to connect to power supply interface of the E70.C3K power supply.

## 4.4 Cable connection

- ▶ When the power supply is disconnected, connect the PZT&Sensor cable to the E70.C3K controller interface. Note that the number on the piezoelectric actuator corresponds to the number of the controller.
- ▶ Analog control mode, when the signal source (signal generator, analog signal source, DA control card) output is 0, connect the SMB cable to the SMB interface of the E70.C3K controller.
- ▶ Connect to the computer control mode of PC, connect to PC through the cable connection USB interface or RS-232/422 interface socket.

## 5. Operating

### 5.1 Control mode optional(Output control)

▶ **Analog mode**

Toggle Switches	Setting
M A	A

▶ **Digital mode**

Toggle Switches	Setting
M A	M

### 5.2 Software mode optional(Software control)

Toggle Switches	Setting
1	M
2	M
3	M
4	M

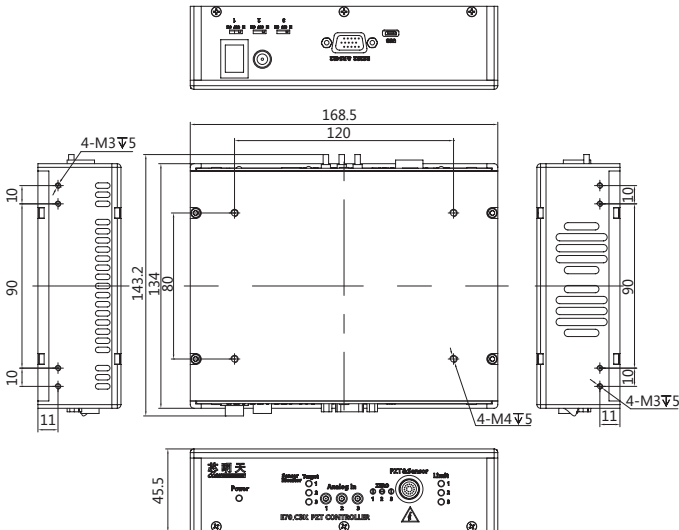
## 6.Parameter

### 6.1 Environmental conditions

The using environment of E70.C3K series controller:

Environmental conditions	Condition description
Application	For room use only
Environment humidity	Highest relative humidity 80%, temperature can reach 30°C Highest relative humidity 50%, temperature can reach 40°C
Operating temperature	0 °C — +50 °C
Storage temperature	-10 °C — +85 °C

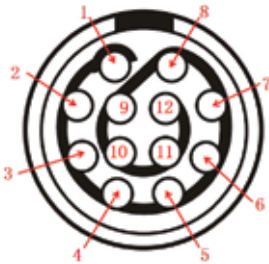
### 6.2 Drawing



## 6.3 Pin Definition

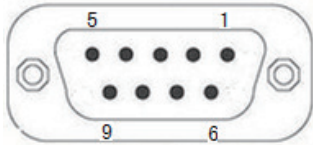
### 6.3.1 PZT & Sensor

No.	Pin Definition
1	-
2	-
3	-
4	HV_GND
5	PZT OUTPUT 3
6	PZT OUTPUT 2
7	PZT OUTPUT 1
8	
9	-
10	-
11	-
12	-



### 6.3.2 RS-232/422

No.	Pin Definition
1	not used
2	RS-232 TxD
3	RS-232 RxD
4	not used
5	GND
6	RS-422 RxD+
7	RS-422 RxD-
8	RS-422 TxD+
9	RS-422 TxD-



## 7. Power Calculation

- Average output ( Sine wave operation mode )

$$P_a \approx U_{pp} \cdot U_s \cdot f \cdot C_{piezo}$$

$P_a$ =Average output[W]

$C_{piezo}$ =Piezo actuator capacitance[F]

$U_{pp}$ =Peak and peak drive voltage [V]

$f$ =Operating frequency of the sine wave[Hz]

$U_s$ =Drive voltage[V] ( (  $V_{s+}$  ) - (  $V_{s-}$  ) )

## 8. Maintenance, storage, transportation

### 8.1 Cleaning measures

Note! The PCB board of the function module in the E07.C3K system is an ESD (electrostatic discharge) sensitive device. Take precautions against any static build-up of these devices before use to avoid contact with circuit component leads and PCB wiring. Before touching any electronic components, the body first touches the grounding conductor to discharge static electricity, ensuring that any type of conductive particles (metal, dust or debris, pencil lead, screws) enter the device. Be careful not to drop the equipment when cleaning, to avoid any form of mechanical shock!

Disconnect the power plug of the E07.C3K system before cleaning.

Prevent cleaning fluid and any liquid from entering the system module to avoid short circuits.

The surface of the system chassis and the front panel of the module, please do not use an organic solvent for surface wiping.

### 8.2 Transportation and storage

This product is packed in carton. Transportation must be carried out under product packaging conditions, and direct rain and snow, direct contact with corrosive gases and strong vibrations should be avoided during transportation.

The instrument can be transported under various conditions of normal transportation, and should avoid damp, load, collision, extrusion, irregular placement and other adverse conditions during

transportation.

If the instrument is not used for a long time, the instrument should be packaged and stored.

The instrument should be stored in a non-corrosive atmosphere and in a well ventilated, clean room.

In the process of transportation, storage and use, attention should be paid to fire prevention, shockproof, waterproof and moisture proof.

## 9.Contact us

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