

# E51.B3S Series Piezo Controller

## User Manual

Version: V1.0



This document describes the following products:

- E51.B3S-H1 Piezo Controller SGS sensor
- E51.B3S-I1 Piezo Controller SGS sensor

# DECLARATION

## Declaration!

This user manual is a integrated user manual of the E51.B3S series piezoelectric 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 E51.B3S 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 piezoelectric power amplifier 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!

E51.B3S housing should be installed on a horizontal surface in an area with a 3CM 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 Introduction

- ▶ Please keep surface of E51.B3S clean and dry.
- ▶ Do not operate in the humid or static environment.
- ▶ E51.B3S is used to drive capacitive loads (such as piezo actuators).
- ▶ E51.B3S should not be used in user manuals of other products of the same name.
- ▶ Pay special attention that E51.B3S cannot be used to drive resistive or inductive loads.
- ▶ E51.B3S could be used for static and dynamic operating applications.

### 1.2 Safety Instructions

E51.B3S is based on the national safety standard. Improper use may cause personal injury or damage to the piezo controller. The operator is responsible for the correct installation and operation of the piezo controller.

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

If the protective ground wire is not connected or connected incorrectly, there will be a possibility of leakage. If you touch the E51.B3S piezo controller, it may cause serious or even fatal injuries.

If the piezo controller housing is opened without permission, touching the live parts may cause electric shock, resulting in serious or even fatal injury or damage to the piezo controller.

▶ Only authorized professional technicians with corresponding qualifications could open the piezo controller.

- ▶ When opening the piezo controller housing, you need to disconnect the power plug.
- ▶ Please do not touch any internal parts when operating under bare conditions.

### 1.3 Notes

▶ The contents in the user manual are all standard descriptions, and the customized parameters are not explained in detail in this manual.

- ▶ The latest user manual is available for download on CoreMorrow website.
- ▶ When operating the E51.B3S, the user manual should be placed near the system for easy reference in time. If the user manual is missing or damaged, please contact CoreMorrow 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. Please read and understand the content in the user manual before installing and operating the E51.B3S.
- ▶ Only professionals who are authorized to meet the technical requirements could install, operate, maintain and clean the E51.B3S.

## 2. Introduction

### 2.1 Features

- ▶ 3 channels small size
- ▶ 20~30V power supply
- ▶ Peak current 180mA
- ▶ Ave current 25mA
- ▶ Unload bandwidth 1KHz
- ▶ Output short circuit protection

### 2.2 Applicaitons

- ▶ Driving piezo actuators
- ▶ 2D driving piezo tiptilt platform
- ▶ 3D driving piezo motion table

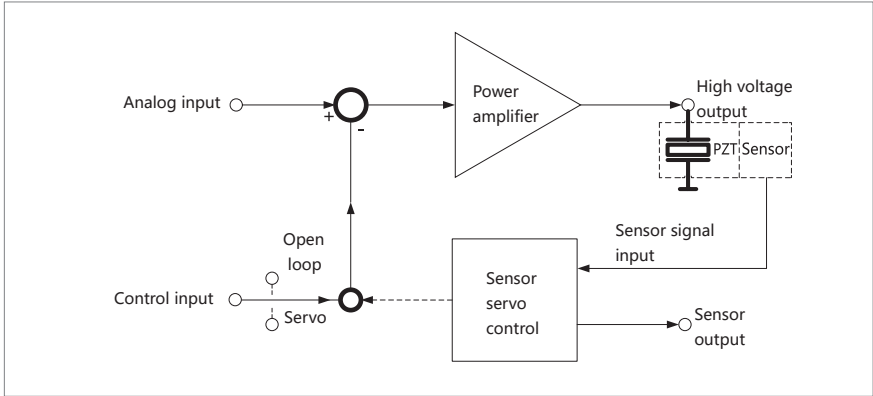
### 2.3 Order information

- ▶ E51.B3S-H1—— 3 channels closed loop
- ▶ E51.B3S-I1—— 2 channels closed loop, CH3 constant voltage output

Accept customized according to requirements:

- ① 12bit gain/-20 ~ 120V output voltage (default)
- ② 15bit gain/-20 ~ 150V output voltage

### 3. Driving Principle



### 4. Power Calculation

- Average output (Sine wave operation mode)

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

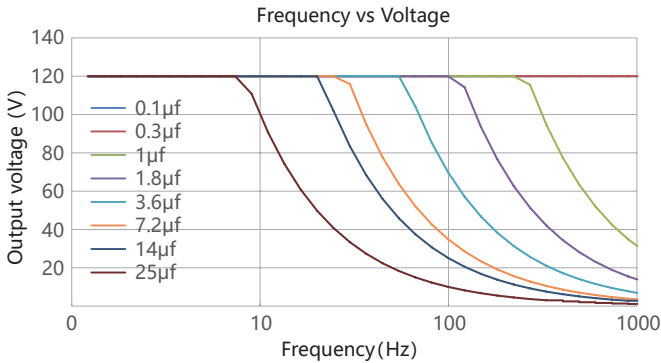
$P_a$  = Average output [W]

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

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

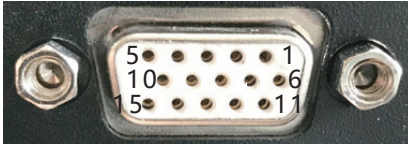
$f$  = Operating frequency of the sine wave [Hz]

$U_s$  = Drive voltage [V] (  $(V_s+) - (V_s-)$  )



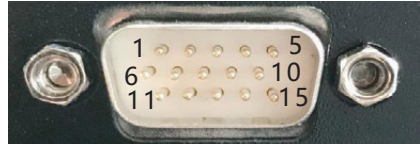
## 5. Panel Introduction

Drive output and sensor input



No.	Pin definition
1	CH 2 drive output
2	CH 3 drive output
3	CH 3 sensor input -
4	CH 3 sensor input +
5	Sensor power supply: DC 10V
6	CH 1 drive output
7	Drive output ground
8	Sensor power supply: DC 10V
9	Sensor power supply ground
10	Sensing power supply ground
11	Drive output ground
12	CH 2 sensor input -
13	CH 2 sensor input +
14	CH 1 sensor input +
15	CH 1 sensor input -

Power supply and control



No.	Pin definition
1	+24V power supply ground
2	CH 2 sensor control switch
3	AGND
4	AGND
5	AGND
6	+24V power supply
7	CH 3 servo control switch
8	CH 1 sensor control switch
9	CH 1 analog input
10	CH 2 analog input
11	CH 3 sensor output
12	CH 2 sensor output
13	CH 1 sensor output
14	AGND
15	CH 3 analog input

## 6. Notes and suggestions

- ▶ E51.B3S cannot be used to drive inductive loads. If the inductive loads are driven, the product may be damaged.
- ▶ When the power is high (the sum of the average current of the drive output is greater than 40mA), please pay attention to heat dissipation so that the temperature of the shell is kept below 65°C .

## 7. Maintenance, Storage, Transportation

### 7.1 Cleaning measures

Note! The PCB board of the function module in the E51.B3S 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 E51.B3S 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.

### 7.2 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.

Note: Pay attention to frost when the E51.B3S series piezo controller is powered on in winter to avoid burning the controller!

▶ Check whether the controller has frost before power on (frost usually occurs when moving from outdoor to indoor)

▶ If the controller is frosted, wipe or dry it, and store it indoors for more than two hours before powering it up.

## 8. Service and Maintenance

### 8.1 Disposal

▶ When disposing of old equipment, please abide by the national regulations and local regulations. Please dispose of the old equipment properly. Please contact CoreMorrow for the upgrade and replacement of old equipment in order to meet the customer's handling of system products.

▶ If you have an old device or an unusable device that cannot be handled, you can ship it to the following address:

▶ Address: 1F, Building I2, No.191 Xuefu Road, Nangang District, Harbin, Heilongjiang

### 8.2 After-sales Service

▶ E51.B3S does not contain user repairable components.

▶ E51.B3S must be returned to factory for any service and repair.

▶ Any part of E51.B3S is dismantled, there will be no warranty service.

▶ E51.B3S is a precision instrument which should be handled with care.

▶ In case of any problem, please record the problem and contact CoreMorrow to be repaired by professional technicians.

## 9.Contact us

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**CoreMorrow Official and CTO WeChat are below:**

