



# E51.D12S Series Piezo Controller

## User Manual

Version: V1.0



This document describes the following products:

- E51.D12S Servo controller SGS sensor 18 channels

# DECLARATION

## Declaration!

This user manual is a integrated user manual of the E51.D12S 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.D12S 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.D12S 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.D12S clean and dry.
- ▶ Do not operate in the humid or static environment.
- ▶ E51.D12S is used to drive capacitive loads (such as piezo actuators).
- ▶ E51.D12S should not be used in user manuals of other products of the same name.
- ▶ Pay special attention that E51.D12S cannot be used to drive resistive or inductive loads.
- ▶ E51.D12S could be used for static and dynamic operating applications.

### 1.2 Safety Instructions

E51.D12S 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.D12Spiezo 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 E51.D12S series controller, please 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.D12S, 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

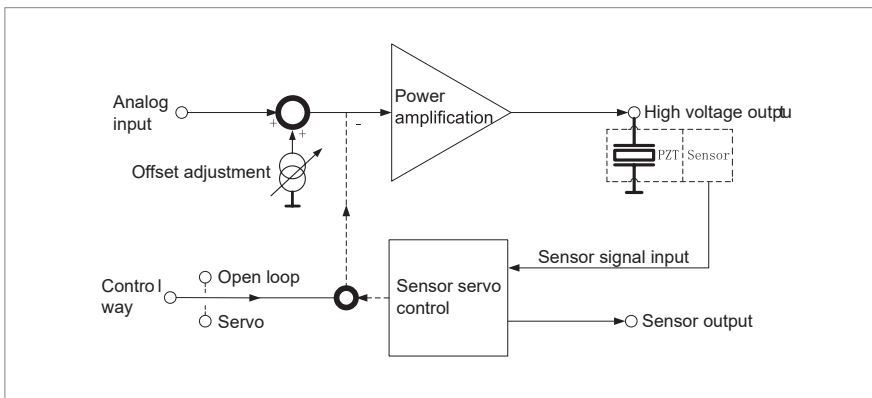
supplements or technical descriptions.

- ▶ 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.D12S.
- ▶ Only professionals who are authorized to meet the technical requirements could install, operate, maintain and clean the E51.D12S.

## 2. Introduction

- ▶ Control 6 mirrors, 12 channels controlled
- ▶ DC 24V power supply
- ▶ Peak current 180mA
- ▶ Ave current 25mA
- ▶ Unload bandwidth 1KHz
- ▶ RS-422 communication control

## 3. Driving Principle





## 4.Checking

E51.D12S 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.



## 5.Installation

### 5.1 Installation Precautions

**Note!** Improper installation of the E51.D12S series piezo controller may cause personal injury or damage the E51.D12S series piezo controller!

- ▶ Installation and using of E51.D12S 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 E51.D12S series piezo controller system.
- ▶ If power cord provided by our company must be replaced, please use power cord with large enough size and effective grounding.

### 5.2 Ensure Ventilation

**Note!** Overheating of equipment due to high temperature may damage the E51.D12S controller!

- ▶ 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°C ).
- ▶ Temperature of cooling surface of controller>50 °C , it is recommended to take external heat dissipation measures to improve the stability of the controller.

### 5.3 Connect power

Use power adapter to connect to power supply interface of the E51.D12S power supply.

### 5.4 Cable Connection

- ▶ When the power supply is disconnected, the swing mirror cable is connected to the

E51. When the power supply is disconnected, connect the PZT&Sensor cable to the E51.D12S controller interface. Note that the number on the piezo actuator corresponds to the number of the controller.

► Connect to the computer control mode of PC, connect to PC through the cable connection USB interface or RS-232/422 interface socket.

## 6. Appearance

### 6.1 Front Panel



Symbol	Function	Description
POWER	Latching switch	Power switch. Press power to turn on the green light. Power off, lights off.

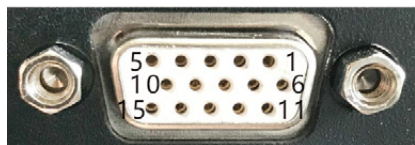
### 6.2 Rear Panel



Symbol	Function	Description
CH1-CH6	DB15-HD	Mirror connection
24V DC	DC-044B-J( 2.5)	Power connector socket. Connect through a power adapter or a DC power supply.
RS-422	D-SUB 9 hole socket	The computer is connected with the controller interface module through RS-422 port access terminal to realize computer control.

## 6.3 Interface

DB15-HD interface(Drive output and sensor connector)



No.	Pin definition	No.	Pin definition
1	CH2 drive output	9	Sensing power supply ground
2	CH3 drive output	10	Sensing power supply ground
3	CH3 sensor input signal -	11	Constant voltage drive output
4	CH3 sensor input signal +	12	CH2 sensor input signal -
5	Sensor power supply: DC 10V	13	CH2 sensor input signal +
6	CH1 drive output	14	CH1 sensor input signal +
7	Drive output ground	15	CH1 sensor input signal -
8	Sensor power supply: DC 10V		

RS-422 interface

No.	Pin definition	
1		
2		
3		
4		
5	GND	
6	RS-422 RxD+	
7	RS-422 RxD-	
8	RS-422 TxD-	
9	RS-422 TxD+	



## 7. Operating Calculation

- Average output (Sine wave operation mode)

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

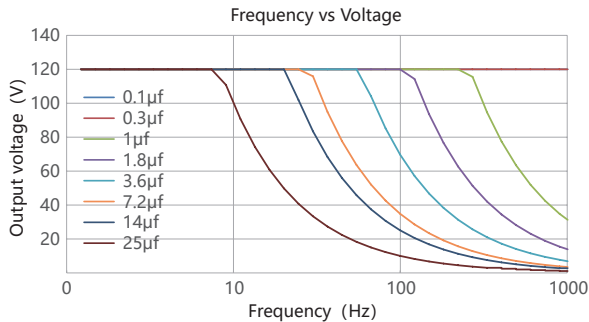
$P_a$ =Average output[W]

$C_{piezo}$ =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 E51.D12Ssystem 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.D12S 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. Service and Maintenance

### 9.1 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

## 9.2 After-sales Service

- ▶ E51.D12S does not contain user repairable components.
- ▶ E51.D12S must be returned to factory for any service and repair.
- ▶ Any part of E51.D12S is dismantled, there will be no warranty service.
- ▶ E51.D12S 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.

## 10.Contact us

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

