零差云控®

ePower-Board User Manual

Version 1.3

Build Robot Fast

https://en.zeroerr.cn

What's New

0.1 ePower-Board User Manual Version 1.3 Update

0.1.1 Format Enhancement

(1) Applied the NEW standard English format;
(2) Enhanced Table & Graphic layout, quality.

0.1.2 Content Enhancement

(1) Enhanced Table 2-2 Technical Data;
(2) Enhanced Table 3-1 The Definition of Electrical Interface;
(3) Enhanced Table 3-2 Specification of Each Rotary Actuator;
(4) Enhanced description of the paragraph in Section 4.2.

0.1.3 Added Content

(1) Chapter What's New;
(2) Chapter Content Modification Markings;
(3) Table 3-3 Specification of Each Robotic Arm;
(4) Declaration;
(5) About us.

Content Modification Markings

0.2 New Content

Example:

★ Thank you for choosing ZeroErr's eRob series rotary actuator module. We appreciate your trust and confidence in our product. To ensure your satisfaction and enhance your user experience, we have carefully designed this user manual to provide you with all the necessary information for operating and maintaining your eRob rotary actuator module.

0.3 Enhanced Content

The enhanced content in document of the current version is marked with a green strip and Δ symbol.

Example:

Δ If you have any questions or encounter any issues while using eRob rotary actuator module, please do not hesitate to reach out to our customer support team. We are here to assist you and provide timely assistance to ensure that you have a smooth and enjoyable experience.

Record of Revisions

Version	Iteration	Description	Date
1.3	1	Applied the NEW standard English format; Enhanced Table & Graphic layout, quality; Enhanced Table 2-2 Technical Data; Enhanced Table 3-1 The Definition of Electrical Interface; Enhanced Table 3-2 Specification of Each Rotary Actuator; Enhanced description of the paragraph in Section 4.2; Chapter What's New; Chapter Content Modification Markings; Table 3-3 Specification of Each Robotic Arm; Declaration; About us.	Jan/12/2024

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Symbols and Abbreviations

0.4 Symbols

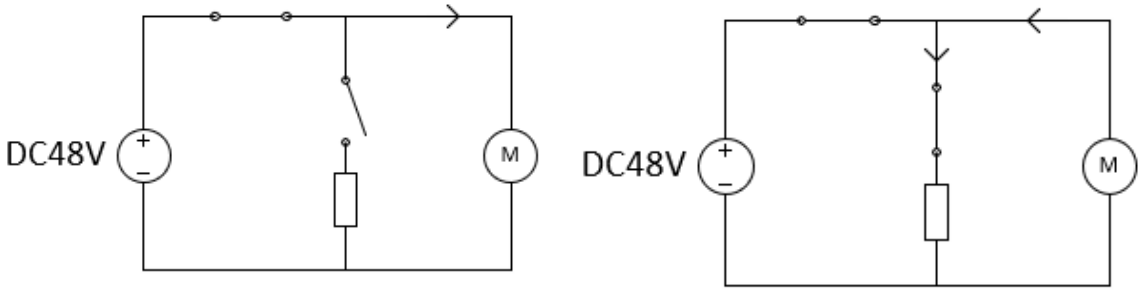
Symbol	Definition
$°C$	Celsius Degree
mm	millimeter
%RH	Relative Humidity
V	Voltage
V_{DC}	DC Voltage
W	Watt
Ω	Resistance

0.5 Abbreviations

Abbreviation	Definition
aka	also known as
etc.	and so forth
C	capacitor
IP	ingress protection
R	resistor
Spec.	specification
VDC	DC Voltage

Chapter 1 Introduction of ePower-Board

ePower-Board is a special device dedicated to the kinetic energy recovery processing of regenerative braking when eRob rotary actuator works under high rotational speed and heavy load, so as to avoid the power voltage spike caused by the regenerative kinetic energy feedback, which may cause the error reports of too high bus voltage and may further cause the shutdown of rotary actuator.
When the eRob is powered by a 48V switching power supply, the operating circuit of adding an ePower-Board can be simplified as Figure 1-1a and Figure 1-1b.



(a) Resistor is disconnected during $V_{DC} < 50V$ (b) Resistor is connected during $V_{DC} > 51V$

Figure 1-1 Resistor action under different voltage

The function of ePower-Board is that when the circuit loop is in kinetic energy recovery processing, the excess energy can be dissipated through the resistor, thereby avoiding the power supply voltage spike in the process of the kinetic energy feedback. However, the ePower-Board cannot be connected to the circuit for a long time, otherwise more heat will be generated continually, resulting in device damage, circuit failure or unnecessary current consumption. Therefore, it is recommended to design a reliable control logic of connecting leak resistors. When setting the permissible maximum bus voltage to 55V, and setting the permissible minimum bus voltage to 44V, the control logic of connecting the ePower-Board is that when the resistor is disconnected during $V_{DC} < 50V$ (as shown in Figure 1-1a), the power supply only outputs electrical energy to the motor; when the resistor is connected during $V_{DC} > 51V$ (as shown in Figure 1-1b), the excess electrical energy is consumed through the resistor.

Chapter 2 Technical Information

2.1 Physical Specification

Table 2-1 Physical Specification

Feature	Specification	Description
Weight	66.5	
Size (mm)	75 × 80 × 22.5	Refer to Figure 4-1a and Figure 4-1b

2.2 Technical Data

Table 2-2 Technical Data

Feature	Unit	Value	Description
Input Voltage	VDC	< 50	When the input voltage exceeds 50V, the ePower-Board will keep working continuously and cause overheat.
Enable Regenerative Braking Voltage	VDC	51	When $V_{DC} \geq 51V$, the regenerative braking will be enabled.
Disable Regenerative Braking Voltage	VDC	50	When $V_{DC} \leq 50V$, the regenerative braking will be disabled.
Power of Brake Resistor	W	50	The specification refers to the built-in braking resistor specification of the ePower-Board. It can meet the requirements for the use of eRob70/80/90 series eRob modules under rated conditions, and the ePower-Board does not require additional heat dissipation measures. It can be installed normally and cooled naturally. However, if used in conjunction with eRob110/142/170 series eRob modules, additional heat dissipation measures need to be added (see Section 4.2)
Resistance of Brake Resistor	Ω	5	

2.3 Environment Condition

Table 2-3 Physical Specification

Feature	Specification
Operating Temperature	-20~$60°C$
Storage Temperature	-30~$60°C$
Ingress Protection Rating	IP30
Use\Storage Humidity	20%~80%RH (*No Condensation*)

NOTE: Make sure that the operating environment is free of dust, metal powder, corrosive gas, flammable gas, oil mist, etc.

Chapter 3 Wiring Instruction

3.1 Definition of Electrical Interface

The electrical interface of ePower-Board is as shown in Figure 3-1 and the definition of the electrical interface is as shown in Table 3-1.

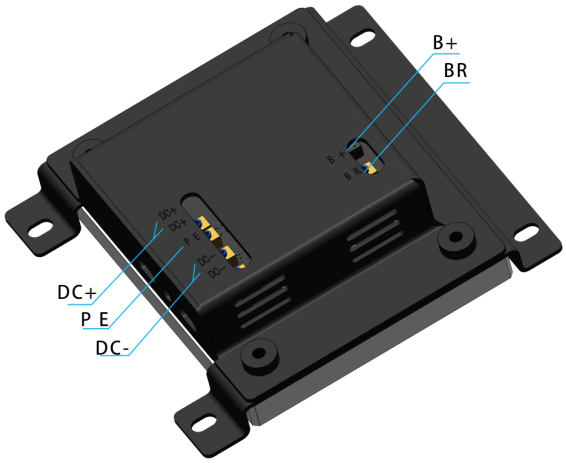


Figure 3-1 The Electrical Interface

Table 3-1 The Definition of Electrical Interface

Pin	Terminal Label	Terminal Function	Terminal Specification
1	DC+	Connect to the positive pole of the 48VDC power supply.	• Frame-Type; • Crimped Terminal; •Wiring Hole: Φ1.9*mm*; •Wiring Tool: 0.9mm HEX Screwdriver, aka Allen Key/Wrench.
2	PE	Connect to the housing EGND.	
3	DC-	Connect to the negative pole of the 48VDC power supply.	
4	BR	Connect to the brake resistor.	
5	B+		

3.2 The Wiring and Instruction

The wiring diagram of DC48V power, ePower-Board and rotary actuator is as shown in Figure 3-2. The power wiring methods of rotary actuator, please refer to ”eRob Rotary Actuator User Manual” Chapter 6 Cable Wiring Among Rotary Actuators. The recommended specification of DC48V power, electrolytic capacitor C and brake resistor R (as shown in Figure 3-2)

- For each model of eRob rotary actuator are as shown in Table 3-2.
- For each model of robotic arm are as shown in Table 3-3.

NOTE: If circuit breaker is connected before the eRob module power supply terminal, it is necessary to connect a buffer electrolytic capacitor after this circuit breaker (reference specification: 1000uF, 100V).

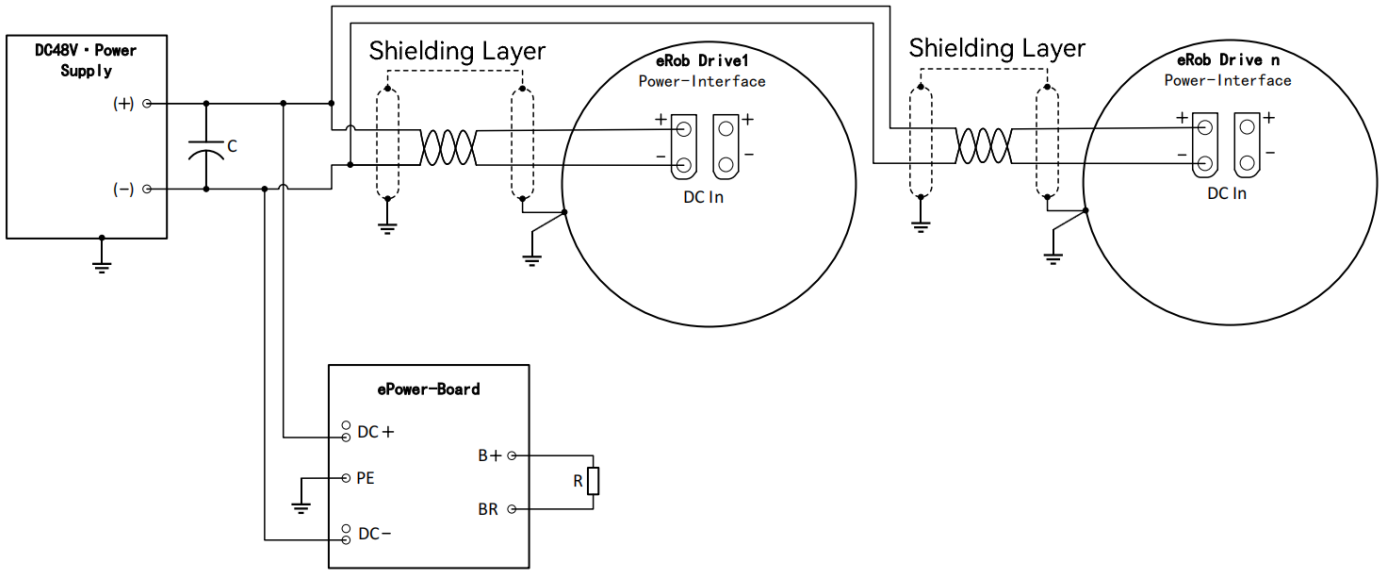


Figure 3-2 ePower-Board Wiring Diagram

Table 3-2 Specification of Each Rotary Actuator

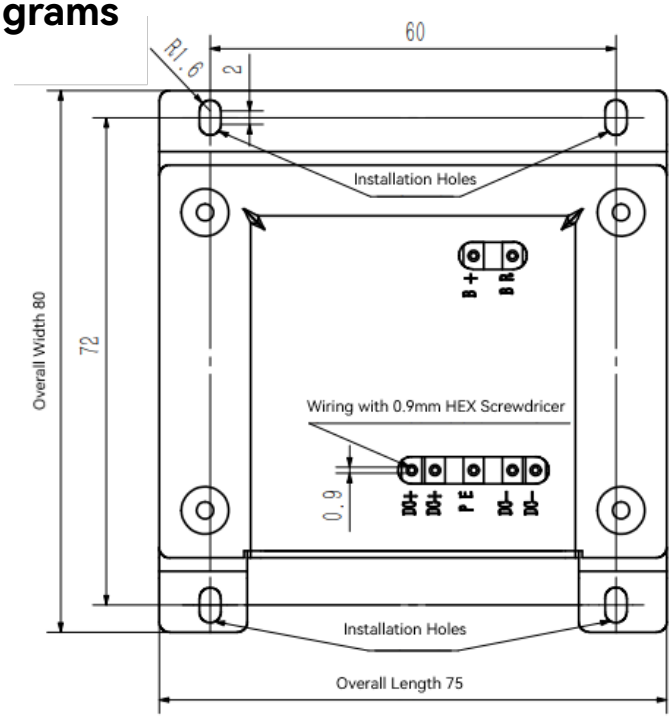
Model	DC Power Supply Spec.	Brake Resistor Spec.	Electrolytic Capacitor Spec.
eRob70	100W, 48VDC	50W, 5Ω	12000μF, 60V
eRob80	200W, 48VDC	50W, 5Ω	12000μF, 60V
eRob90	400W, 48VDC	50W, 5Ω	36000μF, 60V
eRob110	800W, 48VDC	300W, 5Ω	96000μF, 60V
eRob142	1200W, 48VDC	300W, 5Ω	96000μF, 60V
eRob170	1200W, 48VDC	300W, 5Ω	96000μF, 60V

Table 3-3 Specification of Each Robotic Arm

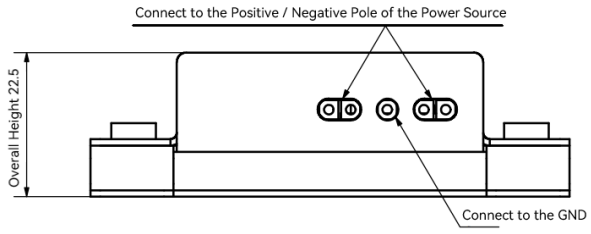
Arm Model	DC Power Supply Spec.	Brake Resistor Spec.	Electrolytic Capacitor Spec.
3kg Arm	400W, 48VDC	50W, 5Ω	12000μF, 60V
5kg Arm	800W, 48VDC	100W, 5Ω	96000μF, 60V
10kg Arm	1500W, 48VDC	300W, 5Ω	96000μF, 60V
20kg Arm	3000W, 48VDC	300W, 5Ω	96000μF, 60V

Chapter 4 Installation Instruction

4.1 Dimension Diagrams



(a) The TOP View



(b) The FRONT View

Figure 4-1 ePower-Board Under Different Viewing Angle

4.2 Installation Method

Δ The installation surface of the power dissipation module is on the side of the braking resistor aluminum casing, as shown in Figure 4-2.

NOTE: when the ePower-Board is working, it will generate heat and even cause the resistor to become hot. Therefore, do no touch it directly. The installation operation should be under good ventilation and heat dissipation condition, such as a metal board with large area and a control cabinet with cooling fans.

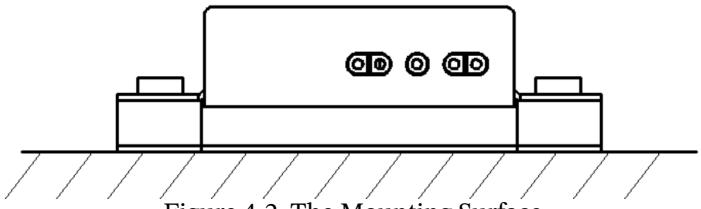


Figure 4-2 The Mounting Surface

Declaration

Our product is not designed or intended for use outside the environmental limitations and operating parameters expressly stated on the product's datasheet. Products are not designed or intended for use in medical, military, aerospace, automotive or oil, gas applications or any safety-critical applications where a failure of the product could severe serious environmental or property damage, personal injury, or death. Any use in such applications must be specifically agreed to seller in writing and is subject to such additional terms as the seller may impose in its sole discretion. Use of products in such applications is at buyer's own risk, and buyer will indemnify and hold harmless seller and its affiliates against any liability, loss, damage, or expense arising from such use. Information contained in this datasheet was derived from product testing under controlled laboratory conditions and data reported thereon is subject to the stated, then to tolerances and variations, or if none are stated, then to tolerances and variations consistent with usual trade practices and testing methods. The product's performance outside of laboratory conditions, including when one or more operating parameters is at its maximum range, may not conform to the product's datasheet. Further, information in the product's datasheet does not reflect the performance of the product in any application, end-use or operating environment buyer or its customer may put the product to. Seller and its affiliates make no recommendation, warranty, or representation as to the suitability of the product for buyer's application, use, end-product, process, or combination with any other product or to any results buyer or its customer might obtain in their use of the product. Buyer should use its own knowledge, judgment, expertise, and testing in selecting the product for buyer's application, and-use and/or operating environment, and should not rely on any oral or written statement, representation, or samples made by seller or its affiliates for any purpose. Except for the warranties expressly set forth in the seller's terms and conditions of sale, seller makes no warranty express or implied with respect to the product, including any warranty of merchantability or fitness for any particular purpose, which are disclaimed and excluded. All sales are subject to seller's exclusive terms and conditions of sales which, where the seller is another person, are available on request, and in each case, are incorporated herein by reference, and are exclusive terms of sale. Buyer is not authorized to make any statements or representations that expand the environmental limitations and operating parameters of the products, or which imply permitted usage outside of that expressly stated on the datasheet or agreed to in writing by seller.

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ZEROERR CONTROL CO.,LTD

About Us

ZeroErr Control Co.,Ltd was founded in December 2016 in ShenZhen, China. ZeroErr stands for Zero Error Motion Control.

We design, develop and manufacture rotary actuators and encoders which are widely used in automation industry, collaborative robots, surgical robots and bionic robots. More than thousands of customer groups in the global use simple combinations with our products makes wide range of applications.

ZeroErr is committed to providing reliable quality standard production, cost-effective products and quick response technical support, enabling our customers to accelerate innovation, improve productivity and achieve extraordinary application performance.

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