佐途 JORTOO®

# ZT-ARD-2P-EXL Automatic Rescue Operation Device for Elevators in the Tuan series

# Use Instructions

Xiamen Zhuo Tu Electronics Technology Co., Ltd.

File Number: ARD-2P-220303
Version Number: V22.01

# Catalogue

# 1、 Precautions Before Installation

- 1.1 To ensure proper installation, calibration, and operation of the ARD (Elevator Automatic Rescue Operation Device), please carefully read this product manual first.
- 1.2 This product model is exclusively intended for use in elevator control systems equipped with emergency power-off operation functionality.
- 1.3 To prevent personnel injuries and equipment accidents, the following safety measures must be implemented during the installation, commissioning, and maintenance of this product:

  1.3.1 Before installing or connecting this product, always disconnect the elevator's main power supply.

  1.3.2 Ensure all elevator components are properly grounded.

  1.3.3 Follow all instructions and warnings in this manual carefully to prevent injuries to installation or maintenance personnel and avoid damaging elevator equipment.

  1.3.4 Before powering on and performing debugging, ensure the connection between the ARD and the elevator electrical system is correct.

  1.3.5 The installation, connection, and debugging of this product shall be performed by qualified professionals in the elevator industry to prevent potential hazards.
- 1.4 This manual outlines the installation and connection procedures for the ARD, describes signal terminals and jumper cap configurations, covers debugging and operation methods, as well as common faults and troubleshooting solutions. To ensure safe operation of the elevator automatic rescue system, this manual must be carefully read to prevent personnel injuries or damage to the elevator system due to improper usage.
- 1.5 Before performing power-off maintenance on the elevator, 반드시 turn off the ARD's power switch; failure to do so may result in injury due to unintended ARD startup.
- 1.6 No separate notice will be given for any updates to this manual.

# 2、 Brief Introduction

## ➢ 2.1 Product Introduction

This device is a dedicated elevator safety system designed to enhance elevator safety performance. It utilizes the elevator's existing control and frequency conversion systems without developing an independent drive system separate from the original control system, thus featuring simple installation and wiring, easy debugging, and high cost-effectiveness. During operation, a power outage or system failure could cause physical and psychological harm to passengers trapped inside the elevator. In such cases, the device automatically activates within a preset time frame, supplying the required electrical power and providing emergency operation signals; the elevator then employs its built-in power-outage emergency function to slowly move the car toward the light-load direction to the nearest floor station, level it, open the doors, and evacuate passengers.

## ➢ 2.2 Product Appearance

# 3、 Functional Characteristics

## 3.1 Product Function

- 3.1.1 Under normal operating conditions, the external power grid remains in standby mode while supplying power to the battery bank. In case of a power outage, the ARD activates and automatically switches back to standby mode upon restoration of power supply.
- 3.1.2 The duration from external power outage to the operational activation of ARD may be determined based on actual requirements, thereby addressing the inconsistency in power-off reset times among different frequency converters.
- 3.1.3 The operating time of ARD can be configured based on floor spacing and rescue speed, with options for extended operation durations (factory default: 3 minutes) to address the issue where elevators require prolonged travel times between floors due to excessive shaft length.
- 3.1.4 All output signals of the ARD are programmatically controlled to prevent erroneous signal responses from interfering with elevator operation.

## 3.2 Product Features

- **3.2.1 Smart Charging**

  Under normal power grid conditions, the ARD remains in charging standby mode. The charging process progresses through three stages: constant-current charging (when battery level is low), constant-voltage charging (when battery capacity approaches saturation), and float charging (after full charging).

- **3.2.2 Intelligent Detection of Grid Power Supply**

  The new national standard requires that when the switch in the elevator machine room's distribution box is manually opened, the ARD must not activate. To comply with this requirement, ARDs could previously only be installed at the front end of the distribution box, which increased installation complexity, cable length, and consequently elevator costs. This ARD model features intelligent detection of whether the power interruption is caused by manual operation or grid failure, and can be installed adjacent to the elevator control cabinet rather than at its front end. The new standard

functionality can be enabled via the shorting cap JP6 on the internal control board; installation requires either connecting it directly to the front end of the control cabinet or to the front end of the distribution box.

### 3.2.3 Dry contact output for fault signals

During an ARD fault, the dry contact output signal alerts the elevator control system.

### ➢ 3.2.4 Automatic Battery Maintenance

If the power grid remains uninterrupted for an extended period, the battery will remain in a saturated state, leading to reduced lifespan and capacity. The automatic battery maintenance function can extend its service life by performing charge-discharge cycles every two months.

### ➢ 3.2.5 Battery Capacity Display Function

By regularly testing battery capacity and displaying the results on the display panel

### ➢ 3.2.6 Battery Under-Voltage Protection

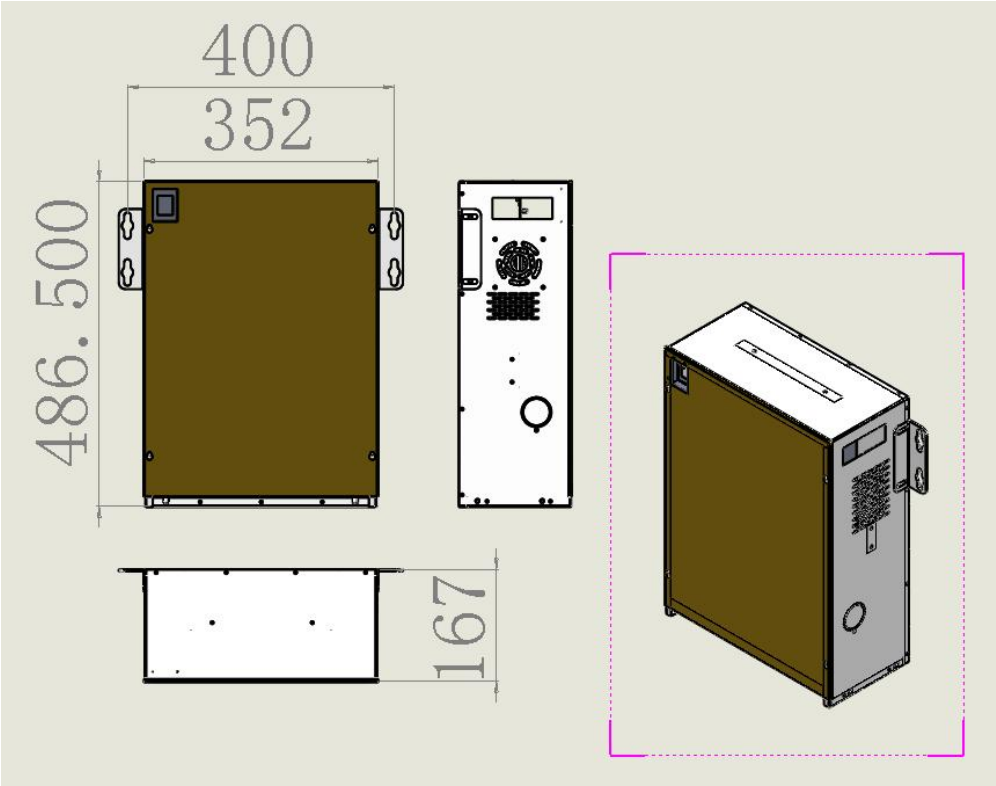
When the battery voltage falls below 40 V, ARD stops outputting signals and displays a fault indication.➢ 3.2.7 Overcurrent Protection

When the output current reaches the set value, ARD stops outputting and sends a fault signal.

# 4、 Installation, Fixing, and Wiring Instructions

### ➢ 4.1 Installation Dimensions

Both the bottom and back of this device housing feature bolt holes for securing with M8 expansion bolts. The rear mounting bracket and floor-mounted bracket are standard components; install them at the required positions on-site according to actual needs.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### ➢ 4.2.1 Description of Connection Ports

| Name | Wiring Port | Function | Explain |
|---|---|---|---|
| Main Circuit Connection Port | PE | ARD earth terminal | |
| | N | Neutral Line Output Port | If the gate crane's power supply does not draw electricity from the control cabinet transformer, connect the neutral wire in parallel; otherwise, do not connect it. |
| | R | Main Power Input Port 1 | The correct connection method for a three-phase power cord is to connect the ARD in series with the main circuit; otherwise, there is a risk of damaging the equipment. |
| | S | Main Power Input Port 2 | |
| | T | Main Power Input Port 3 | |
| | U | Main Power Output Port 1 | |
| | V | Main Power Output Port 2 | |
| | W | Main Power Output Port 3 | |
| Signal circuit wiring | GND | Rescue Completion Signal 1 | Passive Contact Input |
| | GJ | Rescue Completion Signal 2 | |
| | ERB | Normal closed point for fault signal output | Dry Contact |
| | ERA | Normal open point for fault signal output | |
| | ERC | Fault Signal Output COM | |
| | M1 | Passive contact signal output | For control system detection |
| | Y1 | | |
| | M2 | Passive contact signal output | For short-circuit phase sequence |
| | Y2 | | |

### ➢ 4.2.2 City power input: 380 V, 50 Hz

| | | |
|---|---|---|
| R | S | T |

(Connect R, S, and T to the user's power circuit breaker)

- **4.2.3 AC output: 380 V, 50 Hz**(AC Power Output: 380 V, 50 Hz)

| | | | |
|---|---|---|---|
| U | V | W | N |

Connect U, V, and W to the input terminal of the elevator's distribution box. If the door mechanism's power supply is not provided by the elevator isolation transformer, connect the neutral wire (N) in parallel; otherwise, do not connect it.

## ⚠ pay attention to

1 When installing this product, connect the ARD in series with the main circuit for the three-phase power cable; otherwise, there is a risk of equipment damage or personal injury.

2 The characters U, V, and W are strictly prohibited from being used as input parameters for power distribution boxes connected to the mains; doing so may cause irreversible equipment damage or malfunctions.

3 The terminals U, V, and W must not be connected to the traction machine; doing so will cause irreversible equipment damage or failure.

# 5、 ARD Debugging and Usage Instructions

➢ 5.1 Description of the CPU Indicator Light

| State | CPU indicate | Explain |
|---|---|---|
| Normal State | Twinkle alternately | |
| Fault condition | Determine the ARD fault by counting the number of flashes of the CPU indicator light. | CPU flash once: Battery fault; 2 flashes: Overcurrent fault; 3 flashes: Grid fault; 4 flashes: IGBT fault; 5 flashes: Output overvoltage or undervoltage fault; 6 flashes: Charging fault; 7 flashes: Relay stick fault |

➢ 5.2 ARD debugging may only be performed after the elevator installation and commissioning are fully completed and the unit is ready for normal operation.

➢ 5.3 Verify that the connections between the ARD and the elevator control system are properly installed, reliable, and secure as per the drawings; never connect the power terminals (U, V, W) to the mains supply, as this may cause irreversible damage.

➢ 5.4 Connect the three-phase power supply to the external grid and close the control switch SW of the ARD. The CPU indicator light will flash alternately, indicating that the external grid is functioning normally and the battery pack is charging automatically.

➢ 5.5 During a power outage in the external grid, the ARD will activate and commence operation at the preset time (set via control board jumpers JP3 and JP4), emitting an intermittent beeping sound. Upon reaching the specified operating duration (set via control board jumpers JP1 and JP2), the ARD will automatically shut down and enter standby mode once power is restored. (For time parameters and

setting methods, refer to the table below.)

| Short-circuit Pin Number | Function | Explain |
|---|---|---|
| JP5 | City Power Switching Function | Short-circuiting switches to mains power after rescue; non-short-circuiting switches to mains power immediately. |
| JP4 | After a 10-second power outage, ARD resumed operation. | The shorting jumper is optional. When JP3 and JP4 are both shorted, the time parameter is set to 50 seconds; when both JP3 and JP4 are unconnected, the time parameter is set to 5 seconds.<br>The factory parameter is 10 seconds. |
| JP3 | After a 20-second power outage, ARD resumed operation. | |
| JP2 | ARD stops automatically after 3 minutes of operation | The shorting jumper is optional. When both JP1 and JP2 are shorted simultaneously, the time parameter is set to 120 minutes; when both JP1 and JP2 are idle simultaneously, the time parameter is set to 2 minutes.<br>The factory parameter is 3 minutes. |
| JP1 | ARD stops automatically after 9 minutes of operation | |

- 5.6 Overcurrent Protection Settings

| Short-circuit Pin Number | Function | Explain |
|---|---|---|
| JP7 | Overcurrent protection | Protection for output current exceeding 5 A or 8 A |

- 5.7 No further internal debugging is required after the device leaves the factory. Do not adjust any adjustable potentiometers or modify internal wiring without guidance from our technical personnel. For any internal adjustments, please contact us.
- 5.8 Output Voltage Adjustment (Pre-adjusted at factory; generally requires no on-site calibration)

  If the output voltage is too low, rotate the output voltage adjustment potentiometer RTO clockwise; otherwise, rotate it counterclockwise until the desired voltage is achieved.
- 5.9 Charging Voltage Adjustment (Pre-adjusted at factory; generally requires no on-site calibration)

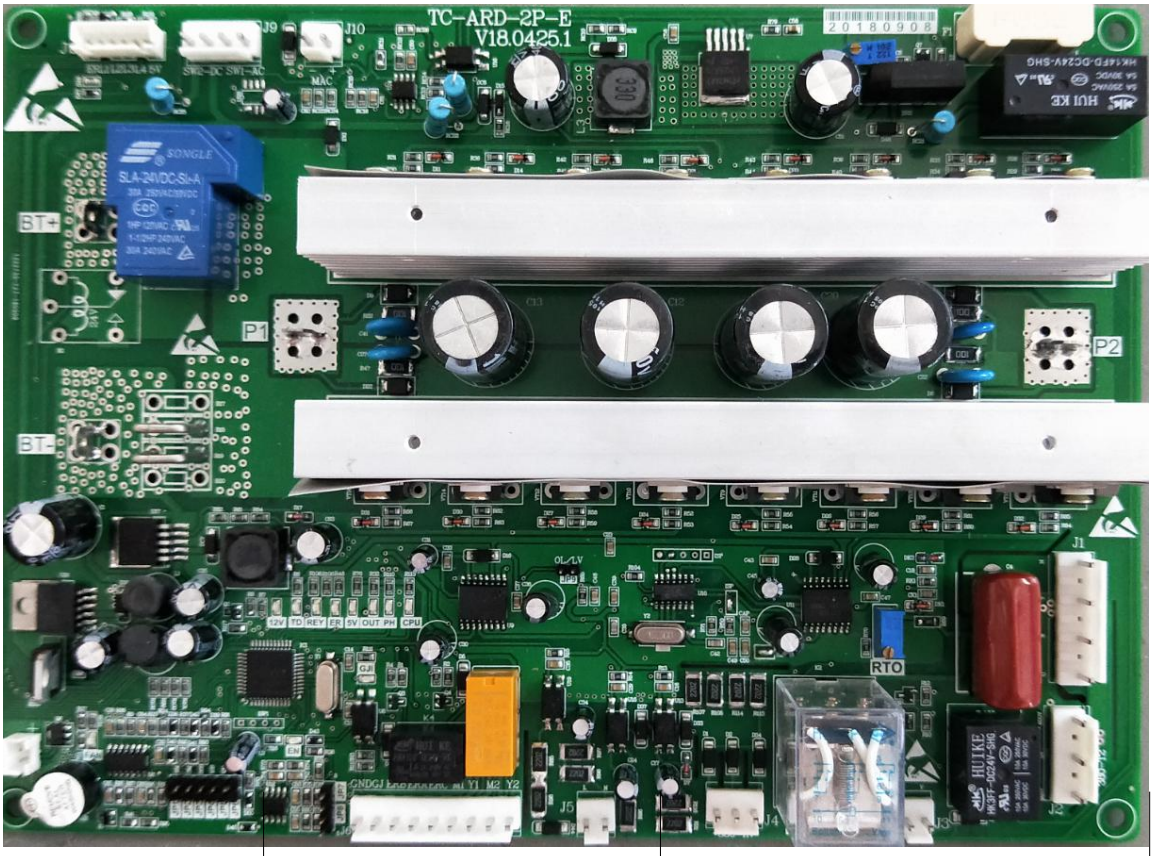
  Before adjusting the charging voltage, be sure to disconnect the battery cable; otherwise, you cannot obtain the correct charging

voltage. An incorrect voltage may damage the battery pack or shorten its lifespan. The adjustment procedure is as follows:

After disconnecting the battery cable, measure the BT+ and BT- terminals on the board. Then rotate the charging voltage adjustment potentiometer (RTC) until the measured voltage reaches DC 58 V (if lower, turn the potentiometer clockwise; otherwise, turn it counterclockwise). Finally, turn off the panel's power switch.

Switch on, connect the battery cable, and turn it back on

## 6、 ARD-2P-EXL motherboard layout diagram




| Board LED Indicator Function Description | | |
|---|---|---|
| **Code/Indicator Light** | **Function** | **Explain** |
| 12V | 12V Power Supply | On: The 12V power supply is functioning normally. Off: No 12V power supply. |
| TD | Stop signal output | On: The power signal output is active Off: The power signal is disconnected |
| REY | Power On | On: Power is turned on<br>Turn Off: Power Supply Isolation |
| ER | ARD hitch | Bright: ARD Fault<br>Extinguished: ARD normal |
| 5V | 5V Control Power Supply | On: Normal 5V power supply Off: Abnormal 5V power supply |
| OUT | Charge Isolation | Bright: Discharge<br>Turn off: Connect to charge |

| | | |
|---|---|---|
| PH | City Power Status | On: The mains power is normal. Off: Power supply is interrupted; one phase is missing. |
| CPU | ARD state | Pulse flicker: ARD fault<br>Alternating Flash: ARD Normal |
| EN | Inverter Status | Bright: Inverter operating<br>Discontinue: The inverter has stopped operating. |
| FAN | Fan Main Power Isolation Status | On: The main power circuit is isolated. Off: The main power circuit is connected. |
| GJI | External Power Off Signal | On: External power-off signal input Off: No external power-off signal |

# 7、 Maintenance

## ➢ 7.1 Maintenance

ARD employs a liquid-free, maintenance-free battery that requires no electrolyte addition; it only needs to be charged and discharged at least once every six months. Since the device operates under high-current conditions, significant heat is generated. During maintenance, verify that the cooling fan is functioning properly and ensure adequate ventilation around the installation area. The system automatically activates protection and cuts off output when the battery voltage falls below the minimum threshold.

## ➢ 7.2 Fault Detection and Resolution

| Fault phenomenon | Cause Analysis of the Fault | Fault Handling Methods |
|---|---|---|
| On the listed device, none of the ARD indicator lights will illuminate. | Is the wiring of the main power supply circuit normal? | . Check whether the switch is turned on and inspect the circuit.<br>. Check the main board fuse |
| Power supply is cut off; the CPU indicator light flashes alternately with no output; the cooling fan does not operate. | The IGBT module is damaged, or the battery pack voltage is abnormal. | Measure the battery pack voltage. If it is below 45 V, charge or replace the battery pack |
| The municipal power supply is interrupted; the ARD unit is functioning normally, but the elevator has no power. | Incorrect phase sequence output or line fault | . Measure the U and V terminal voltages of the ARD; if they are reversed, swap the U and V connections to 380 V.<br>. No voltage detected at U and V terminals; check for poor contact in the internal power lines of the ARD and resolve any circuit faults.<br>. Check whether the elevator's power supply is provided by a transformer. If not, connect the ARD neutral wire. |
| Cut off mains power; ARD takes approximately 2 seconds | Battery pack voltage or circuit fault | . Check whether the battery pack connection cables are in good condition |

| | | |
|---|---|---|
| All subsequent indicator lights have turned off. | | . Check whether the battery pack voltage is normal<br>. Replace the battery pack or inverter board. |
| The main power supply is cut off; the elevator control cabinet remains powered, but the elevator does not operate. | There is a line fault or the parameters of the elevator control system are incorrect. | . Check whether lines 1, 2, 3, and 4 are correctly connected and have good electrical contact.<br>. Check whether the elevator parameter settings are correct |
| Power supply is cut off; the elevator stops immediately after starting and cannot reach the desired floor level. | Power supply fault for the brake mechanism, circuit fault, or incorrect parameters in the elevator control system. | . Check whether the brake power supply is provided by an isolation transformer. Change the brake power supply or connect the ARD neutral wire.<br>. Check whether lines 1, 2, 3, and 4 are correctly connected and have good electrical contact.<br>. Check whether the elevator parameter settings are correct |
| When the mains power is cut and the elevator starts, ARD stops outputting signals. | Battery pack failure or insufficient capacity | . Check the power supply for the brake mechanism.<br>. Measure the battery pack voltage<br>. Replace with a high-capacity ARD |
| When the mains power is cut, the elevator can still operate but will not stop at floor levels. | The control system parameters are incorrect. | . Change Elevator Parameter Settings |

# 8、 Specification Table

| | | | |
|---|---|---|---|
| Specifications | | | 2P-EXL |
| Applicable elevator capacity | | | 3 kW to 30 kW (depending on ARD capacity) |
| Applicable elevator load capacity | | | 320 kg to 2000 kg (depending on ARD capacity) |
| Rescue Mode | | | The elevator control system identifies the direction of light load conditions. |
| Exchange Import | | Voltage | AC380±10% / AC220±10% (specified) |
| | | Frequency | 50 Hz / 60 Hz (specified) |
| Output | Voltage | The city power supply is normal. | AC380±10% / AC220±10% (specified) |
| | | The city power supply has been cut off. | AC380±10% / AC220±10% (specified) |
| | Electric current | | 3A ~ 5A |
| | Wave form | | 50/60 Hz sine wave |
| Voltage Switching Time | | | 3 ~ 50 seconds |
| Cell | Type | | Lead-acid battery designed for use without additional liquid addition or maintenance requirements. |
| | Performance period | | 2~ 3 0 minutes (depending on actual usage load) |
| | Self-rescue attempts | | 3~ 5 times (intermittent power outages followed by power restoration) |
| | Charging interval | | 8 For more than an hour |
| | Cell voltage | | 2×12V/7Ah; 4×12V/7Ah; 4×12V/12Ah (depending on required capacity) |
| Environment | Temperature | | 0 ℃ ～ 40 ℃ |
| | Humidity | | 30% to 75% (non-conductive) |
| Net weight | | | 20 KG~30KG |
| Size (Height × Width × Thickness) mm | | | 352×486×169 436×524×169 |

**Note: Due to varying power consumption of equipment such as elevator door mechanisms and brake systems across models, the actual recommended elevator power capacity should be determined on-site. Users may contact our company to add parallel battery packs for increased output power.**