Single-phase ARD Series Elevator Automatic Rescue Device

User Manual

Rev.2.9

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Content

1 Product Overview

This chapter introduces the model, specifications, and production functions of the elevator automatic rescue device (ARD for short).

1.1 Model Descriptions

Descriptions of ARD model is shown as Figure 1.1 (take AC380V 15kW for example)

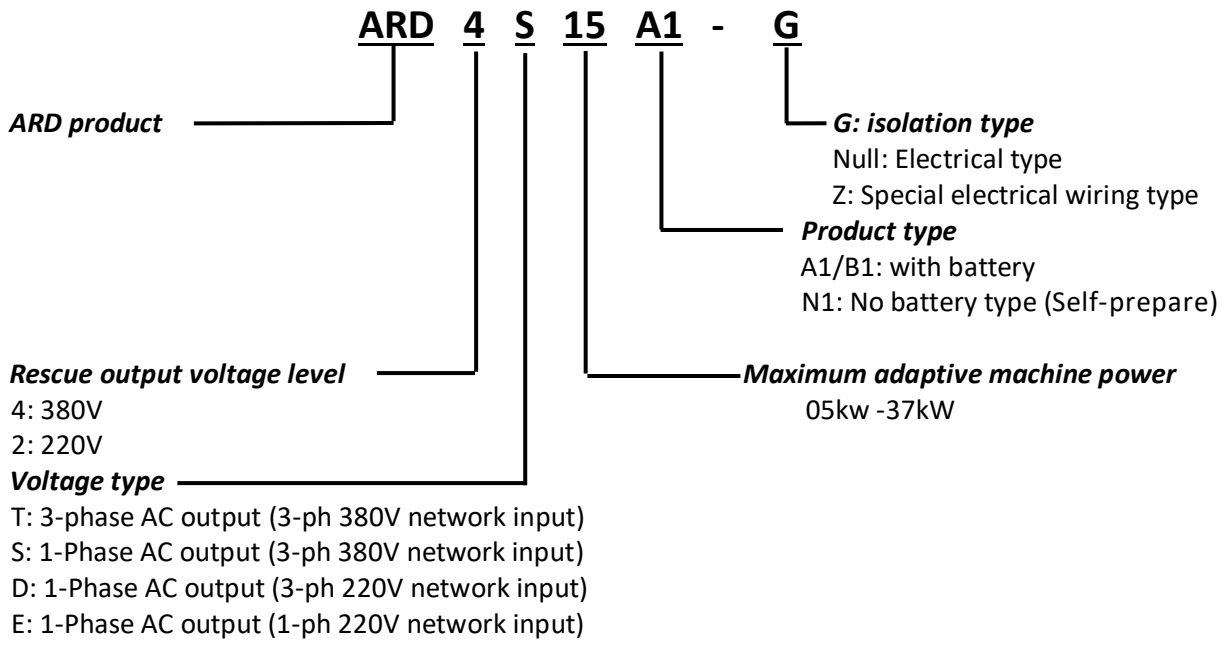


Figure 1.1 Model Descriptions of ARD

Note 1: For 3 types power network (3-ph 380V, 3-ph 220V and 1-ph 220V), two kinds of output voltage levels are available at present: single phase AC220V and single phase AC380V. Please select the voltage level of ARD according to the elevator control system.

Note 2: G series are isolation transformer type, model is ARD4SXXA1-G. When single phase 380V is supplied, please supply additional single phase AC220V auxiliary power, then it can replace original ARD4SXX A1 and ARD2SXX A1 series. This series now has 5 to 22kw.

Note 3: It is recommended to use ARD4SXXX1-Z series, a special model product for elevator cabinet equipped with main board and inverter. Refer to 2.4 ARD4SXX-Z Application Wirings.

1.2 Nameplate Descriptions

Nameplate of ARD is shown as Figure 1.2.

Model, power, input, output, lot number, serial number (the manufacturing number), and barcode of ARD are noted on the nameplate, which is pasted on the right side of the ARD.

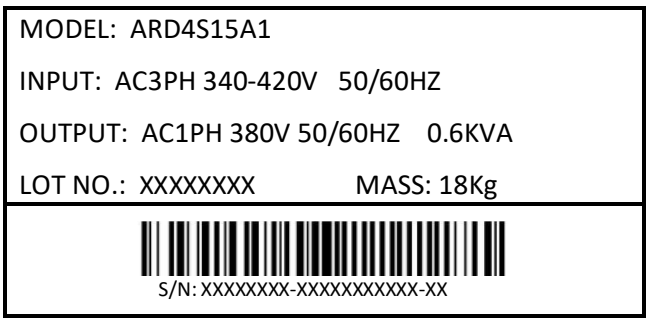


Figure 1.2 Nameplate of ARD

1.3 Technical Specifications

Table 1.1 Standard specification

Model	**A1/B1**	Normal Type
	N1	No Batteries Type (Self-prepare)
Control Features	**Recommended Elevator Rescue Speed**	1/12 Elevator rated running speed
	Single Running Duration	5min
	Output Voltage Wave	Sine Wave
	Efficiency	>90%
Ambience	**Cooling Mode**	Free cooling / Forced air-cooling
	Protection Class	IP20
	Ambient Temperature & Humidity	Ambient humidity below 90%RH (No dewing) -15~40℃, well ventilated
	Vibration Degree	>1G below 20Hz

1.4 Production Model

Chart 1.2 S Series model selection （Power Grid Type：3-PH AC380V，ARD power supply single phase AC380V）

ARD MODEL	Voltage rank in ARD mode	Maximum adapted motor capacity	Maximum adapted rated load of A type	Maximum adapted rated load of B type	Output capacity	Dimension
ARD4S05	1-PH AC380V	5.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD4S07	1-PH AC380V	7.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD4S11	1-PH AC380V	11KW	1150 KG	1350 KG	0.6 KW	E1
ARD4S15	1-PH AC380V	15KW	1150 KG	1350 KG	0.6 KW	E1
ARD4S18	1-PH AC380V	18.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD4S22	1-PH AC380V	22KW	1600 KG	------	0.8 KW	E2
ARD4S30	1-PH AC380V	30KW	1600 KG	------	0.8 KW	E2
ARD4S37	1-PH AC380V	37KW	1600 KG	2000KG	1.3 KW	E3

Chart 1.3 S Series model selection （Power Grid Type：3-PH AC380V，ARD power supply single phase AC220V）

ARD MODEL	Voltage rank in ARD mode	Maximum adapted motor capacity	Maximum adapted rated load of A type	Maximum adapted rated load of B type	Output capacity	Dimension
ARD2S05	1-PH AC220V	5.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD2S07	1-PH AC220V	7.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD2S11	1-PH AC220V	11KW	1150 KG	1350 KG	0.6 KW	E1
ARD2S15	1-PH AC220V	15KW	1150 KG	1350 KG	0.6 KW	E1
ARD2S18	1-PH AC220V	18.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD2S22	1-PH AC220V	22KW	1600KG	------	0.8 KW	E2
ARD2S30	1-PH AC220V	30KW	1600KG	------	0.8 KW	E2
ARD2S37	1-PH AC220V	37KW	1600 KG	2000KG	1.3 KW	E3

Chart 1.4 D Series model selection （Power Grid Type：3-PH AC220V，ARD power supply single phase AC220V）

ARD MODEL	Voltage rank in ARD mode	Maximum adapted motor capacity	Maximum adapted rated load of A type	Maximum adapted rated load of B type	Output capacity	Dimension
ARD2D05	1-PH AC220V	5.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD2D07	1-PH AC220V	7.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD2D11	1-PH AC220V	11KW	1150 KG	1350 KG	0.6 KW	E1
ARD2D15	1-PH AC220V	15KW	1150 KG	1350 KG	0.6 KW	E1
ARD2D18	1-PH AC220V	18.5KW	1600 KG	------	0.8 KW	E2
ARD2D22	1-PH AC220V	22KW	1600 KG	------	0.8 KW	E2

Chart 1.5 E Series model selection （Power Grid Type：1-PH AC220V，ARD power supply single phase AC220V）

ARD MODEL	Voltage rank in ARD mode	Maximum adapted motor capacity	Maximum adapted rated load of A type	Maximum adapted rated load of B type	Output capacity	Dimension
ARD2E05	1-PH AC220V	5.5KW	630 KG	800KG	0.4 KW	E1
ARD2E07	1-PH AC220V	7.5KW	1150 KG	1350 KG	0.6 KW	E1
ARD2E11	1-PH AC220V	11KW	1600 KG	------	0.8 KW	E2

Chart 1.6 G Series model selection （Power Grid Type：3-PH AC380V，ARD power supply single phase AC380V and single phase AC220V）

ARD MODEL	Voltage rank in ARD mode	Maximum adapted motor capacity	Maximum adapted rated load of A type	Maximum adapted rated load of B type	Output capacity	Dimension
ARD4S05A1-G	1-PH AC380V 2-PH AC220V	5.5KW	630 KG	800KG	0.4 KW	E4
ARD4S07A1-G	1-PH AC380V 2-PH AC220V	7.5KW	1150 KG	1350 KG	0.6 KW	E4
ARD4S11A1-G	1-PH AC380V 2-PH AC220V	11KW	1150 KG	1350 KG	0.6 KW	E4
ARD4S15A1-G	1-PH AC380V 2-PH AC220V	15KW	1150 KG	1350 KG	0.6 KW	E4
ARD4S18A1-G	1-PH AC380V 2-PH AC220V	18.5KW	1150 KG	1350 KG	0.6 KW	E4

Note:

1. In chart 1.2~1.6, all listed rated load are suitable for geared motor and gearless motor with 2:1 traction ratio.

2.For gearless motor with 4:1 traction ratio, the rated load can be raised to 1.8 times. For example, the rated load of ARD4S15A1 in above chart is 1150KG with traction ratio 2:1, then its rated load can be about 2000KG with traction ratio 4:1.

3.For gearless motor with 1:1 traction ratio, the rated load need to be choosed as above one level.

4. For winch machine elevator, please consult our technical department while selecting.

1.5 Outline Dimension

Two types of installation are provided for ARD device: floor type and wall hanging type. Dimensions are E1~E3:

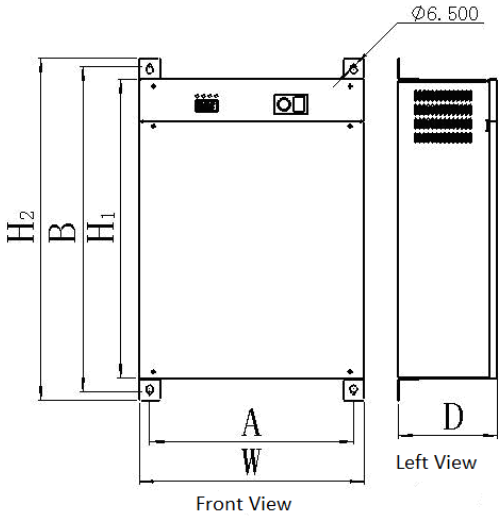


Figure 1.3 Wall hanging type

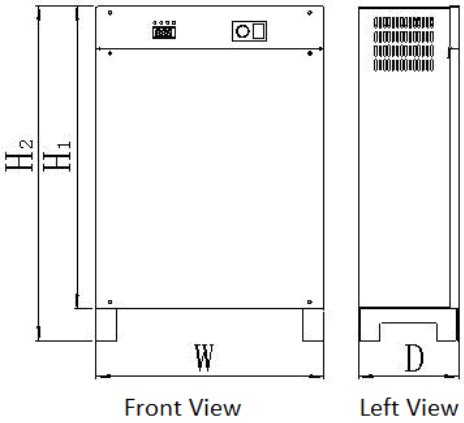


Figure 1.4 floor type

Dimension E4：

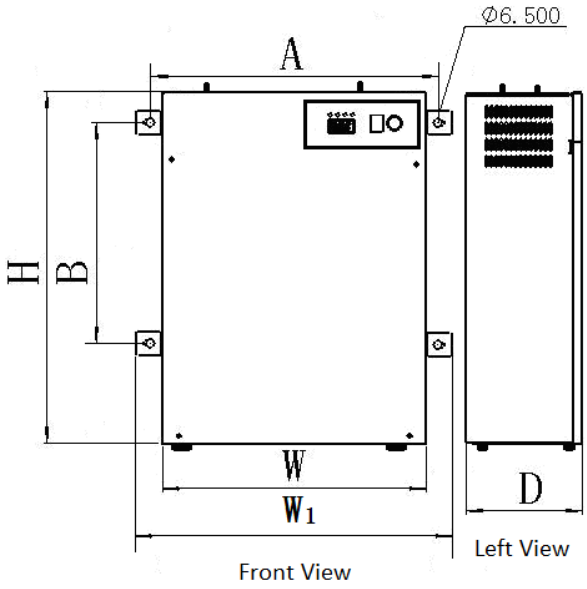


Figure 1.5 Wall hanging type

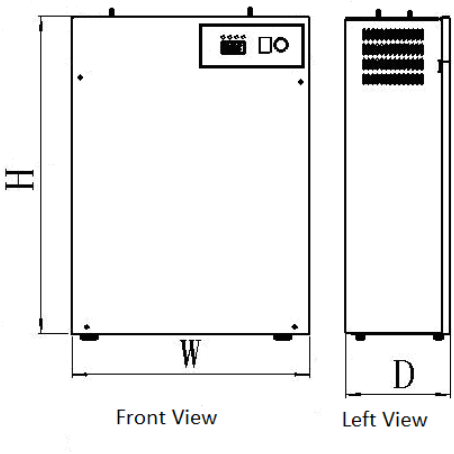


Figure 1.6 floor type

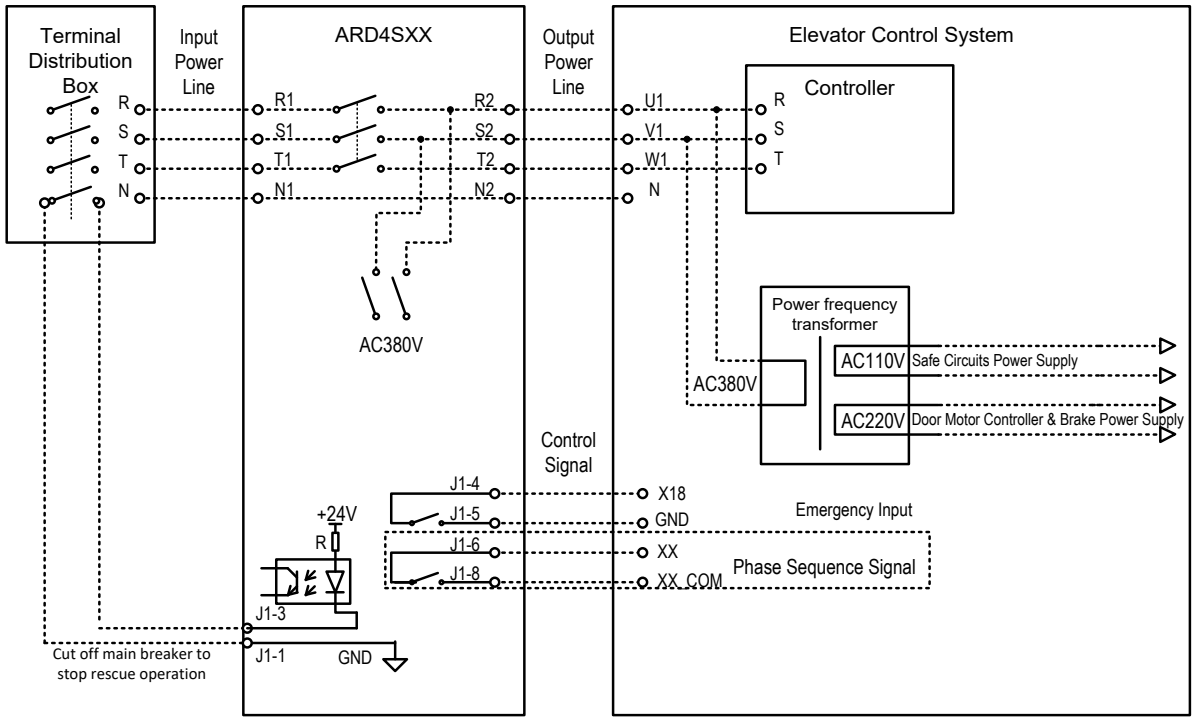
Chart 1.6 Product dimension list（Uint：mm）

Label	W	D	H1	H2	A	B	Installation
E1	320	140	425	488/470	290	463	Wall hanging/Floor Type
E2	335	160	500	563/545	290	540	
E3	350	170	560	623/605	290	600	
Label	**W**	**D**	**H**	**W1**	**A**	**B**	
E4	330	159	445	390/330	360	285	

2 Electric Installation

2.1 ARD4SXX Application Wirings

ARD4SXX Application Wirings (fit for the control system whose control power supply, brake power supply and safe circuits power supply are produced by transformer from 380V power supply.)

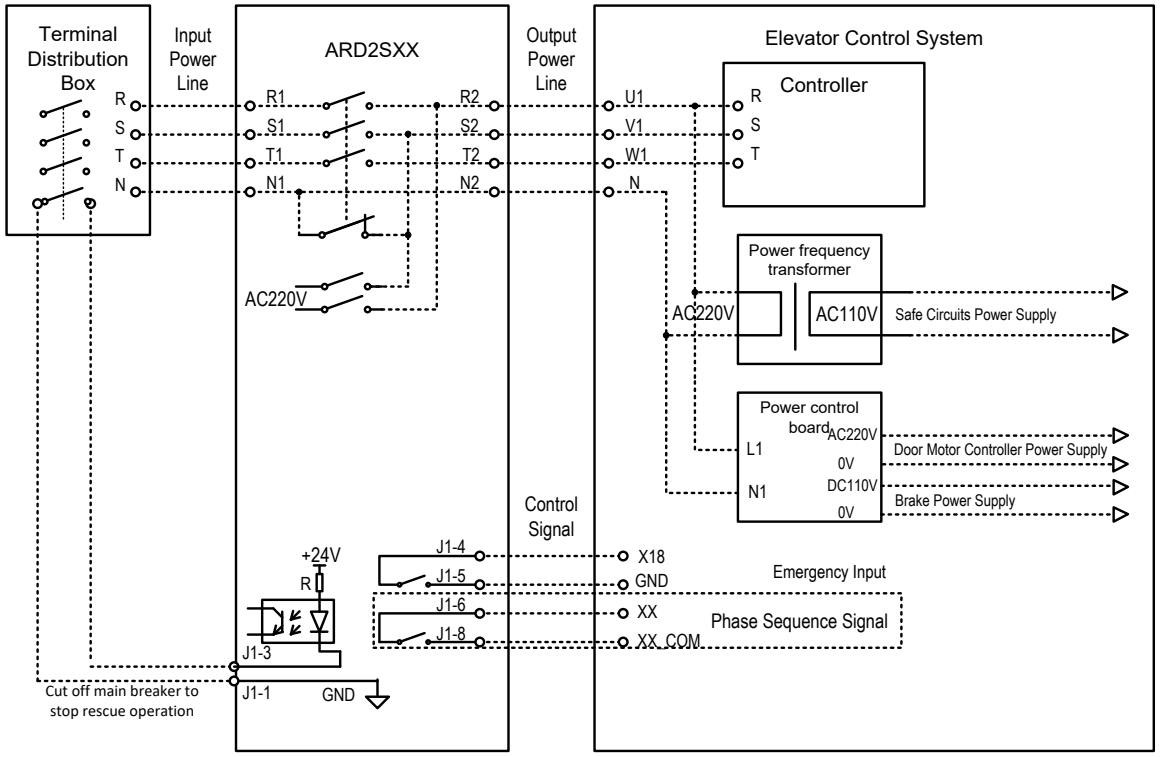


Cut off main breaker to stop rescue operation: Connect to auxiliary contact of main breaker, once auxiliary contact turn off, rescue operation will stop.

Figure 2.1 ARD4SXX application wirings diagram

2.2 ARD2SXX Application Wirings

ARD2SXX Application Wirings (fit for the control system whose control power supply, brake power supply and safe circuit power supply are L and N.)

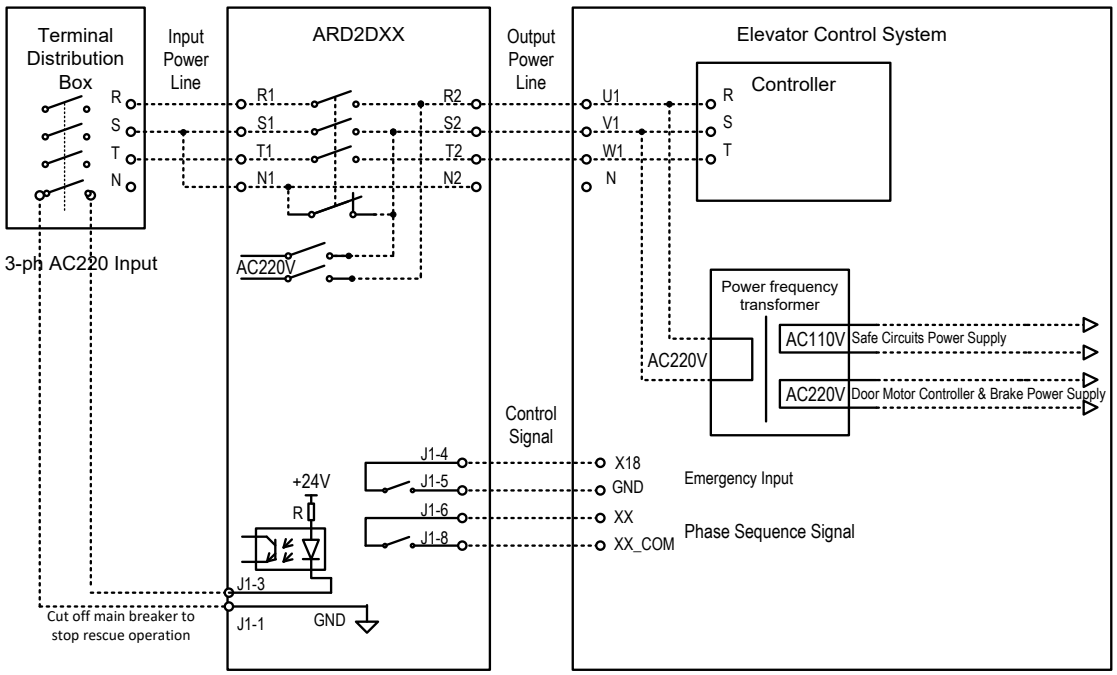


Cut off main breaker to stop rescue operation: Connect to auxiliary contact of main breaker, once auxiliary contact turn off, rescue operation will stop.

Figure 2.2 ARD2SXX application wirings diagram

2.3 ARD2DXX Application Wirings

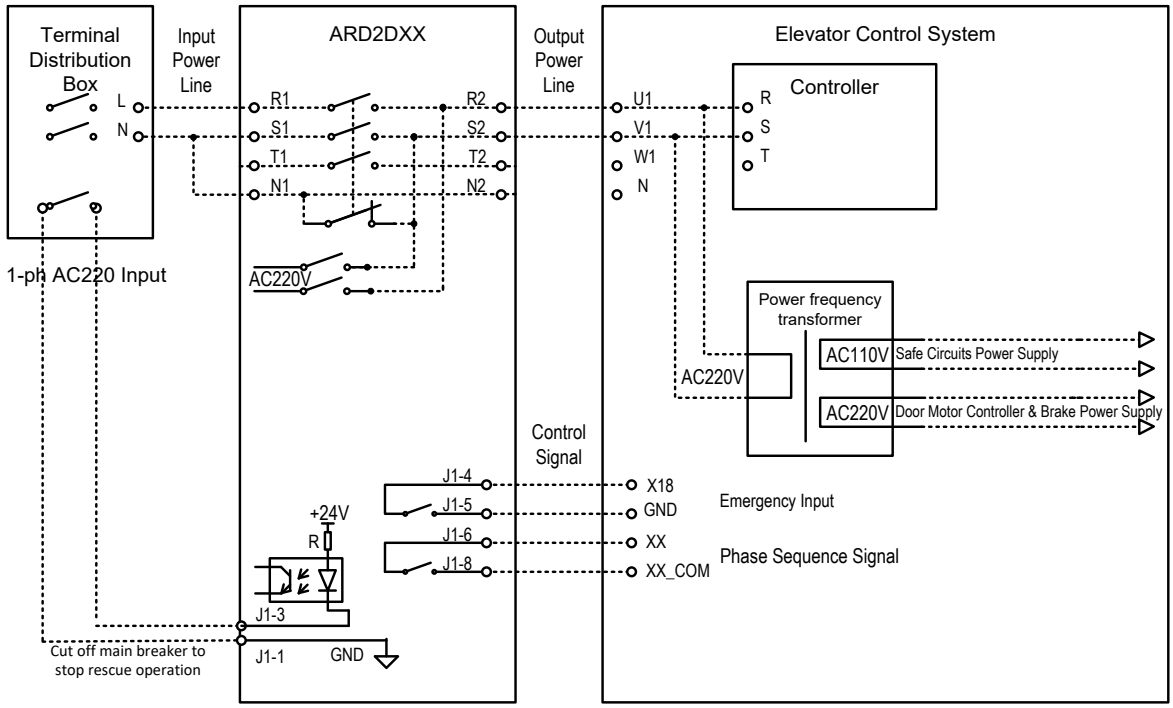
ARD2DXX Application Wirings (fit for the control system whose control power supply, brake power supply and safe circuits power supply are produced by transformer from 220V power supply.)



Cut off main breaker to stop rescue operation: Connect to auxiliary contact of main breaker, once auxiliary contact turn off, rescue operation will stop.

Figure 2.3 ARD2DXX application wirings diagram (for 3-phase AC220 input)

2.4 ARD2EXX Application Wirings

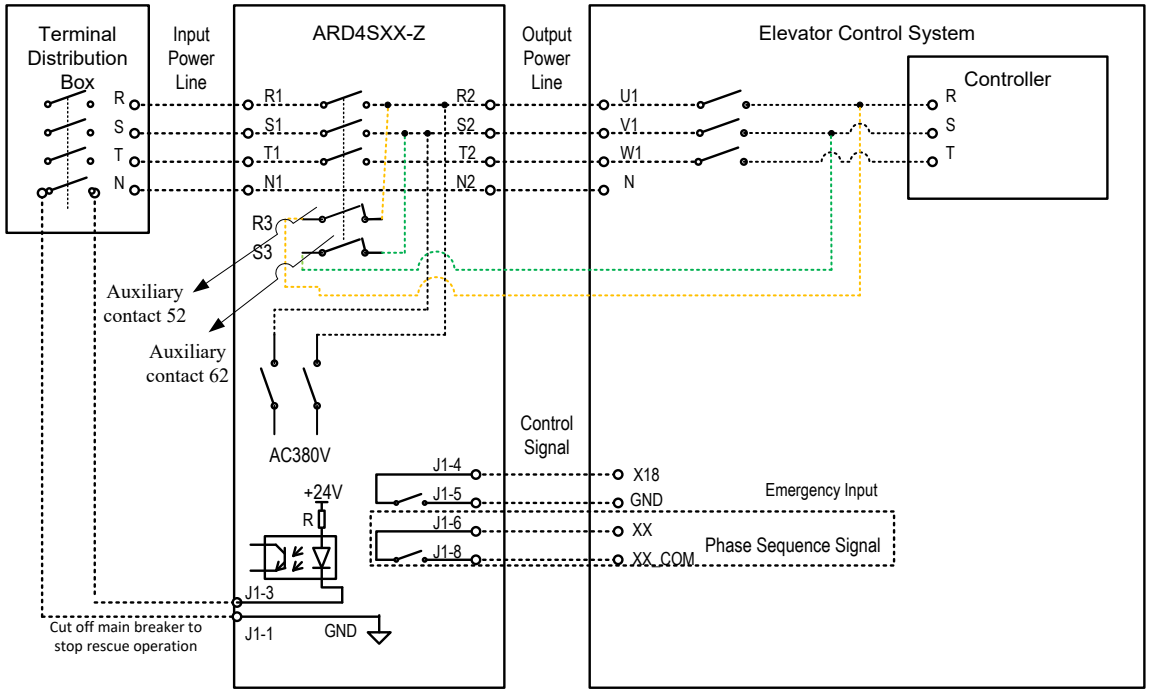


Cut off main breaker to stop rescue operation: Connect to auxiliary contact of main breaker, once auxiliary contact turn off, rescue operation will stop.

Figure 2.4 ARD2DXX application wirings diagram (for 1-phase AC220 input)

2.5 ARD4SXX-Z Application Wirings

This method is for the control system configuration that the inverter has a contactor before its power input (emergency stop contactor or main power contactor).



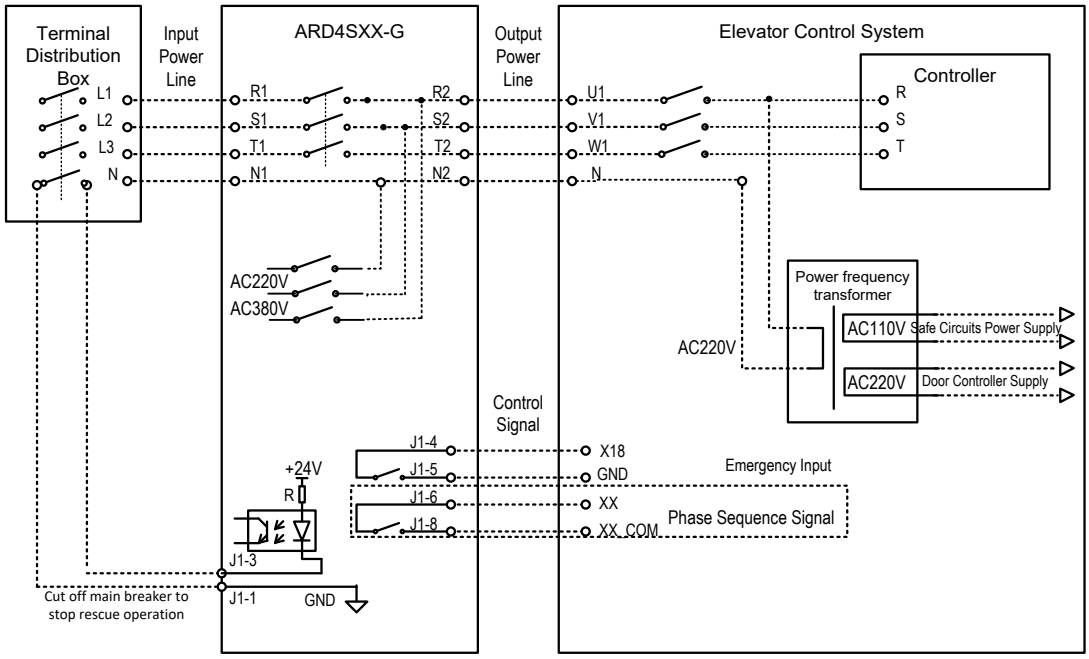
Cut off main breaker to stop rescue operation: Connect to auxiliary contact of main breaker, once auxiliary contact turn off, rescue operation will stop.

Figure 2.5 ARD4SXX-Z application wirings diagram

2.6 ARD4SXX-G Application Wirings

The control power supply, brake power supply, and safety circuit power supply are generated by 380V power supply through a transformer in the control system. The wiring method of ARD4SXX-G is same as that of ARD4SXX in 2.1.

The wiring of ARD4SXX-G replacing ARD2SXX and being used for control power supply, bandgap power supply, and safety circuit power supply L and N in control system is as follows:



Cut off main breaker to stop rescue operation: Connect to auxiliary contact of main breaker, once auxiliary contact turn off, rescue operation will stop.

Figure 2.6 ARD4SXX-G application wirings diagram

3 Usage Description and Battery Maintenance

3.1 Working principle

When the power supply of the external network is normal, the main contactor in the emergency device is sucked in and power supply is provided to the elevator system through the external network. Meanwhile, the device will automatically charge the battery.

When the 3-phase power supply of the external network is cut off, the main contactor in the emergency device is disconnected, and the elevator system is disconnected from the external network. Emergency device will produce single AC220V or AC380V power for elevator system using, meanwhile, emergency running signal will be produced at the output port making the elevator run in self-rescue mode and complete the levelling process at self-rescue speed.

When the emergency power supply is put into use, it can run for up to 5 minutes at a time, and the power will be cut off automatically after 5 minutes.

3.2 Operation Panel

The operation panel consists of four LED indicator lamps and a 4-bit digital block and two operation switches. The appearance is shown in Figure 3.1.

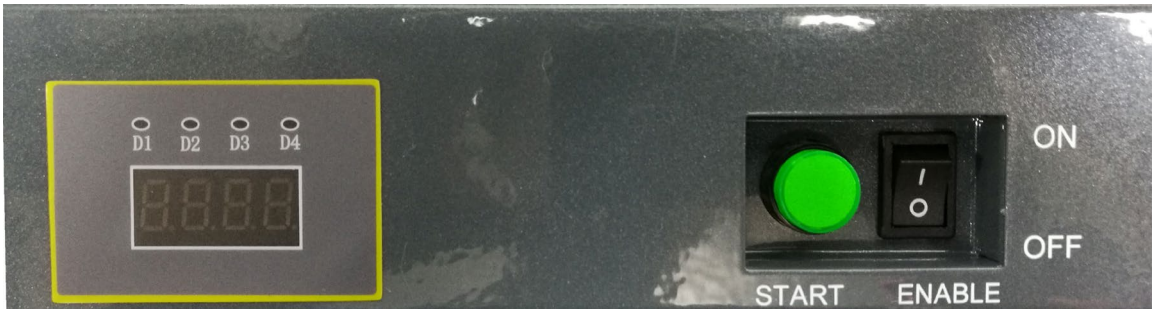


Figure 3.1 Appearance diagram of operation panel

3.2.1 The definition of LED Indicator Lamps

The definitions and functions of the four LED indicator lamps on the operation panel are as shown in **Table**

Table 3.1 The definition and functions of the LED indicator lamps

Name	Function
D1	ARD fault indicator lamp. When fault of ARD occurs, this indicator lamp will be lit up, and extinguished when the fault is restored.
D2	The outer net status indicator lamp. When the power supply voltage of outer net is connected, the indicator is lit up, and when the power supply voltage of outer net is cut off, the indicator lamp is off.
D3	ARD charging indicator. When the ARD starts charging, the indicator is lit up, and when the ARD quits from charging state, the indicator is off.
D4	ARD running indicator. After power on, the ARD runs normally and the indicator lights flicker.

3.2.2 Operation button and switch

The definitions and functions of the button and switch on operation panel are as shown in Table 3.2.

Table 3.2 The definition and functions of the button and switch on operation panel

Name	Function
Circular vertical start button	In power off state, press this button to start the ARD until the digital display is normal, release the button and finish the start process.
Rocker Enable Switch	The rocker switch is inner enable switch. If the normal output state of ARD is required, the rocker switch should be allocated to the "ON". If the external enable switch is effective at the same time and there is no voltage on the net side, the system will delay for about 13 seconds and start working and output the corresponding voltage level.

3.2.3 Display Panel

Display Panel consists of 4-bit digital blocks, the first bit indicates work status, and the latter three bits indicate corresponding value.

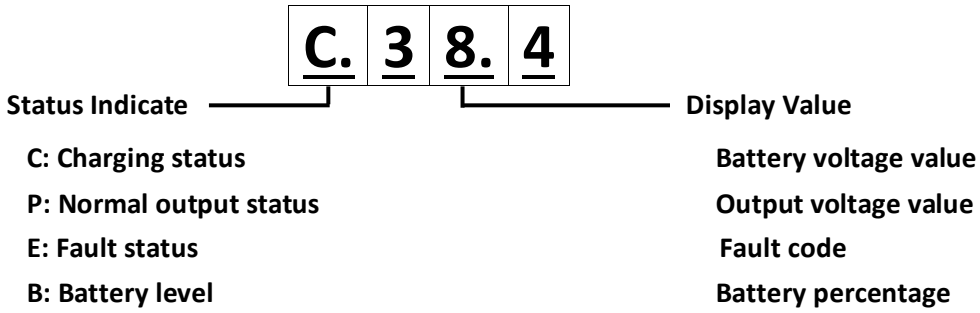


Figure 3.2 Schematic diagram of display panel

Example：

As the digital blocks show **C.38.4**, the first bit shows “C.”, which means current status is charging; the latter 3-bit blocks mean the battery voltage value, and the current battery voltage is 38.4V.

As the digital blocks show **P.220**, the first bit shows “P.”, which means normal output status; the latter 3-bit blocks mean output voltage value, and the current output voltage is 220V.

As the digital blocks show **E.01**, the first bit shows “E.”, which means current status is fault; the latter 3-bit blocks mean Fault 01. The fault can be resolved according to the ARD Fault list.

As the digital blocks show **B.80**, the first bit shows “B.”, which means current battery remaining capacity; the latter 3-bit blocks mean the percentage of battery remaining capacity, and the current remaining battery capacity is 80%.

Table 3.3 ARD fault list

Fault Code	Descriptions	Reasons and Solutions
E.01	Undervoltage battery	Battery charging time is not enough; battery life has reached the limit; charging circuit is abnormal.
E.02	Overvoltage battery	Abnormal battery charging circuit or abnormal battery voltage.
E.03	Overheat	Overheat status has been detected or cooling fan works abnormally.
E.04	IF error	Output current is detected up to limit; the rescue speed should be reduced.
E.05	Output overcurrent	Instantaneous value of output current is detected too large; the rescue speed should be reduced.
E.06	Abnormal charging power supply	Charging circuits work error, please contact the factory.

Table 3.3 ARD fault list (Cont'd)

Fault Code	Descriptions	Reasons and Solutions
E.07	Abnormal zero point of AC voltage or AC current	While working, the zero-point bias of AC voltage or AC current is too large.
E.08	Output overload	The output has been detected arrived at the limit and last for a long time, system should be power down, and rescue speed should be reduced.
E.09	Net-side contactor error: the feedback does not match to the net-side contactor act command	Check the net-side contactor and its output and feedback circuit.
E.10	Inner flash storage error	Internal resident parameters store abnormally, please contact the manufacturer.
E.11	Abnormal voltage sensor	Internal hardware error, please contact the manufacturer.
E.12	Error produced immediately as ARD was put into operation, and the number of retry times is up to 5.	Necessary to determine and dispose according to the error code before E.12
E.13	Undefined error	Inner error, please contact the manufacturer.

3.3 Battery Replacement Guidance

Take ARD2S15A1 as an example, introduce battery replacement and installation, and ARD2S15A1 contains 3 batteries.

Step 1: Loose 4 screws and remove the faceplate.

Step 2: Remove the wirings of batteries. Then remove the batteries in the order of A-B-C.

Step 3: When changing batteries or installing batteries, be sure to pay attention to connecting line numbers. Connect the red outgoing line of the main control board (labelled DC+) with the red terminal of battery (labelled 1); connect the black outgoing line (labelled DC-) with the black terminal of battery (labelled 2). Failure to connect in accordance with specified line sequence will cause damage to devices on the control board, and ARD will not work properly.

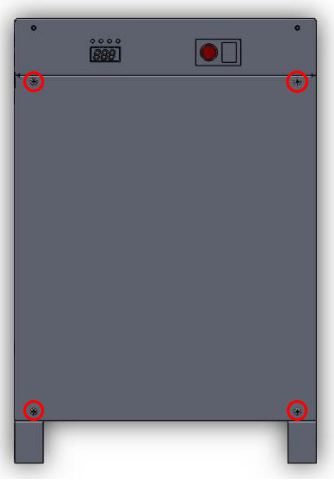


Figure 3.3 Remove Face Plate

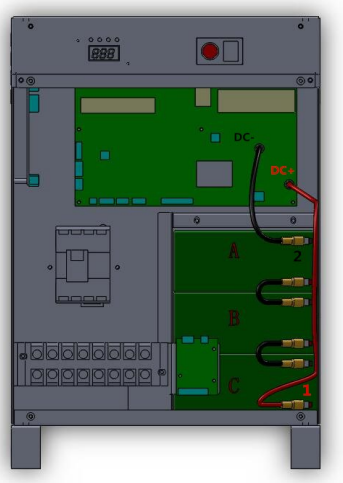


Figure 3.4 Battery Connection