

RBU

Operation Manual



- Thank you very much for your buying RBU series regenerative break unit.
- Before use, please read this manual thoroughly to ensure proper usage. Keep this manual at an easily accessible place so that can refer anytime as necessary.

Safety Precautions

Please read this operation manual carefully before installation, operation, maintenance or inspection.

In this manual, the safety precautions were sorted to "WARNING" or "CAUTION".



WARNING

Indicates a potentially dangerous situation which, if can not avoid will result in death or serious injury.



CAUTION

Indicates a potentially dangerous situation which, if can not avoid will cause minor or moderate injury and damage the device. This

Symbol is also used for warning any un-safety operation.

In some cases, even the contents of "CAUTION" still can cause serious accident. Please follow these important precautions in any situation.

★ **NOTE** indicate the necessary operation to ensure the device run properly.

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1. INTRODUCTION

1.1 Technology Features

Voltage Range	380V
Break Moment	60s with 100% of rated torque (25% Duty cycle), can continuously run with 80% of rated torque.
AC Power	380VAC, 50/60Hz
AC Voltage Range	+10% to -15%, the imbalance between phases less than 2%.
AC Frequency Range	Less than 3Hz
Control Mode	Current Control with 120°
AC Power Factor	Higher than 0.9
Overload Capacity	30s with 150% of rated current
Operation Mode	External terminal, Keyboard
Fault Output	Relay output
Status Display	LED Keyboard
Analog Output	Voltage (0—10V)
Over current Protection	220% rated current
Over load protection	30s with 150% of rated current
Over voltage	DC: 800V
Overtemperature	Temperature resistance detection
AC phase failure fault	AC phase failure
AC frequency failure fault	Fluctuating higher than 3Hz
Power light display	DC: higher than 50V

1.2 Description of Name Plate

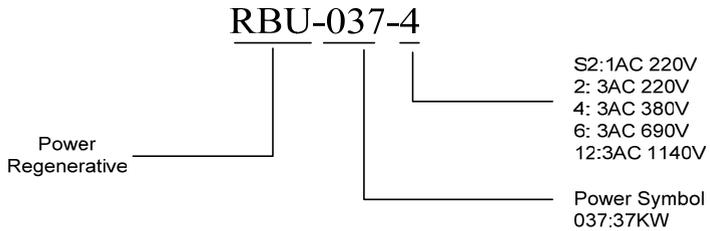


Figure 1.1 Nameplate of RBU.

1.3 Selection Guide

Model No.	Input voltage	Rated Power (KW)	DC rated current (A)	DC rated current (A)	Size
RBU-7R5-4	380V	7.5	13	10	
RBU-011-4	380V	11	19	15	
RBU-015-4	380V	15	26	20	
RBU-018-4	380V	18.5	32	25	
RBU-022-4	380V	22	37	30	
RBU-030-4	380V	30	51	40	
RBU-037-4	380V	37	64	50	
RBU-045-4	380V	45	77	60	
RBU-055-4	380V	55	96	75	
RBU-075-4	380V	75	128	100	

1.4 External Dimension

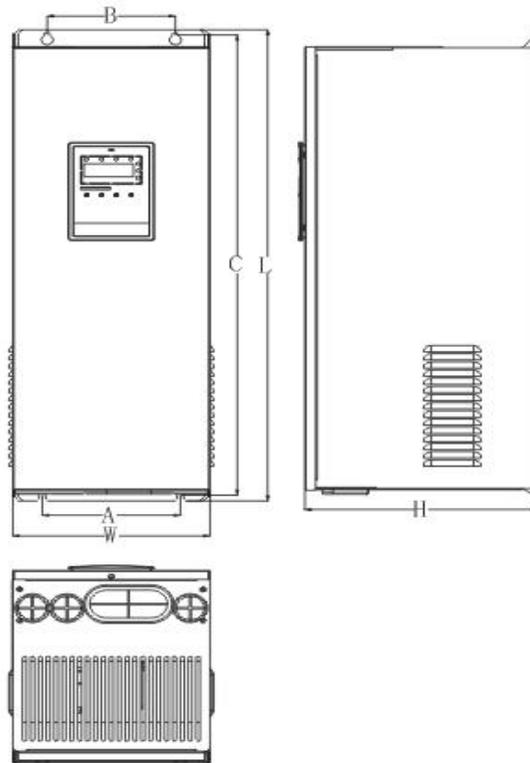


Figure1.2 External dimensions.

Power (kW)	A (mm)	B (mm)	L (mm)	W (mm)	D (mm)	Installation Hole (mm)
	Installation Dimension		External Dimension			
7.5-22	In developing					
30-75	140	130	577	220	236	6

2. INSPECTION



CAUTION

- **Don't install or use any RBU that is damaged or have fault part, otherwise may cause injury.**

Check the following items when unpacking the RBU,

1. Inspect the entire exterior of the RBU to ensure there are no scratches or other damage caused by the transportation.
2. Ensure there is operation manual and warranty card in the packing box.
3. Inspect the nameplate and ensure it is what you ordered.
4. Ensure the optional parts are what you need if have ordered any optional parts.

Please contact the local agent if there is any damage in the RBU or optional parts.

3. INSTALLATION



WARNING

- The person without passing the training manipulate the device or any rule in the “Warning” being violated, will cause severe injury or property loss. Only the person, who has passed the training on the design, installation, commissioning and operation of the device and gotten the certification, is permitted to operate this equipment.
- Input power cable must be connected tightly, and the equipment must be grounded securely.
- Even if RBU is not running, the following terminals still have dangerous voltage:
 - Power Terminals: R, S, T
 - Motor Connection Terminals: U, V, W.
- When power off, should not install the RBU until 5 minutes after, which will ensure the device discharge completely.
- The section area of grounding conductor must be no less than that of power supply cable.



CAUTION

- When moving the RBU please lift by its base and don't lift by the panel. Otherwise may cause the main unit fall off which may result in personal injury.
- Install the RBU on the fireproofing material (such as metal) to prevent fire.
- When need install two or more RBU in one cabinet, cooling fan should be provided to make sure that the air temperature is lower than 45°C. Otherwise it could cause fire or damage the device.

3.1 Environmental Requirement

3.1.1 Temperature

Environment temperature range: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$. RBU will be derated if ambient temperature exceeds 40°C .

3.1.2 Humidity

Less than 95% RH, without dewfall.

3.1.3 Altitude

RBU can output the rated power when installed with altitude of lower than 1000m. It will be derated when the altitude is higher than 1000m. For details, please refer to the following figure:

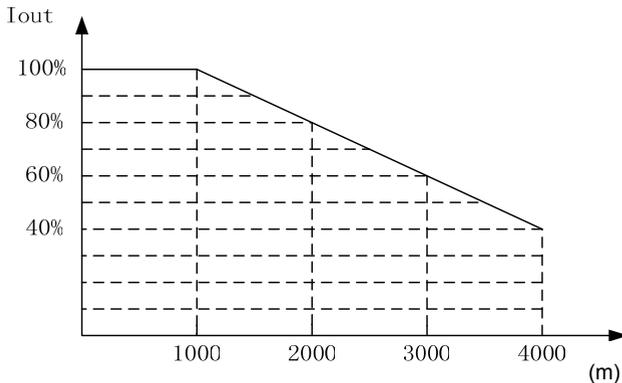


Figure 3.1 Relationship between output current and altitude.

3.1.4 Impact and Oscillation

It is not allowed that the RBU falls down or suffers from fierce impact or the RBU installed at the place that oscillation frequently.

3.1.5 Electromagnetic Radiation

Keep away from the electromagnetic radiation source.

3.1.6 Water

Do not install the RBU at the wringing or dewfall place.

3.1.7 Air Pollution

Keep away from air pollution such as dusty, corrosive gas.

3.1.8 Storage

Do not store the RBU in the environment with direct sunlight, vapor, oil fog and vibration.

3.2 Installation Space

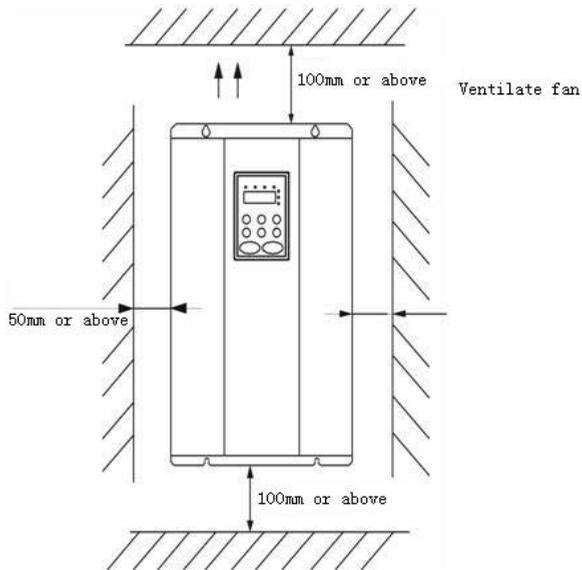


Figure 3.2 Safety space.

Notice: Add the air deflector when apply the up-down installation.

3.3 Dimensions of External Keypad

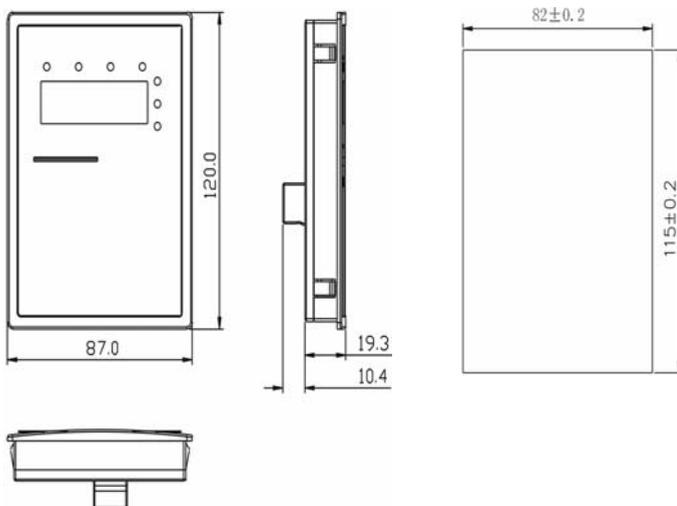


Figure 3.3 Dimension of big keypad.

3.4 Disassembly

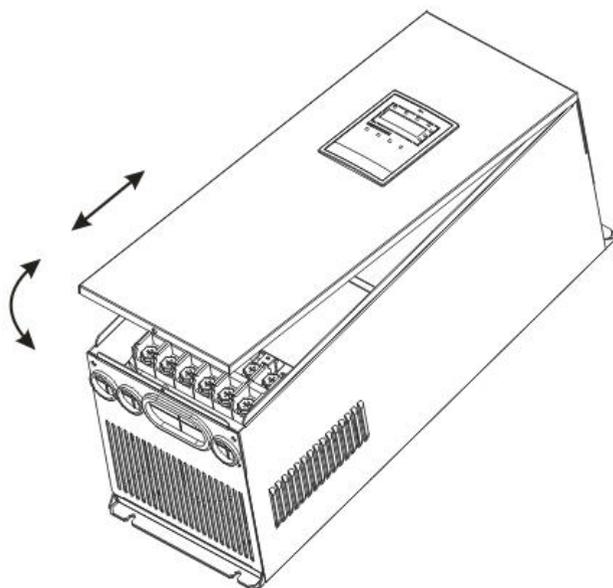


Figure 3.4 Disassembly of cover.

4. WIRING



WARNING

- Wiring must be performed by the person certified in electrical work.
- Forbid testing the insulation of cable that connects the RBU with high-voltage insulation testing devices.
- Cannot install the RBU until discharged completely after the power supply is switched off for 5 minutes.
- Be sure to ground the ground terminal.
400V class: Ground resistance should be 10Ω or less,
Otherwise, it might cause electric shock or fire.
- Connect input terminals (R, S, T) and output terminals (U, V, W) correctly.
Otherwise it will cause damage the inside part of RBU.
- Do not wire and operate the RBU with wet hands.
Otherwise there is a risk of electric shock.



CAUTION

- Check to be sure that the voltage of the main AC power supply satisfies the rated voltage of the RBU.
Injury or fire can occur if the voltage is not correct.
- Connect power supply cables and regenerative cables tightly.

4.1 Terminal Configuration

4.1.1 Main Circuit Terminals

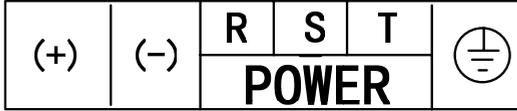


Figure 4.1 Main circuit terminals.

Main circuit terminal functions are summarized according to the terminal symbols in the following table. Wire the terminal correctly for the desired purposes.

Terminal Symbol	Function Description
R、 S、 T	Terminals of 3 phase main power
(+)、 (-)	Input terminals of power regenerative
	Terminal of ground (PE)

4.1.2 Control Circuit Terminals



Figure 4.2 Control circuit terminals.

Control circuit terminals

Terminal	Description
S1~S4	ON-OFF signal input, optical coupling with +24V and COM. Short connect with COM. S1: When terminal control is valid, automatical input; S2: When terminal control is un-valid, manual input; S3: Multi-function terminal (Default is external fault input) S4: Multi-function terminal (Default is fault reset input)

Terminal	Description
COM	Common ground terminal for digital signal and +24V (or external power supply).
Y	Open collector output terminal, The corresponding common ground terminal is COM. External voltage range: 0~24V Output current range: 0~50mA
+24V	Provide output power supply of +24V. Maximum output current: 150mA
AO	Analog output terminal. Output range: 0~10V
GND	Common ground terminal of analog signal and AO. GND must isolated from COM.
RO1A、 RO1B、 RO1C	RO1 relay output: RO1A—common; RO1B—NC; RO1C—NO. Contact capacity: AC 250V/3A, DC 30V/1A.

4.2 Wiring Daragram

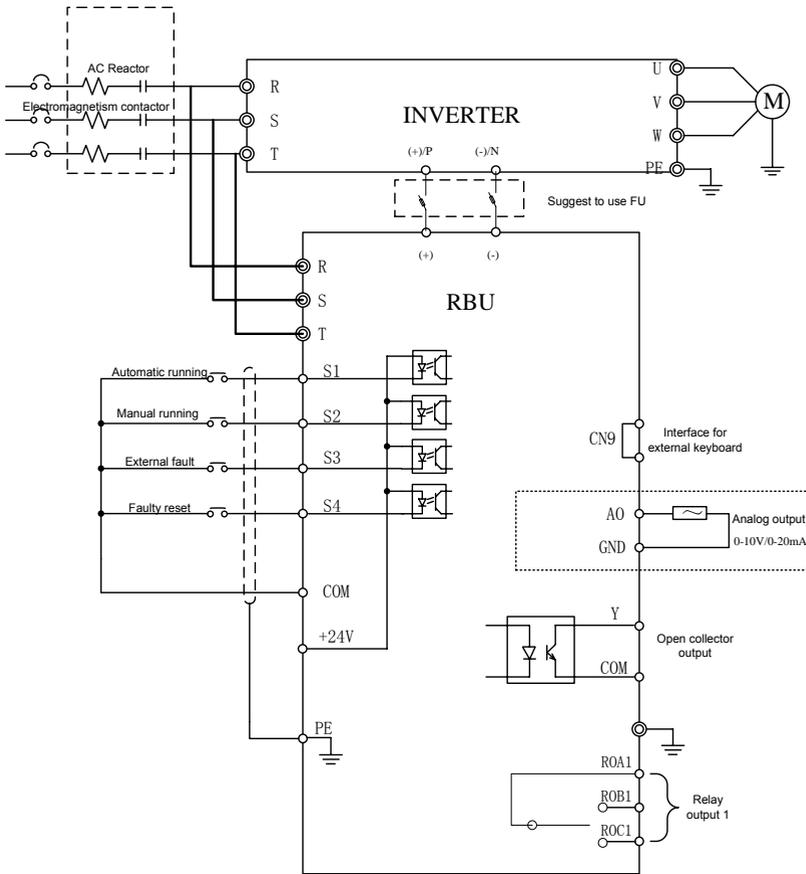


Figure 4.3 Wiring Diagram.

5. OPERATION

5.1 Keypad Description

5.1.1 Keypad schematic diagram

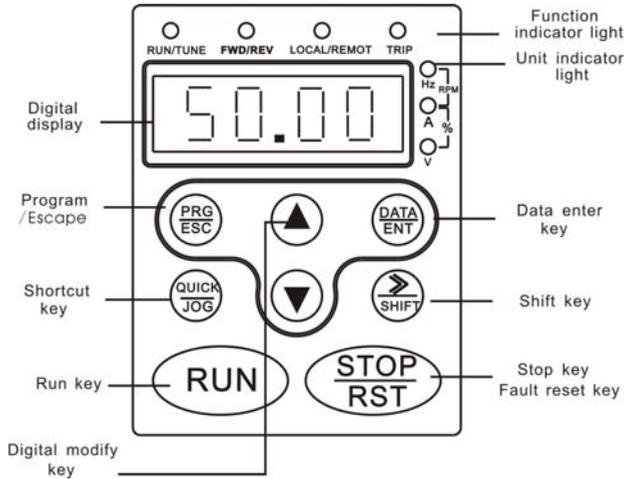


Figure 5.1 Keypad schematic diagram.

5.1.2 Key function description

Key	Name	Function Description
	Programming Key	Entry or escape of first-level menu.
	Enter Key	Progressively enter menu and confirm parameters.
	UP Increment Key	Progressively increase data or function codes.
	DOWN Decrement Key	Progressive decrease data or function codes.
	Shift Key	In parameter setting mode, press this button to select the bit to be modified. In other modes, cyclically displays parameters by right shift

Operation

	Run Key	Start to run the inverter in keypad control mode.
	STOP/RESET Key	In running status, restricted by P7.04, can be used to stop the inverter. When fault alarm, can be used to reset the inverter without any restriction.

5.1.3 Indicator light description

1) Function Indicator Light Description

Function indicator	Description
	Extinguished: stop status Light on: operating status
	Extinguished: keypad control Flickering: terminal control Light on: communication control
	Extinguished: normal operation status Flickering: overload pre-warning status

2) Unit Indicator Light Description

Unit indicator	Description
Hz	Frequency unit
A	Current unit
V	Voltage unit
RPM	Rotating speed unit
%	Percentage

3) Digital Display

Have 5 digit LED , which can display all kinds of monitoring data and alarm codes such as mains voltage, bus voltage, output current and so on.

5.2 Function parameters

Function Code	Name	Description	Factory Setting	Modify	Serial No.
P0 Group: Basic Function					
P0.00	Control mode	0~1 0: Keyboard control 1: Terminal control S1 valid: automatic mode S2 valid: manual mode	1	⊗	0
P0.01	Keyboard control mode	0~1 0: Automatic mode 1: Manual mode	0	⊗	1

Function Code	Name	Description	Factory Setting	Modify	Serial No.
P0.02	ON/OFF filter times	1~10	1	⊙	2
P0.03	Current protection threshold of trip-free	0.5~30.0%	5.0%	○	3
P0.04	Regenerative voltage of start	400.0~760.0V	650.0V	○	4
P0.05	Regenerative voltage range	0.0~60.0V	12.0V	○	5
P0.06	Regenerative stop time	0.1~10.0S	1.0S	○	6
P0.07	Input frequency	0~1 0: 50HZ 1: 60HZ	0	⊙	7
P0.08	S3 terminal function	1~15 3: Valid when short connect S3 and COM Others, reserved	3 (External fault)	⊙	8
P0.09	S4 terminal function	1~15 2: Valid when short connect S4 and COM Others, reserved	2 (Fault reset))	⊙	9
P0.10	Reserved		1	○	10
P0.11	AO function selection	0~8 0: DC bus line voltage (0~1000V) 1: Output current (0~200.0%) 2~8: Reserved	1	○	11
P0.12	AO lower limit	0.0%~100.0%	0.0%	○	12
P0.13	AO lower limit corresponding output	0.00V ~10.00V	0.00V	○	13
P0.14	AO upper limit	0.0%~100.0%	100.0%	○	14
P0.15	AO upper limit corresponding output	0.00V ~10.00V	10.00V	○	15
P0.16	Cooling fan running mode	0~1 0: Run after start 1: Start when temperature higher than 45℃	1	○	16
P0.17	Y ON/OFF output selection	0~15 0: no output	0	○	17

Operation

Function Code	Name	Description	Factory Setting	Modify	Serial No.
P0.18	Relay output selection	1: Running command is valid 2: Regenerative running 3: Reserved 4: Fault output 5-15: Reserved	4 (Fault output)	○	18
P0.19	Under voltage protection	300.0V ~400.0V	380.0V	○	19
P0.20	Fault reset times	0~3	0	⊙	20
P0.21	Fault reset time	0.1~10.0S	3.0S	⊙	21
P0.22	AC input phase-failure protection	0~1 0: Unvalid 1: Valid	1	⊙	22
P0.23	AC input phase-failure protection time	0.5~10.0S	1.0S	⊙	23
P0.24	Running time	0~XXXXXH		●	24
P0.25	Restore function parameters, clear fault record	0~2 0: no change 1: Restore factory setting 2: Clear fault record	0	⊙	25
P0.26	Software version			●	26
P0.27	Fourth latest fault type	0~26 0: No fault		●	27
P0.28	Third latest fault type	1: Reserved 2: Reserved		●	28
P0.29	Second latest fault type	3: IGBT protection(OUT3) 4: Reserved		●	29

Function Code	Name	Description	Factory Setting	Modify	Serial No.
P0.30	Latest fault type	5: Reserved 6: Over-current (OC3) 7: Reserved 8: Reserved 9: Over-voltage (OV3) 10: DC bus Under-voltage(UV) 11: Reserved 12: Inverter overload (OL2) 13: Reserved 14: Input phase failure (SPI) 15: Reserved 16: IGBT overheat (OH2) 17: External fault (EF) 18: Reserved 19: Current detection fault (ITE) 20: Reserved 21: EEPROM fault (EEP) 22: Reserved 23: Reserved 24: Reserved 25: Control power fault (CP) 26: Parameter setting wrong (PER)		•	30
P0.31	Output current at current fault			•	31
P0.32	DC bus voltage at current fault			•	32
P0.33	Parameter locked	0~1 0: No locked 1: Locked	0	○	33
P0.34	Factory password	0~65535	*****	⊙	34

5.3 Detailed function description

Function Code	Name	Description	Factory Setting	Modify	Serial No.
P0.00	Control mode	0~1 0: Keyboard control 1: Terminal control S1 valid: automatic mode S2 valid: manual mode	1	⊙	0
P0.01	Keyboard control mode	0~1 0: Automatic mode 1: Manual mode	0	⊙	1

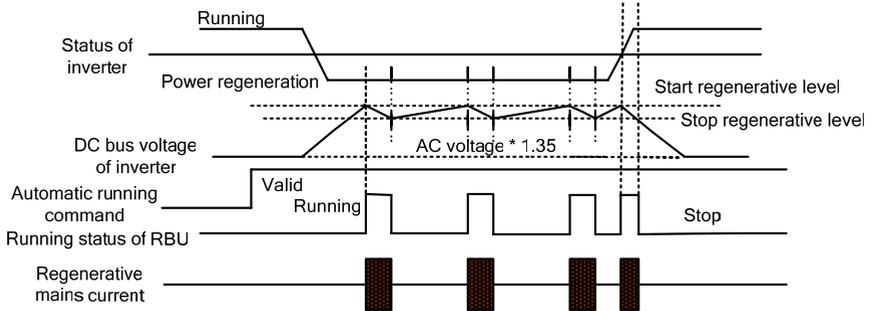
Operation

Automatic mode:

When in automatic mode, RBU detects the bus line voltage and realizes start and stop automatically.

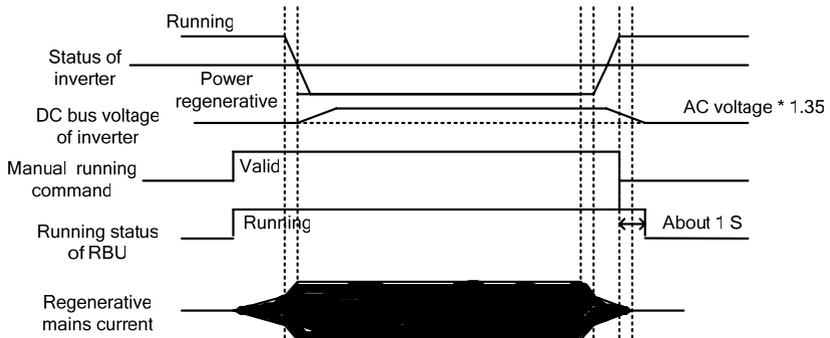
When the bus voltage is higher than P0.04, start the regeneration.

When the bus voltage is lower than P0.04, stop the regeneration.



Manual mode:

When start the running command, RBU regenerates all the time.



6. TROUBLE SHOOTING

Fault Code	Fault Type	Reason	Solution
OUT	IGBT fault	<ol style="list-style-type: none"> 1. IGBT module fault. 2. Malfunction caused by interference. 3. Grounding is not properly. 	<ol style="list-style-type: none"> 1. Inspect external equipment and eliminate interference. Press STOP/RST to reset 2. Ask for support.
OC	Over-current when running	<ol style="list-style-type: none"> 1. Sudden change of regenerative power 2. Lower power of RBU 	<ol style="list-style-type: none"> 1. Decrease the sudden change of regenerative power 2. Use RBU with higher power 3. Ask for support
OV	Over-voltage when running	<ol style="list-style-type: none"> 1. Sudden change of regenerative power 2. More higher threshold setting of RBU 3. No enough capacity of RBU 	<ol style="list-style-type: none"> 1. Set 2. Decrease regenerative voltage threshold 3. Use RBU with higher power 4. Ask for support
OL	RBU overload	<ol style="list-style-type: none"> 1. More lower threshold setting of RBU 2. Sudden change of regenerative power 3. More lower power of RBU 	<ol style="list-style-type: none"> 1. Select variable frequency motor. 2. Check and adjust V/F curve. 3. Check and adjust PB.03 4. Check the load.
SPI	Input phase failure	Power off at AC input	<ol style="list-style-type: none"> 1. Check AC input power supply. 2. Ask for support
EF	External fault	S3: External fault input terminal take effect.	Inspect external equipment.
OH	IGBT overheat	<ol style="list-style-type: none"> 1. Cooling fans of inverter stop or damaged. 2. Obstruction of ventilation channel 3. Ambient temperature is too high. 	<ol style="list-style-type: none"> 1. Install cooling unit. 2. Remove heat source. 3. Replace cooling fan 4. Clear the ventilation channel. 5. Ask for support

Trouble Shooting

CE	Communication fault	1. Improper baud rate setting. 2. Receive wrong data. 3. Communication is interrupted for Long time	1. Set proper baud rate. 2. Check communication devices and signals.
ITE	Current detection fault	Wires or connectors of control board are loose	1. Check the wiring. 2. Ask for support.
EEP	EEPROM fault	Read/Write fault of control parameters	Press STOP/RESET to reset Ask for support
CP	Control power fault	Auxiliary power damaged	Ask for support
PER	Parameters setting wrong		

7. MAINTENANCE



WARNING

- Maintenance must be performed according to designated maintenance methods.
- Maintenance, inspection and replacement of parts must be performed only by certified person.
- After turning off the main circuit power supply, wait for 10 minutes before maintenance or inspection.
- DO NOT directly touch components or devices of PCB board. Otherwise inverter can be damaged by electrostatic.
- After maintenance, all screws must be tightened.

7.1 Daily Maintenance

In order to prevent the fault of RBU to make it operate smoothly in high-performance for a long time, user must inspect the RBU periodically (within half year). The following table indicates the inspection content.

Check Item	Content
Temperature/Humidity	Ensure the environmental temperature is between 0°C~50°C, and humidity is between 20~90%.
Oil mist and dust	Ensure there are no oil mist and dust in the RBU.
RBU	Inspect RBU to ensure whether there are abnormality heat and vibration.
Fan	Ensure the fan is running well, nothing inside to block it.
Input Power	Ensure the input power voltage and frequency is in allowed range.

7.2 Periodic Maintenance

In order to prevent the fault of RBU to make it operate smoothly in high-performance for a long time, user must inspect the RBU periodically (within half year). The following table indicates the inspection content.

Maintenance

Inspection Item	Inspection Content	Solution
Screw of external terminal	Screws are loose or not?	Tighten up
PCB Board	Dust, Dirty object	Clean them completely by dry compressed air
Fan	Abnormity noise and vibration, cumulative time is over 20,000 hours or not?	1. Clean them 2. Replace the fan
Electrolytic Capacitor	Color changed or not, any peculiar smell?	Replace electrolytic capacitor
Heat emission	Dust, dirty object	Clean them completely by dry compressed air
Power Components	Dust, dirty object	Clean them completely by dry compressed air

8.3 Replacement of wearing parts

Fans and electrolytic capacitors are wearing part, please make periodic replacement to ensure long term, safety and failure-free operation. The replacement periods are as follows:

- ◆ Fan: Must be replaced when using up to 20,000 hours;
- ◆ Electrolytic Capacitor: Must be replaced when using up to 30,000~40,000 hours.