HBU3 Series Brake Unit

User Manual

HNC Electric Limited

Preface

Thank you for using HBU3 series brake unit of HNC Electric Limited. HBU3 series brake unit converts the electric energy feedback to the DC bus of the frequency converter into heat through the external braking resistor, so as to limit the DC bus voltage to a specified level, improve the braking capacity of the frequency converter and make the motor brake quickly.

The brake unit must be connected with a suitable braking resistor for use, otherwise it can't play a braking role. The selection of resistors is detailed in the manual for reference.

When using the HBU3 series brake unit, please read this manual carefully and keep it properly. This user manual will help you in the daily maintenance, inspection and troubleshooting of the product.

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1. Precautions for safety

1.1 Symbols related to security

Danger

When used incorrectly, it will cause danger. Serious cases may cause personal injury or death.

Attention

When used incorrectly, it will cause danger. This may cause minor or moderate personal injury or device damage.

1.2 Matters needing attention

- **Confirmation**

Attention
1. Do not install the damaged brake unit and the missing parts. There is a danger of injury.

- **Installation**

Attention

1. Install it on the board of non-combustible materials such as metal.
   Danger of electric shock and fire.
2. Please install cooling fans or other devices to keep the air inlet temperature below 45°C when more than two units are installed in the same cabinet.
   Overheating will cause fire and other accidents.

- **Wiring**

Danger

1. Before wiring, please confirm that the input power supply has been cut off.
   Danger of electric shock and fire.
2. High voltage is present at the terminals of the brake unit and the brake resistance unit.
   Danger of electric shock and fire.
3. Ask electrical engineering professionals for wiring operations.
   Danger of electric shock and fire.
4. After the emergency stop terminal is connected, check whether its action is effective.
   There is a risk of electric shock and injury.
5. Keep grounding reliable. (The grounding resistance shall not be higher than 10 ohms)
   There is a risk of electric shock and injury.
6. Failing to operate according to regulations, the operator shall bear all the accidents.

- **Trial running :**

Danger

1. After confirming that the terminal housing is installed, the input power supply can be turned off. When the power is on, please do not remove the cover.
   There is danger of electric shock!
2. When the brake resistor discharges, the temperature of the heat sink of the brake unit and the brake resistor is very high. Please do not touch it.
   There is a danger of injury.
3. During operation, please do not check the signal. If you check at this time, the equipment will be damaged.
4. All the braking units are provided by our company, so please do not change them without authorization,
   Which will cause damage to the equipment.

- **Maintenance and inspection**

Danger

1. Do not touch the main terminal and signal terminal of the brake unit during power-on.
   There is danger of electric shock!
2. Be sure to install the cover of the terminal before power it on, and disconnect the power supply when removing the cover.
   There is danger of electric shock!
3. Be sure to wait until the power indicator light goes out and the power loop is cut off before maintenance and inspection.
   There is danger of electric shock!
   Non-professional technicians are not allowed to carry out maintenance, inspection, or replacement of parts.

2. Confirmation of incoming goods

The brake unit passed the inspection before leaving the factory, and it is inevitable that it may be damaged during transportation. Please carefully check the following points after unpacking:

● Whether the nameplate data meets your requirements.
● Whether it was damaged during transportation.
●Whether the tightened screws and screws are loosened.

If there is any bad situation, please contact the agent or the relevant department of our company.

3. Installation

3.1 Installation site and environment

● Avoid raindrops and rain.
● Clean and dry.
● Keep away from corrosive gases and liquids.
● Keep away from ash and dust.
● Ambient temperature:-10ºC ~ 45ºC. ,
● Humidity: 20% RH ~ 90% RH.
● Installation foundation is firm and vibration-free.
● Electromagnetic interference environment meets the national standard.
● When used in a closed box, in order to increase the reliability and life of operation,
Please install a cooling fan or a cooling air conditioner to keep the ambient temperature within 45ºC.

3.2 Name and installation dimensions of components

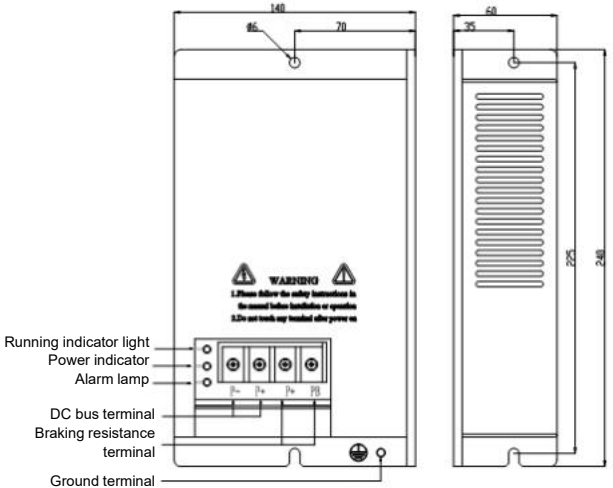


Figure 1 Simple type Brake Unit below 80A

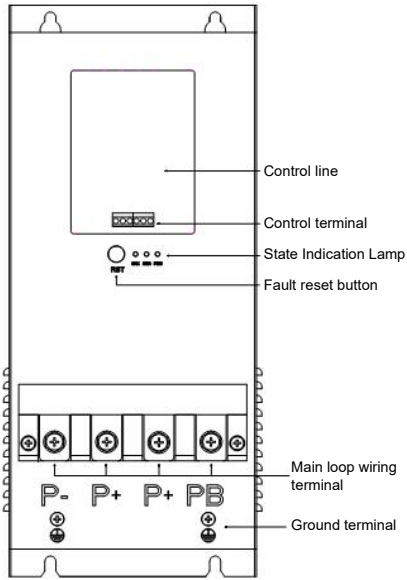


Figure 2 150A ~ 350A Brake unit

Note: The fault reset button and indicator light are on the upper cover plate, and the rest of the components are inside the machine, so the wiring can be performed only after the upper cover plate is disassembled.

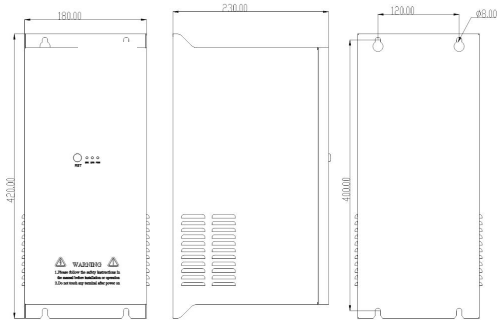


Figure 3 150A～350A Brake Unit

4. Wiring

4.1 Description of terminal blocks of brake unit

4.1.1 Main circuit power terminal

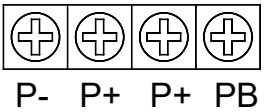


Fig. 4 80A Main circuit power terminal diagram below

Note: The simple brake unit has no control terminal and does not support parallel operation of multiple units.

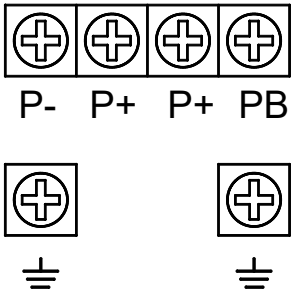


Figure 5 150A～350A Main Circuit Power Terminal Diagram

4.1.2 Control terminal

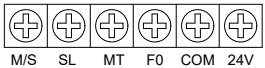


Figure 6 150A～350A Layout of Control Terminals

Note: It is used to realize the parallel connection of master and slave machines and the function of fault signal output.

4.2 Description of terminal identification

Terminal type	Terminal identification	Description and precautions
Main loop terminal	P-, P +	DC bus connection terminal, connected to P- and P+ of frequency converter. The length of two lines should be limited to 3m. Pay special attention not to connect the inverter in reverse, otherwise it will damage the inverter and brake unit.
	P+, PB	Brake resistor connecting wires are connected to both ends of the brake resistor respectively.
Control terminal (150 A to 350A brake units only)	M/S	Master-slave mode selection terminal. Short-circuit to COM is slave mode, and suspended is master mode.
	SL	In slave mode, brake the command input terminal, and brake when low level is input.
	MT	Brake command output, which is used to control the slave mechanism in the master mode, and can also be output as a braking state. Open collector output, active at low level.
	FO	Fault signal output, output low-level signal when overheating or short-circuit fault occurs. The load current is less than 30 mA.
	24V, COM	Supply external 24V power supply and ground, maximum load should not exceed 100mA.
Ground terminal		Ground terminal of machine housing.

4.3 Reference wiring and control circuit of frequency converter

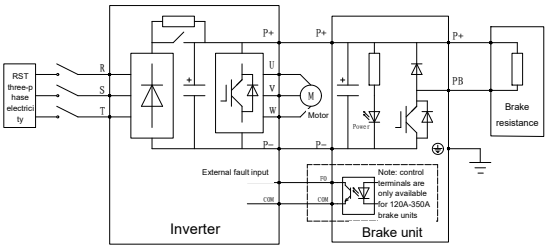


Figure 8 Single main control Wiring diagram

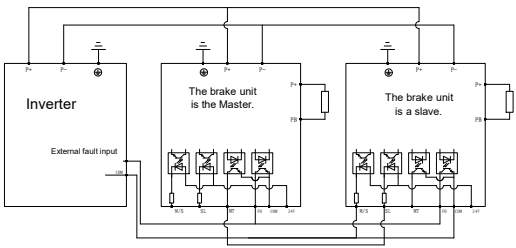


Figure 9 Wiring diagram of parallel operation of two brake units

Note: In parallel operation, one is set as master mode, and the other is controlled to operate as slave. The two braking units must be independently connected with their respective braking resistors. The following power segment brake units of 80A have no master-slave function.

5. Operation

5.1 Check the following items before operation:

5.1.1 Whether the connection is correct, pay special attention to:

- P+, P- terminals are connected to P+, P- of DC bus of frequency converter, and Absolutely can't be reversed.
- The housing ground terminal is reliably grounded.
- In case of two parallel operation modes, the brake units must be connected separately. Self braking resistance.

5.1.2 Whether there is danger of short circuit or short circuit to ground between terminals and exposed live parts.

5.2 Check after the inverter is powered on:

- Whether the frequency converter has an external fault alarm.
- Whether the indicator light of the braking unit is normal (the power indicator light is on, the fault light, and the running indicator light only flashes when the motor slows down).
- Whether the fan is running (150A to 350A power range).

6. Fault analysis and solution

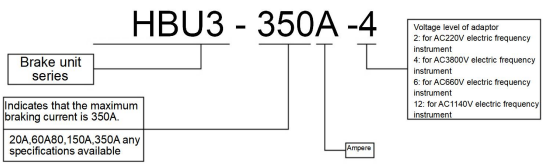
Only professional technicians can be qualified for maintenance, inspection and replacement of product parts.

N0.	The fault feature	Reason	Problem solving
1	The inverter is powered on, but it hasn't run yet, and the braking resistor starts to heat up.	The brake unit IGBT is damaged.	Replace IGBT
		Inverter input voltage is too high.	Re-select the brake unit of the power supply with relevant specifications.
2	Inverter overvoltage (OU)	Braking capacity of brake resistance is insufficient	Recalculate the braking conditions
		The brake unit is not actuated.	Check the wiring when the brake unit is alarmed or damaged, or replace the brake unit.
3	Brake unit reported fault (ERR light is on)	Braking resistance short circuit or grounding	Check the power-off wiring
		Overheating of brake unit	Excessive braking current: reconfigure the braking unit and resistor.
			The ambient temperature is too high (over 45°C: reduce the ambient temperature.

Remarks: When the brake unit reports a fault, it can be divided into overheating fault and short-circuit fault. Overheating when the inverter stops braking or running (without power off), it will be braked and reset after about 10 minutes. At this time, it can be determined and judged as overheating. The short circuit will not reset automatically, so it must be powered off to check the wiring before powering on. There is a fault reset button (RST) in the braking unit of 150A-350A power section, which is generally only used in debugging, but it is not recommended to reset in actual use.

7. Relevant technical specifications

7.1 Naming specification



7.2 Specifications and models

NO.	Specifications and Models (AC380V)	Maximum braking current
1	HBU3-020A-4	20A
2	HBU3-060A-4	60A
3	HBU3-080A-4	80A
4	HBU3-150A-4	150A
5	HBU3-350A-4	350A

7.3 Technical specifications for brake units

Model No.: HBU3- XXXA - 4 series		
Inverter-oriented	Alternating-current power supply	380V
	Power	0.75KW～above
Output characteristics	Maximum braking current	See specific specifications and models
	Brake starting voltage	690V±10V
	Hysteresis voltage	670V±10V
Power supply	U(p+_p-)	350V～800V
Protection function	Electronic thermal relay	Brake unit heat sink temperature exceeds 85° C protection, braking unit stops braking, fault indicator light is on.
	Power indicator	When the input voltage exceeds 200V, the power indicator is on.
	Brake indicator	The brake indicator blinks when the brake unit is bllinking.
Control mode	Single mode	When one brake unit works, it is selected as the Master mode.
	Master-slave mode	When multiple units are running in parallel, one of them is in master mode, and the others are in slave mode.

Conditions of use	Installation site	Indoor. Below 1Km above sea level, free of dust, corrosive gas, liquid and direct sunlight.
	Applicable environment	-10°C ~ 45°C, 20% ~ 90% RH (without condensation).
	Vibration	Less than 0.5g
	Storage mode	-25°C ～ 65°C
	Installation method	Wall mounting type

Note: When multiple brake units are used in parallel, please ensure that one of them is in the master control mode and the other is in the slave control mode. At this time, all the parallel brake units are turned on or off synchronously, otherwise, the brake units will be overloaded and damaged.

7.4 Specification selection of braking unit and braking resistor

Brake unit model	Inverter power	Recommended braking resistance power	Recommended resistance of braking resistance
HBU3-020A-4	18.5KW	1.3KW	≥35Ω
HBU3-020A-4	22KW	1.5KW	≥35Ω
HBU3-060A-4	30KW	2.5KW	≥25Ω
HBU3-060A-4	37KW	3.7kW	≥20Ω
HBU3-060A-4	45KW	4.5kW	≥15Ω

Brake unit model	Inverter power	Recommended braking resistance power	Recommended resistance of braking resistance
HBU3-080A-4	55KW	5.5kW	≥10Ω
HBU3-150A-4	75KW	7.5kW	≥8Ω
HBU3-150A-4	90KW	14KW	≥8 Ω
HBU3-150A-4	110KW	14KW	≥5 Ω
HBU3-150A-4	132KW	14KW	≥5Ω
HBU3-150A-4	160KW	14kW	≥5Ω
HBU3-150A-4	185KW	14kW	≥5 Ω
HBU3-350A-4	200KW	20kW	≥3.5Ω
HBU3-350A-4	220KW	20kW	≥2.5Ω
HBU3-350A-4	250KW	28KW	≥2.5Ω
HBU3-350A-4	280KW	28KW	≥2 .5Ω
HBU3-350A-4	315KW	35KW	≥2.Ω
HBU3-350A-4	355KW	35KW	≥2 Ω
HBU3-350A-4	400KW	35KW	≥2 Ω
HBU3-350A-4*2	450KW	2 X 28KW	≥2X2.5Ω
HBU3-350A-4*2	500KW	2 X 28KW	≥2X2.5Ω
HBU3-350A-4*2	560KW	2 X 28KW	≥2X2.5Ω

Note: The above recommended values are recommended according to 100% braking torque and 25% braking rate. When more braking torque or more frequent braking is required, please reduce the resistance value and increase the power of the braking unit.

8. Warranty of brake unit

8.1 During the warranty period, when this product is used normally according to the instruction manual, our company will be responsible for free maintenance if the product fails or is damaged due to its own problems.

8.2 During the warranty period, a certain maintenance fee will be charged if:

- Machine damage caused by improper use or self-repair, modification, etc.;
- Machine damage caused by flood, fire, abnormal voltage, lightning, earthquake, salt corrosion, gas corrosion or other natural disasters;
- Machine damage caused by man-made falling or transportation;
- Failure of the machine caused by incorrect operation and use according to the instructions in the instruction manual;
- Machine damage caused by obstacles outside the machine;

8.3 Outside the warranty period, our company also provides lifelong maintenance service, and will charge a certain maintenance fee as appropriate.

8.4 The relevant service charges shall be implemented according to our maintenance charge regulations. If there is an agreement, the agreement shall take precedence.

Version: 2.0

Thanks for choosing HNC product.

Any technique support, please feel free to contact our support team

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