Chapter 2 Technical specifications and installation

2-1.Technical specifications

Type	Starting braking voltage (V)	Maximum continuous braking current(A)
PB200-040-2	350	40
PB200-050-2	350	50
PB200-075-2	350	75
PB200-100-2	350	100
PB200-180-2	760	180
PB200-040-3	670	40
PB200-050-3	670	50
PB200-075-3	670	75
PB200-100-3	670	100
PB200-180-3	760	180
PB200-040-4	760	40
PB200-050-4	760	50
PB200-075-4	760	75
PB200-100-4	760	100
PB200-180-4	760	180

2-2.Main circuit terminal screw specifications

Brake unit model	Main loop screw specifications	Tightening torque (Nm)
PB200-040-2	M5	2~2.5
PB200-050-2	M5	2~2.5
PB200-075-2	M5	2~2.5
PB200-100-2	M5	2~2.5
PB200-180-2	M8	9~11
PB200-040-3	M5	2~2.5
PB200-050-3	M5	2~2.5
PB200-075-3	M5	2~2.5
PB200-100-3	M5	2~2.5

PB200-180-3	M8	9~11
PB200-040-4	M5	2~2.5
PB200-050-4	M5	2~2.5
PB200-075-4	M5	2~2.5
PB200-100-4	M5	2~2.5
PB200-180-4	M8	9~11

2-3.Installation

2-3-1 Conditions for Use

Hanging Brake unit should be installed inside the house where is ventilative.

2-3-2 Ambient condition

1. Ambient temperature -10℃~50℃. more than 40 ℃, according more than 1℃ ,proportion of 3% derating. not suggest more than 50℃.

2. Prevent electromagnetic interference, far away from disturbance sources;

3. Prevent dropping dust, powder, cotton fiber or fine metal powder from entering it.

4. Prevent oil, salt and corrosive gas from entering it.

5. Avoid vibration.

6. Avoid high temperature and moisture and avoid being wetted due to raining, with the humidity below 90%RH (not dewing).

7. Prohibit the use in the dangerous environment where inflammable or combustible or explosive gas, liquid or solid exists.

8. Brake unit can not installation near Air inlet.

2-4.Shape dimensions and installation dimensions

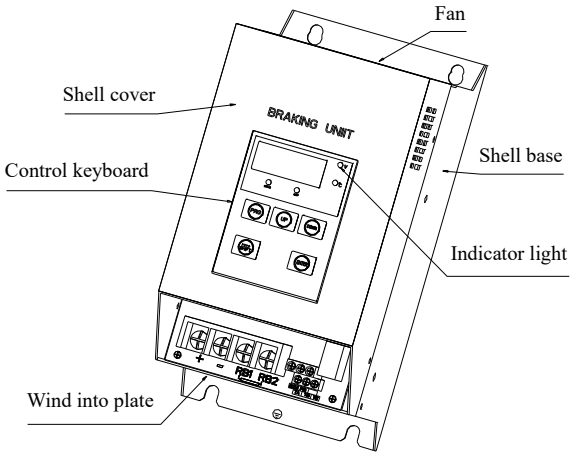


Figure 2-1. 40-100A The brake unit sketch

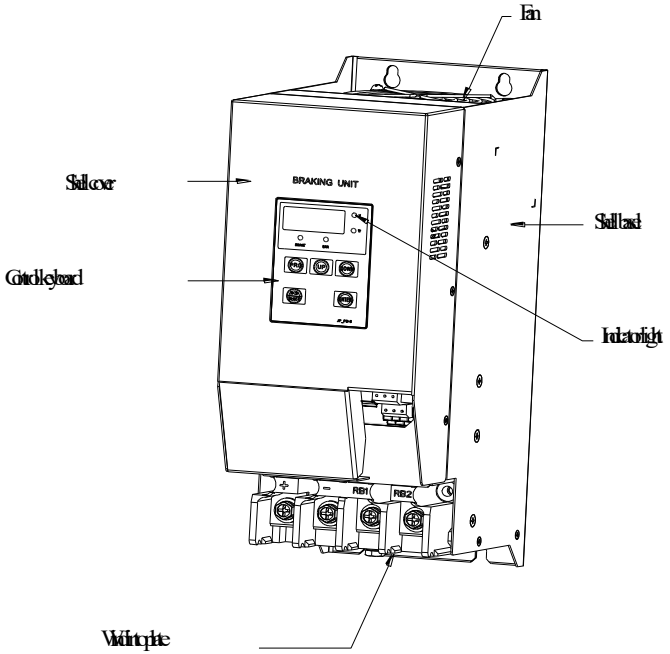


Figure 2-2. 180A The brake unit sketch

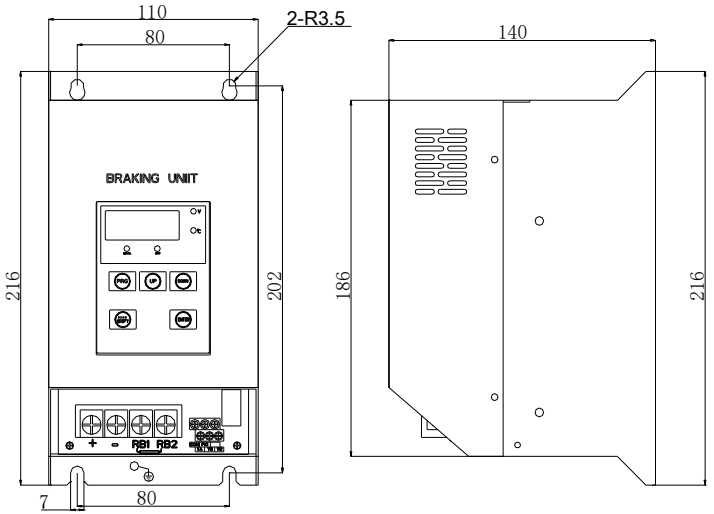


Figure 2-3. 40-100A Brake unit Installation dimensions

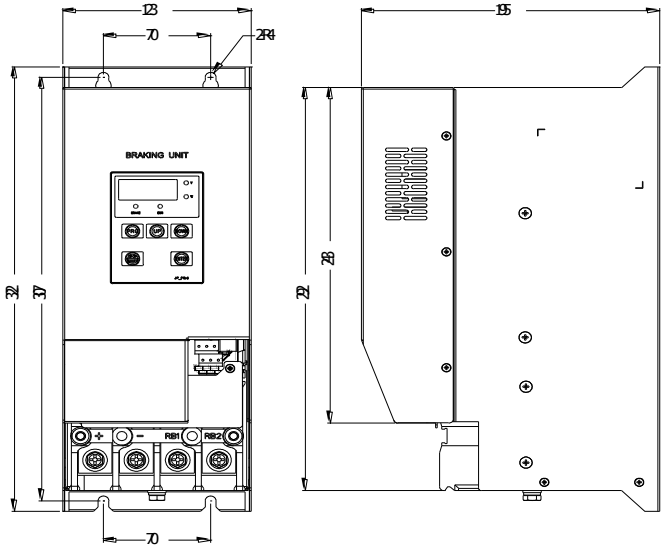


Figure 2-4. 180A Brake unit Installation dimensions

2-5.Wiring diagram

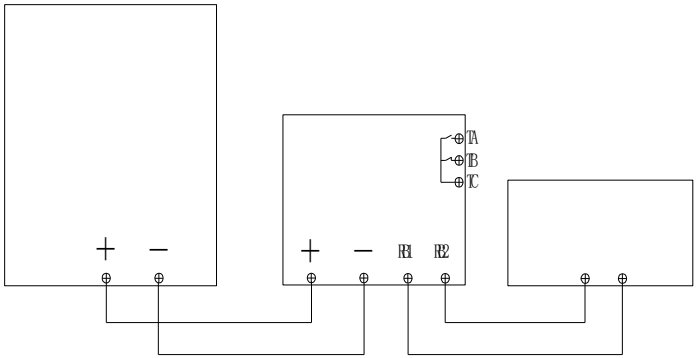


Figure 2-5. Single brake unit wiring diagram

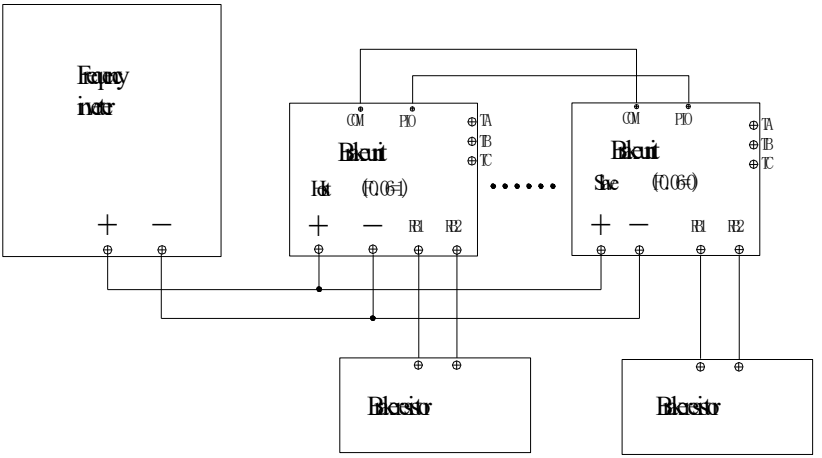


Figure 2-6. Figure more than one brake unit parallel connection diagram

NOTE:

1. The distance of the connection between the inverter and brake unit should less than 5m. And shall be added heat conductors.
2. The distance of the connection between the brake resistor and brake unit should as short as possible less than 10m.
3. +/P+、-/P- is the DC BUS in the inverter "+""-", P is positive, N is negative.
4. Output of relay TA/TB/TC, TA-TC normally open, TB-TC normally close. Relay drive ability. ： normally close3A/AC 250V， normally open.5A/AC 250V.
5. Wrong connection of main circuit will cause damage of brake unit and frequency inverter.
6. Please do not touch the brake unit when it is working, avoid scald.

2-5-1. Brake termial unit main circuit terminal and Making circuit terminal

1、Main circuit terminal

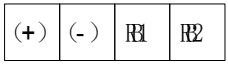


Figure 2-7. Brake unit main circuit termial

Terminal mark	Function instruction
(+)	Connect the positive terminal of the inverter DC BUS.
(-)	Connect the Negative terminal of the inverter DC BUS.
RB1、RB2	External connect brake resistor terminal
PE	Brake unit ground terminal

2. Control circuit terminal

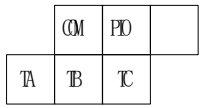


Figure 2-8. Control circuit terminal

Terminal mark	Function instruction
COM	Brake unit control circuit ground
PIO	When brake units work in parallel use input or output terminal,when many sets of brake unit used in parallel, send control signal through the terminal that braking unit can run simultaneously.
TA/TB/TC	Fault output terminals, when braking unit failure, fault alarm signal output. TA - TC for normally open, TB - TC is normally closed

Chapter 3 Operate keyboard

3-1. Operate keyboard instruction

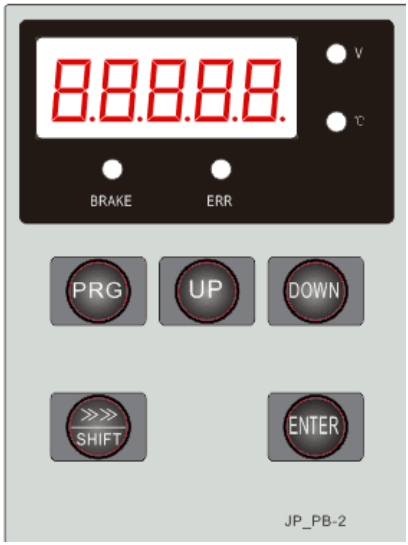


Figure 3-1:Operate keyboard display

3-2. Keyboard light instruction

Light indicator		Name
Status light	V	Brake unit input voltage
	℃	On :IGBT temperature
	BRAKE	On :Brake unit on brake status . Dull : Brake unit on status standby
	ERR	Off :Fault indicator light

3-3. Operation panel button

Mark	Name	Function
	Parameter setting / ESC key	* Enter the first level menu parameters changes state. * Exit function data modify. * Sub menu or function menu exit to the status display menu item.
	Shift key	* Under the standby display interface and brake interface, can choose according to loop parameters; When modifying parameters, can choose the parameter changes

UP	Increasing key	* Date and function Increasing key.
DOWN	Descending key	* Date and function descending key.
ENTER	Confirm key	* Step by step into the menu screen, set parameter confirmation.

3-4. Keyboard display letters and Numbers corresponding to the table

	Display letter	Corresponding to letter	Display letter	Corresponding to letter	Display letter	Corresponding to letter
Digital display area	0	0	1	1	2	2
	3	3	4	4	5	5
	6	6	7	7	8	8
	9	9	d	d	E	E
	F	F	r	r	y	y
	.	.	-	-		

3-5.Parameter setting sample

3-5-1.function code check and repair instruction.

PB200 Operation panel adopts three-level menu structure of the parameter Settings, and so on. Three-level menu are: parameter set (menu) - function code (level 2) - function code value (level 3) menu. Operation process as shown.

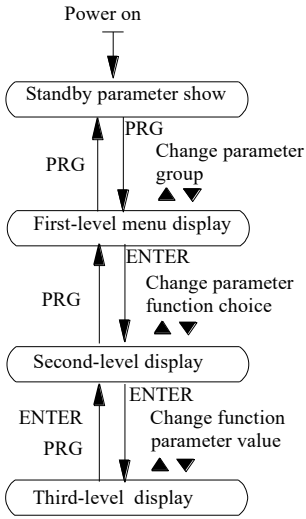
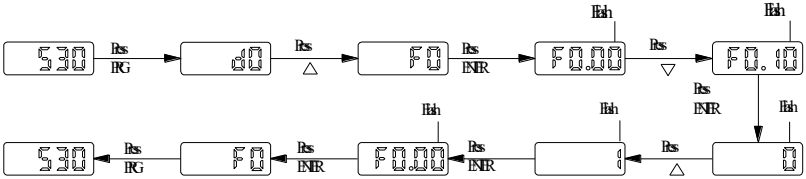


Figure 3-2:Operation flow chart

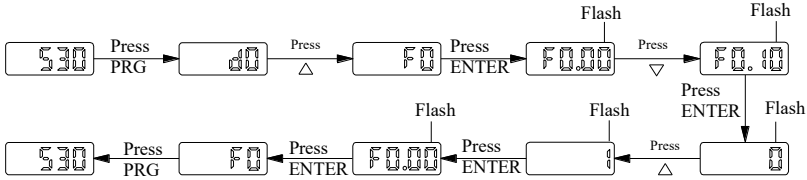
Explanation: the three-level menu operation, can press.PRG key or the ENTER key to return to the secondary menu. The difference between them is: press ENTER to save setting parameters then returning to the secondary menu, and automatically move to the next function code; While press.PRG return to the secondary menu, not storage parameters, and return to the current function code.

Case 1: brake start voltage to modify parameters (380V) grade, assume that the brake unit input voltage is 530 VDC.

F0.00 from 670V to 660V



Example 2. Restore factory parameters



In the third level menu state, if the parameter does not have a flashing bit, it indicates that the function code can not be modified, possible reasons below:

1) This function code is unmodifiable. Such as the actual detection parameters, operating parameters., etc.

2) The function code can not be modified in the running state, it needs to be stopped before being modified.

3-5-2.How to view the status parameters

In the shutdown or operating state, through the Shift key "SHIFT", can monitor temperature and brake unit input voltage respectively.

Chapter 4 Function parameter description

4-1. Menu grouping

Note:

"★": In braking state, the set value of this parameter can not be changed.

"●": The actual detection value, can not be changed;

"☆": In stop or running state, can be changed;

d Group is a monitoring function parameter, F group is the basic function parameters, y1 group is fault history query.

4-1-1.d0 Monitor function group

Parameter Function Code	Parameter name	The smallest unit
d0.00	Braking unit input voltage / Inverter bus voltage	V
Braking unit input voltage value		
d0.01	Module temperature	℃
Inverter module heatsink temperature detection value		
d0.02	Software version	-
Display current brake unit software version number		

4-1-2. Basic function group

Code	Parameter name	Setting range	Factory setting	Change
F0.00	Braking start voltage	300V～2500V	Model confirmed	☆
This parameter is used to set the starting braking voltage of the braking unit. 220V voltage level, default braking voltage is 350V; 380V voltage level, default braking voltage is 670V; 480V voltage level, default braking voltage is 760V;				
F0.01	Braking hysteresis voltage	0V～100V	20V	☆
This parameter is used to set the hysteresis voltage during braking. Generally when setting braking start voltage and braking stop voltage, there must be a hysteresis loop. Such as settings F0.00=670V，F0.01=20V，when the bus voltage d0.00 is higher than F0.00, start braking. When the bus voltage d0.00 is lower than (F0.00-F0.01), stop braking. When the original state is in braking state, and the value of d0.00 is within F0.00 ~ (F0.00-F0.01), the braking state is maintained.				
F0.02	Default brake voltage selection	0～2	1	★
This parameter is used to set the default braking voltage for different voltage levels. When setting to 0, corresponding to 220V voltage level, the default braking voltage is 350V; When setting to 1, corresponding to 380V voltage level, the default braking voltage is 670V;				

When setting to 2, corresponding to 480V voltage level, the default braking voltage is 760V;

F0.03	Braking rate	0%～100%	100%	☆

This parameter is used to select the braking rate.

When braking rate is set to 100%, it shows that the braking is fully open, at this time the braking effect is the best, with the fastest voltage drop, but the brake resistor temperature rises quickly.

When the braking rate is set to 0%, it shows that the braking is turned off, at this time even if it reaches the braking condition, the braking does not work.

F0.04	Voltage modulation factor	0%～200%	100%	☆

This parameter can be used to adjust the d0.00 bus voltage detection value.

That is d0.00＝DC BUS input voltage =d0.00*F0.04.

F0.05	Relay output function selection	0～4	0	☆

Relay function instructions below:

Setting value	Function	Description
0	No output	The relay outputs no action.
1	In Braking	In braking state, the relay outputs ON signal.
2	Braking feedback fault (IGBT short circuit)	In braking process, it feedback IGBT short-circuit fault, the relay output ON signal.
3	Over-temperature alarm	When the module temperature exceeds 85 ℃, the over-temperature alarm signal is generated, the relay outputs ON signal.
4	Fault output	When brake feedback fault or over-temperature fault occurs, the relay output ON signal.

F0.06	Master and slave selection	Slave	0	1	★
		aster	1		

This parameter is used for the parallel function, setting the braking unit as master or slave. If you do not use the parallel function, the system single-set default unit host.

F0.07	Temperature hysteresis value	0～50	3	☆

This parameter is used to set the hysteresis value of the temperature. The default temperature alarm value for the brake unit is 85 ℃. If the temperature hysteresis value is set to 3 ℃, when there is not over temperature fault, if only the temperature exceeds 85 ℃, it alrms. If over temperature fault occurs, the alarm is canceled only when the temperature drops below 82 ℃.

F0.08	Total power-on time	0~50000h	-	●

Display the total power-on time of braking unit since it is out of factory.

F0.09	Total running time		0~50000h	-	●
F0.10	Parameter initialization	No operation	0	0	★
		The parameters restored to	1		

		factory value			
		Clear record information	2		

1: Restore to the factory setting (F0.10 = 1), most of the brake unit parameters are restored to factory setting, except default braking voltage level (F0.02), fault record information, total power-on time, total running time.

2: Clear the record information (F0.10 = 2) Clear the fault record information, total power-on time, total running time of the braking unit.

4-1-3. Fault history query

Code	Parameter name	Setting range	Factory setting	Change
y1.00	Type of the first fault	0～2	-	●
y1.01	Type of the second fault	0～2	-	●
y1.02	Type of the third(at last) fault	0～2	-	●

Record the type of the last three faults of PB200, 0 for no fault. Please refer to the related instructions for the possible causes and solutions for each fault code.

Failure type table:

No.	Failure type
0	No fault
1	Braking feedback fault (IGBT short circuit)
2	Over temperature fault

y1.03	Bus voltage of the third fault	Bus voltage of the last fault	●
y1.04	Temperature of the third fault	Temperature of the last fault	●
y1.05	Braking rate of the third fault	Braking rate of the last fault	●
y1.06	Power on time of the third fault	Power on time of the last fault	●
y1.07	Running time of the third fault	Running time of the last fault	●
y1.08	Bus voltage of the second fault	Bus voltage of the previous fault	●
y1.09	Temperature of the second fault	Temperature of the previous fault	●
y1.10	Braking rate of the second fault	Braking rate of the previous fault	●
y1.11	Power on time of the second fault	Power on time of the previous fault	●
y1.12	Running time of the second fault	Running time of the previous fault	●
y1.13	Bus voltage of the first fault	Bus voltage before the previous fault	●
y1.14	Temperature of the first fault	Temperature before the previous fault	●
y1.15	Braking rate of the first fault	Braking rate before the previous fault	●
y1.16	Power on time of the first fault	Power on time before the previous fault	●
y1.17	Running time of the first fault	Running time before the previous fault	●

Chapter 5 Braking unit and resistor selection

5-1 The selection of braking unit

5-1-1.The brake voltage selection are based on the following two criterions

(1) Selecting the corresponding voltage level of the braking unit according to the inverter input voltage level.

(2) Selecting the corresponding braking unit power according to the braking power required.

The selection principle of braking unit power is that the braking unit power is greater than the braking power. In the case of unspecified braking power,the following method can be used to estimate:

Pb=P*Td*K

Where: Pb-----Braking power

P-----Motor Power

K----- Mechanical energy conversion efficiency, the general value: 0.7

Td---- Braking torque and rated motor torque ratio

The values of Td are not the same in different systems, as shown in the following table

Common applications	Elevators, hoists, cranes	Winding up and winding down	Large inertia devices that require fast stopping	Common inertial load
Td value	100%	120%	120%	80%

5-1-2.Braking resistance selection

The regenerative energy of motor is almost entirely consumed in the braking resistor while braking. As per the formula:

U*U/R=Pb

U----- Braking voltage for stable braking system

(They are not the same for different systems, for 220VAC system usually take 380V; for 380VAC system,generally take 700V, 480VAC systems take 800V)

Note: When the calculated R is less than the minimum resistance at each voltage level, multiple braking units are required.

5-1-3.Braking resistor power selection

Theoretically the braking resistor power and braking power are the same, but taking the derating of 70% into account. According to the formula:

0.7*Pr=Pb*ED

Pr-----Braking resistor power

ED----- Braking frequency, that is, the braking process accounted for the proportion of the entire work process

Common application	ED Value
Winding up and winding down	20%～30%
Casual braking load	5%
Elevator	20%～30%

Hoisting machine, centrifugal machine	50%～60%
injection molding machine	5%～10%
General occasion	10%

In the table above, the recommended braking unit and braking resistor values can meet the various application conditions of the inverter with ED = 0 to 100%, but the power of braking resistor will depend on different application conditions.

5-1-4.Inverter input voltage level specification and selection reference

1. This table for inverter 220V, braking unit DC operating point 350V, braking frequency 10%, braking torque 100%.

Inverter power (kW)	Braking unit		Braking resistor (100% braking torque)	
	Specification	Quantity(PC)	Specification	Quantity(PC)
15	PB200-040-2	1	≥ 9Ω /2kW	1
18.5	PB200-040-2	1	≥ 9Ω /2kW	1
22	PB200-050-2	1	≥ 7Ω /3kW	1
30	PB200-075-2	1	≥ 5Ω /3kW	1
37	PB200-075-2	1	≥ 5Ω /4kW	1
45	PB200-100-2	1	≥ 4Ω /5kW	1
55	PB200-100-2	1	≥ 4Ω /6kW	1
75	PB200-180-2	1	≥ 2Ω /8kW	1
93	PB200-180-2	1	≥ 2Ω /10kW	1
110	PB200-180-2	2	≥ 2Ω /7kW	2
132	PB200-180-2	2	≥ 2Ω /8kW	2
160	PB200-100-2	2	≥ 2Ω /9kW	2

2.This table for inverter 380V, braking unit DC operating point 670V, braking frequency 10%, braking torque 100%.

Inverter power (kW)	Braking unit		Braking resistor (100% braking torque)	
	Specification	Quantity(PC)	Specification	Quantity(PC)
18.5	PB200-040-3	1	≥ 17Ω /2kW	1
22	PB200-040-3	1	≥ 17Ω /3kW	1
30	PB200-040-3	1	≥ 17Ω /3kW	1
37	PB200-040-3	1	≥ 17Ω /4kW	1
45	PB200-050-3	1	≥ 14Ω /5kW	1
55	PB200-075-3	1	≥ 9Ω /6kW	1
75	PB200-100-3	1	≥ 7Ω /8kW	1
93	PB200-100-3	1	≥ 7Ω /10kW	1

110	PB200-180-3	1	≥ 4Ω /12kW	1
132	PB200-180-3	1	≥ 4Ω /15kW	1
160	PB200-180-3	1	≥ 4Ω /18kW	1
187	PB200-100-3	2	≥ 7Ω /10kW	2
200	PB200-100-3	2	≥ 7Ω /11kW	2
220	PB200-180-3	2	≥ 4Ω /12kW	2
250	PB200-180-3	2	≥ 4Ω /13kW	2
280	PB200-180-3	2	≥ 4Ω /15kW	2
315	PB200-180-3	2	≥ 4Ω /17kW	2
355	PB200-180-3	3	≥ 4Ω /13kW	3
400	PB200-180-3	3	≥ 4Ω /14kW	3

3.This table for reference as: inverter 480V, braking unit DC operating point760V, braking frequency 10%, braking torque 100%.

Inverter power (kW)	**Braking unit**		**Braking resistor (100% braking torque)**	
	Specification	**Quantity(PC)**	**Specification**	**Quantity(PC)**
18.5	PB200-040-4	1	≥ 19Ω /2kW	1
22	PB200-040-4	1	≥ 19Ω /3kW	1
30	PB200-040-4	1	≥ 19Ω /3kW	1
37	PB200-040-4	1	≥ 19Ω /4kW	1
45	PB200-050-4	1	≥ 16Ω /5kW	1
55	PB200-075-4	1	≥ 11Ω /6kW	1
75	PB200-075-4	1	≥ 11Ω /8kW	1
93	PB200-100-4	1	≥ 8Ω /10kW	1
110	PB200-100-4	1	≥ 8Ω /12kW	1
132	PB200-180-4	1	≥ 5Ω /14kW	1
160	PB200-180-4	1	≥ 5Ω /18kW	1
187	PB200-180-4	1	≥ 5Ω /20kW	1
200	PB200-180-4	1	≥ 5Ω /22kW	1
220	PB200-100-4	2	≥ 8Ω /12kW	2
250	PB200-180-4	2	≥ 5Ω /14kW	2
280	PB200-180-4	2	≥ 5Ω /15kW	2
315	PB200-180-4	2	≥ 5Ω /17kW	2
355	PB200-180-4	2	≥ 5Ω /19kW	2
400	PB200-180-4	2	≥ 5Ω /21kW	2

Chapter 6 Abnormal diagnosis and treatment

PB200 braking unit has 2 types of protection, once the fault occurs, the protection function act, braking unit stops working, and display the fault type on the braking unit display panel. Users can follow the tips in this section to check firstly, analys the reason of fault, and find a solution.

If fault occurs during debugging, refer to the troubleshooting and protection functions list in Table 6-1 to confirm fault type and troubleshooting method. If you can not find the troubleshooting method during the debugging process, please contact Sourcetronic technical service personnel.

Table 6-1 List of braking unit fault diagnosis and protection functions

No.	Failure code	Failure type	Possible causes	Solutions
1	E.SHo	Braking feedback fault (IGBT short circuit)	1、Braking unit output circuit short out 2、The internal wiring of the brake unit loosen. 3, Drive circuit is abnormal 4, Inverter module abnormal	1, Exclude peripheral faults 2, Plug all the cables well 3, Seek technical support 4, Seek technical support
2	E.oH	Module is overheating	1, Air duct get blockage 2, Fan damage 3, Ambient temperature is too high 4, Module thermistor damage 5, Inverter module damage	1, Clean air duct 2, Replace fan 3, Reduce ambient temperature 4, Replace thermistor 5, Replace inverter module

Chapter 7 Maintenance and inspection

7-1. Inspection and maintenance

Brake unit in normal use, in addition to daily inspection, it still needs regular inspection. Please refer to the table below for preventive measures.

Inspection date		Inspection part	Inspection item	Inspection matter	Inspection method	Judgement criteria
Routine	Periodic					
√		Display	LED display	If there is abnormal on display	Vision	Confirm as status of use
√	√	cooling system	Fan	If there is abnormal sound or vibration	Vision, hearing	No abnormality
√		Case	Surroundings	Temperature humidity, dust, harmful gases	Vision, smell, feeling	According to the technical specifications of environmental standards
√		Input and output terminals	Voltage	If there is abnormal on input voltage	Measure (+), (-) terminals	According to the standard specifications
	√	Main circuit	Full view	If there are loose fasteners, overheating traces, discharge phenomenon, too much dust, blocked air duct	Visual, fastening, wipe	No abnormality
			Conductor, conductive row	If it is loose	Visual	No abnormality
			Terminals	If bolts or screws are loose	Fastening	No abnormality

"√" indicates the need for routine or periodic inspections. In the inspection, operator can not remove or shook the device for no reason, especially can not unplug connector, otherwise it will not work properly or enter the fault display state and lead to component failure or even the main switch IGBT module damage.

7-2. Replacement for vulnerable components of braking unit

To ensure the reliable operation of the brake unit, in addition to regular maintenance, for the long-term mechanical wear inside the device - all cooling fans and printed circuit boards and others should be replaced regularly.

For general continuous use, the replacement could be implemented as per the provisions in the following table, but also should take account of specific circumstances,

like the operating environment, load conditions and the status of the brake unit ans so on.

Component name	Standard replacement year number
Cooling fan	1～3 years
Printed circuit board	5～8 years

7-3. Storage and keep

If the braking unit is not used immediately after purchase (temporary or long-term storage), the following should be done:

(1) It should be placed in the standard temperature range and no tide, no dust, no metal dust, and well ventilated place.

(2) It is not good to implement pressure test, it will lead to reduce the life of braking unit.

(3) Long-term storage will lead to the degradation of electrolytic capacitors, it must ensure that within 2 years, running through power, power-on time at least 5 hours, the input voltage must be raised slowly to the rated voltage by adjustable power supply.