DBU100H 能耗制动单元快速使用指南

本指南简要介绍了 DBU100H 能耗制动单元的产品基础信息、端子、安装、接线、参数设置、常见故障及对策、产品尺寸和选型规范。

扫描二维码，查阅 DBU100H 能耗制动单元完整电子说明书。

拨打服务热线 400-700-9997 或访问 www.invt.com.cn 获取更多信息及资源下载。保修条款详见完整版电子说明书。

警告

- 本指南仅包含基本的安装接线信息。若不遵守相关文档中的安全说明和安装接线说明，可能导致设备损坏、人身伤害、甚至人员死亡等事故。
- 只有培训合格的专业人员才允许进行相关操作。

危险

- 禁止在电源接通的情况下进行接线、检查或更换器件等作业。进行这些作业前，须确认所有输入电源已断开，并等待时间不短于能耗制动单元上标示的时间，建议用户直接使用万用表监测能耗制动单元直流母线电压低于 36V 以下，才允许对能耗制动单元进行调整与检修。

1 产品型号

DBU100H-220-4

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

字段标识	字段详细说明
Ⓐ	DBU：制动单元
Ⓑ	1：技术版本
Ⓒ	00：预留区分代码
Ⓓ	H：重载型
Ⓔ	额定制动电流，单位 A
Ⓕ	2：适配输入电压规格为 AC 3PH 220(-15%)~240(+10%)的变频器 4：适配输入电压规格为 AC 3PH 380V(-15%)~440V(+10%)的变频器 6：适配输入电压规格为 AC 3PH 520V(-15%)~690V(+10%)的变频器

2 产品尺寸

图 2-1 60A 产品尺寸

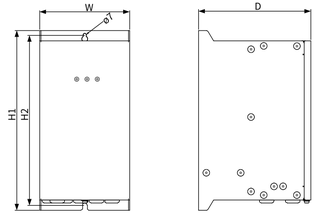


图 2-2 110A~220A 产品尺寸

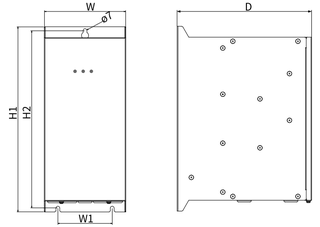
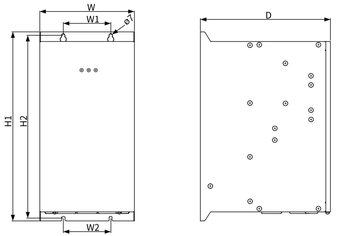


图 2-3 320A~400A 产品尺寸



型号	W1	W2	H2	W	H1	D	推荐安装螺栓
	安装尺寸(mm)			外形尺寸(mm)			
DBU100H-60-2	-	-	246	130	260	163	M6*16
DBU100H-60-4							M6*16
DBU100H-110-2	100	-	326	150	340	248	M6*16
DBU100H-110-4							M6*16
DBU100H-110-6							M6*16
DBU100H-160-2							M6*16
DBU100H-160-4							M6*16
DBU100H-160-6							M6*16
DBU100H-220-2							M6*16
DBU100H-220-4							M6*16
DBU100H-220-6							M6*16
DBU100H-320-4	100	100	391	200	405	275	M6*16
DBU100H-320-6							M6*16
DBU100H-400-4							M6*16
DBU100H-400-6							M6*16

3 安装

DBU100H 能耗制动单元必须纵向安装。

DBU100H 能耗制动单元支持壁挂式安装（适用于所有外形尺寸的能耗制动单元）。

3.1 安装步骤

步骤1 标记安装孔的位置。有关安装孔的位置，见 2 产品尺寸。

步骤2 将螺钉或者螺栓固定到标记的位置上。

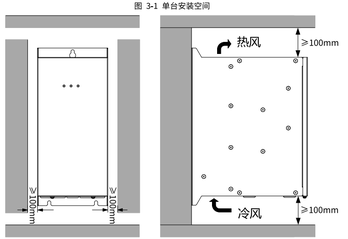
步骤3 将能耗制动单元靠在墙上。

步骤4 拧紧墙上的紧固螺钉。

3.2 安装空间

3.2.1 单台制动单元

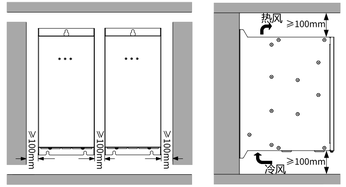
图 3-1 单台安装空间



3.2.2 多台制动单元

- **并行安装**

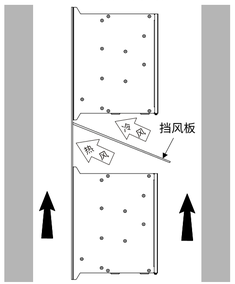
图 3-2 多台并行安装空间



注意：安装大小不同的制动单元时，请对齐各制动单元上部位置，便于后期维护

- **垂直安装**

图 3-3 多台垂直安装空间



注意：垂直安装时，必须增加挡风板，否则会导致多台能耗制动单元之间相互影响，引起散热不良。

4 端子

4.1 主回路端子

图 4-1 60A~220A 主回路端子

PE	(+)	(-)	(+)	PB

图 4-2 320A~400A 主回路端子

(+)		(+)		(+)
PE	(-)	(-)		PB

端子标识	端子功能描述
(+)、(-)	直流母线输入端子
(+)、PB	外接制动电阻端子
PE	安全保护接地端子，每台机器必须接地

4.2 控制回路端子

EFI	COM	PI	PO	COM		ROA	ROB	ROC

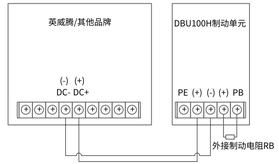
端子标识	端子功能描述
EFI	外部故障输入端子。出厂时 EFI 和 COM 默认短接，当外部出现故障时断开，制动单元输出故障信号。
PI	制动单元从机并联输入端子。
PO	制动单元主机并联输出端子。
COM	EFI、PI、PO 的公共端。
ROA	故障输出端子，当制动单元出现故障时，故障继电器动作输出故障报警信号； ROA 常开，ROB 常闭，ROC 为公共端； 触点容量：3A/AC250V，1A/DC30V。
ROB	
ROC	**注意：**不可用作高频开关输出。

5 接线

5.1 单台接线

当只有一台制动单元时，请依据图 5-1，将变频器、制动单元和制动电阻连接好，设置好电压等级及制动阈值点后便可运行。

图 5-1 单台制动单元与变频器主回路接线



注意：

- 变频器和制动单元之间连接线长度 L<5m。
- 制动电阻（RB）和制动单元之间连接线长度 L<10m。
- DC+、DC-为变频器内直流母线的 "+" "-" 两端，DC+为正端（Positive），DC-为负端（Negative）。

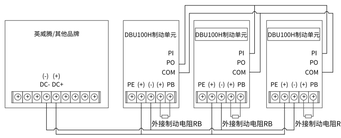
⚠ ◇ 主回路连线接错会导致制动单元和变频器的损坏。
◇ 机器在上电时，不可以触摸控制板的端子。

5.2 多台接线

当用两台以上制动单元并联运行时，请依据图 5-2，将变频器、多台制动单元和制动电阻连接好。

控制端子接线说明：当多台制动单元并联使用时，将第一台作为主机，则其他作为从机，从机参数设定请参考 6 电压选择设置中 "制动电压阀值设定" 表的第 9 项，从机和主机的制动率应保持一致。第一台制动单元的并联输出端子 PO、COM 端子接至第二台制动单元的并联输入端子 PI、COM。第二台制动单元的并联输入端子 PI、COM，以此类推，就可以将整个并联制动单元系统相互监控运行情况。

图 5-2 多台制动单元并联运行与变频器连接



6 电压选择设置

制动电压阈值设定：按照变频器输入电源电压不同，要对制动单元电压选择进行设置，电压选择时必须断开电源，下表为电压选择设置和制动起始电压的关系。

序号	S1 选择	220V 系统（V）	380V 系统（V）	690V 系统（V）
0	1 O 1 2 3 4	350	640	1040
1	1 O 1 2 3 4	360	660	1060
2	1 O 1 2 3 4	370	680	1080
3	1 O 1 2 3 4 （厂家出厂设定）	380	700	1100
4	1 O 1 2 3 4	390	720	1120
5	1 O 1 2 3 4	400	740	1140
6	1 O 1 2 3 4	410	760	1160

序号	S1 选择	220V 系统（V）	380V 系统（V）	690V 系统（V）
7	1 O 1 2 3 4	420	780	1180
8	1000~1110	保留	保留	保留
9	1 O 1 2 3 4	从机模式	从机模式	从机模式

注意：

- 若电网电压高于正常供电的 20%以上时，请设定较大制动电压。
- 请确认变频器允许的制动起始电压与本设置必须匹配。

⚠ 不允许带电操作，在 POWER 指示灯未完全熄灭之前（即（+）、(-) 端之间有电压时）不允许调整设置。

7 选型规范

7.1 制动电压选择

制动电压设置应足够低，应尽量使变频器工作在额定电压附近，对设备安全运行有最大保证。选择高的制动电压，虽然可以保证制动单元不会误动作，但过高的电压对设备长期安全运行有很大的影响。

7.2 制动电阻和制动电流的计算（按 100%制动力矩计算）

制动电流是指制动时流过制动电阻和制动单元的直流电流。

按 380V 标准交流电机来计算：

- P：电机额定功率（kW）
- V：制动单元直流工作点，通常取 700V
- I：制动电流（A）
- η：回馈时机械能的转换效率，通常取 η =1.0

计算依据：制动电阻必须完全吸收电机的再生电能

制动电阻吸收功率（V*I）＝电机再生电能（瓦）=1000*P* η

7.3 制动电阻的计算和选择（按 100%制动力矩计算）

制动电阻大小间接反应系统制动力矩的大小。制动力矩过小，变频器仍然会跳过压保护。

按 380V 标准交流电机来计算：

- P：电机额定功率（kW）
- P_R：制动电阻额定消耗功率（kW）
- V：制动单元直流工作点，通常取 700V
- R：制动电阻等效电阻值（Ω）
- η：回馈时的机械能转换效率，一般取 η =1.0
- $\mathcal{E}$：制动电阻功耗安全系数，取 $\mathcal{E}$ =1.4
- K_f：制动频度，指再生过程占整个电机工作的时间比例

通常 K_f 取值如下：

场景	K_f 取值	场景	K_f 取值
开卷和卷取	50~60%	油田磕头机	10~20%
电梯	10~15%	离心机	5~20%
下放高度超过 100 米的吊车	20~40%	偶尔制动的负载	5%
其他	10%		

电阻计算依据：制动电阻必须完全吸收电机的再生电能

电阻吸收功率（V*V/R）＝电机再生电能（瓦）=1000*P* η

电阻功率计算依据：电机再生电能必须被电阻吸收并转变为热能释放

P_R =P* K_f * η * $\mathcal{E}$ =P* K_f *1.0*1.4

7.4 适配 220V 输入电压等级变频器使用规范与选型参考

此表是按制动单元直流工作点为 380V 的选型参考，用户可根据实际工况数据进行计算选型。

功率	制动单元型号	100%制动力矩适配制动电阻值(Ω)	制动电阻耗散功率(kW)(10%制动率)	制动电阻耗散功率(kW)(50%制动率)	制动电阻耗散功率(kW)(80%制动率)	最小允许制动电阻(Ω)
15kW	DBU100H-60-2	9.6	2	11	18	6.4
18kW		8.0	3	14	22	
22kW		6.5	3	17	26	
30kW	DBU100H-110-2	4.8	5	23	36	3.5
37kW		3.9	6	28	44	
45kW	DBU100H-160-2	3.2	7	34	54	2.4
55kW		2.6	8	41	66	
75kW	DBU100H-220-2	1.9	11	56	90	1.8
90kW	两台 DBU100H-160-2	1.6	7*2	34*2	54*2	2.4*2
110kW		1.3	9*2	43*2	66*2	

7.5 适配 380V 输入电压等级变频器使用规范与选型参考

此表是按制动单元直流工作点为 700V 的选型参考，用户可根据实际工况数据进行计算选型。

功率	制动单元型号	100%制动力矩适配制动电阻值(Ω)	制动电阻耗散功率(kW)(10%制动率)	制动电阻耗散功率(kW)(50%制动率)	制动电阻耗散功率(kW)(80%制动率)	最小允许制动电阻(Ω)
37kW	DBU100H-60-4	13.2	6	28	44	11.7
45kW	DBU100H-110-4	10.9	7	34	54	6.4
55kW		8.9	8	41	66	
75kW		6.5	11	56	90	

功率	制动单元型号	100%制动力矩适配制动电阻值(Ω)	制动电阻耗散功率(kW)(10%制动率)	制动电阻耗散功率(kW)(50%制动率)	制动电阻耗散功率(kW)(80%制动率)	最小允许制动电阻(Ω)
90kW	DBU100H-160-4	5.4	14	68	108	4.4
110kW		4.5	17	83	132	
132kW	DBU100H-220-4	3.7	20	99	158	3.2
160kW	DBU100H-320-4	3.1	24	120	192	2.2
200kW		2.5	30	150	240	
220kW	DBU100H-400-4	2.2	33	165	264	1.8
250kW		2.0	38	188	300	
280kW	两台 DBU100H-320-4	3.6*2	21*2	105*2	168*2	2.2*2
315kW		3.2*2	24*2	118*2	189*2	
350kW		2.8*2	27*2	132*2	210*2	
400kW		2.4*2	30*2	150*2	240*2	
500kW	两台 DBU100H-400-4	2*2	38*2	186*2	300*2	1.8*2

7.6 适配 660V 输入电压等级变频器使用规范与选型参考

此表是按制动单元直流工作点为 1100V 的选型参考，用户可根据实际工况数据进行计算选型。

功率	制动单元型号	100%制动力矩适配制动电阻值(Ω)	制动电阻耗散功率(kW)(10%制动率)	制动电阻耗散功率(kW)(50%制动率)	制动电阻耗散功率(kW)(80%制动率)	最小允许制动电阻(Ω)
37kW	DBU100H-110-6	32.7	6	28	44	10.0
45kW		26.9	7	34	54	
55kW		22.0	8	41	66	
75kW		16.1	11	56	90	
90kW		13.4	14	68	108	
110kW		11.0	17	83	132	
132kW	DBU100H-160-6	9.2	20	99	158	6.9
160kW		7.6	24	120	192	
200kW	DBU100H-220-6	6.1	30	150	240	5.0
220kW		5.5	33	165	264	
250kW	DBU100H-320-6	4.8	38	188	300	3.4
280kW		4.3	42	210	336	
315kW		3.8	47	236	378	
350kW		3.5	53	263	420	
400kW	DBU100H-400-6	3.0	60	300	480	2.8
500kW	两台 DBU100H-320-6	4.8*2	38*2	186*2	300*2	5.0*2
560kW		4.4*2	42*2	210*2	336*2	

7.7 制动电阻的选择

- 制动电阻建议采用无感电阻，以降低电感量。
- 制动电阻必须有过热自动隔离的保护装置。
- 制动电阻严禁接地故障发生，否则将引起本装置和变频器的重大故障。
- 制动电阻的容量选用为参考值，依负荷惯性、制动频度、制动电压阀值等特性作修正。若有疑问请联系本公司。
- 本公司备有水泥电阻、大功率被漆电阻、金属外壳等无感电阻，欢迎咨询购买。

注意：

- 制动单元并联能够扩大制动能力。
- 2 台制动单元并联的制动能力为单台的 2 倍；如 DBU100H-220-4=DBU100H-110-4*2。

8 常见故障及对策

故障通过指示灯指示。当 FAULT 指示灯点亮时，表明能耗制动单元处于异常状态。

序号	故障状态	原因	处理方法
1	制动过程中制动电阻发热严重	制动电阻选择功率太小	更换更大功率制动电阻
2	未制动时，制动电阻发热严重	制动单元主电路功率 IGBT 损坏	更换制动单元
		制动单元电压选择设置与电压不匹配	重新设置
		制动单元故障	更换制动单元
3	变频器跳过压（OV）	制动电阻制动能力不足	重新检查制动条件
		接线错误	检查并改正
		制动单元电压选择设置与电压不匹配	重新设置
		制动单元故障	更换制动单元
4	故障继电器输出信号	外部故障输入有效	重新检查运行条件
		制动电阻短路	更换制动电阻
		IGBT 温度超过 85℃	-

注意：当外部电网电压太高，请设置较大的电压。

⚠ 制动单元控制线路采用非隔离电路，操作与检查本装配时，请先断开（+）、(-) 连线并确认（+）、(-) 间无电压。

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DBU100H Dynamic Braking Unit Quick Start Guide

The guide provides a brief introduction to the basic product information, terminals, installation, wiring, parameter settings, common faults and solutions, product dimensions, and selection specifications for the DBU100H dynamic braking unit.

Visit www.invt.com for more information and source download. For details, see the full version of corresponding product e-manual.

Scan the QR code to view the full version of DBU100H dynamic braking unit e-manual.

Warning

- This guide only provides the basic installation and wiring information. Failure to comply with the safety instructions and installation and wiring instructions in the relevant documentation may result in accidents such as equipment damage, personal injury, or even death.
- Only trained and qualified professionals are allowed to carry out related operations.

Danger

- Do not perform any operations including wiring, inspection, or component replacement when power supply is applied. Before performing these operations, ensure that all input power supplies are disconnected and wait for a period no shorter than the time indicated on the dynamic braking unit. It is recommended that you directly use a multimeter to monitor the DC bus voltage of the dynamic braking unit, and only proceed with adjustments and maintenance when the DC bus voltage is below 36V.

1 Product model

DBU100H-220-4

Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ

Field identifier	Description
Ⓐ	DBU: Dynamic braking unit
Ⓑ	1: Technical version
Ⓒ	00: Spare code
Ⓓ	H: Heavy load
Ⓔ	Rated braking current, the unit is A
Ⓕ	2: Compatible with VFDs with input voltage specification of AC 3PH 220V (-15%)–240V (+10%). 4: Compatible with VFDs with input voltage specification of AC 3PH 380V (-15%)–440V (+10%). 6: Compatible with VFDs with input voltage specification of AC 3PH 520V (-15%)–690V (+10%).

2 Product dimensions

Figure 2-1 60A product dimensions

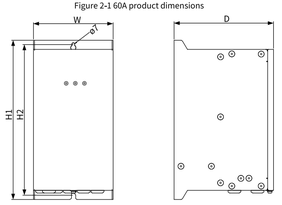


Figure 2-2 110A–220A product dimensions

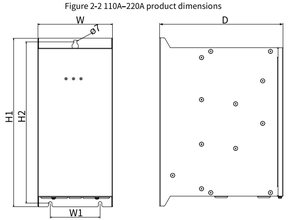
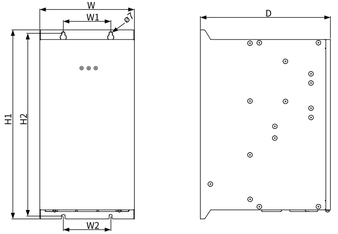


Figure 2-3 320A–400A product dimensions



Model	W1	W2	H2	W	H1	D	Recommended mounting bolt
	Installation dimensions (mm)			Outline dimensions (mm)			
DBU100H-60-2	-	-	246	130	260	163	M6*16
DBU100H-60-4							M6*16
DBU100H-110-2	100	-	326	150	340	248	M6*16
DBU100H-110-4							M6*16
DBU100H-110-6							M6*16
DBU100H-160-2							M6*16
DBU100H-160-4							M6*16
DBU100H-160-6							M6*16
DBU100H-220-2							M6*16
DBU100H-220-4							M6*16
DBU100H-220-6							M6*16
DBU100H-320-4	100	100	391	200	405	275	M6*16
DBU100H-320-6							M6*16
DBU100H-400-4							M6*16
DBU100H-400-6							M6*16

3 Installation

DBU100H must be installed vertically.

DBU100H can be installed in wall (for all frame sizes).

3.1 Installation procedures

Step1 Mark the position of mounting holes. For details about the installation hole positions, see section 2 Product dimensions.

Step2 Mount the screws or bolts into the marked positions.

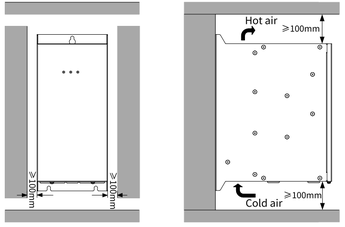
Step3 Place the dynamic braking unit against the wall.

Step4 Tighten the fastening screws on the wall.

3.2 Installation space

3.2.1 Single dynamic braking unit

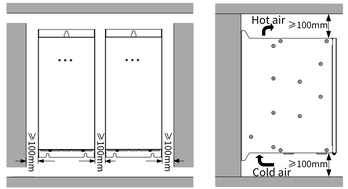
Figure 3-1 Installation space diagram of single dynamic braking unit



3.2.2 Multiple dynamic braking units

- **Parallel installation**

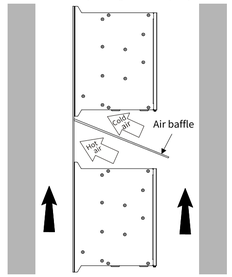
Figure 3-2 Parallel installation space diagram of multiple dynamic braking units



Note: When you install dynamic braking units in different sizes, align the top of each dynamic braking unit before installation for the convenience of future maintenance.

- **Vertical installation**

Figure 3-3 Vertical installation space diagram of multiple dynamic braking units



Note: During vertical installation, you must install windshield, otherwise, the dynamic braking units will experience mutual interference, and the heat dissipation effect will be degraded.

4 Terminal

4.1 Main circuit terminals

Figure 4-1 Main circuit terminal diagram for 60A–220A

PE	(+)	(-)	(+)	PB

Figure 4-2 Main circuit terminal diagram for 320A–400A

(+)		(+)		(+)
PE	(-)	(-)	PB	

Terminal	Description
(+), (-)	DC bus input terminals
(+), PB	External braking resistor terminals
PE	Grounding terminal for safe protection; each machine must be grounded.

4.2 Control circuit terminals

EFI	COM	PI	PO	COM		ROA	ROB	ROC

Terminal	Description
EFI	External fault input terminal. EFI and COM are defaulted to be short circuited in factory. When the external fault occurs, it will be switched off and the braking unit outputs fault signal.
PI	Slave parallel input terminal of the braking unit.
PO	Master parallel output terminal of the braking unit.
COM	Common terminal of EFI, PI and PO.
ROA	Fault output terminal. When fault occurs to the braking unit, the fault relay will output fault report signal.
ROB	

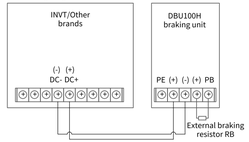
Terminal	Description
ROC	ROA NO, ROB NC, ROC is the common terminal Contact capacity: 3A/AC250V, 1A/DC30V **Note:** Cannot be used as high frequency switch output.

5 Wiring

5.1 Wiring of single braking unit

When there is only one braking unit, please connect the VFD, braking unit and braking resistor according to Figure 5-1. It will work after setting the voltage degree and the braking threshold.

Figure 5-1 Wiring diagram of the main circuit between one DBU and the VFD



Note:

- The wiring between the VFD and the braking unit is less than 5m.
- The wiring between the braking resistor (RB) and the braking unit is less than 10m.
- DC+ and DC- are "+" and "-" of the internal DC bus in the VFD. DC+ is the positive pole and DC- is the negative pole.

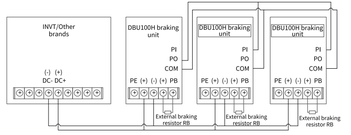
⚠
- Wrong wiring of the main circuit may cause damage to the braking unit and the VFD.
- Do not touch the terminals of the control board when the machine is powering on.

5.2 Wiring of multiple braking units

When there are more than two braking units in parallel operation, connect the VFD, multiple brake units and braking resistors according to Figure 5-2.

Control terminal wiring instructions: When multiple braking units are used in parallel, set the first unit as the master and the others as slaves. The parameter settings for the slave units should refer to item 9 in the "Braking voltage threshold setting" table under section 6 Voltage selection setting, ensuring that the braking rate of the slaves is consistent with that of the master. Connect the parallel output terminals PO and COM of the first braking unit to the parallel input terminals PI and COM of the second braking unit, and then connect the parallel input terminals PI and COM of the third braking unit, and so on. This setup allows the entire parallel braking unit system to monitor the operation state of each unit.

Figure 5-2 Wiring diagram between braking units in parallel operation and the VFD



6 Voltage selection setting

Braking voltage threshold setting: set the voltage selection of the braking unit according to the input power voltage of the VFD. The voltage selection can only performed when disconnecting the power supply. The table below shows the relationship between the voltage selection settings and the starting braking voltage.

No.	S1 selection	220V system (V)	380V system (V)	690V system (V)
0	1 O 1 2 3 4	350	640	1040
1	1 O 1 2 3 4	360	660	1060
2	1 O 1 2 3 4	370	680	1080
3	1 O 1 2 3 4 (Factory default setting)	380	700	1100

No.	S1 selection	220V system (V)	380V system (V)	690V system (V)
4	1 O 1 2 3 4	390	720	1120
5	1 O 1 2 3 4	400	740	1140
6	1 O 1 2 3 4	410	760	1160
7	1 O 1 2 3 4	420	780	1180
8	1000–1110	Reserved	Reserved	Reserved
9	1 O 1 2 3 4	Slave mode	Slave mode	Slave mode

Note:

- If the grid voltage exceeds the normal supply by more than 20%, please set a higher braking voltage.
- Ensure that the allowable braking starting voltage of the VFD comply with this setting.

⚠ Do not operate during powering on. Do not adjust the setting when the POWER indicator is not totally off (the voltage is present between (+) and (-)).

7 Model selection specifications

7.1 Braking voltage selection

The setting of the braking voltage is low enough to make the DBU works around the rated voltage and ensure a safe running. Select high braking voltage can avoid misaction of the braking unit, but too high voltage has impact on the long-term running safety.

7.2 Calculation of the braking resistor and the braking current

(at 100% of the braking torque)

Braking current is the DC current running through the braking unit and the braking resistor during braking. Calculating at the standard AC motor of 380V:

- P: Rated power of the motor (kW)
- V: DC operating point of the braking unit, usually it is 700V
- I: Braking current (A)
- η : Conversion efficiency of the mechanical energy during feedback, usually it is 1.0

Calculation basis: the braking resistor needs to absorb all the regenerative electric energy of the motor.

Absorbed power of the braking resistor (V*I)＝The regenerative electric energy of the motor (W)=1000*P*η

7.3 Calculation and selection of the braking resistor

(at 100% of the braking torque)

The braking resistor reflects the braking torque in the system. If the braking torque is too small, the DBU will carry out overvoltage protection.

Calculating at the standard AC motor of 380V:

- P: Rated power of the motor (kW)
- P_R : Rated consumed power of the braking resistor (kW)
- V: DC operating point of the braking unit, usually it is 700V
- R: Equivalent resistance of the braking resistor (Ω)
- η : Conversion efficiency of the mechanical energy during feedback, usually it is 1.0
- $\mathcal{E}$: Safety coefficient of the power consumption for the braking resistor $\mathcal{E}$ =1.4
- K_f : Braking frequency, the time ratio of the regeneration to the whole working time

Usually, K_f is:

scenario	K_f	scenario	K_f
Winding up and winding down	50–60%	Oilfield machines	10–20%
Elevators	10–15%	Centrifuge	5–20%
Crane(the height of lifting is more than 100m)	20–40%	Occasionally braking load	5%
Others	10%		

Basis of resistor calculation: the braking resistor needs to absorb all the regenerative electric energy of the motor.

Absorbed power of the resistor(V*V/R)＝The regenerative electric energy of the motor (W)＝1000*P*η

Basis of resistor power calculation: The regenerative electric energy of the motor needs to be absorbed by the resistor and converted into heat to release.

P_R =P*K_f*η*$\mathcal{E}$ =P*K_f*1.0*1.4

7.4 Usage standard and selection reference for VFDs of 220V input voltage class

Below is the selection reference when the DC operating point of the braking unit is 380V. You can calculate the selection based on actual working conditions data.

Power	Model	Resistance applicable for 100% braking torque(Ω)	Braking resistor dissipation power (kW) (10% braking ratio)	Braking resistor dissipation power (kW) (50% braking ratio)	Braking resistor dissipation power (kW) (80% braking ratio)	Min. allowed braking resistance (Ω)
15kW	DBU100H-60-2	9.6	2	11	18	6.4
18kW		8.0	3	14	22	
22kW		6.5	3	17	26	
30kW	DBU100H-110-2	4.8	5	23	36	3.5
37kW		3.9	6	28	44	
45kW	DBU100H-160-2	3.2	7	34	54	2.4
55kW		2.6	8	41	66	
75kW	DBU100H-220-2	1.9	11	56	90	1.8
90kW	Two DBU100H-160-2	1.6	7*2	34*2	54*2	2.4*2
110kW		1.3	9*2	43*2	66*2	

7.5 Usage standard and selection reference for VFDs of 380V input voltage class

Below is the selection reference when the DC operating point of the braking unit is 700V. You can calculate the selection based on actual working conditions data.

Power	Braking unit model	Resistance applicable for 100% braking torque(Ω)	Braking resistor dissipation power (kW) (10% braking ratio)	Braking resistor dissipation power (kW) (50% braking ratio)	Braking resistor dissipation power (kW) (80% braking ratio)	Min. allowed braking resistance (Ω)
37kW	DBU100H-60-4	13.2	6	28	44	11.7
45kW	DBU100H-110-4	10.9	7	34	54	6.4
55kW		8.9	8	41	66	
75kW		6.5	11	56	90	
90kW	DBU100H-160-4	5.4	14	68	108	4.4
110kW		4.5	17	83	132	
132kW	DBU100H-220-4	3.7	20	99	158	3.2
160kW	DBU100H-320-4	3.1	24	120	192	2.2
200kW		2.5	30	150	240	
220kW	DBU100H-400-4	2.2	33	165	264	1.8
250kW		2.0	38	188	300	
280kW	Two DBU100H-320-4	3.6*2	21*2	105*2	168*2	2.2*2
315kW		3.2*2	24*2	118*2	189*2	
350kW		2.8*2	27*2	132*2	210*2	
400kW		2.4*2	30*2	150*2	240*2	
500kW	Two DBU100H-400-4	2*2	38*2	186*2	300*2	1.8*2

7.6 Usage standard and selection reference for VFDs of 660V input voltage class

Below is the selection reference when the DC operating point of the braking unit is 1100V. You can calculate the selection based on actual working conditions data.

Power	Braking unit model	Resistance applicable for 100% braking torque(Ω)	Braking resistor dissipation power (kW) (10% braking ratio)	Braking resistor dissipation power (kW) (50% braking ratio)	Braking resistor dissipation power (kW) (80% braking ratio)	Min. allowed braking resistance (Ω)
37kW	DBU100H-110-6	32.7	6	28	44	10.0
45kW		26.9	7	34	54	
55kW		22.0	8	41	66	
75kW		16.1	11	56	90	
90kW		13.4	14	68	108	
110kW		11.0	17	83	132	
132kW	DBU100H-160-6	9.2	20	99	158	6.9
160kW		7.6	24	120	192	
200kW	DBU100H-220-6	6.1	30	150	240	5.0
220kW		5.5	33	165	264	
250kW	DBU100H-320-6	4.8	38	188	300	3.4
280kW		4.3	42	210	336	
315kW		3.8	47	236	378	
350kW		3.5	53	263	420	
400kW	DBU100H-400-6	3.0	60	300	480	2.8
500kW	Two DBU100H-320-6	4.8*2	38*2	186*2	300*2	5.0*2
560kW		4.4*2	42*2	210*2	336*2	

7.7 Selection of the braking resistors

- It is recommended to apply non-inductive resistance to reduce the inductance.
- The protective devices for auto-partitioning during overheating are necessary.
- The grounding fault is prohibited; otherwise the damage to the device and VFD may occur.
- The capacity of the braking resistor is the reference value and it can be modified according to the inertial loads, braking frequency and braking voltage threshold. Please consult with our company for more information.
- Our company offers cement resistors, high-power coated resistors, and metal-cased non-inductive resistors. Please feel free to contact us for inquiries and purchases.

Note:

- Paralleled braking units can enlarge the braking capacity.
- The braking capacity of two parallel braking units is twice that of a single unit. For example, DBU100H-220-4=DBU100H-110-4*2.

8 Common faults and solutions

The fault is indicated by indicators. When the FAULT indicator is on, it indicates the dynamic braking unit is in abnormal state.

No.	Fault state	Cause	Solution
1	Severe heating of the braking resistor during braking	The power of the braking resistor is too low.	Replace with a braking resistor with greater power.
2	Severe heating of the braking resistor when not braking	The IGBT in the main circuit of the braking unit is damaged.	Replace the braking unit.
		The voltage selection of the braking unit is not correct.	Reset the settings.
		Braking unit fault	Replace the braking unit.
3	VFD overvoltage (OV)	Insufficient braking capacity of the braking resistor	Recheck the braking conditions.
		Wiring error	Check and correct.
		The voltage selection of the braking unit is not correct.	Reset the settings.
		Braking unit fault	Replace the braking unit.
4	Fault relay output signal	External fault input is valid.	Recheck the operating conditions.
		Braking resistor short circuit	Replace the braking resistor.
		IGBT temperature exceeds 85°C.	-

Note: When the external grid voltage is too high, please set a higher voltage.

⚠ The control circuit of the braking unit uses a non-isolated circuit. Before operating or inspecting this assembly, please disconnect the (+) and (-) wires and ensure that there is no voltage between the (+) and (-) terminals.

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