

SINAMICS V20 变频器能耗制动模块（选项）

SINAMICS V20 Converter – Dynamic braking module (option)



**警告**

**变频器上的危险电压可导致触电风险**

变频器断电后还带有危险电压。此电压可能导致严重的人身伤害或死亡。

- 变频器断电后，必须等待至少五分钟才能安装/更换能耗制动模块。



**WARNING**

**Electric shock due to hazardous voltages in converters**

Hazardous voltages can remain present in the converter after the power is removed. This has the potential to cause severe personal injury or death.

- After the converter is powered off, wait at least five minutes before installing/replacing the dynamic braking module.

**说明**

该模块仅适用于外形尺寸为 AA 到 C 的变频器。更多安全说明，请参见《SINAMICS V20 变频器操作说明》。

**NOTE**

This module is applicable for frame sizes AA to C only. For more information about safety notes, see *SINAMICS V20 Converter Operating Instructions*.

功能

**Functionality**

能耗制动模块（可控制外接制动电阻）用于实现变频器的能耗制动。能耗制动将电机制动时产生的再生能量转换成热能，较常用于输送带或提升类应用。

A dynamic braking module which can control an external braking resistor is required for dynamic braking. Dynamic braking converts the regenerative energy, which is released when the motor brakes, into heat. It is typically used in applications such as conveyor drives or hoisting gear.

选择适当的制动电阻

**Selecting a suitable braking resistor**

变频器外形尺寸 Converter frame size	额定输出功率 Rated output power	制动电阻订货号 Braking resistor article number	阻值 ± 10% Resistance ± 10%
<b>230 V</b>			
FSAA/FSAB	0.12 ... 0.75 kW	6SE6400-4BC05-0AA0	180 Ω
FSAC	1.1 ... 1.5 kW	JJY:023151720007	68 Ω
FSAD/FSC	2.2 ... 3.0 kW	JJY:023163720018	37 Ω
<b>400 V</b>			
FSA	0.37 ... 1.5 kW	6SE6400-4BD11-0AA0	390 Ω
	2.2 kW	6SE6400-4BD12-0BA0	160 Ω
FSB	3.0 ... 4.0 kW		
FSC	5.5 kW	6SE6400-4BD16-5CA0	56 Ω

\* 以上制动电阻的最大占空比为 5%。

\* All the above resistors are rated for a maximum duty cycle of 5%.

## 安装方向

### Mounting orientation

安装能耗制动模块时必须遵循下图所示的安装方向。即，模块的开口槽必须始终朝上，以确保充分散热。

The dynamic braking module must be installed in the orientation as shown in the following diagram. That is, the open slots must always point directly upwards to ensure adequate cooling.

<p>制动电阻 (选件) Braking resistor (Option) R- R+ PE</p> <p>占空比控制旋钮 Duty cycle control knob</p> <p>状态 LED Status LEDs</p> <p>DC- DC+ PE</p> <p>SINAMICS V20 外形尺寸 AA 至 C Frame size AA to C</p>	<p><b>订货号:</b> 6SL3201-2AD20-8VA0</p> <p><b>状态 LED:</b> 电源 (黄色): 模块已上电。 保护 (红色): 模块处于保护模式。 制动 (绿色): 模块正在将电机制动时产生的再生能量转换成热能。</p> <p><b>占空比控制旋钮:</b> 230 V: 用于设定 230 V 变频器的占空比。 400 V: 用于设定 400 V 变频器的占空比。 5: 占空比 5% 10: 占空比 10% 20: 占空比 20% 50: 占空比 50% 100: 占空比 100%</p>	<p><b>Article number:</b> 6SL3201-2AD20-8VA0</p> <p><b>Status LEDs:</b> POWER (yellow): Module is powered up. PROTECTION (red): Module is in protection mode. ACTIVE (green): Module is releasing regenerative energy produced when the motor brakes into heat.</p> <p><b>Duty cycle control knob:</b> 230 V: Duty cycle values labeled are for 230 V converters. 400 V: Duty cycle values labeled are for 400 V converters. 5: 5% duty cycle 10: 10% duty cycle 20: 20% duty cycle 50: 50% duty cycle 100: 100% duty cycle</p>
<p>钻孔尺寸 (mm) Drill pattern (mm)</p>		

#### 警告

##### 直流端子的极性接反可导致设备损毁

如果变频器和能耗制动模块的直流端子极性接反，可能导致变频器和模块损毁。

- 请务必确保直流端子的极性正确。

#### WARNING

##### Device destruction due to reversed polarity of the DC terminals' connections

If the polarity of the DC terminals' connections between the converter and the dynamic braking module is reversed, it could result in the destruction of the converter and the module.

- Make sure that the polarity of the DC link connections is correct.

#### 注意

##### 制动电阻损坏

占空比/电压设置错误可能会损坏接在模块上的制动电阻。

#### NOTICE

##### Damage to the braking resistor

Incorrect setting for the duty cycle/voltage could damage the attached braking resistor.

## 推荐使用的电缆截面积

### Recommended cable cross-sections

变频器外形尺寸 Converter frame size	额定输出功率 Rated output power	直流端子 (DC-, DC+) 的电缆截面积 Cable cross-sections for DC terminals (DC-, DC+)
<b>230 V</b>		
FSAA/AB	0.12 ... 1.5 kW	1.0 mm <sup>2</sup>
FSAC	1.1 ... 1.5 kW	2.5 mm <sup>2</sup>
FSAD/FSC	2.2 ... 3.0 kW	4.0 mm <sup>2</sup>
<b>400 V</b>		
FSA	0.37 ... 0.75 kW	1.0 mm <sup>2</sup>
	1.1 ... 2.2 kW	1.5 mm <sup>2</sup>
FSB	3.0 ... 4.0 kW	2.5 mm <sup>2</sup>
FSC	5.5 kW	4.0 mm <sup>2</sup>

\* 注意：不得使用截面积小于 0.3 mm<sup>2</sup>（变频器外形尺寸 AA/AB/A）/0.5 mm<sup>2</sup>（变频器外形尺寸 AC/AD/B/C）的电缆。螺钉紧固扭矩为 1.0 Nm/8.9 lbf.in（公差：±10%）。

\* Note: Do not use the cables with cross-sections less than 0.3 mm<sup>2</sup> (for converter frame sizes AA/AB/A) / 0.5 mm<sup>2</sup> (for converter frame sizes AC/AD/B/C). Use a screw tightening torque of 1.0 Nm/8.9 lbf.in (tolerance: ±10%).

## 技术规格

### Technical specifications

	单相交流 230 V 变频器 Single phase AC 230 V converters	三相交流 400 V 变频器 Three phase AC 400 V converters
额定峰值功率 Peak power rating	3.0 kW	5.5 kW
峰值功率时的有效电流 RMS current at peak power	8.0 A	7.0 A
最大连续功率额定值 Maximum continuous power rating	3.0 kW	4.0 kW
最大连续电流额定值 Maximum continuous current rating	8.0 A	5.2 A
最大连续功率额定值（并排安装） Maximum continuous power rating (side-by-side mounted)	1.5 kW	2.75 kW
最大连续电流额定值（并排安装） Maximum continuous current rating (side-by-side mounted)	4.0 A	3.5 A
外接制动电阻最小阻值 Minimum resistance of the external braking resistor	39 Ω	56 Ω
环境温度 Surrounding air temperature	0 °C 至 50 °C：无降额 0 °C to 50 °C: without derating	0 °C 至 40 °C：无降额；40 °C 至 50 °C：有降额 0 °C to 40 °C: without derating; 40 °C to 50 °C: with derating
环境温度为 50 °C 时的最大连续电流额定值 Maximum continuous current rating at 50 °C surrounding air temperature	8.0 A	1.5 A
尺寸（长 x 宽 x 高） Outline dimensions (L x W x D)	150 x 90 x 88 (mm)	
安装方式 Mounting	控制柜内安装（4 x M4 组合螺钉，紧固扭矩：1.8 Nm ± 10%） Mounting in a control cabinet (4 x M4 screws, tightening torque: 1.8 Nm ± 10%)	
最大占空比 Maximum duty cycle	100%	
保护功能 Protection functions	短路保护、过热保护 Short-circuit protection, over-temperature protection	

最大电缆长度 Maximum cable length	能耗制动模块至变频器连接电缆: 1 m Braking module to converter: 1 m	
	能耗制动模块至制动电阻连接电缆: 10 m Braking module to braking resistor: 10 m	
存放温度 Storage temperature	- 40 °C 至+ 70 °C - 40 °C to + 70 °C	
防护等级 Protection class	IP 20	
最大湿度 Maximum humidity level	95% (无凝露) 95% (non-condensing)	
抗冲击性与抗振性 Shock and vibration	在运输包装内长时间存放时, 符合 EN 60721-3-1 标准 1M2 类 Long-term storage in the transport packaging according to EN 60721-3-1 Class 1M2	
	在运输包装内运输时, 符合 EN 60721-3-2 标准 2M3 类 Transport in the transport packaging according to EN 60721-3-2 Class 2M3	
	运行期间的抗振性符合 EN 60721-3-3 标准 3M2 类 Vibration during operation according to EN 60721-3-3 Class 3M2	
运行海拔高度 Operating altitude	海拔 4000 m 以下 Up to 4000 m above sea level 1000 m 至 4000 m: 输出电流降额; 2000 m 至 4000 m: 输入电压降额 1000 m to 4000 m: output current derating; 2000 m to 4000 m: input voltage derating	
环境等级 Environmental classes	污染等级: 2 固体颗粒: 3S2 化学气体: 3C2 (SO <sub>2</sub> , H <sub>2</sub> S) 气候等级: 3K3	Pollution degree: 2 Solid particles: class 3S2 Chemical gases: class 3C2 (SO <sub>2</sub> , H <sub>2</sub> S) Climate class: 3K3

#### 说明

并排安装能耗制动模块会造成模块的功率和电流降额。所以, 西门子推荐安装能耗制动模块时, 遵守 V20 变频器的间距要求。更多相关信息, 参见《SINAMICS V20 变频器操作说明》中“安装方向及间距”章节。

#### NOTE

Mounting dynamic braking modules side-by-side causes power and current derating to the modules. To avoid this, Siemens recommends that you observe the clearance requirements for V20 converters when mounting the dynamics braking modules. For more information, see Section "Mounting orientation and clearance" in *SINAMICS V20 Converter Operating Instructions*.