

# SIKES

# SIKES CATALOGUE

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西凯士·回馈装置选型手册

Regenerative drive Selection Brochure

Regenerative  
drive  
回馈装置



Filter  
滤波器

Transformer  
变压器

Load bank  
负载

Choke  
电抗器

RESISTOR  
电阻

Dynamic  
Braking Unit  
制动单元

SIKES ELECTRIC (HK) CO., LTD.  
西凯士电气(香港)有限公司

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**SIKES ELECTRIC(HK) CO., LTD.**

西凱士電氣(香港)有限公司

**SHENZHEN SIKES ELECTRIC CO., LTD.**

深圳市西凱士电气有限公司

Add.:Bldg. B,Huayuan industrial park,Phoenix,  
Fuyong ST 518103, Baoan district, Shenzhen, Guangdong, China  
地址 :中国·广东深圳市宝安区福永街道凤凰华源工业区B栋

Tel: 0086-755-33859592/33859590

Fax: 0086-755-33859590-810

Email: sikes@sikes-elec.com

[www.sikes-elec.com](http://www.sikes-elec.com) [www.sikes-elec.cn](http://www.sikes-elec.cn)

E-commerce Platform: <http://sikes.en.alibaba.com>

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# Economic Regenerative Drive 经济型回馈装置

## Product Profile 产品简述

- Adopting microprocessor chip with fast respond, high-accuracy process control, safe, stable and reliable for operating. It can make the inverter operating in four-quadrant, continuously feedback, regenerative braking frequency is 100%. Electric regeneration efficiency up to 97%.
  - Strong anti-jamming ability: It uses SPWM modulation to greatly reduce distinctive peaks of current and form perfect sine wave current, input side current THD lower than 5%, power factor up to 99%.
  - Excellent Protection: It can prevent power grid flow back, overheat, overcurrent, out of phase, undervoltage, short circuit.
  - Adaptive connection mode, no need to identify Plus-n-Minus when connect to Inverter or power grid, very easy to connect.
  - Intelligent digital keypad for easy operation, can modify operation voltage, online monitoring input voltage, DC bus voltage, output current and temperature of the radiator. It can store relevant operating data and fault outputs for trace and diagnose. Additional RS485 or Ethernet interface is available for data transfer and long distance operation.
  - It contains built-in intelligent fan, high and low order harmonic filter, external short circuit protection.
  - Suitable for all inverters. Similar to Siemens, ABB, Schneider, Fuji and Yaskawa Active Front End.
  - Warranty period: 18 months.
- 
- 采用最新32位高性能工业微处理器控制、响应速度快、控制精度高，运行安全、稳定、可靠；使变频器实现四象限运行，间断性回馈，回馈制动频度40%以下。
  - 把再生能量回馈电网，效率97%，增加运行经济效益；优化回馈SPWM控制算法、功率因素高，输出电流波形更优，畸变率更低。
  - 保护方面：具有防电网回流，过热、过流、缺相、欠压、输出短路等保护功能；热损耗为耗能制动的3%以下，改善工作环境。
  - 在接线方面，回馈装置均采用自适应接线方法，驳接变频器直流母线端子时，需区分正负极性，驳接电网时，不需区分三相相位，从而避免了由于现场接线错误引起的各种问题，使用户更方便使用。
  - 数字化控制，具有灵活调整回馈装置的动作电压，在线检测输入电压、直流母线电压、输出电流、散热器温度等功能，用户可依据需要在线查看回馈工作状况。带操作面板（550-700V动作电压可调；电流、温升可视；故障输出、系统可存储设备运行数据等）。
  - 内置智能风机，散热性能更佳；低频滤波装置，使回馈波形更好，降低对外高频噪声干扰；当出现故障保护时，系统可存储相关数据，实现故障智能诊断，从而使用户了解设备在现场的工作状况。
  - 通配所有进口、国产的变频器，可代替Siemens, ABB, Schneider, Fuji and Yaskawa 同类产品。
  - 国家三包原则，18个月免费保修。



## ■ Main technical parameter

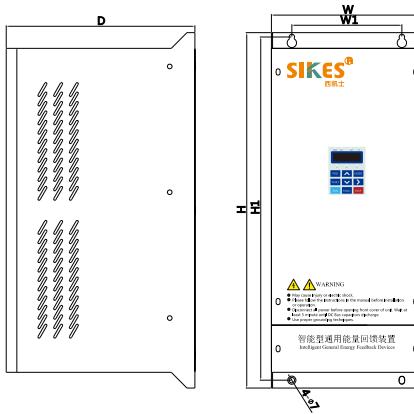
- Nominal parameter: working DC power: DC 315/620V; output AC power: three-phase AC 220/380V; allowable working frequency: 46-60HZ
- Accuracy index: setting error: <0.5%
- Overload capability: 110% long-term; 150% 1 min; 180% 2S
- Control characteristic: intelligent detection and control; auto-detection of AC current, voltage and temperature whether in acceleration, deceleration or steady-state operational process
- Operation panel: modify working parameters with the key; panel displays input DC voltage, output AC current, module temperature; internal storage records input voltage, output voltage/current and module temperature at last trap time for fault
- Protection function: OCP, OVP, UVP, overheating protection and polarity protection
- Environmental ambient temperature: -10 °C ~ +60 °C (non-frozen); ambient humidity: below 90% (non-frost); elevation < 1km
- Protection class: IP20
- Cooling mode: forced-air cooling
- Installation way: wall-mounted, floor type

## 主要技术参数

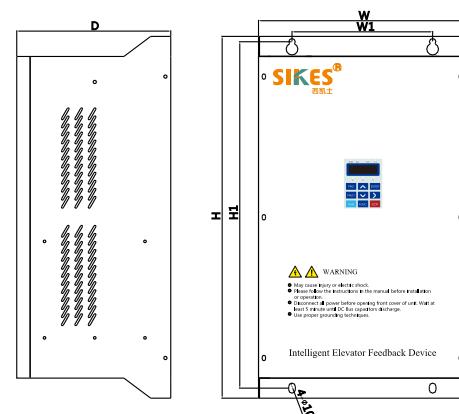
- 额定参数：工作直流电源：DC 220V/400V/600V/1150V；输出交流电源：三相AC 220/380V；允许工作频率：46-60Hz
- 精度指标：整定误差：< 0.5%
- 过载能力：110%长期；150% 1min；180% 2S
- 控制特性：智能检测和控制；无论在加速、减速或稳态运行过程中，皆自动侦测电流、电压及温度
- 操作面板：使用按键修改工作参数；面板显示输入直流电压，输出交流电压，输出交流电流，模块温度；内部存储器记录最近故障跳闸时的输入电压、输出电压/电流及模块温度
- 保护功能：过电流保护、过电压保护、欠压保护、过热保护及极性保护
- 环境周围温度：-10°C至+60°C（不冻结）；周围湿度：90%以下（不结霜）；海拔低于1000m
- 防护等级：IP20
- 冷却方式：强制冷风
- 安装方式：壁挂式、落地式

# Economic Regenerative Drive 经济型回馈装置

## Product Size 产品尺寸图



Picture A



Picture B

## Selection Table 选型表

Category 类别	Application industry 应用行业	Type 规格	Picture NO. 图号	Rated Power 功率 (W)	Rated Current 额定电流 (A)	Weight 重量 (kg)	Chopper Voltage 斩波电压	Voltage Grade 电压等级	Dimensions 外形尺寸 (±5mm)					Reactor 电抗器		Terminal 端子	Cable 配线 (m <sup>3</sup> )
									H	H1	W	W1	D	Built-in 内置	External 外置		
Economic Regenerative Style Unit 经济型回馈装置	Oil-field pumping unit, travelling crane, tower crane 油田抽油机 /行车/塔吊	SKS-IF-E4018	A	7.5-18.5	50A	15.5	DC620V±5V ( With a keyboard 带可操作面板 )	400V	452	436	192	140	240	√	/	√	4-6 m <sup>3</sup>
		SKS-IF-E4055		22-55	75A	15.5	DC620V±5V ( With a keyboard 带可操作面板 )		452	436	192	140	240	√	/	√	8-10 m <sup>3</sup>
	SKS-IF-E4075	B		75	100A	16/23	DC620V±5V ( With a keyboard 带可操作面板 )		540	517	310	210	230	√	/	√	10-16 m <sup>3</sup>
				90	150A	16/23	DC620V±5V ( With a keyboard 带可操作面板 )		540	517	310	210	230	√	/	√	25-35 m <sup>3</sup>

# General Regenerative Drive 通用型回馈装置

## Product Profile 产品简述

When variable speed drive systems are braking, the regenerative power must be dissipated. If the excess energy is not dissipated, the drive system can lose control of the process due to an overvoltage trip, or must extend the braking time to keep from overpowering the drive.

Instead of dissipating the excess energy as heat in a resistor, an Regenerative Drive returns this energy to the power grid efficiently, with minimal heat loss, allowing the entire braking system to be installed in the drive cabinet.

Regenerative Drive is a controllable rectifier with advantages such as providing bidirectional power exchange between AC and DC power and regenerating reusable power to the mains to reduce the cost of power. It is an option for frequency inverters to return energy to the line supply.

It provides 4-quadrant operation and thus is ideal for all applications with a generator operating mode.

It uses SPWM modulation to greatly reduce distinctive peaks of current and form perfect sine wave current. It eliminates high order harmonics and reduces the total current distortion factor THD(i) to a value of less than 5%. It can be applied to a serial connection.



回馈装置的作用是将变速驱动系统在减速的过程中产生的再生能量返回到电网中，以此达到控制驱动系统过压和实现节能的目的。回馈装置是一种可控整流器，能够实现系统交流和直流间的双向能量传输，是变频器能够将多余能量转入线路中重新利用的一种选择。它能够使变频器实现四象限运行，是发电机操作模式应用的首选。通过正弦波PWM控制，产生完美的正弦波电流，大幅度消除高次谐波，使电流畸变率值小于5%。它能够在线路中串联使用。

- Adopting microprocessor chip with fast respond, high-accuracy process control, safe, stable and reliable for operating. It can make the inverter operating in four-quadrant, continuously feedback, regenerative braking frequency is 100%. Electric regeneration efficiency up to 97%.
- Strong anti-jamming ability: It uses SPWM modulation to greatly reduce distinctive peaks of current and form perfect sine wave current, input side current THD lower than 5%, power factor up to 99%.
- Excellent Protection: It can prevent power grid flow back, overheat, overcurrent, out of phase, undervoltage, short circuit.
- Adaptive connection mode, no need to identify Plus-n-Minus when connect to Inverter or power grid, very easy to connect.
- Intelligent digital keypad for easy operation, can modify operation voltage, online monitoring input voltage, DC bus voltage, output current and temperature of the radiator. It can store relevant operating data and fault outputs for trace and diagnose. Additional RS485 or Ethernet interface is available for data transfer and long distance operation.
- It contains built-in intelligent fan, high and low order harmonic filter, external short circuit protection.
- Suitable for all inverters. Similar to Siemens, ABB, Schneider, Fuji and Yaskawa Active Front End.
- Warranty period:18 months.

- 采用最新32位高性能工业微处理器控制、响应速度快、控制精度高，运行安全、稳定、可靠；使变频器实现四象限运行，间断性回馈，回馈制动频率40%以下。
- 把再生能量回馈电网，效率97%，增加运行经济效益；优化回馈SPWM控制算法、功率因素高，输出电流波形更优，畸变率更低；
- 保护方面：具有防电网回流，过热、过流、缺相、欠压、输出短路等保护功能；热损耗为耗能制动的3%以下，改善工作环境；
- 在接线方面，回馈装置均采用自适应接线方法，驳接变频器直流母线端子时，需区分正负极性，驳接电网时，不需区分三相相位，从而避免了由于现场接线错误引起的各种问题，使用户更方便使用。
- 数字化控制，具有灵活调整回馈装置的动作电压，在线检测输入电压、直流母线电压、输出电流、散热器温度等功能，用户可依据需要在线查看回馈工作状况。带操作面板（100V范围动作电压可调；电流、温升可视；故障输出、系统可存储设备运行数据等）；
- 内置智能风机，散热性能更佳；低频滤波装置，使回馈波形更好，降低对外高频噪声干扰；当出现故障保护时，系统可存储相关数据，实现故障智能诊断，从而使用户了解设备在现场的工作状况。
- 通配所有进口、国产的变频器，可代替Siemens, ABB, Schneider, Fuji and Yaskawa同类产品。
- 国家三包原则，18个月免费保修。

# General Regenerative Drive 通用型回馈装置

## ■ Product Feature 产品特点

### ■ Main technical parameter

- Nominal parameter: working DC power: DC 620V; output AC power: three-phase AC 400V; allowable working frequency: 46-60HZ
- Accuracy index: setting error: <0.5%
- Overload capability: 110% long-term; 150% 1 min; 180% 2S
- Control characteristic: intelligent detection and control; auto-detection of AC current, voltage and temperature whether in acceleration, deceleration or steady-state operational process
- Operation panel: modify working parameters with the key; panel displays input DC voltage, output AC current, module temperature; internal storage records input voltage, output voltage/current and module temperature at last trap time for fault
- Protection function: OCP, OVP, UVP, overheating protection and polarity protection
- Environmental ambient temperature: -10 °C ~ +60 °C (non-frozen); ambient humidity: below 90% (non-frost); elevation < 1km
- Protection class: Ip20;
- Cooling mode: forced-air cooling
- Installation way: wall-mounted, floor type

### 主要技术参数

- 额定参数：工作直流电源：DC 620V；输出交流电源：三相AC 400V；允许工作频率：46-60Hz
- 精度指标：整定误差：< 0.5%
- 过载能力：110%长期；150% 1min；180% 2S
- 控制特性：智能检测和控制；无论在加速、减速或稳态运行过程中，皆自动侦测电流、电压及温度
- 操作面板：使用按键修改工作参数；面板显示输入直流电压，输出交流电压，输出交流电流，模块温度；内部存储器记录最近故障跳闸时的输入电压、输出电压/电流及模块温度
- 保护功能：过电流保护、过电压保护、欠压保护、过热保护及极性保护
- 环境周围温度：-10°C至+60°C（不冻结）；周围湿度：90%以下（不结霜）；海拔低于1000m
- 结构防护等级：IP20
- 冷却方式：强制冷风
- 安装方式：壁挂式、落地式

**■ Anti-jamming capability****Anti-jamming performance**

Meet the requirement of GB/T 15153.1 (IEC60870-2-1) 4 class high-frequency interference test:

**Common mode:** 2.5kV, 1MHz, 2s

**Differential mode:** 1.0kV, 1MHz, 2s

**■ 抗干扰能力****抗干扰性能**

符合国标 GB/T 15153.1(IEC60870-2-1) 4级高频干扰试验要求：

共模：2.5kV , 1MHz , 2s

差模：1.0kV , 1MHz , 2s

**■ EMC**

Accord with GB/T 17626.4 ( IEC61000-4-4 ) 4 class EFT interference test

Accord with GB/T 17626.3 ( IEC61000-4-3 ) 4 class radiation EMF test

Accord with GB/T 17626.2 ( IEC61000-4-2 ) 4 class ESD test

All technical specifications are suitable for SIKES regenerative style unit series models, which must meet the following requirements first if verified whether they comply with technical specifications:

Must have been in continuous operation for 20 minutes within the operating temperature range specified;

During the Warranty Period;

Ensure all technical specifications, except that marked "typical", meet the requirements.

**■ 电磁兼容性**

符合国标 GB/T 17626.4 ( IEC61000-4-4 ) 4级电快速瞬变脉冲群干扰试验；

符合国标 GB/T 17626.3 ( IEC61000-4-3 ) 4级辐射电磁场试验

符合国标 GB/T 17626.2 ( IEC61000-4-2 ) 4级静电放电试验

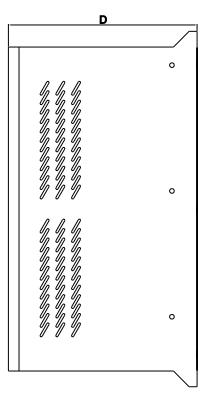
所有技术规格都适用于西凯士回馈装置系列型号，要验证通用型回馈装置是否符合技术规格，通用型回馈装置必须首先符合以下条件：  
在指定的操作温度内，通用型回馈装置必须已经工作了连续二十分钟；

通用型回馈装置必须属于厂家保证期限内；

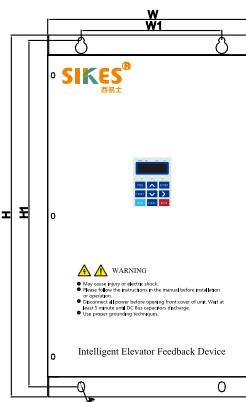
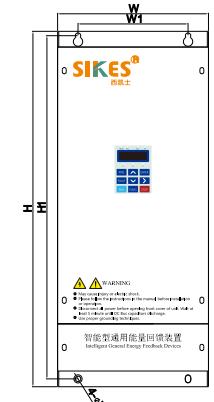
除标记为“典型”的技术规格外，所有技术规格都保证符合要求。

# General Regenerative Drive 通用型回馈装置

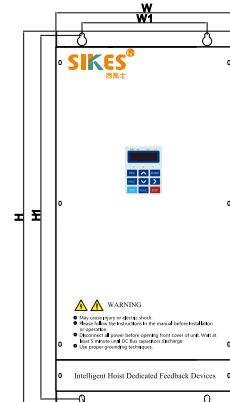
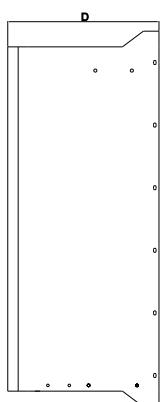
## Product size 产品尺寸图



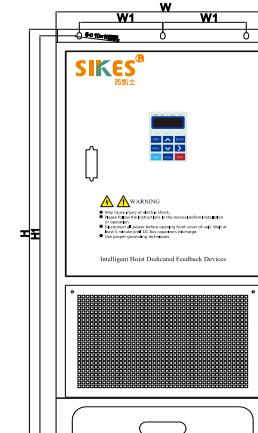
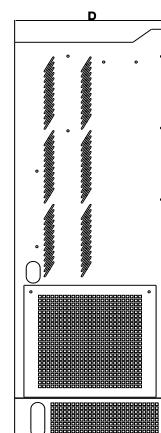
Picture A



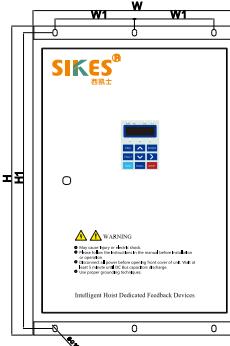
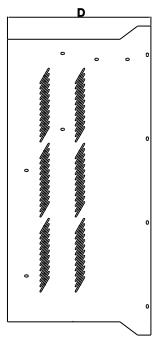
Picture B



Picture C



Picture D



Picture E

## Selection Table 选型表

Category 类别	Type 规格	Picture NO. 图号	Rated Power 功率 (kW)	Rated Current 额定电流 (A)	Weight 重量 (kg)	Chopper Voltag 斩波电压	Voltage Grade 电压等级	Dimensions 外形尺寸 (±5mm)					Reactor 电抗器		Terminal 端子			Cable 配线 (m <sup>3</sup> )
								H	H1	W	W1	D	Built-in 内置	External 外置	Terminal 端子	Dc circuit breaker 直流 断路器	Ac circuit breaker 交流 断路器	
General Regenerative Drive 通用型 回馈装置	SKS-IF-G4022	A	7.5-22	75A	15.5	DC620V±5V ( With a keyboard 带可操作面板 )	400V	452	436	192	140	240	√		√			8-10 m <sup>3</sup>
	SKS-IF-G4045	B	30-45	100A	23	DC620V±5V ( With a keyboard 带可操作面板 )	400V	540	517	310	210	230	√		√			8-10 m <sup>3</sup>
	SKS-IF-G4075		55-75	150A	65	DC620V±5V ( With a keyboard 带可操作面板 )	400V	540	517	310	210	230	√		√			10-16 m <sup>3</sup>
	SKS-IF-G4110	C	90-110	200A	65	DC620V±5V ( With a keyboard 带可操作面板 )	400V	720	697	340	240	290	√		√			25-35 m <sup>3</sup>
	SKS-IF-G4160	D	132-160	300A	120	DC620V±5V ( With a keyboard 带可操作面板 )	400V	950	925	460	360	325	√		√	◆	◆	50-70 m <sup>3</sup>
	SKS-IF-G4200	E	187-200	400A	130	DC620V±5V ( With a keyboard 带可操作面板 )	400V	700	670	460	360	325		√	√	◆	◆	95-120 m <sup>3</sup>
	SKS-IF-G4250		220-250	600A	150	DC620V±5V ( With a keyboard 带可操作面板 )	400V	700	670	460	360	325		√	√	◆	◆	95-120 m <sup>3</sup>
	SKS-IF-G4400		280-400	800A	235	DC620V±5V ( With a keyboard 带可操作面板 )	400V	700	670	460	360	325		√	√	◆	◆	
	SKS-IF-G4500		450-500	1200A	260	DC620V±5V ( With a keyboard 带可操作面板 )	400V	700	670	460	360	325		√	√	◆	◆	

Note : √ is a standard, ◆ is optional, according to the selection table or consult factory.

备注 : √是标配 , ◆是选配 , 可根据选配表选型或者咨询厂家。

# Special Regenerative Drive 专用型回馈装置

## Product Profile 产品简述

- Adopting microprocessor chip with fast respond, high-accuracy process control, safe, stable and reliable for operating. It can make the inverter operating in four-quadrant, continuously feedback, regenerative braking frequency is 100%. Electric regeneration efficiency up to 97%.
  - Strong anti-jamming ability: It uses SPWM modulation to greatly reduce distinctive peaks of current and form perfect sine wave current, input side current THD lower than 5%, power factor up to 99%.
  - Excellent Protection: It can prevent power grid flow back, overheat, overcurrent, out of phase, undervoltage, short circuit.
  - Adaptive connection mode, no need to identify Plus-n-Minus when connect to Inverter or power grid, very easy to connect.
  - Intelligent digital keypad for easy operation, can modify operation voltage, online monitoring input voltage, DC bus voltage, output current and temperature of the radiator. It can store relevant operating data and fault outputs for trace and diagnose. Additional RS485 or Ethernet interface is available for data transfer and long distance operation.
  - It contains built-in intelligent fan, high and low order harmonic filter, external short circuit protection.
  - Suitable for all inverters. Similar to Siemens, ABB, Schneider, Fuji and Yaskawa Regenerative Drive
  - Warranty period:18 months.
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- 采用最新32位高性能工业微处理器控制、响应速度快、控制精度高，运行安全、稳定、可靠；使变频器实现四象限运行，间断性回馈，回馈制动频度40%以下。
  - 把再生能源回馈电网，效率97%，增加运行经济效益；优化回馈SPWM控制算法、功率因素高，输出电流波形更优，畸变率更低。
  - 保护方面：具有防电网回流，过热、过流、缺相、欠压、输出短路等保护功能；热损耗为耗能制动的3%以下，改善工作环境。
  - 接线方面，回馈装置均采用自适应接线方法，驳接变频器直流母线端子时，需区分正负极性，驳接电网时，不需区分三相相位，从而避免了由于现场接线错误引起的各种问题，使用户更方便使用。
  - 数字化控制，灵活调整回馈装置的动作电压，在线检测输入电压、直流母线电压、输出电流、散热器温度等功能，用户可依据需要在线查看回馈工作状况。带操作面板（100V范围动作电压可调；电流、温升可视；故障输出、系统可存储设备运行数据等）。
  - 内置智能风机，散热性能更佳；低频滤波装置，使回馈波形更好，降低对外高频噪声干扰；当出现故障保护时，系统可存储相关数据，实现故障智能诊断，从而使用户了解设备在现场的工作状况。
  - 通配所有进口、国产的变频器，可代替Siemens, ABB, Schneider, Fuji and Yaskawa同类产品。
  - 国家三包原则，18个月免费保修。



## ■ Main technical parameter

- Nominal parameter: working DC power: DC 620/1150V; output AC power: three-phase AC 400/660V; allowable working frequency: 46-60Hz
- Accuracy index: setting error: <0.5%
- Overload capability: 110% long-term; 150% 1 min; 180% 2S
- Control characteristic: intelligent detection and control; auto-detection of AC current, voltage and temperature whether in acceleration, deceleration or steady-state operational process
- Operation panel: modify working parameters with the key; panel displays input DC voltage, output AC current, module temperature; internal storage records input voltage, output voltage/current and module temperature at last trap time for fault
- Protection function: OCP, OVP, UVP, overheating protection and polarity protection
- Environmental ambient temperature: -10 °C ~ +60 °C (non-frozen); ambient humidity: below 90% (non-frost); elevation < 1km
- Protection class: IP20;
- Cooling mode: forced-air cooling
- Installation way: wall-mounted, floor type

## 主要技术参数

- 额定参数：工作直流电源：DC 620/1150V；输出交流电源：三相AC 400/660V；允许工作频率：46-60Hz
- 精度指标：整定误差：< 0.5%
- 过载能力：110%长期；150% 1min；180% 2S
- 控制特性：智能检测和控制；无论在加速、减速或稳态运行过程中，皆自动侦测电流、电压及温度
- 操作面板：使用按键修改工作参数；面板显示输入直流电压，输出交流电压，输出交流电流，模块温度；内部存储器记录最近故障跳闸时的输入电压、输出电压/电流及模块温度
- 保护功能：过电流保护、过电压保护、欠压保护、过热保护及极性保护
- 环境周围温度：-10°C至+60°C（不冻结）；周围湿度：90%以下（不结霜）；海拔低于1000m
- 防护等级：IP20；
- 冷却方式：强制冷风
- 安装方式：壁挂式、落地式

# Special Regenerative Drive 专用型回馈装置

## ■ Anti-jamming capability

### Anti-jamming performance

Meet the requirement of GB/T 15153.1 (IEC60870-2-1) 4 class high-frequency interference test:

Common mode: 2.5kV, 1MHz, 2s

Differential mode: 1.0kV, 1MHz, 2s

## ■ 抗干扰能力

### 抗干扰性能

符合国标 GB/T 15153.1(IEC60870-2-1) 4级高频干扰试验要求：

共模：2.5kV , 1MHz , 2s

差模：1.0kV , 1MHz , 2s

## ■ EMC

Accord with GB/T 17626.4 ( IEC61000-4-4 ) 4 class EFT interference test

Accord with GB/T 17626.3 ( IEC61000-4-3 ) 4 class radiation EMF test

Accord with GB/T 17626.2 ( IEC61000-4-2 ) 4 class ESD test

All technical specifications are suitable for SIKES regenerative drive series models, which must meet the following requirements first if verified whether they comply with technical specifications:

Must have been in continuous operation for 20 minutes within the operating temperature range specified;

During the Warranty Period;

Ensure all technical specifications, except that marked "typical", meet the requirements.

## ■ 电磁兼容性

符合国标 GB/T 17626.4 ( IEC61000-4-4 ) 4级电快速瞬变脉冲群干扰试验；

符合国标 GB/T 17626.3 ( IEC61000-4-3 ) 4级辐射电磁场试验；

符合国标 GB/T 17626.2 ( IEC61000-4-2 ) 4级静电放电试验；

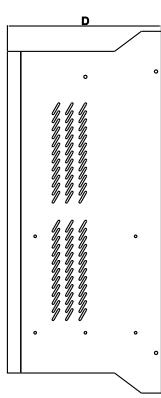
所有技术规格都适用于西凯士回馈装置系列型号，要验证专用型回馈装置是否符合技术规格，专用型回馈装置必须首先符合以下条件：

在指定的操作温度内，专用型回馈装置必须已经工作了连续二十分钟；

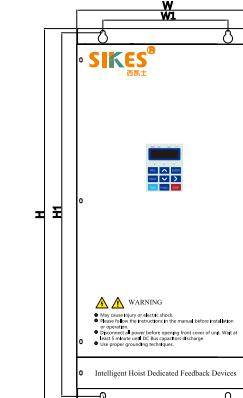
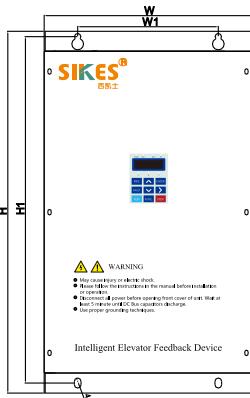
专用型回馈装置必须属于厂家保证期限内；

除标记为“典型”的技术规格外，所有技术规格都保证符合要求。

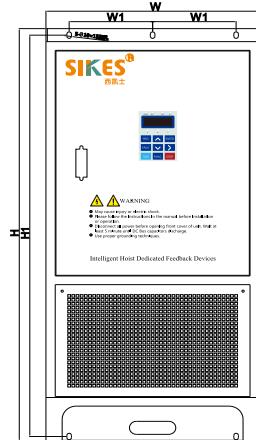
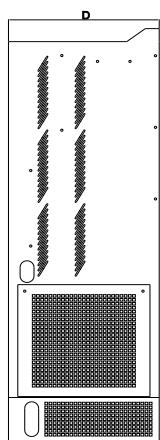
## ■ Product size 产品尺寸图



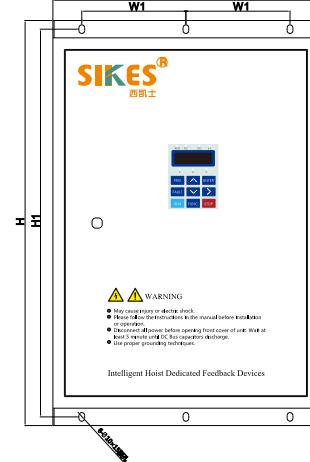
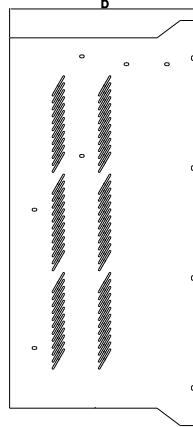
Picture A



Picture B



Picture C



Picture D

## Selection Table 选型表

Category 类别	Application 应用行业	Type 规格	Picture NO. 图号	Rated Power (kw)	Rated Current (A)	Weight 重量 (kg)	Chopper Voltage 斩波电压	Voltage Grade 电压等级	Dimensions 外形尺寸 (±5mm)					Reactor 电抗器		Terminal 端子			Cable 配线 (m <sup>2</sup> )
									H	H1	W	W1	D	Built-in 内置	External 外置	Terminal 端子	Dc circuit breaker 直流 断路器	Ac circuit breaker 交流 断路器	
Special Regenerative Drive 专用型 回馈装置	Hoist, salvage ship, winch, forging equipment 提升机/打捞船/卷扬机/锻压设备/起重机	SKS-IF-S4075	A	55-75	150A	65	DC620V±5V ( With a keyboard 带可操作面板 )	400V	540	517	310	210	230	✓		✓			10-16 m <sup>2</sup>
		SKS-IF-S4110	B	90-110	200A	65	DC620V±5V ( With a keyboard 带可操作面板 )		720	697	340	240	290	✓		✓			25-35 m <sup>2</sup>
		SKS-IF-S4132	C	132-160	300A	120	DC620V±5V ( With a keyboard 带可操作面板 )		950	925	460	360	325	✓		✓	•	•	50-70 m <sup>2</sup>
		SKS-IF-S4200	D	187-200	400A	130	DC620V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	95-120 m <sup>2</sup>
		SKS-IF-S4250		220-250	600A	150	DC620V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	95-120 m <sup>2</sup>
		SKS-IF-S4400		280-400	900A	260	DC620V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	
	Hoist, salvage ship, oil-field pumping unit 提升机/打捞船/油田抽油机	SKS-IF-S6075	A	55-75	100A	/	DC1150V±5V ( With a keyboard 带可操作面板 )	660V	540	517	310	210	230	✓		✓			10-16 m <sup>2</sup>
		SKS-IF-S6110		90-110	150A	/	DC1150V±5V ( With a keyboard 带可操作面板 )		540	517	310	210	230	✓		✓			25-35 m <sup>2</sup>
		SKS-IF-S6160		132-160	200A	/	DC1150V±5V ( With a keyboard 带可操作面板 )		540	517	310	210	230	✓		✓			10-16 m <sup>2</sup>
		SKS-IF-S6200	C	187-200	300A	/	DC1150V±5V ( With a keyboard 带可操作面板 )		950	925	460	360	325	✓		✓	•	•	50-70 m <sup>2</sup>
		SKS-IF-S6250	D	220-250	500A	/	DC1150V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	95-120 m <sup>2</sup>
		SKS-IF-S6400		280-400	800A	/	DC1150V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	
	Motor power test for automobile and motorcycle engine, etc. 汽车发动机/ 摩托车马达等 电机功率的测试	SKS-IF-D4022	C	55-75	150A	/	DC620V±5V ( With a keyboard 带可操作面板 )	400V	950	925	460	360	325	✓		✓	•	•	10-16 m <sup>2</sup>
		SKS-IF-D4030		90-110	150A	/	DC620V±5V ( With a keyboard 带可操作面板 )		950	925	460	360	325	✓		✓	•	•	25-35 m <sup>2</sup>
		SKS-IF-D4037		132-160	200A	/	DC620V±5V ( With a keyboard 带可操作面板 )		950	925	460	360	325	✓		✓	•	•	25-35 m <sup>2</sup>
		SKS-IF-D4045	D	187-220	300A	/	DC620V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	50-70 m <sup>2</sup>
		SKS-IF-D4080		250-315	400A	/	DC620V±5V ( With a keyboard 带可操作面板 )		700	670	460	360	325		✓	✓	•	•	95-120 m <sup>2</sup>

Note : ✓ is a standard, • is optional, according to the selection table or consult factory.

备注 : ✓是标配 , •是选配 , 可根据选配表选型或者咨询厂家。

# Regenerative Drive for Elevator 智能型电梯专用回馈装置系列

## Power Generation Principle of Elevator 电梯的发电原理

The mechanical energy (potential energy, kinetic energy) of moving load, is converted by regenerative drive for elevator into electrical energy (renewable electrical energy), which returns to AC power grid to serve other electric equipments nearby. It can lower the electrical energy consumption of motor drive system per unit time to save electrical energy. The elevator with frequency conversion has maximum mechanical energy when running at a top speed after startup, and gradually slows to a stop before reaching the target floor, the process is called that the elevator tractor releases the mechanical energy.

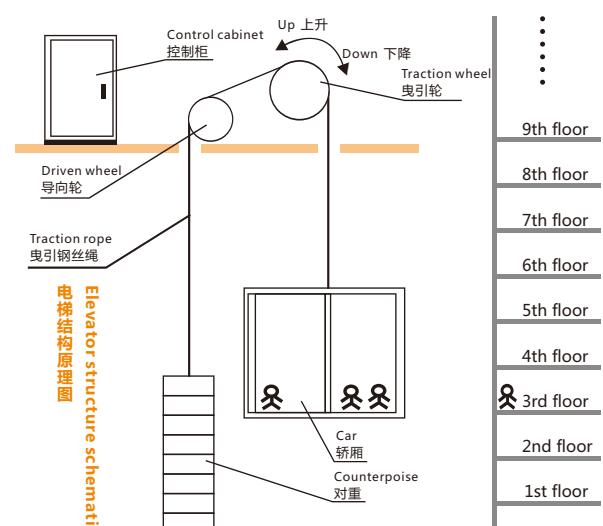
Besides, the elevator is also a potential energy load. In order to drag the load uniformly, the elevator is composed of the car that carries passengers and the counterpoise. Only when the car weights about 50% of the rated load (about 7 people) the car and the counterpoise will be balance each other. Otherwise, the mechanical energy will be produced when the elevator is running because of the quality difference between the car and the counterpoise. The excess mechanical energy (include potential energy, kinetic energy) of the elevator in service, is converted by motor and inverter into DC electrical energy, which is stored in the capacitor in the inverter's DC circuit. The capacitor can be likened to a small reservoir at the moment, the more electrical energy is returned to the capacitor, the higher the capacitor voltage is, just like the reservoir level is higher. There will be an overvoltage fault if the electrical energy stored in the capacitor doesn't released in time. Then the inverter will stop working and the elevator won't be in normal running.



将运动中负载上的机械能（位能、动能）通过电梯专用能量回馈装置变换成电能（再生电能）并回送给交流电网，供附近其它用电设备使用，使电机拖动系统在单位时间消耗电网电能下降，从而达到节约电能的目的。采用变频调速的电梯启动运行达到最高运行速度后具有最大的机械功能，电梯达到目标层前要逐步减速直到电梯停止运动为止，这一过程是电梯曳引机释放机械功能量的过程。此外，升降电梯还是一个位能性负载。为了均匀拖拽负载，电梯由曳引机拖动的负载是由载客轿厢和对重平衡块组成，只有当轿厢载重量约为50%（1吨载客电梯乘客为7人左右）时，轿厢和对重平衡块才相互平衡，否则，轿厢和对重平衡块就会有质量差，使电梯运行时产生机械位能。电梯运行中多余的机械能（含位能、动能）通过电动机和变频器转换成直流电能储存在变频器直流回路中的电容中，此时电容就好比是一个小水库，回送到电容中的电能越多，电容电压就越高（好比水库水位超高），如不及时释放电容器储存的电能，就会产生过压故障，使变频器停止工作，电梯无法正常运行。

## Power Generation Status Schematic Diagram of Elevator 电梯发电状态示意图

Block of heavy weight = car loaded weight*50% 对重块重量 = 轿厢满载重量×50%		
Both sides of the tractor wheel load status 曳引轮两侧载荷状态	Direction 运行方向	Motor status 电机状态
Car side <of the heavy side 轿厢侧 < 对重侧	Uplink 上行	Power Generation 发电
	Downlink 下行	Power consumption 耗电
Car side >of the heavy side 轿厢侧 > 对重侧		
Uplink 上行	Power consumption 耗电	Power Generation 发电
Downlink 下行		
<b>Note:</b> Under normal circumstances, only the car's load reach 50% of the rated load, the heavy side and the car on the side of it is in complete balance, when the load amount of said elevator balance. 备注：一般情况下，只有轿厢的载重量达到50%的额定载重量时，对重一侧和轿厢一侧才处于完全平衡，这时的载重额称电梯的平衡点。		



Picture A

Picture A shows the schematic diagram of four-layer elevator, we can simply think of the elevator as a fixed pulley block, with one side hanging the car and the other hanging the counterpoise. The tractor function as a pulley is actually a motor. The car goes up or down accordingly to achieve the goal of transferring passengers or goods when the motor rotates in forward or reverse direction. The inverter in the control system of elevator is a device which drives the motor. In general, the equilibrium coefficient of elevator is about 50%, that is, the car weights the same as the counterpoise when the load weights about 45% of the rated in the car.

图A所示的是四层电梯示意图，我们可以把电梯简单理解成一个两端分别悬挂轿厢和配重的定滑轮组，起滑轮作用的曳引机实际上就是一部电动机。当电动机正向或者反向旋转时，轿厢会相应的上行或者下行，实现了电梯运送乘客或者货物的目的。位于电梯控制系统中的变频器是驱动电动机运行的装置。一般来讲，电梯平衡系数为45%左右，即轿厢内放置45%左右载重时，轿厢与电梯配重的重量相当。

## The Operation Condition of Elevator 电梯的运行状况分为以下几种工况

- The lesser of the car and counterpoise goes up, like the empty car going up and the full going down, the process is called that the system releases potential energy ( $Ep=mgh$ ), the tractor is operating in generating state at this point.
- The lesser of the car and counterpoise goes down, like the empty car going up and the full going down, the potential energy of system is increasing at this point, and the tractor is operating in motoring state.
- The system releases kinetic energy ( $E_k=1/2mv^2$ ) when the elevator is braking before reaching the target floor, at this moment the tractor is also operating in generating state.
- The elevator runs in or near half-full load state, at the moment the tractor is operating in or near balance condition, this is the maximum probability operating condition of elevator.
- The tractor is operating in generating state when the elevator runs in (a), (c) condition, the energy produced is converted by the motor and inverter into DC electrical energy on DC-bus of the inverter, which is stored temporarily in the large capacitor in the inverter's DC circuit. The electrical energy and voltage of the capacitor will be increasing gradually with the duration of elevator working, which causes an overvoltage fault to make the elevator stop working.
- The braking resistor, where part of this energy consumed in the form of heat, is usually added to DC-bus for elevator to avoid overvoltage fault. According to statistics, the energy consumed in the braking resistor accounts for 25%-35% of elevator's total electricity consumption.
- The average power consumed in the braking resistor is about 4.5kw (accounting for 30% of motor power) if the average power of each elevator is 15kw, that is, the motor in continuous operation for 1 hour consumes 15 kilowatt hours of electricity. It not only waste the energy, but also has much effect on the environment. In some cases, electricity of equipment such as air conditioners and fans, dissipating heat for machine room, is even larger than the elevator itself.
- The energy should have been consumed in the braking resistor is converted by regenerative style unit into AC, which returns to the same power grid nearby to serve other electrical equipment. Generally, the converting efficiency is about 95%. For this reason, the energy-saving effect of regenerative style unit reaches 15-45%. In addition, the higher the floor is, the faster the elevator is, and energy-saving effect is clearer. The elevator can save 4.5 KWh of electricity after installing the regenerative style unit.

# Regenerative Drive for Elevator 智能型电梯专用回馈装置系列

- 轿箱或配重较轻的一边上升，比如空车上行和满载下行，这是系统释放势能 ( $E_p=mgh$ ) 的过程，此时曳引机工作在发电状态。
- 轿箱或配重较轻的一边下降，比如空车下行与满载上行，此时系统势能在不断增加，曳引机工作在电动状态。
- 当电梯到达所在楼层减速制动时，系统释放动能 ( $E_k=1/2mv^2$ )，此时曳引机也工作在发电状态。
- 电梯在半载或在接近半载状态下运行，此时曳引机工作在平衡或接近平衡工况，这是电梯运行的最大概率工况。
- 当电梯运行在(a)、(c)工况时，曳引机工作在发电状态，所产生的能量通过电动机和变频器转化为变频器直流母线上的直流电能。这些能量被临时存储在变频器直流回路的大电容中，随着电梯工作时间的持续，电容中的电能和电压会逐渐升高，导致过压故障，使电梯停止工作。
- 电梯为了避免过压故障，通常在直流母线上加制动电阻，将这部分能量以发热的方式消耗在制动电阻上，据统计，消耗在制动电阻上的能量占电梯总用电量的25%-35%。
- 假如按每台电梯的平均功率是15KW，即电机连续工作1小时消耗15度电，那么消耗在制动电阻上的平均功率约为4.5KW(按电机功率的30%)。这种方法不仅将能量白白浪费掉，而且对周围环境的影响很大。有些情况下，给机房散热的空调和风机等设备的耗电量甚至超过了电梯本身。
- 能量回馈系统的作用就是将原来消耗在制动电阻上的能量，通过逆变转化为交流电，并回馈到临近的同一电网或供其他电气设备使用。一般能量逆变的效率约为95%。因此，电梯能量回馈系统的节能效果在15%-45%之间，且楼层越高、电梯速度越快，节能效果愈明显。如上例所述，加装能量回馈装置后，电梯能节电4.5度。

## Product Profile 产品简述

- Controlled by 32 bit high-performance industrial MPU with fast response speed, high control accuracy, and security, stability and reliability of operation;  
SPWM control arithmetic, high power factor, better output current waveform, lower distortion factor;
  - Protection: can prevent power grid from backflow, overheating, over-current, phase-lacking, under-voltage and output short-circuit;
  - Adopt self-adaptive connection mode, without dismantling discharge resistance, bus doesn't distinguish positive and negative, undocking power grid doesn't distinguish three-phase position;
  - With operation panel (adjustable range operation voltage; visible current and temperature; fault output etc.);
  - Built-in intelligent fan, three groups of LC high and low frequency filters, three groups of short-circuit protection;
  - Voltage class: 220V, 440V, (480V can be customizable);
  - Suitable for all elevators; Three guarantees; Warranty period: 24 months.
- 采用32位高性能工业微处理器控制、响应速度快、控制精度高，运行安全、稳定、可靠；
  - SPWM控制算法、功率因素高，输出电流波形更优，畸变率更低；
  - 保护：具有防电网回流，过热、过流、缺相、欠压、输出短路等保护功能；
  - 采用自适应接线方式，无需拆卸放电电阻、母线无需区分正负极、驳接电网无需区分三相相位；
  - 带操作面板（范围动作电压可调；电流、温度可视；故障输出等）；
  - 内置智能风机，三组LCL高、低频滤波装置，三组短路保护；
  - 电压等级分：220V、400V、（480V属于定制产品）；
  - 通配所有进口、国产电梯；国家三包原则，2年免费保修。

## ■ Main technical parameter

- Nominal parameter: working DC power: DC 315/620V; output AC power: three-phase AC 220/380V; allowable working frequency: 46-60HZ
- Accuracy index: setting error: <0.5%
- Overload capability: 110% long-term; 150% 1 min; 180% 2S
- Control characteristic: intelligent detection and control; auto-detection of AC current, voltage and temperature whether in acceleration, deceleration or steady-state operational process
- Operation panel: modify working parameters with the key; panel displays input DC voltage, output AC current, module temperature; internal storage records input voltage, output voltage/current and module temperature at last trap time for fault
- Protection function: OCP, OVP, UVP, overheating protection and polarity protection
- Environmental ambient temperature: -10 °C ~ +60 °C (non-frozen); ambient humidity: below 90% (non-frost); elevation < 1km
- Protection class: Ip20;
- Cooling mode: forced-air cooling
- Installation way: wall-mounted, floor type

## 主要技术参数

- 额定参数：工作直流电源：DC 315/620V；输出交流电源：三相AC 220/380V；允许工作频率：46-60Hz
- 精度指标：整定误差：< 0.5%
- 过载能力：110%长期；150% 1min；180% 2S
- 控制特性：智能检测和控制；无论在加速、减速或稳态运行过程中，皆自动侦测电流、电压及温度
- 操作面板：使用按键修改工作参数；面板显示输入直流电压，输出交流电压，输出交流电流，模块温度；内部存储器记录最近故障跳闸时的输入电压、输出电压/电流及模块温度
- 保护功能：过电流保护、过电压保护、欠压保护、过热保护及极性保护
- 环境周围温度：-10°C至+60°C（不冻结）；周围湿度：90%以下（不结霜）；海拔低于1000m
- 防护等级：IP20
- 冷却方式：强制冷风
- 安装方式：壁挂式、落地式

# Regenerative Drive for Elevator 智能型电梯专用回馈装置系列

## ■ Anti-jamming capability

### Anti-jamming performance

Meet the requirement of GB/T 15153.1 (IEC60870-2-1) 4 class high-frequency interference test:

Common mode: 2.5kV, 1MHz, 2s

Differential mode: 1.0kV, 1MHz, 2s

### ■ 抗干扰能力

#### 抗干扰性能

符合国标 GB/T 15153.1(IEC60870-2-1) 4级高频干扰试验要求：

共模：2.5kV , 1MHz , 2s

差模：1.0kV , 1MHz , 2s

## ■ EMC

Accord with GB/T 17626.4 ( IEC61000-4-4 ) 4 class EFT interference test

Accord with GB/T 17626.3 ( IEC61000-4-3 ) 4 class radiation EMF test

Accord with GB/T 17626.2 ( IEC61000-4-2 ) 4 class ESD test

All technical specifications are suitable for SIKES regenerative style unit series models, which must meet the following requirements first if verified whether they comply with technical specifications:

Must have been in continuous operation for 20 minutes within the operating temperature range specified;

During the Warranty Period;

Ensure all technical specifications, except that marked "typical", meet the requirements.

### ■ 电磁兼容性

符合国标 GB/T 17626.4 ( IEC61000-4-4 ) 4级电快速瞬变脉冲群干扰试验；

符合国标 GB/T 17626.3 ( IEC61000-4-3 ) 4级辐射电磁场试验；

符合国标 GB/T 17626.2 ( IEC61000-4-2 ) 4级静电放电试验。

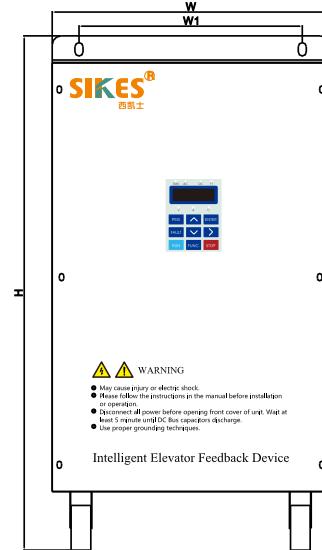
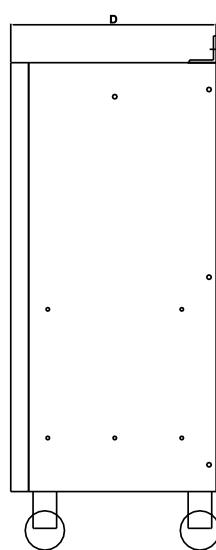
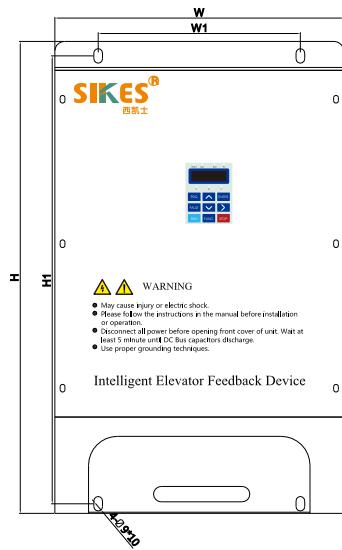
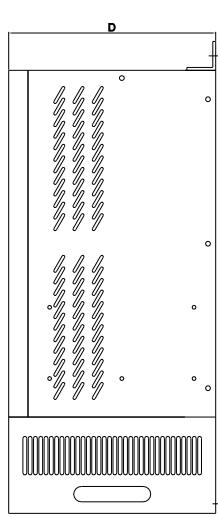
所有技术规格都适用于西凯士回馈装置系列型号，要验证智能型电梯专用回馈装置是否符合技术规格,智能型电梯专用回馈装置必须首先符合以下条件：

在指定的操作温度内，智能型电梯专用回馈装置必须已经工作了连续二十分钟；

智能型电梯专用回馈装置必须属于厂家保证期限内；

除标记为“典型”的技术规格外，所有技术规格都保证符合要求。

## ■ Product size 产品尺寸图



Picture A

Picture B

## Selection Table 选型表

Category 类别	Application 应用行业	Type 规格	Picture NO. 图号	Rated Power 功率 (KW)	Rated Current 额定 电流 (A)	Weight 重量 (kg)	Chopper Voltage 斩波电压	Voltage Grade 电压 等级	Dimensions 外形尺寸 (±5mm)					Reactor 电抗器			Cable 配线 (m <sup>3</sup> )
									H	H1	W	W1	D	Built-in 内置	DC Circuit Breaker 直流断路器	AC Circuit Breaker 交流断路器	
Intelligent Regenerative Style Unit for Elevator 智能型电梯专用回馈装置	Elevator 电梯	SKS-IF-EV2011	A	7.5-11	50A	28	DC310V±5V ( With a keyboard 带可操作面板 )	220V	490	465	300	210	215	√	√	√	6 m <sup>3</sup>
		SKS-IF-EV2018		15-18.5	75A	28	DC310V±5V ( With a keyboard 带可操作面板 )		490	465	300	210	215	√	√	√	10 m <sup>3</sup>
		SKS-IF-EV2037	B	22-37	100A	36	DC310V±5V ( With a keyboard 带可操作面板 )		576	/	310	250	230	√	√	√	25 m <sup>3</sup>
		SKS-IF-EV2055		45-55	150A	36	DC310V±5V ( With a keyboard 带可操作面板 )		576	/	310	250	230	√	√	√	35 m <sup>3</sup>
		SKS-IF-EV4011	A	7.5-11	25A	28	DC620V±5V ( With a keyboard 带可操作面板 )	400V	490	465	300	210	215	√	√	√	6 m <sup>3</sup>
		SKS-IF-EV4018		15-18.5	50A	28	DC620V±5V ( With a keyboard 带可操作面板 )		490	465	300	210	215	√	√	√	8 m <sup>3</sup>
		SKS-IF-EV4037	B	22-37	75A	36	DC620V±5V ( With a keyboard 带可操作面板 )		576	/	310	250	230	√	√	√	16 m <sup>3</sup>
		SKS-IF-EV4055		45-55	100A	36	DC620V±5V ( With a keyboard 带可操作面板 )		576	/	310	250	230	√	√	√	25 m <sup>3</sup>

Note : √ is a standard, according to the selection table or consult factory.  
 备注 : √是标配 , 可根据选配表选型或者咨询厂家。

## The impact of energy-saving effect of factors 影响节能效果的几大因素

Energy-saving effect is related to elevator power, the whole system and equilibrium system, etc., the effect will be better under the following circumstances:

- The higher the floor is, braking frequently, the more energy will be saved;
- The elevator with new installation, the mechanical inertia is high, the more energy will be saved;
- The faster the elevator is, braking frequently, the more energy will be saved;
- The more frequently the elevator is used, braking frequently, the more energy will be saved.

节能效果与电梯功率、整个系统以及平衡系统等方面有关，以下几类情况节能效果更好：

- |                           |                             |
|---------------------------|-----------------------------|
| ■ 楼层越高的电梯 , 制动频繁 , 节能越多 ; | ■ 新安装使用的电梯 , 机械惯性大 , 节能越多 ; |
| ■ 速度越快的电梯 , 制动频繁 , 节能越多 ; | ■ 使用越频繁的电梯 , 制动频繁 , 节能越多。   |

## National promotion policy 国家推广政策

The PRC Energy Saving Law prescribes: the high energy-consumption special equipments shall be energy-saving censored and supervised according to the regulations of the State Council, and like elevators etc. shall have an energy efficiency test, enterprises that have substandard equipment shall be urged to rectify; if the rectify still can not meet the standard, enterprises shall be urged to carry through equipment improvement. Energy Saving Regulations for Public Institution and Civil Architecture has been formally implemented since issued on August 1, 2008.

《中华人民共和国节约能源法》规定：对高耗能的特种设备，按照国务院的规定实行节能审查和监管；对电梯等高耗能特种设备实行能效测试，对不达标的设备督促企业整改；整改仍然难以达标的，应当督促企业进行设备改造。2008年8月1日，《公共机构节能条例》、《民用建筑节能条例》颁布，现已正式实施。

# Regenerative Drive for Elevator 智能型电梯专用回馈装置系列

## ■ Some of project cases show 部分工程案例展示

**Shenzhen Legacy Home (eastern real estate)**

**Shenzhen Hongfa Field Center Tower**

**Beijing RoyQueen International**

**Erdos People's Hospital**

**Dongguan Citic New Field**

**Beijing Haidian District Fire Department**

**Shenzhen Blue-water Dragon-court Housing Estate**

**Xi'an Fire Department**

**Daya Bay Economic Development Zone Management Committee**

**Shenzhen Buji Lily Hotel**

**Shenzhen Astronautic Building**

**Xinjiang Urumuqi People's Bank of China**

**Beijing Konggan Institution**

**Beijing 307 Hospital**

**Lanzhou Tianzheng Real estate Zhongguang Building**

**Lanzhou Northwest Bookstore**

**Gansu Procuratorate**

**Gansu Civil Defense Building**

**Lanzhou University**

**Gansu Government Relatives Courtyard**

**深圳新新家园 (东部物业 )**

**深圳宏发领域中心大厦**

**北京朗琴国际**

**鄂尔多斯人民医院**

**东莞中信新天地**

**北京海淀区消防局**

**深圳碧水龙庭小区**

**西安消防局**

**大亚湾经济开发区管理委员会**

**深圳布吉百合酒店**

**深圳航天大厦**

**新疆乌鲁木齐人民银行**

**北京空干所**

**北京307医院**

**兰州市天正物业中广大厦**

**兰州西北书城**

**甘肃省检察院**

**甘肃省人防大厦**

**兰州大学**

**甘肃省政府家属院**

**深圳罗湖区和平广场**

**深圳罗湖茂业港岛中心**

## 案例展示

### CASE DEMONSTRATION

