

Battery Emulation Test System

Product Name : RPS

High Power Battery Emulation Test System
for inverter, traction motor and eAxe testing

*Eight configurations, covering a power range
from 100kW to 400kW*



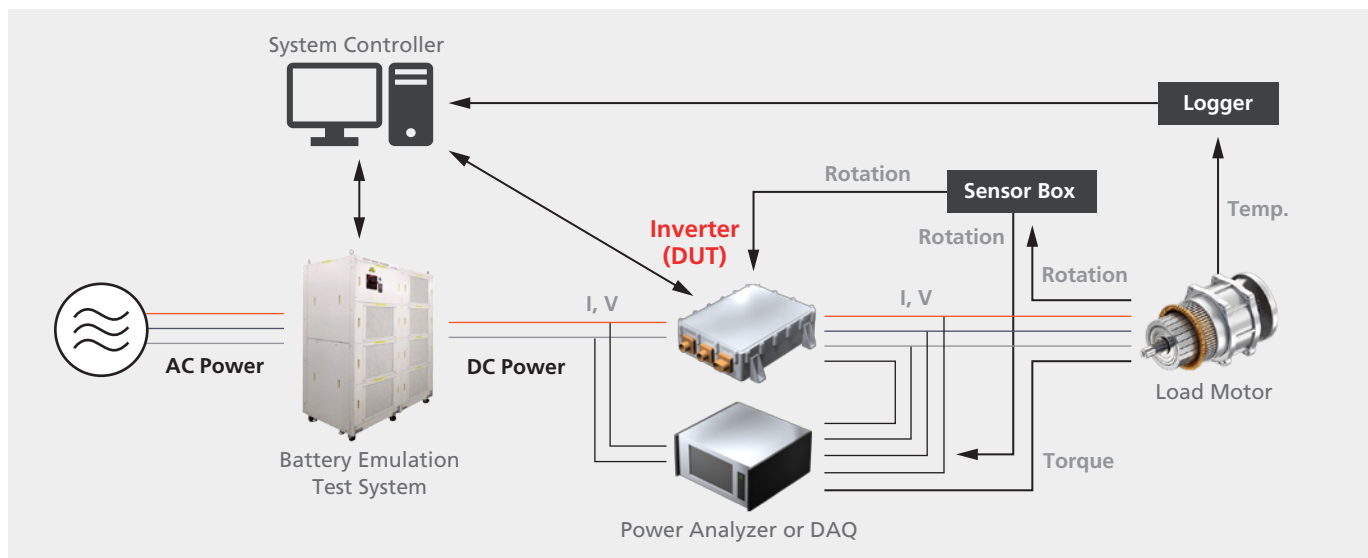
Empowering Your eMobility Testing in a Realistic Vehicle Environment

RPS provides high-precision voltage and current control, fast current response, and seamless power supply suitable for testing inverters, traction motors, and eAxe.



Use Case

- ▼ Test System supports testing under realistic driving conditions, with several control modes such as CC, CV and CP, as well as variable internal resistance function.



Specifications

- ▼ Variable voltage and current anywhere within the 400kW power envelope.

650V model

Rated output voltage : Max. $\pm$ 650V

Rated output current : Max. $\pm$ 1,200A

Rated output power : Max. $\pm$ 400kW

* See datasheet for detail.

1000V model

Rated output voltage : Max. $\pm$ 1,000V

Rated output current : Max. $\pm$ 600A

Rated output power : Max. $\pm$ 400kW

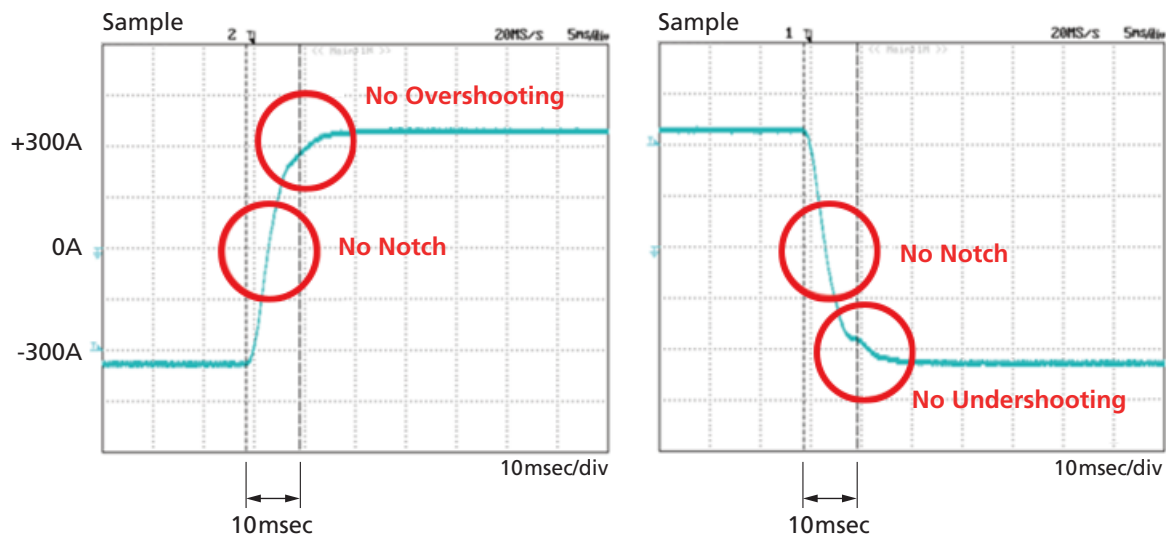
Features

- Emulates actual battery use scenarios while maintain stability. Fully independent of DUT load functions.



- Minimize stress on the DUT by eliminating current overshooting and undershooting.

- Current response ≤ 5 m sec.
- Seamless switching between sourcing and loading.
- Minimize stress on the DUT by eliminating current overshooting and undershooting.

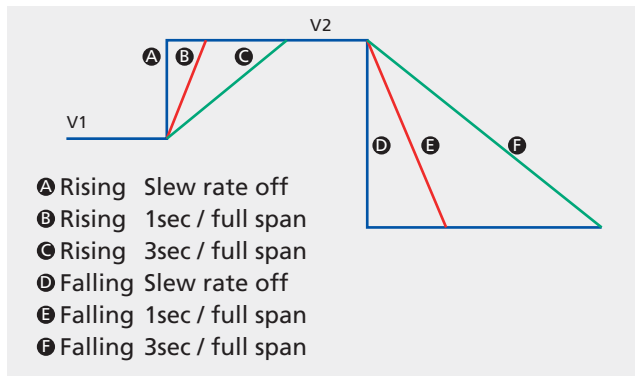


▼ Safety features

- Overvoltage, overcurrent, and overtemperature detection
- Earth leakage breaker
- Optional operational status light on top of machine
- Emergency Stop button

▼ Adjustable slew rates

Slew rate of output voltage and current can be set to minimize rush current. This function is adjustable for rising and falling voltages, currents.



▼ Sequential operation

Built in sequencer functionality.

▼ Large console panel

7-inch console panel display provides easy operation and comfortable visibility.

▼ High efficiency and low Noise

Achieves regenerative efficiency exceeding 90%.

▼ High stability

Accurate output characteristic and loss-evaluation independent of DUT load conditions.

▼ Fan noise control

Output power sensing automatically reduces fan RPM for lower output power.

▼ LAN connectivity for control and monitoring

Setting, Output control and Output monitoring are available from PC with LAN connection.

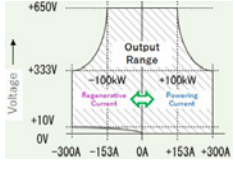
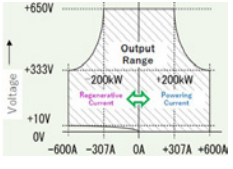
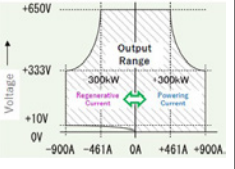
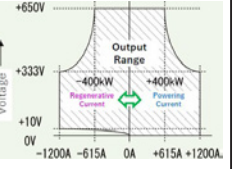
▼ External Interface

Interfaces such as Analog input to control machine, Contact Output, and Contact Input for E-stop are available.

▼ Battery Emulation Software (Option)

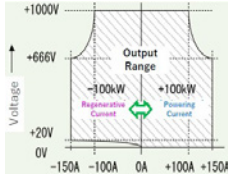
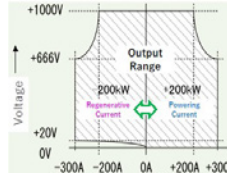
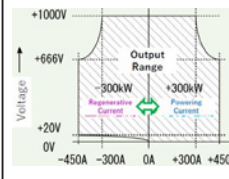
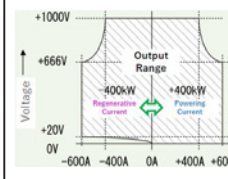
- Setting I-V characteristics based on SoC
- Configure equivalent circuits for secondary batteries

Data Sheet of RPS Battery Emulation Test System

Model			RPS650-300	RPS650-600	RPS650-900	RPS650-1200K
Rated Output			650V300A100kW	650V600A200kW	650V900A300kW	650V1200A400kW
Output Range						
note 1) Current will be limited by power limiter, if the power exceeds the rated power.						
note 2) Set current may not be sent without BIAS power option, if voltage of the regeneration side is less than 10V.						
Operation Mode			CV, CV(ΔR), CC, and CP			
Constant Voltage mode (CV)	Setting Range		+ 1.00V to +652.00V			
	Setting Accuracy		±0.1% of Rated Output Voltage			
	Output Limitation		Current Limitation (CL) and Power Limitation (CP)			
Internal Resistance mode at Constant	Setting Range		0.0000Ω to 1.0000Ω	0.0000Ω to 0.5000Ω	0.0000Ω to 0.3333Ω	0.0000Ω to 0.2666Ω
	Setting Accuracy		±(1% + 1.00mΩ) of setting value	±(1% + 0.50mΩ) of setting value	±(1% + 0.33mΩ) of setting value	±(1% + 0.27mΩ) of setting value
	Output Limitation		Current Limitation (CL) and Power Limitation (CP)			
Constant Current mode (CC)	Setting Range		0.00A to ±303.00A	0.00A to ±606.00A	0.00A to ±909.00A	0.00A to ±1,212.00A
	Setting Accuracy		±0.3% of Rated Output Current			
	Output Limitation		Voltage Limitation (CVH and CVL), Current Limitation (CL), and Power Limitation (CP)			
Constant Power mode (CP)	Setting Range		0.00kW to ± 101.00kW	0.00kW to ± 202.00kW	0.00kW to ± 303.00kW	0.00kW to ± 404.00kW
	Setting Accuracy		±1.0% of Rated Output Power			
	Output Limitation		Voltage Limitation (CVH and CVL), Current Limitation (CL), and Power Limitation (CP)			
Output Limitation	Voltage Limitation	Setting Range of Upper Voltage Limitation (CVH)	+ 1.00V to +652.00V			
		Setting Range of Lower Voltage Limitation (CVL)	0.00V to +651.00V			
		Setting Accuracy	±0.1% of Rated Output Voltage			
	Current Limitation	Setting Range of Current Limitation for powering (+CL)	+ 1.00A to + 303.00A	+ 1.00A to + 606.00A	+ 1.00A to + 909.00A	+ 1.00A to + 1,212.00A
		Setting Range of Current Limitation for regenerating (-CL)	- 303.00A to 1.00A	- 606.00A to 1.00A	- 909.00A to 1.00A	- 1,212.00A to 1.00A
		Setting Accuracy	±0.5% of Rated Output Current			
	Power Limitation	Setting Range of Power Limitation for powering (+PL)	+ 1.00kW to + 102.00kW	+ 1.00kW to + 204.00kW	+ 1.00kW to + 306.00kW	+ 1.00kW to + 408.00kW
		Setting Range of Power Limitation for regenerating (-PL)	- 102.00kW to 1.00kW	- 204.00kW to 1.00kW	- 306.00kW to 1.00kW	- 408.00kW to 1.00kW
		Setting Accuracy	±2.0% of Rated Output Power			
Protection Setting	Over Voltage (OVP)	Setting Range	+ 10.00V to +715.00V			
		Setting Accuracy	(0.1% of Rated Output Voltage) ± 2V			
	Current for Powering (OCP)	Setting Range	+ 3.20A to + 330.00A	+ 6.40A to + 660.00A	+ 9.60A to + 990.00A	+ 12.80A to + 1,320.00A
		Setting Accuracy	(± 0.3% of Rated Output Current) ± 1.8A	(± 0.3% of Rated Output Current) ± 3.6A	(± 0.3% of Rated Output Current) ± 5.4A	(± 0.3% of Rated Output Current) ± 7.2A
	Current for Regenerating (LCP)	Setting Range	- 3.20A to - 330.00A	- 6.40A to - 660.00A	- 9.60A to - 990.00A	- 12.80A to - 1,320.00A
		Setting Accuracy	(± 0.3% of Rated Output Current) ± 1.8A	(± 0.3% of Rated Output Current) ± 3.6A	(± 0.3% of Rated Output Current) ± 5.4A	(± 0.3% of Rated Output Current) ± 7.2A

Model			RPS650-300	RPS650-600	RPS650-900	RPS650-1200K
Current	Rising Time (CC mode): Time for load current to reach 10% to 90% of set value		Less than 5 ms			
Response Time	Falling Time (CC mode): Time for load current to reach 90% to 10% of set value		Less than 5 ms			
Powering / Regenerating Switching Function			Automatic Switching without any vulgate notches (Either powering or regenerating is determined by the polarity of load current.)			
Stability of Output Voltage	Line Regulation		Less than ± 0.05% of Rated Output Voltage against ± 10% fluctuation of input voltage			
	Load Regulation		Less than ± 0.1% of Rated Output Voltage against the fluctuation from 1% to 100% of Rated Output Current			
	Temperature Coefficient (Representative Value)		± 200pp,/°C			
	Transient	Voltage Fluctuation	Max. variation is less than ± 1% of Rated Output Voltage against the rapid change from 0% to ± 100% of Rated Load Current			
	Recovery	Recovery Time	100ms : Time to recovery less than ± 0.1% of Rated Output Voltage against the rapid change from 0% to ± 100% of Rated Load Current			
10ms : Time to recovery less than ± 2% of Rated Output Voltage against the rapid change from 0% to ± 100% of Rated Load Current						
Stability of Output Current	Line Regulation		Less than ± 0.05% of Rated Output Current against ± 10% fluctuation of input voltage			
	Load Regulation		Less than ± 0.1% of Rated Output Current against the fluctuation from +10V to +650V of Load Voltage			
	Temperature Coefficient (Representative Value)		± 200pp,/°C			
Ripple	CV mode		Less than 0.1% rms of Rated Output Voltage			
	CC mode		Less than 0.2% rms of Rated Output Current			
Measurement	Voltage Measurement	Measurement Range	- 1.00V to +656.50V			
		Measurement Accuracy	± 0.1% of Rated Output Voltage			
	Current Measurement	Measurement Range	- 303.00A to + 303.00A	- 606.00A to + 606.00A	- 909.00A to + 909.00A	- 1,212.00A to + 1,212.00A
		Measurement Accuracy	± 0.3% of Rated Output Current			
	Update interval on console		Approx. 1 sec.			
	Operating Hour Meter		Mounted on front panel (Time is counted interlocking with leakage breaker)			
Protection Function	Protection Function		Over-Current-Protection, Over-Voltage-Protection, Over-Power-Protection (Output Limitation), Over-Temperature-Protection (mounted on each power unit), and Leakage Breaker			
	Grid Connection Protection Function		Islanding prevention, OVR (Voltage-rise protection), UVR(Voltage-reduction protection), OFR(Frequency-rise protection), and UFR(Frequency-reduction protection)			
	Emergency Stop		RPS is stopped urgently by pressing e-stop button on the front panel.			
	Contact Interface	Input : 3 points (3b)	2 points to stop the RPS urgently by the contact-input and 1 point to stop the RPS urgently by the contact -input after discharging voltage of EUT.			
		Output : 2 points (2c)	Abnormalities are notified by output contact for a system failure.			
Operating Power Supply	Input Voltage		AC380V to AC460V, Three-phase, 50Hz/60Hz			
	Max. Current Consumption	For AC420V (For AC380V)	160A (170A)	310A (340A)	470A (520A)	620A (690A)
		Rated Current of leakage breaker	200A (250A flame)	400A (250A flame)	600A (630A flame)	800A (800A flame)
Operational Environment	Temperature		0°C to 104°F (Current Derating with 86% of Rated Current is required, if the ambient temperature exceeds 95°F.)			
	Humidity		20% to 85% without any freezing and condensation			
Other Functions	Power System		Combination of regenerative AC/DC converters and reversible switching DC/DC converters			
	Cooling System		Forced Cooling with FAN			
	Noise		Less than 80db measured at 1m distance from the front panel and 1m higher than the floor with frequency-weighting A and time-weighting FAST.			
	Calorific value (kcal/h)		Approx. 10,000 at 100kW powering	Approx. 20,000 at 200kW powering	Approx. 30,000 at 300kW powering	Approx. 40,000 at 400kW powering
	Color		Munsell 5Y7/1			
	Dimension (inch: W x H x D without protruding object)		60 x 77 x 33	60 x 77 x 33	89 x 77 x 33	138 x 77 x 33
	Weight		1,764 lbs	2,425 lbs	3,528 lbs	4,409 lbs
	External Control Function		Remote control is available via LAN communication with remote software			

Data Sheet of RPS Battery Emulation Test System

Model			RPS1000-150	RPS1000-300	RPS1000-450	RPS1000-600
Rated Output			1000V150A100kW	1000V300A200kW	1000V450A300kW	1000V600A400kW
Output Range						
note 1) Current will be limited by power limiter, if the power exceeds the rated power.						
note 2) Set current may not be sent without BIAS power option, if voltage of the regeneration side is less than 20V.						
Operation Mode			CV, CV(ΔR), CC, and CP			
Constant Voltage mode (CV)	Setting Range		+ 1.00V to +1,002.00V			
	Setting Accuracy		±0.1% of Rated Output Voltage			
	Output Limitation		Current Limitation (CL) and Power Limitation (CP)			
Internal Resistance mode at Constant	Setting Range		0.0000Ω to 2.0000Ω	0.0000Ω to 2.0000Ω	0.0000Ω to 1.0000Ω	0.0000Ω to 1.0000Ω
	Setting Accuracy		±(1% + 2.00mΩ) of setting value	±(1% + 2.00mΩ) of setting value	±(1% + 1.00mΩ) of setting value	±(1% + 1.00mΩ) of setting value
	Output Limitation		Current Limitation (CL) and Power Limitation (CP)			
Constant Current mode (CC)	Setting Range		0.00A to ±151.50A	0.00A to ±303.00A	0.00A to ±454.50A	0.00A to ±606.00A
	Setting Accuracy		±0.3% of Rated Output Current			
	Output Limitation		Voltage Limitation (CVH and CVL), Current Limitation (CL), and Power Limitation (CP)			
Constant Power mode (CP)	Setting Range		0.00kW to ± 101.00kW	0.00kW to ± 202.00kW	0.00kW to ± 303.00kW	0.00kW to ± 404.00kW
	Setting Accuracy		±1.0% of Rated Output Power			
	Output Limitation		Voltage Limitation (CVH and CVL), Current Limitation (CL), and Power Limitation (CP)			
Output Limitation	Voltage Limitation	Setting Range of Upper Voltage Limitation (CVH)	+ 1.00V to +1,002.00V			
		Setting Range of Lower Voltage Limitation (CVL)	0.00V to +1,001.00V			
		Setting Accuracy	±0.1% of Rated Output Voltage			
	Current Limitation	Setting Range of Current Limitation for powering (+CL)	+ 1.00A to + 151.50A	+ 1.00A to + 303.00A	+ 1.00A to + 454.50A	+ 1.00A to + 606.00A
		Setting Range of Current Limitation for regenerating (-CL)	- 151.50A to 1.00A	- 303.00A to 1.00A	- 454.50A to 1.00A	- 606.00A to 1.00A
		Setting Accuracy	±0.5% of Rated Output Current			
	Power Limitation	Setting Range of Power Limitation for powering (+PL)	+ 1.00kW to + 102.00kW	+ 1.00kW to + 204.00kW	+ 1.00kW to + 306.00kW	+ 1.00kW to + 408.00kW
		Setting Range of Power Limitation for regenerating (-PL)	- 102.00kW to 1.00kW	- 204.00kW to 1.00kW	- 306.00kW to 1.00kW	- 408.00kW to 1.00kW
		Setting Accuracy	±2.0% of Rated Output Power			
Protection Setting	Over Voltage (OVP)	Setting Range	+ 20.00V to +1,100.00V			
		Setting Accuracy	(0.1% of Rated Output Voltage) ± 3.6V			
	Current for Powering (OCP)	Setting Range	+ 3.20A to + 165.00A	+ 3.20A to + 330.00A	+ 6.40A to + 495.00A	+ 6.40A to + 660.00A
		Setting Accuracy	(± 0.3% of Rated Output Current) ± 1.8A	(± 0.3% of Rated Output Current) ± 1.8A	(± 0.3% of Rated Output Current) ± 3.6A	(± 0.3% of Rated Output Current) ± 3.6A
	Current for Regenerating (LCP)	Setting Range	- 3.20A to - 165.00A	- 3.20A to - 330.00A	- 6.40A to - 495.00A	- 6.40A to - 660.00A
		Setting Accuracy	(± 0.3% of Rated Output Current) ± 1.8A	(± 0.3% of Rated Output Current) ± 1.8A	(± 0.3% of Rated Output Current) ± 3.6A	(± 0.3% of Rated Output Current) ± 3.6A

Model			RPS1000-150	RPS1000-300	RPS1000-450	RPS1000-600
Current	Rising Time (CC mode): Time for load current to reach 10% to 90% of set value		Less than 5 ms			
Response Time	Falling Time (CC mode): Time for load current to reach 90% to 10% of set value		Less than 5 ms			
Powering / Regenerating Switching Function			Automatic Switching without any vulgate notches (Either powering or regenerating is determined by the polarity of load current.)			
Stability of Output Voltage	Line Regulation		Less than ± 0.05% of Rated Output Voltage against ± 10% fluctuation of input voltage			
	Load Regulation		Less than ± 0.1% of Rated Output Voltage against the fluctuation from 1% to 100% of Rated Output Current			
	Temperature Coefficient (Representative Value)		± 200pp,/°C			
	Transient	Voltage Fluctuation	Max. variation is less than ± 1% of Rated Output Voltage against the rapid change from 0% to ± 100% of Rated Load Current			
	Recovery	Recovery Time	100ms : Time to recovery less than ± 0.1% of Rated Output Voltage against the rapid change from 0% to ± 100% of Rated Load Current			
10ms : Time to recovery less than ± 2% of Rated Output Voltage against the rapid change from 0% to ± 100% of Rated Load Current						
Stability of Output Current	Line Regulation		Less than ± 0.05% of Rated Output Current against ± 10% fluctuation of input voltage			
	Load Regulation		Less than ± 0.1% of Rated Output Current against the fluctuation from +20V to + 1,000V of Load Voltage			
	Temperature Coefficient (Representative Value)		± 200pp,/°C			
Ripple	CV mode		Less than 0.1% rms of Rated Output Voltage			
	CC mode		Less than 0.2% rms of Rated Output Current			
Measurement	Voltage Measurement	Measurement Range	- 1.00V to + 1,010.00V			
		Measurement Accuracy	± 0.1% of Rated Output Voltage			
	Current Measurement	Measurement Range	- 151.50A to + 151.50A	- 303.00A to + 303.00A	- 454.50A to + 454.50A	- 606.00A to + 606.00A
		Measurement Accuracy	± 0.3% of Rated Output Current			
	Update interval on console		Approx. 1 sec.			
	Operating Hour Meter		Mounted on front panel (Time is counted interlocking with leakage breaker)			
Protection Function	Protection Function		Over-Current-Protection, Over-Voltage-Protection, Over-Power-Protection (Output Limitation), Over-Temperature-Protection (mounted on each power unit), and Leakage Breaker			
	Grid Connection Protection Function		Islanding prevention, OVR (Voltage-rise protection), UVR(Voltage-reduction protection), OFR(Frequency-rise protection), and UFR(Frequency-reduction protection)			
	Emergency Stop		RPS is stopped urgently by pressing e-stop button on the front panel.			
	Contact Interface	Input : 3 points (3b)	2 points to stop the RPS urgently by the contact-input and 1 point to stop the RPS urgently by the contact -input after discharging voltage of EUT.			
		Output : 2 points (2c)	Abnormalities are notified by output contact for a system failure.			
Operating Power Supply	Input Voltage		AC380V to AC460V, Three-phase, 50Hz/60Hz			
	Max. Current Consumption	For AC420V (For AC380V)	160A (170A)	310A (340A)	470A (520A)	620A (690A)
		Rated Current of leakage breaker	200A (250A flame)	400A (250A flame)	600A (630A flame)	800A (800A flame)
Operational Environment	Temperature		0°C to 104°F (Current Derating with 86% of Rated Current is required, if the ambient temperature exceeds 95°F.)			
	Humidity		20% to 85% without any freezing and condensation			
Other Functions	Power System		Combination of regenerative AC/DC converters and reversible switching DC/DC converters			
	Cooling System		Forced Cooling with FAN			
	Noise		Less than 80db measured at 1m distance from the front panel and 1m higher than the floor with frequency-weighting A and time-weighting FAST.			
	Calorific value (kcal/h)		Approx. 10,000 at 100kW powering	Approx. 20,000 at 200kW powering	Approx. 30,000 at 300kW powering	Approx. 40,000 at 400kW powering
	Color		Munsell 5Y7/1			
	Dimension (inch: W x H x D without protruding object)		60 x 77 x 33	60 x 77 x 33	89 x 77 x 33	138 x 77 x 33
	Weight		1,764 lbs	2,425 lbs	3,528 lbs	4,409 lbs
	External Control Function		Remote control is available via LAN communication with remote software			

TAKASAGO, LTD. reserves the right to modify the features and specifications in this brochure at any time without prior notice or obligation. For the most up-to-date information, please visit our website at www.takasago-ss.co.jp/en/.

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