



High-Efficiency, High-Capacity Switching Power Supply **PAT-T Series**

PAT20-400T (0 to 20 V/0 to 400 A) **NEW**

PAT40-200T (0 to 40 V/0 to 200 A)

PAT60-133T (0 to 60 V/0 to 133 A) **NEW**

Parallel operation of up to five units (40 kW)

Features a power factor correction circuit

Equipped with an RS-232C interface as standard

GPIB or USB interface can be equipped as a factory option

Tough & Eco

Environmentally Conscious, Energy-Saving, High-Capacity Power Supply



High-capacity

8kW

Power factor: 0.95

Features a power factor
correction circuit.

High-Efficiency, High-Capacity Switching Power Supply

PAT-T Series

Model		Rated power	Rated voltage	Rated current
PAT20-400T	NEW	8 kW	0 V ~ 20 V	0 A ~ 400 A
PAT40-200T		8 kW	0 V ~ 40 V	0 A ~ 200 A
PAT60-133T	NEW	8 kW	0 V ~ 60 V	0 A ~ 133 A

The PAT-T series is a constant voltage/constant current, auto-shifting, switching DC power supply. It features a soft switching system that offers greater efficiency and lower noise. At the same time, it makes full use of high-density packaging technology to reduce the unit's size and weight. The chassis is the standard rack width (430 mm), and is about 130 mm high and 550 mm deep. The output power is 8 kW. Compared to series regulated products of the same capacity, it is about 1/6 the volume and 1/7 the weight. While offering a high output of 8 kW despite its small cabinet size, it also features a "power factor correction circuit," thereby improving the power environment (suppresses harmonic currents) and also greatly contributing to "energy saving," as exemplified by its simplified and miniaturized power reception and distribution modules and overall lower power consumption.

Furthermore, an optimized heat radiation design will make operation guaranteed at ambient temperatures of up to 50°C. It can thus be deployed in demanding applications where it must provide full-load, continuous operation despite high ambient temperatures. The layout of the operation/display panel is simple and intuitive and has been designed with viewability and usability in mind. An RS-232C interface is provided as standard together with external analog control, monitor output, and

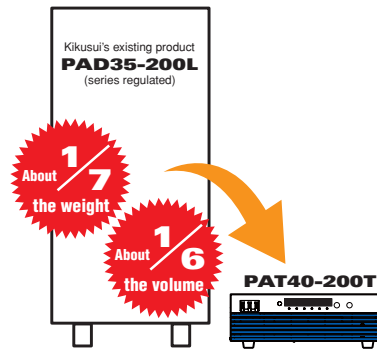
status output connectors, enabling control from an external computer or sequencer (USB and GPIB interfaces are optionally supported). The unit can either be used in a standalone configuration or can be incorporated into a test system.



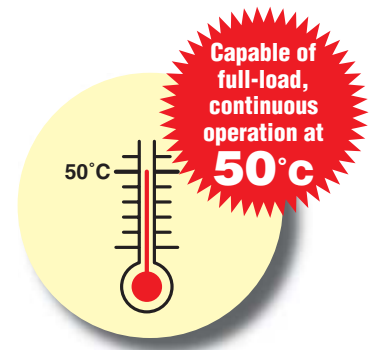
●Rear panel

Features

- Output capacity of 8 kW from a unit of standard rack width (430 mm), a height of about 130 mm, and a depth of about 550 mm.
- Incorporates a power factor correction circuit to improve the power environment and contribute to energy saving.
- Capable of full-load, continuous operation even at an ambient temperature of 50°C.
- High noise resistance
- Can be configured in parallel with a master/slave setup to supply up to 40 kW.



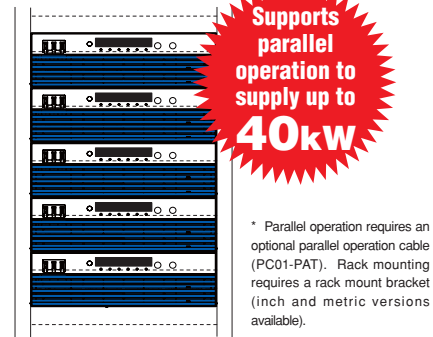
[Size comparison]



[Guaranteed operating temperature]

- Memory feature lets you store and recall three sets of voltage/current values.
- Eight protective features to guard against overvoltage, overcurrent, etc.
- Capable of external analog control, voltage/current monitor output, and status output.
- Enables setting of a delay time (0.1 to 10.0 seconds) from the time OUTPUT switch is turned on until actual output (output on/off delay function).
- Trigger function that has improved the degree of freedom of measurement timing.
- Capable of external analog control, monitor output, and status output.
- Equipped with an RS-232C interface as standard.
- GPIB or USB interface available as factory option.
- IEEE 488.2 and SCPI standard compliant interface commands.
- Controllable from Excel VBA and LabView, using a measuring instrument driver*.

* Downloadable free at Kikusui web site.

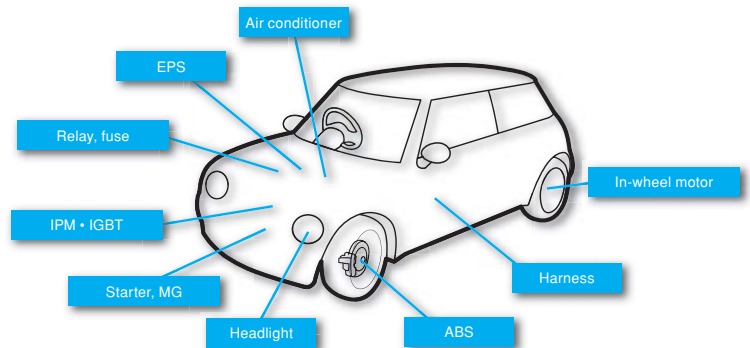


[Rack mounting example (inch rack)]

Applications

[Car electronics applications]

- Lifetime testing of headlights, etc
- Performance and endurance testing of inverters for use in high-capacity air conditioners and motors
- Performance and endurance testing of brushless motors for use in EPS and MG units
- Performance testing of IPM, IGBT, and other power modules
- Performance testing of starter motors



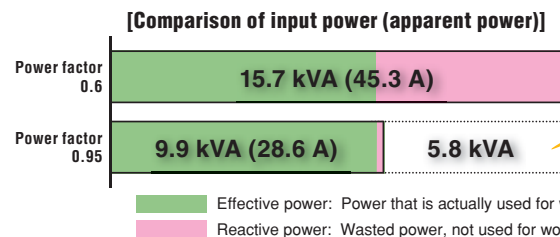
Advantages of the power factor correction circuit

The power factor (PF) is a value that indicates the efficiency of an alternating current circuit; it refers to the ratio of effective power to apparent power. A higher power factor indicates a greater power efficiency of the device (circuit), with the ideal being 1. A power factor correction circuit, when incorporated into the input section of a power circuit, compensates for the phase difference between the alternating voltage and current (the difference in waveform, which causes reactive power), thus improving the power use efficiency. Specific advantages include the following:

- (1) Reduces the reactive power, such that less power is wasted. This results in energy saving.
- (2) Reduces excess input current, so that the power reception and distribution modules can be simplified and miniaturized (such as circuit breakers).
- (3) Suppresses the peak current to reduce the power transmission loss in the power line.
- (4) Suppresses the harmonic currents that adversely affect the power environment (voltage drop and waveform distortion).
- (5) Reduces running costs (electricity charges) by suppressing power consumption.

CO₂ reduced

Input power reduced by about 40%



The above values are for when DC power, full-load operation is performed with an output of 40 V and 200 A, and an efficiency of 85%.

* The value in parentheses is the current value in that phase with three-phase, 200-V input.

Improving the power factor from 0.6 to 0.95 reduces the required input power by about 40%. Thus, a high power factor saves energy!

Promote energy saving

Miniaturize power reception and distribution modules

Reduce power transmission loss

Power factor improvement

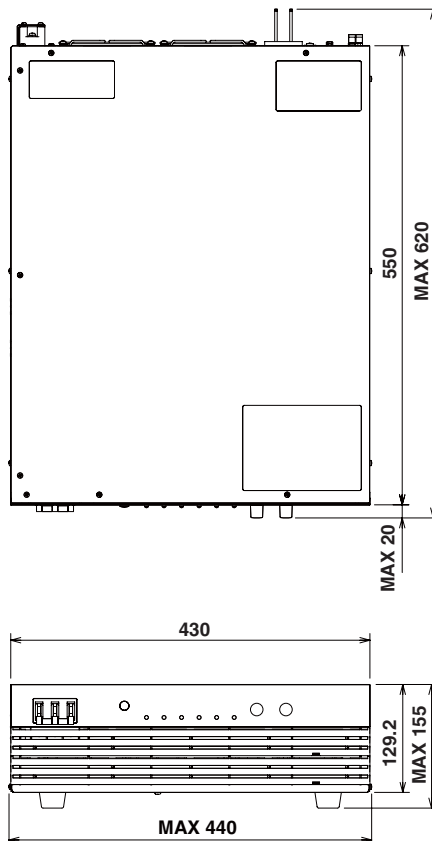
Improve power environment

Reduce running costs

Specifications

Item		PAT20-400T	PAT40-200T	PAT60-133T	
Input	Nominal input rated voltage	Three-phase 200 to 240 VAC, 50 ~ 60 Hz			
	Input voltage range/Input frequency range	180 V to 250 V / 47 Hz to 63 Hz			
	Efficiency	85% (min.) [at input voltage of 200 VAC and rated load]			
	Power factor	0.95 (typical) [at input voltage of 200 VAC and rated load]			
	Input current	32 A (max) [rated load]			
	Inrush current	100 A peak (max)			
	Input power	10 kVA (max)			
Output	Rating	Rated output power	8 kW		
		Rated output voltage	20.00 V	40.00 V	60.00 V
		Rated output current	400.0 A	200.0 A	133.0 A
	Constant voltage	Setting accuracy	0.2% of rating +50 mV		
		Max setting voltage	105% of rating		
		Line regulation	0.05% of rating +5 mV		
		Load regulation	0.1% of rating +5 mV		
		Transient response time	5 ms (at an instantaneous change in the load current from 50% to 100%)		
		Ripple noise	100 mVp-p	300 mVp-p	350 mVp-p
			If the measurement frequency band is 10 Hz to 20 MHz		
			10 mVrms	30 mVrms	30 mVrms
		If the measurement frequency band is 5 Hz to 1 MHz			
		Rise time	100 ms (rated load)/100 ms (no load)		
		Fall time	100 ms (rated load)/2000 ms (no load)		
	Temperature coefficient	100 ppm/°C (max) [with external analog control]			
	Constant current	Setting accuracy	0.5% of rating +50 mA		
		Max setting current	105% of rating		
		Line regulation	0.1% of rating +30 mA		
		Load regulation	0.2% of rating +30 mA		
		Ripple noise	500 mArms	400 mArms	350 mArms
			If the measurement frequency band is 5 Hz to 1 MHz		
	Temperature coefficient	200 ppm/°C (typ) [with external analog control]			
	OUTPUT ON/OFF delay	OFF, 0.1 to 10.0 s (resolution: 0.1 s)			
	Voltage display	Maximum display (error)	99.99: ±(0.2% of reading +5digits) at 23°C ±5°C		
	Current display	Maximum display (error)	999.9: ±(0.5% of reading +5digits) at 23°C ±5°C		
	Protection functions		Overvoltage protection (OVP) / Overcurrent protection (OCP) / Overheat protection (OHP) / Input open phase protection (PHASE) / Fan error protection (FAN) / Mis-connection protection (SENSE) / Breeder circuit overheat protection (BOHP) / Shutdown (SD)		
	External analog control	OUTPUT ON/OFF control, etc.	OUTPUT ON/OFF, SHUTDOWN		
Constant voltage, external voltage control		0% to 100% of the rated output voltage at 0 to 10 V			
Constant voltage, external resistance control		0% to 100% or 100% to 0% of the rated output voltage at 0 Ω to 10 kΩ			
Constant current, external voltage control		0% to 100% of rated output current at 0 to 10 V			
Constant current, external resistance control		0% to 100% or 100% to 0% of rated output current at 0 Ω to 10 kΩ			
Monitor output	Output voltage	10.00 V ±0.25 V at rated voltage output			
	Output current	0.00 V ±0.25 V at 0 V output			
		10.00 V ±0.25 V at rated current output			
Status output		0.00 V ±0.25 V at 0 A current			
Status output		OUT ON, CV, CC, ALARM, POWER ON, POWER OFF, insulated open collector			
Remote control		Equipped with RS-232C interface as standard. SCPI commands, up to 38,400 bps			
Operating temperature/humidity range		0°C to 50°C, 20% to 85% rh			
Storage temperature/humidity range		-25°C to 70°C, 90% rh or less (non-condensing)			
Dimensions (maximum)/weight		430 (440) W × 129.2 (155) H × 550 (620) D mm / Approx. 26 kg			
Weight		Approx. 26 kg			
		Approx. 24 kg			

Dimensions (mm)



Communication interface	
RS-232C	Conforms to EIA232D specifications. D-SUB 9-pin connector Baud rate: 1200, 2400, 4800, 9600, 19200, 38400 bps Data length: 7 or 8 bits, Stop bit length: 1 or 2 bits, Parity: None, flow control
GPIO *1	Conforms to IEEE Std 488.1-1987 specifications. SH, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1
USB *1	Conforms to USB 2.0 specifications. Communication speed: 12 Mbps (full speed) Conforms to USBTMC-USB488 device class specifications.
Common	Conforms to the messaging protocol IEEE Std 488.2-1992 and SCPI Specification 1999.0.

Options

Product name	Model	Specifications
Input power cable	AC8-4P4M-M6C	Three-phase, 4-conductor 8mm ² 4m M6
Parallel operation cable	PC01-PAT	Flat cable 250 mm
Rack mount bracket	KRB3-TOS	EIA (inch)
	KRB150-TOS	JIS (metric)
GPIO interface *2	Factory option	
USB interface *2	Factory option	

*1: When equipped with that option.

*2: Either one of them can be mounted to the power supply unit.



[Input power cable]



[Parallel operation cable]



KIKUSUI ELECTRONICS CORPORATION

1-1-3, Higashiyamata, Tsuzuki-ku, Yokohama, 224-0023, Japan
Phone: (+81) 45-593-7570, Facsimile: (+81) 45-593-7571, www.kikusui.co.jp

KIKUSUI AMERICA, INC. Toll Free 1-800-KIKUSUI www.kikusui.us



1744 Rollins Road, Burlingame, CA 94010
Phone : 650-259-5900 Facsimile : 650-259-5904

KIKUSUI TRADING (SHANGHAI) Co., Ltd. www.kikusui.cn



Room, D-01, 11F, Majesty Bld, No.138, Pudong Ave, Shanghai City
Phone : 021-5887-9067 Facsimile : 021-5887-9069

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