

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

8 kW type (eleven models) and 4 kW type (four models): fifteen models in total. Capable of operating continuously under full load even with an ambient temperature of 50°C. Up to five units can be operated in parallel (40 kW). Equipped with power factor correction circuit. High noise resistance. equipped with RS-232C interface equipped as standard. USB, GPIB, and LAN interfaces available (factory option). LAN interface applies to



Tough & Eco

Large-capacity, yet compact and tough. Large-capacity power supply that is environmentally friendly.





High-Efficiency, Large-Capacity **Switching Power Supply**



Two types, with rated power outputs of 8 kW and 4 kW: 15 models in total.

[8kW type]

Outline

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 greatly reduce the size and weight of the unit. It features an exceptional "power factor correction circuit" for its class, and improves the power supply environment (suppresses harmonic currents). It also greatly contributes to "energy saving," as exemplified by its simplified and miniaturized power reception and distribution modules, and lower power consumption. Furthermore, an optimized heat radiation design makes operation guaranteed at ambient temperatures of up to 50°C. It can thus be deployed in demanding usage environments where it must provide full-load, continuous operation despite high ambient temperatures.

Lineup

Rated Power	Model	Rated Voltage	Rated Current
	PAT20-400T*	0 V-20 V	0 A-400 A
	PAT30-266T	0 V-30 V	0 A-266 A
	PAT40-200T*	0 V-40 V	0 A-200 A
	PAT60-133T*	0 V-60 V	0 A-133 A
	PAT80-100T	0 V-80 V	0 A-100 A
8 kW	PAT160-50T*	0 V-160 V	0 A-50 A
	PAT250-32T [*] NEW	0 V-250 V	0 A-32 A
	PAT350-22.8T [*] NEW	0 V-350 V	0 A-22.8 A
	PAT500-16T [*] NEW	0 V-500 V	0 A-16 A
	PAT650-12.3T*	0 V-650 V	0 A-12.3 A
	PAT850-9.4T [*] NEW	0 V-850 V	0 A-9.4 A
	PAT20-200T	0 V-20 V	0 A-200 A
4 6101	PAT40-100T	0 V-40 V	0 A-100 A
4 K.VV	PAT60-67T	0 V-60 V	0 A-67 A
	PAT160-25T	0 V-160 V	0 A-25 A

*For those models with * mark, 3-phase 400V input is available.

Large capacity yet compact!

Neatly fits into smaller spaces!



Can use vertically, too! (Optional)



Easy to carry and can use on test table side. Compatible with all PAT-T series models. Comes with caster-equipped frame and handle kit.

PAT-T series

Option Vertical stand

*PAT-T series main unit is not included.

Offers compactness, high efficiency, and energy saving!

B

Turn or

Soft switching waveform (example)

Soft switching system

This power supply circuit system skillfully utilizes resonance to execute power device switching when the voltage or current is zero. Thus, in principle, the unit can operate without switching loss and without transient crossover of voltage and current. In general, switching that occurs when voltage is zero is called zero voltage switching (ZVS), while switching that occurs when current is zero is called zero current switching (ZCS). With conventional power supply circuits, problems such as increasing power loss and diminishing efficiency occur when switching operations increase in speed. A soft switching system, however, features a high-efficiency power supply circuit that reduces heat loss generated from the power supply and enables the miniaturization of circuits, not only making it possible to miniaturize equipment but to considerably minimize noise generated from the power supply.

Power factor correction circuit

The power factor (PF) is a value that indicates the efficiency of an alternating current circuit, and it refers to the ratio of the effective power to the apparent power. The closer the power factor is to 1, the better will be the efficiency of electric power energy usage in the equipment (circuit). Incorporating a power factor correction circuit into a power circuit's input unit will correct AC voltage and current phase differences (waveform deviations cause reactive power), and improve the efficiency of electric power usage. Specific advantages include the following:

- Promotes energy saving.
- •Downsizes power reception and distribution equipment.
- Improves the power supply environment.
- Reduces transmission loss.
- Reduces noise.



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!**

Turn on

Turn off

Hard switching waveform (example)

Voltage waveform — Current waveform

A: Surge voltage B: Surge current C: Tail current D: Switching loss

Turn off



The output voltage lineup ranges from 20 V to 850 V. The product can be used as a power supply for various evaluations and tests.



More convenient, easier to use, and safer

- 4 kW type can operate even with single-phase 200 volt input. (However, current is limited to about 75% of rated value.)
- Equipped with RS-232C interface as standard.
- Supports USB/GPIB/LAN interface. (Factory option)
- Controllable from Excel VBA and LabView with measuring instrument driver. Driver can be downloaded free at our web site.
- Capacity can be expanded by parallel operation (up to five units of the same model).
- Equipped with output ON/OFF delay function during sequence operations.

Up to five units (of the same model) possible

Up to five units, including the master unit, can be connected in parallel. Parallel operation is enabled using parallel operation cable (optional).



Memory function (three sets of voltage/current)

FPS

- Voltage/current monitor output
- Status signal output
- Remote sensing function
- Protective functions (shutdown, as well as protection against overvoltage, overcurrent, overheating, input phase interruption, fan malfunction, sensing, and bleeder circuit overheating)
- High noise resistance (for reassurance during car electronics testing)
- Good maintainability, including easy fan replacement

Smart rack system

This large-current model assembles multiple PAT-T series units with special rack parts.*For the 850V model, it supports up to 16kW,18,8A. Eleven types are available, with rated voltages of 20, 30, 40, 60, 80, 160, 250, 350, 500, 650, and 850 volts.

A total of eighty-two models are available, ranging from 16 kW to 40 kW.



* About the smart rack system, please consult us.

[Car electronics applications]

of inverters for use in high-capacity air conditioners and motors

brushless motors for use in EPS and

and other power modules

electrical components

MG units

8 kW Type Specifications

Item		PAT20-400T	PAT30-266T	PAT40-200T	PAT60-133T	PAT80-100T			
Nominal input rated voltage		Three-phase 200 to 240 VAC, 50-60 Hz							
Input voltage range/Input frequency range		180 V to 250 V / 47Hz to 63 Hz							
	Efficiency		85% (min) [at input voltage of 200 VAC and rated load]						
Input	Power fact	or	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)					
				10kVA (max)					
	<u> </u>	Rated output power	R kW						
-	Rating	Bated output voltage	20.00 V	30.00 V	40.00 V	60.0 V	80.0 V		
		Bated output current	400.0 A	266.0 A	200.0 A	133 0 A	100 0 A		
		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%)						
			100 m\/n-n	300 mVp-p	300 mVn-n	350 m\/p-p	350 m\/n-n		
	Constant		100 mvp-p	When the measu	rement frequency band is	10 Hz to 20 MHz	000 mvp-p		
	voltage	Ripple noise	10 m\/rmc	20 m\/rmc	20 mV/rmc	20 m\/rms	20 m\/rms		
			10 11101113	When the measure	urement frequency band i	s 5 Hz to 1 MHz	30 1111113		
Output		Paisa timo	when the measurement frequency band is 5 Hz to 1 MHz						
Output				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]						
		Setting accuracy	± (0.5% of rating +50 mA)						
		Max setting current	105% of rating						
	Constant	Line requlation	± (0.1% of rating +30 mA)						
	current	Load requlation	± (0.2% of rating +30 mA)						
		Ripple noise	500 mArms	400 mArms	400 mArms	350 mArms	300 mArms		
			When 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 Kerror Maximum display Error		99.99							
		± (0.2% of reading +5 digits) at 23°C ±5°C							
Current display Maximum display Error		999.9							
		± (0.5% of reading +5 digits) at 23°C ±5°C							
Protection function		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. Constant voltage, external voltage contro Constant voltage, external resistance contro Constant current, external voltage contro Constant current, external voltage contro		OUTPUT ON/OFF, SHUTDOWN							
		Constant voltage, external voltage control		0% to 100%	of the rated output voltage	e at 0 to 10 V			
		Constant voltage, external resistance control		0% to 100% or 100%	to 0% of the rated output v	oltage at 0 Ω to 10 k Ω			
		Constant current, external voltage control		0% to 100	% of tared output current a	at 0 to 10 V			
		Constant current, external resistance control		0% to 100% or 100%	6 to 0% of rated output cur	renn at 0 Ω to 10 k Ω			
Monitor output Output voltage Output current		Output valtage		10.00	V ±0.25 V at rated voltage	output			
		Output voltage	0.00 V ±0.25 V at 0 V output						
			10.00 V ±0.25 V at rated current 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)		ım)	430 (44	0)(16.93"(17.32")) W × 129	9.2 (155)(5.09''(6.10'')) H ×	550 (620)(21.65"(24.41"))) D mm		
Weight		Approx. 26 kg (57.32 lb) Approx. 27 kg (59.52 lb) Approx. 25 kg (55.12 lb) Approx. 24 kg (52.91 lb)							

PAT-T series

8 kW Type Specifications

Item		PAT160-50T	PAT250-32T	PAT350-22.8T	PAT500-16T	PAT650-12.3T	PAT850-9.4T			
Nominal input rated voltage		Three-phase 200 to 240 VAC, 50-60 Hz								
Input voltage range/Input frequency range		180 V to 250 V / 47Hz to 63 Hz								
	Efficiency		85% (min) [at input voltage of 200 VAC and rated load]							
Input Power facto		or	0.95 (typical) [at input voltage of 200 VAC and rated load]							
	Input current		32 A (max) [rated load]							
					100 A pe	ak (max)				
	Input powe	r			10kVA	(max)				
	Rated output power		8 kW							
	Rating	Rated output voltage	160.0 V	250.0 V	350.0 V	500.0 V	650.0 V	850.0 V		
	Ŭ	Rated output current	50.0 A	32.0 A	22.8 A	16.0 A	12.3 A	9.4 A		
		Setting accuracy			± (0.2% of ra	ating +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	I UII VIII I UIII I I VIII I UIII I I I							
			350 mVp-p	450 m\/n-n	450 mVn-n	600 mVp-p	600 mVp-p	600 mVn-n		
	voltage		coo myp p	When the	e measurement frequ	iency band is 10 Hz t	0.20 MHz	oco mp p		
		Ripple noise	20 m\/rmc	50 m\/rmc	50 m\/rmc	100 m\/rms	100 m\/rmc	100 m\/rmc		
Output			30 111/1115	Whon	bo mossuromont from	woney band is 5 Hz t		100 11111115		
Output		Paiaa tima		WIGH	100 mp (rotod loog		0 1 10112			
			100 mg (rated load)	100 ms (rated load)/100 ms (no load)						
			200 ms (rated load)/2000 ms (no load) 200 ms (no load)							
			100 ppm/°C (max) [with external analog control]							
		Setting accuracy	± (U.5% of rating +50 mA) ± (1% of rating +100 mA)							
		Max setting current	105% of rating							
	Constant	Line requiation	± (0.1% of rating +30 mA)							
	current	Load requiation	± (0.2% of rating +30 mA)							
		Ripple noise	200 mArms	200 mArms	200 mArms	200 mArms	150 mArms	120 mArms		
			200 ppm//C (tup) [with sufarral apples carter]							
			OFF 0.1 to 10.0 s (resolution: 0.1 s)							
OUTPUT ON/OFF delay		999.9								
Voltage display		± (0.2% of reading +5 dioits) at 23°C +5°C								
Error		Error	± (0.2% of reading +5 digits) at 23°C ±5°C							
Current display		999.99 1 (0.5% of reading to 5 divide) of 200 or 50								
Error		\pm (0.5% of reading +5 digits) at 23°C ±5°C								
Protection function		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 External analog Constant voltage, external voltage control Constant voltage, external voltage control Constant current, external voltage cont Constant current, external resistance cont Constant current, external current current, external current curren		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 k Ω			
		Constant current, external voltage control		0	% to 100% of tared ou	tput current at 0 to 1	0 V			
		Constant current, external resistance control		0% to 100%	or 100% to 0% of ra	ted output currenn at	0 Ω to 10 kΩ			
Monitor output Outpu		Output voltage			10.00 V ±0.25 V at	rated voltage output				
		Output voltage			0.00 V ±0.25	V at 0 V output				
					10.00 V ±0.25 V at	rated current output				
		Output current			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)		430 (440)(16.93"(17.32")) W × 129.2 (155)(5.09"(6.10")) H × 550 (620)(21.65"(24.41")) D mm					mm			
Weight		Approx. 24 kg (52.91 lb)		Approx. 23 kg (50.71 l	b)	Approx. 22 kg (48.50 lb)	Approx. 23 kg (50.71 lb)			

•Rear panel (8 kW type PAT40-200T rear panel)





4 kW Type Specifications

li e en		DATOO OOOT	DAT40 100T	DATCO CTT	DATION OFT				
Item		PA120-2001	PA140-1001	PA160-671	PAT 160-251				
Nominal input rated voltage		Single-phase/three-phase 200 to 240 VAC, 50-60 Hz				4 kW			
Input voltage		ge range/input frequency range	180 V to 250 V / 4/ Hz to 63 Hz				type can		
Innut	Dewerfeet		84% (11111)	operate with					
input	Fowerraci	01	Cinale aboos		(three phase 17 A (max))		single-phase 200		
	Input current		Single-phase	VUIL IIIµUL.					
			Single phase	50 A pea	(three phase E k)/A (max)	[at rated load]	limited to about		
	input powe		Single-phase	+ KVA (IIIax) [at 5 KW IUau]	/Intee-phase 5 kVA (max)		75% of rated value.		
	Poting	Reted output voltage	20.00.1/	4 6	60.00.V	160.0.1/			
	nating	Rated output voltage	20.00 V	40.00 V	60.00 V	160.0 V	_		
		Rated output current	200.0 A	100.0 A	67.00 A	25.00 A	_		
		Max potting voltage		± (0.2% 011a	f roting				
		Max setting voltage		_					
				± (0.05% of rating +5 mV)					
		Load requiation		± (0.1% Of ra	ating +5 mV)	100%)	_		
		Transient response time	5 ms (a	_					
	Constant voltage		IUU mvp-p	300m vp-p	350 mvp-p	350 mvp-p	_		
		Ripple noise	40 mm	en the measurement frequ	ency band is 10 Hz to 20	0.0	_		
Output			IU mvrms	30 mvrms	30 mvrms	30 mvrms	_		
Output		Deire time	VV	nen tre measurement freq	UPICY Dand IS 5 HZ to 1 M	IHZ	_		
		Raise time		100 ms (rated load	(2000 ms (no load)		_		
				100 ms (rated load)			_		
				100 ppm/ C (max) [with	external analog control		_		
		Setting accuracy	1050/	_					
		Max setting current	105% of rating × /	_					
	Constant			_					
	current	Load requiation	100 m 4 rm a	± (0.2% of ra	ting +30 mA)	000 m 4 rms	_		
		Ripple noise	400 marms	300 marms	250 MARINS	200 marms	_		
			VVI	_					
				_					
	0011010	Maximum display		_					
Voltage	display	Frror		+ (0.2% of reading +	5 digits) at 23°C +5°C	555.5	_		
		Maximum display	90	± (0.2 % of reading +	aq	99	_		
Current	display	Fror		_					
			Overvoltage protect	-					
Protection function		Input or Mis connection protect							
		Mis-connection protect	-						
External analog control Constant voltage, external voltage control Constant voltage, external voltage control Constant current, external voltage control Constant current, external voltage control			_						
		Constant voltage, external resistance control	0% to 10	0% or 100% to 0% of the r	ated output voltage at 0 C	0 to 10 k0	-		
		Constant current external voltage control	0 /0 10 10	0% to 100% of tared ou	tout current at 0 to 10 V		_		
		0% to 1	_						
		10 00 V +0.25 V at rated voltage output				_			
Monitor output Output voltage Output current		Output voltage		_					
				10 00 V +0 25 V at r	rated current output		_		
		Output current		0.00 V ±0.25 V	at 0 A current		-		
Status outout		OUT ON CV CC ALARM POWER ON POWER OFF insulated open collector				1			
Remote control		Equipped with RS-232C interface as standard. SCPI commands up to 38 400 bos				-			
Operating temperature/humidity range		0°C to 50°C 20% to 85% rh				1			
Storage temperature/humidity range		-25°C to 70°C, 90% rh or less (non-condensing)				-			
Dimensions (maximum)		430 (440)(16.93"(17.32")) W x 129.2 (155)(5.09"(6.10")) H x 550 (620)(21.65"(24.41")) D mm				1			
Weight		Approx, 20 kg(44 09 lb)	Approx. 19 kg(41 89 lb)	Annrox 18	kg(39.68 lb)	1			
Toght		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	, approx. 10					

	Communication Interface (Each Model is the Same)
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
GPIB*	Conforms to IEEE Std 488.1-1987 specifications. SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1
USB*	Conforms to USB2.0 specifications. Communication speed: 12 Mbps (full speed) Conforms to USBTMC-USB488 device class specifications.
LAN <u></u>	Conforms to the protocol VXI-11 IEEE 802.3 100Base-TX/10Base-T Ethernet IPv4, RJ-45 connector
Common	Conforms to the messaging protocol IEEE Std 488.2-1992, SCPI Specification 1999.0

*Only one of these can be built in the power supply unit optionally.

Note: An input power cable is not included with the PAT-T series. Customers should either provide an input cable themselves or request an input cable (AC8-4P4M-M6C) sold optionally by Kikusui.

PAT-T series

Options

Communication interface (factory option) * GPIB / USB / LAN



*Only one of these can be built in the power supply unit optionally.

Command supports SCPI in addition to the IEEE 488.2 standard. Also, utilization of a measuring instrument driver (which can be downloaded at our web site) enables controlling with Excel VBA and LabView, and sequence

control with "Wavy for PAT" sequence creation software is also possible. Furthermore, The LAN interface applies to the LXI(LAN eXtention for Instrumentation). If a LAN interface is used, it is possible to control and monitor the power supply from a browser.

Input power cable

AC8-4P4M-M6C

(Three-phase, four-conductor,

8 mm², 4 m, M6)



Parallel operation cable

(Flat cable: 250 mm)

Power switch guard
 OP01-PAT

PC01-PAT

"Wavy" sequence creation software Wavy for PAT-T

This software is used to support sequence creation and execution with a DC power supply. You can use the Wavy to create and edit sequenses with a mouse.





Distributor:





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