P A T - T S E R I E S

High-Efficiency, Large-Capacity Switching Power Supply

PAT-T Series

8 kW type (13 models) and 4 kW type (4 models): 17 models in total.
PAT-T Series Smart Rack System 200 V/400 V Input Type: 164 models in total.
Ambient temperature of 50°C under full load continuous operation (Smart Rack System: 40°C)
Parallel operation up to five units for increased power. (40 kW)
Equipped with power factor correction circuit.
High noise resistance.
RS232C standard digital interface.
USB, GPIB, and LAN optional digital interfaces.
LXI compliant LAN communication interface.

KIKUSUI

High-capacity, compact, durable and environmentally friendly.

[Guaranteed operating temperature]
*Smart Rack System : 40°C

Ambient temperature of 50°C under full load continuous operation

*Max. dimensions ( )

Weight: Approx. 25 kg (55.12 lb) (PAT40-200T)

High-Efficiency, Large-Capacity Switching Power Supply

PAT-T SERIES

Maximum power output 8 kW [8 kW type]

Available in 2 types, with rated power outputs of 8 kW and 4 kW: 17 models in total.

Outline

The PAT-T Series is a CV/CC auto-shifting switching DC power supply featuring excellent efficiency and low noise due to a soft switching system design. The PAT-T series is equipped with state-of-the-art high-density packaging technology allowing for extremely high power capacity with a vastly reduce chassis size and weight. A built-in "power factor correction circuit" greatly reduces noise while supressing harmonic currents for an optimal electronic test environment. Power reception and distribution modules have been simplified resulting in lower power consumption and an overall decreased cost of ownership. Guaranteed continuous operation at ambient temperatures as high as 50°C make the PAT-T the perfect power supplies for extremely demanding environments even under full-load. The PAT-T is equipped with an intuitive, user-friendly display panel supporting standard RS232C digital interface as well as external analog control, monitor output and status output connectors allowing for control via computer or sequencer. USB, GPIB, or LAN (LXI) digital interfaces are also available as a factory option. The PAT-T power supply is an extremely versatile test instrument easily incorporated into any test system or used stand-alone.

Lineup

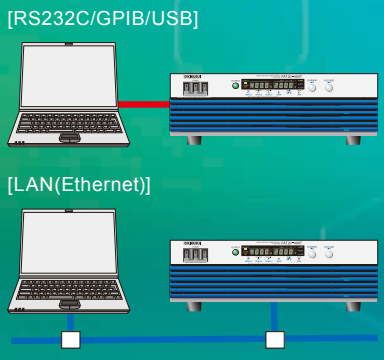
Rated Power	Model	Rated Voltage	Rated Current
8 kW*	PAT20-400T	0 V to 20 V	0 A to 400 A
	PAT30-266T	0 V to 30 V	0 A to 266 A
	PAT40-200T	0 V to 40 V	0 A to 200 A
	PAT60-133T	0 V to 60 V	0 A to 133 A
	PAT80-100T	0 V to 80 V	0 A to 100 A
	PAT160-50T	0 V to 160 V	0 A to 50 A
	PAT250-32T	0 V to 250 V	0 A to 32 A
	PAT350-22.8T	0 V to 350 V	0 A to 22.8 A
	PAT500-16T	0 V to 500 V	0 A to 16 A
	PAT650-12.3T	0 V to 650 V	0 A to 12.3 A
	PAT850-9.4T	0 V to 850 V	0 A to 9.4 A
	PAT1000-8T (SPEC21163)	0 V to 1000 V	0 A to 8.0 A
	PAT1500-5.3T (SPEC21164)	0 V to 1500 V	0 A to 5.3 A
4 kW	PAT20-200T	0 V to 20 V	0 A to 200 A
	PAT40-100T	0 V to 40 V	0 A to 100 A
	PAT60-67T	0 V to 60 V	0 A to 67 A
	PAT160-25T	0 V to 160 V	0 A to 25 A

*3-phase 400 V/460 V available for 8 kW type models.

RS232C standard digital interface, USB, GPIB and LAN(LXI compliant) options available.

Communication interface

Commands are compatible with both SCPI and IEEE 488.2 standards. Free measurement instrument drivers (available on website) are available for control via Excel VBA and LabView alongside proprietary Kikusui sequence creation software, "Wavy for PAT-T," allowing for easy creation and editing of customization of user-defined waveforms. The digital LAN interface is compliant with LXI (LAN eXtentions for Instrumentation), meaning that the PAT-T can easily be controlled and monitored from a remote browser.



*USB, GPIB, and LAN (LXI compliant) factory option.
*One optional interface per power supply unit.

Options

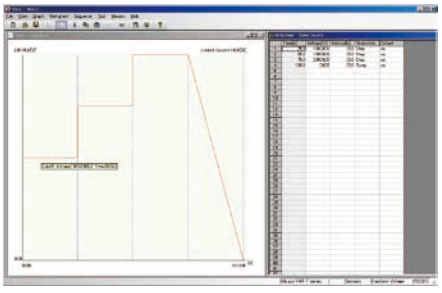
"Wavy" sequence creation software

Wavy series

Wavy for PAT-T

[Operating environment] Windows Vista/Windows 7/Windows 8/Windows 10
*For details, please refer to our product catalog and web site .

Waveform generation software further enhancing the PAT-T Series potential.
Wavy software allows the user to easily create and edit sequences with the click of a mouse.



- Sequence creation and test condition data editing made easy.
- Test data can be stored as a data file for easy management of standard test conditions.
- Easy monitoring of test sequence progress on graph alongside real-time setting values.
- Monitor graph plots values during sequence execution for intuitive monitoring of actual output power.
- Capable of saving acquired monitor data as test results.
- "Waveform image" window has been added for easy monitoring of AC signals.
- Arbitrary waveforms can be easily created and edited.
  Once created, arbitrary waveforms can immediately be written and output.
- Easily select and de-select steps within sequence. The pause function, trigger function, AC waveform and other functions allow for maximum customization.

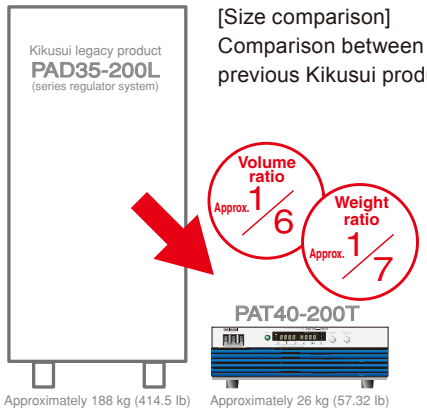
Download !

Free trial available on our website!!
http://www.kikusui.co.jp/en/download/index.html

TOUGH & ECO-FRIENDLY

High Power in Compact Chassis!

Save precious testing laboratory space!



[Size comparison]
Comparison between PAT-T (8 kW) and previous Kikusui product (7 kW)

Optional vertical stand!

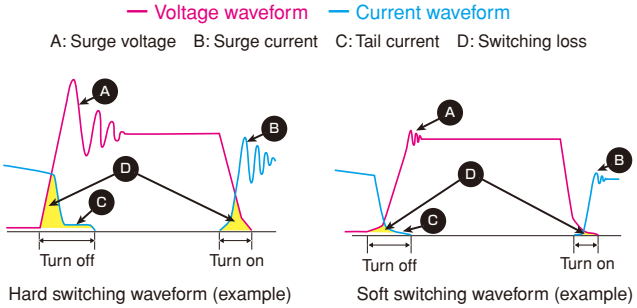
Optional vertical stand for easy transportation and table side operation. Compatible with all PAT-T series models. Caster-equipped frame and handle kit included.

Option
■ Vertical stand
●VS01
*PAT-T series main unit is not included.

Offers Compactness, High Efficiency, and Energy Saving!

Soft switching system

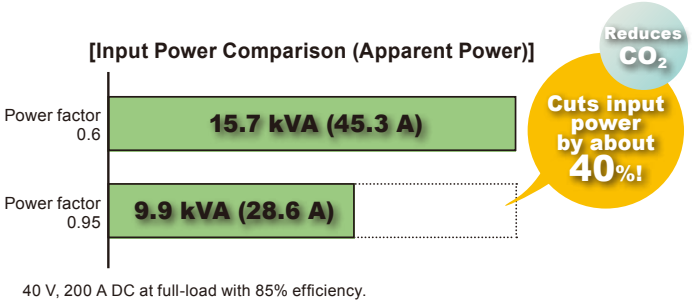
The PAT-T power supply circuit system skillfully utilizes resonance when executing power device switching when the voltage or current is at zero. This allows the unit to operate without switching loss or transient crossover of voltage and current. Switching that occurs at 0V is known as "zero voltage switching" (ZVS), while switching at zero current is referred to as "zero current switching" (ZCS). With conventional power supply circuits, problems such as increased power loss and diminishing efficiency occur when switching speed increases. However, a soft-switching system utilizes highly efficient power supply circuits that reduce heat loss and allow for for smaller circuitry, resulting in compact chassis size as well as minimal noise generation.



Power factor correction circuit

The power factor (PF) values indicates the efficiency of an AC circuit, referring to the ratio of effective power to apparent power. The closer the power factor is to 1, the more efficient the equipment (circuit) is in its electrical power usage. Incorporating a power factor correction circuit corrects AC voltage and current phase differences (waveform deviations causing reactive power), improving electrical power efficiency. Specific advantages include the following:

- Increased energy efficiency.
- Downsizing of power reception and distribution modules.
- Improved power supply environment.
- Reduces transmission loss.
- Vastly reduces noise emissions.



40 V, 200 A DC at full-load with 85% efficiency.

Improving the power factor from 0.6 to 0.95 reduces required input power by approximately 40%. A high power factor **saves energy!**

Increased Capacity via Parallel Operation: Max. 40 kW, 2000 A

Parallel operation up to five units of the same model!

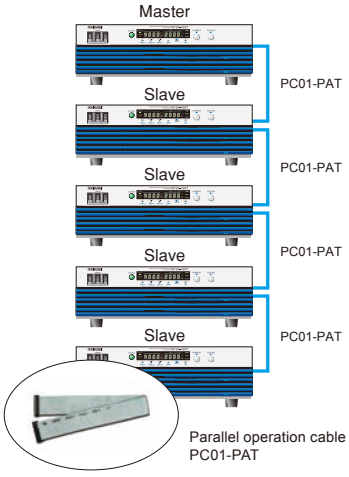
Up to five units (two units for PAT850-9.4T, PAT1000-8T and PAT1500-5.3T) can be configured in a master-slave parallel connection. This allows you to control the whole system via the master unit front panel with full display of the current sum (max. output current: rated output current of single unit x number of parallel units). Furthermore, the output current of each slave unit can be monitored by pressing the STORE button of each slave unit*. For parallel connection, parallel operation cable PC01-PAT is required for each slave units.

*Not available with 8 kW-type 400 V input models (20 V, 40 V, 60 V, and 160 V types) and 4 kW types.

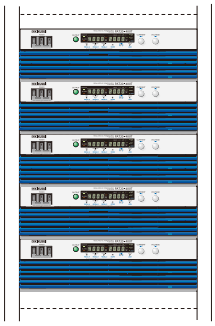
Series operation up to two units of the same model!

Up to two units can be connected in series for 8 kW (PAT20-400T, PAT30-266T, PAT40-200T, PAT60-133T, PAT80-100T, and PAT160-50T) and 4 kW types. However, master-slave operation is not supported. The sum of the output voltage between the two units is supplied to the load.

Parallel operation with up to five units (same model) possible



Efficient rack-mounting possible with air exhausts on front and rear panels.

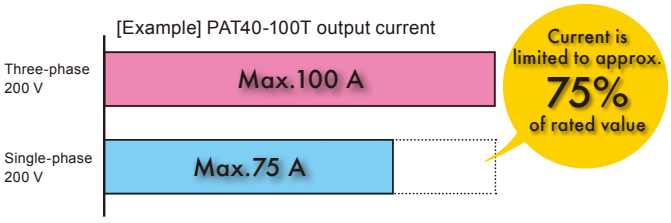


Rack assembly example (rack in inches)

Convenient, Intuitive, and Safe

4 kW types operable with single-phase 200 V input.

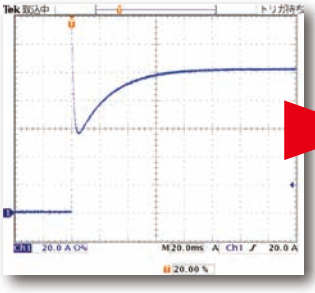
The current is limited to approximately 75% of the rated value with a power limit of 3 kW.



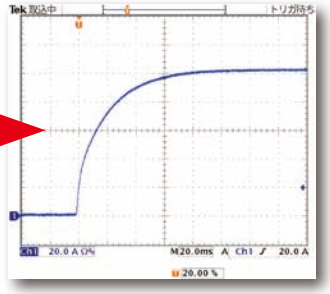
CV, CC priority starting function*

The PAT-T can be set to start up as either a constant voltage (CV) power supply or constant current (CC) power supply when the output is turned ON. CV priority mode is used during constant voltage, while CC priority mode is used during constant current for smooth startup without overshoot.

■Output current rise waveform comparison during constant current operation



▲CV Priority Mode Setting



▲CC Priority Mode Setting

External analog control function

Output voltage can be controlled by an external voltage (Vext) of 0 V to 10 V or an external resistance (Rext) of 0 kΩ to 10 kΩ. FAST mode* allows for direct control of external voltage (without passing through CPU), removing any delay between Vext and changes in output voltage.

Other functions

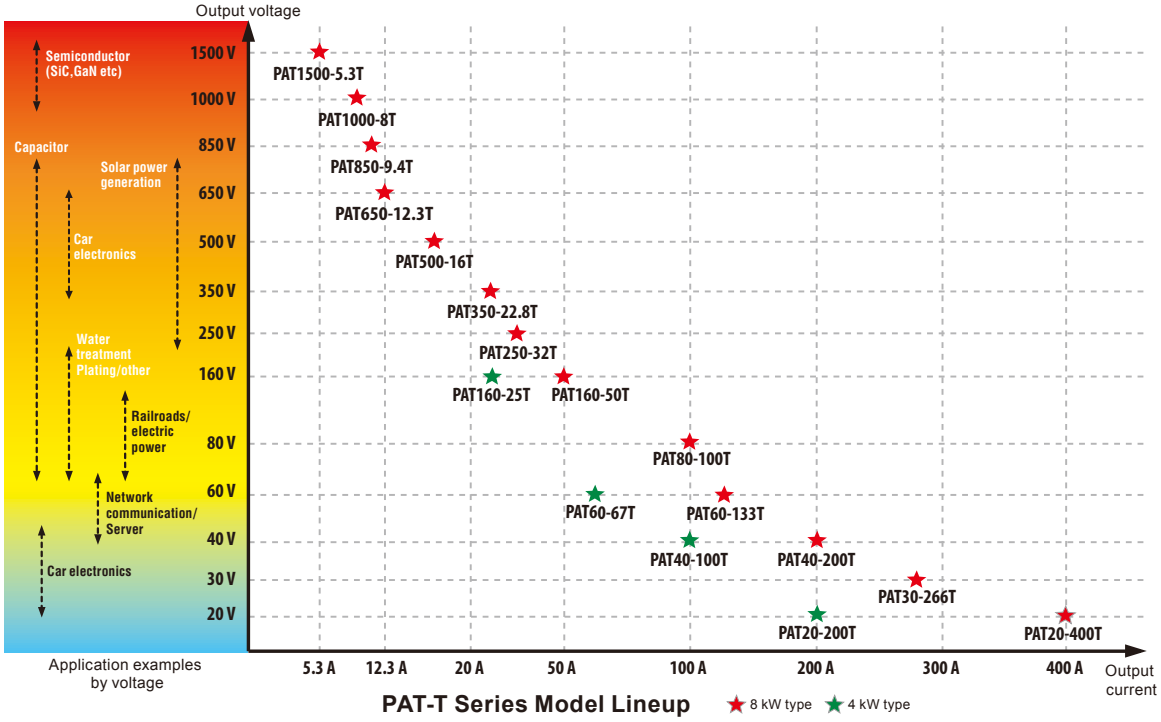
- RS232C standard digital interface
- USB/GPIB/LAN optional digital interfaces
- Reliable output ON/OFF delay function for sequence output
- Memory function (three sets of voltage/current)
- Voltage/current monitor output
- Status signal output
- Remote sensing function
- Protection functions
  Protections against shutdown, overvoltage, overcurrent, overheating, input phase interruption, fan malfunction, sensing, and bleeder circuit overheating available
- High noise resistance
  (for reassurance during car electronics testing)
- Easy maintenance with quick fan replacement

*Not available with 8 kW-type 400 V input models (20 V, 40 V, 60 V, and 160 V types) and 4 kW types.

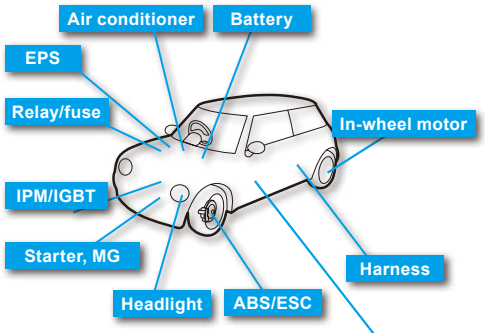
APPLICATION

Purpose and Application Examples/Various Functions

Output voltage lineup ranging from 20 V to 1500 V.
Highly versatile power supply for a wide range of tests and evaluations.



Car electronics applications

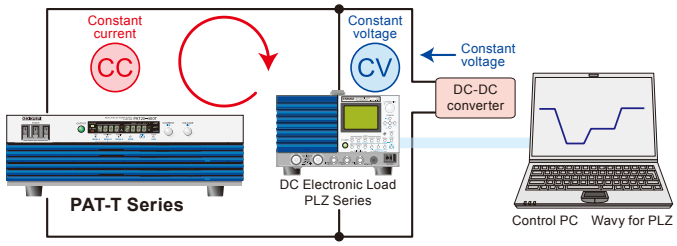


- Automotive headlight lifetime testing
- High-capacity air conditioner inverters and motor performance/ endurance testing
- Brushless motor (for EPS and MG unit) performance/endurance testing
- IPM, IGBT and other power module performance testing
- Starter motor performance evaluation
- EV/HEV electrical component performance testing

DC-DC converter and related devices

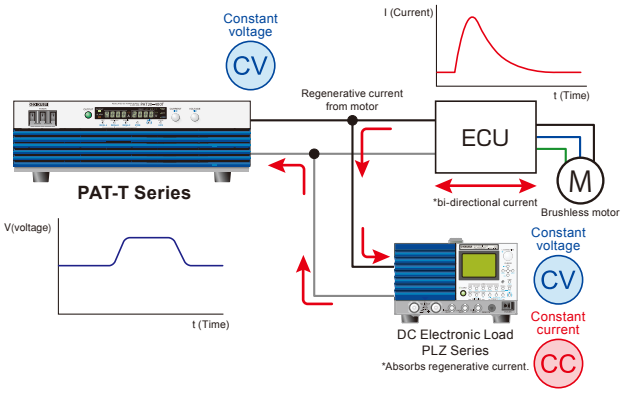
● Simple Voltage Variation Tests

Medium-speed voltage variation in a battery can be simulated by connecting a high voltage DC power supply and DC electronic load in parallel. Voltage variation waveforms can be created with the optional Wavy sequence creation software.



● Brushless Motor Surge Protection

Protect the power supply and ECU from regenerative current from the motor during brushless motor performance tests with a DC electronic load.

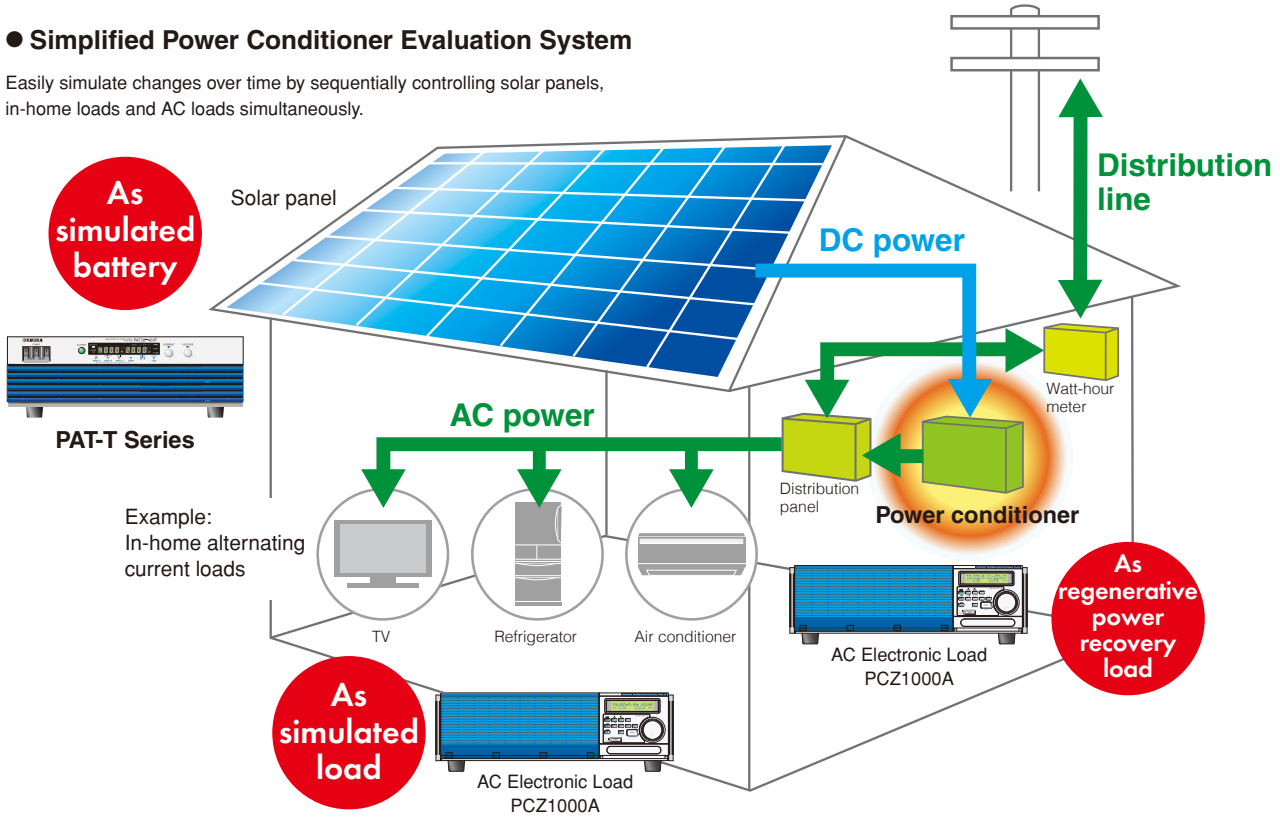


Application Examples

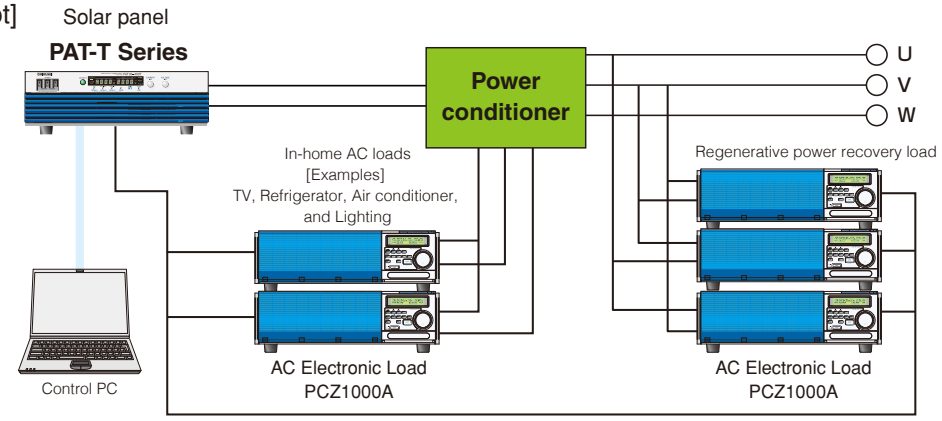
Solar Power Generation

● Simplified Power Conditioner Evaluation System

Easily simulate changes over time by sequentially controlling solar panels, in-home loads and AC loads simultaneously.



[System concept]



AC Electronic Load

PCZ1000A

RS-232C
DRIVERS
GPIB
OPTION

Dimensions/Weight

430(16.93″)W × 128(5.04″)H × 400(15.75″)Dmm/22 kg(48.5 lbs)

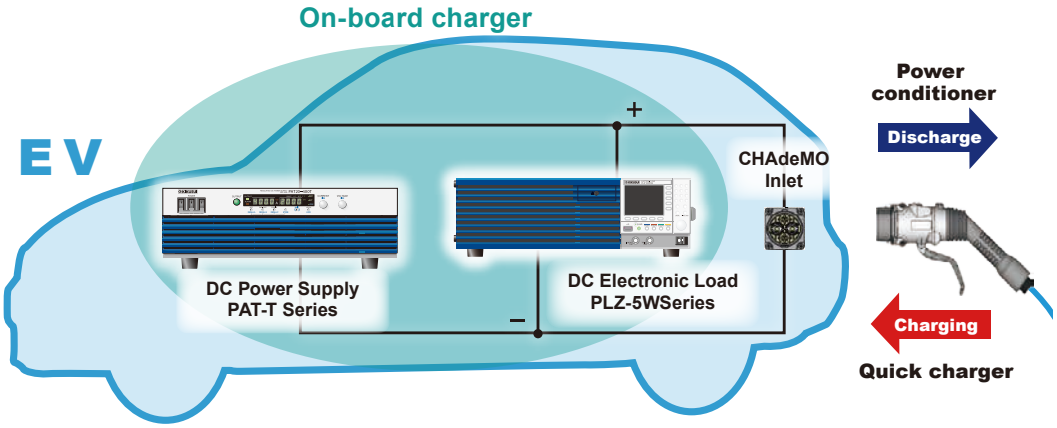
Conduct load tests of inverters or transformers used in Fuel Cell, UPS, and Solar Power Generation

- **Crest Factor Function**
  The PCZ1000A is equipped with a Crest Factor function for peak and harmonic currents during load tests. Crest factor value programmable from 1.4 to 4.0.
- **Parallel Operation Function**
  Up to 5 units can be configured in master-slave parallel connection. (Max. 5 kW, 50 Arms)
- **Tracking Operation Function**
  Synchronized setting values between master and slave units for convenient use as a single-phase 3-wire AC electronic load.

*Please refer to our product catalog or home page for further details on the PCZ1000A.

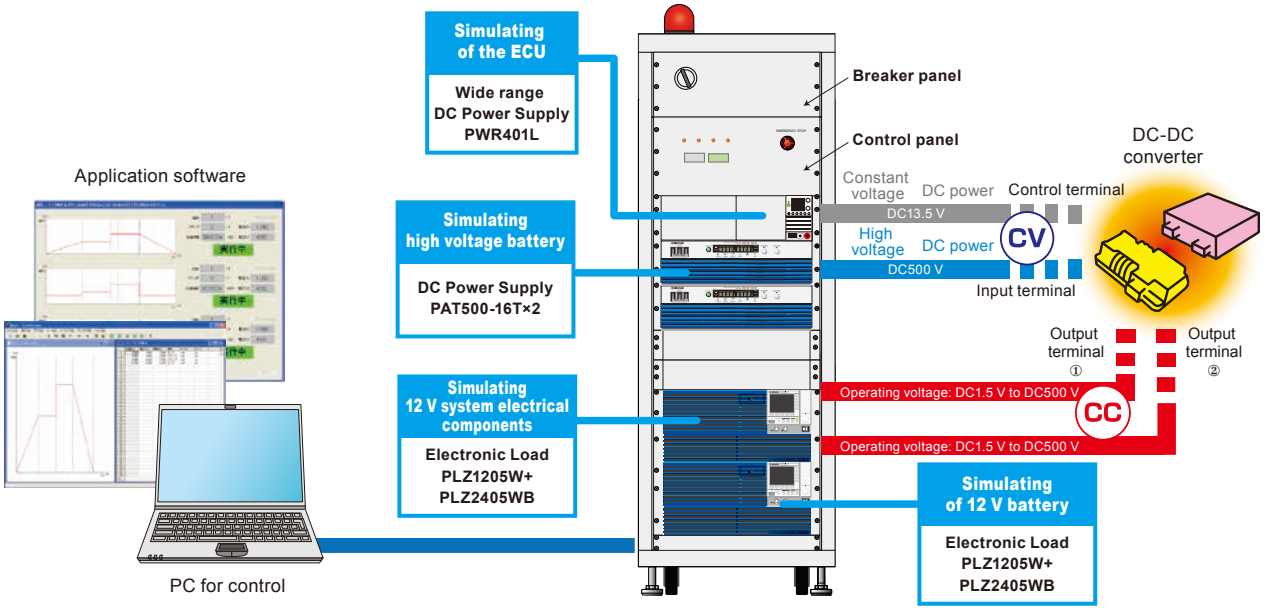
V2H/L EV Simulator

There is always the risk of breakdown or failure to comply with various charging standards (CHAdeMO, Combo, GB, etc.) when using an actual EV in quick charger and V2H/L power conditioner R&D testing. Using an EV simulator makes it possible to closely evaluate charging devices in accordance with various charging standards without requiring an actual vehicle.



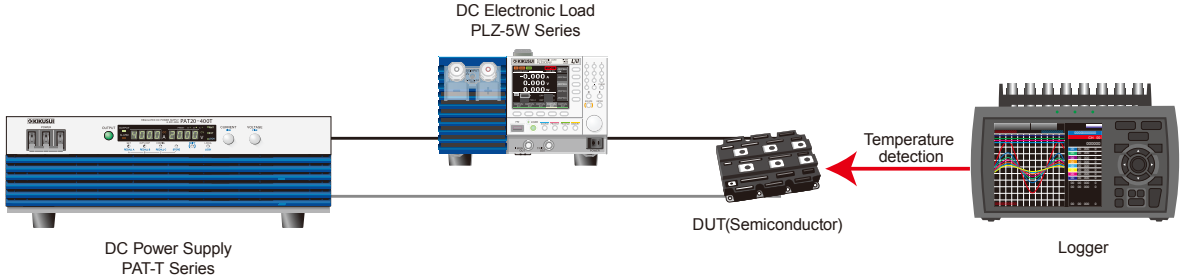
DC-DC Converter Evaluation Test System

By utilizing a combination of programmable DC power supplies , electronic loads, and dedicated application software, performance tests for automotive DC-DC converters has never been easier.



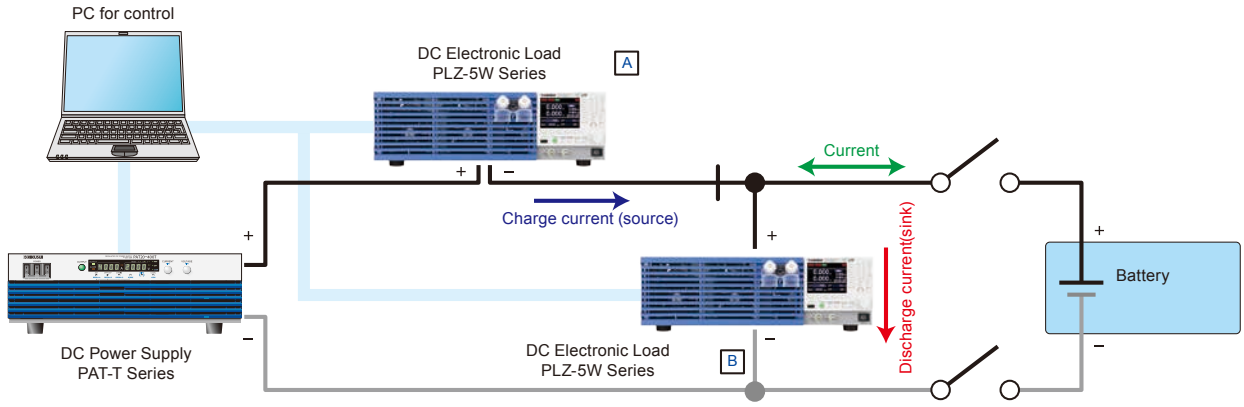
Power Semiconductor Evaluation System

For example, in transient thermal tests of semiconductors, it is necessary to start up a large amount of current at a high speed to measure temperature changes in semiconductors, and up to a hundred A to several thousand A must be flowed in just a few ms.
If the high-capacity switching power supply PAT-T series is used alone, the start-up time is several tens of milliseconds*, and if the PLZ-5W series of electronic load is used in combination with it, the speed can be further increased.
* Startup in a few milliseconds is possible by special order. Please contact us for more details.



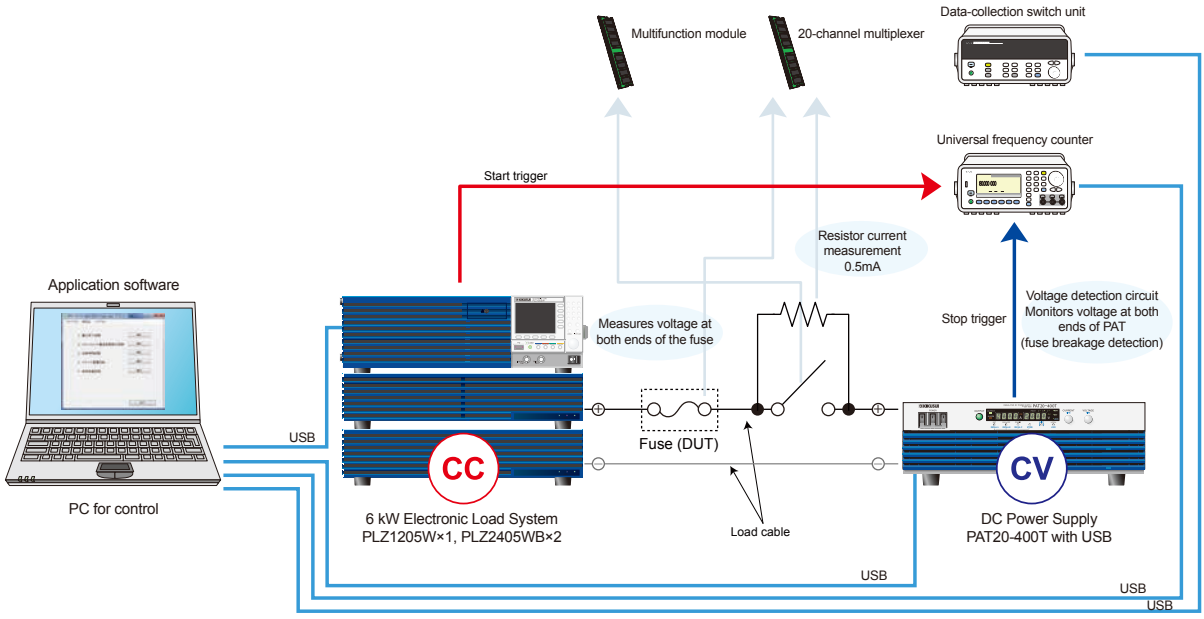
Battery Evaluation Test

Although high-speed operation cannot be achieved using only the PAT-T high-capacity switching power supply, the fast-response unipolar power supply system can be suplemented by connecting with the PLZ-5W series electronic load in series and parallel. This makes it possible to flow current while synchronizing the charge and discharge current patterns for a battery at high speeds.



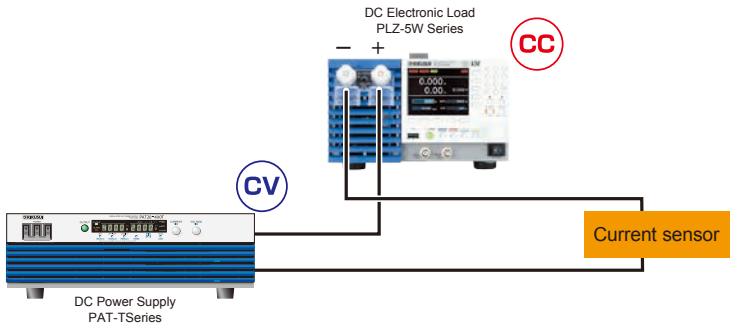
Fuse Rupture Test

For fuse rupture tests, DC power supplies with high speed CC control is absolutely vital. Although it is normally quite difficult to achieve such high speed control with only a DC power supply, the addition of a PLZ-5W electronic load makes high speed current control possible. With the PLZ-5W, fuse rupture tests that adhering to standards such as the JASO D612 are made possible. These tests include voltage drop tests, transient current cut-off tests, rupture time tests, step energization tests, and breaker capacity tests.



Current Sensor Evaluation

Accurate current sensor evaluation possible when combined with a high-precision CC DC power supply. Additionally, 3-level range settings allow you to select your desired current setting resolution in accordance with your test requirements.



8 kW Type Specifications

Item			PAT20-400T	PAT30-266T	PAT40-200T	PAT60-133T	PAT80-100T	PAT160-50T	PAT250-32T
Input	Nominal input rated voltage		Three-phase 200 V to 240 V, 50 Hz to 60 Hz						
	Input voltage range/Input frequency range		180 V to 250 V / 47Hz to 63 Hz						
	Efficiency		85% (TYP) [at input voltage of 200 VAC and rated load]						
	Power factor		0.95 (TYP) [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	30.00 V	40.00 V	60.0 V	80.0 V	160.0 V	250.0 V
		Rated output current	400.0 A	266.0 A	200.0 A	133.0 A	100.0 A	50.0 A	32.00 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 (with sensing at external output, at an instantaneous change in the load current from 50% to 100%)						
		Ripple noise	100 mVp-p	300 mVp-p	300 mVp-p	350 mVp-p			450 mVp-p
			When the measurement frequency band is 10 Hz to 20 MHz						
			10 mVrms	20 mVrms	30 mVrms	30 mVrms			50 mVrms
			When the measurement frequency band is 5 Hz to 1 MHz						
		Raise 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	400 mArms	350 mArms	300 mArms	200 mArms	200 mArms
			Output voltage is 10 % to 100 % of the rating when the measurement frequency bandwidth 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	99.99					999.9	
		Error	± (0.2% of reading +5 digits) at 23˚C ±5˚C						
Current display		Maximum display	999.9						99.99
		Error	± (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.	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 tared output current at 0 to 10 V						
		Constant current, external resistance control	0% to 100% or 100% to 0% of rated output currenn at 0 Ω to 10 kΩ						
Monitor output		Output voltage	10.00 V ±0.25 V at rated voltage output						
			0.00 V ±0.25 V at 0 V output						
		Output current	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 RS232C 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(inch)						
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)			Approx. 23 kg (50.71 lb)

*During constant current operation (set the output voltage at the rated output current greater than equal to the rated output voltage)

Rated load: Refers to a load with a resistance that makes the voltage drop when the rated output current is supplied to be 95 % to 100 % of the maximum output voltage at the rated output current. The output voltage of the PAT including the voltage drop in the load cable must not exceed the maximum output voltage at the rated output current.

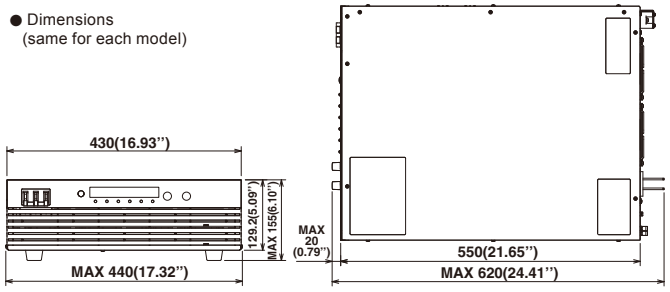
No load: Refers to a load with a resistance that makes the voltage drop when the rated output current is supplied to be 10 % of the maximum output voltage or 1 V, whichever is greater, at the rated output current.

8 kW Type Specifications

Item			PAT350-22.8T	PAT500-16T	PAT650-12.3T	PAT850-9.4T	PAT1000-8T	PAT1500-5.3T
Input	Nominal input rated voltage		Three-phase 200 V to 240 V, 50 Hz to 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]					
	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	350.0 V	500.0 V	650.0 V	850.0 V	1000.0 V	1500.0 V
		Rated output current	22.80 A	16.00 A	12.30 A	9.40 A	8.00 A	5.30 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 (with sensing at external output, at an instantaneous change in the load current from 50% to 100%)					
		Ripple noise	450 mVp-p	600 mVp-p	600 mVp-p	600 mVp-p	800 mVp-p	1200 mVp-p
			When the measurement frequency band is 10 Hz to 20 MHz					
			50 mVrms	100 mVrms	100 mVrms	100 mVrms	150 mVrms	200 mVrms
			When the measurement frequency band is 5 Hz to 1 MHz					
		Raise time	100 ms (rated load)/100 ms (no load)					
		Fall time	200 ms (rated load)/ 4000 ms (no load)				200 ms (rated load)/ 5000 ms (no load)	200 ms (rated load)/ 6000 ms (no load)
		Temperature coefficient	100 ppm/˚C (max) [with external analog control]					
	Constant current*	Setting accuracy	± (0.5% of rating +50 mA)		± (1% of rating +100 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	200 mArms	200 mArms	150 mArms	120 mArms		
			Output voltage is 10 % to 100 % of the rating when the measurement frequency bandwidth 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		999.9				9999	
	Error		± (0.2% of reading +5 digits) at 23˚C ±5˚C					
Current display	Maximum display		99.99					
	Error		± (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.		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 tared output current at 0 to 10 V					
	Constant current, external resistance control		0% to 100% or 100% to 0% of rated output currenn at 0 Ω to 10 kΩ					
Monitor output	Output voltage		10.00 V ±0.25 V at rated voltage output					
			0.00 V ±0.25 V at 0 V output					
	Output current		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 RS232C 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(inch)					
Weight			Approx. 23 kg (50.71 lb)		Approx. 22 kg (48.50 lb)	Approx. 23 kg (50.71 lb)		

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

● Dimensions
(same for each model)



4 kW Type Specifications

Item			PAT20-200T	PAT40-100T	PAT60-67T	PAT160-25T
Input	Nominal input rated voltage		Single-phase/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		84% (min)	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		Single-phase 22 A (max) [at 3 kW load]/three-phase 17 A (max) [at rated load]			
	Inrush current		50 A peak (max)			
	Input power		Single-phase 4 kVA (max) [at 3 kW load]/three-phase 5 kVA (max) [at rated load]			
Output	Rating	Rated output power	4 kW(three-phase input mode) / 3 kW(single-phase input mode)			
		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
	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 instantaneous change in load current from 50% to 100%)			
		Ripple noise	100 mVp-p	300m Vp-p	350 mVp-p	350 mVp-p
			When the measurement frequency band is 10 Hz to 20 MHz			
			10 mVrms	30 mVrms	30 mVrms	30 mVrms
			When the measurement frequency band is 5 Hz to 1 MHz			
		Raise 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 × 75% (with single-phase input) / 105% of rating (with three-phase input)			
		Line regulation	± (0.1% of rating +30 mA)			
		Load regulation	± (0.2% of rating +30 mA)			
		Ripple noise	400 mArms	300 mArms	250 mArms	200 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		Maximum display	99.99			999.9
		Error	± (0.2% of reading +5 digits) at 23˚C ±5˚C			
Current display		Maximum display	999.9		99.99	
		Error	± (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.	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 tared output current at 0 to 10 V			
		Constant current, external resistance control	0% to 100% or 100% to 0% of rated output currenn at 0 Ω to 10 kΩ			
Monitor output		Output voltage	10.00 V ±0.25 V at rated voltage output			
			0.00 V ±0.25 V at 0 V output			
		Output current	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 RS232C 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			
Weight			Approx. 20 kg(44.09 lb)	Approx. 19 kg(41.89 lb)	Approx. 18 kg(39.68 lb)	

4 kW type can operate with single-phase 200 volt input.
However, current is limited to about 75% of rated value.

*During constant current operation (set the output voltage at the rated output current greater than equal to the rated output voltage)
Rated load: Refers to a load with a resistance that makes the voltage drop when the rated output current is supplied to be 95 % to 100 % of the maximum output voltage at the rated output current. The output voltage of the PAT including the voltage drop in the load cable must not exceed the maximum output voltage at the rated output current.
No load: Refers to a load with a resistance that makes the voltage drop when the rated output current is supplied to be 10 % of the maximum output voltage or 1 V, whichever is greater, at the rated output current.

Communication Interface (Each Model is the Same)	
RS232C	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*	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.