

AC/DC Regenerative Electronic Load

Ene-phant Series

NEW!!



3-phase 12kW model

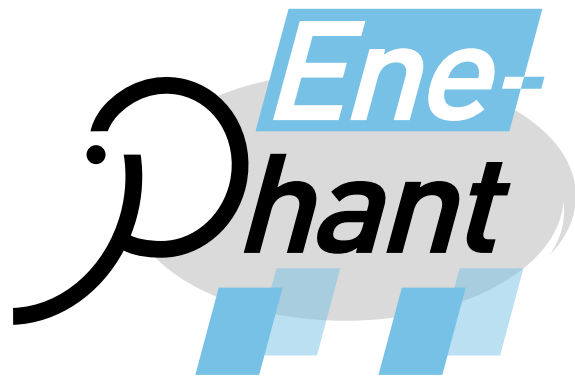
Single phase 10kW model

Can be used as AC Electronic Load or DC
Electronic Load while Regenerating to the Grid.

AC ~ 480Vrms / DC ~ 680V / 10kW ~ 50kW / 60A ~ 300A

AC/DC Regenerative
Electronic Load

Ene-phant series



Single phase 10kW model
NT-AA-10KE-L



3-phase 12kW model
NT-AA-12KE-L

[AC & DC Dual Purposes] + [Regenerative Operation]

1 Various AC Loading Tests For Inverters and Power Generators



- AC 3-phase , 3-wire
- AC single phase, 3-wire
- AC single phase, 2-wire

Single unit of Ene-phat is capable to test those connections.

2 Loading test for High Voltage DC Power Supplies or Converters



- High Voltage DC power supplies (~ 680VDC)
- AC/DC converters
- DC/DC converters

It can be used to test such as High Voltage DC/DC converters for vehicles since as high as 680V loading is accomplished.

3 Conforming to the Grid-interconnection Code



Realized over 90% of regenerative efficiency (at rated load). Utilizing High Efficient Regenerative Method, the power can be reused effectively without wasting as heat. Ene-phat is an environmentally friendly Electronic Load.

4 Adapted to 29 different capacities and input types with its Master-Slave operation



Multiple units of Single-phase , 3-phase models are connected in parallel for various handling power and wiring type.

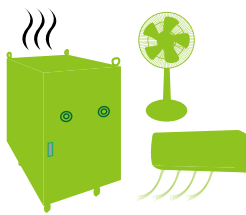
* For details to p.10.

It can be used as AC Load or DC Load while
Regenerating the Loading Power to the Grid.

Because we care about the future, This is the Electronic Load

Resistor Load to Regenerative Electronic Load

Before It is necessary to cool down the room temperature when tested with resistive load as they generate heat and increase the temperature. In addition, it has been time consuming if voltage or power measurement are made by individually.



- Thermal conversion
- Manual operation
- Ambient temperature

After We realized to recycle over 90% electric power to the grid by this Regenerative Electronic Load. It is beneficial to the user when high power heat run test or aging test is mandatory. With its communication and external remote control features, it is possible to build a automated test system.



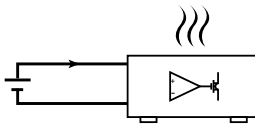
- Power conversion
- Automated
- Regeneration

*Efficiency at the rated load

Series Regulating Type Electronic Load to Regenerative Electronic Load

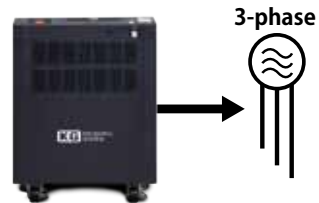
Before The ordinary electronic loads that are designed with using series regulating power devices and the power consumed and wasted as heat is increasing these days.

Method to exchange Electric Energy to Heat Energy.



- Dropper
- Heat exchange
- Large size

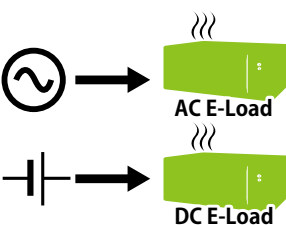
After With utilizing Regenerative Technology in the electronic load, the heat is converted to the electric power and reused. This can minimize the total-power loss while testing devices. We propose the conservation of energy in those testing from now on. By using regenerative technology, the size became down to 1/3 of ordinary types.



- Switching
- Regenerative
- Small size


AC or DC Electronic Load to AC/DC Electronic Load

Before Normally, DC Electronic Load and AC Electronic Load are designed differently so the customer needs to prepare both electronic load for their applications.



2 units for AC & DC

After The Ene-phant is designed to be used in AC environment as well as DC environment as to cope with various power converting applications. This can minimize the assets and cut the cost.



1 unit for AC & DC

2 models to choose from.

Based on those 2 models, they can be paralleled to increase the loading power.



	NT-AA-10KE-L		NT-AA-12KE-L	
Loading power	10kW		12kW	
Type of input	DC	AC. Single phase 2-wire	DC	AC. 3-phase, 3-wire
Loading Voltage	L range:70~340VDC H range:140~680VDC	L range:50~240VrmsAC H range:100~480VrmsAC	L range:70~340VDC	L range:50~240VrmsAC
Loading Current (Freq)	L range: 60ADC H range:30WDC	L range: 60ArmsAC H range:30ArmsAC (40 ~70Hz)	L range: 90ADC	H range:52ArmsAC (40~70Hz)
Grid	3-phase, 3-wire 202V+/- 20VAC			

20kW to 50kW Power Expansion

It is adapted to 14 difference loading powers and AC input types by paralleling 2 or more units.


- Single models can be used at 3-phase application by the combination of multiple units.
- It is adapted to single phase, 3-wire system by connecting multiple single phase units.

Parallel	Input		NT-AA-10KE-L (Single phase model)	NT-AA-12KE-L (3-phase model)
Master/Slave	DC		1~5 sets (Max : 50kW)	1~4 sets (Max : 48kW)
	AC	Single phase, 2-wire	1~5 sets ((Max : 50kW)	1~4 sets ((Max : 48kW)
		Single phase, 3-wire	2 / 4 sets ((Max : 40kW)	—
		3-phase, 3-wire	3 sets ((Max : 30kW)	1~4 sets (Max : 48kW)

Features and Functions

Robust basic features and added value.

**Down sized
by 50%!**



Down
by 66%!

Less space only for 2.2 meters

With High Efficient Switching Technology, the Ene-phant is made compact and light. It is reduced approx 66% of its volume compared with our dropper type 10kW electronic load.

It requires only 2.2 meter wide when expanded to 50 kW.

10kW AC Electronic Load (example)

AC Electronic Load

■ Adapted to Single phase input and 3-phase input

NT-AA-10KE-L, single phase model, is capable to test single phase, 2-wire, 3-wire system as well as 3-phase,3-wire system when multiple units are used.

NT-AA-12KE-L, 3-phase model, is capable to test 3-phase, 3-wire system. (See page10 for detail)

■ Test voltage up to 480VAC (Single phase model)

NT-AA-10KE-L, single phase model, is equipped with HIGH and LOW switch and enabled to test up to 480VAC.

Model	NT-AA-10KE-L	NT-AA-12KE-L
Input	Single 2-wire	3-phase, 3-wire
Low range	50 ~ 240Vrms AC	50 ~ 240Vrms AC
High range	100 ~ 480Vrms AC	—

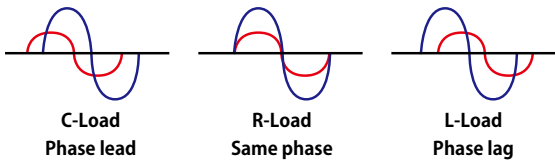
■ Equipped with 3-Basic AC Load Mode

With those loading modes, it can be used to test such as Inverters, Power Conditioners as well as Generators.

- CC (Constant current)
- CR (Constant Resistance)
- CP (Constant Power)

■ Phase lead and lag setting

It can simulate Capacitive load (C), Resistive load (R) as well as Inductive load (L) all by itself while it can set the current phase from 0 ~ -1 and 0~+1. The phase lead and the phase lag can be set by the angle as well (-90deg ~ 0 ~ +90deg).

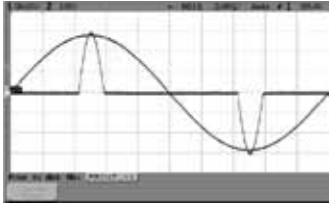


Blue: Voltage / Red: Current

■ Crest Factor Setting

The crest factor can be set from 1.4 to 4.0 in 0.1 increment at the AC Load mode.

This feature is suitable to simulate such as capacitor input rectifier circuit of switching power supplies.



■ Loading up to 400Hz (Factory option)

Standard frequency range is 40Hz to 70Hz but it can be extended to 400Hz for the application of aircraft and ship.

DC Electronic Load

■ It can test as high as 680V

As voltage rating of electronic devices are increasing especially devices for electric vehicles, it is designed and rated as 680VDC max.

Model	NT-AA-10KE-L	NT-AA-12KE-L
Low range	70 ~ 340VDC	70 ~ 340VDC
High range	140 ~ 680VDC	—

■ Equipped with 5 basic loading modes

From high power DC/DC converters to Chargers (AC/DC converters), Quick-Chargers, High Power Batteries, the following 5 functions are equipped.

CC (Constant Current)
CR (Constant Resistant)
CV (Constant Voltage)
CP (Constant Power)
MPPT (Maximum Power Point Tracking)

■ MPPT mode (Hill Climbing Method)

The I/V characteristic test of PV panel is possible as it is incorporated MPPT mode.

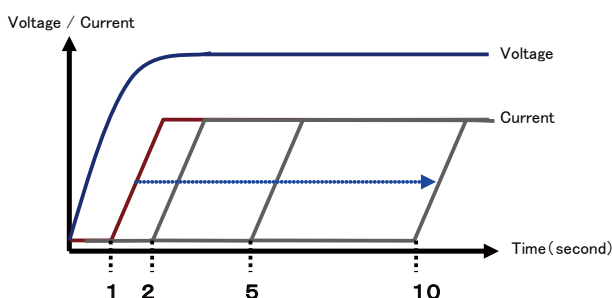
Without using a power conditioner which is incorporated MPPT feature, this electronic load alone can test PV directly for various parameters.

Common

■ Soft Start Function

It delays the current start point from the rising edge of the DC voltage.

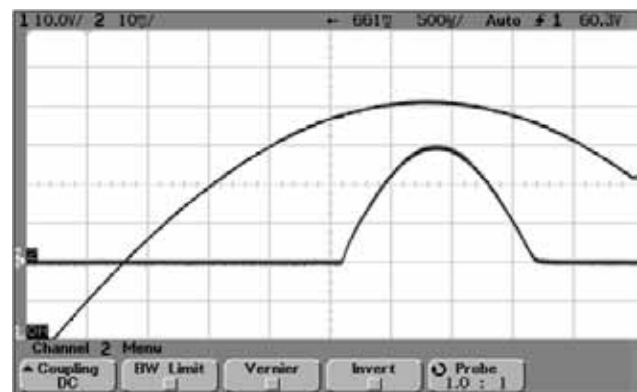
It is selected among 1, 2, 5 and 10 seconds in accordance to the



characteristics of the DUT.

■ Voltage/Current monitor (option)

Isolated voltage and current monitors (BNC output) are available as



option.

■ Various Interfaces

USB, RS232C and PLC interfaces are equipped as standard which enable it to control remotely.

In addition, GP-IB and LAN (Ethernet) interfaces are available as option.

■ External Control by PLC

There are contact input and analog signal (0 ~ 10V) input from PLC for external control. External control is simply possible through PLC without communication or command.

Analog (Ai) : CC / CP / Phase setting

Digital (Di) : Load ON / OFF

Digital (Do) : Alarm output

■ Infrared Remote Control (option)

Optional infrared remote controller is convenient. This can be used as a numeric key pad to enter such as the current value.



Features and Functions

Protective function

■ Protections

The following 8 protections are incorporated as to protect the electronic load.

Protection	
OVP(INT)	Internal Over Voltage Protection
OTP(INT)	Internal Over Temperature Protection
OCP	Over Current Protection
OVP	Over Voltage Protection
LVP	Low Voltage Protection
OPP	Over Power Protection
OFP	Over Frequency Protection
LFP	Low Frequency Protection

■ Emergency Stop and Isolation

Emergency Stop switch is on the front panel which enables GATE BLOCK of the power line. There is a transformer which is isolating the electronic load and the grid.



■ Conforming to JET Standard for Grid Connection

It is equipped with Grid Monitor and Protectors which are found in such as power conditioners available in the market. With those monitor system and protectors, it can recycle electronic energy and used safely manner.

Grid monitor	
OCR	Over Current Relay
OVR	Over Voltage Relay
UVR	Under Voltage Relay
OFR	Over Frequency Relay
UFR	Under Frequency Relay
Single operation detector	Active method
	Passive method

■ Input Voltage Selection of the Grid Side (Factory option)

This option enabled to measure the integrated grid power and effective power (Instantaneous power)

■ Grid power measurement (Factory option)

Input voltage of 220V and 230V, 3-phase, 4-wire are also available as option.

Grid connection / Regenerative Function

■ Highly Efficient Regenerative Function

Over 90% (at rated loading) of power is reused by the regenerative circuit by our technology which is backed by the bi-directional product development for smart grid.

This brings big change on electronic load testing from "Wasting Power as Heat" to "Recycle Electronic Power".

Operation

■ Simple dial operation

A large sized rotary knob is used to set the parameters and functions. With its intuitive manner, the operation is very simple.



Technology inside

Switching technology

Analog technology

Power regeneration

Non-linear control



Modern control

High efficient technology

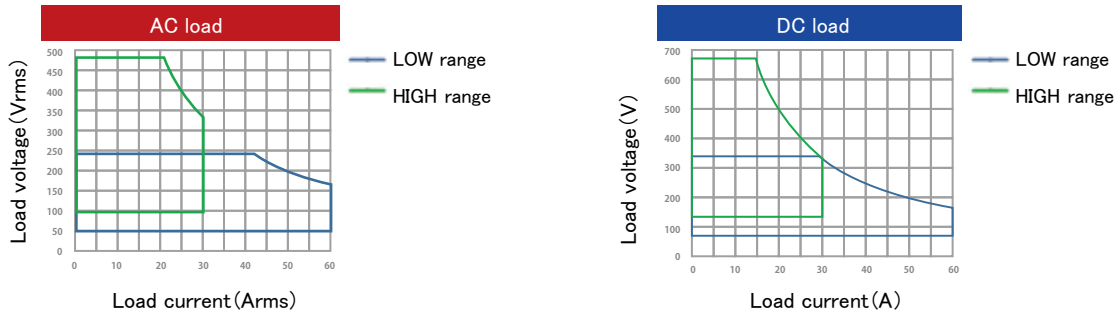
Digital control

DSP

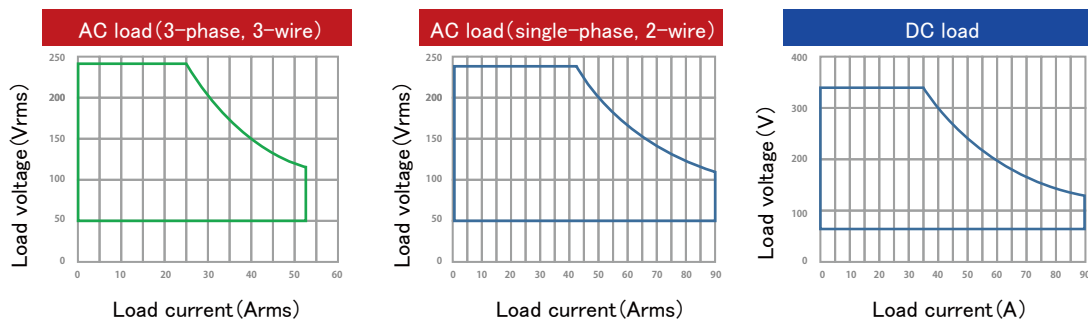
Grid connection

Operation curve

Single-phase 10kW type power curve (model : NT-AA-10KE-L)

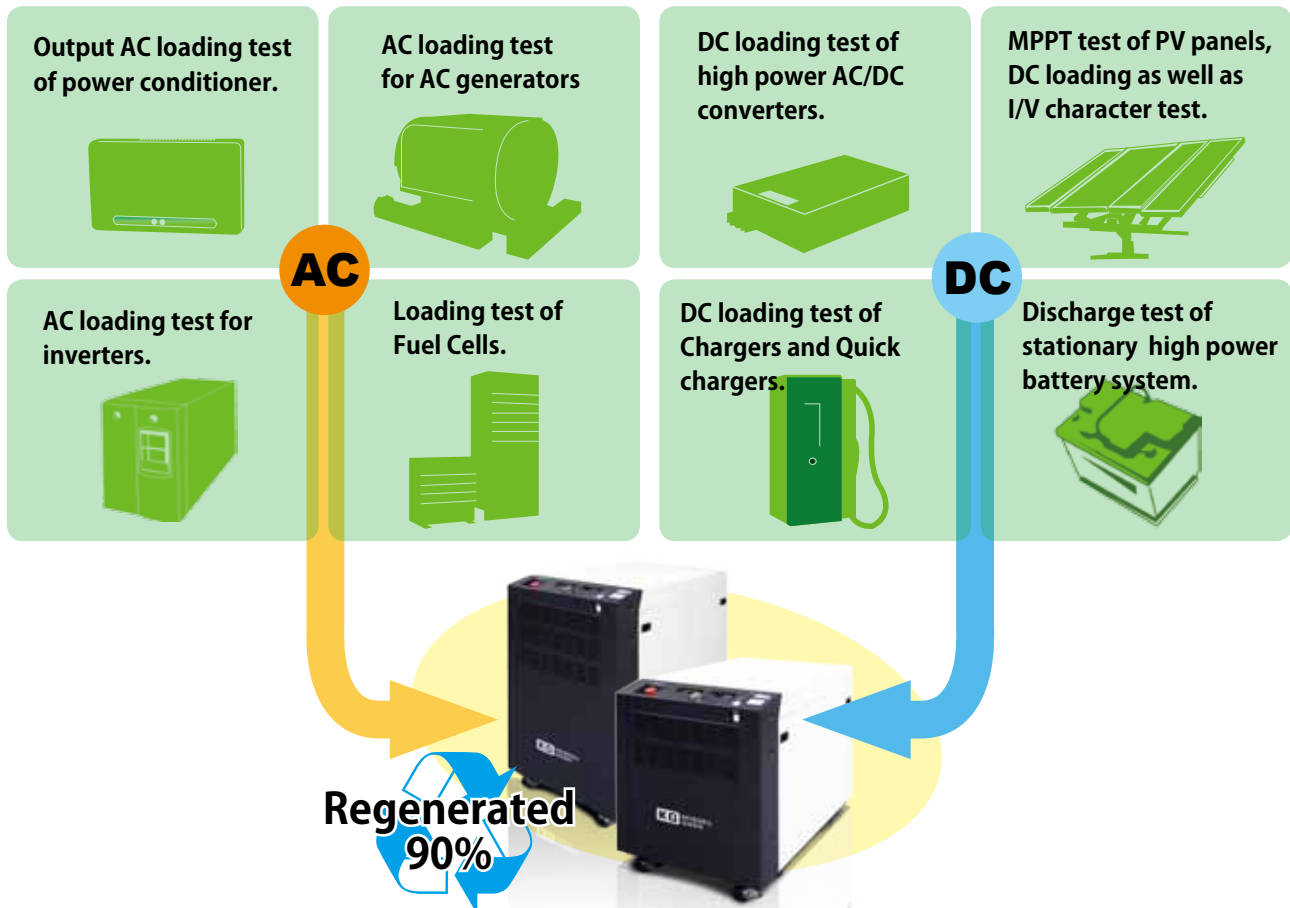


3-phase 12kW type power curve (model : NT-AA-12KE-L)



Application

As AC/DC electronic load, it can be used in various fields.



Power Expansion

With the MASTER- SLAVE feature, it can be expanded up to 50kW (48kW for 3-phase model) for various high power applications.

Example-1 : DC and Single-phase, 2-wire AC input

Single-phase model
NT-AA-10KE-L

Single-phase, 2-wire
~ AC480Vrms

OR

DC
~ DC680V

Master

Slave

Slave

Slave

Slave

AC202V

Electronic load side

Grid side
(Regenerative and Supply side)

Slave (1 ~ 4 units)
20kW ~ 50kW expansion!

Power	Configuration
10kW	M:1=1 set
20kW	M1+S1=2 sets
30kW	M1+S2=3 sets
40kW	M1+S3=4 sets
50kW	M1+S4=5 sets

M=Master, S=Slave

Example-2 : Single-phase, 3-wire AC input

Single-phase model
NT-AA-10KE-L

Single-phase, 3-wire
~ AC480Vrms

Master

Slave

Slave

Slave

AC202V

Electronic load side

Grid side
(Regenerative and Supply side)

Slave (1 or 3 units)
20kW or 40kW expansion!

Power	Configuration
10kW	—
20kW	M1+S1=2 sets
30kW	—
40kW	M1+S3=4 sets
50kW	—

M=Master, S=Slave

Example-3 : 3-phase, 3-wire AC input

Single-phase model
NT-AA-10KE-L

3-phase, 3-wire
~ AC480Vrms

Master

Slave

Slave

AC202V

Electronic load side

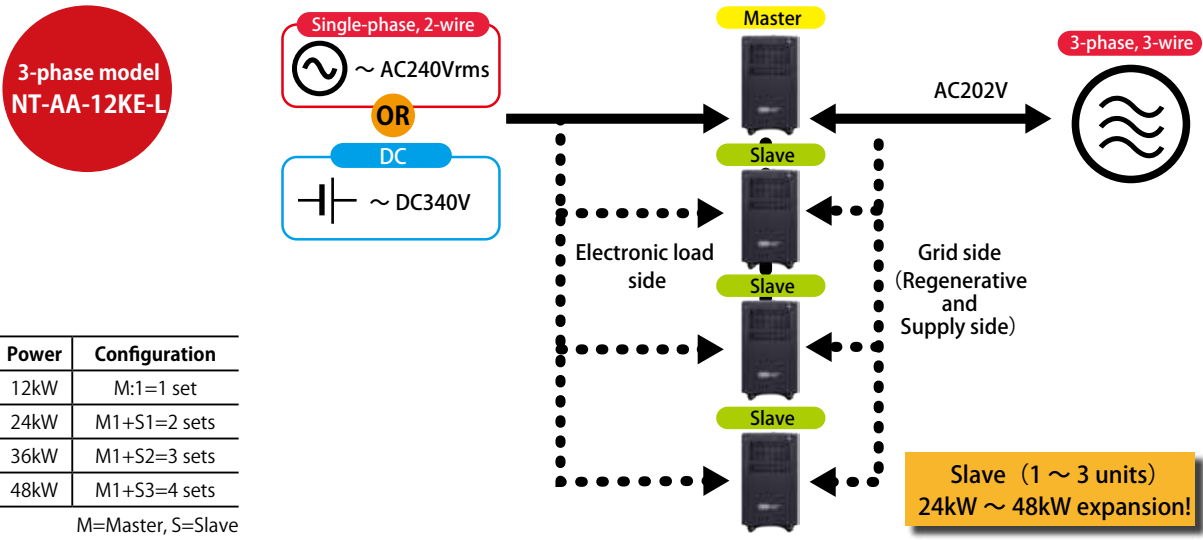
Grid side
(Regenerative and Supply side)

Slave (2 units)
30kW expansion!

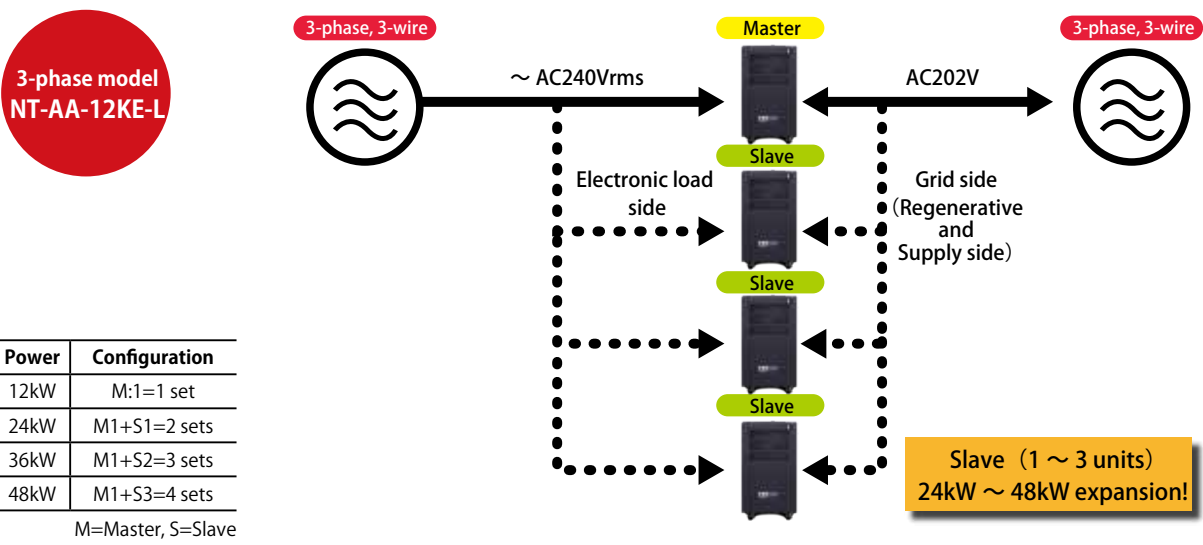
Power	Configuration
10kW	—
20kW	—
30kW	M1+S2=3 sets
40kW	—
50kW	—

M=Master, S=Slave

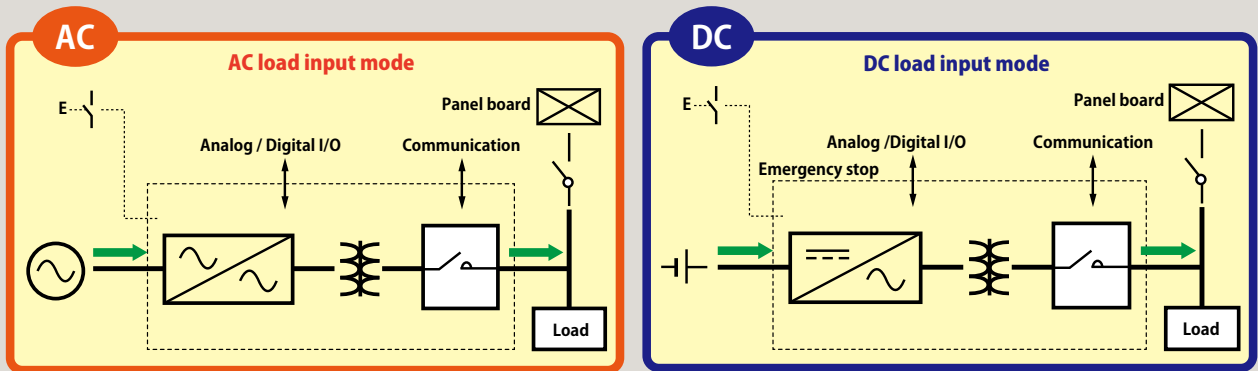
Example-1 : DC and Single-phase, 2-wire AC input



Example-2 : 3-phase, 3-wire AC input



● Wiring diagram



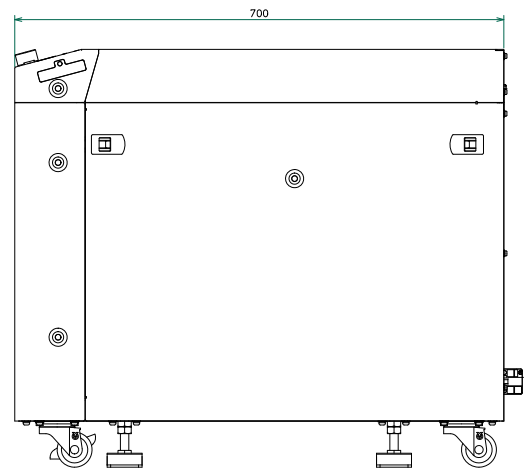
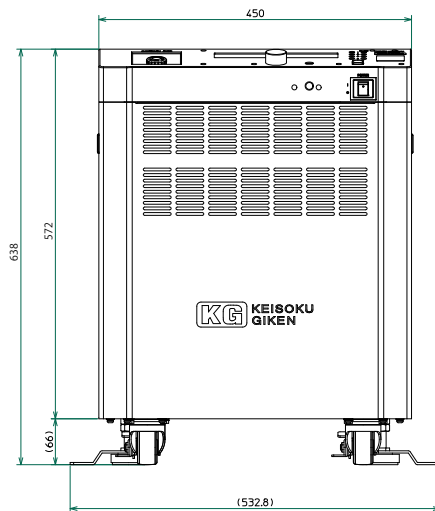
Specification (Draft)

Model		NT-AA-10KE-L		NT-AA-12KE-L	
		Low range	High range	Low range	High range
Load section-Rating	Rated power	0 ~ 10kW		0 ~ 12kW	
	Operating frequency	DC, 40 ~ 70Hz (400Hz: Optional)			
	Rated current	60Arms/120Apeak 60Adc	30Arms/60Apeak 30Adc	52Arms/104Apeak non-DC (3P3W) 90Arms/180Apeak 90Adc(1P2W)	—
	Rated voltage	50 ~ 240Vrms 70 ~ 340Vdc	100 ~ 480Vrms 140 ~ 680Vdc	50 ~ 240Vrms non-DC (3P3W) 50 ~ 240Vrms 70 ~ 340Vdc(1P2W)	—
	Minimum operating voltage	50Vrms 70Vdc	100Vrms 140Vdc	50Vrms 70Vdc	—
CC mode	Setting range	0 ~ 60Arms 60Adc	0 ~ 30Arms 30Adc	0 ~ 52Arms 90Adc	—
	Resolution	50mA	25mA	50mA(3P3W) 150mA(1P2W)	—
	Accuracy	± 1% ± 0.2A	± 1% ± 0.2A	± 1% ± 0.2A(3P3W) ± 1% ± 0.6A(1P2W)	—
	PF setting range	± 1(AC mode only)			
	PF resolution	0.01(AC mode only)			
	Phase setting range	± 90deg(AC mode only)			
	Phase setting resolution	1deg(AC mode only)			
CR mode	Setting range	0.8 ~ 3.4k Ω	3.3 ~ 6.8k Ω	0.8 ~ 3.4k Ω (3P3W)	—
	Resolution	10S			
	Accuracy	Converted current value ± 1% ± 0.2A			
CV mode (DC mode only)	Setting range	70 ~ 340V	140 ~ 680V	70 ~ 340V	—
	Resolution	0.5V	1V	0.5V	—
	Accuracy	± 1% ± 1V	± 1% ± 2V	± 1% ± 1V	—
CP mode	Setting range	0 ~ 10kW		0 ~ 12kW	
	Resolution	20W			
	Accuracy	± 40W			
MPPT mode (DC mode only)	Hill Climbing Method	DC mode only		DC mode 1P2W only	
CF mode (AC mode only)	Setting range	1.4 ~ 4.0 (Limitation may apply to the peak current)			
	Resolution	0.1			
Current limit	Setting range	Low : 0 ~ 120A	High : 0 ~ 60A	0 ~ 104A	
	Resolution	Low : 0.5A	High : 1.0A	0.5A	
Voltage limit	Setting range	Low : 70 ~ 340V	High : 140 ~ 680V	70 ~ 340V	
	Resolution	Low : 0.5V	High : 1V	0.5V	
Power limit	Setting range	100 ~ 10kW		100 ~ 12kW	
	Resolution	20W			
Soft-start	Setting range	1, 2, 5, 10sec		1, 2, 5, 10sec	
Voltage measurement	Measurement range	748V (680V+10%) (rms)		374V (340V+10%) (rms)	
Current measurement	Measurement range	66A (60A+10%) (rms)		99A (90A+10%) (rms)	
Peak current measurement	Measurement range	132A (120A+10%)		114.4A (104A+10%)	
Effective power measurement	Measurement range	11kW (10kW+10%)		13.2kW (12kW+10%)	
Apparent power measurement	Measurement range	11kVA (10kVA+10%)		13.2kVA (12kVA+10%)	
PF measurement	Measurement range	-1 ~ +1			
Frequency measurement	Measurement range	40 ~ 70Hz			
Protection		Emergency stop, Inside OVP, Inside OHP, OCP, OVP, OPP, OFP, Low frequency, Isolated operation detect-passive, Isolated operation detect-active, DC side UVR, OVR, OFR, UFR, OCR			
Interface	Standard	RS-232C, USB, LAN (Ethernet)			
	Option	GP-IB			

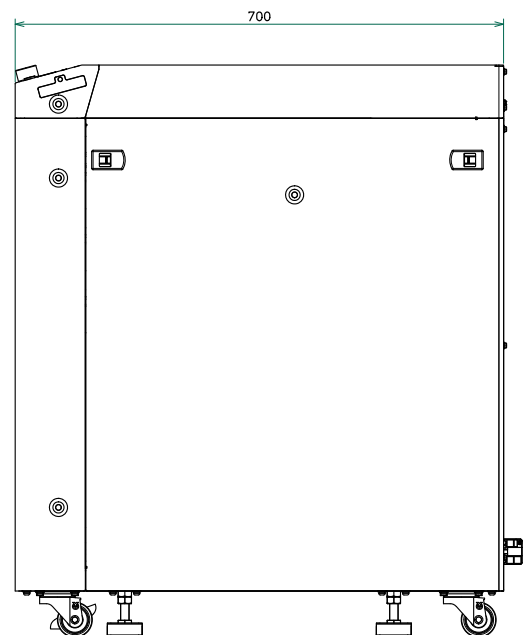
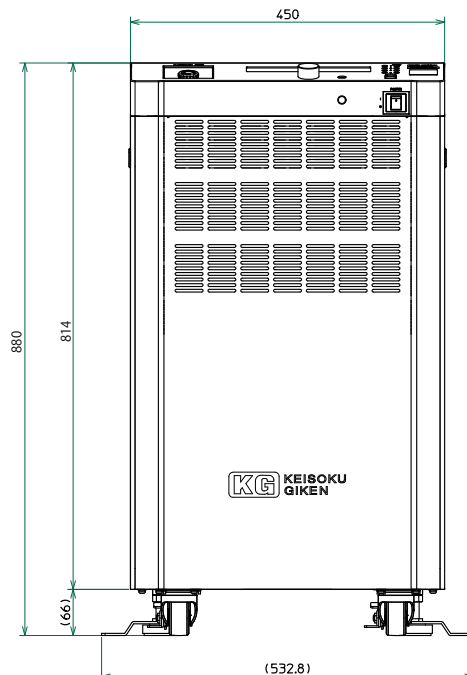
Model		NT-AA-10KE-L		NT-AA-12KE-L	
		Low range	High range	Low range	High range
External control	DI	Photo-coupler input			
	DO	Photo-coupler output (Open collector)			
	AI	0 ~ 10V(CC/CP/phase difference)			
Monitor output (Option)	Voltage	10V/1000V/BNC/50 Ω /insulated output			
	Current	10V/200A/BNC/50 Ω /insulated output			
Parallel connection (Master/Slave)	1P2W	1 ~ 4 units		1 ~ 4 units	
	1P3W	2/4 units		—	
	3P3W	3 units		1 ~ 4 units	
General	Operating area	Grid side input : 202V ± 20V, 50/60Hz Load side : 0Arms ~ 60Arms, 0 ~ 10000W/0 ~ 12000W			
	Power consumption	200VA 以下 (at standby state)			
	Dimensions(W x H x D)	450mm x 638mm x 700mm		450mm x 880 mm x 700mm	
	Weight	171kg		186kg	
	Ambient temperature	0 ~ 50°C (Derating necessary over 40°C)			
	Ambient humidity (RH)	5 ~ 85%RH 以下 (No dew condensation, no corrosive gas)			

External dimensions

■ NT-AA-10KE-L



■ NT-AA-12KE-L



Power band


Direct Current

Power Supply




3.2kW WS series(S/6) 360W

19.2 kW Li-battery NT-B series(3) 1.2 kW





About Power Supply and Electronic Load ---KG!

5W Charge-Discharge tester MCD series(L/3) 1W



2kW Bidirectional Power Supply System




Electronic Load


60kW 50kW 36200 series(D/2) 36300 series(D/2)




50kW Ene-phat series(S/2) 10kW




50kW 34300 series(D/8) 5kW




30kW 34100 series(D/6) 34200 series(D/6) 5kW



14.4 kW 33500F series(D/14) 2.4 kW




14.4 kW 3360F series(D/17) 600W



10kW Load Station series(D/4) 300W



5kW Load Edge series(D/2) 350W



Load Star series(D/2) LE series(D/2) 300W 150W

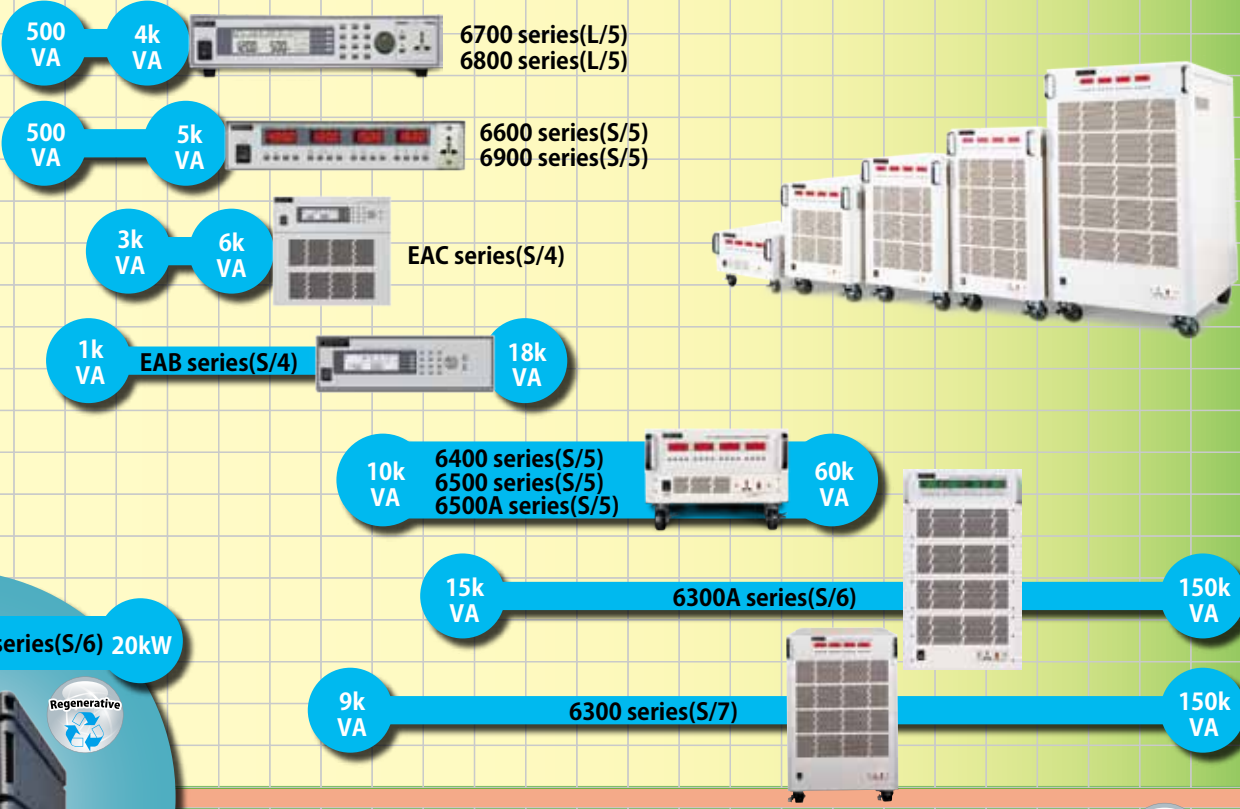


3300F series(D/12) 300W 40W




*Regenerative mark (Logo) : Product with regenerative method. (Others are of dropper method.)

Alternative Current



500 VA 4k VA 6700 series(L/5)
6800 series(L/5)

500 VA 5k VA 6600 series(S/5)
6900 series(S/5)

3k VA 6k VA EAC series(S/4)

1k VA EAB series(S/4) 18k VA

10k VA 6400 series(S/5)
6500 series(S/5)
6500A series(S/5) 60k VA

15k VA 6300A series(S/6) 150k VA


9k VA 6300 series(S/7) 150k VA

NT series(S/6) 20kW

Regenerative



Regenerative



12kW Ene-phat series(S/2) 48kW

1.2 kW 3260A series(D/9) 12.6 kW

300W 3250A series(D/3)

Regenerative

Power extends, and Connects.

*D: Dropper, L: Linear, S: Switching or PWM. *Capacity of the power band is including parallel operation and power expansion.

<http://www.keisoku.co.jp/en/>



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