Ene-phant series

■**Regenerative DC power supply (bidirectional)**
50kW to 250kW (50kW model)

■**Regenerative AC/DC electronic load**
10kW to 50kW (10kW model)
50kW to 250kW (50kW model)

■**Regenerative DC electronic load**
10kW to 50kW (10kW model)
50kW to 250kW (50kW model)

Can be expanded in 50kW increments!
Bidirectional power supply ideal for high power.

Up to **61** expansion combination

Power supply output voltage
350V DC to 1500V DC
Power supply output current max.
DC±1500A

Load voltage max.
AC480Vrms/DC1500V

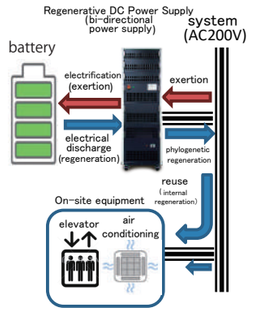
Load Current Max.
AC875Arms/DC1500A

Regenerative DC Power Supply

What is a regenerative DC (bidirectional) power supply?

It is a power supply that combines a converter that converts AC power supplied from the grid (e.g., cogeneration) into DC power and an inverter that conversely converts DC power into AC power that is supplied (regenerated) to the grid. The power from the grid can be recharged in the battery and reused by equipment on the premises that regenerates the power to the grid. Our regenerative DC (bidirectional) power supplies achieve a conversion efficiency of over 90%, enabling effective use of power.

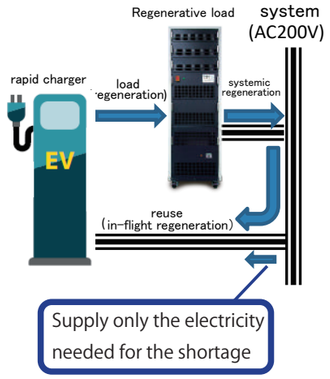
P.4 Regenerative DC Power Supply



What is a regenerative electronic load?

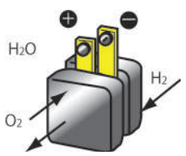
Conventional electronic loads simulate electric power by converting the power to be consumed into heat. As the capacity of these loads increased, the amount of heat energy converted increased, and air conditioning equipment was required to cool the heat energy, which had a negative impact on the environment.
Regenerative electronic load converts the power to be consumed into AC power to be supplied to the grid (regeneration) instead of heat, thus reducing the size by reducing the heat conversion unit and creating energy through regenerative power (supplying AC power to the grid), leading to a reduction in environmental impact.
Our lineup of regenerative electronic loads includes both AC and DC loads as well as DC-only loads. AC loads can be used as RLC simulation loads because the power factor can be varied from 0 to ±1.

P.12 Regenerative DC electronic loads and regenerative AC electronic loads



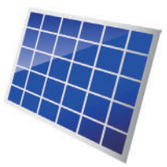
From new energy to V2L and infrastructure equipment for automotive electronics
Highly flexible test environments can be built


Wind power generation



Fuel cell


Power conditioner


Solar battery

Rapid charger


HVDC 320V ～ 380V
Servers Data Center


Railroads Infrastructure


Motor Driver (Inverter)

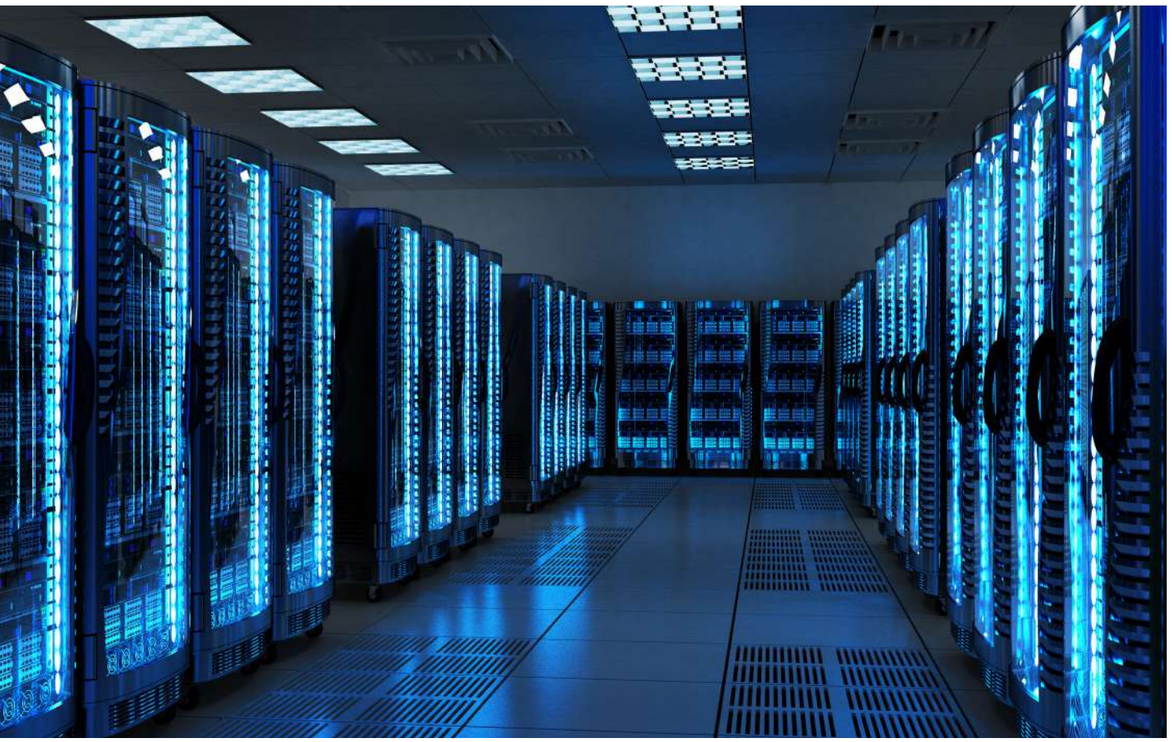
UPS


Power generator


Battery


Electric vehicle (EV)

- Various interfaces
- Standard Features
- Large 3.5-inch LCD panel and Intuitive operation panel
- Emergency stop button as standard equipment
- Expandable up to 250 kW (5 units)
- Simple power supply function and Power and Regenerative SwitchingFunction
- MPPT mode convenient for PV panel evaluation (Factory option)
- Compliant with grid-connection regulations
- Regenerative efficiency of 90% or higher
- Low in accordance with CISPR Class A
- Low power noise
- Supports 3-phase 3-wire 400 V grid input
- Three-phase 3-wire 200 V system input also available
- Available as factory option



Expandable up to ± 250 kW with standard products

Maximum voltage of 1500V and maximum current of ±1500A can be extended by combination with standard models. Our strength as a standard product (quality, price, and support) is extended to large capacity models.

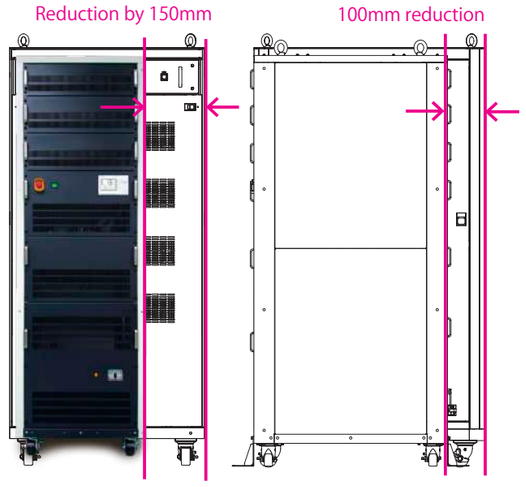
50kW bidirectional model - Provides increased capacity through expansion

Up to 15 expansion combination

	50kW	100kW	150kW	200kW	250kW
350V	NT-AD-50KD-B ×1 ±300A	NT-AD-50KD-B ×2 ±600A	NT-AD-50KD-B ×3 ±900A	NT-AD-50KD-B ×4 ±1200A	NT-AD-50KD-B ×5 ±1500A
750V	NT-AD-50KH-B ×1 ±200A	NT-AD-50KH-B ×2 ±400A	NT-AD-50KH-B ×3 ±600A	NT-AD-50KH-B ×4 ±800A	NT-AD-50KH-B ×5 ±1000A
1500V	NT-AD-50KO-B ×1 ±100A	NT-AD-50KO-B ×2 ±200A	NT-AD-50KO-B ×3 ±300A	NT-AD-50KO-B ×4 ±400A	NT-AD-50KO-B ×5 ±500A

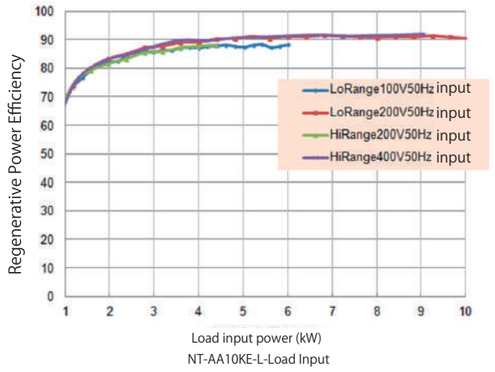
Space-saving and contributes to a smaller footprint

The 50kW stand-alone unit has been reduced by 150mm in width and 100mm in depth from the previous model, resulting in an installation area reduction of approximately 0.31m2 as a footprint ratio. Both the area and volume ratios contribute to space savings of approximately 30%, allowing for flexible installation.



Industry-leading regenerative efficiency of 90% or higher

High efficiency of over 90% (at rated load). Furthermore, a regenerative efficiency of 80% or higher is achieved when the rated power is 15% or more of the rated power. Highly efficient regeneration is possible over a wide range of load power.



Regenerative DC Power Supply
Ene-phant Series

DC 1500V | DC 750V | DC 350V | 3 Model | switching | regeneration | RS-232C | LAN | booster | emergency stop

The Ene-phant series of regenerative DC power supplies are models that perform power operation as a power source and regenerative operation as an electronic load in a single unit. 50kW large capacity, yet space-saving with a width of 600mm and height of 1900mm. 350V, 750V, and 1500V in total, 5 in parallel each for 3 different voltage models, The system can be operated bidirectionally with a maximum of ±250 kW, a maximum voltage of 1500 V, and a maximum current of ±1500 A. It can be used for a wide range of applications from battery simulation, charge-discharge evaluation, motor and inverter R&D to outgoing tests.

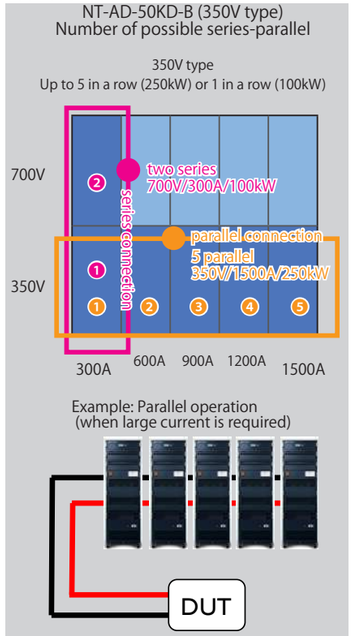
Order Information

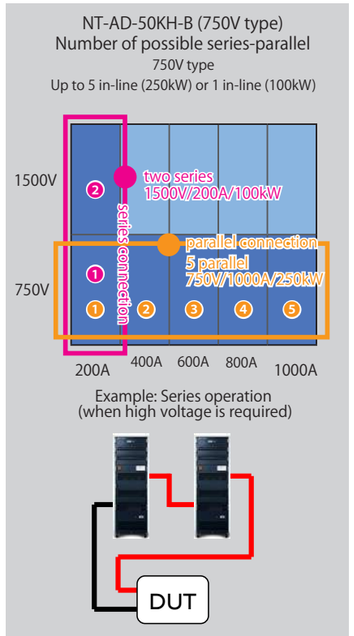
Model	Name of product	Price
350V type		
NT-AD-50KD-B	Regenerative DC power supply 50kW, 350V, ±300A	Please contact us
NT-AD-50KD-B x2	Regenerative DC power supply 100kW, 350V, ±600A	
NT-AD-50KD-B x3	Regenerative DC power supply 150kW, 350V, ±900A	
NT-AD-50KD-B x4	Regenerative DC power supply 200kW, 350V, ±1200A	
NT-AD-50KD-B x5	Regenerative DC power supply 250kW, 350V, ±1500A	
NT-AD-50kD-B/REC*1	NT-AD-50kD-B Inspection Report	
750V type		
NT-AD-50KH-B	Regenerative DC power supply 50kW, 750V, ±200A	Please contact us
NT-AD-50KH-B x2	Regenerative DC power supply 100kW, 750V, ±400A	
NT-AD-50KH-B x3	Regenerative DC power supply 150kW, 750V, ±600A	
NT-AD-50KH-B x4	Regenerative DC power supply 200kW, 750V, ±800A	
NT-AD-50KH-B x5	Regenerative DC power supply 250kW, 750V, ±1000A	
NT-AD-50kH-B/REC*1	NT-AD-50kH-B Inspection Report	
1500V type		
NT-AD-50KO-B	Regenerative DC power supply 50kW, 1500V, ±100A	Please contact us
NT-AD-50KO-B x2	Regenerative DC power supply 100kW, 1500V, ±200A	
NT-AD-50KO-B x3	Regenerative DC power supply 150kW, 1500V, ±300A	
NT-AD-50KO-B x4	Regenerative DC power supply 200kW, 1500V, ±400A	
NT-AD-50KO-B x5	Regenerative DC power supply 250kW, 1500V, ±500A	
NT-AD-50kO-B/REC*1	NT-AD-50kO-B Inspection Report	
Common Options		
TCP	Traceability by Product*2	Please contact us
SCI	Standard Instrument Test Report*2	
AX-OP01	Master-slave connection 1m cable	
AX-OP02	Master-slave connection 3m cable	
AX-OP03	Voltage and current monitoring options	
AX-OP13	Optional three-phase 3-wire 200V conversion on the grid side	

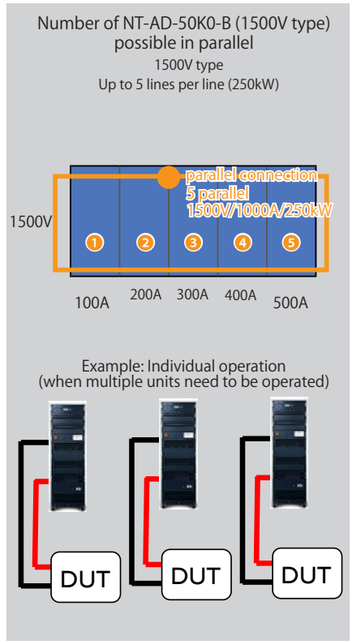
*1 : In the case of multiple-unit configurations, inspection reports are required for the quantity of units.
*2 : An inspection report must be ordered.

Expandable up to 5 units in parallel up to 250kW! High voltage and high current can be achieved by series-parallel combination

The same model can be expanded up to two units in series connection (only one 1500 V model) and up to five units in parallel connection, just like batteries. Flexible configurations can be realized, from capacity expansion by combining multiple units to individual operation of multiple units, depending on the stage of evaluation and testing, taking advantage of the master-slave dual-use model.







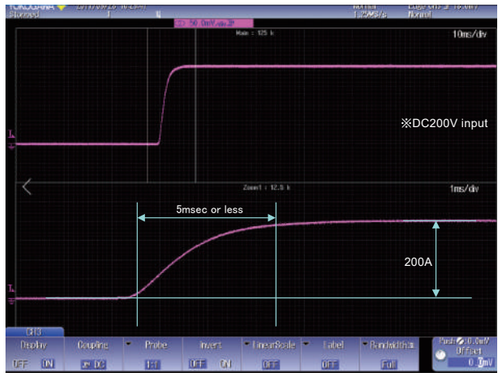
Seamless bidirectional and 0V operation

Seamless bidirectional ±current operation is possible from 0V without range switching.

High speed operation

The current response speed is as fast as 10msec or less, and seamless switching between power (drive: power supply) and regeneration (absorption: load) is realized. Therefore, there is no overshooting or undershooting of the current, and the EUT can be used safely without unexpected stress.

Rising current waveform (at 200A DC 200V input)



Compliant with grid connection regulations

Equipped with grid monitoring and protection functions compliant with grid interconnection regulations, it has the same monitoring and protection functions as general power conditioners on the market, allowing energy to be circulated safely and without waste. The various grid monitoring functions can be set to any desired value.

System monitoring	
OCR	Overcurrent relay
OVR	Overvoltage relay
UVR	Undervoltage relay
OFR	Overfrequency relay
UFR	Under-frequency relay
Stand-alone operation detection function	Active method (frequency shift method)
	Passive method (voltage phase jump method)

Adopts electrical insulation with transformer

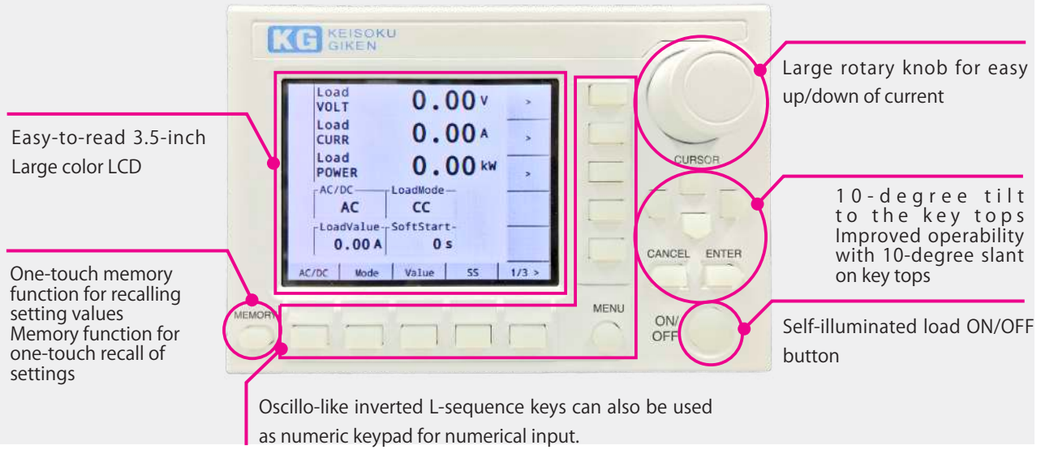
Electrical isolation between the power supply (electronic load) and the system is provided by a large transformer. Safe and secure design.

Three-phase 3-wire 200 V input voltage selection on the grid side(Factory option: AX-OP13)

The input voltage can be changed to the standard 3-phase 3-wire 200V used in offices and factories. Also, 3-phase 4-wire 220V, 230V, etc. are available upon special order.
(Compatible models: NT-AD-50KD-B, NT-AD-50KH-B, NT-AD-50KO-B)

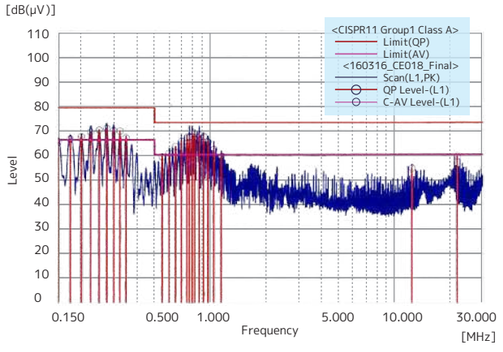
Oscilloscope-like operability

In pursuit of ease of use, the button layout and operability of an oscilloscope are adopted.



Regenerative power supply noise Compliant with CISPR Class A

Regenerative power noise complies with Class A. Low noise so that other devices are not affected by regenerative power noise, such as malfunctions.



Control Interface

LAN (Ethernet), RS-232C, and PLC interfaces are commonly equipped as standard. Remote control including automation from a host PC is possible.

Interface			
RS-232C	LAN	DI/DO	AI/AO
○	○	O	O

Emergency stop button

Equipped with an emergency stop button, which is indispensable in the car electronics industry. The gate of the power line is blocked (forced open by conductor) when operating. It is guarded to prevent malfunction and can be externally controlled (DI input).

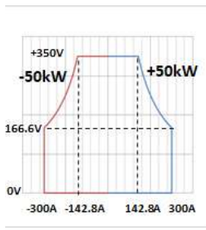
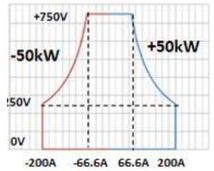
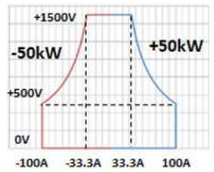
Emergency stop button layout

Body protection function

The main body of the electronic load device is equipped with 8 types of protection functions for safe test operation.

Safeguard	
OVP(INT)	internal overvoltage protection
OTP(INT)	Internal overheat protection
OCP	Overcurrent protection
OVP	Overvoltage protection
LVP	Overvoltage protection
OPP	Overpower protection
OFP	Overfrequency protection
LFP	Low frequency protection

(technical) Specification

Model		NT-AD-50KD-B	NT-AD-50KH-B	NT-AD-50KO-B
Basic functionality				
Output range				
Rated value (engineering)	Rated power	50kW		
	Rated voltage	350V	750V	1500V
	Rated current	± 300A	± 200A	± 100A
	Minimum operating voltage	0V		
	Ripple current	Within 4Ap-p (switching frequency component)		
	Regenerative efficiency	More than 90% of the maximum (when framed into the output force)		
Constant voltage (CV) mode	Voltage setting range	0 ～ 350V	0 ～ 750V	0 ～ 1500V
	Setting resolution	0.1V		
	Accuracy	± 0.3% of F.S.		
	Response Time	Within 50msec (10% to 90%)		
	Transitional Recovery Time	Within 20msec		
	Switching function between power and regeneration	Automatic switchover		
Constant current (CC) mode	Current setting range	0 ～ ± 300A	0 ～ ± 200A	0 ～ ± 100A
	Setting resolution	0.3A	0.25A	0.125A
	Accuracy	± 0.3% of F.S.		
	Response Time	Within 10msec (10% to 90%)		
	Switching function between power and regeneration	Manual switching		
Constant Power (CP) mode	Power setting range	0 ～ ± 50kW		
	Setting resolution	20W		
	Accuracy	± 0.5% of F.S.		
	Response Time	Within 10msec (10% to 90%)		
	Switching function between power and regeneration	Manual switching		
Soft start		0, 1, 2, 5, 10sec		
Measurement Division				
Voltage measurement	Voltage measurement range	0.0 ～ 350.0V	0.0 ～ 750.0V	0.0 ～ 1500.0V
	Measurement resolution	0.1V	0.1V	0.2V
	Measurement accuracy	± 0.3% of meas. ± 1V	± 0.3% of meas. ± 1V	± 0.3% of meas. ± 2V
Current measurement	Current measurement range	0.0 ～ ± 300.0A	0.0 ～ ± 200.0A	0.0 ～ ± 100.0A
	Measurement resolution	0.15A	0.125A	0.0625A
	Measurement accuracy	± 0.3% of meas. ± 0.3A	± 0.3% of meas. ± 0.25A	± 0.3% of meas. ± 0.125A
Power measurement	Power measurement range	0 ～ ± 50kW		
	Measurement resolution	20W		
	Measurement accuracy	± 0.5% of meas. ± 62.5W		
limit function				
Voltage Limit	Voltage setting range	0 ～ 360V	0 ～ 760V	0 ～ 1520V
	resolution	1V	1V	2V
	Operation at Limit	Alarm is triggered at the set value of the limit. Output stops.		
Current Limit	Current setting range	0 ～ ± 300A	0 ～ ± 200A	0 ～ ± 100A
	resolution	0.3A	0.25A	0.125A
	Operation at Limit	Clip the current at the set value of the limit		
Power Limit	Power setting range	0 ～ ± 50kW		
	resolution	20W		
	Operation at Limit	Clip power at limit setpoints		
Safeguard				
Emergency stop		Emergency stop of the equipment by pressing the emergency stop button on the rack		
Overvoltage protection		390V	780V	1560V
Overcurrent protection		330A	220A	110A
Overpower protection		51.5kW		
Overheat Protection		90℃（Switching element temperature）		
Undervoltage protection		-2V		

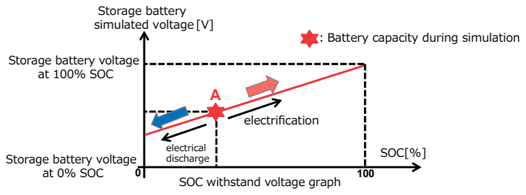
Specifications (continued)

Internal overvoltage protection		480V	960V	1920V
Reverse connection alarm		-2V		
System protection function				
Overcurrent protection		82Arms		
Overvoltage protection		445 to 475Vrms / Resolution 10Vrms / Detection time 0.1 to 2.5sec		
Undervoltage protection		325 to 355Vrms / Resolution 10Vrms / Detection time 0.1 to 2.5sec		
Overfrequency protection		50.0 to 65.9Hz / Resolution 0.1Hz / Detection time 0.0 to 9.9sec		
Insufficient Frequency Protection		45.0 to 60.9Hz / Resolution 0.1Hz / Detection time 0.0 to 9.9sec		
Stand-alone operation detection passive		Voltage phase jump detection / Detection level 2 to 10° / Enable/Disable selectable		
Stand-alone operation detection active		Reactive power fluctuation method / Enable/disable selectable		
Other Functions				
Remote sensing	Feature	Correction for voltage drop on power lines (up to 10 V one way)		
	EXT IN terminal (rear panel)	Rear terminal block (M6)		
Parallel run	Maximum number of parallel units	5 units		
	Maximum rated voltage/current/power	DC 350V ± 1500A 250kW	DC 750V ± 1000A 250kW	DC 1500V ± 500A 250kW
Serial operation	Maximum number of in-line units	2 units (not parallel when connected in series, factory option)		Cannot be connected in series
	Maximum rated voltage/current/power	DC 700V ± 300A100kW	DC 1500V ± 200A100kW	
External control signal Output/Input				
Digital I/O	Load on/off	Photocoupler input（DC12 ～ 24V/8mA）		
	Protection/alarm status	Photo-coupler output open collector（DC24V/10mA, 1mA recommended）		
	Operation mode setting	Photocoupler input（DC12 ～ 24V/8mA）		
	Emergency stop	Photocoupler input（DC12 ～ 24V/8mA）		
Analog input	Input voltage	0 ～ 10V		
	Setting items	CC, CC limit, CV, CV limit, CP, CP limit		
Analog Output Voltage monitor	Monitor output	0 ～ 10V / 0 ～ 500V	0 ～ 10V / 0 ～ 1000V	0 ～ 10V / 0 ～ 1500V
	Output impedance	50 Ω		
	port (e.g. LAN port)	BNC / Isolated output		
Analog Output Current monitor	Monitor output	-10 ～ 10V / -300 ～ 300A	-10 ～ 10V / -200 ～ 200A	-10 ～ 10V / -100 ～ 100A
	Output impedance	50 Ω		
	Port (e.g. LAN port)	BNC / Isolated output		
Interface				
LAN	Communication Specifications	IEEE 802.3		
	Connector	RJ45		
	Data rate	10Base-T 100Base-TX		
RS-232C	Connector	D-sub 9pin		
General Specifications				
Power supply	Input Rating	System side: 3-phase 3-wire 400 ± 40 V, 50 Hz ± 2 Hz or 60 Hz ± 2 Hz Overvoltage category II		
power factor	At maximum load	0.9 or higher		
Input power	At no load	800 VA or less		
Input	Maximum load (at AC400V)	73Arms		
	Maximum load (at AC360V)	89Arms		
	Recommended breaker	AC 100A		
Terminal block Screw diameter	Power output terminal block	M12	M10	M6
	System Entry Force Terminal Block	M6		
	Remote sense terminal block	M6		
Weight	Main body only	Approx. 750 kg or less		
Dimensions	Not including protrusions	W600 × H1977.5 × D900mm		
Environmental condition	Operating environment	In-house use		
	Operating temperature	0 ℃～ +40 ℃		
	Operating humidity	20 %rh to 85 %rh (no condensation)		
	Storage temperature	-20 ℃～ +60 ℃		
	Storage Humidity	20 %rh to 85 %rh (no condensation)		
	Advanced	2000 m or less		
Cooling method		Forced air cooling by fan		
Withstand voltage	Between input and output	No abnormality after application of 1800 VAC for 1 minute		
	Between input and FG	No abnormality after application of 1800 VAC for 1 minute		
Withstand voltage	Between input and FG	DC500 V, 30 M Ω min.		
Compliant Standards	EMC Standards	EN 61000-3-2		
	CE	Low Voltage Directive 2014/35/EU		
	Safety standards	IEC 61010-1		

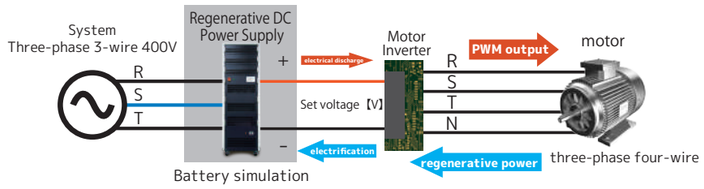
Application

Battery Simulation

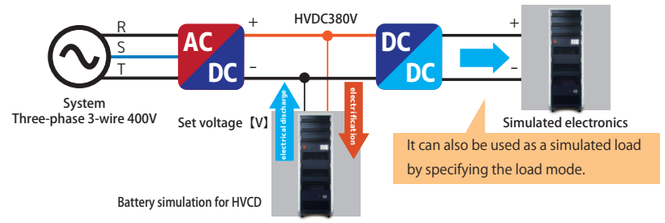
The CV mode is specified so that the set voltage value (A in the figure on the right) remains constant, and charge/discharge is automatically repeated. This enables battery simulation by simulating the A voltage.



Power supplies for automotive inverter evaluation

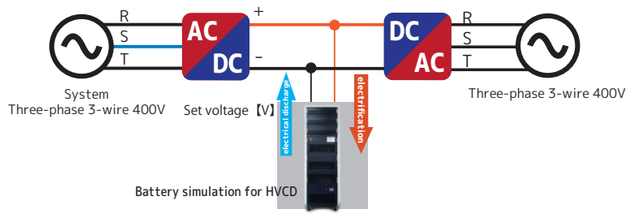


DC power supply (HVDC: High Voltage DC Network) evaluation

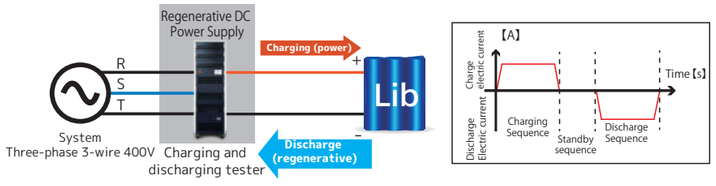


It can also be used as a simulated load by specifying the load mode.

As a battery simulator for high-capacity UPS, etc.

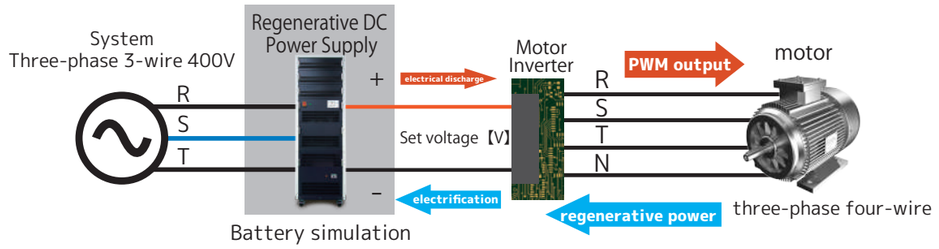


Charging and Discharging Tests

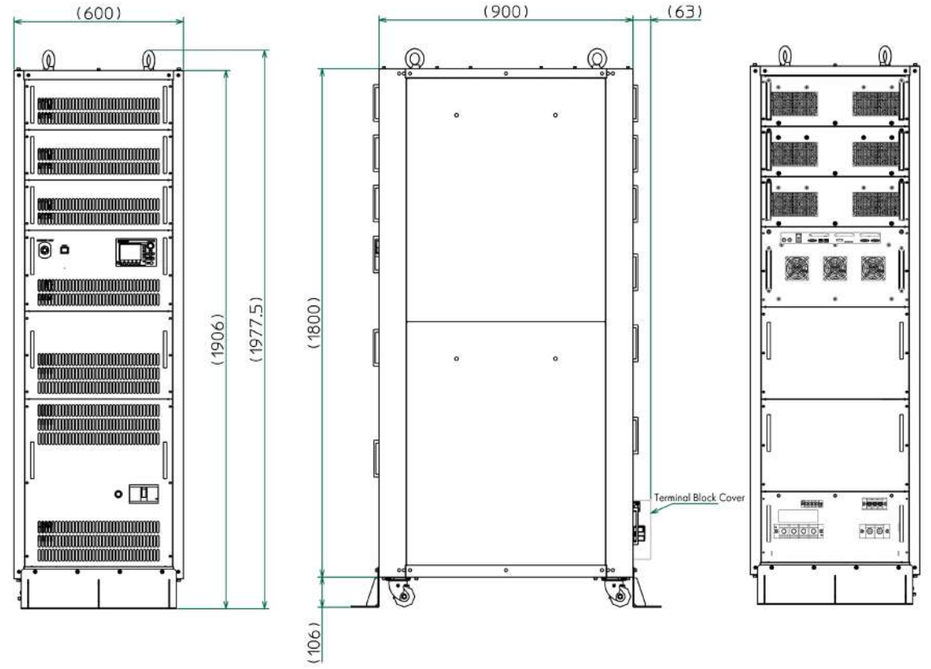


In CC or CP mode, by switching and specifying charge (power) and discharge (regeneration), the storage battery can be
Charging and discharging of storage batteries is possible.
The maximum voltage is as high as 1500V, so testing up to stacks is possible.

Three-phase PCS emulator with P and Q control of output values



Outline drawing



NT-AD-50K ■ -B Outline drawing
■ is D(350V) or H(750V) or O(1500V)

Regenerative DC electronic load
Regenerative type AC/DC electronic load

The electronic loads of the Ene-phantseries are From DC to 3-phase AC Suitable for evaluation of all energy sources.

46 patterns of regenerative electronic loads can be expanded by combination, ranging from DC up to 1500V to worldwide grid voltages for 3-phase 3-wire/4-wire. Load capacities can be extended up to 250 kW.
The system can be used to evaluate all energy sources, from the grid to converters and inverters. It can also flexibly handle power conversion for future automotive electronics such as V2L and V2G, which will become generation infrastructure equipment.

10kW dual-use AC/DC model - Provides increased capacity through expansion

Up to 13 expansion combination

	10kW	20kW	30kW	40kW	50kW
DC 680Vdc	NT-AD-10KE-L ×1 60A	NT-AD-10KE-L ×2 120A	NT-AD-10KE-L ×3 180A	NT-AD-10KE-L ×4 240A	NT-AD-10KE-L ×5 300A
1Φ 2W 480Vrms	NT-AD-10KE-L ×1 60Arms	NT-AD-10KE-L ×2 120Arms	NT-AD-10KE-L ×3 180Arms	NT-AD-10KE-L ×4 240Arms	NT-AD-10KE-L ×5 300Arms
1Φ 3W 480Vrms		NT-AD-10KE-L ×2 60Arms		NT-AD-10KE-L ×4 120Arms	
3Φ 3W/4W 480Vrms			NT-AD-10KE-L ×3 60Arms		

10kW DC model - Provides increased capacity through expansion

Up to 5 expansion combination

	10kW	20kW	30kW	40kW	50kW
DC 680Vdc	NT-AD-10KG-L ×1 60A	NT-AD-10KG-L ×2 120A	NT-AD-10KG-L ×3 180A	NT-AD-10KG-L ×4 240A	NT-AD-10KG-L ×5 300A

50kW AC/DC model - Provides increased capacity through expansion

Up to 13 expansion combination

	50kW	100kW	150kW	200kW	250kW
DC 750Vdc	NT-AD-50KE-L ×1 200A	NT-AD-50KE-L ×2 400A	NT-AD-50KE-L ×3 600A	NT-AD-50KE-L ×4 800A	NT-AD-50KE-L ×5 1000A
1Φ 2W 350Vrms	NT-AD-50KE-L ×1 175Arms	NT-AD-50KE-L ×2 350Arms	NT-AD-50KE-L ×3 525Arms	NT-AD-50KE-L ×4 700Arms	NT-AD-50KE-L ×5 875Arms
1Φ 3W 350Vrms		NT-AD-50KE-L ×2 175Arms		NT-AD-50KE-L ×4 350Arms	
3Φ 3W/4W 350Vrms			NT-AD-50KE-L ×3 175Arms		

50kW DC model - Provides increased capacity through expansion

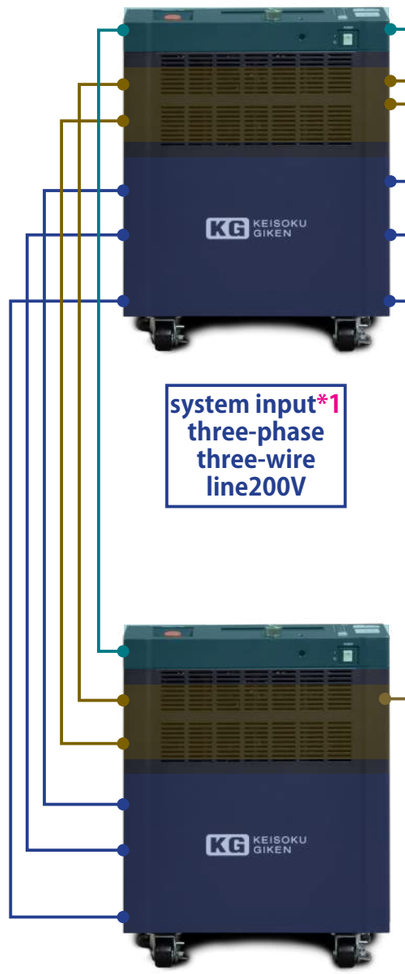
Up to 15 expansion combination

	50kW	100kW	150kW	200kW	250kW
350V	NT-AD-50KD-L ×1 300A	NT-AD-50KD-L ×2 600A	NT-AD-50KD-L ×3 900A	NT-AD-50KD-L ×4 1200A	NT-AD-50KD-L ×5 1500A
750V	NT-AD-50KH-L ×1 200A	NT-AD-50KH-L ×2 400A	NT-AD-50KH-L ×3 600A	NT-AD-50KH-L ×4 800A	NT-AD-50KH-L ×5 1000A
1500V	NT-AD-50KO-L ×1 100A	NT-AD-50KO-L ×2 200A	NT-AD-50KO-L ×3 300A	NT-AD-50KO-L ×4 400A	NT-AD-50KO-L ×5 500A

「AC-DC dual-use」＋「regeneration」
Aiming for the next level

10 kW model ～ 50 kW

Single phase, DC **NT-AA-10KE-L**



system input*1
three-phase
three-wire
line200V

DC only **NT-AD-10KG-L**

system input*1
three-phase
three-wire
line200V

Interface
USB, RS-232C, LAN, DI/DO, AI as standard equipment

Extended up to 50 kW
Up to 5 units, 50 kW for single-phase 2-wire
Expandable up to 30 kW (3 units) for three-phase

Load function（AC-DC dual-use）
DC: 680V/60A
CC,CR,CV.CP,MPPT

AC: 480Vrms/60Arms
CC,CR,CP,CF,PF(40 to 70Hz)
Advance/delay phase can be set
(-90deg to 0 to +90deg)

Frequency 40~440Hz seamless (optional)
Frequency 40~70Hz/380Hz~420Hz (optional)
Frequency 5~1000Hz (optional)
Additional load mode (GCC/GCR) for generators (optional)

Regenerative efficiency of 90% or more
Highest efficiency in the industry! 1/10 of the load power
High efficiency of more than 70% and high efficiency regeneration even with 1/10 of the load power!

Compliant with grid-connection regulations
Equipped with grid monitoring function as standard.
monitoring functionality equivalent to that of a PCS!

Low regenerative power noise
Power noise in accordance with CISPR Class A

Load function (DC only)
DC: 680V /60A
CC,CR,CV,CP,MPPT

*1Input voltage can be changed to single-phase 3-wire 200V (option)

50 kW model ～ 250 kW

Interface
RS-232C, LAN, DI/DO, AI/AO as standard equipment

Oscilloscope-like control panel
Large 3.5-inch LCD. The oscilloscope's
The button layout allows intuitive operation.

Extended up to 250 kW
Up to 5 units for single-phase 2-wire, up to 250 kW
Expandable up to 150 kW (3 units) for three-phase
*NT-AA-50KE-L model

Load function (DC only)
1500V/100A（NT-AD-50KO-L）
750V/200A（NT-AD-50KH-L）
350V/300A（NT-AD-50KD-L）

CC,CR,CV,CP,
MPPT（Factory Options）

Load function (AC-DC dual-use)
DC: 750V/200A
CC,CR,CV.CP,.
MPPT (factory option)

AC: 350Vrms/175Arms
CC,CR,CP,PF(40 to 70Hz)
Advance and delay phase can be set
（-90deg ～ 0 ～＋ 90deg）
Frequency 40 to 440Hz seamless (optional)
Frequency 40 to 70 Hz/380 to 420 Hz (optional)
Additional load mode (GCC/GCR) for generators (optional)

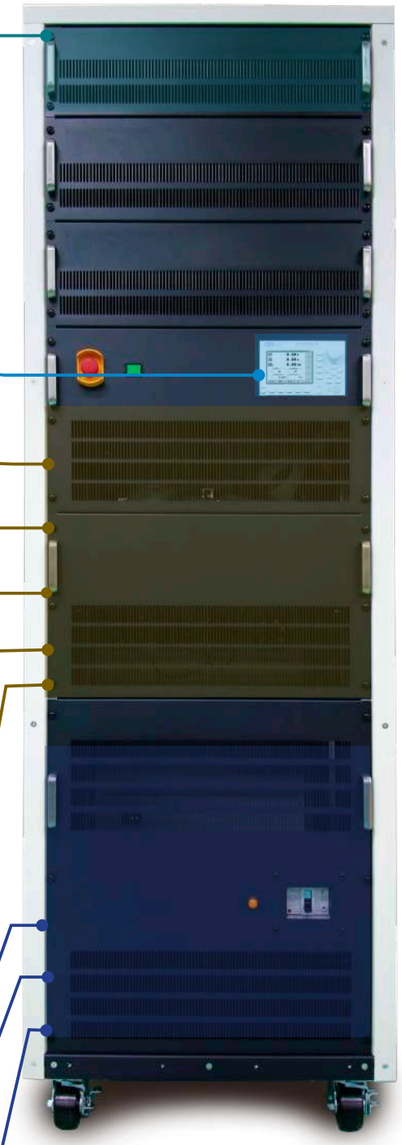
Maximum rated 1500V
NT-AD-50KO-L can handle up to 1500V

Series operation option
eries operation connection is available as an option. (except NT-AD-50KO-L)
Expandable up to 700 V with NT-AD-50KD-L (350 V) and up to 1'500 V with NT-AD-50KH-L by series connection*1

Regenerative efficiency of 90% or
High efficiency is realized! Highly efficient regeneration with efficiency of over 70% even at 1/10 of load power

Compliant with grid-connection regulations
Equipped with grid monitoring function as standard.
Capable of monitoring equivalent to PCS!

Low regenerative power noise
Power noise in accordance with CISPR Class A



Single phase, DC **NT-AA-50KE-L**

system input*2
three-phase three-wire line400V

DC only **NT-AD-50KO-L**
NT-AD-50KH-L
NT-AD-50KD-L

system input*2
three-phase three-wire line400V

*1Neutral point connected to ground
*2 Input voltage can be changed to 3-phase 200V (option)

Regenerative AC/DC Electronic Loads
Regenerative DC electronic load
Ene-phant Series

6 Model | MPPT | USB | LAN | booster | emergency stop | RS-232C | GP-IB (option) | スイッチング | regeneration | DC 1500V (50kW model) | DC 750V (50kW model) | DC 680V (10kW model) | AC 480V (10kW model) | AC 350V (50kW model)

The Ene-phant series of regenerative AC/DC electronic loads offers five load voltage models with capacities of 10 kW and 50 kW, from 350 V to 480 V AC and 350 V to 1500 V DC. It is the only AC load among regenerative electronic loads and can be used for a wide range of applications from three-phase to variable power factor. Since it can be used for both AC and DC, it can be used as a multi-input variable PCS, and can be used for demonstration experiments ranging from wind power generation and solar power generation to bio-fuel-based power generation.

※ Free control software "NT-AA Controller*1" is also available.

*1 : This is for 10kW models.

Download Page：https://www.keisoku.co.jp/pw/support/download-doc/

Order Information

Model	Name of product	Price
NT-AA-10KE-L	Regenerative AC/DC electronic load (single-phase 10 kW model)	Please contact us
NT-AD-10KG-L	Regenerative DC electronic load (single-phase 10 kW model)	
NT-AD-50KO-L	Regenerative DC electronic load (single-phase 50 kW model)	
NT-AD-50KH-L	Regenerative DC electronic load (single-phase 50 kW model)	
NT-AD-50KD-L	Regenerative DC electronic load (single-phase 50 kW model)	
NT-AA-50KE-L	Regenerative AC/DC electronic load (single-phase 50 kW model)	
NT-AA-10KE-L/REC	NT-AA-10KE-L Inspection Report	
NT-AD-10KG-L/REC	NT-AD-10KG-L Inspection Report	
NT-AD-50KO-L/REC	NT-AD-50KO-L Inspection Report	
NT-AD-50KD-L/REC	NT-AD-50KD-L Inspection Report	
NT-AD-50KH-L/REC	NT-AD-50KH-L Inspection Report	
NT-AA-50KE-L/REC	NT-AA-50KE-L Inspection Report	
AX-OP01	Master-slave connection 1m cable option	
AX-OP02	Master-slave connection 3m cable option	
AX-OP03*2	Voltage and current monitoring options	
AX-OP04*2	GP-IB interface option	
AX-OP05*2	Frequency 400Hz seamless option(40-440Hz)	
AX-OP07*2	AC cable 3m option	
AX-OP08*2	System-side power measurement option	
AX-OP09*2	Adjuster bracket	
AX-OP10*2	Option to convert to single-phase 3-wire 200V on the grid side	
AX-OP11*2	Additional load mode option for generators (GCC/GCR)	
AX-OP13*1	Optional three-phase 3-wire 200V conversion on the grid side	
AX-OP14*1	Frequency 400Hz seamless option (40-440Hz)	
AX-OP15*2	Frequency 400Hz option (for 40 to 70Hz/380 to 420Hz/10kW)	
AX-OP16*1	Frequency 400 Hz option (40 to 70 Hz/380 to 420 Hz)	
AX-OP17*1	Load mode option for generators (GCC/GCR)	
AX-OP18*2	Frequency 1,000 Hz seamless option (5 to 1,000 Hz)	

*1:Option for 50kW model only *2 : Option for 10kW model only

Load function

Various load modes for both AC and DC

Supports up to 12 different load modes in AC and DC mode, depending on the model

【Load Mode DC】

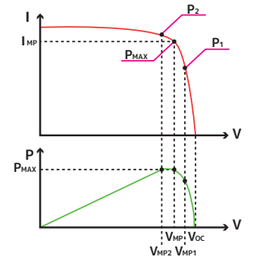
Model	CC	CR	CV	CP	CC+CV	CP+CV	MPPT
NT-AA-10KE-L	○	○	○	○	-	-	○
NT-AD-10KG-L	○	○	○	○	-	-	○
NT-AD-50KO-L	○	○	○	○	○	○	○ *1
NT-AD-50KH-L	○	○	○	○	○	○	○ *1
NT-AD-50KD-L	○	○	○	○	○	○	○ *1
NT-AA-50KE-L	○	○	○	○	○	○	○ *1

【Load Mode AC】

Model	CC	CR	CP	CF	PF	GCC	GCR
NT-AA-10KE-L	○	○	○	○	○	○ *1	○ *1
NT-AD-10KG-L	-	-	-	-	-	-	-
NT-AD-50KO-L	-	-	-	-	-	-	-
NT-AD-50KH-L	-	-	-	-	-	-	-
NT-AD-50KD-L	-	-	-	-	-	-	-
NT-AA-50KE-L	○	○	○	-	○	-	-

MPPT mode

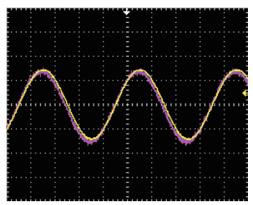
MPPT mode (mountain climbing method*) that enables testing of IV characteristics, etc. by directly connecting PV panels. This is a control method that continuously adjusts the operating voltage and current until maximum power* is obtained.



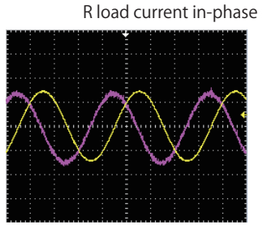
Mountain Climbing Method Mode Operation Image

PF mode (advance and delay current phase setting)

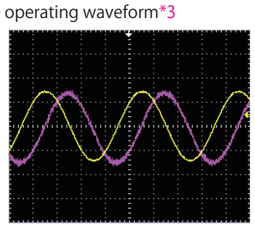
Capacitive (C), resistive (R), and inductive (L) loads can be simulated with a single unit. The phase can be set in the range of -90deg to +90deg, and can also be set by power factor. It is best suited as an output load for inverters.



R load current in-phase operating waveform*3



C Load current advance phase operating waveform*3



L Load Current Delay Phase Operating Waveform*3

Supports high voltages

Supports up to 1500V for a wide range of output load tests of various high-voltage devices associated with higher voltages of electronic components

【DC】

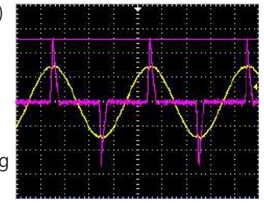
Model	Low range	High range
NT-AA-10KE-L	70 ～ 340V	140 ～ 680V
NT-AD-10KG-L	70 ～ 340V	140 ～ 680V
NT-AD-50KO-L	50 ～ 1500V	
NT-AD-50KH-L	20 ～ 750V	
NT-AD-50KD-L	20 ～ 350V	
NT-AA-50KE-L	20 ～ 750V（40 ～ 1500V*2）	

【AC】

Model	Low range	High range
NT-AA-10KE-L	50 ～ 240Vrms	100 ～ 480Vrms
NT-AD-10KG-L	-	
NT-AD-50KO-L	-	
NT-AD-50KH-L	-	
NT-AD-50KD-L	-	
NT-AA-50KE-L	20 ～ 350Vrms	

CF mode (Crest factor setting)

The crest factor (crest factor) can be set arbitrarily in the range from 1.4 (sine wave) to 4.0 in 0.1 increments. This enables testing that reproduces the crest factor of capacitor-sintop switching power supplies, etc.



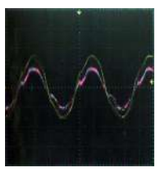
CF mode operating waveform*3

GCC/GCR mode(Factory option for generator output: AX-OP10, AX-OP17)

Even if the output waveform contains distortion, as in an engine generator, the new load modes GCC and GCR can take the load stably.
(Compatible models: NT-AA-10KE-L and NT-AA-50KE-L)

GCC：GeneratorCC
（Constant current mode for generators）
GCR：GeneratorCR
（Constant resistance mode for generators）

In addition, advance and delay phase can be set by PF mode



Operating waveform in GCR mode*3

Supports 400 Hz frequency (Factory option: AX-OP05, AX-OP15)

The standard frequency range is 40~70Hz, but with the option, 400Hz AC (380Hz~420Hz) for aircraft and ships can be supported. A custom option is also available for seamless response from 40 to 420 Hz. It can also be applied to evaluation and testing of industrial motor inverters (smoothing inductance is required separately). (Compatible models: NT-AA-10KE-L and NT-AA-50KE-L)

*1:Factory Options *2:When connected in series *3:Yellow: voltage / Pink: current

Load function

Frequency 1000 Hz supported (Factory option: AX-OP18)

Seamless operation from 5Hz to 1,000Hz

It responds from 5 Hz, which is the low frequency range required for motor simulation, and corresponds to the base frequency of motor inverters, 5 Hz to 1,000 Hz (accuracy guaranteed: 5 Hz to 800 Hz). This is the only model in Japan with a wide bandwidth of 5Hz to 1,000Hz for AC electronic loads. (According to our own research).
(Compatible model: NT-AA-10KE-L)

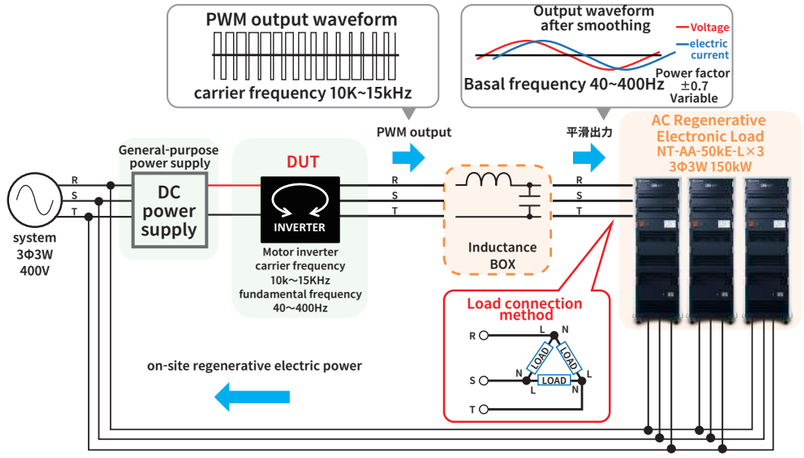
Frequency 400 Hz seamless option (Factory option: AX-OP05, AX-OP14)

Seamless operation from 40Hz to 440Hz

The base frequency of industrial motor inverters from 40 Hz to 440 Hz is supported.
(Compatible models: NT-AA-10KE-L and NT-AA-50KE-L)

Compatible with motor inverters (PWM output)

The PWM output from the motor inverter is smoothed by a filter to enable evaluation experiments without using a motor emulator or actual motor. Since it is not a dedicated testing device, it can also be used for a wide range of experiments as a general-purpose AC electronic load.



Grid interconnection (Regeneration)

Compliance with grid-connection regulations

Equipped with grid monitoring and protection functions compliant with grid interconnection regulations, it has the same monitoring and protection functions as general power conditioners on the market, allowing energy to be circulated safely and without waste. The various grid monitoring functions can be set to any desired value.

System monitoring	
OCR	overcurrent relay
OVR	overvoltage relay
UVR	undervoltage relay
OFR	overfrequency relay
UFR	under-frequency relay
Stand-alone operation detection function	Active method (frequency shift method)
	Passive method (voltage phase jump method)

Adopts electrical insulation with transformer

Electrical isolation between electronic load and grid by transformerbetween the electronic load and the system. Safe and securedesign.

Load side and grid side Transformer isolation" for peace of mind

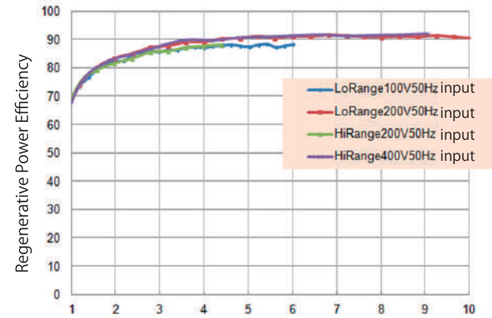
Single-phase 3-wire input voltage selection on the grid side(Factory option: AX-OP10)

Input voltage can be changed to single-phase 3-wire (single-phase 2-wire connection possible) system. 3-phase 4-wire 220V, 230V, etc. are also available upon special order.
(Compatible models: NT-AA-10KE-L, NT-AD-10KG-L)

Grid interconnection (Regeneration)

Regenerative efficiency of more than 90

High efficiency of over 90% (at rated load) is realized. Furthermore, a regenerative efficiency of 80% or higher is achieved when 15% or more of the rated power is used. Highly efficient regeneration is possible over a wide range of load power.

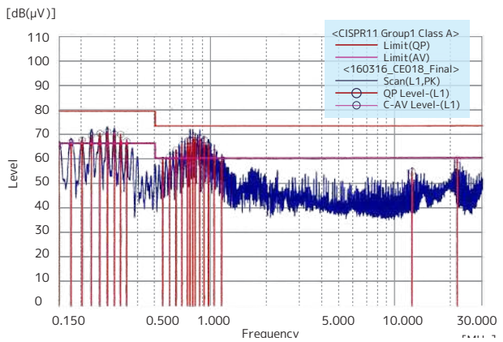


NT-AA10KE-L-Load Input
Regenerative Power Efficiency Characteristics

※ LoRange 100V 50Hz input: The maximum power data is up to 6kW because the load current specification range is 60A.

Regenerative power noise Complies with Class A of CISPR

Regenerative power noise complies with Class A. It is low noise so that there is no influence such as operation failure to other devices caused by regenerative power noise.



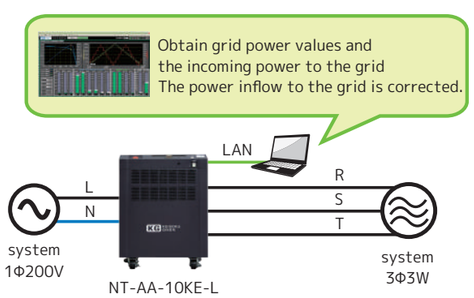
Three-phase 3-wire 200 V input voltage selection on the grid side(Factory option: AX-OP13)

The input voltage can be changed to the standard 3-phase 3-wire 200V used in offices and factories. 3-phase 4-wire 220V, 230V, etc. are also available upon special order.
(Compatible models: NT-AA-50KE-L, NT-AD-50KO-L, NT-AD-50KH-L, NT-AD-50KD-L)

System-side power measurement (Factory option: AX-OP08)

It can measure the integrated power and active power (instantaneous power) on the grid side. This function can be used as a multiple power generation simulator by controlling and correcting the power flowing into the grid by varying the load power. The ability to simulate power generation operations using software makes it ideal for smart grid demonstration experiments.
(Compatible models: NT-AA-10KE-L, NT-AD-10KG-L)

Multi-Power Generation Simulator



The load power can be varied and the power flowing into the grid can be controlled.
It can be used as a multi-generation simulator.

User interface

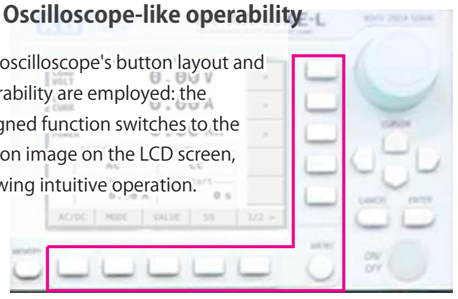
Easy to use and simple dial operation

A large dial (rotary knob) is provided for comfortable operation of various functions and settings. The controls are as simple as possible, with emphasis on intuitive operation.

10kW model

Oscilloscope-like operability

The oscilloscope's button layout and operability are employed: the assigned function switches to the button image on the LCD screen, allowing intuitive operation.



50kW model

Emergency stop button

Equipped with an emergency stop button, which is indispensable in the car electronics industry. The gate of the power line is blocked (forced open by conductor) when operating. To prevent malfunction, guards are provided for 10kW and 50kW respectively, and external control (DI input) is also possible.

10kW model

50kW model

Interface

Extensive interfaces

RS-232C, LAN (Ethernet), and PLC interfaces are commonly equipped as standard, enabling remote control including automation from a host PC. The 10kW model is also equipped with USB as standard. GP-IB (AX-OP04) can also be selected as an option.

【Load Mode DC】

Model	LAN	USB	RS-232C	GP-IB	DI/DO	AI
NT-AA-10KE-L	○	○	○	○ *1	○	○
NT-AD-10KG-L	○	○	○	○ *1	○	○
NT-AD-50KO-L	○	-	○	-	○	○
NT-AD-50KH-L	○	-	○	-	○	○
NT-AD-50KD-L	○	-	○	-	○	○
NT-AA-50KE-L	○	-	○	-	○	○

Analog input signal (AI): CC / CP / current phase setting
Digital input signal (DI): Load ON / OFF
Digital output signal (DO): Various alarms

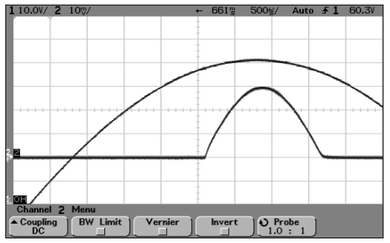
*1 : Factory Options

Voltage and current monitor

(Option: AX-OP03 10kW model only, 50kW is standard equipment)

Voltage and current monitoring (waveform observation with an oscilloscope, etc.) is possible with a BNC connector (isolated) as an option.
voltage and current can be monitored (waveform observation by oscilloscope, etc.) with BNC connector (isolated) as an option.

Voltage 10V/1000V/50 Ω BNC terminal/isolated output
Current 10V/200A/50 Ω BNC terminal/isolated output
In case of NT-AA-10KE-L and NT-AD-10KG-L

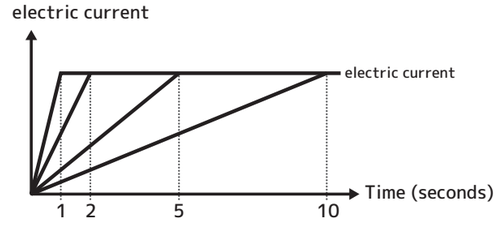


Regenerative AC/DC electronic load

Other

Soft start function

The time setting for current rise can be selected from four types: 1 second, 2 seconds, 5 seconds, and 10 seconds, allowing for flexible response to the responsiveness of the power supply under test, etc.



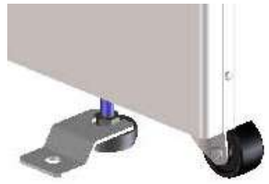
Body protection function

The main body of the electronic load device is equipped with 8 types of protection functions for safe test operation.

Safeguard	
OVP(INT)	Internal overvoltage protection
OTP(INT)	Internal overheat protection
OCP	Overcurrent protection
OVP	Overvoltage protection
LVP	Undervoltage protection
OPP	Overpower protection
OFP	Overfrequency protection
LFP	Low frequency protection

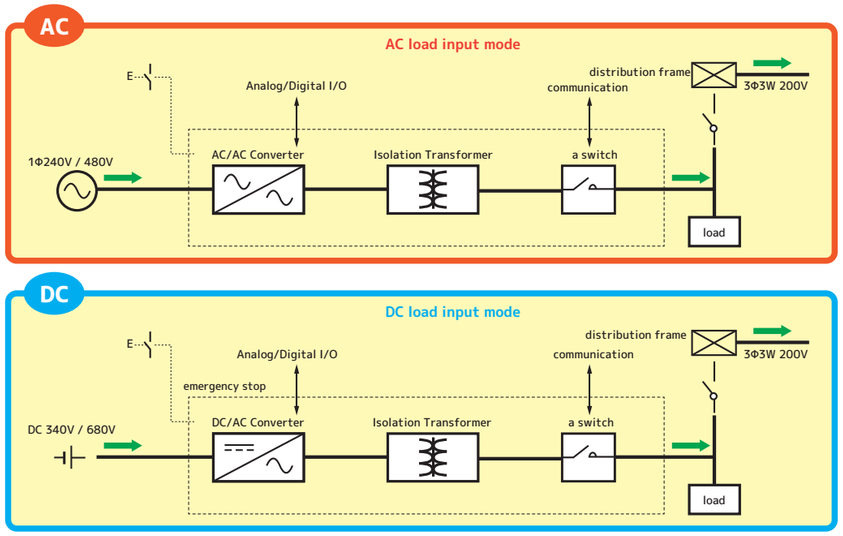
Convenient adjuster fixture for earthquake resistance (Option: AX-OP09 10kW model only)

Adjuster fixing fittings are available as an option. Anchor bolts can be hammered directly into the floor surface to secure the unit, providing earthquake protection.



Single-component overview chart

This is a single-coupling diagram for AC and DC modes respectively.



Series operation connection option (50kW model: optional)

The NT-AD-50KD-L can be used as a multi-power interface power conditioner by utilizing a wide range of DC inputs. The 350 V type NT-AD-50KD-L has an input voltage of 700 V, a current of 300 A, and a capacity of 100 kW, while the 750 V type NT-AD-50KH-L can expand the input voltage to 1500 V, a current of 200 A, and a capacity of 100 kW.
(Compatible models: NT-AD-50KD-L, NT-AD-50KH-L)

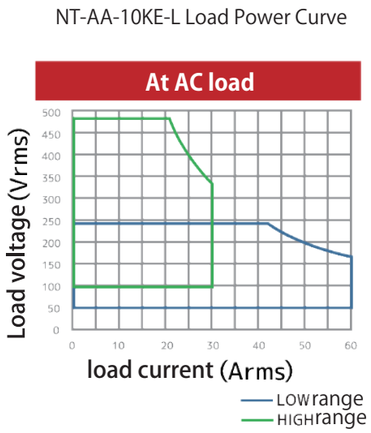
※ Neutral point connected to ground

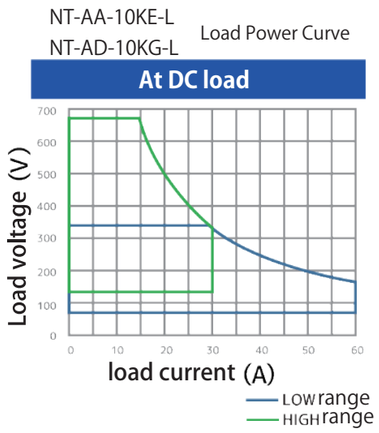
Expanded capacity up to 250 kW (50 kW model)

Three units in a master-slave configuration provide 150 kW of three-phase power, and five units in a master-slave configuration can be combined to provide up to 250 kW. The system can be used for quick charger testing and high-capacity EV battery testing.

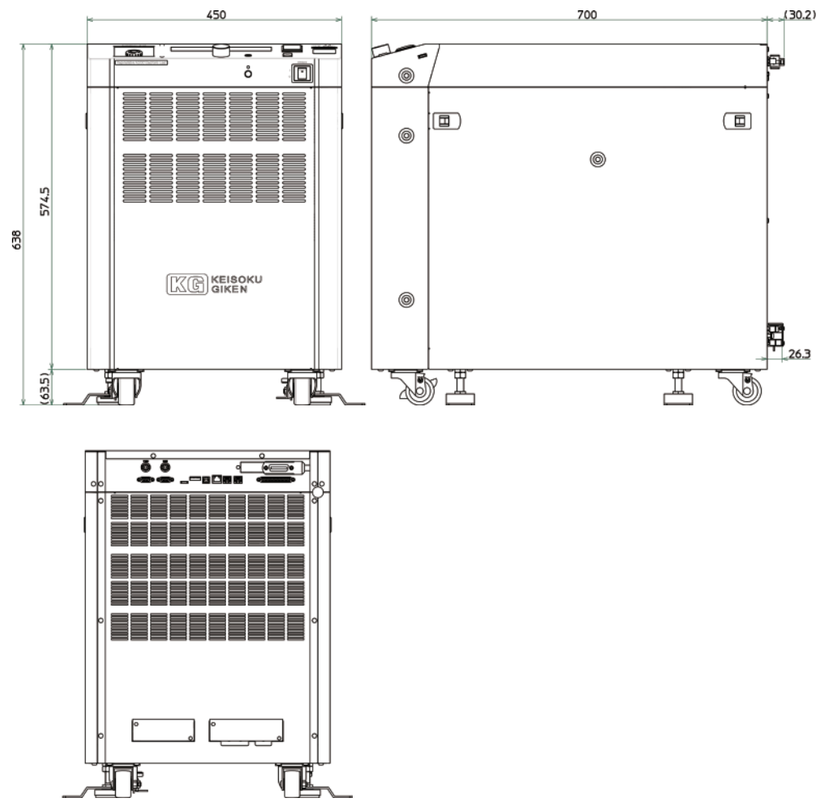
10kW model Operating range and Outside drawing

Operating range (power curve)





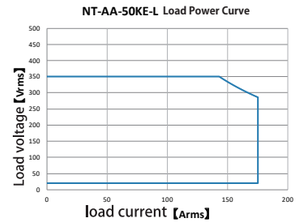
Outline drawing



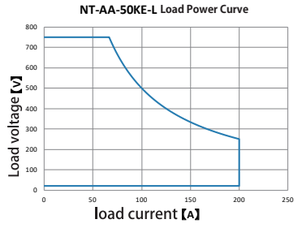
50kW model Operating range and Outside drawing

Operating range (power curve)

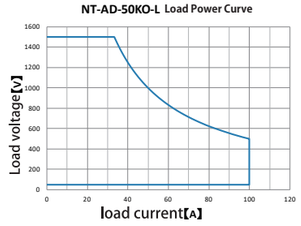
At AC load

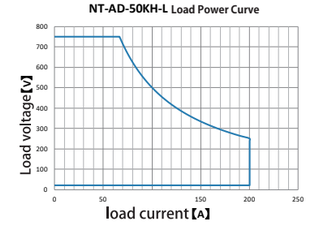


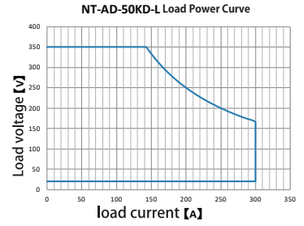
At DC load



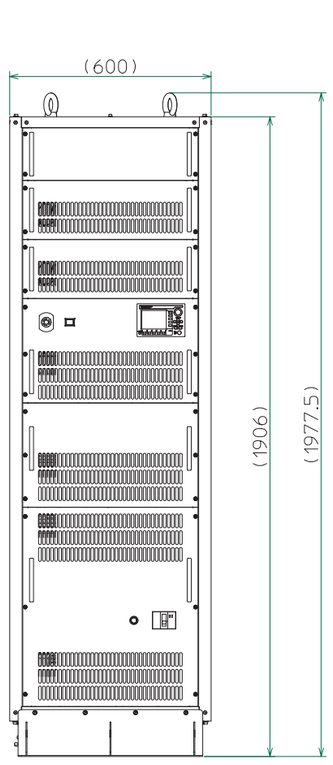
At DC load

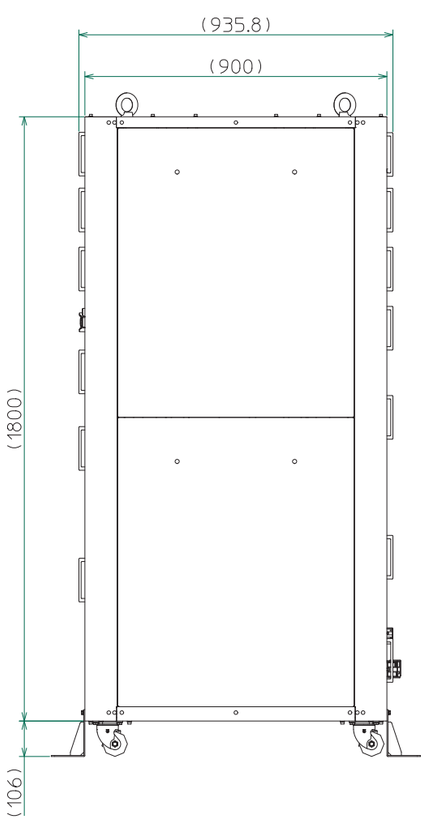






Outline drawing





Specification NT-AD-10KG-L

Model		NT-AD-10KG-L	
		Low range	High range
Rated value (engineering)			
Load section rating	Rated power	0 ~ 10 kW	
	Operating Frequency	DC	
	Rated current	60 A 10 kW > @180 V	30 A 10 kW > @360 V
	Rated voltage	70 ~ 340 V	140 ~ 680 V
	Minimum operating voltage	70 V	140 V
Load mode			
CC mode	Range of values	0 ~ 60A	0 ~ 30 A
	Setting resolution	50 mA	25 mA
	Accuracy (*1)	± 1.0 % ± 0.2 A	
CR mode	Range of values	1.2 ~ 3.4 k Ω	4.7 ~ 6.8 k Ω
	Setting resolution	10 siemens	
	Accuracy (*2)	Converted current value ± 1.0 % ± 0.2 A	
CV mode	Range of values	70 ~ 340 V	140 ~ 680 V
	Setting resolution	0.5 V	1.0 V
	Accuracy	± 1.0 % of Setting ± 1 V	± 1.0 % of Setting ± 2.0 V
CP mode	Range of values	0 ~ 10 kW	
	Setting resolution	20 W	
	Accuracy (*2)	1.0 % of Setting ± 40 W	
MPPT mode		Mountain climbing	
Measurement (*3) (*4)			
Voltage measurement	Measuring range	0 ~ 748 V (680 V + 10 %)	
	Measurement accuracy	± 2.0 % of meas ± 1.0 V	
	Measurement resolution	± 0.8 V	
Current measurement	Measuring range	0 ~ 66 A (60 A + 10 %)	
	Measurement accuracy	± 2.0 % of meas ± 0.2 A	
	Measurement resolution	± 0.12 A	
Power measurement	Measuring range	0 ~ 11 kW (10 kW + 10 %)	
	Measurement accuracy	± 4 % of meas. ± 1 W	
	Measurement resolution	± 0.1 W	
System-side active power measurement	Measuring range	11 kW (10 kW + 10 %) (optional)	
	Measurement accuracy	11 kW (10 kW + 10 %) (optional)	
System-side integrated power measurement	Measuring range	kWh (optional)	
Feature			
Response speed	Voltage	—	
	Electric current	200 usec or less (at 200 VDC input, voltage in low range)	
Current Limit	Range of values	0 ~ 60 A	0 ~ 30 A
	Setting resolution	1.0 A	0.5 A
Voltage Limit	Range of values	70 ~ 340 V	140 ~ 680 V
	Accuracy	0.5 V	1.0 V
Power Limit	Range of values	100 W ~ 10 kW	
	Setting resolution	20 W	
Power Limit	Range of values	1, 2, 5, 10 sec	
Parallel connection (Master/Slave)	1P2W	1 to 5 units	
	1P3W	2 / 4 units	
	3P3W	3 units	

Protection		
Safeguard	Emergency stop	Internal relay switch off (stop operation by emergency stop button)
	Internal overvoltage(IVP)	Internal HVDC 430 V or more for load disconnection operation
	Internal overheating	Switching device mounting Load shutdown operation at 90 ° C or higher on heatsink
	Overcurrent (OCP)	Setting resolution and accuracy are the same as CC mode (Threshold is set by current limit)
	Overvoltage (OVP)	Setting resolution and accuracy are as same as CV mode (Threshold is set by current limit)
	Undervoltage (UVP)	Setting resolution and accuracy are the same as CV mode
	Over Power (OPP)	10.5 kW or more Load shutdown
	DC side reverse connection(DRCP)	LoadOn is not turned on when the applied voltage is reverse polarity.
System protection function	Overcurrent (OCR)	None (standby time and recovery method are common, OFF)
	Overvoltage (OVR)	220 to 280 V (10 V steps) (common standby time and recovery method, OFF)
	Undervoltage (UVR)	120 to 190 V (10 V steps) (common standby time and recovery method, OFF)
	Over Frequency (OFR)	50.0 to 65.9 Hz (0.1 Hz steps) (common standby time and return method, OFF)
	Under Frequency (UFR)	45.0 to 60.9 Hz (0.1 Hz steps) (common standby time and recovery method, OFF)
	Independent operation detectionPassive (IDP)	Deg voltage phase jump (Wait time and return method are common)
	Independent operation detectionActive (IDA)	Master-slave, up to 50 kW limit Cancel if system protection is OFF
	Reverse Tidal Limit	Frequency shift (standby time and return method are common)
External interface		
Interface	Standard	RS-232C, USB (1.1 compliant), LAN
	Option	GP-IB
External Control	DI	Photocoupler input
	DO	Photo-coupler output (open collector)
	AI	0 ~ 10 V (CC/CP)
Monitor output (Optional)	Voltage	0 to 10 V / 0 to 1000 V, BNC/50 Ω /isolated output (optional)c
	Electric current	0 to 10 V / 0 to 200 A, BNC/50 Ω /isolated output (optional)
General Specifications		
Rated voltage of power supply (domestic specification)		3 Φ 3W 202 V ± 20 V、50 / 60 Hz
Withstand voltage	Withstand voltage	AC 1800 V for 1 minute
	Input- Between load terminals	AC 1800 V for 1 minute
Insulation resistance	Between Input and FG Input- Between load terminals	DC 500 V 30 M Ω min.
Ripple current		2 A or less / 1 A or less
Switching frequency		25 kHz
Operating environment	Active area	System side input: 3 Φ 3W 202 V ± 20 V, 50 / 60 Hz Load side: 0 A to 60 A, 0 W to 10000 W
	Power Consumption	200 VA or less (standby state)
	Ambient temperature	0 ~ + 40 °C
	Environmental humidity	20 to 85 % RH (no condensation, no corrosive gases)
	Installation environment	Indoor (court, pool, etc.)
	advanced	Less than 2000 m
	Cooling method	Forced air cooling
Dimensions (W x H x D)		W 450 × H 638 × D 700 (mm) (Not including protrusions)
Weight		172 kg

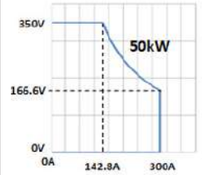
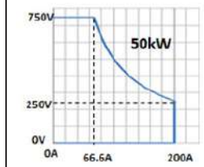
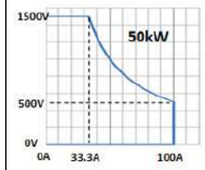
*1 :Low range: at 200 V, Hi range: at 400 V. Accuracy is not guaranteed below 5 A. *2 :Low range: at 200 V, Hi range: at 400 V. Accuracy is not guaranteed below 5 A.*3 :Indicator not guaranteed *4 :The current measurement system is shared with the current sensor of the internal converter, so the amount of current flowing through the filter circuit (about 15uF) is an error.*The contents of product specifications are subject to change without notice.

Specification NT-AA-10KE-L

Model		NT-AA-10KE-L	
		Low range	High range
Load section rating	Rated power	0 ～ 10kW	
	Operating Frequency	DC, 40 ～ 70Hz(400Hz is optional)	
	Stop motion current	60Arms 120Apeak / 60Adc	30Arms 60Apeak / 30Adc
	Rated voltage	240Vrms / 340Vdc	480Vrms / 680Vdc
	Minimum operating voltage	50Vrms / 70Vdc	100Vrms / 140Vdc
	Regenerative efficiency	More than 90% of the maximum (when framed into the output force)	
CC モード	Range of values	0 ～ 60Arms / 0 ～ 60Adc	0 ～ 30Arms / 0 ～ 30Adc
	Resolution	50mA	25mA
	Accuracy *1, 2	± 1.0% of Setting ± 0.2A(DC, 50/60Hz)	
	Power factor setting range	± 1.00(AC mode only)	
	Force Rate Setting Decomposition Energy	0.01(AC mode only)	
	Phase difference setting range	± 90deg(AC mode only)	
	Phase difference setting resolution	1deg(AC mode only)	
CR Mode	Range of values	AC : 0.9 ～ 3.4k Ω / DC:1.2 ～ 3.4k Ω	AC : 3.4 ～ 6.8k Ω / DC:4.7 ～ 6.8k Ω
	Setting resolution	10S	
	Accuracy *1	± 1.0% of converted current ± 0.2A (DC, 50/60Hz)	
CV mode (DC mode only)	Range of values	70 ～ 340V	140 ～ 680V
	Setting resolution	0.5V	1V
	Accuracy	± 1.0% of Setting ± 1V	± 1.0% of Setting ± 2V
CP Mode	Range of values	0 ～ 10kW	
	Setting resolution	20W	
	Accuracy *1	± 1.0% of Setting ± 40W(DC, 50/60Hz)	
MPPT mode (DC mode only)		Mountain climbing	
CF mode (AC mode only)	Range of values	1.4 to 4.0 (peak current limited)	
	Setting resolution	0.1	
Response speed	Voltage	----	
	Electric current	400usec or less (at 200V DC input, voltage in low range)	
Current Limit	Range of values	0 ～ 120Aac / 0 ～ 60Adc	0 ～ 60Aac / 0 ～ 30Adc
	Setting resolution	0.5A	1.0A
Voltage Limit	Range of values	50 ～ 240Vrms / 70 ～ 340Vdc	100 ～ 480Vrms / 140 ～ 680V
	Setting resolution	0.5V	1.0V
Power Limit	Range of values	100W ～ 10kW	
	Setting resolution	20W	
Soft start	Range of values	1, 2, 5, 10sec	
Voltage measurement	Measuring range	0 ～ 748V	
	Measurement accuracy	± 2.0% of meas ± 1V	
	Measurement resolution	± 0.8V	
Current measurement	Measuring range	0 ～ 66A (60A+10%)	
	Measurement accuracy	± 2.0% of meas ± 0.2A	
	Measurement resolution	± 0.12A	
Peak current measurement	Measuring range	0 ～ 132A (120A+10%)	
	Measurement accuracy	± 2.0% of meas ± 0.2A	
	Measurement resolution	± 0.12A	
Effective power measurement	Measuring range	0 ～ 11kW (10kW+10%)	
	Measurement accuracy	± 4.0% of meas ± 1W	
	Measurement resolution	± 0.1W	
Apparent power measurement	Measuring range	0 ～ 11kVA (10kVA+10%)	
	Measurement accuracy	± 2% of meas ± 40VA	
	Measurement resolution	± 0.1VA	
Power factor measurement	Measuring range	± 1.00	
	Measurement accuracy	± 10% of measure	
	Measurement resolution	0.01	
Frequency measurement	Measuring range	40 ～ 70Hz	
	Measurement accuracy	± 10% of measure	
	Measurement resolution	1Hz	
Safeguard		Emergency stop, internal overvoltage, internal overheat, overcurrent, overvoltage, undervoltage, overpower, Overfrequency, underfrequency, reverse connection on DC side	
System protection function		Overcurrent, overvoltage, undervoltage, overfrequency, underfrequency, Passive stand-alone operation detection, active stand-alone operation detection	
Interface	Standard	RS-232C, USB, Ethernet(LAN)	
	Option	GP-IB	
External Control	DI	Photocoupler input	
	DO	Photo-coupler output (open collector)	
	AI	0 ～ 10V(CC/CP/ Phase difference)	
Monitor output (Optional)	Voltage	0 ～ 10V / 0 ～ 1000V, BNC/50 Ω /Isolated output	
	Electric current	0 ～ 10V / 0 ～ 200A, BNC/50 Ω /Isolated output	
Parallel connection (Master/Slave)	1P2W	1 to 5 units	
	1P3W	2 / 4 units	
	3P3W	3 units	
General Specifications	Active area	System side input: 3-phase 3-wire 202V ± 20V, 50/60Hz Load side: AC 50 to 480Vrms / DC 70 to 680V	
	Power Consumption	200VA or less (standby state)	
	External dimensions	W450 × H638 × D700mm	
	Weight	171kg	
	Operating elevation	Less than 1000m	
	Ambient temperature	0 ～ +40℃	
	Environmental humidity	20 ～ 85%RH(No condensation, no corrosive gases)	

*1 5A or less out of range of use *2 50/60Hz

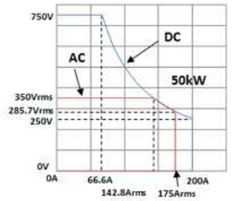
Specification NT-AD-50KD-L/NT-AD-50KH-L/NT-AD-50KO-L

Model		NT-AD-50KD-L	NT-AD-50KH-L	NT-AD-50KO-L
Basic functionality				
Output range				
Rated value (engineering)	Framing Power	50kW		
	Rated voltage	350V	750V	1500V
	Stop motion current	300A	200A	100A
	Minimum operating voltage	0V		
	Ripple current	Within 4Ap-p (switching frequency component)		
	Regenerative efficiency	More than 90% of the maximum (when framed into the output force)		
Constant voltage (CV) mode	Voltage setting range	0 ～ 350V	0 ～ 750V	0 ～ 1500V
	Setting resolution	0.1V		
	Accuracy	± 0.3% of F.S.		
	Response Time	Within 500msec（10% ～ 90%）		
Constant current (CC) mode	Current setting range	0 ～ 300A	0 ～ 200A	0 ～ 100A
	Setting resolution	0.3A	0.25A	0.125A
	Accuracy	± 0.3% of F.S.		
	Response Time	Within 5msec（10% ～ 90%）		
Constant resistance (CR) mode	Current setting range	0.05 Ω～ 1.50k Ω	0.1 Ω～ 3.00k Ω	1 Ω～ 6.00k Ω
	Setting resolution	100S	50S	10S
	Accuracy	0.3% of Rated Converted Current		
	Response Time	5msec 以内（10% ～ 90%）		
Constant Power (CP) mode	Power setting range	0 ～ 50kW		
	Setting resolution	20W		
	Accuracy	± 0.5% of F.S.		
	Response Time	Within 5msec（10% ～ 90%）		
MPPT mode		Mountain climbing method (factory option)		
CC+CV mode		Setting range, resolution, and accuracy conform to CC mode and CV mode		
CP+CV mode		Setting range, resolution, and accuracy conform to CP mode and CV mode		
Soft start		0, 1, 2, 5, 10sec		
Measurement Division				
Voltage measurement	Voltage measurement range	0.0 ～ 350.0V	0.0 ～ 750.0V	0.0 ～ 1500.0V
	Measurement resolution	0.1V	0.1V	0.2V
	Measurement accuracy	± 0.3% of meas. ± 1V	± 0.3% of meas. ± 1V	± 0.3% of meas. ± 2V
Current measurement	Current measurement range	0.0 ～ 300.0A	0.0 ～ 200.0A	0.0 ～ 100.0A
	Measurement resolution	0.15A	0.125A	0.0625A
	Measurement accuracy	± 0.3% of meas. ± 0.3A	± 0.3% of meas. ± 0.25A	± 0.3% of meas. ± 0.125A
Power measurement	Power measurement range	0 ～ 50kW		
	Power measurement range	20W		
	Measurement accuracy	± 0.5% of meas. ± 62.5W		
limit function				
Voltage Limit	Voltage setting range	0 ～ 360V	0 ～ 760V	0 ～ 1520V
	Resolution	1V	1V	2V
	Operation at Limit	Alarm is triggered at the set value of the limit. Output stops.		
Current Limit	Current setting range	0 ～ 300A	0 ～ 200A	0 ～ 100A
	Resolution	0.3A	0.25A	0.125A
	Operation at Limit	Clip the current at the set value of the limit		
Power Limit	Power setting range	0 ～ 50kW		
	Resolution	20W		
	Operation at Limit	Clip the current at the set value of the limit		
Safeguard				
Emergency stop		Emergency stop of the equipment by pressing the emergency stop button on the rack		
Overvoltage protection		390V	780V	1560V
Overcurrent protection		330A	220A	110A
Overpower protection		51.5kW		
Overheat Protection		90℃（Switching element temperature）		
Undervoltage protection		-2V		
Internal overvoltage protection		480V	960V	1920V
Reverse connection alarm		-2V		

(technical) specification NT-AD-50KD-L/NT-AD-50KH-L/NT-AD-50KO-L（succession）

System protection function				
Overcurrent protection		82Arms		
Overvoltage protection		445 ～ 475Vrms / Resolution 10Vrms / Detection time 0.1 to 2.5sec		
Undervoltage protection		325 ～ 355Vrms / Resolution 10Vrms / Detection time 0.1 to 2.5sec		
Overfrequency protection		50.0 ～ 65.9Hz / Resolution 0.1Hz / Detection time 0.0 to 9.9sec		
Insufficient Frequency Protection		45.0 ～ 60.9Hz / Resolution 0.1Hz / Detection time 0.0 to 9.9sec		
Stand-alone operation detection passive		Voltage phase jump detection / Detection level 2 to 10° / Enable/Disable selectable		
Stand-alone operation detection active		Reactive power fluctuation method / Enable/disable selectable		
Other Functions				
Remote sensing	Feature	Correction for voltage drop in power lines (up to 10 V one way)		
	EXT IN terminal (rear panel)	Rear terminal block（M6）		
Parallel run	Maximum number of parallel units	5 units		
	Maximum rated voltage/current/power	DC 350V 1500A 250kW	DC 750V 1000A 250kW	DC 1500V 500A 250kW
Serial operation	Maximum number of in-line units	2 units (not parallel when connected in series, factory option)		Cannot be connected in series
	Maximum rated voltage/current/power	DC 700V 300A 100kW	DC 1500V 200A 100kW	
External control signal Output/Input				
Digital I/O	Load on/off	Photocoupler input（DC12 ～24V/8mA）		
	Protection/alarm status	Photo-coupler output open collector（DC24V/10mA、recommendation1mA）		
	Operation mode setting	Photocoupler input（DC12 ～24V/8mA）		
	Emergency stop	Photocoupler input（DC12 ～24V/8mA）		
Analog input	Input voltage	0 ～ 10V		
	Setting items	CC, CC limit, CV, CV limit, CP, CP limit		
Analog Output Voltage monitor	Monitor output	0 ～ 10V / 0 ～ 500V	0 ～ 10V / 0 ～ 1000V	0 ～ 10V / 0 ～ 1500V
	Output impedance	50 Ω		
	Port (e.g. LAN port)	BNC / Isolated output		
Analog Output Current monitor	Monitor output	0 ～ 10V / 0 ～ 300A	0 ～ 10V / 0 ～ 200A	0 ～ 10V / 0 ～ 100A
	Output impedance	50 Ω		
	Port (e.g. LAN port)	BNC / Isolated output		
Interface				
LAN	Communication Specifications	IEEE 802.3		
	Connector	RJ45		
	Data rate	10Base-T 100Base-TX		
RS-232C	Connector	D-sub 9pin		
General Specifications				
Power supply	Input Rating	System side: 3-phase 3-wire 400 ± 40 V, 50 Hz ± 2 Hz or 60 Hz ± 2 Hz Overvoltage category II		
Power factor	At maximum load	0.9 or higher		
Input power	At no load	800 VA 以下		
input current	At maximum load（At 400 VAC）	60Arms		
	At maximum load（At 360 VAC）	73Arms		
	Recommended breaker	AC 100A		
Terminal block Screw diameter	Power output terminal block	M12	M10	M6
	System Entry Force Terminal Block	M6		
	Remote sense terminal block	M6		
Weight	Main body only	Approx. 750 kg or less		
Dimensions	Not including protrusions	W600 × H1977.5 × D900mm		
Environmental condition	operating environment	Indoor use		
	Operating temperature	0 ℃～ +40 ℃		
	Operating humidity	20 %rh ～ 85 %rh（No dew condensation）		
	Storage temperature	-20 ℃～ +60 ℃		
	Storage Humidity	20 %rh ～ 85 %rh（No dew condensation）		
	Advanced	2000 m or less		
Cooling method		Forced air cooling by fan		
Withstand voltage	Between input and output	AC1800 V、No abnormality after 1 minute of application		
	Between input and FG	AC1800 V、No abnormality after 1 minute of application		
Insulation resistance	Between input and FG	DC500 V、30 M Ω min.		
Compliant Standards	EMC Standards	EN 61000-3-2		
	CE	Low Voltage Directive 2014/35/EU		
	Safety standards	IEC 61010-1		

(technical) Specification NT-AA-50KE-L

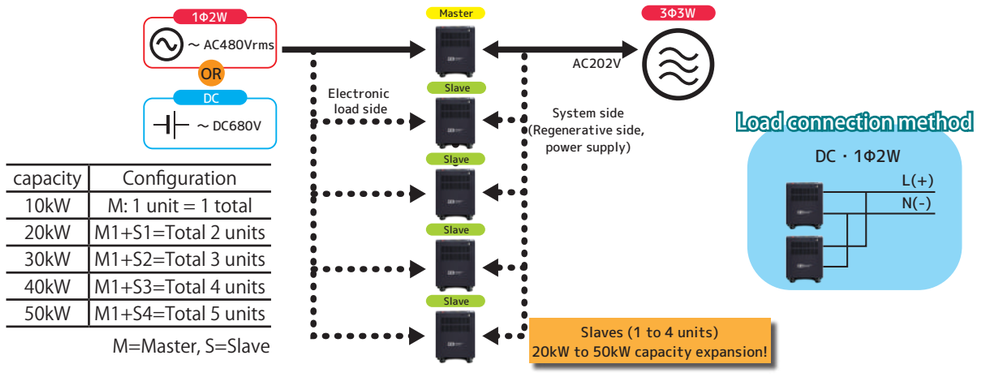
Model		NT-AA-50KE-L
Basic functionality		
Output range		
Rated value (Engineering)	Framing Power	50kW
	Rated voltage	AC 350Vrms / DC 750V
	Stop motion current	AC 175Arms / DC 200A
	Minimum operating voltage	AC 20Vrms / DC 20V
	Ripple current	Within 4Ap-p(Switching frequency component)
	Regenerative efficiency	More than 90% of the maximum (when framed into the output force)
Constant voltage (CV) mode (DC mode only)	Voltage setting range	DC 20 ～ 750V
	Setting resolution	1V
	Accuracy	1% of setting. ± 2V
	Response Time	Within 500msec（10% ～ 90%）
Constant current (CC) mode	Current setting range	AC 0.0Arms ～ 175Arms / DC 0.0A ～ 200.0A
	Setting resolution	AC 0.25Arms / DC 0.25A
	Accuracy	AC 2% of setting. ± 2.50Arms DC1% of setting. ± 1.25A
	Power Factor Setting Range / Resolution	± 1.00 / 0.01 (AC mode only)
	Phase difference setting range / resolution	± 90deg / 1deg (AC mode only)
	Response Time	Within 5msec（In DC mode 10% ～ 90%）
Constant resistance (CR) mode	Current setting range	AC 0.12 Ω～ 1.40k Ω / DC 0.10 Ω～ 3.00k Ω
	Setting resolution	50S
	Accuracy	2% of converted set current value ± 2.50A
	Response Time	Within 5msec（10% ～ 90%）
Constant Power (CP) mode	Power setting range	0 ～ 50kW
	Setting resolution	20W
	Accuracy	2% of setting. ± 200W
	Response Time	Within 5msec（In DC mode 10% ～ 90%）
MPPT mode（DC mode only）		Mountain climbing(Factory Options)
CC+CV mode（DC mode only）		Setting range, resolution, and accuracy conform to CC mode and CV mode
CP+CV mode（DC mode only）		Setting range, resolution, and accuracy conform to CP mode and CV mode
Soft start		0, 1, 2, 5, 10sec
Measurement Division		
Voltage measurement	Voltage measurement range	0.0 ～ 750.0V
	Measurement resolution	0.1V
	Measurement accuracy	1% of meas. ± 1V
Current measurement	Current measurement range	0.0 ～ 300.0A
	Measurement resolution	0.125A
	Measurement accuracy	1% of meas. ± 1A
Peak current measurement		0A ～ 220A
Effective power measurement	Power measurement range	0 ～ 50kW
	Measurement resolution	20W
	Measurement accuracy	2% of meas. ± 250W
Apparent power measurement		0VA ～ 50kVA
Power factor measurement		± 1.00
Frequency measurement		40Hz ～ 70Hz
limit function		
Voltage Limit	Voltage setting range	AC 20V ～ 510V(kurtosis) / DC 20 ～ 760V
	Resolution	1V
	Operation at Limit	Alarm is triggered at the set value of the limit. Output stops.
Current Limit	Current setting range	AC 250A(kurtosis) / DC 200A
	Resolution	0.25A
	Operation at Limit	Clip the current at the set value of the limit
Power Limit	Power setting range	0 ～ 50kW
	Resolution	100W
	Operation at Limit	Clip power at limit setpoints
Safeguard		
Emergency stop		Emergency stop of the equipment by pressing the emergency stop button on the rack
Overvoltage protection		AC 365Vrms / DC 780V
Overcurrent protection		AC 195Arms / DC 220A
Overpower protection		51.5kW

(technical) Specification NT-AA-50KE-L（succession）

Overheat Protection		90℃（Switching element temperature）
Undervoltage protection		AC 10Vrms / DC 10V
Overfrequency protection		75Hz
Low frequency protection		35Hz
Internal overvoltage protection		960V
Reverse connection alarm	（DC mode only）	-10V
System protection function		
Overcurrent protection		82Arms
Overvoltage protection		445 ～ 475Vrms / Resolution10Vrms / Detection time0.1 ～ 2.5sec
Undervoltage protection		325 ～ 355Vrms / Resolution10Vrms / Detection time0.1 ～ 2.5sec
Overfrequency protection		50.0 ～ 65.9Hz / Resolution0.1Hz / Detection time0.0 ～ 9.9sec
Insufficient Frequency Protection		45.0 ～ 60.9Hz / Resolution0.1Hz / Detection time0.0 ～ 9.9sec
Stand-alone operation detection passive		Voltage phase jump detection / Detection level 2 ～ 10° / Enable disabled
Stand-alone operation detection active		Reactive power variation method / Enable disabled
Other Functions		
Remote sensing	Feature	Correction for voltage drop in power lines (up to 10 V one way)
	EXT IN terminal (rear panel)	Rear terminal block（M6）
Parallel run	1P2W	5 units
	1P3W	2 units/4 units
	3P3W	3 units
	Maximum rated voltage/ current/power	AC 350Vrms 875Arms 250kW / DC 750V 1000A 250kW
Serial operation	Maximum number of units in series	2 units(Cannot be parallel when connected in series、Factory option for DC mode only)
	Maximum rated voltage/ current/power	DC 1500V 200A 100kW
External control signal Output/Input		
Digitall/O	Load on/off	Photocoupler input（DC12 ～24V/8mA）
	Protection/alarm status	Photo-coupler output open collector（DC24V/10mA、Recommended 1mA）
	Operation mode setting	Photocoupler input（DC12 ～24V/8mA）
	Emergency stop	Photocoupler input（DC12 ～24V/8mA）
Analog input	Input voltage	0 ～ 10V
	Setting items	CC, CC limit, CV, CV limit, CP, CP limit
Analog Output Voltage monitor	Monitor output	-10 ～ 10V / -1000 ～ 1000V
	Output impedance	50 Ω
	port (e.g. LAN port)	BNC / Isolated output
Analog Output Current monitor	Monitor output	-10 ～ 10V / -200 ～ 200A
	Output impedance	50 Ω
	Port (e.g. LAN port)	BNC / Isolated output
Interface		
LAN	Communication Specifications	IEEE 802.3
	Connector	RJ45
	Data rate	10Base-T 100Base-TX
RS-232C	Connector	D-sub 9pin
General Specifications		
Power supply	Input Rating	System side: 3-phase 3-wire 400 ± 40 V, 50 Hz ± 2 Hz or 60 Hz ± 2 Hz Overvoltage category II
Power factor	At maximum load	0.9 or higher
Input power	At no load	800 VA or less
Input	At maximum load（At 400 VAC）	60Arms
	At maximum load（At 360 VAC）	73Arms
	Recommended breaker	AC 100A
Terminal block Screw diameter	Power input terminal block	M10
	System input terminal block	M6
	Remote sense terminal block	M6
Weight	Main body only	Approx. 750 kg or less
Dimensions	Not including protrusions	W600 × H1977.5 × D900mm
Environmental condition	Operating environment	Indoor use
	Operating temperature	0 ℃～ +40 ℃
	Operating humidity	20 %rh ～ 85 %rh（No dew condensation）
	Storage temperature	-20 ℃～ +60 ℃
	Storage Humidity	20 %rh ～ 85 %rh（No dew condensation）
	Advanced	2000 m or less
Cooling method		Forced air cooling by fan
Withstand voltage	Between input and output	AC1800 V、No abnormality after 1 minute of application
	Between input and FG	AC1800 V、No abnormality after 1 minute of application
Insulation resistance	Between input and FG	DC500 V、30 M Ω min.
Compliant Standards	EMC Standards	EN 61000-3-2
	CE	Low Voltage Directive 2014/35/EU
	Safety standards	IEC 61010-1

Example of capacity expansion configuration

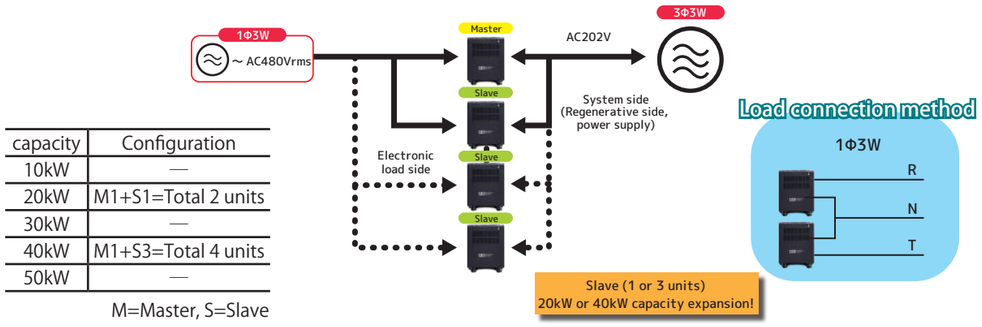
DC and single-phase 2-wire AC input



capacity	Configuration
10kW	M: 1 unit = 1 total
20kW	M1+S1=Total 2 units
30kW	M1+S2=Total 3 units
40kW	M1+S3=Total 4 units
50kW	M1+S4=Total 5 units

M=Master, S=Slave

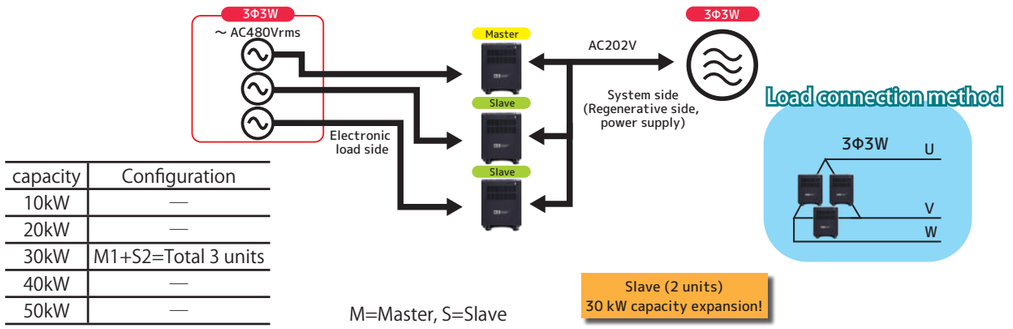
Configuration example 2: Single-phase 3-wire AC input



capacity	Configuration
10kW	—
20kW	M1+S1=Total 2 units
30kW	—
40kW	M1+S3=Total 4 units
50kW	—

M=Master, S=Slave

Configuration example 3: Three-phase 3-wire AC input



capacity	Configuration
10kW	—
20kW	—
30kW	M1+S2=Total 3 units
40kW	—
50kW	—

M=Master, S=Slave

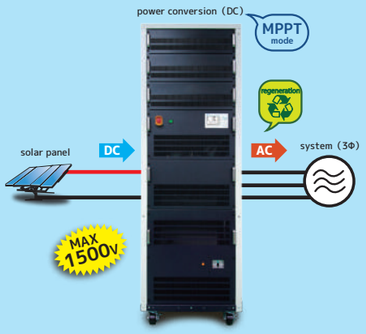
Supported Extension Configuration Table

10kW model capacity	50kW model capacity	Direct current	Single-phase 2-wire	Single-phase 3-wire	Three-phase 3-wire/4-wire	M/S Cable
10kW	50kW	○	○			
20kW	100kW	○	○	○		2
30kW	150kW	○	○		○	3
40kW	200kW	○	○	○		4
50kW	250kW	○	○			5

Application

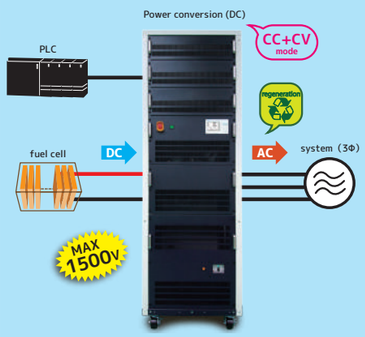
DC Applications

Solar battery



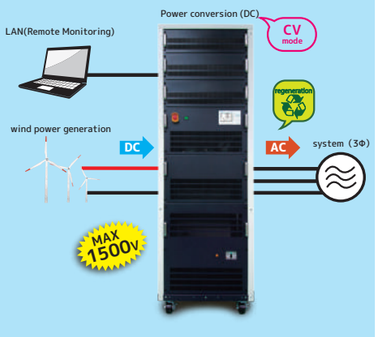
- Wide range (20 to 750 VDC input) multi-powerAs interface power conditioner
- PV Panels with Maximum Power Point Tracking (MPPT)As an evaluation
- Compliance with grid-connection regulations

Fuel cell



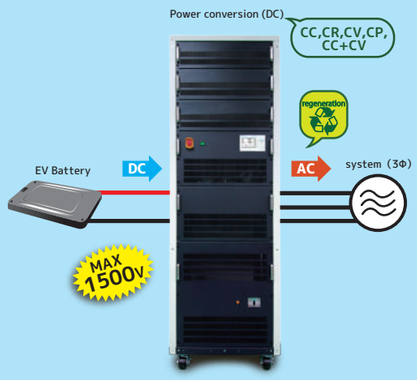
- As a wide range (20 to 750 VDC input) multi-power interface power conditioner
- Hardwired to PLC. suitable for FC CC+CV and CP+CV modes available
- Compliance with grid-connection regulations

Wind power generation



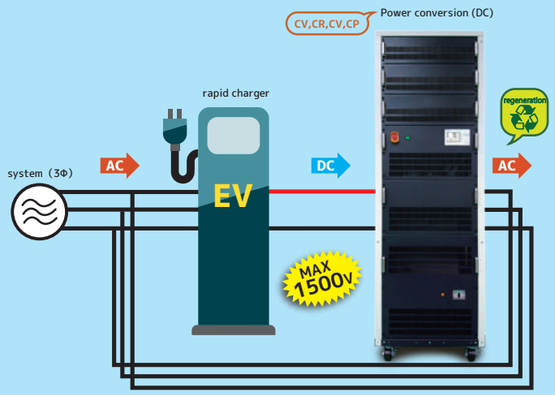
- CV mode is used to handle transient wind power generationResponding to peaks
- Remote monitoring viaLANcommunication (standard)
- Compliance with grid-connection regulations

EV Battery



- Equipped with CC, CR, CV, and CP load modes as well as CC+CV for optimal battery discharge
- Expandable up to 250 kW in master-slave configuration (5 units)

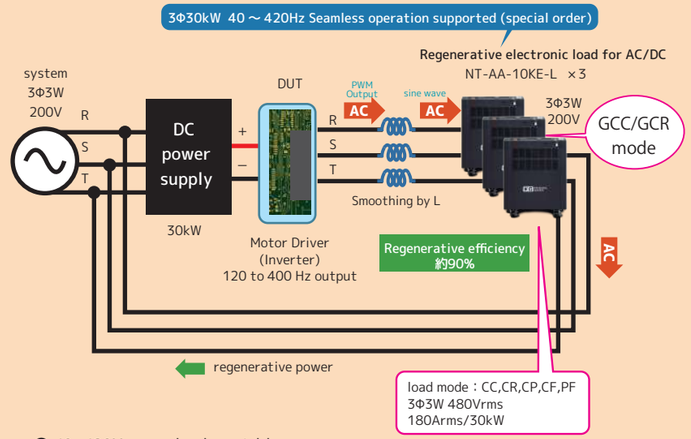
Rapid charger



- Regenerative power is transferred to the input of quick chargers. Energy conservation evaluation with on-site regenerative use.
- Expandable up to 250 kW in master-slave configuration (5 units)

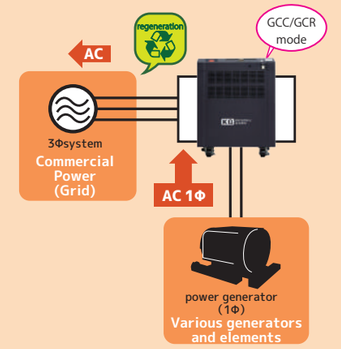
AC Applications

Motor driver (inverter)



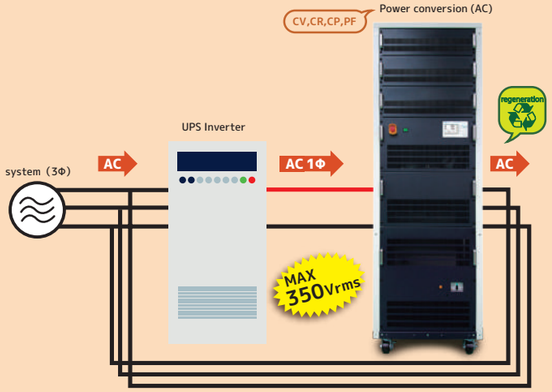
- 40~420Hz seamlessly variable
- Variable power factor (± 1.0) for detailed evaluation
- Three-phase possible (30kW) in master-slave configuration (3 units)

Power generator



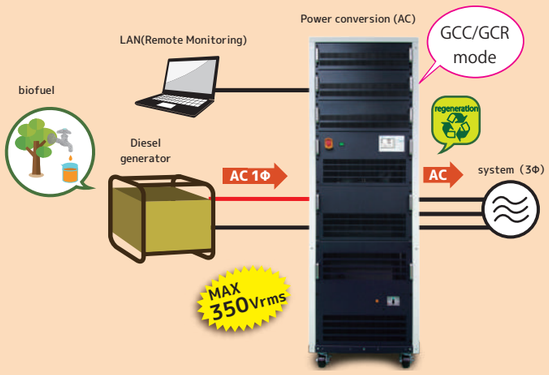
- GCC/GCR mode for unstable power output
- Three-phase possible (30kW) in master-slave configuration (3 units)
- Compliance with grid-connection regulations

UPS, inverter, PCS



- Regenerative power is transferred to the input of UPS and inverters. Energy conservation evaluation with on-site regenerative use
- Three-phase possible in master-slave configuration (3 units) (MAX 150kW)
- Power factor variable from 1 to -1 (phase variable with COS Θ)

BioWeight power supply



- AC load mode for unstable generator output
- Three-phase possible in master-slave configuration (3 units) (MAX 150kW)
- Compliance with grid-connection regulations

Four-Masu's Mother　Four-Masu-kun　Tess-Masu-kun　Four-Masu's Father

We liken the increasing power/voltage/current of power electronics to a "big elephant" and represent our main products, "DC power supplies, AC power supplies, DC electronic loads, and AC electronic loads" as "4 squares (4 quadrants)". The name ``Four Masu'' is based on an analogy, and the image character is "elephant + 4 squares (Masu is the Japanese word for square.)".

Inquiry before product purchase

+81-44-223-7950

E-mail : PWsales@hq.keisoku.co.jp

Inquiries about technical support and repair/ calibration

+81-44-223-7970

E-mail : PW-support@hq.keisoku.co.jp

KG

KEISOKU GIKEN Co., Ltd.

PowerElectronics Sales Dept.

Hiyoshi Operation　4-11-1 Minamikase, Saiwai-ku, Kawasaki-shi, Kanagawa, Japan
TEL +81-44-223-7950　FAX +81-44-223-7960

E-mail : PWsales@hq.keisoku.co.jp / https://www.keisoku.co.jp

Agents

● CP-0175-2307