



Bidirectional Power Supply **NT Series**



Elexible configuration by modular type power unit (2kW)

- ★ Newly developed 2kW /unit Bidirectional Power Supply
- ★ Suitable for Smart Grid simulation

-DD-2000 IM

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- ★ For a power back up supplemental system with batteries
- ★ For Power Peak Shift or Power Peak Cut during day time

Keisoku Giken Co., Ltd.



About NT series Bidirectional Power Supply

With a system controller that is equipped with a network function and multiple units of high efficient 2kW power unit configure Unit type Bidirectional Power Supply System.

This system is not only suitable to various type power generations and energy storage applications such as Solar Power or Lithium Ion battery but also enabled to transfer electric energy to the power system interconnection.

Furthermore, with its unique system controller, it can be adapted to upper level EMS or can be used as standalone system.

It can also be adapted to HVDC energy transfer in 350V to 400V range between DC sides.

Smart Grid begins in earnest

Development of renewable energy, Practical use of new Electric Power Grid, Expanding integrated utility servicesHighly efficient use of those various power sources is demanded worldwide.

For Energy generation, energy storage, energy conservation....all are connected and will be ruled. There are increasing expectation on those Bidirectional Power Supplies that can be compatible to various new applications and verifications.



Toward the Smart Grid to come…

Nev

4 kinds of functional units and varia

Four YES! in NT series Bidirectional Power Supply

YES! Adapted to various applications

Bidirectional unit (AC/DC, DC/DC) or Unidirectional (DC/DC) unit can be connected to the control unit through CAN BUS.

YES! Compatible to flexible HVDC bus setting

Currently high voltage DC transmission (HVDC: high –voltage direct current) is under consideration for standardization. NT series is capable to set the voltage within 350V to 400V range so it can be adapted to unique applications.



v style Bidirectional Power Supply

ble voltage HVDC bus to cope with

YES! Expandable from 2kW to configure highly efficient system

Since the power rating of the unit is 2kW, smaller power system to larger power system can be built in over 90% efficiency in 2kW increment.

YES! Adapted to network system

By using the system controller which is equipped with network function and flexible HVDC bus, this system is capable to the following: It can be connected with external network system, applicable to various different systems and transfer DC energy within DC side. Cooperation with upper EMS or use as a standalone system is possible.

Day time Power Peak Cut by PV & Battery

These are required !

- PV power to charge battery or supply to the power system interconnection
- Supply energy from the battery to the power system interconnection when necessary.
- Optimize electric power circulation by changing HVDC setting.
- Charge batteries in the night while PV power is not enough.
- Draw electric power in from PV by MPPT.
- Simulate loadings for AC power system interconnection.

with NT-series, system integration is easy!



Compatible to latest Li battery

Configure All-in-ONE system



Wiring (Example)



Bidirectional power supply NT series **LINEUP**

AC/DC Bidirectional unit (Not isolated type)

(AC/DC 2.2kW)



Model: NT-AD-2000

USE :

Supply to system interconnection from HVDC

2kW power conversion between system interconnection side and HVDC (DC350V -400V). It covers monitoring functions that is conforming to the system interconnection guide line. *The power can be increased by parallel operation.

System interconne	ction side (AC side)]
Power	2.2kW	
Voltage	AC 220V \pm 20V	
Current	11 A	Voltage
When in standa	alone (AC side)	DC350V to 400V
Power	2kW	
Voltage	AC 0 \sim 200V	
Current	10A	*A transformer maybe needed depends on the conditio

DC/DC Bidirectional unit (Insulated type)

(DC/DC 2kW)



Model: NT-DD-2000

*Type (A,D,E or F) in the 🗌 .

USE :

Charge/discharge of battery

• For various DC power generators and DC power supplies

2kW DC/DC conversion between HVDC (DC350V to 400V) and battery, power generator or any other power consuming devises. It is possible to charge and discharge battery station. Handling power can be increased by parallel connection.

	Batt	ery (DC side)]	
Туре	Power	Voltage	Current] [HVDC side
A		$36 \sim 60V$	52A		Voltage
D	21444	$200 \sim 350 V$	10A		350V to 400V
E	ZKVV	$250 \sim 460 V$	8A]	
F		$300 \sim 550 V$	7A		

DC/DC Unidirectional unit (Isolated type)

(DC/DC 2kW)



USE :

• Power conversion from PV to HVDC

Model: NT-LD-2000E

• For various natural energy, DC power generators and DC power supplies

DC/DC conversion from power generator to HVDC (DC350V to 400V). Handling power can be expanded by parallel operation.

DC side	(PV side)		
Power	2kW]	HVDC side
Voltage	50 to 450V		Voltage
Current	20A		350V to 400V
Current	20A		350V to 400V



Model: NT-SC

This controls NT series through CAN bus.

Lithium ion battery

1.2kWh lithium ion battery module and battery controller configure storage battery.



Nominal power	1.2kWh, 24Ah typ.
Rated power	1.1kWh, 22Ah
Nominal voltage	51.2V
Charge voltage	$57.6V \pm 0.8V$
Max. charge current	24.0 A

Max. capacity	16.8kWh	19.2kWh
Operating voltage range	60V to 420V	40V to 60V
Operating current range	0A to 50A	0A to 100A

NT series rack

The system can be built into standard 19 rack. (Rack mount adaptor is necessary.)



Common functions to NT-AD, DD and LD.

Power expansion by parallel operation

The power can be expanded by parallel operation. (*) It can also be used to revert the power to the system interconnection.



Front panel control & display

The display, rotary knob and enter key are all located on the front panel that enabled for easier access. This is especially convenient when used in manual operation or maintenance on site.



Reliable safety design

Well equipped protection features and monitoring functions.

HVDC Input/output

The HVDC voltage (DC350V to 400V) can be optimized for maximum efficiency so the power conversion between system interconnection, battery and Photovoltaic power Generatov are efficiently made.

Measurement functions

AC/DC: Voltage, Current, Wattage, Wh of systems interconnection are measured.

DC/DC: Voltage, Current, Wattage, Wh of battery and Voltage & Current of HVDC are measured.

HVDC side	Interconnection side/Battery & PV side
A (Current)	W (Wattage)
V (Voltage)	A (Current)
	V (Voltage)
	Wh (Watt-hour meter)

Counter measure for power failure

It stops operation by blocking the gate and opens relay intended to protect internal circuit from power failure. It is highly recommended to use UPS to keep the control power supply of the NT series alive while in power failure.

CAN communication

It is equipped with CAN interface as standard which is widely recognized and used as it has been standardized by ISO. This makes NT series easier to transfer data to upper level controllers or receive commands.

AC/DC Bidirectional unit (Non isolated type) NT-AD (AC/DC 2.2kW)

>96% efficiency of AC/DC conversion

Higher efficiency than 96% (at rated load) is obtained by using new AC/DC converter technology. This resulted to minimize the energy conversion loss.



Compatible to Power System Interconnection and Standalone operation

It can be compatible to both the system interconnection mode and standalone mode by mode switching. Any voltage of 0V to 200V can be used at the standalone mode. (*)

* At the standalone mode, the handling power is 1kW max. at AC100V operation (2kW max. when in AC200V operation). No parallel operation possible in standalone mode.

HVDC voltage setting

The HVDC voltage can be set from DC350 to 400V range freely in 1V increment.

Enhanced monitoring system

The following monitoring systems are equipped to monitor the system interconnection side: OCR/OVP/UVP/OFR/UFR/ detection of standalone operation(passive/active)/DC component leak detection. Each setting value, detection time and hold up time are freely set.

It will block the gate and control relays when detected above alarm signals.

OCR	Over current relay	
OVR	Over voltage relay	
UVR	Under voltage relay	
OFR	Over frequency relay	
UFR	Under frequency relay	
Standalone operation	Active method	
detector	Passive method	
DC component detector		





DC/DC bidirectional unit (isolated type)

NT-DD (DC/DC 2kW)

Voltage selection among 4 ranges

Four kinds of voltages are selected from A,D,E and F. With this wide ranging selection, it can be adapted to high voltage to low voltage system.

Battery (DC side)				
Туре	Wattage	Voltage	Current	
A		32 to 60V	65A	
D	21444	200 to 350V	10A	
E	ZKVV	250 to 460V	8A	
F		300 to 550V	7A	

Over 94% conversion efficiency



By using highly efficient DC/DC converter (isolated), it is achieved over 94% efficiency at single unit. (at rated load)

DC supply from HVDC possible

It is possible to supply DC power to the loads which were supposed to be driven by DC. Type A can supply to standard 48V DC system.

Compatible to Charge/Discharge to battery

There are CC and CV mode in powering (Charging battery) mode. It can set charge-stop voltage at CV mode. When in regenerative mode of operation (discharging battery), it is possible to set threshold voltage to eliminate over charging intended to protect battery and CC mode is also available. By these functions, energy can be fed from battery to system interconnections hence it is enabled to realize peak-cut or peak-shift.

Powering	CC (Constant current)
(Charging)	CV (Constant voltage)
Regenerative	CC (Constant current)
(Discharging)	Under voltage limit

DC/DC unidirectional unit (Isolated type) NT-LD (DC/DC 2kW)

Power from PV

PW power can be converted and supplied to HVDC since the input voltage of HVDC is wide ranging from 50 to 450V.



DC side (PV side)		
Wattage 2kW		
Voltage	50 to 450V	
Current	20A	

MPPT control function

MPPT function is equipped and can be turned ON or OFF. (MPPT: Maximum Power Point Tracking)

4 operational modes

All popular operational modes are equipped so it can be used with various devices.

Load mode	CC : Constant current
	CV: Constant voltage
	CR: Constant resistance
	CP: Constant power

Superior current response

NT-LD contains less capacitance at input side circuit than that was for DC/DC bidirectional NT-DD-2000 therefore current response is much faster and realized 500 μ s or faster.

Use as regenerative type electronic load

When used with an AC/DC bidirectional unit (NT-AD-20000), it can be used as a regenerative type electronic load. By this feature, the power being wasted can be reused. The destination (AC side or battery) where to feed the regenerated power can be set by setting unit (NT-SC).



Energy is regenerated and used again.

Common features (Common to NT-DD/LD)

Isolated Input and Output by HF transformer

The input and output are totally isolated by HF transformer hence there is no risk of DC leaks from control circuit.



DC ground fault detection (Optional)

This monitors earth current and shut the relay then block the gate when detected earth current above the threshold level. (Factory option only)



NT-SC control unit

Power unit control

This controls energy traffic (input and output of energy) to the power unit from HVDC. It collects measuring data then controls the system properly and acts as gateway.

Slim 1U design

Designed in slim 1U (44mm) size.



Emergency stop button

This emergency stop button blocks each gate when necessary in onsite work or when in emergency case. It is connected with power unit by hard wires.



LAN/USB communication with upper level

It is equipped with 10/100BaseT LAN so it is enable to connect with the control unit and upper system by regular LAN cable. This enabled to control power and monitor the status in HMI (display, key board panel so forth) by using PC or PLC.



CAN communication between power units

NT-SC

It can be connected to lower level power unit by using CAN interface and battery that is equipped with CAN bus can also be incorporated in this system.

Up to 12-unit of power units are connected.

Single unit (NT-SC) can control up to 12 units of lower level power units (NT-AD/NT-DD/NT-LD) on CAN interface.

External alarm input

It is equipped with Dio (digital input & output) hence it can detect abnormal signals such as PRP signal, abnormal condition signal of battery or relay–open signal. It controls relays and block the gate.

Power measurement option of system power side.

This option enables to read the voltage, current and power of the system power side. No additional power meter is necessary.

CAN communication with Lithium ion battery sold by us.

This enables to communicate with our Lithium ion battery so that battery control can be achieved within the system. Charging and Discharging of the battery can be operated within the system.

Lithium ion battery

Lithium ion battery made of Olivine-type lithium ion phosphate

It will last over 10 years when charged and discharged daily at 23C temperature condition and also it is achieved the certain cycle life of charging and discharging regard less to the depth of discharge. (*1)

The energy loss is expected to be low compared to such as lead battery or Ni-Cad battery. (High charge-discharge efficiency) There is no Memory effect which is seen in such as Ni-Cad battery. (*2) In addition, it is also known that Olivine type structure does not have thermal runaway or structural collapse.

*1: Depth of Discharge(DOD): The ratio of discharge depth to the battery rated capacity. This is heavily related to the life time of various kinds of batteries.

*2: Memory effect: This is an effect observed in such as Ni-Cad battery that causes them to hold less charge. This will happen when partially discharged and recharged it repeatedly.

Long lasting performance

We realized over 80% of capacity after 5000 cycles of charging & discharging daily at 23C.

4000 cycles	Sustain >85% capacity
5000 cycles	Sustain >80% capacity
8000 cycles	Sustain >70% capacitor

Highly safety performance

Utilizes Olivine-type lithium ion phosphate for the anode plate and embedded self-diagnosis function in the battery controller. These contribute safety operation of the battery.

High speed charging & discharging possible

Achieved DOD90% per 1C charging. Discharge at 2C possible.

Expandable to max.16.8kWh or 19.2kWh

There are 2-type of battery controllers that enables series or parallel connection.

Max. 7 units in series and 2 units in parallel of 1.2kWh storage power module can be connected to 1 controller (Max. 16.8kWh, full charge voltage at 395.5V, final voltage at 280V) or max. 16 units in parallel operation without series connection (max power to be 19.2kWh, full charge voltage at 60V, final voltage at 40V.) is possible.

Battery controller

With using the data output from the battery modules, it controls charging and protect battery from over charging, over discharging, over current charging, over current discharging, abnormal temperature and so forth. Remaining amount, battery status and alarm are communicated through CAN protocol.



Handling

• Lithium ion batteries are considered as dangerous device. We need to confirm with customers if they are secured to handle those dangerous device prior to the sales. We do not accept orders for the battery module alone.

The proposal for Smart Grid.

There are increasing demands for steady supply of electric power.

Local power generation at office, factory or home will increase by using such as solar batteries and energy saving batteries.

We developed NT series bidirectional power supply intended to support to realize cooperative energy society.

NT series is equipped with bidirectional power conditioner feature and HVDC bus function. The HVDC is the function to control energy circulation by DC power generation and DC power supply to the network. We designed automatic control feature, measurement, and communication feature into one package as [System-Communication-Control-Power supply].

This system can be built according to the application by adding the unit and the system is using lithium ion battery which does not have memory effect.

In addition, removing the power supply from the system and block the gate of power supplies are equipped as safety feature.

This power supply can be used to simulate SMART GRID to optimize the performance, various power sources as all-in-one bidirectional power supply.

Note: Parallel operation of AC/DC Bidirectional unit (Non-isolated)

As AC/DC bidirectional unit is not isolated between input and output, it is necessary to insert a transformer to the system side when in the following condition.

When in DC/DC bidirectional unit (NT-DD-2000) and DC/DC unidirectional unit (NT-LD-2000) are used, the transformer is not necessary as they are natively isolated.

Ex. When isolation transformer is needed at system side (AC side). (1) (When in system operation) ---- When multiple units of NT-AD-2000 are connected in parallel with common HVDC.



Ex. When isolation transformer is needed at system side (AC side). (2) (When used as standalone in single phase 3 wires application) ----When using NT-AD-2000 as a load for single phase 3 wires operation.



Ex. When no isolation transformer is necessary at system side (AC side) ---When connected NT-AD-2000 and NT-DD-2000 one by one and in parallel operation. (HVDC is not commonly used)



HVDC

The "HVDC" stands for High Voltage Direct Current and ranging approximately 300V to 400V. This is a High Voltage DC transmission system. It is not standardized by now. Each supplier sets the specification by itself. NT series can be adapted to 350V to 400V range.

Regeneration

Regeneration stands for energy conversion usually from heat energy to electric power energy.

Powering

Powering stands for the normal energy supply from system to storage battery. This is a meaning opposite to Regeneration.

Specification of each unit

		NT-SC series controller	
Communication interface		LAN: 10/100 BaseT (for upper level control)	
		CAN bus: Ver2.0B passive (for NT series control)	
Communication protocol		Unique IP, ECHO NET Lite1.0	
Operational mode		System mode, Gateway mode	
Emergency stop button wiring		Hardware wiring	
Control power	Voltage	Single phase 2 wires, AC100 -240V, 50/60Hz	
	Consumption	Less than 50VA	
	Environmental	0 to 40C, up to 2000meter	
General	Placement	In room, Horizontal placement	
	Size and weight	430(W)x43(H)x450(D)mm, less than 4kg	

		NT-AD series Bidirectional AC/DC unit (Non-isolation type)		
		Interconnection side	Interconnection side	
NA		(When used with interconnection)	(When used as a standalone)	
Max capacity		2.2kW 2kW		
Rated voltage		Single phase 2		
Rated current and Fr	eq.			
Voltage range		AC220V+/-20V	AC0-200V	
Power factor		>0.95 (At rated power)		
Total distortion, Curr	ent distortion	<5%(Rated power),<3% (rated power up to 40th)		
Emciency		>96%(At rated power) *1		
Inrush current	Courses			
HVDC side voltage &		DC350-400V (Some limitation may apply), /A		
Control Voltage	V, Freq.	Single phase 2 wires:AC100 - 240VAC, 50/60Hz		
Inculation 9	VA	<50VA		
withstanding	insulation resistance	Uver I Mohm at I kV (AC-FG, HVDC-FG)		
voltage	Withstanding Voltage	L.SKVAC, 60 Second	IS (AC-FG,HVDC-FG)	
	Temp & Altitude	0-40C, <2	000meter	
Conoral		In house use only, On flat surface use only		
General	Cooling	Forced air co	poling by fan	
	Dimensions	430(W) x 131(H) x	450(D)mm, <11kg	
Interface		CAN/USB (NT-SC control/Independent control)		
	Massurament	Interconnection Voltage, Current, Power (AC0-300V,0-20A,0-2.5kW)		
	measurement	HVDC Voltage, Current: DC0-450V,0-10A		
	Condition	Power: Main power ON (Internal relay) Remote/Local: Powering/regeneration/Communication status		
Display	Alarm	Interconnection over voltage, Interconnection under voltage, interconnection over frequency, Interconnection under frequency, Interconnection over current, Individual operation active detection(Freqshift), Individual operation active detection(Voltage phase jump)/DC out flow detection/ Internal over heat/HVDC over voltage/HVDC under voltage/HVDC over current/Fan stop/SC(Controller) and External emergency stop.		
	AC-DC operation	ONOFF: Main circuit ON-OFF		
Setting	Interconnection monitoring relay setting	 OVR: Threshold :220,230,240,250,260,270,280 /detection time:0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1,1.5,2,5 sec /Recovery obstruction time(2-300sec) UVR: Threshold: 120,130,140,150,160,170,180,190 /Detect time:0.1,0.2,0.3,0.4,0.5,0.6,0.7,0.8,0.9,1.2,4,6,8,10sec /Recovery obstruction time(2-300sec) OFR: Threshold: 50-65.9Hz, 0.1Hz resolution /Detection time: 0.1-9.9sec, 0.1sec resolution/ Recovery obstruction time 300sec) UFR: Threshold: 45 – 60.9Hz, 0.1Hz resolution /Detection time:0.1 – 9.9sec, 0.1sec resolution/Recovery obstruction tim -300sec) OCR: Detection time/ Recovery obstruction time(2 -300sec) /Individual operation detection: Recovery obstruction time(2 -300sec) 		
Protective action at each alarm		BIOCK gates, Open relays Recover after Recovery obstruction time (ACV_OVP, ACV_UVP, AC_OFR, AC_UFR, AC_OCR, Individual operation active, individual operation passive)		

*1 excluding control loss

		NT-DD series (Battery side) Bidirectional DC/DC unit (Isolated type)	BT-LD series (DC side) Unidirectional DC/DC unit (Isolated type)		
Max. rating		2kW			
Rated voltage		36-60V/200-350V/250-460V/300-550V	50-450V		
Rated current		52A/10A/8A/7A	20A		
Efficiency		>94%(rated power)*1	>90%(rated power)*1		
Inrush current		No more than ra	ated current		
HVDC side Vol	tage, Current	DC350-400V, 7A			
Insulation type	5	High frequency insulation			
Control	Voltage, Freq.	Single phase 2 wires: AC100V-240V, 50/60Hz			
power	VA	<50V	A		
Insulation & withstanding voltage	Insulation resistance	>1Mohm at 1kV (AC-FG, HVDC-FG)			
	Withstanding voltage	1.5kV, 60sec (AC-F	G, HVDC-FG)		
	Ambient temp. &Altitude	0-40C,<2000meter	0-40C		
General	Placement	In house us	se only		
	Cooling	Forced cooling fan			
	Dimensions and weight	430(W) x 131(H) x 450(D)mm, <11kg			
Interface		CAN/USB (NT-SC control	/ individual control)		
	Measurement	Battery side voltage: DC 0 ~ 100V/ ~ 400V/ ~ 500V/ ~ 600V Battery side current: DC 0 ~ 70A(DC 0 ~ 100V)/DC0 ~ 12A Battery side power: DC 0 ~ 2kW	DC side Voltage, Current, Power DC 0 \sim 500V, 0 \sim 22A, 0 \sim 2.5kW DC side integral power		
		HVDC Voltage, Current: $DC \sim 450V$, 0 $\sim 10A$			
Display	Condition	Remote/local: powering/regeneration/communication	Communication : remote / local Operation mode : CC,CR,CV,CP,MPPT		
		Over voltage protector, under voltage	protector, over frequency detector		
		Over temperature detect.(2 point OR)	Inner over temperature detect		
	Alarm	HVDC over voltage detect HVDC under voltage detect HVDC over current detect	HVDC under voltage detect, HVDC over current detect		
		FAN stop detect, SC(controller) or external emergency stop.			
		Ground fault current detect *2			
Setting		Powering setting: Powering setting (No simultaneous operation with regenerative operation) CV setting(Powering): Battery side CV(Charge)/Setting resolution: 0.1V CC setting(Powering): Battery side CC (Charge)/setting resolution: 0.1A	DC side setting CC setting: DC side CC/setting resolution:0.05A CR setting: DC side CR/setting resolution: N/A CV setting: DC side CV/setting resolution: 0.1V CP setting: DC side CC/setting resolution:10W MPPT setting: DC side MPPT		
		Regenerative operation: Regenerative operation setting (No simultaneous operation with powering operation) CC setting(Regenerative): Battery side CC(Discharge)/setting resolution:0.1A	HVDC side setting: Setting resolution: 1V		
		CV setting(Regenerative): HVDC side CV(Discharge)/setting resolution: 1V Output under voltage: Alarm threshold level can be set.	CV side setting(Regenerative): HVDC side CV		
Protective a	ction when in	Block gates, Open relays			
alarm		(OHD,HVDC_OVP,HVDC_UVP,BaDCV_OVP,BaDCV_UVP, BaDC_OCP, Stop FAN,Emergency stop)			

Lithium ion battery module (1.2kWh)					
Nominal capacity/ Rated power	1.2kWh, 24Ah type, discharge cut off voltage 32.0V / 1.1kWh, 22Ah				
Nominal voltage	51.2V				
Charge voltage/Max charge current	$57.6V \pm 0.8V/24.0A$				
Charge time	Approx. 2.5 hours at 24.0 charge current				
Weight	17kg				
Battery controller (BMS)					
Operating voltage range	60 to 420V	19.2 kWh			
Operating current range	0 to 50A	$40 \sim 60 \mathrm{V}$			

*2 Factory option

Ordering information

Model	Features	Specification		
NT-SC	Controller			
		IN/OUT interconnection side	IN/OUT HVDC side	
NT-AD-2000	AC/DC bidirectional unit(2.2kW) non-isolated	2.2kW / AC200V	2kW/DC350-400V	
		IN/OUT DC side (Battery)	IN/OUT HVDC side	
NT-DD-2000A	DC/DC bidirectional unit(2kW) isolated	2kW/DC32-60V	2kW/DC350-400V	
NT-DD-2000D	Ditto	2kW/DC200-350V	2kW/DC350-400V	
NT-DD-2000E	Ditto	2kW/DC250-460V	2kW/DC350-400V	
NT-DD-2000F	Ditto	2kW/DC300-550V	2kW/DC350-400V	
		INPUT DC side (PV)	OUTPUT HVDC side	
NT-LD-2000E	Ditto	2kW/DC50-450V	2kW/DC350-400V	
NT-SC/REC	Test data for NT-SC			
NT-AD-2000/REC	Test data for NT-AD-2000			
NT-DD-2000x/REC	Test data for NT-DD series	(x) stands for above model number		
NT-LD-2000E/REC	Test data for NT –LD series			
NX-1UKit-EIA	Rack mount kit for NT series	10		
NX-3UKit-EIA	Rack mount kit for NT series	3U		
NX-OP01	Ground fault option	NT-DD		
NX-OP02	Power measurement option	NT-SC		
NX-OP03	CAN cable	10 units connectable. Ask us for 11 units or more		

NT series panel layout







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