5KW True Sine Wave Inverter with AC Charger / UPS

NTN-5K series



AC output side



DC input side



User's Manual

IEC62368-1 BS EN/EN62368-1 TPTC004 AS/NZS 62368.1

Household Railway Car Use Marine Network Telecom

Features

- Combining AC/DC charger, DC/AC Inverter, AC by-pass & support external MPPT solar charger
- AC utility charger up to 4520W
- UPS function (AC by-pass) without interruption, transfer time <10ms
- True sine wave output (THD<3%)
- High surge power up to 10KW
- Parallel synohronized operation up to 30KW (5+1 unit)
- Temperature controlled cooling fan
- AC output voltage and frequency selectable by DIP S.W
- Protections :
  Input : Reverse polarity / DC low alarm / DC low shutdown / Over voltage
  Output : Short circuit / Overload / Over temp.
- Battery over discharge protection (low voltage disconnect)
- -30℃~+70℃ wide operating temperature
- Suitable for lead-acid or li-ion batteries
- Support MODBus-RTU(RS-485) / CANBus protocol communication
- Conformal coating
- 5 years warranty

Applications

- Home and office appliance
- Power tools
- Portable equipment
- Vehicle
- Yacht
- Off-grid solar power system
- Wireless network
- Telecom or datacom system

Description

NTN-5K is a 5000W highly reliable off-grid true sine wave DC-AC power inverter with built-in AC charger and UPS function(AC by-pass). Its key features include: digital design with MCU control, streamlined control circuitry that quickly responds to environmental changes and improves reliability, high quality fan with low acoustic noise, 10KW peak power, adjustable AC output voltage and frequency, -30~+70℃ wide. Operating temperature range, complete protection features, and etc. Combined with batteries, the NTN-5K is suitable for use in residential, commercial, marine, automobile, mine, construction site, and remote areas with no access to utility power, and the output can be used to power fans, TV, radio, phone charger, PC/laptop, lighting, induction stove, air conditioner, electromechanical tool, communication equipment, power distribution cabinet, outdoor camping equipment, marine AC power, factory equipment, and etc.

Model Encoding

NTN - 5K - 2 24 □

- □ : Communication protocol option
- 24 : DC input voltage (24: 24Vdc, 48: 48Vdc, 380: 380Vdc)
- 2 : AC output voltage (1:100/110/115/120Vac, 2:200/220/230/240Vac)
- 5K : Rated wattage
- NTN : Series name

Type	Communication Protocol	Note
Blank	MODBus protocol	In Stock
CAN	CANBus protocol	In Stock

SPECIFICATION

MODEL NO.			NTN-5K-224	NTN-5K-248	NTN-5K-2380
AC OUTPUT	RATED POWER(Continuous)		5000W		
	OVER RATED POWER(3 Min.)		5750W		
	PEAK POWER(10 Sec.)		7000W	7500W	
	SURGE POWER(30 Cycles)		8000W	10000W	
	AC VOLTAGE		Default setting set at 230VAC		
			200 / 220 / 230 / 240Vac selectable by DIP S.W		
	FREQUENCY		Default setting set at 50±0.1Hz		
			50/60Hz selectable by DIP S.W		
	WAVEFORM Note.1		True sine wave (THD<3%)		
	AC REGULATION		±3.0% at rated input voltage		
DC INPUT	DC VOLTAGE		24Vdc	48Vdc	380Vdc
	VOLTAGE RANGE (Typ.)		20 ~ 33Vdc	40 ~ 66Vdc	280 ~ 430Vdc
	DC CURRENT (Typ.)		240A	120A	16A
	NO LOAD DISSPATION (Typ.)	NON-SAVING MODE	2.5A	1.4A	0.2A
		SAVING MODE	Default disable, auto detect AC output load≦10W will be changed to saving mode		
			<25W		
	OFF MODE CURRENT DRAW		≦1mA		
	EFFICIENCY (Typ.) Note.1		91%	93%	94.5%
	BATTERY TYPES		Lead Acid or li-ion		
PROTECTION DC INPUT	LOW	ALARM	22±0.5Vdc	44±1Vdc	300±5Vdc
		SHUTDOWN	20±0.5Vdc	40±1Vdc	280±5Vdc
		RESTART	25±0.5Vdc	50±1Vdc	335±5Vdc
	HIGH	ALARM	31±0.5Vdc	62±1Vdc	420±5Vdc
		SHUTDOWN	33±0.5Vdc	66±1Vdc	430±5Vdc
		RESTART	30±0.5Vdc	60±1Vdc	400±5Vdc
	REVERSE POLARITY		No damage, re-power on to recover after fault condition is removed		
PROTECTION AC OUTPUT	OVER TEMPERATURE		Shut down o/p voltage, recovers automatically after temperature goes down		
	OUTPUT SHORT		Shut down o/p voltage, re-power on to recover		
	OVER LOAD (Typ.)		105 ~ 115% load for 180 sec., 115% ~ 140% load for 10 sec.	105 ~ 115% load for 180 sec., 115% ~ 150% load for 10 sec.	
			Protection type : Shut down o/p voltage, re-power on to recover		
	CIRCUIT BREAKER		35A		
FUNCTION	REMOTE CONTROL		Power ON-OFF remote control by front panel dry contact connector(by RELAY), Open : Remote off ; Short : Normal work		
	COMMUNICATION		MODBus-RTU (RS-485) / CANBus		
AC UPS MODE	AC INPUT RANGE		200/220/230/240Vac±16%, recover±13%		
	FREQUENCY RANGE		45 ~ 65Hz		
	TRASFER TIME(Typ.)		10ms inverter ⟷ AC by pass		
AC CHARGER	BOOST CHARGE VOLTAGE		Default 28.8Vdc	Default 57.6Vdc	Default 400Vdc
	FLOAT CHARGE VOLTAGE		Default 27.6Vdc	Default 55.2Vdc	Default 385Vdc
	CHARGE VOLTAGE RANGE		21 ~ 30Vdc	42 ~ 60Vdc	300 ~ 400Vdc
	CONSTANT CURRENT		135A	70A	11.3A
	MAX. CHARGE POWER		4050W	4200W	4520W
	TEMPERATURE COMPENSATION		By external NTC		
ENVIRONMENT	WORKING TEMP.		-30 ~ +70℃(Refer to "Derating curve")		
	WORKING HUMIDITY		20% ~ 90% RH non-condensing		
	STORAGE TEMP., HUMIDITY		-30 ~ +70℃ / -22 ~ +158°F, 10 ~ 95% RH non-condensing		
	VIBRATION		10 ~ 500Hz, 3G 10min./1cycle, 60min. each along X, Y, Z axes		
SAFETY & EMC (Note.4)	SAFETY STANDARDS		CB IEC62368-1, CSA C22.2 No. 62368-1, TUV BS EN/EN62368-1, AS/NZS 62368.1, EAC TP TC 004 approved		
	WITHSTAND VOLTAGE		DC I/P - AC:3.0KVAC AC - FG:1.5KVAC		
	ISOLATION RESISTANCE		DC I/P - AC O/P, DC I/P - FG, AC O/P - FG: 100M ohms / 500VDC / 25℃/ 70% RH		
	EMC EMISSION		**Parameter**	**Standard**	**Test Level / Note**
			Radiated	BS EN/EN55032(CISPR32)	Class A
			Conducted	BS EN/EN55032(CISPR32)	Class A
			Harmonic Current	BS EN/EN61000-3-2	Class A
			Voltage Flicker	BS EN/EN61000-3-3	-----
	EMC IMMUNITY		BS EN/EN55024, BS EN/EN55035		
			Parameter	**Standard**	**Test Level / Note**
			ESD	BS EN/EN61000-4-2	Level 3, 8KV air ; Level 2, 4KV contact
			Radiated	BS EN/EN61000-4-3	Level 2
			EFT / Burst	BS EN/EN61000-4-4	Level 2, 1KV
			Surge	BS EN/EN61000-4-5	Level 3, 1KV/Line-Line 2KV/Line-Earth
			Conducted	BS EN/EN61000-4-6	Level 2
			Magnetic Field	BS EN/EN61000-4-8	Level 1
			Voltage Dips and Interruptions	BS EN/EN61000-4-11	>95% dip 0.5 periods, 30% dip 25 periods, >95% interruptions 250 periods
OTHERS	MTBF		200.9K hrs min. Telcordia TR/SR-332 (Bellcore) ; 17.8K hrs min. MIL-HDBK-217F (25℃)		
	DIMENSION		460*211*83.5mm (L*W*H)		
	PACKING		10.5Kg; 1pcs/ 10.5Kg/ 1.25CUFT		

NOTE

1.Efficiency, AC regulation and THD are tested by 75% load, linear load at 25Vdc/50Vdc/400Vdc input voltage.
2.All parameters not specified above are measured at 25Vdc/50Vdc/400Vdc input and 25℃ of ambient temperature and set to factory setting.
3.The tolerance of each voltage value by models is: 224→±0.5V; 248→±1V; 2380→±5V.
4.The power supply is considered as an independent unit, but the final equipment still need to re-confirm that the whole system complies with the EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on https://www.meanwell.com//Upload/PDF/EMI_statement_en.pdf)

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CB IEC62368-1 BS EN/EN62368-1

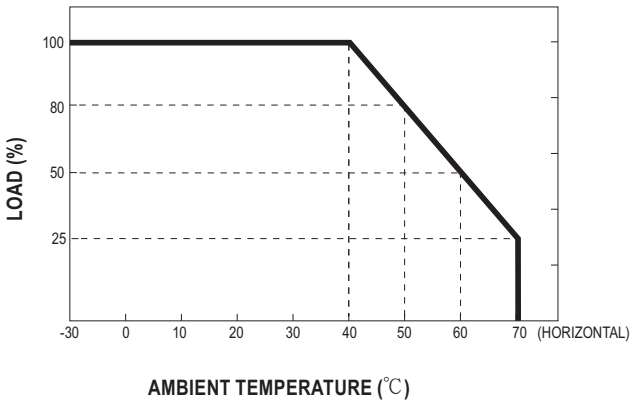
SPECIFICATION

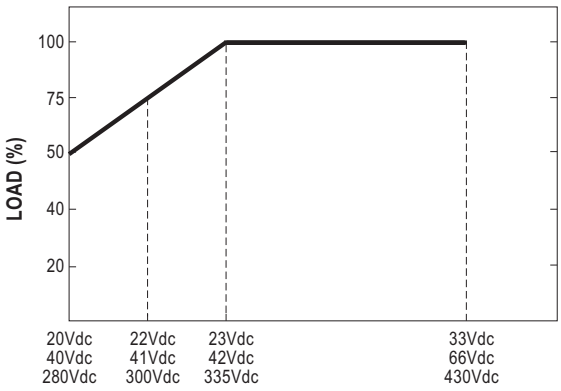
MODEL NO.				NTN-5K-124	NTN-5K-148
AC OUTPUT	RATED POWER(Continuous)			4000W	
	OVER RATED POWER(3 Min.)			4600W	
	PEAK POWER(10 Sec.)			5600W	6000W
	SURGE POWER(30 Cycles)			7000W	8000W
	AC VOLTAGE			Default setting set at 110VAC	
				100 / 110 / 115 / 120Vac selectable by DIP S.W	
	FREQUENCY			Default setting set at 60±0.1Hz	
				50/60Hz selectable by DIP S.W	
	WAVEFORM Note.1			True sine wave (THD<3%)	
	AC REGULATION			±3.0% at rated input voltage	
DC INPUT	DC VOLTAGE			24Vdc	48Vdc
	VOLTAGE RANGE (Typ.)			20 ~ 33Vdc	40 ~ 66Vdc
	DC CURRENT (Typ.)			200A	100A
	NO LOAD DISSPATION (Typ.)	NON-SAVING MODE		2.5A	1.4A
		SAVING MODE		Default disable, auto detect AC output load≦10W will be changed to saving mode	
				<25W	
	OFF MODE CURRENT DRAW			≦1mA	
	EFFICIENCY (Typ.) Note.1			89%	91%
	BATTERY TYPES			Lead Acid or li-ion	
PROTECTION	DC INPUT	LOW	ALARM	22±0.5Vdc	44±1Vdc
			SHUTDOWN	20±0.5Vdc	40±1Vdc
			RESTART	25±0.5Vdc	50±1Vdc
		HIGH	ALARM	31±0.5Vdc	62±1Vdc
			SHUTDOWN	33±0.5Vdc	66±1Vdc
			RESTART	30±0.5Vdc	60±1Vdc
		REVERSE POLARITY		No damage, re-power on to recover after fault condition is removed	
	AC OUTPUT	OVER TEMPERATURE		Shut down o/p voltage, recovers automatically after temperature goes down	
		OUTPUT SHORT		Shut down o/p voltage, re-power on to recover	
		OVER LOAD (Typ.)		105 ~ 115% load for 180 sec., 115% ~ 150% load for 10 sec.	
				Protection type : Shut down o/p voltage, re-power on to recover	
		CIRCUIT BREAKER		50A	
FUNCTION	REMOTE CONTROL			Power ON-OFF remote control by front panel dry contact connector(by RELAY), Open : Remote off ; Short : Normal work	
	COMMUNICATION			MODBus-RTU (RS-485) / CANBus	
AC UPS MODE	AC INPUT RANGE			100/110/115/120Vac±16%, recover±13%	
	FREQUENCY RANGE			45 ~ 65Hz	
	TRASFER TIME(Typ.)			10ms inverter ⟷ AC by pass	
AC CHARGER	BOOST CHARGE VOLTAGE			Default 28.8Vdc	Default 57.6Vdc
	FLOAT CHARGE VOLTAGE			Default 27.6Vdc	Default 55.2Vdc
	CHARGE VOLTAGE RANGE			21 ~ 30Vdc	42 ~ 60Vdc
	CONSTANT CURRENT			120A	60A
	MAX. CHARGE POWER			3600W	3600W
	TEMPERATURE COMPENSATION			By external NTC	
ENVIRONMENT	WORKING TEMP.			-30 ~ +70℃ (Refer to "Derating curve")	
	WORKING HUMIDITY			20% ~ 90% RH non-condensing	
	STORAGE TEMP., HUMIDITY			-30 ~ +70℃ / -22 ~ +158℉, 10 ~ 95% RH non-condensing	
	VIBRATION			10 ~ 500Hz, 3G 10min./1cycle, 60min. each along X, Y, Z axes	
SAFETY & EMC (Note.4)	SAFETY STANDARDS			CB IEC62368-1, TUV BS EN/EN62368-1 approved	
	WITHSTAND VOLTAGE			DC I/P - AC:3.0KVAC AC - FG:1.5KVAC	
	ISOLATION RESISTANCE			DC I/P - AC O/P, DC I/P - FG, AC O/P - FG: 100M ohms / 500VDC / 25℃/ 70% RH	
	EMC EMISSION			**Parameter**	**Standard** / **Test Level / Note**
				Radiated	FCC / Class A
				Conducted	FCC / Class A
OTHERS	MTBF			200.9K hrs min. Telcordia TR/SR-332 (Bellcore) ; 17.8K hrs min. MIL-HDBK-217F (25℃)	
	DIMENSION			460*211*83.5mm (L*W*H)	
	PACKING			10.5Kg; 1pcs/ 10.5Kg/ 1.25CUFT	

NOTE

1.Efficiency, AC regulation and THD are tested by 75% load, linear load at 25Vdc/50Vdc input voltage.
2.All parameters not specified above are measured at 25Vdc/50Vdc/400Vdc input and 25℃ of ambient temperature and set to factory setting.
3.The tolerance of each voltage value by models is: 124→±0.5V; 148→±1V.
4.The power supply is considered as an independent unit, but the final equipment still need to re-confirm that the whole system complies with the EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on https://www.meanwell.com//Upload/PDF/EMI_statement_en.pdf)
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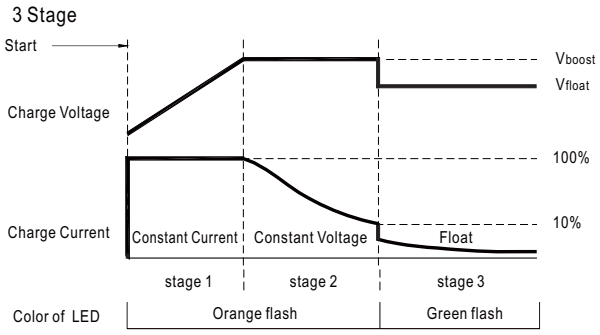
■ DERATING CURVE





■ CHARGING CURVE

◎ Default 3 stage charging curve

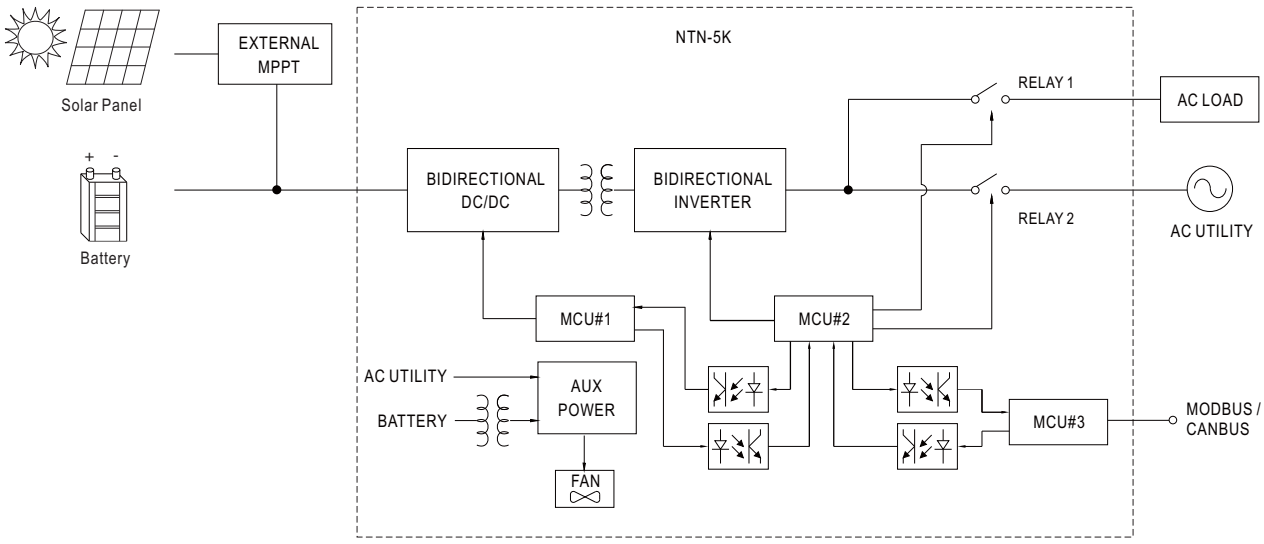


◎ Embedded 3 stage charging curves

MODEL	Vboost	Vfloat	C.C	Adjustable by MODBus / CANBus
124	Default 28.8Vdc	27.6Vdc	120A max.	21~30Vdc
224			135A max.	
148	Default 57.6Vdc	55.2Vdc	60A max.	42~60Vdc
248			70A max.	
380Vdc	Default 400Vdc	385Vdc	11.3A max.	300~400Vdc

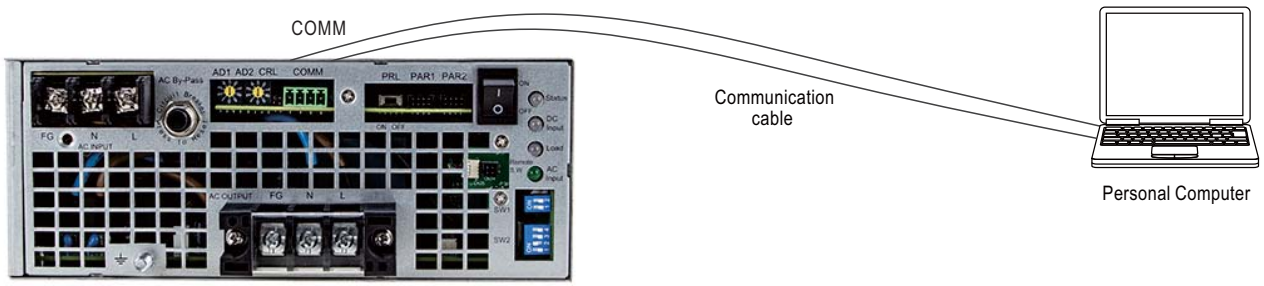
◎ Suitable for lead-acid batteries (flooded, Gel and AGM) or li-ion

■ BLOCK DIAGRAM



■ Function Manual

1.Support MODBus / CANBus Communication

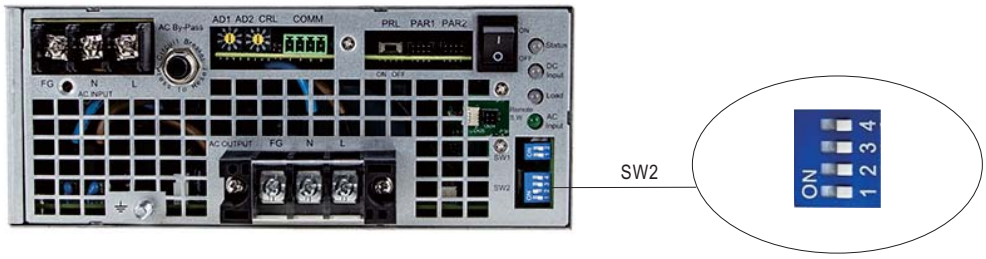


※ Please refer to for more detail: http://www.meanwell.com/manual.html

2.Remote ON-OFF Control

PAR1/PAR2	Remote ON-OFF	AC Output Status
Pin1:3	Short	Power inverter ON
Pin1:3	Open	Power inverter OFF

3.AC Output Voltage、Frequency、Power saving mode selectable by DIP SW



AC Output Voltage、 Frequency、Power saving mode selectable by DIP SW			
S1 S2		S3	S4
OFF	OFF : 100Vac or 200Vac	ON : 50Hz	ON : Saving mode
OFF	ON : 110Vac or 220Vac		
ON	OFF : 115Vac or 230Vac	OFF: 60Hz	OFF: Non-Saving mode
ON	ON : 120Vac or 240Vac		

4. 3Ø 4W AC output Voltage connection selectable by DIP SW



◎3Ø 4-wire / Y

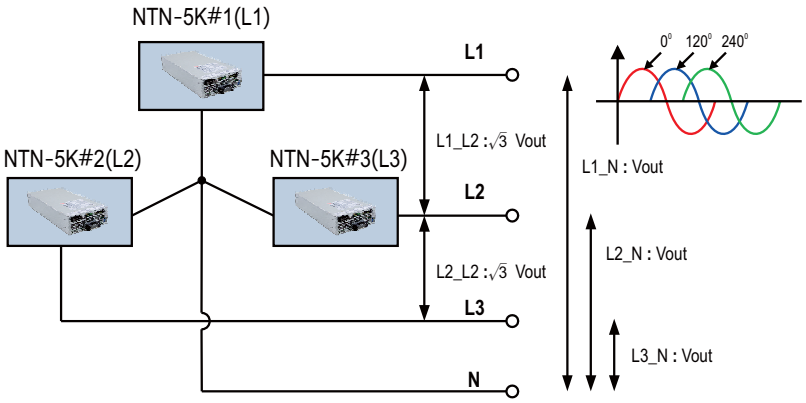


Fig 1.1

S1	S2	AC output phase
OFF	OFF	L1, 0^0
OFF	ON	L2, $+120^0$
ON	OFF	L3, $+240^0$

5.Temperature compensation(3 stage only)

Temperature compensation function to prolong battery life for lead-acid batteries. Temperature compensation range is 0 ~ 40℃.
The battery temperature sensor comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage.
If the sensor is not used, the charger works normally.



6.AC Output Parallel Function

NTN-5K has the built-in active current sharing function and can be connected in parallel, up to 6 units, to provide higher AC output power as exhibited below :

※ The inverter should be paralleled using short and large diameter wiring and then connected to the load.

※ The total output current must not exceed the value determined by the following equation:

Maximum output current at parallel operation = (Rated current per unit) x (Number of unit) x 95% ; when parallel unit less than 6.

※ PAR1/PAR2, PRL Function pin connection

Parallel	PSU1		PSU2		PSU3		PSU4		PSU5		PSU6	
	PAR1	PRL	PAR1	PRL	PAR1	PRL	PAR1	PRL	PAR1	PRL	PAR1	PRL
1 unit	X	ON	—	—	—	—	—	—	—	—	—	—
2 unit	V	ON	V	ON	—	—	—	—	—	—	—	—
3 unit	V	ON	V	OFF	V	ON	—	—	—	—	—	—
4 unit	V	ON	V	OFF	V	OFF	V	ON	—	—	—	—
5 unit	V	ON	V	OFF	V	OFF	V	OFF	V	ON	—	—
6 unit	V	ON	V	OFF	V	OFF	V	OFF	V	OFF	V	ON

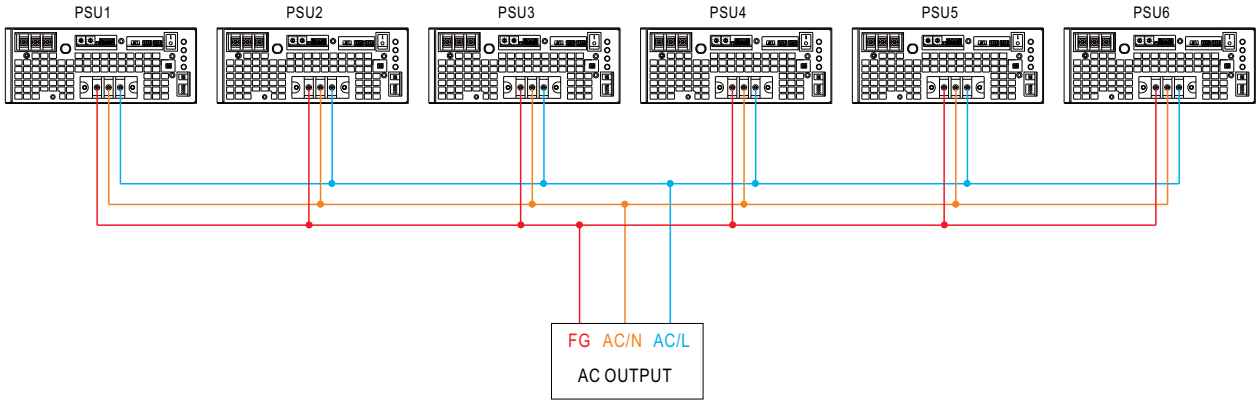
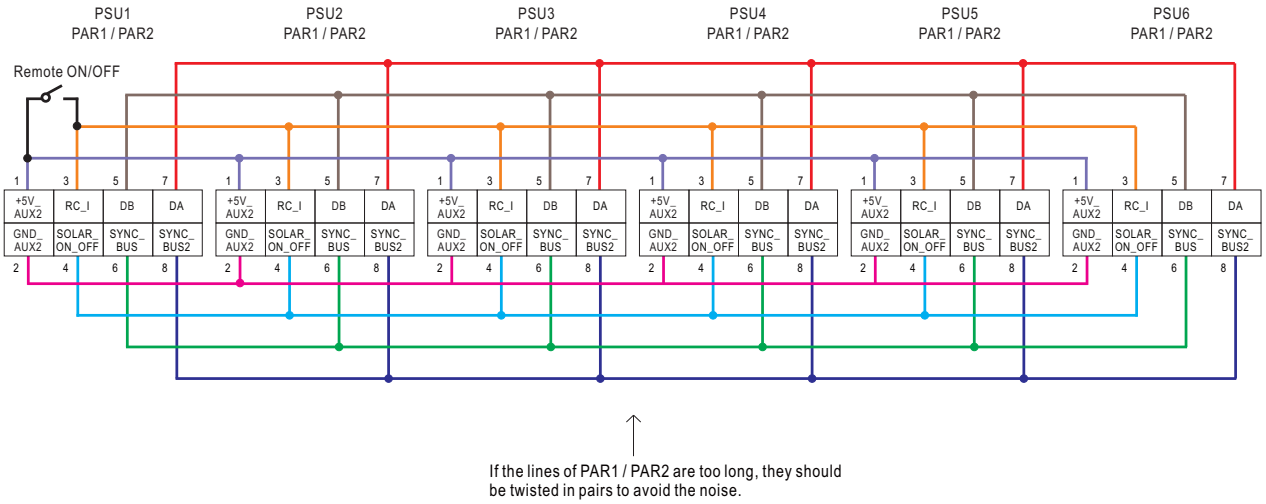


Fig 6.1



If the lines of PAR1 / PAR2 are too long, they should be twisted in pairs to avoid the noise.

■ LED STATUS

Normal work:

	Green	Orange	Red
Status	● Inverter OK ✳ System check	● Remote off ✳ Saving mode	● Abnormal Status (See below table)

	Green	Orange	Red
DC Input	● 25~31Vdc ● 50~62Vdc ● 300~370Vdc ✳ Maintain	● 22~25Vdc ● 44~50Vdc ● 260~300Vdc ✳ Charging	● <22Vdc or >31Vdc ● <44Vdc or >62Vdc ● <300Vdc or >420Vdc

Load	Green	Orange	Red
Inverter Mode	● <40% load	● 40~80% load	● >80% load
Bypass Mode	✳ <40% load	✳ 40~80% load	✳ >80% load

	Green	-----	-----
AC Input	● Utility OK ✳ Utility error ○ Utility disconnected	-----	-----

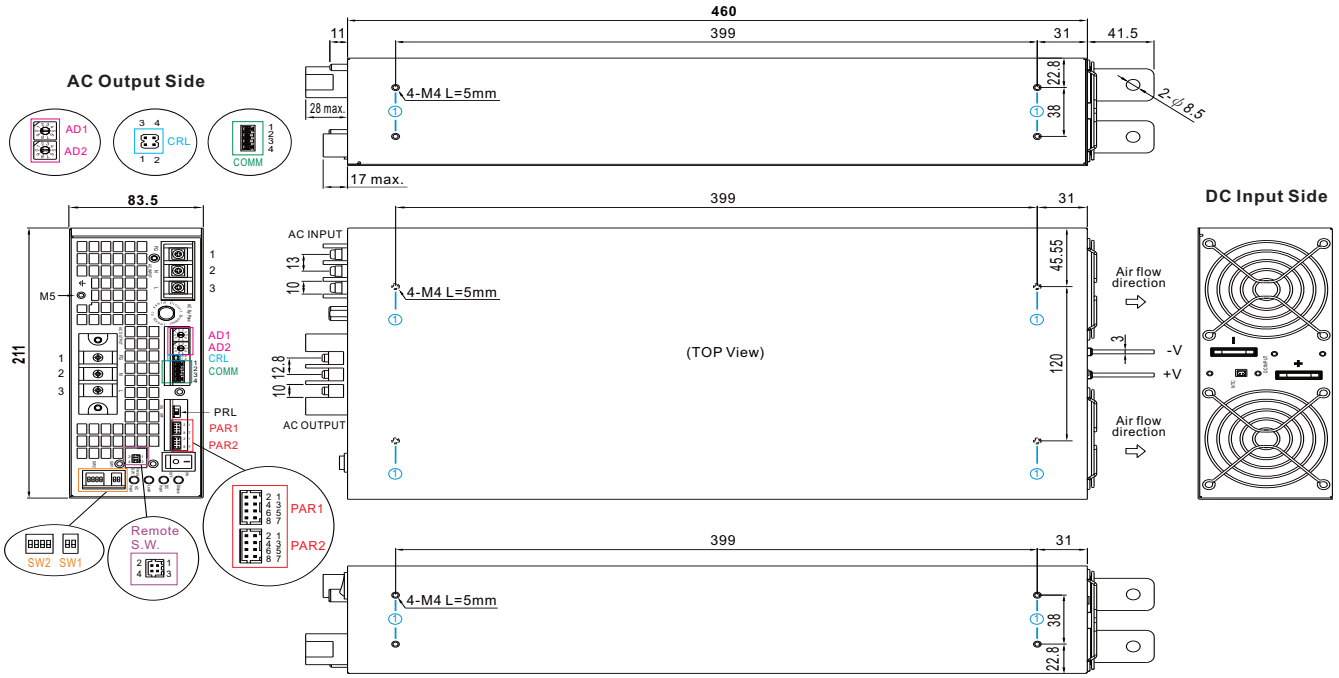
Abnormal status :

LED Indicator	Abnormal Indication
Status ● **DC Input** ○ **Load** ✳	Output overload or AC output short circuit
Status ● **DC Input** ✳ **Load** ○	Abnormal DC voltage
Status ● **DC Input** ✳ **Load** ✳	Over temperature or Fan lock
Status ✳ **DC Input** ○ **Load** ○	Inverter fail

● Light
○ Light off
✳ Flash

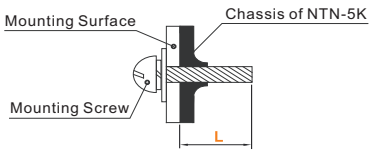
■ MECHANICAL SPECIFICATION

Case No.223 Unit:mm



※ Mounting Instruction

Hole No.	Recommended Screw Size	MAX. Penetration Depth L	Recommended mounting torque
①	M4	5mm	7~10Kgf-cm



※ Terminal Pin No. Assignment

Pin No.	Assignment	AC input	AC output	Maximum mounting torque
1	FG	1 2 3	1 2 3	18Kgf-cm
2	AC/N			
3	AC/L			

※ AC IN Connector Pin No. Assignment (COMM):

Pin No.	Function	Description
1	GND-AUX	Auxiliary voltage output GND.
2	DA/CANH	For MODBus model: Data line used in MODBus interface.(Note)
		For CANBus model: Data line used in CANBus interface.(Note)
3	DB/CANL	For MODBus model: Data line used in MODBus interface.(Note)
		For CANBus model: Data line used in CANBus interface.(Note)
4	+5V_AUX	Auxiliary voltage output, 4.5~5.5V, referenced to GND-AUX (pin1)

Note: Isotated signal,referenced to GND_AUX2

※ Control Pin No. Assignment (CRL):

Pin No.	Function	Description
1,3	RL	Short: Termination resistors(120Ω) For MODBus/CANBus communication, please use Jumper (pin1,3)

※ AD1,AD2 switch for MODBus/CANBus interface address setting, please refer to the user manual for more details

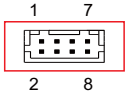
※ Control Pin No. Assignment (Remote S.W.) : HRS DF11-04DP-2DS or equivalent



Mating Housing	HRS DF11-04DS or equivalent
Terminal	HRS DF11-**SC or equivalent

Pin No.	Function	Description
1,2,3,4	REMOTE SWITCH	The unit can be remotely turned the output ON/OFF by dry contact between Pin1,2 & 3,4. Power ON : Short Pin1 to 2 and Pin3 to 4 ; Power OFF : Pin1 ~ Pin4 open.

※ Control Pin No. Assignment (PAR1,PAR2) : HRS DF11-08DP-2DS or equivalent



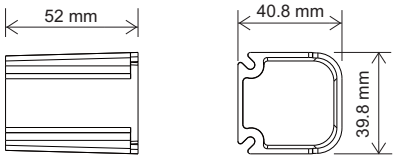
Mating Housing	HRS DF11-08DS or equivalent
Terminal	HRS DF11-**SC or equivalent

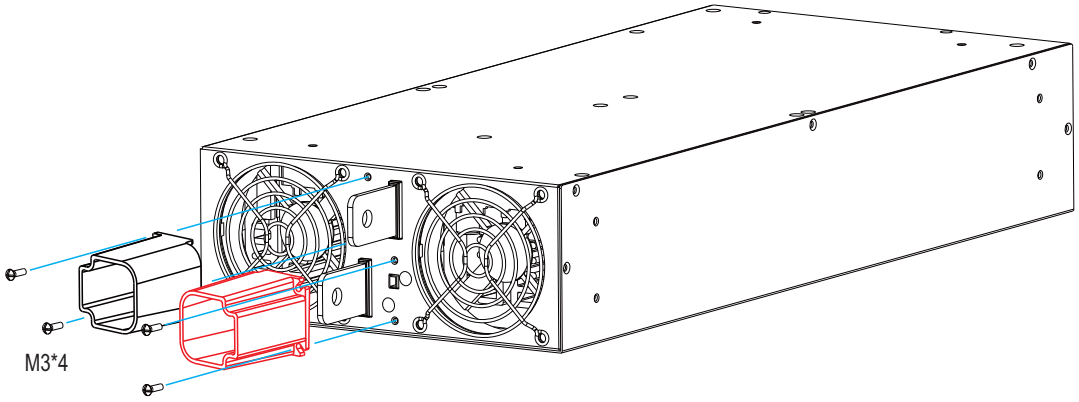
Pin No.	Function	Description
1	+5V_AUX2	Auxiliary voltage output, 4.5~5.5V, referenced to GND_AUX2 (pin2). (Only for REMOTE ON-OFF)
2	GND_AUX2	Auxiliary voltage output GND_AUX2 (pin2).
3	REMOTE ON-OFF	The unit can turn the output ON/OFF by dry contact between Remote ON/OFF and +5V_AUX2.(Note) Short : Power ON ; Open : Power OFF
4	SOLAR_ON_OFF	External MPPT charger control, referenced to GND_AUX2 (pin2).
5	DA	Data line used for parallel control.
6	SYNC_BUS	Phase synchronization used for parallel control.
7	DB	Data line used for parallel control.
8	SYNC_BUS2	Mode synchronization used for parallel control.

Note: Isotated signal,referenced to GND_AUX2

■ Accessory List

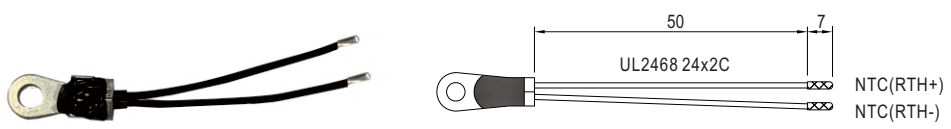
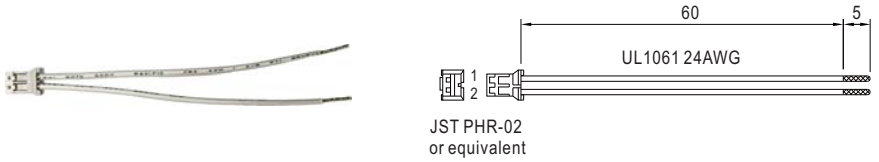
※ Terminal protector mating along with NTN-5K (Standard accessory)

	Item		Quantity
①			1
②			1
③			4

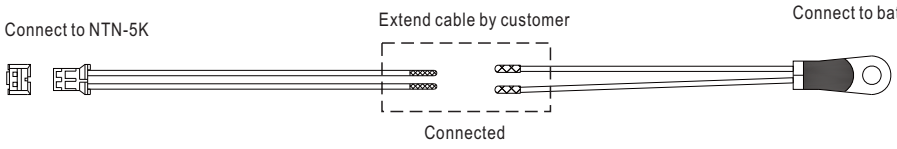




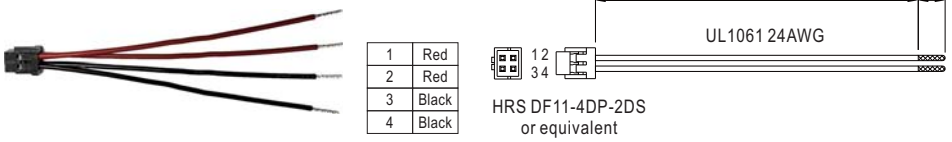
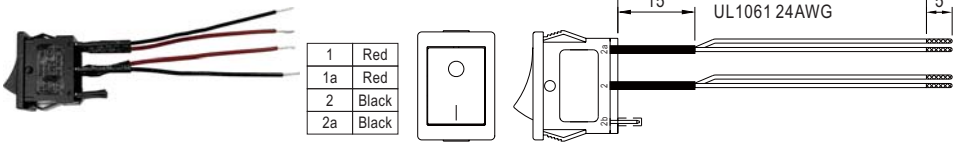
※ NTC Sensor and Remote Control mating along with NTN-5K (Standard accessory)

Item		Quantity
1	NTC sensor wire 	1
2	NTC mating wire 	1

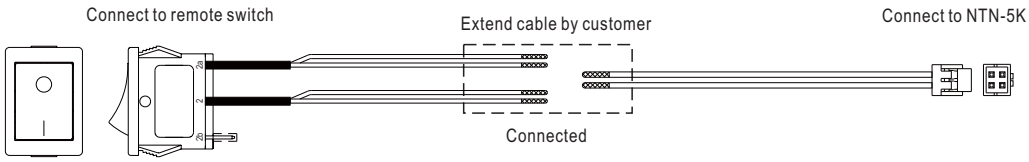
Connection Diagram



※ Remote Control mating along with NTN-5K (Standard accessory)

Item		Quantity
1	Remote S.W mating wire 	1
2	Remote S.W mating wire 	1

Connection Diagram



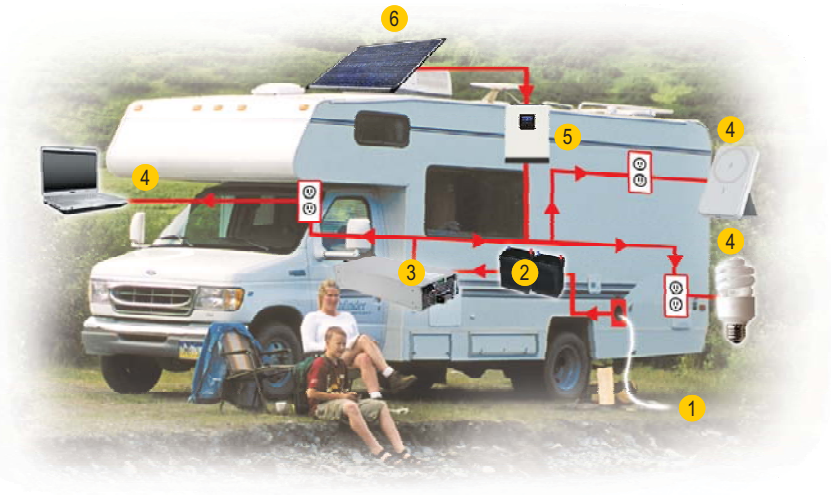
■ TYPICAL APPLICATION



1 Battery Bank
2 Off-Grid DC/AC Inverter (NTN series)
3 AC Outlet

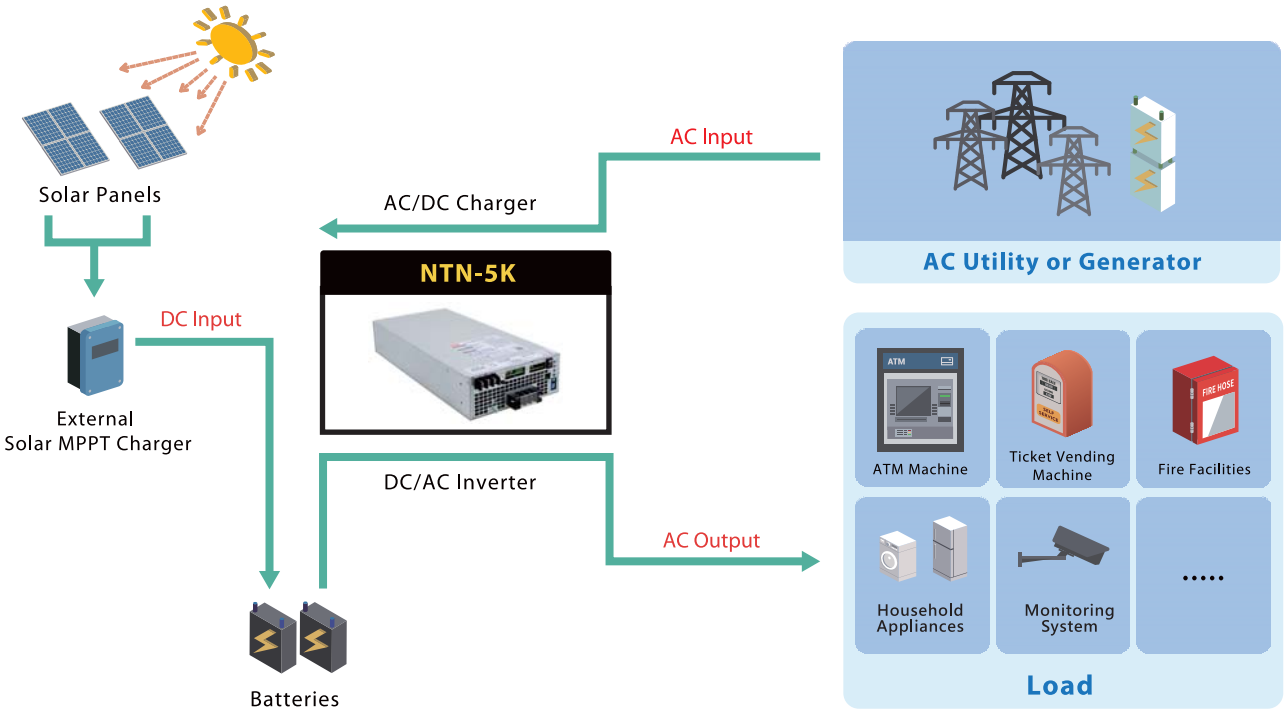


1 Utility Input (Shore)
2 Battery Bank
3 Off-Grid DC/AC Inverter (NTN series)
4 AC Outlet



1 Utility Inlet
2 Battery Bank
3 Off-Grid DC/AC Inverter (NTN series)
4 AC Outlet
5 MPPT Charger (External)
6 Solar Panel (External)

■ SYSTEM CONFIGURATION



1. Battery Bank
2. Off-Grid DC/AC Solar Inverter (NTN series)
3. AC Outlet