Premium
Powering Your Challenge

BBC-30K

30kW Bi-directional inverter charger

GENERAL FEATURES

- Output power up to 30 kW @ 400/415 Vac three phase
- Typical efficiency 95.5 % (full load)
- AC input range: Three phase 180 – 460 Vac (line-to-line)
- DC output voltage range 150 – 1000 Vdc
- Bi-directional operation: AC-DC charging, DC-AC discharging (grid-forming), grid-connected P/Q control, bi-directional CC/CV/CP control
- DC side built-in pre-charge circuit, directly applied DC voltage up to 1000 V
- OTP, OVP, UVP, OCP protections
- Operation temperature −40 °C to 55 °C at full load; 55 °C to 75 °C linearly derating to 50 %
- CAN bus communication interface
- Glue protection (top-layer potting) for harsh environments

DESCRIPTION

The bi-directional inverter charger is designed for use in V2G, V2H, energy storage stations, echelon utilization of retired batteries and bi-directional conversion applications in micro-grids with multiple energy inputs. This model has the advantages of a wide constant-power and constant-voltage range, high efficiency, high power factor, high power density, low electromagnetic radiation and interference, and high reliability. The product is designed with glue protection (top-layer potting), suitable for harsh environments such as high humidity and heavy dust.

mode 1, AC-DC charging mode					
Parameter	**Description/condition**	**Min**	**Nor**	**max**	**Unit**
AC input side parameters					
Input voltage three phase	Line to line voltage	180	400/415	460	Vac
Input current	@ Vin=320Vac, Pout=30kW			58	A
Output power	Vin=320~460Vac		30	30	kW
Line frequency		47	50/60	63	Hz
Leakage current	@Vin=460V			10	mA
Power factor	Vin=400Vac, Pout=30kW	0.99			
Startup current	% of current at normal operation			110	%
Efficiency	95.5% @400Vac, Vout=800V, 100% load, 30kW		95.5		%
DC output side parameters					
Output voltage	Support CV/CC mode, and CV/CC transition based on the parameter setup and load setup	150	400/800	1000	Vdc
Output current	@Vout=300Vdc and Pout=30kW			100	A
Output ripple current	IEC 61851-23				A

mode 2, DC-AC discharging mode, AC voltage output					
Parameter	**Description/condition**	**Min**	**Nor**	**max**	**Unit**
DC side parameters					
DC input voltage	Battery voltage, nominal 150~1000Vdc	150	400/800	1000	Vdc
DC Input current	@ Vin=315Vdc, Pout=30kW			100	A
Output power	Vin=315~1000Vdc		30	30	kW
Inrush current	The pre-charge circuit should be set by inverter charger			20	A
Efficiency	95.5%@Vin=800Vdc and Vout=230Vac, Phase voltage		95.5		%
AC side parameters					
Output voltage range L-N voltage	UL1-N= UL2-N= UL3-N, Voltage setting via CAN (Phase balanced load)	120	230	265	Vac
Output current	L1-N, L2-N, L3-N can be loaded separately 43.5A@ 115V line to neutral voltage, balanced load		43.5	43.5	A
Output power	Phase balanced load		30	30	kVA
	Phase unbalanced Load maximum power @each phase			5	kVA
Output frequency		47	50/60	63	Hz
Load step response	@230Vac nominal output, 4.35A~22A, 22A~43.5A	-10%	0	10%	
Output voltage THD	Resistive load: 0~43.5A, Vout=230V phase voltage		5%		
Power factor	The load could be inductive or capacitive load	0.8		1	
DC voltage component	For every individual phase voltage, DC component is limited to 1.2V, 0.5% of L/N voltage			1.2	Vdc
Turn on/off delay	Turn on delay @ start up			6	s
	Turn off delay @ via CAN communication			1	s

mode 3, Grid-connected mode, P/Q control mode					
Parameter	**Description/condition**	**Min**	**Nor**	**max**	**Unit**
DC side parameters					
DC input voltage	Battery voltage	150		1000	Vdc
DC Input current	@ Vin=315Vdc, Pout=30kW			100	A
Output power	Vin=315~1000Vdc		30	30	kW
Inrush current	The pre-charge circuit should be set by inverter charger			20	A
Efficiency	95.5%@Vin=800Vdc and Vout=400Vac, full load		95.5		%
AC side parameters					
AC voltage range	Line to line voltage	180	400/415	460	Vac

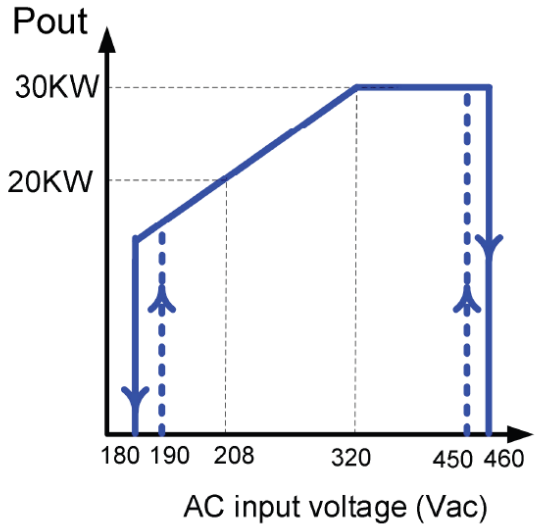
Output apparent power	Supported apparent power control, set via CAN bus with P and Q command		30	30	kVA
Power factor	Two range can be supported -0.8~-1, 0.8~1	-1		-0.8	
		0.8		1	
Output current THD	@Vac=400Vac, Apparent power: 30kVA			5%	

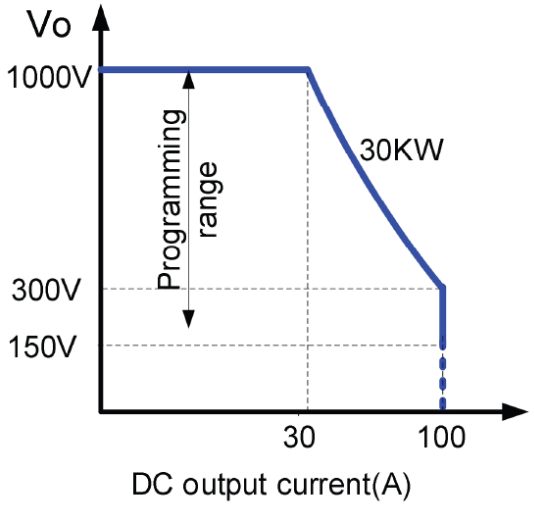
mode 4, bi-directional operation, DC side control mode, CC, CV, CP can be setting

Parameter	Description/condition	Min	Nor	max	Unit
DC side parameters					
DC input voltage	Battery voltage	50		1000	Vdc
DC Input current	@ Vin=300Vdc, Pout=30kW			±100	A
Output power	Vin=300~1000Vdc		±30	±30	kW
Inrush current	The pre-charge circuit should be set by inverter charger			20	A
Efficiency	95.5%@Vin=800Vdc and Vout=400Vac, full load		95.5		%
AC side parameters					
AC voltage range	Line to line voltage	180	400/415	460	Vac
AC side current	@ 320Vac AC side voltage			58	A
Power factor	When the power is over ±30kW		0.99		
AC side current THD	@Vac=400Vac, DC side power: ±30kW			5%	

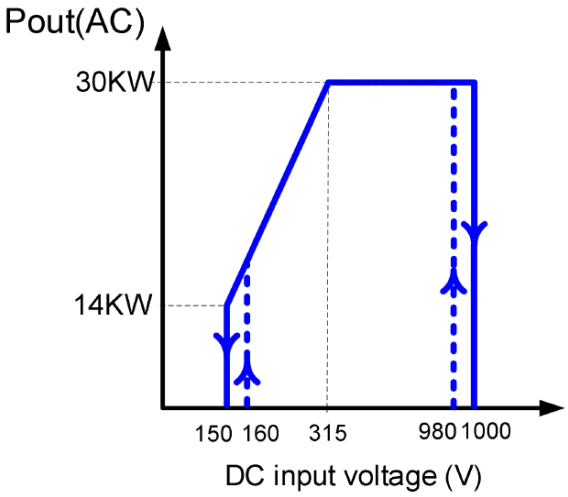
Output power de-rating curve·

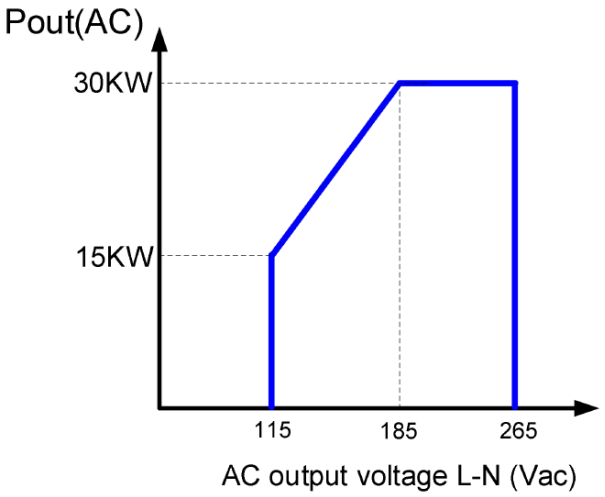
Mode 1: AC-DC charging mode



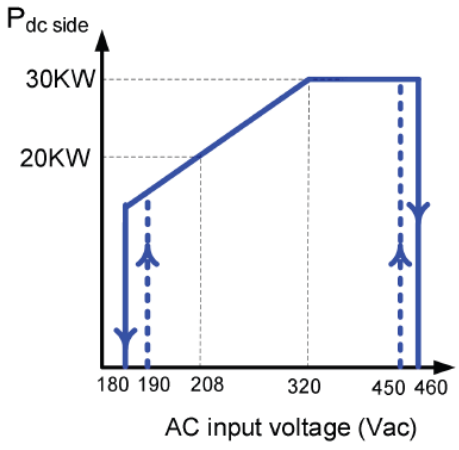


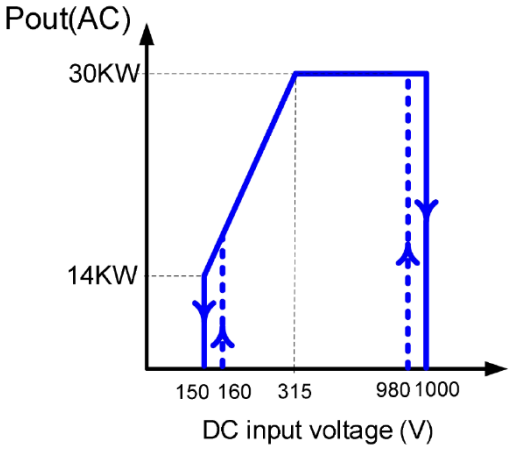
Mode 2: Grid forming mode, AC voltage output

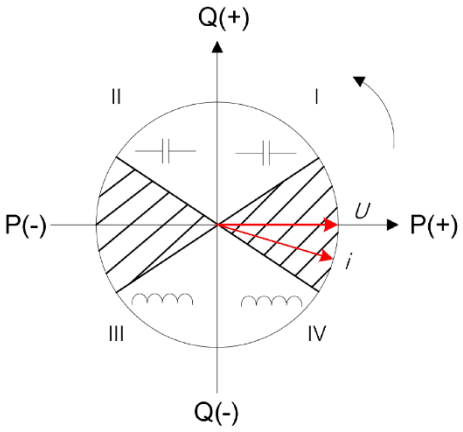




Mode 3: Grid connection mode, P/Q control





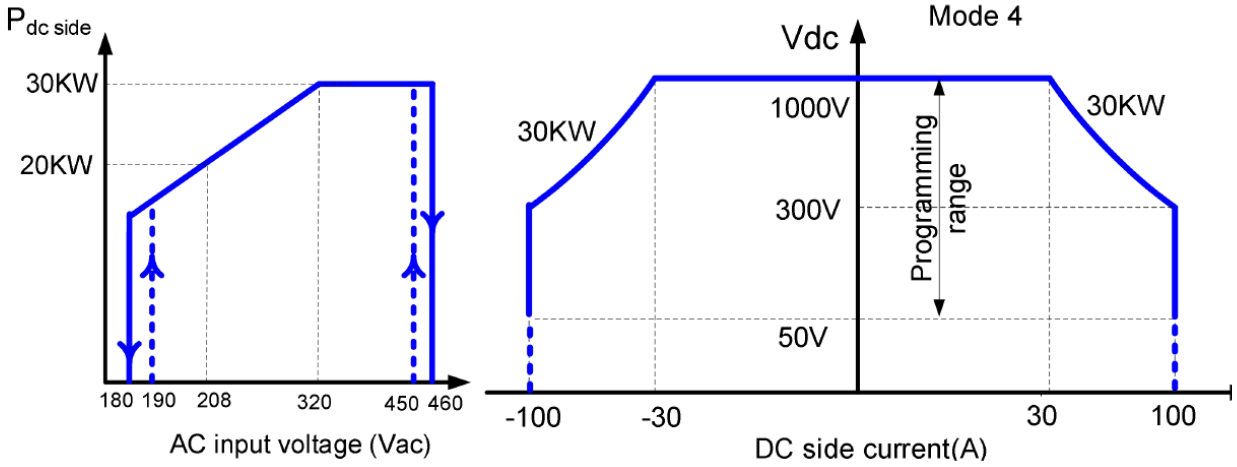


The operating range for the mode 3 is defined in the shadow area, the power factor range is

0.8~1 and -0.8~-1.0. Here, Defining the Power factor be positive when power transfer from AC to

DC and defining the power factor to be negative e.g. -1, when power transfer from DC side to AC side.

Mode 4: AC-DC bi-directional operation, DC side CC, CV and CP control



Protections

Parameter	Description/condition	Min	Nor	max	Unit
AC OCP	Mode 1, 2, 3		65		A
AC OVP	Mode 1,3		460		Vac
AC UVP	Mode 1,3		180		Vac
DC OCP	Mode 1		110		A
DC OVP	Mode 1		1050		Vdc
	Mode 2,3,4		1000		Vdc
DC UVP	Mode 1		50		Vdc
	Mode 2,3		150		Vdc
	Mode 4		30		Vdc
Input and output fuse protection	AC Input fuse internal parallel (500Vac)		30A*3		A
	DC input fuse (1000V)		30A*5		A
	LV dc (10~32V) input fuse		3.5		A
OTP	Converter shut down at T_amb higher than		75		°C

Monitoring and control signals

Parameter	Description/condition
CGND, V12V	10~32V aux battery voltage input. Used to supply internal aux converter. Input protected against reverse connection.
CANH-DC, CANL-DC	DC side CAN bus, for system control
CANH-AC, CANL-AC	AC side CAN bus, for Grid forming mode, no need connection if grid forming disabled
Sync-1H, Sync-2L	Synchronous signal for grid forming mode

Environmental Specifications

Parameter	Description/condition	Min	Nor	max	Unit
Operation altitude				4000	m
Storage temperature		-40		85	℃
Operation Temperature		-40		75	℃
Relative humidity		0		95	%
Protection			IP20		
Pollution degree	IEC61851-1		II/III		
Acoustic noise	400Vac/800Vdc Full Load@25℃		60		dB
Overvoltage degree	IEC61851-1		2		

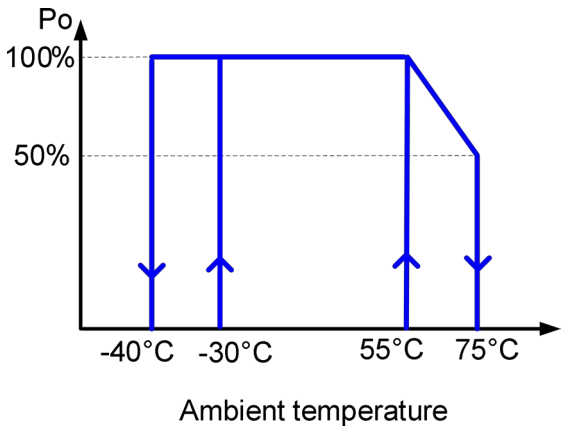
Note: It is not recommended to install the module in the severely corrosive conditions with dense salt spray to avoid damaging the module.

Cooling Specifications

Parameter	Description/condition	Min	Nor	max	Unit
Cooling method	Forced air-cooling				
Maximum ambient temperature	+75°C (55~75°C linear derating to 50% load, @55°C, 30kW power)				

Thermal derating curve

The module can operate in the ambient temperature up to 75ºC with derating over 55ºC. The derating curve is shown below with 50% of rated power at 75ºC. In certain extreme states, when the temperature of internal components in the module is too high, the output power will also be de-rating.



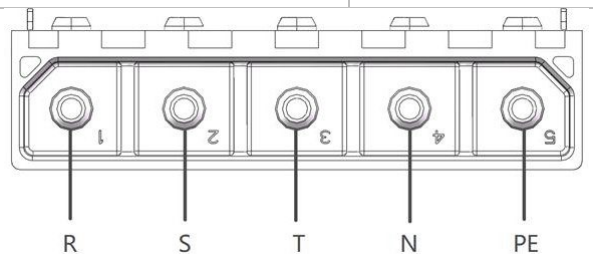
Safety, Regulatory and EMI Specification

Parameter	Description/condition	Criterion
Emission requirements: IEC 61851-21-2		
Radiated Emission	CISPR16-2-3	Class A
Conducted Emission	CISPR 16-2-1	Class A
Harmonics input current	EN 61000-3-12	
Immunity requirements: IEC 61851-21-2		
Electrostatic Discharge	IEC61000-4-2	
Radiated RF field	IEC61000-4-3	
Electrical Fast Transient (EFT)/burst	IEC61000-4-4	
Surge immunity	IEC61000-4-5	
conducted RF field	IEC 61000-4-8	
Hi-pot test	AC input to HV output: AC input to chassis HV output to chassis:	Refer to IEC 61851
Insulation resistance	The insulation resistance between each independent circuit and the ground (chassis)	Refer to IEC 61851
	The insulation resistance between each circuit without electrical connection	

Input and output Connectors

AC side power connector

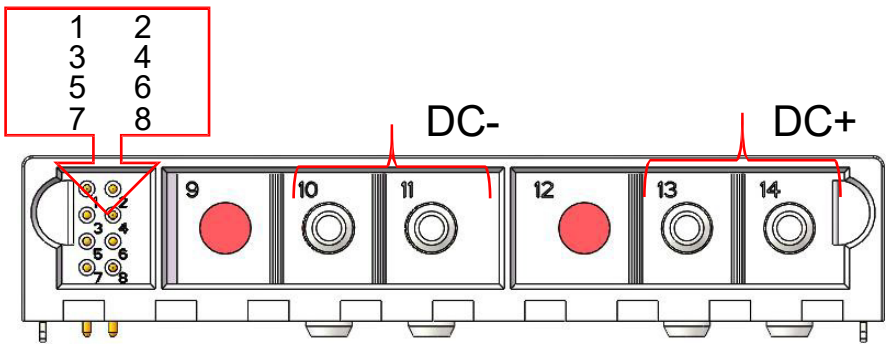
Manufacturer	YongHaoRun technology Co., Ltd.	
Manufacturer P/N	YHR-MPC-5TJW1	Male, customer side
Manufacturer P/N	YHR-MPC-5ZKY1	Female housing



Foot position	Signal	description
5	PE	PE Terminal
4	N	Three-phase AC N-phase
3	T	Three-phase AC T-phase
2	S	Three-phase AC S-phase
1	R	Three-phase AC R-phase

DC side power and signal connector

Manufacturer	YongHaoRun technology Co., Ltd	
Manufacturer P/N	YHR MPC-14G12TJW1-3	Female housing
Manufacturer P/N	YHR MPC-14G12ZKY1-10	Male, customer side



Pin	Signal	Description
13,14	Output +	The positive of main output
10,11	Output -	The return of main output
1	CANH-DC	Positive terminal of CAN-DC bus, for system control
2	CANL-DC	Negative terminal of CAN-DC bus, for system control
3	SYNC-1H	Synchronous signal 1, for Grid-forming
4	SYNC-2L	Synchronous signal 2, for Grid-forming
5	CANH-AC	Positive terminal of CAN-AC bus, for Grid-forming
6	CANL-AC	Negative terminal of CAN-AC bus
7	CGND	Control signal ground
8	C-12V	Control low voltage, for grid forming mode, 10~32V, recommend 12V or 24V, Power 8~10W

Mechanical Specifications

Parameter	Description/condition
Dimensions (W*H*D)	300mm*84mm*437.5mm
Weight	17.5kg
Enclosure Materials	SGLCC