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
- AC grid configuration: three-phase / 4-wire + PE (L1, L2, L3, N, PE)
- Glue protection (top-layer potting) for harsh environments

DESCRIPTION

The BBC-30K is a 30 kW bi-directional AC/DC power module that enables controlled energy transfer between a three-phase AC network (180–460 Vac) and high-voltage DC battery systems (150–1000 Vdc), supporting charging, discharging and grid-forming power conversion with CC/CV/CP control modes. It is designed for use in BESS, V2G, V2H, echelon utilization of retired batteries, and bi-directional conversion applications in micro-grids with multiple energy inputs, offering a wide constant-power and constant-voltage range, high efficiency (95.5% typical), high power factor, high power density, low electromagnetic radiation and interference, and high reliability. The module integrates a built-in DC pre-charge circuit for direct connection up to 1000 Vdc, independent CAN communication channels for the DC and AC sides, and glue protection (top-layer potting), suitable for harsh environments such as high humidity and heavy dust..

Model	Mode	Energy flow	AC range	DC range	Max current	Total power
BBC-30K-35831	Charging	AC → DC	180–460 Vac (L-L)	150–1000 Vdc	100 A DC	30 kW
	Grid-forming	DC → AC	120–265 Vac (L-N)	150–1000 Vdc	43.5 A AC	30 kVA
	Grid-connected P/Q	AC ↔ DC	180–460 Vac (L-L)	150–1000 Vdc	±100 A DC	±30 kVA
	Bidirect. CC/CV/CP	AC ↔ DC	180–460 Vac (L-L)	50–1000 Vdc	±100 A DC / 58 A AC	±30 kW

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

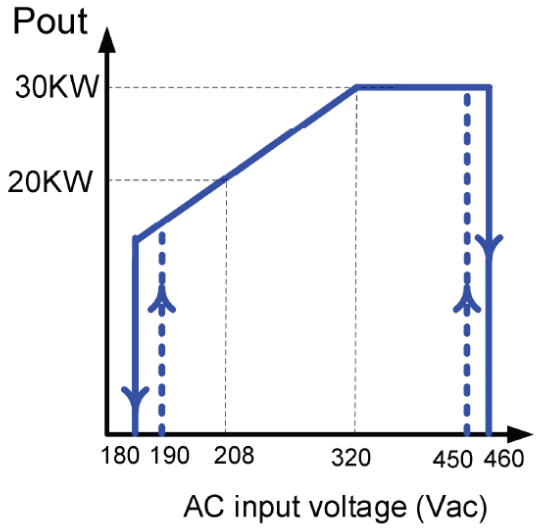
mode 3, Grid-connected mode, P/Q control mode					
Parameter	**Description/condition**	**Min**	**Nor**	**max**	**Unit**
Output apparent power	Supported apparent power control, set via CAN bus with P and Q command		30	30	kVA
Power factor	Two range can be supported -0.8~-1, 0.8~1	-1		-0.8	
		0.8		1	
Output current THD	@Vac=400Vac, Apparent power: 30kVA			5%	

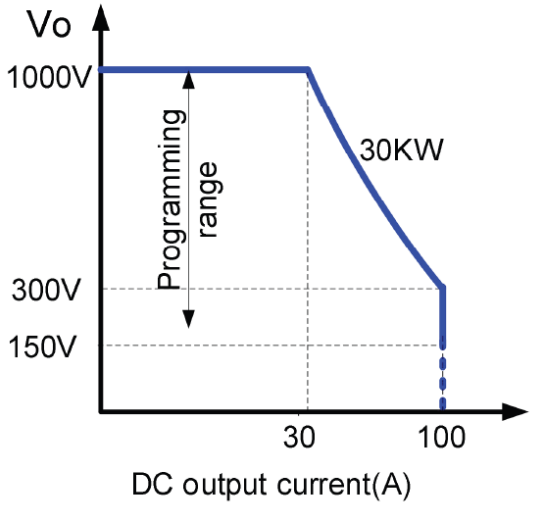
mode 4, bi-directional operation, DC side control mode, CC, CV, CP can be setting

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%	

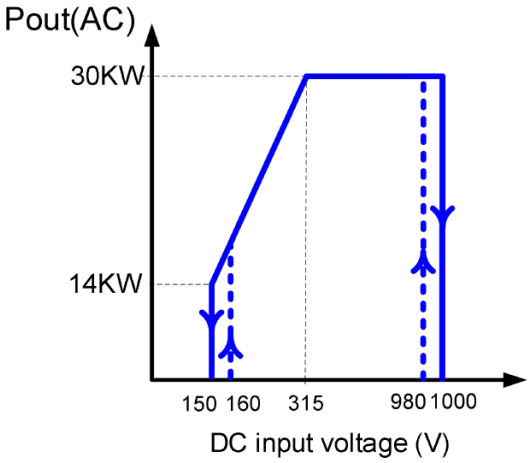
Output power de-rating curve·

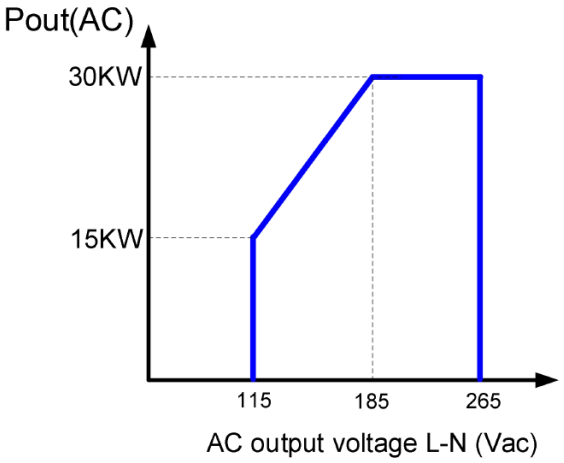
Mode 1: AC-DC charging mode



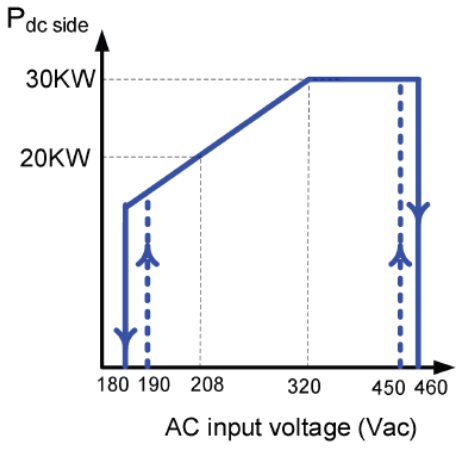


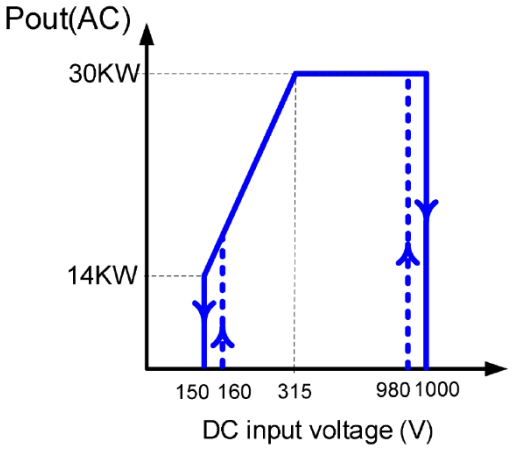
Mode 2: Grid forming mode, AC voltage output



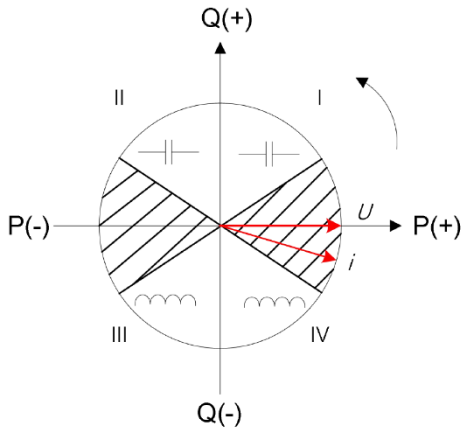


Mode 3: Grid connection mode, P/Q control





Output power de-rating curve·

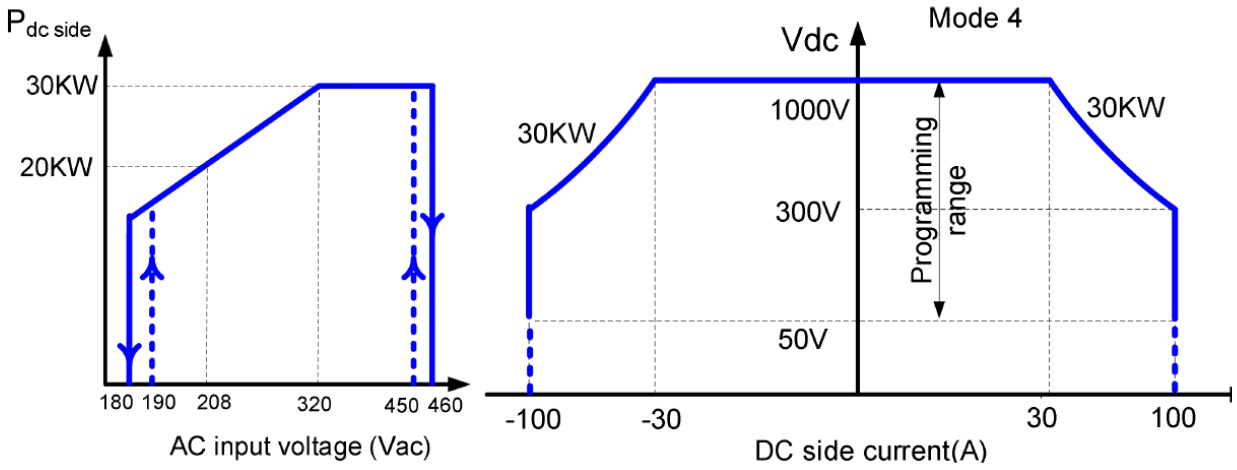


The operating range for the mode 3 is defined in the shadow area, the power factor range is

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

Parameter	Description/condition	Min	Nor	max	Unit
OTP	Converter shut down at T_amb higher than		75		°C
NTC sensor fault (ambient)	Open circuit: under-temperature shutdown. Short circuit: over-temperature shutdown.				
Recommended external protection	3P+PE breaker with RCD function on the AC input side; DC disconnector on the DC output circuit (installation recommendation, IEC 62477-1 type test)				

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
Isolation	CAN bus and control signal circuits are SELV, galvanically isolated from AC/DC power circuits by approved isolating transformers, optocouplers and isolation chips (IEC 62477-1 type test)

Environmental Specifications

Parameter	Description/condition	Min	Nor	max	Unit
Operation altitude				4000	m
Storage temperature		-40		85	°C
Operation Temperature		-40		75	°C
Relative humidity		0		95	%
Protection			IP20		
Pollution degree	IEC 62477-1		PD2		
Acoustic noise	400Vac/800Vdc Full Load@25°C		60		dB
Overvoltage category	IEC 62477-1		AC: III / DC: II		
Electrical supply system	IEC 62477-1		TN		

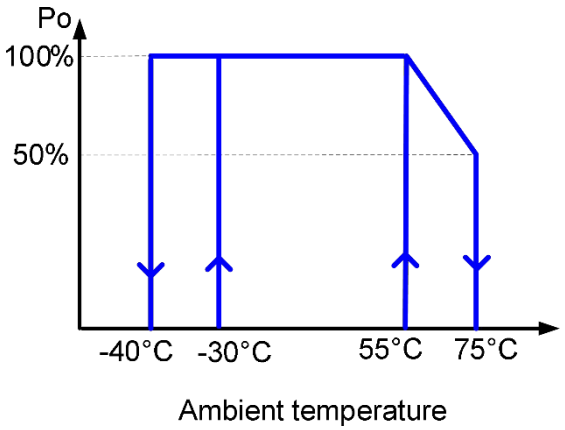
Note: It is not recommended to install the module in the severely corrosive conditions with dense salt spray to avoid damaging the module.

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)				
Clogged air filter behaviour	50% clogged: unit maintains full power (30 kW) for 20 min, then derates to 15 kW. 100% clogged: safety shutdown (over-temperature protection)				

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.



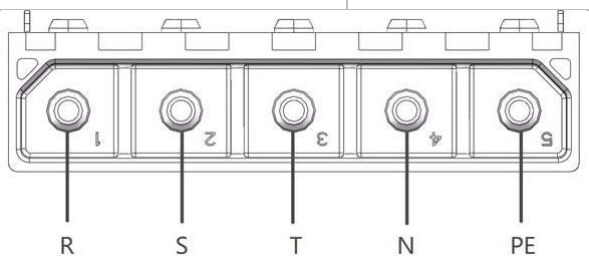
Safety, Regulatory and EMI Specification

Parameter	Description/condition	Criterion
Emission requirements: EN IEC 61000-6-4:2019		
Radiated Emission	CISPR16-2-3	Class A
Conducted Emission	CISPR 16-2-1	Class A
Harmonics input current	EN 61000-3-12	
Immunity requirements: EN IEC 61000-6-2:2019		
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:	DC 2120 V (impulse withstand 4923 V, IEC 62477-1)
Dielectric strength (SELV)	AC input / DC output to SELV circuit:	DC 4240 V (impulse withstand 7385 V, IEC 62477-1)
Insulation resistance	The insulation resistance between each independent circuit and the ground (chassis)	Refer to IEC 62477-1
	The insulation resistance between each circuit without electrical connection	

Input and output Connectors

AC side power connector

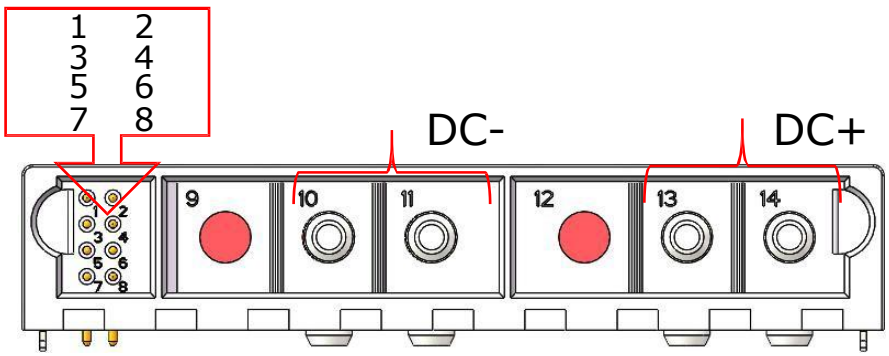
Manufacturer	YongHaoRun technology Co., Ltd.	
Manufacturer P/N	YHR-MPC-5TJW1	Male, customer side
Manufacturer P/N	YHR-MPC-5ZKY1	Female housing



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

Pin	Signal	Description
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

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