High Cost Performance and High Reliability Products

EVC16 Series DC Fast EV Charger

Input: 260～485Vac; Output: 200-1000Vdc; Power: 30~240kW

Specification: V1.2

Catalogue

Statement

① The specifications describe the performance of the EVC16 series DC fast EV charger in detail. Before performing all operations on the integrated charger, please read this specification carefully and comply with the safety specifications of the relevant industry. The company shall not be responsible for damage caused by improper operation or beyond the conditions of use specified in this specification.

② We reserve the rights to change the content of this specification without notifying .

③ Safety regulations

	The AC power input wire is working at a high-voltage , ensure that the AC input is powered off before operation is necessary, and the switch that is not allowed to be used during the operation,it should be added with a forbidden mark.

	AC wire terminal connection and other unnecessary exposed wires, should be fully insulated.
	Ensure well grounded before powering on.
	The module is not support hot plugging. Ensure that the AC power is off and all module indicators are not illuminated before performing this operation.
	Do not perform high voltage during thunderstorms.

1. Charger Overview

1.1 Key Features

- Standard configuration of three charging guns integrated in one DC charger ,wide power range 30~240kW.
- The charger controls by high performance ARM chip, and 7 inch LCD touch screen make it easily to achieve human-machine interaction.
- Protection function: input over and under voltage protection, output over current protection, output over voltage protection, output short circuit protection, over temperature protection, battery anti-reverse protection, insulation detection protection, emergency stop protection.
- The charging rectifier module adopts active power factor compensation technology, and the value of power factor reaches 0.99.
- The charging rectifier module adopts soft Switching Three-level technology, and the efficiency can reach 96%.
- Perfect AC side lightning protection design, suitable for thunderstorms areas.
- Ultra-low radiation, safe and reliable. The voltage withstand level, insulation level and EMC of the charger meet the relevant requirements of the international regulations. The grade of dust proof and waterproof design up to IP55, meet the requirements of indoor and outdoor charging. In outdoor operation, a ceiling need to be installed above the charger to prevent rain from falling directly.

1.2 Charger Configuration

The charger consists of outdoor cabinet, human-machine interface, power distribution unit, monitoring module and charging rectifier module. The modules selection can be referred to the following table:

Power Module (kW)	Module Quantity Selection (Max)	AC Power Supply	Monitor Module	Remark
30kW	8	AC input: Three-phase five-wire , circuit breaker 500A/3P: 240 kW 400A/3P: 120/150/180 kW 200A/3P: 30/60/90 kW Surge protection: Three-phase C class 20~40KA DC output(standard): Maximum 200A （DC+、DC-）	Monitoring system	For details, please check the charging module specifications

1.3 Model Description

EVC16	—	DH	—	180K	—	7P	—	3	—	UE	—	X
a	—	b	—	c	—	d	—	e	—	f	—	g

a: INVT Electric Vehicle Drive Technology(Shenzhen) Co., LTD

b: Integrate Charger

c: Power Output (DC) 180K—180kW (Power range 30/60/90/120/150/180/240 kW)

d: Hardware Version 7P—Commercial

e: Connector Type 0—CCS2, 1—CCS2+CCS2, 2—CCS2+Type2, 3—CCS2+CCS2+Type2

f: Execution Standard UE：European Union Criterion

g: Colour and Silkscreen of Enclosure(Blank or 1~99)

1.4 Charger Principle Overview

① The charger power adopts three-phase and five-wire input system. The power enters the charging rectifier module according to main circuit breaker. The C-class surge protector is connected in parallel to the input end of the charging rectifier module and provides AC surge protection with rated discharge current of 20KA. The charging module converts the three-phase AC into high-voltage DC and connects it to the DC distribution unit. The number of charging rectifier modules can be freely selected according to the capacity requirements.

② The DC distribution unit output the high voltage DC current to the vehicle charging socket through the DC charging gun to charge electric vehicle. The DC charger is composed of monitoring system, up to 1~6 charging rectifier modules and human-machine operation monitoring interface. The maximum output power reaches 30~180kW and the output voltage is adjustable from 200 to 1000Vdc.

1.5 Modification Record

Version	Editor	Date	Modify	Update
V1.0		2023.6.12	First	Clarify functions and specifications
V1.1		2023.08.09	Second	Update model description
V1.2		2024.06.04	Third	Update Power Range

1.6 Foreword

Welcome to use EVC1616 series DC fast EV charger that developed and produced by INVT Electric Vehicle Drive Technology Shenzhen Co., LTD. The charger consists of cabinet, human-machine interface, power distribution unit, monitoring module and charging rectifier

module.

The power input of DC fast charger adopts three-phase five-wire system, the output voltage can provide wide range of 200-1000Vdc , and the maximum current at full load can reach 200A when charging. The dust-proof and waterproof grade of the charger reaches IP55, which can be used indoors and outdoors (outdoor operation, the top of the charger should be installed a ceiling to prevent rain from falling directly on the charger). The humanized designed of charger make it easily installation and debugging, simple operation and maintenance, stable performance, robust interoperability, and 7 inch touch screen can achieve human-machine interactive more easily.

2. System parameters

Parameters	Min	Typical	Max	Unit	Remark
Operating temperature	-25	25	45	°C	Certified within this temperature range
Limit temperature	-30	25	55	°C	-20°C ~ 50°C can be started with load, and the module reduces the power output after over temperature.
Protection Ratings	IP55				
Noise	≤70dB				
Relative humidity	5		95	%	No condensation on the surface
Altitude			2000	m	< 2000 m (2000 to 5000 m with power derating)

Input parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Remark**
AC input connection	3P+N+PE				Note: The charging module no need connect with neutral wire, net work type: TN-S, TN-C
Rated voltage	323	400	437	Vac	
Input voltage range	260	400	485	Vac	260±5V~323±5V, power derating 50%
Max input AC current	79A, 30kW+22kW				Note(without type 2 connector): 46A, 30kW / 93A, 60kW 139A, 90kW / 230A, 150kW 180A, 120kW / 277A, 180kW 372A, 240kW
	124A, 60kW+22kW				
	170A, 90kW+22kW				
	216A, 120kW+22kW				
	262A, 150kW+22kW				
	310A，180kW+22kW				
	400A, 240kW+22kW				

Transformer capacity	65KVA，30kW+22kW				Note(without type 2 connector) 38KVA, 30kW / 75KVA, 60kW 113KVA, 90kW / 150KVA, 120kW 188KVA, 150kW /225KVA, 180kW 300KVA, 240kW
	104KVA，60kW+22kW				
	140KVA，90kW+22kW				
	177KVA, 120kW+22kW				
	215KVA，150kW+22kW				
	252KVA, 180kW+22kW				
	327KVA, 240KW+22kW				
Start time	3		8	S	Rated input voltage range is powered on until the output voltage rises to the set value
Operation frequency	45～65Hz				
Power factor(> 50 % Load)	＞0.99				Rated input, full load output
THDi (> 50 % Load)	Total harmonic current distortion ＜5%				Rated input, full load output
Over voltage category	AC side (input) OVC: III				
Output parameters					
Parameters	**Min**	**Typical**	**Max**	**Unit**	**Remark**
Rated output voltage		1000		Vdc	Command output is limited to more than 200V
DC output voltage	200		1000	Vdc	CHAdeMO: 150 to 500 Vdc
Max output current	0	100	200	A	Each charging connector can output 200A max at the same time, CCS2 Boost mode 300A (Optional). (30kW/ 100A max)
DC output power	30/60/90/120/150/180 kW				
Voltage regulate precision	-0.5		+0.5	%	
Voltage ripple value			1	%	
Dynamic respond time			200	us	
Dynamic overshoot	-0.5		+0.5	%	
Efficiency	>95		>96	%	Rated working condition
Current sharing unbalance	-5		5	%	Test when the output current is more than 50%
Heat dissipation mode	Intelligent fan cooling				
AC Output	Rated voltage				400Vac
	Rated current				≤32A
	Rated power				22 kW

Configuration			
Cable length	AC 4.5m , DC 5m		
Charging interface standard	IEC/EN 62196-2016		
User authentication	RFID Card,QR Code		
Number of charging interface	Three (Quantity can be optional)		
Energy metering	Class A(DC), Class B(AC), (For AC meter : MID, PTB certificated optional; For DC meter: PTB certificated optional)		
Cool-down method	Auto fan cooling		
Net weight	220Kg(Without charging module)		
Size(mm)	550*750*1840（W*L*H）		
Protection	30mA leakage protection; Over current; Short-circuit; Charging gun disconnected detect; Ground-detect; Over voltage; Under voltage; RCD protection; Over temperature; Insulation monitor; Surge protection.		
Cellular communication	**Operation mode**	**Frequency range**	**Max output power**
	GSM 900	880 – 915 MHz, 925 – 960 MHz	32.73dBm
	GSM 1800	1 710 – 1 785, 1 805 – 1 880 MHz	28.78dBm
	WCDMA BAND I	1 920 – 1 980 MHz, 2 110 – 2 170 MHz	22.69dBm
	WCDMA BANDVIII	880 – 915 MHz, 925 – 960 MHz	23.35dBm
	LTE B1	1 920 – 1 980 MHz, 2 110 – 2 170 MHz	23.21dBm
	LTE B3	1 710 – 1 785 MHz, 1 805 – 1 880 MHz	22.83dBm
	LTE B7	2 500 – 2 570 MHz, 2 620 – 2 690 MHz	21.62dBm
	LTE B8	880 – 915 MHz, 925 – 960 MHz	22.39dBm
	LTE B20	832 – 862 MHz, 791 – 821 MHz	22.3dBm
	LTE B40	2 300 – 2 400 MHz	24.33dBm
	RFID	13.56MHz	far less than 20mW
Connectivity	Internet access via 4G (optional)/Ethernet (RJ45)		
EMC standard	EN 61851-21-2 ,EN 61000-6-2,EN 61000-6-4		
Certification	CE		
Efficiency	≥ 95 %		
Short circuit current	≥ 65 kA		

rating	
User interface	7.0-inch IPS-TFT-LCD Touchscreen
Communication protocols	OCPP 1.6 JSON
RFID reader	ISO14443 TypeA、MIFARE® ONE（MF1)Card
Emergency button	Yes
Software update	Location USB or OTA update via web portal
Protection ratings	IP55 outdoor use and IK-10
Enclosure type	Galvanizing plate（SECC）
Cable Management	Optional
Warranty	2 years standard, (Can be discussed on the contract)

3. Monitoring System

Monitoring Function

Function	Statement
The HMI interface monitors system working condition	Users can set parameters and control the system through the touch screen to achieve the function
Monitoring management to charging rectifier module	The monitoring module issues commands of control adjustment or parameter acquisition to the charging module through CAN communication
Control and management functions for monitoring system	System output state detection, system output voltage and current detection, system fan working state detection, charging gun state detection, electronic lock state detection, output bus detection, environmental temperature detection, charging gun temperature detection, Surge protector state detection, CAN communication control
Monitoring system for vehicle control	According to the parameter instruction issued by BMS, the monitoring system implements the distribution of charging current and voltage, real-time monitoring of charging current and voltage, and maintains real-time communication with BMS

System remote update	The DC charger can be connected to the INVT special platform through 4G network or Ethernet, which can achieve software remote update and upgrade maintenance, and achieve charging cost operation and management.

4. Power Module Description

4.1 Parameters

Item	Unit	Min	Typical	Max	Test condition
AC input	Vac	260	400	485	
AC input frequency	Hz	45	55	65	Rated load
THD		≤5			
Input power factor		≥0.99			Rated output load
Max input current	A	＜60A			
Input over voltage protection	V	490±5V			
Input under voltage protection	V	255±5V			
Input efficiency		>95		>96	
Output voltage range	Vdc	200		1000	
Output current	A	0	30	100	
Voltage stabilized accuracy				≤±0.5%	
Current stabilized accuracy				≤±1%	
Output power	kW	0		30	
Input over voltage protection	Vac	485	490	495	
Input under voltage protection	Vac	250	255	260	
Output over voltage protection	Vdc	1005	1010	1015	
Output under voltage protection	Vdc		190		
Over temperature protection	℃	When the environment temperature is >70±4 ℃ or <-40±4 ℃, the module is powered off			

Communication		CAN			
Constant power voltage range	V	300		1000	30kW
Storage temperature	℃	-40		85	
Net weight	Kg			15.5	
Parallel Quantity		60pcs maximum			

4.2 Power Module Installation

① The system power must be cut off before module installation!

② Install the base of the rectifier module.

③ Open the side cabinet door of the charger

④ Push the module sideways slowly into the module shelf inside the cabinet, and pay attention to the output and input terminals ,do not push hard to prevent damage from input and output wires.

④ Connect the input and output terminals to the module, and check whether any terminals touch the cabinet.

5. Indicator Statement

5.1 Indicator Status

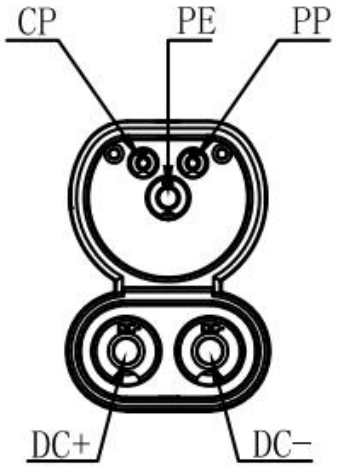
Cabinet LED		
Signal	**Color**	**Description**
Run	Green	The green light is on when the power standby
A/B/C	Yellow	When charging normally, the yellow light is on
Fault	Red	When the system have a fault, the red light is on

Charging module LED			
Color	**status**	**Fault description**	**Suggestion**
Green	Not	No AC power input	Check whether the input is normal

	illuminated	Internal module fault	Return to factory
Yellow	On	The AC input voltage lack of phase and temperature result in lower power output	Check whether the environment temperature is too high or too low or whether AC input power lack of phase.
	Flashing	Run in manual mode works normally	Check whether get into manual mode
Red	On	EEPROM fault	Return to factory
		The fan driver fault	
		Internal over temperature	
		The communication between the primary and secondary sides is abnormal	
		Ac input over voltage or under voltage (E03);	Check whether the input is over voltage or under voltage
		Ac input phase missing (E03);	Check whether AC input is out of phase
		Output over voltage (E06), Under voltage (E01)	Check whether output is over voltage or Under voltage

5.2 Charging Connector Definition

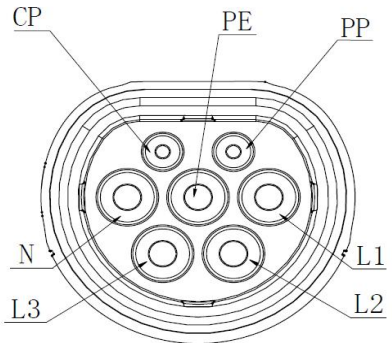
5.2.1 DC charger:



Signal Statement

PIN	Definition	Rated Current	Diameter(mm²)	Color
DC+	DC positive	250A	70	Red
DC-	DC negative	250A	70	Black
PE	Protective grounding	/	35	Yellow/Green
PP	Proximity pilot	/	/	/
CP	Control pilot	2A	0.75	White
T1+	Temperature sensor	2A	0.75	Brown
T1-	Temperature sensor	2A	0.75	Gray
T2+	Temperature sensor	2A	0.75	Blue
T2-	Temperature sensor	2A	0.75	Purple

5.2.2 AC Charger:



Signal Statement

Pin	Definition	Rated current	Diameter(mm²)	Core color
L1	AC power L1 phase	32A	6	Brown
L2	AC power L2 phase	32A	6	Black
L3	AC power L2 phase	32A	6	Grey
N	AC power neutral	32A	6	Blue
PE	Protective	/	6	Yellow and green

	grounding			
CP	Control pilot signal	2A	0.5	White
PP	Confirmation of charging connection	2A	0.5	/

Note: The definition of the charging gun will be slightly different from the model what you have received , please refer to the specification of the actual one.

6. Safety Use Instruction

6.1 Unpack

Check whether the charger is damage in transportation. Retain packaging materials until all modular units of the charger have been registered and inspected.

6.2 General Rule

- The air passage of the module unit in the charger shall not be blocked.
- The distance between any conductive part of the charger and the metal part must meet the relevant safety standards.

6.3 Safety Protection

- Once the safety protection of the charger is damaged, the charger must stop working and refer to the relevant maintenance regulations.
- Condensation can cause dangerous problems when the charger is switched from a cold to a warm environment, so the grounding requirements must be strictly enforced. Only a qualified person can connect the charger to the power supply.
- The charger must be shut down for four minutes before maintenance, so that the capacitor has sufficient discharge time.

6.4 Attention

- The charger shall be used under the environmental conditions specified in the specification;

- The charger should keep good ventilation and heat dissipation . The emergency stop switch should immediately press when smoke or bad smell out from cabinet.
- An air filter is needed due to the forced air cooling inside the charger. The charger needs to be cleaned in time due to the accumulation of dust, otherwise, it will affect the heat dissipation of the system, and there will be overheat protection and load reduction. In areas with poor air quality, it is necessary to clean up at least once every two months.

6.5 Package

The packing box have the product name, model, manufacturer's logo, inspection certificate of the manufacturer's quality department, manufacturing date, etc.; There are product specifications and list of attachments inside the package.

6.6 Transportation

The charger can be transport by vehicle, boat, aircraft , The charger should be covered, sun protection during transportation , civilized loading and unloading.

6.7 Storage

The product should be placed in the packing box when storage, the environment temperature of the warehouse should be between -45 ~ +70℃, relative humidity is 5% ~ 90%. The warehouse is not allowed to have harmful gases, flammable, explosive products and corrosive chemical products. And there is no strong mechanical vibration, shock and strong magnetic field. The packing box should be at least 20cm high from the ground and at least 50cm away from the wall, heat source and window air inlet. The storage period under these conditions is generally 2 years, and the inspection should be carried out again after more than two years.

6.8 Guarantee Time

Any natural damage under normal use conditions within one year warranty period, INVT is responsible for free repair, but if there is any of the following circumstances, it is not covered by the warranty:

- Damage caused by maintenance without permission of INVT.
- Any parts addition or modification without permission.

7. Execution Standard

EN/IEC 60038:2011	《IEC standard voltages》
EN/IEC 60309-1:2012	《Plugs, socket-outlets for industrial purposes - Part 1 : General requirements》
EN/IEC 60309-2: 2022	《Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes - Part 2: Dimensional compatibility requirements for pin and contact-tube accessories》
EN/IEC 60364-4-41:2017	《Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock》
IEC 60364-5-54:2011	《Low-voltage electrical installations – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements and protective conductors》
IEC 60529:2001	《Degrees of protection provided by enclosures (IP Code)》
IEC 60664-1:2020	《 Insulation coordination for equipment within low-voltage supply systems – Part 1 : Principles , requirements and tests》
IEC 60898-1 Amd 1 :2019	《Electrical accessories – Circuit-breakers for over current protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation》
IEC 60947-2:2017	《Low-voltage switch gear and control gear – Part 2: Circuit-breakers》
IEC 60947-3:2020	《 Low-voltage switch gear and control gear – Part 3: Switches, disconnections, switch-disconnections and fuse-combination units》
IEC 60947-6-2:2020	《Low-voltage switch gear and control gear – Part 6-2: Multiple function equipment – Control and protective switching devices (or equipment) (CPS)》
IEC 60990:2016	《Methods of measurement of touch current and protective conductor current》
IEC 61008-1:2013	《Residual current operated circuit-breakers without integral over current protection for household and similar uses (RCCBs) – Part 1: General rules》
IEC 61009-1:2013	《 Standard for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits, Part 2: Particular Requirements for Protection Devices for Use In Charging Systems》
EN 61000-3-12:2011	《 Electromagnetic compatibility (EMC) – Part 3-2:Limits – Limits for hormonic currents produced by equipment connected to public low-voltage systems with input current ＞16A and ≤ 75A per phase》
EN 61000-4-2:2008	《 Electromagnetic compatibility (EMC) – Part 4-2 : Testing and measurement techniques – Electrostatic discharge immunity test》

EN 61000-4-3:2006;+A1:2008; +A2:2010	《 Electromagnetic compatibility (EMC) – Part 4-3 : Testing and measurement techniques – Radiated, radio-frequency electromagnetic field immunity test》;+A1+A2
EN 61000-4-4:2012	《 Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burs immunity test》
EN 61000-4-5:2014;+A1:2017	《 Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test》
EN 61000-4-6:2014	《 Electromagnetic compatibility (EMC) – Part 4-6 : Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields》
EN 61000-4-8:2010	《 Electromagnetic compatibility (EMC) – Part 4-8 : Testing and measurement techniques – Power frequency magnetic field immunity test》
EN 61000-4-11:2004;+A1:2017	《 Electromagnetic compatibility (EMC) – Part 4-11 : Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests》;+A1
EN 61000-4-34:2007;+A1:2009	《 Electromagnetic compatibility (EMC) – Part 4-34 : Testing and measurement techniques –Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current more than 16 A per phase》;+A1
EN IEC 61000-6-1:2019	《Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential , commercial and light-industrial environments》
EN IEC 61000-6-3:2021	《Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emissions standard for residential , commercial and light-industrial environments》
IEC 61558-2-4:2021	《Safety of transformers, reactors, power supply units and combinations thereof – Part 2-4: Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications》
IEC 61851-23:2014	《Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station》
IEC 61851-24:2014	《 Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging》
IEC 62196-2:2017	《Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive

	charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories》
IEC 61851-21-2:2018	《Electric vehicle conductive charging system – Part 21-2: Electric vehicle requirements for conductive connection to an AC/DC supply – EMC requirements for off-board electric vehicle charging systems》
BS EN IEC 61851-21-2:2021	《Electric vehicle conductive charging system – Part 21-2: Electric vehicle requirements for conductive connection to an AC/DC supply – EMC requirements for off-board electric vehicle charging systems》