



HzWP LS300-A60

Wireless Charging Power System

Product Specifications

Product Model: HzWP LS300-A60

Version: Rev. 03 24-09-14

Revision date: 2024-09-14

Component	Product code
HzWP LS300-A60- TC transmitter controller	911004503012
HzWP LS300-A60-TX-3m transmitter coil	911920503012
HzWP LS300-A60-RC receiver controller	911122506010
HzWP LS300-A60-RX receiver coil	911890506010

Revision history

Editions	Author	Submitted date	Auditor	Issue date
Version Rev. 01	Engineer Tan	2024-06-03		2024-06-03
Version Rev. 02	Engineer Tan	2024-06-26		2024-06-26
Version Rev. 03	Engineer Tan	2024-09-14		2024-09-14

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1 Product overview

1.1 Product Introduction

HzWP LS300-A60 Wireless Charging Power Supply System is a wireless charging power device based on magnetic coupling resonant technology, which can provide wireless charging for devices using lithium batteries and lithium iron phosphate batteries.

The wireless charging power supply is applied to all kinds of wireless charging scenarios with charging power below 3000W. Compared with traditional charging methods, it has the advantages of safety, small size, large power and maintenance-free, and is suitable for the charging application of mobile robots such as AGV, AMR, unmanned forklift truck.

1.2 Model description

Model number	Instructions
HzWP LS300-A60	Max. power 3kW, rated voltage 58V, Max. current 60A

2 Product structure & dimensions

HzWP LS300-A60 wireless charging power system consists of four parts: a transmitter controller, a transmitter coil, a receiver coil, and a receiver controller.

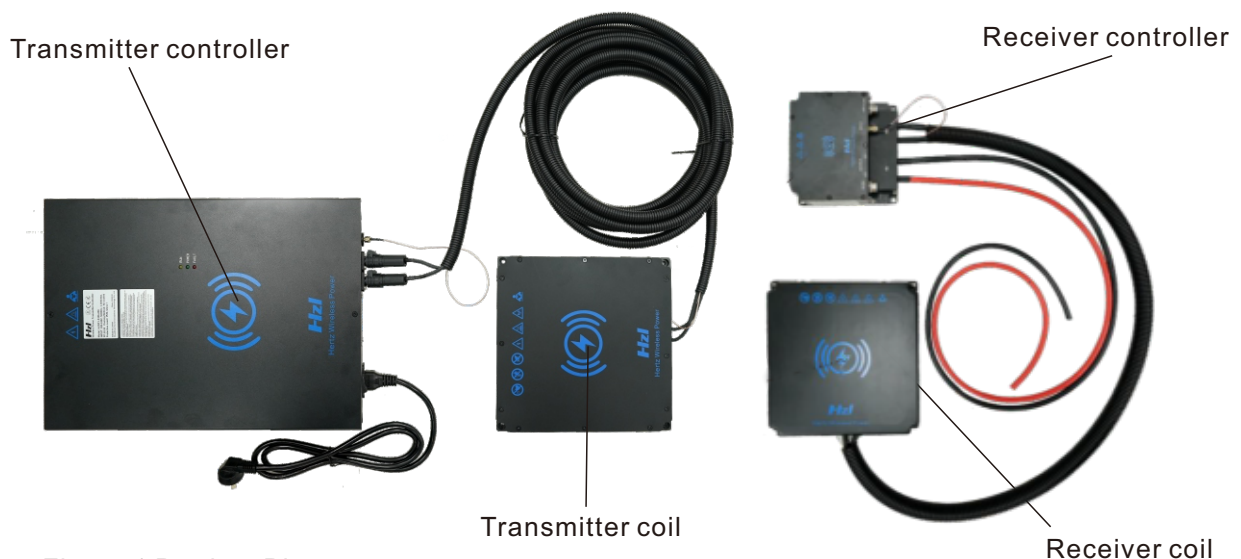


Figure 1 Product Picture

2.1 Transmitter controller

The main body of the Transmitter controller shell is made of aluminum plate material, the transmit controller is connected to the AC220V power supply, the protection level is IP20, and the maximum external dimension is L*W*H=460*378*110mm

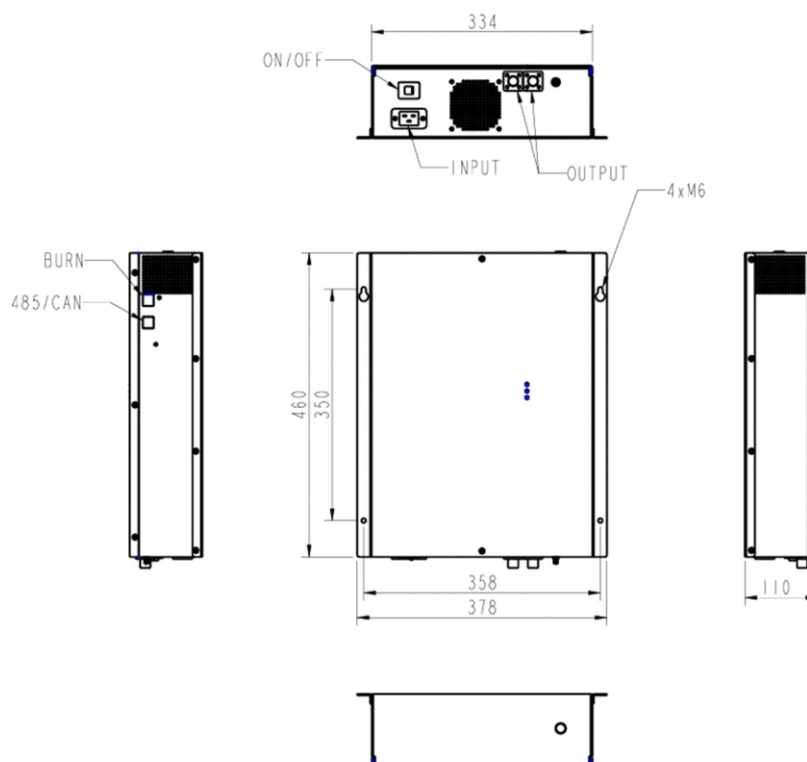
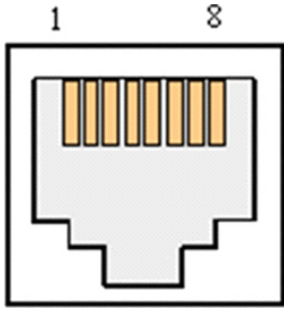


Figure 2 Outline and dimensions of transmitter controller

The Transmitter controller ports are defined in the following table:

No.	Identification/ Mark	Function Description/Description
01	INPUT	220V AC Input, C20 Socket.
02	ON/OFF	Input Switch AC input switch
03	2.4G (SMA-K port)	Antenna port(SMA-K)for connecting to one of the transmitter coil outputs (SMA-J)
04	OUTPUT	Connect to Transmitter Coil (Non-Polarized), male Connector.
05	485/CAN	COM. Port, RJ45 network port. Definitions are detailed in Form 485/CAN Port.
06	BURN	Standard RJ45 network port, not enabled

Transmitter controller 485/CAN port definition description

1.485/CAN Port				
PIN	Signal	Description	Note	 Rj45 network port
1	485+	485_A		
2	485-	485_B		
3	CANH	CAN_H bus line (dominant High)		
4	CANL	CAN_L bus line (dominant Low)		
5	N/A	Do not use		
6	N/A	Do not use		Can only be used for debugging or updating programs
7	+12V	INPUT 12V positive		
8	GND	INPUT 12V negative		

2.2 Transmitter coil

The outer shell of the Transmitter coil is made of ABS+ PC and aluminum alloy material, the inner part is filled with glue, the protection grade is IP65, the maximum bearing capacity is 1.2 tons, and the maximum external dimension is L*W*H=295*295*20mm.

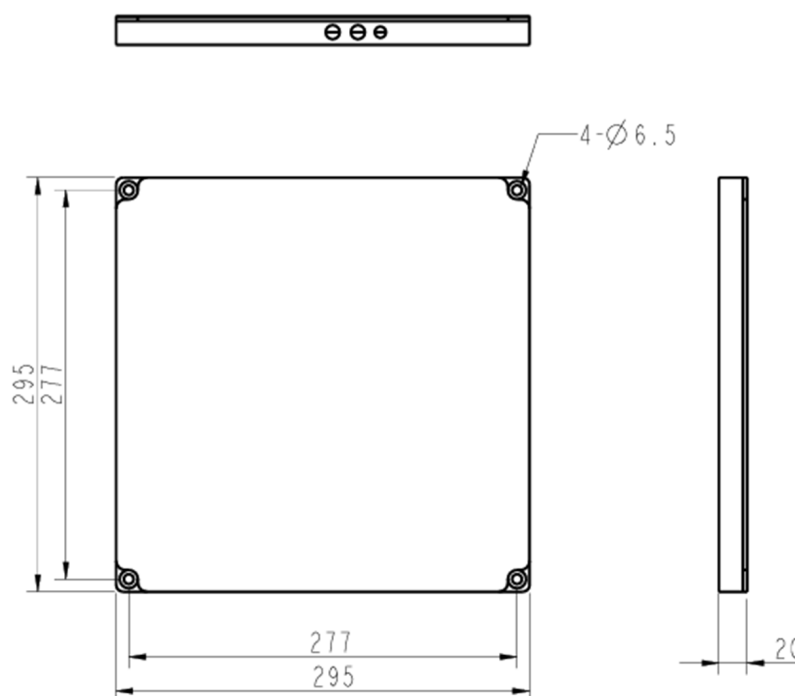


Figure 3 Outline and dimensions of Transmitter coil

2.2 Receiver coil

The outer shell of the receiver coil is made of PC and aluminum alloy, the interior is filled with glue, the protection grade is IP65, the maximum bearing capacity is 0.5 tons, and the maximum external dimension is L*W*H= 233*233*26mm.

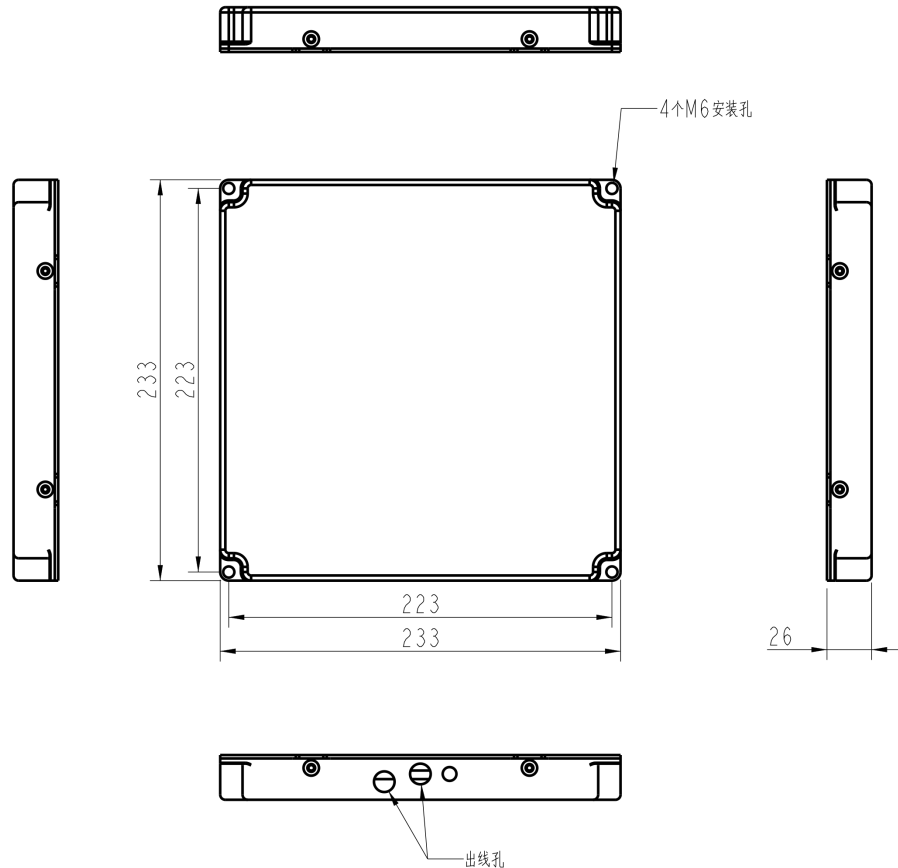


Figure 4 Outline and dimensions of receiver coil

2.2 Receiver controller

The main body of the receiver controller enclosure is made of aluminum alloy, with 4 input and output terminals, a CAN/485 port, a burning port and a 2.4G antenna interface. The marks(DC+/-) are connected to the user's electrical equipment (battery), and the marks (INPUT) are connected to the receiver coil. The protection level is IP54. The maximum external dimension is L*W*H= 150*150*75mm.

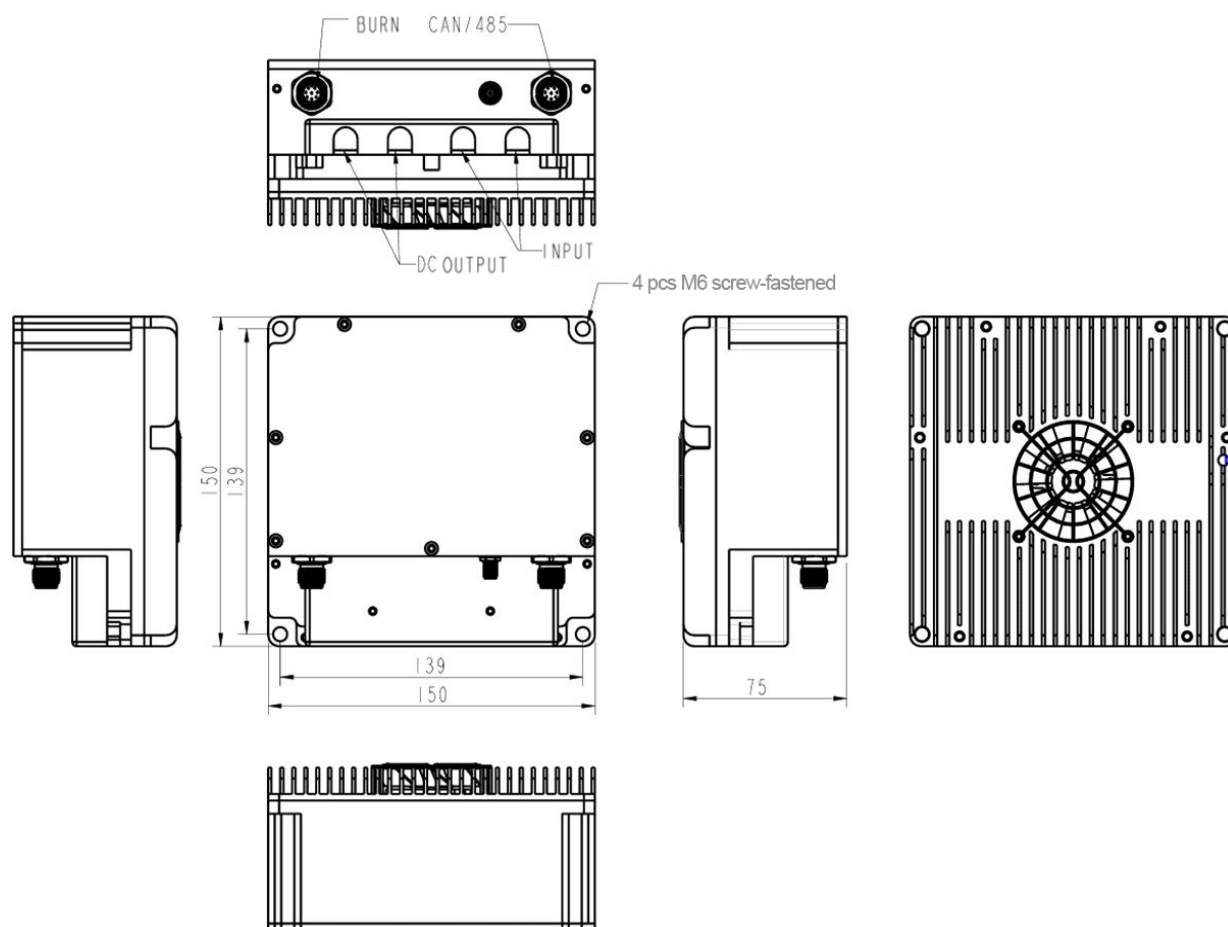


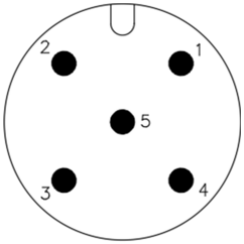
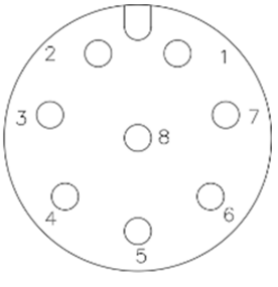
Figure 5 Outline and dimensions of receiver controller (active cooling)

The receiver port is defined in the following table:

(Attention: DC+ and DC-negative and positive connection is strictly prohibited)

No.	Mark	Description
01	BURN	Debug Port , 8Pin M12 female connector. Definitions are detailed in form Debug Port
02	DC+	DC OUTPUT positive, connect to battery positive , M6 Lock Hole
03	DC-	DC OUTPUT negative, Connect to battery negative , M6 Lock Hole
04	SMA-K port	Antenna port(SMA-K) for connecting to one of the receiver coil outputs (SMA-J)
05	INPUT	Connect to Receiver Coil (Non-Polarized), M6 Lock Hole
06	485/CAN	COM.Port , 5Pin M12 male connector, definitions are detailed in Form COM. Port

Receiver controller port definition description

1、 COM. Port				
PIN	Signal	Description	Color	 5Pin M12 male connector
1	485+	485_A	Brown	
2	485-	485_B	White	
3	CAN_GND	485&CAN Ground	Blue	
4	CANH	CAN_H bus line (dominant High)	Black	
5	CANL	CAN_L bus line (dominant Low)	Gray	
2、 Debug Port (Note: Can only be used for debugging or updating programs)				
PIN	Signal	Description	Color	 8Pin M12 female connector
1	12V-	INPUT 12V negative	Brown	
2	12V+	INPUT 12V positive	White	
3	GND	Ground	Blue	
4	CLK	SWCLK	Pink	
5	DIO	SWDIO	Gray	
6	+3.3V	+3.3V Power	Yellow	
7	N/A	Do not use	Green	
8	N/A	Do not use	Red	

3 Product Data Sheet

SN	Description	Data
Basic data		
01	Output power	3kW Max
02	Transfer efficiency	90% Max (at optimum distance)
03	Wireless charging distance	20-45mm
04	Operating frequency	85kHz
05	Communication method (Transmitter and receiver)	2.4G
06	Communication protocol	CAN / RS485
07	Magnetic insulation protection	Magnetic material + aluminum plate shield
08	Startup	Automatic detection self-starting
09	Charging method	Constant current and constant voltage
10	Operating ambient temperature	-20℃~50℃ / -4°F~122°F
11	Storage ambient temperature	-40℃~85℃ / -40°F~185°F
12	Operating environment humidity	≤90%

SN	Description	Data
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Transmitter data

01	Input voltage	1-phase 200-240V, 50/60Hz
02	Input current	16A Max
03	Transmitter controller Dimension	L*W*H=460*378*110mm
04	Transmitter controller Weight	Approx. 7.5kg
05	Transmitter controller housing material and IP grade	Aluminum plate, IP20
06	AC input	C20 socket (1.8m three-plug cable is optional)
07	Transmitter coil size	L*W*H=295*295*20mm
08	Transmitter coil weight	Approx. 5.85kg (including 8m cable)
09	Transmitter coil outlet cable length	3 m (wire diameter about 6mm, Φ18mm bellows wrapped)
10	Transmitter coil housing material and IP grade	ABS+PC and aluminum alloy, IP65 (filling glue), maximum bearing capacity 1.2 tons

Receiver data

01	Output rated voltage	58V (applicable range: 42-58V)
02	Output rated current	60A Max. (Adaptable range: 10-60A)
03	Output voltage ripple	About ±3.5%
04	Output current ripple	About ±3.5%
05	Type of load	Lithium battery
06	Receiver coil size	L*W*H=233*233*26mm
07	Receiver coil weight	Approx. 5.7kg(including adapter structure)
08	Receiver coil outlet length	Approx. 1 m (wire diameter approx. 10mm, Φ25mm bellows wrapped)
09	Receiver coil housing material and IP grade	PC and aluminum alloy, IP65 (filling glue), maximum bearing capacity 0.5 tons
10	Receiver controller Dimension	L*W*H=150*150*75mm
11	Receiver controller Weight	About 1.2kg
12	Length of the DC output cable	Approx. 1 m, wire diameter approx. 8.5mm (optional 120A Anderson connector)
13	Receive controller shell material and IP grade	Aluminum plate, IP54

SN	Description	Data
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Other auxiliary power and signal data

Startup and signal parameters (no need for external power supply and boot signal)

01	Receiver end auxiliary source output voltage	12V DC (non-isolated, 12V- connected to DC-, not recommended for customers)
02	Receiver end auxiliary source output current	0.1A Max.
03	Transmitter end auxiliary source output voltage	12V DC
04	Transmitter end auxiliary source output current	0.1A Max.
05	Communication signals at transmitter end	485 / CAN
06	Communication signals at the receiver end	485 / CAN

Other

01	Protection features	Overload, over temperature, over current, short circuit, over voltage, etc
02	Special attention	The output cannot be reversed

Certifications

01	EMC	EN 300 440 EN 301 489-1/-3 EN 62311 EN 55011
02	Safety	EN 62477-1:2012/A12:2021 UL 1564 CSA C22.2 No. 107.2-01
03	Immunity	EN 61000-6-2
04	FCC	FCC Part 15 FCC Part 18
05	Chemistry	Reach
06	Protection class	Transmitter controller =1 Transmitter coil =2 Receiver controller =2 Receiver coil =2

4 Installation instructions

- 1.The transmitter controller and the Transmitter coil are connected and installed in the charging position, and the receiver controller and the receiver coil are installed on the user equipment;
 - 2.The connection mode is shown in Figure 6. The normal working vertical range of the Transmitter coil and the receiver coil is 20-45mm (the best charging distance is 40mm); Single direction (X or Y) offset is $\pm 40\text{mm}$, both directions (X and Y) offset is $\pm 25\text{mm}$.
 - 3.The receiver end output connected to the user device, red wire is positive, black wire is negative.
 - 4.Coil installation as shown in Figure 7, pay attention to the coupling surface, between the two coils and No metal or living organisms are allowed to enter within 5cm of the two coils around.
 - 5.The transmitter controller and the receiver controller are equipped with cooling fans, pay attention not to block the inlet and outlet, and keep the gap between the inlet and outlet and other objects $\geq 3\text{cm}$.
 - 6.When working, the coil around 0.3 meters outside, the human body can be safely exposed to radiation area (according to EN IEC 62311:2020, the Annex III, table 2 of 1999/519/EC), so please be sure to do isolation and protective measures and warning signs when installing, When the equipment is working, prevent personnel from entering the coil range within 0.3 meters.
 - 7.When connected with the battery, the output is strictly prohibited from reverse connection; If the output is reversed, it is very likely to damage the device and even the battery.
 - 8.When installing the coil, do not Flush mounting (the coil should not be embedded in the metal cavity), otherwise the metal near the coil may be heated by the magnetic field.
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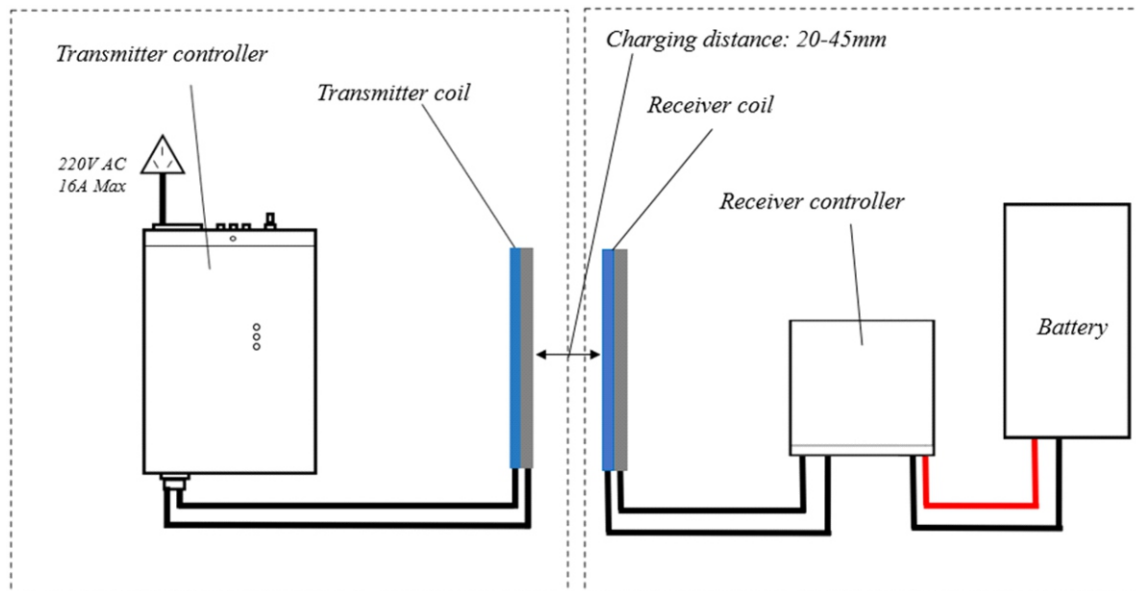


Figure 6 System wiring diagram

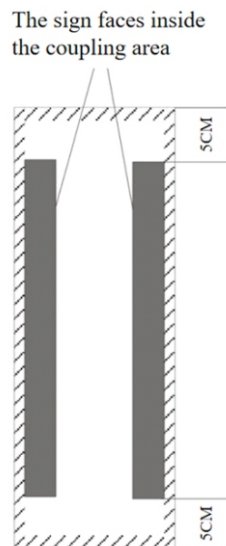


Figure 7 Coil coupling area indication

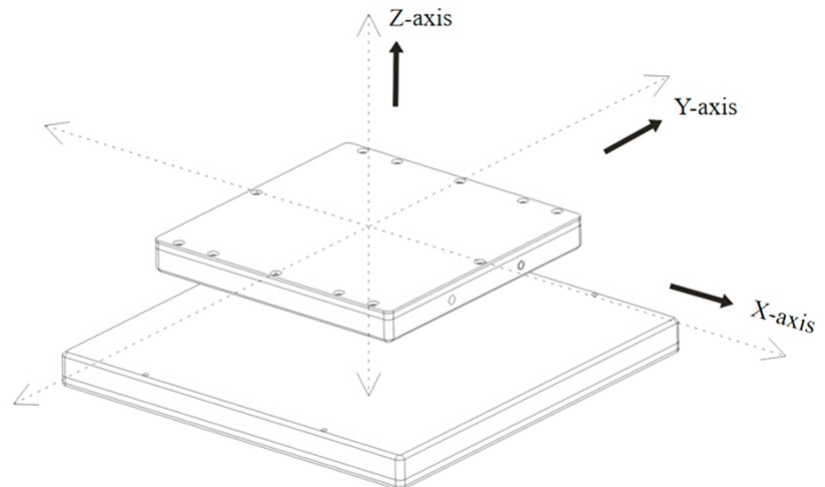


Figure 8 Coil offset indication

Positioning Tolerance

Distance between coils (Z axis) (mm)	Offset (the Transmitter and receiver coils are installed vertically), the offset distance between the center points of the two coils	
	Single-direction offset (X or Y)	Both directions (X and Y) offset
20~45mm	40mm	25mm
Relative inclination angle between coils	10°	
Coil mounting method	Recommended side installation (If installed at the bottom, must pay attention to prevent metal foreign bodies/living bodies into the coupling surface)	

Note: The coils offset is shown in Figure 6. Assuming to be installed at the bottom , the vertical (Z-axis) direction offset between the coils is 20 ~ 45mm, the single direction (X or Y) offset is ± 40mm, and the two directions (X and Y) offset is ±25mm.

5 Instructions for use

Power-on steps:

Step 1: In the power off state, install the Transmitter end and receiver end respectively according to Figure 6. Connect the input end of the transmitter controller to AC220V.

Step 2: Connect the output cable of the receiver controller to the corresponding interface of the battery or load.

Step 3: Check that the distance between the two plane coupling surfaces of the Transmitter controller and the receiver controller coil is controlled within the charging range, and ensure that the deviation of the center point of the two coupling surfaces is not out of range, and confirm that there can be no metal between the Transmitter controller and the receiver controller coupling surface.

Step 4: Turn ON AC 220V, turn on the ship switch to ON, the green light on the Transmitter controller is steady on, and the device is in standby state; The Transmitter controller starts to periodically (about 5 seconds) try to detect the feedback of the receiver controller. When the receiver controller is within the effective charging distance, the yellow light of the Transmitter controller is steady on, and the green light is off. At this time, the device is in a rechargeable state; Press and hold the strong charge button for 5 seconds or receive the charging command from the BMS (vehicle side), start charging, when there is current at the output end ($\geq 5A$), the yellow light of the transmitter controller flashes, and the fan of the receiver controller starts to rotate.

Step 5: When the battery is fully charged, the yellow light is steady on and the fan of the receiving controller stops.

Step 6: After the receiver controller (generally on the user device) leaves, the Transmitter is in standby and the green light is steady on.

Power-off steps

Disconnect the AC 220V input.

Note: After power-on, if the load is light load or no load, the Transmitter controller will be in standby state, and the wave detection interval is about 5 seconds, so the output voltage may be low during no-load, but as long as the load is within the effective charging distance, it can work normally.

Special attention: It is strictly forbidden to connect the positive and negative output cables in reverse, and it is strictly forbidden to plug and unplug the battery with electricity during the working process.

When the user device reaches the designated area, the charging logic at the Transmitter is shown in Figure 9

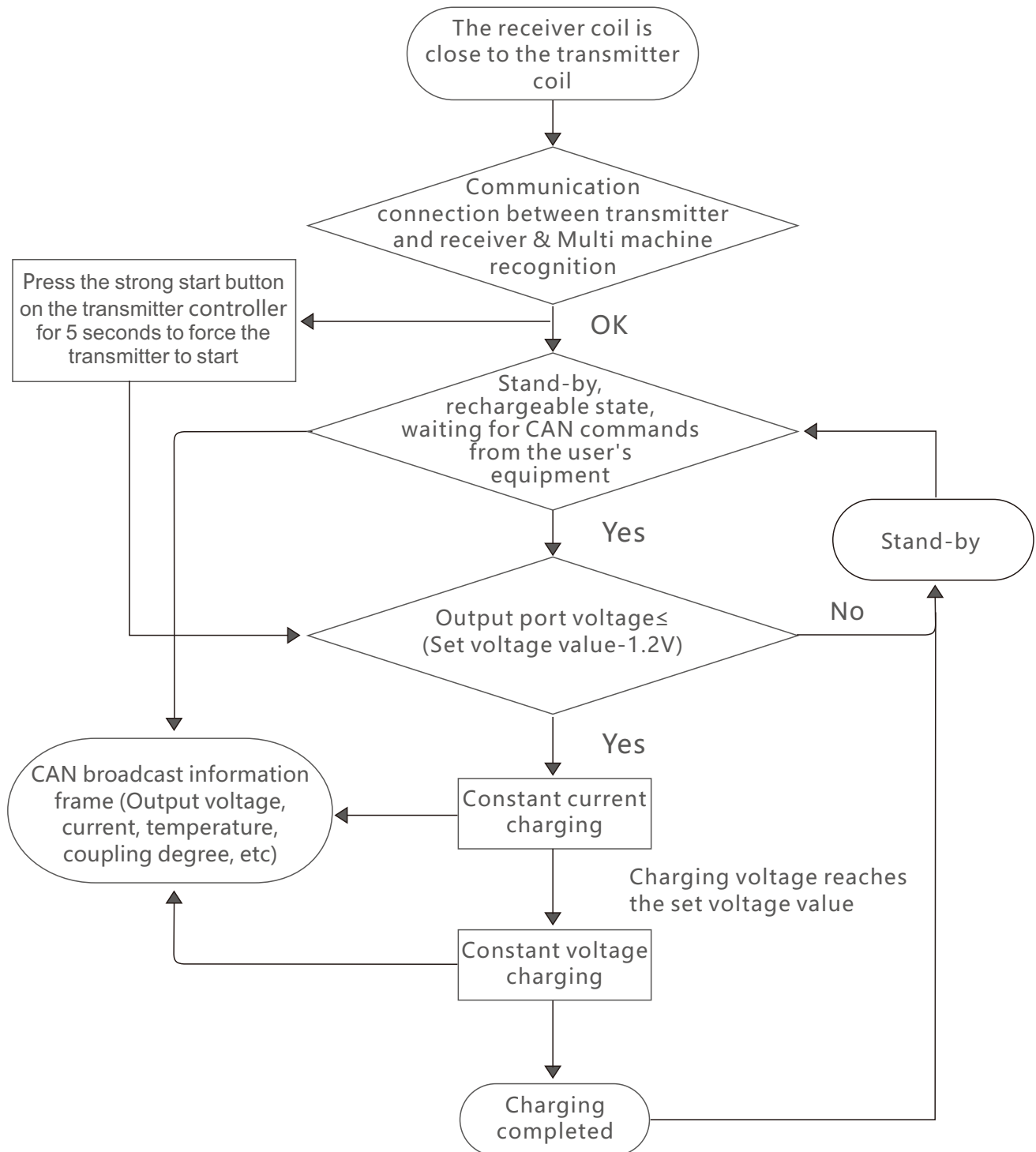


Figure 9 Charging control logic diagram

Indicator light description:

(1) **Red light:** Blinks when there is a fault, extinguishes after the fault is eliminated or restarted; For specific faults, check the CAN packets reported by the host computer or receiver.

(2) **Green light:** After the Transmitter is powered on, the indicator is steady on in the standby state and off in other states.

(3) **Yellow light:** When the communication between the Transmitter and the receiver is established, the indicator is steady on, indicating that the system is in the rechargeable state. The indicator blinks when the output current ($\geq 5A$) is generated at the receiver.

All lights blink 600ms(on 300ms off 300ms) at 900ms intervals.

6 Fault analysis and troubleshooting

SN	Fault manifestations	Fault cause analysis	Solution
1	When the product is connected, it does not work	1. a link of the product connection is wrong 2. The antenna is not connected	1. Check whether the wiring is wrong, whether the positive and negative are correct , whether the parameters correspond, and whether the coil coupling surface is normal. Whether the coil is inverted; 2. Check that the antenna is connected correctly
2	Yellow light is not on	Poor 2.4G communication between transmitter & receiver	1.Check that the antenna is not broken and the connector is properly installed; 2.Whether the coil distance is within the nominal range. 3.Leave the charging station and re-enter, then try to verify multi machine communication again.
3	No charging after aligning the charging position	1. no load 2. short circuit of load 3. No charging command has been issued	1. Check that the load battery is properly connected. 2. check whether the battery internal charging relay is open; 3. whether there is CAN communication instruction.
4	Indicator light is not on	There is a problem with the power supply or the Transmitter is damaged	1. The wiring of indicator board is loose or falls off; 2. Contact the original after-sales service for confirmation.

7 Precautions

In order to use the company's wireless charger safely and reliably, please be sure to pay attention to the following:

1.The default input voltage of the charger is 220V, 50/60Hz, which is subject to the specifications. There may be static electricity generated when the machine is working, the transmitter controller must be reliably grounded, and note: do not expose to rain.

2.The Transmitter coil must be connected to the Transmitter controller (or Transmitter pile) before the main power 220V can be connected. If the transmitter coil is not connected, the main power is turned on 220V. there is the possibility of damage to the internal circuit.

3.Please confirm that the receiver coil is connected to the receiver controller before it can enter the range of the transmitter coil and work normally. If the receiver coil is not connected to the controller, it enters the magnetic field range of the transmitter coil, and the two ends of the coil will be coupled with high voltage, which is more dangerous.

4.It is strictly forbidden to reverse the positive and negative lines of the receiver controller output, otherwise there is a great possibility of damage to the machine.

5.Danger: There is danger of electric shock. Do not touch the uninsulated parts of the transmitter controller and receiver controller.

6.The output parameters are subject to the specifications, if the customer changes the parameters of the load (battery) in the actual application, please modify the output voltage/output current parameters on the host computer according to the actual load parameters, if you do not know the modification, please consult the manufacturer.

7.The charging distance of the charger (the distance between the two coils) has strict requirements, and if it is not within the specified range, it may lead to the failure to charge or the charging current is very small, please refer to the specification for details. If the nominal charging distance range is 20 - 45mm, the optimal charging distance is between 35 and 40mm, when the charging efficiency is the highest. When installing the coil, it is recommended to install it according to the optimal charging distance, of course, leaving a margin for deviations.

8. When working, the current and voltage inside the Transmitter/receiver coil are relatively high, and it is high frequency. Its parameters have been strictly designed and tested. The cable is a multi-strand Leeds wire dedicated to high frequency, which is not a general cable. If you need to change the length of the cable, please be sure to consult the manufacturer, and the manufacturer will determine whether it can be changed and how to change.

9. The Transmitter/receiver coil has the characteristics of high frequency, high voltage and high current when working. Please be sure to keep the wire intact during installation and use. For the application environment with trampling or rolling, be sure to increase the corresponding protective measures.

10. Since the magnetic field has a magnetic heating effect on metals, magnetic materials and living creatures, it must be ensured that no metal, magnetic materials and living creatures are attached to the surface of the coil when the power is working.

11. The protection level of the Transmitter controller (or Transmitter pile) is IP20, the protection level of the receiver controller is IP54, and the protection level of the coil is IP65. When used in an environment beyond its protection level, please add other protective measures.

12. The burning port is special for the update program, please do not use it without authorization, otherwise the machine may be damaged.

13. Do not disassemble/repair the machine without authorization. There are high-voltage capacitors and other devices in the internal circuit. There may still be high-voltage surplus electricity after Turning off the power for a period of time. If you need to repair the machine, please consult the manufacturer.

14. When the power is on or just off, the surface temperature of the coil may be a little high (depending on the heat dissipation conditions), do not touch to prevent high temperature burns.

15. When powered on, due to the phenomenon of ionizing radiation within the magnetic field range of the coil, the radiation area around the coil is safe for the human body to be exposed outside the range of 0.75 meters during operation, so please be sure to do isolation protective measures and warning signs when installing, to prevent non-professionals from entering the coil range within 0.75 meters.

16. The machine is an industrial wireless charger, suitable for lithium batteries, other types of batteries may burst and cause personal injury and damage, only use the battery pack that contains the battery management system and all the necessary protection.

Important Safety Instructions

- (a) Save these instructions. This manual contains important safety and operating instructions
 - (b) Working in the vicinity of a lead-acid battery is dangerous. Batteries generate explosive gases during normal battery operation. For this reason it is of the utmost importance that each time before using your charger, you read and follow the instructions provided exactly
 - (c) To reduce risk of battery explosion, follow these instructions and those marked on the battery
 - (d) Never smoke or allow an open spark or flame in the vicinity of the battery or engine
 - (e) Use charger for charging a lead-acid battery only. It is not intended to supply power to an extra-low-voltage electrical system or to charge dry-cell batteries. Charging dry-cell batteries may cause them to burst and cause injury to persons and damage to property
 - (f) Never charge a frozen battery
 - (g) If it is necessary to remove battery from vehicle to charge it, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off in order to prevent an arc
 - (h) Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge
 - (i) For a charger having an output voltage selector switch, refer to the car owner's manual in order to determine the voltage of the battery and to make sure the output voltage is set at the correct voltage. If an output voltage selector switch is not provided, do not use the battery charger unless the battery voltage matches the output voltage rating of the charger.
 - (j) Never place the charger directly above or below the battery being charged; gases or fluids from the battery will corrode and damage the charger. Locate the charger as far away from the battery as dc cables permit
 - (k) Do not operate charger in a closed-in area or restrict ventilation in any way
 - (l) Connect and disconnect dc output clips only after setting any charger switches to the off position and removing ac cord from the electric outlet. Never allow clips to touch each other
 - (m) Follow these steps when battery is installed in vehicle. A spark near battery may cause a battery explosion. To reduce risk of a spark near battery:
 - (i) Position ac and dc cords to reduce risk of damage by hood, door, or moving engine part;
 - (ii) Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons;
 - (iii) Check polarity of battery posts. A positive (pos, p, +) battery post usually has a larger diameter than a negative (neg, n, -) post;
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(iv) Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see item (v). If positive post is grounded to the chassis, see item (vi);

(v) For a negative-grounded vehicle, connect the positive (red) clip from battery charger to positive (pos, p, +) ungrounded post of battery. Connect the negative (black) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block;

(vi) For a positive-grounded vehicle, connect the negative (black) clip from battery charger to negative (neg, n, -) ungrounded post of battery. Connect the positive (red) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gauge metal part of the frame or engine block;

(vii) Connect charger ac supply cord to electric outlet; and

(viii) When disconnecting charger, turn switches to off, disconnect ac cord, remove clip from vehicle chassis, and then remove clip from battery terminal

(i) Follow these steps when battery is outside vehicle. A spark near the battery may cause a battery explosion. To reduce risk of a spark near battery:

(i) Check polarity of battery posts. A positive (pos, p, +) battery post usually has a larger diameter than a negative (neg, n, -) post;

(ii) Attach at least a 60 cm 6-gauge (awg) insulated battery cable to a negative (neg, n, -) battery post

(iii) Connect the positive (red) charger clip to the positive (pos, p, +) post of battery;

(iv) Position yourself and the free end of cable as far away from battery as possible, then connect the negative (black) charger clip to free end of cable;

(v) Do not face battery when making final connection;

(vi) Connect charger ac supply cord to electrical outlet; and

(vii) When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while standing as far away from battery as practical

(j) When the instructions refer to adapters, the following statement shall be included: Use of an adapter is not allowed in Canada. If a grounding type receptacle is not available, do not use this appliance until the proper outlet is installed by a qualified electrician
