Claims

1. A power transfer device, characterized in that the power transfer device includes

a battery holder, for being mounted on the body of an electric vehicle to fix a battery pack, the battery holder comprises a fixing bracket and a lock mechanism, the lock mechanism is fixed on the fixing bracket, characterized in that the battery holder further comprises:

a plurality of supporting devices, the supporting device is fixed on one side of the fixing bracket facing the battery pack, and the plurality of supporting devices provide a plurality of support points to support the battery pack,

the fixing bracket forms a battery pack containment cavity for containing the battery pack, both sides of the battery pack are provided with the locking shafts, and the lock mechanisms are fixed on two sides of the battery pack containment cavity, the power transfer device further comprises:

an electrical connector of the vehicle side, the electrical connector of the vehicle side is arranged in the battery pack containment cavity, and the electrical connector of the vehicle side faces to an electrical connector of the battery side of the battery pack, both of the electrical connector of the vehicle side and the electrical connector of the battery side have a plurality of corresponding poles;

wherein when the locking shaft of the battery pack rises in place in the lock mechanism along the height direction of the battery pack, the distance between the locking shaft and the lock point along the length of the battery pack in the lock mechanism is greater than the gap between the electrical connector of the battery side and the electrical connector of the vehicle side along the length direction of the battery pack;

when the locking shaft reaches the locking point of the lock mechanism, the pole of the electrical connector of the battery side is abutting against the pole of the electrical connector of

the vehicle side.

2. The power transfer device according to claim 1, characterized in that the distance between the locking shaft and the lock point along the length of the battery pack in the lock mechanism is called a first distance, and the gap between a high-voltage pole of the electrical connector of the battery side and a high-voltage pole of the electrical connector of the vehicle side along the length direction of the battery pack is called a second distance;

the height of the low-voltage pole of the electrical connector of the vehicle side is lower than the height of the high-voltage pole of the electrical connector of the vehicle side, and the height difference between the low-voltage pole of the electrical connector of the vehicle side and the high-voltage pole of the electrical connector of the vehicle side is less than or equal to the difference between the first distance and the second distance;

or, the height of the low-voltage pole of the electrical connector of the battery side is lower than the height of the high-voltage pole of the electrical connector of the battery side, and the height difference between the low-voltage pole of the electrical connector of the battery side and the high-voltage pole of the electrical connector of the battery side is less than or equal to the difference between the first distance and the second distance;

preferably, the range of height difference between the low-voltage pole of the electrical connector of the vehicle side and the high-voltage pole of the electrical connector of the vehicle side is 0-2 mm.

3. The power transfer device according to claim 1, characterized in that the distance between the locking shaft and the lock point along the length of the battery pack in the lock mechanism is called the first distance, and the gap between a high-voltage pole of the electrical

connector of the battery side and a high-voltage pole of the electrical connector of the vehicle side along the length direction of the battery pack is called the second distance;

the height of the low-voltage pole of the electrical connector of the vehicle side is lower than the height of the high-voltage pole of the electrical connector of the vehicle side, and the height of the low-voltage pole of the electrical connector of the battery side is lower than the height of the high-voltage pole of the electrical connector of the battery side;

the sum of the height difference between the low-voltage pole of the electrical connector of the vehicle side and the high-voltage pole of the electrical connector of the vehicle side and the height difference between the low-voltage pole of the electrical connector of the battery side and the high-voltage pole of the electrical connector of the battery side is less than or equal to the difference between the first distance and the second distance.

4. The power transfer device according to at least one of claims 1-3, characterized in that the electrical connector of the vehicle side is used for being in floating electric connection with the electrical connector of the battery side;

preferably, the high-voltage pole of the electrical connector of the vehicle side has an electrical contact end and a wiring terminal;

wherein, an end face of the electrical contact end of the high-voltage pole is provided with a groove, the groove is concave inwards along the axial direction of the high-voltage pole, the groove is embedded with a conductive elastic part, and the conductive elastic part protrudes from the contact surface of the electrical contact end;

preferably, the conductive elastic part is a conductive spring.

5. The power transfer device according to claim 1, characterized in that the lock

mechanism includes a locking base, the locking base is provided with the opening and the cavity extending from the opening, the opening is used for the locking shaft to enter the cavity;

the battery holder is provided with an upper-position accommodating cavity, the upper-position accommodating cavity is located above the opening, the upper-position accommodating cavity is provided with an upper-position sensor;the upper-position sensor is used to detect whether the locking shaft has passed through the opening, and to detect whether the locking shaft has risen in place in the lock mechanism along the height direction of the battery pack;

and/or, the battery holder is provided with a front-position accommodating cavity, the front-position accommodating cavity is located at the front end of the cavity, the front-position accommodating cavity is provided with a front-position sensor; the front-position sensor is used to detect whether the locking shaft has entered the front end of the cavity, and to detect whether the locking shaft has been locked in place in the lock mechanism along the length direction of the battery pack;

preferably, both sides of the battery holder in the length direction of the battery holder are provided with two of the lock mechanisms, and the two lock mechanisms on the same side of the battery holder are arranged at intervals, and the two lock mechanisms are respectively a primary lock mechanism and a secondary lock mechanism; the electrical connector of the vehicle side is arranged on one side wall of the battery holder along the width direction of the battery holder; wherein the length direction of the battery holder is parallel to the length direction of the battery pack.

6. The power transfer device according to claim 5, characterized in that the power transfer device further includes a locking protection mechanism,

the locking protection mechanism is fixed on the side opposite to the primary lock mechanism on the battery holder, and the locking protection mechanism is arranged on the moving path of the locking link to limit the movement of the locking link relative to the primary locking base of the primary lock mechanism;

preferably, the locking protection mechanism can move between a first position and a second position relative to the locking link;

wherein when the locking protection mechanism is in the first position, the locking protection mechanism acts on the locking link to limit the movement of the locking link relative to the primary locking base; when the locking protection mechanism is in the second position, the locking protection mechanism is separated from the locking link to allow the movement of the locking link relative to the primary locking base;

preferably, the locking protection mechanism includes:

a lower housing, the first lower housing can be detachably connected to a side opposite to the locking shaft in the primary locking base, the inner part of the first lower housing has a holding cavity, and the side wall of the lower housing has a through hole communicated with the holding cavity;

a locking pin, the locking pin is located in the holding cavity, and the locking pin is penetrated in the locking pin, and can switch between an extended state and a retracted state, wherein when the locking pin is in the extended state, the locking pin is in the first position; when the locking pin is in the retracted state, the locking pin is in the second position;

preferably, the locking protection mechanism further includes:

a driving pin, the driving pin acts on the locking pin, and the driving pin can move relative to the locking pin under an action of external force to be engaged with or separated from the locking pin;

wherein when the driving pin is separated from the locking pin, a force is applied to the locking pin along the retraction direction to make the locking pin in the retracted state; when the driving pin is engaged with the locking pin, the locking pin is the extended state.

7. The power transfer device according to claim 5, characterized in that the battery holder is further provided with a wire harness, the wire harness is used to transmit the upper-position signal detected by the upper-position sensor and the front-position signal detected by the front-position sensor to the power transfer equipment.

8. The power transfer device according to at least one of claims 1-7, characterized in that the power transfer device further includes a plurality of support structures,

the plurality of support structures are fixed on one side of the battery holder facing to the battery pack, and the plurality of support structures are used to provide a plurality of support points for supporting the battery pack;

preferably, the support structure includes:

a supporting base, the supporting base is provided with a supporting opening and a supporting groove extending from the supporting opening, the supporting opening is used for a support part installed on the battery pack to enter the supporting groove;

preferably, the plurality of support structures are distributed on both sides of the battery holder in the length direction of the battery holder, and the support structures arranged on the two sides of the battery holder are one-to-one corresponding and relatively arranged;

both sides of the battery holder in the length direction of the battery holder are provided with the lock mechanisms, and the support structures and the lock mechanisms on the same side are interval setted.

9. The power transfer device according to at least one of claims 1-8, characterized in that the battery holder further includes:

a power exchange sensor, the power exchange sensor is arranged on the battery holder, the power exchange sensor is used to detect the power transfer equipment and to control the disconnection of the electrical connection between the electrical connector of the vehicle side and the electrical connector of the battery side.

10. The power transfer device according to claim 1, characterized in that the lock mechanism includes a locking base, the locking base is provided with an opening and a cavity extending from the opening, the opening is used for a locking shaft installed on the battery pack to enter the cavity;

the supporting device is provided with a supporting groove, a lower surface of the supporting groove is in the same plane with a lower surface of the cavity.

11. The power transfer device according to claims 1 or 10, characterized in that the supporting device is provided with the supporting groove;

the supporting device comprises:

a supporting base, the supporting base is provided with a supporting opening and a supporting groove which extends from the supporting opening, and the supporting opening is used for a supporting portion mounted on the battery pack to enter the supporting groove;

preferably, the fixing bracket has an upper-position accommodation cavity, the upper-position accommodation cavity is located above the supporting opening, an upper-position sensor is arranged in the upper-position accommodation cavity, the

upper-position sensor is used for detecting whether the supporting portion of the battery pack has passed through the supporting opening;

and/or, the fixing bracket has a front-position accommodation cavity, the front-position accommodation cavity is located at the front end of the supporting groove , a front-position sensor is arranged in the front-position accommodation cavity, the front-position sensor is used to detect whether the supporting portion of the battery pack has entered a front end of the supporting groove.

12. The power transfer device according to claim 11, characterized in that the supporting device further comprises an elastic part, the elastic part is at least partially located in the supporting groove, and the elastic part is used for abutting against the supporting portion of the battery pack ;

preferably, the elastic part comprises an elastic pad, an elastic handle and an elastic head connected in sequence;

the elastic pad is located in the supporting groove, the elastic pad is used for abutting against the supporting portion of the battery pack;

the elastic handle passes through the supporting base, and a wall portion of the supporting base is clamped between the elastic pad and the elastic head.

13. The power transfer device according to claim 11, characterized in that the supporting base is provided with a locating hole, the supporting device further includes a dowel pin, the dowel pin is partially located outside the locating hole, and the dowel pin is in interference fit with the locating hole;

and/or, the supporting base is provided with a mounting hole, the mounting hole is a

threaded hole, the supporting base can be detachably connected to the fixing bracket through the mounting hole;

and/or, the supporting opening is a bell mouth.

14. The power transfer device according to at least one of claims 1,10-13, characterized in that the plurality of supporting devices are distributed on both sides of the fixing bracket in the length direction of the fixing bracket;

preferably, the numbers of the supporting devices respectively located on both sides of the fixing bracket are the same, and the supporting devices arranged on both sides of the fixing bracket are one-to-one corresponding and relatively arranged;

and/or, both sides of the fixing bracket in the length direction of the fixing bracket are provided with the lock mechanisms, the supporting device and the lock mechanism which are on the same side are arranged at intervals;

preferably, in the supporting devices and the lock mechanisms which are on the same side, and in the length direction of the fixing bracket, the supporting devices are distributed at both ends of the fixing bracket, the lock mechanisms are located in the middle part of the fixing bracket.

15. The power transfer device according to claim 14, characterized in that in the length direction of the fixing bracket, both sides of the fixing bracket are both arranged with two lock mechanisms, the two lock mechanisms on the same side of the fixing bracket are arranged at intervals, and are respectively a primary lock mechanism and a secondary lock mechanism;

preferably, the primary lock mechanism comprises a locking link, at least one primary locking tongue and at least one primary locking base, the primary locking base is fixed on the

fixing bracket, the primary locking base is provided with a primary opening and a primary cavity extending from the primary opening, the primary opening is used for the primary locking shaft installed on the battery pack to enter the primary cavity, the locking link is rotatably connected with the at least one primary locking tongue, the locking link is used to drive the primary locking tongue to rotate under the action of external force, so that the primary locking tongue can rotate relative to the primary locking base to change between a primary unlocking state and a primary locking state, when the primary locking tongue is in the primary locking state, the primary locking tongue can prevent the primary locking shaft from leaving the primary cavity from the primary opening;

and/or, the secondary lock mechanism comprises:

a secondary locking base, the secondary locking base is fixed on the fixing bracket, the secondary locking base is provided with a secondary opening and a secondary cavity extending from the secondary opening, the secondary opening is used for the secondary locking shaft installed on the battery pack to enter the secondary cavity;

a secondary locking tongue, the secondary locking tongue can rotate relative to the secondary locking base to change between an unlocking state and a locking state, the secondary locking tongue includes a secondary locking tongue body and a secondary locking tongue extension portion which are fixedly connected, the secondary locking tongue extension portion is on the outside of the secondary locking base, when the secondary locking tongue is in the locking state, the secondary locking tongue body can prevent the secondary locking shaft from leaving the secondary cavity from the secondary opening ; and,

a secondary reset part, the secondary reset part is arranged on the secondary locking base, and the secondary reset part acts on the secondary locking tongue, the secondary reset part is able to be elastically deformed, the secondary reset part is used to rotate the secondary locking

tongue in a locking direction to reset from the unlocking state to the locking state.

16. The power transfer device according to at least one of claims 1, 10-15, characterized in that the fixing bracket comprises a frame and a temporary connector, one side of the frame in the width direction of the fixing bracket has a bracket opening, and the temporary connector is detachably connected to the portions at the two ends of the bracket opening in the frame, and covers the bracket opening or is located in the bracket opening;

and/or, the battery holder further includes a quick-change sensor, the quick-change sensor is arranged on the fixing bracket, the quick-change sensor is used to detect the position signal of a power transfer equipment and transmit the position signal to a controller.

17. An installation method for the power transfer device according to any of claims 1-9, characterized in that the installation method for the power transfer device includes the following steps:

S1. install the battery pack from the bottom of the battery holder along the height direction of the battery pack into the battery holder until the locking shaft rises in place in the lock mechanism along the height direction of the battery pack;

S2. move the battery pack forward along its length direction until the locking shaft reaches the locking point in the lock mechanism along the length direction of the battery pack.

18. An electric vehicle, the electric vehicle includes a battery pack assembly, the battery pack assembly includes a battery pack and a locking shaft, the locking shaft is mounted on the battery pack, characterized in that the electric vehicle further comprises a battery holder, for being mounted on the body of an electric vehicle to fix a battery pack, the battery holder

comprises a fixing bracket and a lock mechanism, the lock mechanism is fixed on the fixing bracket, characterized in that the battery holder further comprises:a plurality of supporting devices, the supporting device is fixed on one side of the fixing bracket facing the battery pack, and the plurality of supporting devices provide a plurality of support points to support the battery pack,

the battery pack assembly is mounted on the battery holder, the locking shaft is located in the lock mechanism;

the battery pack assembly further includes a plurality of supporting portion, the plurality of supporting portion are mounted on the battery pack and are provided in one-to-one correspondence with the plurality of support devices, the supporting devices are used to support the supporting portion correspondingly,

the lock mechanism includes a locking base, the locking base is provided with an opening and a cavity extending from the opening, the opening is used for the locking shaft to enter the cavity, the locking shaft is mounted on the cavity;

the supporting device comprises a supporting base, the supporting base is provided with a supporting opening and a supporting groove which extends from the supporting opening, and the supporting opening is used for the supporting portion to enter the supporting groove;

the supporting portion includes a supporting shaft, the supporting shaft is pressed in the supporting base and located in the supporting groove;

preferably, the supporting portion further includes a shaft sleeve, the shaft sleeve is rotatably sleeved on the supporting shaft;

preferably, the material of the shaft sleeve is elastic material;

and/or, the supporting portion further comprises a gasket, the gasket is sleeved on the supporting shaft and pressed on one end of the shaft sleeve;

and/or, the supporting shaft comprises a shaft body and a flange portion, the flange portion is coaxially arranged at one end of the shaft body, the shaft sleeve is sleeved on the shaft body, the flange portion is detachably connected to the battery pack;

and/or, the supporting shaft is provided with an electromagnetic induction component, preferably, the electromagnetic induction component is magnetic steel;

the fixing bracket has an upper-position accommodation cavity, the upper-position accommodation cavity is located above the supporting opening, an upper-position sensor is arranged in the upper-position accommodation cavity acts on the electromagnetic induction component to detect whether the supporting portion of the battery pack has passed through the supporting opening;

and/or, the fixing bracket has a front-position accommodation cavity, the front-position accommodation cavity is located at the front end of the supporting groove, a front-position sensor is arranged in the front-position accommodation cavity, the front-position sensor acts on the electromagnetic induction component to detect whether the supporting portion of the battery pack has entered the front end of the supporting groove;

preferably, one end of the supporting shaft far from the battery pack is provided with a concave part, and the electromagnetic induction element is located in the concave part, and the electromagnetic induction component is on the same plane with the two ends of the supporting shaft far away from the battery pack;

and/or, the supporting portion includes:

a supporting shaft, the supporting shaft is pressed in the supporting device;

a shaft sleeve, the shaft sleeve is rotatably sleeved on the supporting shaft;

preferably, the electric vehicle further includes a chassis, and the battery holder is fixed on the chassis.