What is claimed is:

1. An integrated electric drive system, comprising a motor, a speed reducer, a controller, and a single-piece enclosure, wherein a first enclosure space having a first opening and configured for the controller to be mounted is recessed on the single-piece enclosure; a second enclosure space configured for the motor to be mounted and a third enclosure space configured for the speed reducer to be mounted are arranged on the single-piece enclosure in a direction facing away from the first opening; the controller is connected with the motor; an output shaft of the motor is connected with the speed reducer;

an absolute value of a difference between a preset mounting width value and a width value of the first enclosure space is less than or equal to a first difference threshold in a direction parallel to the output shaft of the motor; the preset mounting width value is a sum of a width value of the second enclosure space and a width value of the third enclosure space, the first difference threshold ranges from 0mm to 10mm; and

an absolute value of a difference between a length value of the first enclosure space and a length value of the third enclosure space is less than or equal to a second difference threshold in a direction perpendicular to the output shaft of the motor and parallel to a horizontal plane, the second difference threshold ranges from 0mm to 10mm.

2. The integrated electric drive system according to claim 1, wherein an absolute value of a difference between a half of the length value of the first enclosure space and the length value of the second enclosure space is less than or equal to a third difference threshold in the direction perpendicular to the output shaft of the motor and parallel to the horizontal plane.

3. The integrated electric drive system according to claim 2, wherein the first difference threshold is zero.

4. The integrated electric drive system according to claim 2, wherein the second difference threshold is zero.

5. The integrated electric drive system according to claim 2, wherein the third difference threshold is zero.

6. The integrated electric drive system according to any of claims 1 to 5, further comprising an air conditioning compressor and a support mounted on an end surface of the speed reducer away from the second enclosure space, wherein the air conditioning compressor is mounted to the support and connected with the controller.

7. The integrated electric drive system according to claim 6, further comprising a water pump mounted to the support and connected with the controller.

8. The integrated electric drive system according to claim 7, wherein the support comprises a vertical plate and a transverse plate connected with an upper end of the vertical plate; the vertical plate is mounted to an end surface of the speed reducer away from the motor; the water pump is mounted above the transverse plate; and the air conditioning compressor is mounted to a side of the vertical plate away from the speed reducer and is located below the transverse plate.

9. The integrated electric drive system according to any of claims 1 to 8, wherein the controller comprises a capacitor module, an insulated gate bipolar transistor (IGBT) module, a three-phase copper bar, a direct current (DC) bus, an on-board charger, and a DC converter; the on-board charger and the DC converter are both connected with a vehicle power battery; the capacitor module, the IGBT module, the three-phase copper bar, the on-board charger, and the DC converter are all mounted in the first enclosure space; the capacitor module is connected with the vehicle power battery through the DC bus mounted to the single-piece enclosure; the three-phase copper bar is connected with a three-phase terminal of the motor; and

the vehicle power battery drives the motor to rotate through the DC bus, the capacitor module, the IGBT module, and the three-phase copper bar connected in sequence.

10. The integrated electric drive system according to claim 9, wherein the on-board charger and the DC converter comprise a heat dissipation module, an electric control element driving module, and a heating element driving module; the heating element driving module is mounted to the heat dissipation module; and the electric control element driving module is mounted to an end of the heating element driving module away from the heat dissipation module.

11. The integrated electric drive system according to claim 9, wherein the first enclosure space comprises a first internal space and a second internal space both arranged in a rectangular shape and adjacent to each other;

the capacitor module, the IGBT module, and the three-phase copper bar are all mounted in the first internal space; the on-board charger and the DC converter are mounted in the second internal space; and the DC bus is located on a side of the first internal space facing away from the second

internal space.

12. The integrated electric drive system according to claim 9, wherein the single-piece enclosure comprises a first cooling water channel, a second cooling water channel, a water channel inlet, and a water channel outlet; the first cooling water channel is arranged at a position in the single-piece enclosure opposite to the IGBT module; the second cooling water channel is arranged at a position in the single-piece enclosure opposite to the on-board charger and the DC converter;

one end of the water channel inlet is connected with a preset water inlet device; the other end of the water channel inlet is connected with the first cooling water channel and the second cooling water channel; and the water channel outlet is connected with ends of the first cooling water channel and the second cooling water channel away from the water channel inlet.

13. The integrated electric drive system according to claim 12, wherein the motor comprises an outer enclosure connected with the speed reducer and an inner enclosure inserted in the outer enclosure; a cooling space is formed between an inner wall of the outer enclosure and an outer wall of the inner enclosure; a water inlet and a water outlet both in communication with the cooling space are arranged on the outer enclosure; and an end of the water channel outlet away from the first cooling water channel is in communication with the water inlet.

14. The integrated electric drive system according to claim 13, wherein a plurality of ribbed flow guide plates are arranged on the outer wall of the inner enclosure in a circumferential direction of the output shaft of the motor.

15. The integrated electric drive system according to any of claims 1 to 14, wherein the speed reducer comprises a main shaft, an intermediate shaft, an output shaft, a driving gear, an output gear, an intermediate driving gear, and an intermediate driven gear; the main shaft is connected with the output shaft of the motor; the driving gear is mounted to the main shaft; the intermediate driving gear and the intermediate driven gear are both mounted to the intermediate shaft; the output gear is mounted to the output shaft; the intermediate driving gear is meshed with the driving gear; the intermediate driven gear is meshed with the output gear;

an axis of the intermediate shaft is higher than axes of the main shaft and the output shaft; and an included angle between a line connecting a center point of the main shaft to a center point of the output shaft and the horizontal plane is less than or equal to a preset angle on a plane perpendicular to the axis of the main shaft.

16. The integrated electric drive system according to any of claims 1 to 15, wherein a battery mounting space configured for a battery to be mounted is arranged on an end surface of the single-piece enclosure facing away from the first opening.

17. The integrated electric drive system according to any of claims 1 to 16, further comprising an enclosure cover adaptively connected with the first opening.

18. An electric vehicle, comprising the integrated electric drive system according to any of claims 1 to 17.

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