CLAIMS

What is claimed is:

1. A cooling structure for an integrated electric drive system, comprising a motor assembly, wherein the motor assembly comprises a rotary shaft and a cooling tube having an inner hole; a mounting hole for the cooling tube to be inserted is arranged on the rotary shaft; an annular water channel is formed between an outer wall of the cooling tube and an inner wall of the mounting hole; and the inner hole and the annular water channel are constructed into a rotor cooling water channel,

wherein the cooling structure further comprises a controller housing mounted to the motor assembly, wherein an electric control cooling water channel is arranged on the controller housing; a stator cooling water channel is arranged on the motor assembly; the inner hole is in communication with the electric control cooling water channel; and the annular water channel is in communication with the stator cooling water channel;

wherein two opposite ends of the electric control cooling water channel are respectively provided with a water channel inlet and an electric control water channel outlet;

wherein the motor assembly further comprises a cover plate and an end cover configured to mount the rotary shaft to the motor housing; the end cover is mounted to the motor housing; the cover plate is mounted to an end surface of the end cover away from the motor housing;

wherein a connecting water channel is arranged on the cover plate; a first communication channel, a second communication channel, and a third through hole in communication with the mounting hole are arranged on the end cover; one end of the cooling tube is mounted to the cover plate; the other end of the cooling tube passes through the third through hole and is inserted into the mounting hole; the annular water channel is in communication with the stator

cooling water channel through the first communication channel; and the electric control cooling water channel is in communication with the inner hole through the second communication channel and the connecting water channel in sequence.

2. The cooling structure for the integrated electric drive system according to claim 1, wherein the rotary shaft comprises a middle rotor and a first rotor and a second rotor connected with two opposite ends of the middle rotor; the mounting hole comprises a first through hole arranged on the first rotor and a second through hole arranged on the middle rotor; and the first through hole is in communication with the second through hole.

3. The cooling structure for the integrated electric drive system according to claim 2, wherein the middle rotor further comprises a plurality of branch grooves circumferentially arranged at intervals around the second through hole; and the plurality of branch grooves are all in communication with the second through hole.

4. The cooling structure for the integrated electric drive system according to any one of claims 1 to 3, wherein a diameter of the inner hole gradually decreases in a first direction; the first direction is from an end of the inner hole through which a cooling liquid flows in to an end from which the cooling liquid flows out;

a cross-sectional area of the annular water channel perpendicular to an axis of the rotary shaft gradually decreases in a second direction; the second direction is from an end of the annular water channel through which the cooling liquid flows in to an end from which the cooling liquid flows out; and the first direction is opposite to the second direction.

5. The cooling structure for the integrated electric drive system according to claim 1, wherein the motor assembly comprises a motor housing; the rotary shaft is mounted in the motor housing; the controller housing is mounted to the motor housing; and the stator cooling water channel is arranged on the motor housing.

6. The cooling structure for the integrated electric drive system according to claim 1, wherein the motor assembly further comprises a mechanical seal; the mechanical seal comprises a movable ring and a stationary ring fixed to an inner side wall of the third through hole; the movable ring is sleeved on the rotary shaft and rotates with the rotary shaft; and the stationary ring is sleeved on the movable ring and rotatably connected with the movable ring.

7. The cooling structure for the integrated electric drive system according to claim 5, wherein the stator cooling water channel comprises a plurality of straight water channels arranged at intervals on the motor housing and a plurality of transition water channels in communication with two adjacent straight water channels.

8. An integrated electric drive system, comprising the cooling structure for an integrated electric drive system according to any one of claims 1 to 7.