

CLAIMS

1. An intravascular blood pump 1, comprising a pumping device 11 with a pump section 3 and a drive section 4, wherein
 - 5 - the pump section 3 comprises a pump casing 2 having a primary blood flow inlet 211 and a primary blood flow outlet 22 hydraulically connected by a primary passage 30 and the drive section 4 comprises a stator 40 and a rotor 41 rotatable about an axis of rotation 10 and configured to rotate a primary impeller 31, the primary impeller 31 being configured to convey a primary blood flow from the primary blood flow inlet 211
10 to the primary blood flow outlet 22 along the primary passage 30,
- the drive section 4 further comprises an ancillary blood flow inlet 23 and an ancillary blood flow outlet 24 hydraulically connected by an ancillary passage extending through an axial gap 401 between the rotor 41 and the stator 40 and an ancillary impeller 42 arranged at a drive section end DSE of the rotor 41 and rotatable about the axis of
15 rotation 10 along with the rotor 41, the ancillary impeller 42 comprising one or more ancillary impeller vanes 421 configured to convey an ancillary blood flow from the ancillary blood flow inlet 23 to the ancillary blood flow outlet 24 along an ancillary passage in a direction toward a pump section end PSE of the pumping device 11,
- the rotor 41 is mounted in a blood-purged radial sliding rotor bearing 47 with an inner
20 rotor bearing surface 4211 and an outer rotor bearing surface 4311, and
- the ancillary impeller 42 forms the inner rotor bearing surface 4211 of the radial sliding rotor bearing 47.
2. The intravascular blood pump according to claim 1, wherein the inner rotor
25 bearing surface 4211 and the rotor 41 have a common outer diameter.
3. The intravascular blood pump according to any one of claims 1 and 2, wherein the ancillary impeller 42 is a radially or a radially-axially delivering impeller.
- 30 4. The intravascular blood pump according to any one of claims 1 to 3, wherein the ancillary impeller vanes 421 each have an outer circumferential surface and wherein the inner rotor bearing surface 4211 is formed by the outer circumferential surfaces of at least two of the ancillary impeller vanes.

5. The intravascular blood pump according to any one of the preceding claims, wherein at least one of the ancillary impeller vanes 421 protrudes axially from the ancillary impeller 42.
- 5 6. The intravascular blood pump according to any one of the preceding claims, wherein at least one of the ancillary impeller vanes 421 extends radially from the blood flow inlet at least up to the axial gap 401.
7. The intravascular blood pump according to any one of the preceding claims,
10 wherein at least one of the ancillary impeller vanes 421 extends along a radial direction relative to the axis of rotation 10.
8. The intravascular blood pump according to any one of the preceding claims, wherein at least one of the ancillary impeller vanes 421 forms an ancillary pump gap
15 423 with an inner wall of the pump casing 2.
9. The intravascular blood pump according to any one of the preceding claims, wherein the outer circumferential surface of at least two of the ancillary impeller vanes 421 is slanting in a circumferential direction so as to form a hydrodynamic sliding rotor
20 bearing 47.
10. The intravascular blood pump according to any one of the preceding claims, wherein the inner rotor bearing surface 4211 comprises a radially protruding bulge with an apex of the bulge extending in a circumferential direction.
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11. The intravascular blood pump according to any one of the preceding claims, wherein the inner rotor bearing surface 4211 is made of ceramic material.
12. The intravascular blood pump according to claim 11, wherein the ancillary
30 impeller 42 is an integral piece of ceramic material.
13. The intravascular blood pump according to any one of the preceding claims, wherein a part of the pumping device 11 forming the outer rotor bearing surface 4311 of the radial sliding rotor 47 is a rotor bearing ring 43.

14. The intravascular blood pump according to claim 13, wherein the outer rotor bearing surface 4311 is made of ceramic material.

15. The intravascular blood pump according to claim 14, wherein a part of the
5 pumping device 11 forms the outer rotor bearing surface.

16. The intravascular blood pump according to any one of the preceding claims,
comprising an axial rotor bearing or an axial-radial rotor bearing having an axial or an
axial-radial rotor bearing surface, respectively, which is arranged at the ancillary
10 impeller 42.

17. The intravascular blood pump according to claim 16, wherein at least the axial
or axial-radial rotor bearing surface of the ancillary impeller 42 is made of ceramic
material.
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18. The intravascular blood pump according to any one of claims 11, 12, 14, 15
and 17, wherein the ceramic material is silicon carbide.

19. The intravascular blood pump according to any one of the preceding claims,
20 wherein an axial length of the ancillary impeller 42 is smaller than a maximum outer
diameter of the ancillary impeller 42.

20. The intravascular blood pump according to any one of the preceding claims,
wherein the primary impeller 31 and the ancillary impeller 42 are arranged on opposite
25 sides of the rotor 41.

21. The intravascular blood pump according to any one of the preceding claims,
wherein a radially outer edge of one or more of the ancillary impeller vanes 421 is
chamfered.
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22. The intravascular blood pump according to any one of the preceding claims,
wherein the ancillary blood flow outlet 24 is arranged outside the primary passage 30.

23. The intravascular blood pump according to any one of the preceding claims, wherein the ancillary blood flow inlet 23 comprises a plurality of ancillary inlet through-holes 231 arranged about the axis of rotation 10.
- 5 24. The intravascular blood pump according to claim 23, wherein, in an interspace between two of the ancillary inlet through-holes 231, a wire channel 25 for an electric supply wire 51, 52, 53 for the drive section 4 is arranged.
25. The intravascular blood pump according to claim 23 or 24, wherein the axial
10 gap 401 has an inlet arranged for blood to flow into the axial gap 401, and wherein an internal end 233 of the ancillary inlet through-hole 231 is arranged further radially inward than a radially innermost section of the inlet into the axial gap 401.
26. The intravascular blood pump according to any one of the preceding claims,
15 wherein the pumping device 11 comprises a tertiary impeller 242 arranged for drawing the ancillary blood flow through the ancillary passage.
27. The intravascular blood pump according to claim 26, wherein the tertiary
20 impeller 242 is rotatable about the axis of rotation 10 along with the rotor 41.
28. The intravascular blood pump according to any one of the preceding claims, wherein the ancillary blood flow outlet 24 is arranged at a radial gap 241 between the primary impeller 31 and the stator 40.
- 25 29. The intravascular blood pump according to claim 28, wherein the ancillary blood flow outlet 24 is arranged such that, in operation, a pumped blood flow PBF leaving the primary blood flow outlet 22 passes the ancillary blood flow outlet 24.
30. The intravascular blood pump according to claim 28 or 29, wherein a rotatable
30 wall 2411 of the radial gap 241 is rotatable along with the rotor 41.
31. The intravascular blood pump according to claim 30, wherein a stationary wall 2410 of the radial gap 241 opposite to the rotatable wall 2411 of the radial gap 241 is mechanically connected to the stator 40.

32. The intravascular blood pump according to any one of claims 28 to 31,
including claim 27, wherein the tertiary impeller 242 is arranged in the radial gap 241.

33. The intravascular blood pump according to claim 32, including claim 30,
5 wherein the tertiary impeller 242 comprises at least one tertiary impeller vane 2412
which protrudes from the rotatable wall 2411 of the radial gap 241.

34. The intravascular blood pump according to any one of claims 32 and 33,
wherein an inflow to the tertiary impeller 242 is arranged at an outflow end of the axial
10 gap 401.