

CLAIMS

1. An intravascular blood pump, comprising a rotatable shaft (25) carrying an impeller (34) and a housing (20) having an opening (35), wherein the shaft (25) extends
5 through the opening (35) with the impeller (34) positioned outside said housing, the shaft and the housing having surfaces (25A, 33A) forming a circumferential gap within said opening (35), wherein the gap has a length and has a width of 2 μm or less over at least a part of said length and wherein at least one (33A) of the surfaces (25A, 33A) forming the gap is made of a material having a thermal conductivity of at least 100
10 W/mK.
2. The intravascular blood pump of claim 1, wherein the thermal conductivity is at least 130 W/mK.
- 15 3. The intravascular blood pump according to claim 1, wherein the thermal conductivity is at least 150 W/mK.
4. The intravascular blood pump according to claim 1, wherein the thermal conductivity is at least 200 W/mK.
- 20 5. The intravascular blood pump according to any one of claims 1 to 4, wherein said surfaces forming the gap constitute a radial sliding bearing for the shaft.
6. The intravascular blood pump according to any one of claims 1 to 5, wherein said
25 at least one (33A) of the surfaces (25A, 33A) forming the gap makes part of a structural element (33) which is entirely made of said material and which, when the intravascular blood pump is in use in a blood vessel of a patient, is in direct contact with flowing blood.
- 30 7. The intravascular blood pump according to any one of claims 1 to 5, wherein said at least one (33A) of the surfaces (25A, 33A) forming the gap makes part of a structural

element (33) which is entirely made of said material and has at least one further surface thermoconductively connected to a thermoconductive element (33B) which, when the intravascular blood pump is in operation in a blood vessel of a patient, is either in direct contact with flowing blood or via one or more further thermoconductive elements in indirect thermoconductive contact with flowing blood, so that heat from the at least one (33A) of the surfaces (25A, 33A) forming the gap can dissipate into the flowing blood by thermal conduction, wherein the thermal conductivity of said one (33B) or more thermoconductive elements is at least 100 W/mK.

10 8. The intravascular blood pump according to any one of claims 1 to 7, wherein each of the surfaces (25A, 33A) forming the gap has a surface roughness of 0.1 μm or less.

9. The intravascular blood pump according to any one of claims 1 to 8, wherein said at least one surface (33A) is made of ceramic material.

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10 The intravascular blood pump according to any one of claims 1 to 9, wherein said at least one surface (33A) makes part of a ceramic sleeve (33) in which the shaft (25) can journal.

20 11. The intravascular blood pump according to any one of claims 1 to 10, wherein the shaft (25) including the surface (25A) of the shaft forming the gap is made of ceramic material.

25 12. The intravascular blood pump according claim 11, wherein the surface (25A) of the shaft forming the gap is made of alumina toughened zirconia (ATZ).

13. The intravascular blood pump according to any one of claims 1 to 11, wherein said at least one surface (33A) comprises silicon carbide (SiC).

30 14. The intravascular blood pump according to claim 13, wherein one (33A) of the at least one surfaces (25A, 33A) comprises silicon carbide (SiC) and another one (25A) of the at least one surfaces (25A, 33A) comprises alumina toughened zirconia (ATZ).

15. The intravascular blood pump according to any one of claims 1 to 14, further comprising a purge-fluid supply line (29) connected to the housing and arranged to guide purge fluid into the housing so as to exit the housing through the opening (35).

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16. The intravascular blood pump according to any one of claims 1 to 15, wherein the gap (39) converges towards an impeller-side end (39A) of the gap (39) and said width of 2 μm or less is located somewhere within 50% of the length of the gap (39) closest to said impeller-side end (39A) of the gap (39).

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17. The intravascular blood pump of claim 16, wherein said width of 2 μm or less is present at the impeller-side end (39A) of the gap (39).

18. The intravascular blood pump according to claim 16 or 17, wherein said width of 2 μm or less extends over 30% or less of the length of the gap (39).

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19. The intravascular blood pump of any one of claims 16 to 18, wherein a diameter of the opening (35) converges towards the impeller-side end (39A) of the gap (39).

20. The intravascular blood pump according to any one of claims 16 to 19, wherein an outer diameter of the shaft (25) expands towards the impeller-side end (39A) of the gap (39).

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21. The intravascular blood pump of claim 20, wherein the outer diameter of the shaft (25) has a circumferential groove stretching over an end of the gap (39) opposite the impeller-side end (39A) of the gap (39).

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22. The intravascular blood pump according to claim 20, wherein the outer diameter of the shaft (25) expands from a constant diameter shaft section stretching over an end of the gap (39) opposite the impeller-side end (39A) of the gap (39) to a maximum outer diameter within the gap (39).

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23. The intravascular blood pump according to any one of claims 16 to 22, wherein a maximum width of the gap (39) is 15 μm or less.
24. The intravascular blood pump according to claim 23, wherein a maximum width
5 of the gap (39) is 6 μm or less.
25. The intravascular blood pump according to any one of claims 1 to 24, wherein the length of the gap (39) is in the range of from 1 to 2 mm.
- 10 26. The intravascular blood pump of claim 25, wherein the length of the gap (39) is in the range of from 1.3 to 1.7 mm.