

Claims

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1. An external drive unit (7) for an implantable heart assist pump (4) comprising

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a motor housing (51), a transcutaneous drive shaft (3) and a motor (35) for driving the heart assist pump (4), wherein the motor (35) is connectable to the heart assist pump (4) via the drive shaft (3) and wherein the motor (35) is arranged inside the motor housing (51),

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further comprising a catheter (2) surrounding the drive shaft (3)

and a purge line (53) for injecting a purge medium into a lumen of the catheter (2) or into a space (41) between the catheter (2) and the drive shaft (3),

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characterized in that the purge line (53) is in thermal contact (54, 55) with an outer surface of the motor housing (51),

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wherein the purge line (53) is configured to guide the purge medium such that it first comes into thermal contact (55) with the outer surface of the motor housing (51) and is afterwards injected into the lumen of the catheter (2) or into the space (41) between the catheter (2) and the drive shaft (3).

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2. The drive unit (7) of claim 1, characterized in that the purge line (53) is configured to guide the purge medium such that it first comes into thermal contact (55) with the outer surface of the proximal section (52) of the catheter (2) and is afterwards injected into the lumen of the catheter (2) or into the space (41) between the catheter (2) and the drive shaft (3).
3. The drive unit (7) of any of claims 1 or 2, characterized in that the

purge line (53) is in thermal contact (54, 55) with both the outer surface of the motor housing (51) and the outer surface of the proximal section (52) of the catheter.

- 5 4. The drive unit (7) of claim 3, characterized that the purge line is fully extracorporal.
- 10 5. The drive unit (7) of any of claims 3 or 4, characterized in that the purge line (53) is configured to guide the purge medium such that it first comes into thermal contact (54) with the outer surface of the proximal section (52) of the catheter (2) and afterwards comes into thermal contact (55) with the outer surface of the motor housing (51).
- 15 6. The drive unit (7) of any of claims 1 to 5, characterized in that the motor (35) comprises a stator (37) and a rotatably mounted rotor (36) connected to the drive shaft (3), wherein a fluid gap (43) is formed between the rotor (36) and the stator (37), wherein the fluid gap (43) is in fluid connection with a purge opening (42) for injecting the purge medium into the fluid gap (43), wherein the purge line (53) is connected to or connectable to the purge opening (42).
- 20 7. The drive unit (7) of claim 6, characterized in that the purge line (53) and the fluid gap (43) are configured to guide the purge medium such that it first comes into thermal contact (55) with the outer surface of the motor housing (51) and/or with the outer surface of the proximal section (52) of the catheter (2), is afterwards injected into the fluid gap (43) between the rotor (36) and the stator (37), and is afterwards injected into the lumen of the catheter (2) or into the space (41) between the catheter (2) and the drive shaft (3).

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- 30 8. The drive unit (7) of any of claims 1 to 7, characterized in that the purge line (53) is configured to guide a flow of the purge medium in a proximal direction in an area in which the purge line (53) is in thermal contact (55) with the outer surface of the motor housing (51) and/or with the outer surface of a proximal section (52) of the catheter (2) prior to injection of the purge medium into the lumen of the catheter

(2) or into the space (41) between the catheter (2) and the drive shaft (3).

- 5 9. The drive unit (7) of any of claims 1 to 8, characterized in that the purge line (53) encircles the motor housing (51) and/or the proximal section (52) of the catheter (2) in an area in which the purge line (53) is in thermal contact (55) with the outer surface of the motor housing (51) and/or with the outer surface of a proximal section (52) of the catheter (2).
- 10 10. The drive unit (7) of claim 9, characterized in that the purge line (53) runs around the motor housing (51) and/or the proximal section (52) of the catheter (2) in a helical manner in the area in which the purge line (53) is in thermal contact (55) with the outer surface of the motor housing (51) and/or with the outer surface of a proximal section (52) of the catheter (2).
- 15 11. The drive unit (7) of claim 10, characterized in that the purge line (53) runs around the proximal section (52) of the catheter (2) in a helical manner in the area in which the purge line (53) is in thermal contact (55) with the outer surface of a proximal section (52) of the catheter (2).
- 20 12. The drive unit (7) of any of claims 1 to 11, characterized by a housing (17) of the drive unit (7), wherein the motor housing (51) and/or the proximal section (52) of the catheter are arranged within the housing (17) of the drive unit (7).
- 25 13. The drive unit (7) of any of claims 1 to 12, characterized in that an overall thermal conductance between an interior surface of the purge line (53) and an interior surface of the motor housing (51) may amount to at least five times, preferably at least ten times, an overall thermal conductance between the interior surface of the purge line (53) and an interior surface of the housing (17) of the drive unit (1).
- 30 14. The drive unit (7) of any of claims 12 or 13, characterized in that a part of the purge line (53) runs between the motor housing (51) and the

housing (17) of the drive unit (7).

15. The drive unit of any of claims 12 to 14, characterized in that a part of the purge line (53) runs between the proximal section (52) of the catheter (2) and the housing (17) of the drive unit (7).
- 5 16. The drive unit (7) of any of claims 12 to 15, characterized by a thermal insulator arranged between the purge line (53) and the housing (17) of the drive unit (7).
- 10 17. The drive unit (7) of any of claims 1 to 16, characterized by a heat spreader (19) comprising a contact surface configured to contact a skin of a patient, wherein the contact surface is connected or connectable with the motor (35) in a thermally-conductive manner to transfer heat generated by the motor (35) to tissue of the patient.
18. The drive unit (7) of claim 17, characterized in that the heat spreader (19) is flexible at least in areas.
- 15 19. A heart assist device (1) comprising the drive unit (7) of any one of the previous claims and the implantable heart assist pump (4).