CLAIMS

1. A boosting system suitable for subsea use comprising:

a submersible electric motor having a motor shaft;

a magnetic coupling comprising a driver portion and a follower portion magnetically coupled together;

a booster unit having a booster unit shaft operatively connected to the magnetic coupling follower portion; and

a hermetically sealed container encompassing the magnetic coupling driver portion and electric motor, the magnetic coupling follower portion being separated from the magnetic coupling driver portion by a pressure containment member of the hermetically sealed container,

characterized by:

a hydrodynamic coupling comprising an input portion and an output portion, the input portion connected to the motor shaft;

a stub shaft connected to the hydrodynamic coupling output portion and connected to the magnetic coupling driver portion;

wherein the hydrodynamic coupling is encompassed within the hermetically sealed container with the magnetic coupling driver portion and electric motor.

2. The boosting system of claim 1, wherein the hermetically sealed container is hydrostatically compensated to the ambient environment via a pressure compensation device.

3. The boosting system of claims 1 or 2, further comprising a flow network system for circulating a cooling fluid throughout the hermetically sealed container.

4. The boosting system of claim 3, wherein the flow network system circulates the cooling fluid around the magnetic coupling driver portion coupled to the hydrodynamic coupling output portion, around the hydrodynamic coupling, and around the electric motor to lubricate and cool the magnetic coupling driver portion and hydrodynamic coupling and electric motor in the hermetically sealed container.

5. The boosting system of claims 3 or 4, further comprising within the hermetically sealed container a plurality of bearings coupled to the motor shaft, the hydrodynamic coupling and the magnetic coupling driver portion,

wherein the flow network system circulates the cooling fluid to lubricate and cool the plurality of bearings in the hermetically sealed container.

6. The boosting system of claims 3, 4, or 5, wherein the hydrodynamic coupling uses a fluid to transfer energy across the hydrodynamic coupling, and the fluid used to transfer energy across the hydrodynamic coupling is the cooling fluid.

7. The boosting system of any of the preceding claims, further comprising:

an enclosed booster unit compartment encompassing the magnetic coupling follower portion, booster unit and booster unit shaft,

wherein the pressure containment member extends between the driver portion and the follower portion of the magnetic coupling, and comprises part of the booster unit compartment and part of the hermetically sealed container.

8. The boosting system of claim 7, wherein the enclosed booster unit compartment is a pressure containment enclosure.

9. The boosting system of claims 7 or 8, further comprising:

an upper radial bearing on an upper portion of the booster unit shaft;

a lower radial bearing on a lower portion of the booster unit shaft;

an upper divider having an upper mechanical seal forming a seal with the upper portion of the booster unit shaft;

a lower divider having a lower mechanical seal forming a seal with the lower portion of the booster unit shaft;

wherein an upper sealed chamber of the booster unit compartment defined by the upper divider having the upper mechanical seal, and a lower sealed chamber of the booster unit compartment defined by the lower divider having the lower mechanical seal; and

wherein the upper radial bearing is in the upper sealed chamber and the lower radial bearing is in the lower sealed chamber.

10. The boosting system of claim 9, further comprising a lower thrust bearing on a lower portion of the booster unit shaft in the lower sealed chamber, or an upper thrust bearing on an upper portion of the booster unit shaft in the upper sealed chamber.

11. The boosting system of claims 9 or 10, further comprising a barrier fluid system circulating a barrier fluid in the upper and lower sealed chambers.

12. The boosting system of claim 11, wherein the barrier fluid system comprises:

a pressurized tank and/or a subsea high pressure unit;

a check valve;

a pressure regulating valve; and

a barrier fluid circulating system.

13. The boosting system of claims 7 or 8, further comprising:

an upper radial bearing on an upper portion of the booster unit shaft;

a lower radial bearing on a lower portion of the booster unit shaft;

a thrust bearing on a portion of the booster unit shaft; and

wherein the upper and lower radial bearings and the thrust bearing are lubricated and cooled by a process fluid and the process fluid is also the fluid pumped through the booster unit.

14. The boosting system of any of the preceding claims, wherein the hydrodynamic coupling input and output portions comprise an impeller, a turbine and a plurality of guide vanes.

15. The boosting system of claim 14, further comprising an actuator controlling the positioning of the guide vanes of the hydrodynamic coupling.