Fig. 3 shows an example of a power backup arrangement 10-1 forming part of a power system such as power system 3. The backup-arrangement 10-1 comprises a battery unit 11, a converter unit 9 connectable to the battery unit 11, and a rotary converter 12 connectable to the converter unit 9. In one embodiment the rotary converter 12 is a 690 V:11kV rotary converter.

The rotary converter 12 comprises a motor 15 and a generator 17. The rotary converter 12 has a rotatable shaft 15-1, i.e. a rotor. Preferably, the rotatable shaft 15-1 is a common shaft to the generator 17 and the motor 15. Hence when the motor 15 via the converter unit 9 drives the rotatable shaft 15-1 to rotate, the rotatable shaft 15-1 induces currents in the stator of the generator 17. The generator 17 can thereby deliver power to the vessel 1 and its thrusters.

In one embodiment the generator 17 is a synchronous generator. The generator may in particular be an MV synchronous generator connectable to the bus 13 and to the motor 15. In one embodiment the motor is an induction motor. In one embodiment, the motor 15 is an LV induction motor. The MV synchronous generator may for instance be adapted to deliver 11 kV and the LV induction machine may have 690 V input terminals for driving the rotatable shaft 15-1.

The power backup arrangement 10-1 may further comprise a voltage regulator 19 such as an automatic voltage regulator connected to the rotary converter 12. Thereby the rotary converter 12 is able to maintain the alternating bus voltage at a constant amplitude level even when the first combustion engine driven generator fails or during load variations.

In normal operation of the power system ~~13~~, the battery unit 11 is charged via the bus 13, the rotary converter 12 and the converter unit 9. Alternatively, the battery unit 11 can be charged via other means. Furthermore, in normal operation the power backup arrangement 10-1 is connected to the bus 13 wherein the generator 17 shares the reactive load with the first combustion engine driven generator G1. Thus, the generator 17 helps to prevent trips due to voltage control problems.

CLAIMS

1. A power system (3) for dynamic positioning of a vessel (1), which power system (3) comprises:

a first combustion engine driven generator (G1),

a second combustion engine driven generator (G2),

a battery unit (11), and

a converter unit (9) arranged to provide power to the vessel (1) from the battery unit (11),

wherein in a first operational state of the power system only the first combustion engine driven generator (G1) is arranged to deliver power to the vessel (1), and wherein in a second operational state in which the first combustion engine driven generator (G1) is subject to a failure, the second combustion engine driven generator (G2) is arranged to deliver power to the vessel (1), and wherein the converter unit (9) is arranged to deliver power to the vessel (1) during the transition from the first operational state to the second operational state.

2. The power system (3) as claimed in claim 1, wherein the first operational state is a state in which the first combustion engine driven generator (G1) is in a normal operational mode.

3. The power system (3) as claimed in claim 1 or 2, comprising a bus (13), wherein the first combustion engine driven generator (G1) and the second combustion engine driven generator (G2) are connectable to the bus (13), and wherein the converter unit (9) is connectable to the bus (13) and to the battery unit (11).

4. The power system (3) as claimed in claim 3 comprising a rotary converter (12~~10~~), wherein the converter unit (9) is connectable to the bus (13) via the rotary converter (12~~10~~).

5. The power system (3) as claimed in claim 4, wherein the rotary converter (12~~10~~) comprises a generator (17) and an induction machine (15) electrically coupled via a rotatable shaft (15-1) of the rotary converter (12~~10~~).

6. The power system (3) as claimed in claim 5, wherein the generator (17) is an MV synchronous generator.

7. The power system (3) as claimed in claim 5 or 6, wherein the induction machine (15) is an LV induction machine.

8. The power system (3) as claimed in any of claims 5-7, wherein the induction machine (15) is connectable to the converter unit (9), and wherein the generator (17) is connectable to the bus (13).

9. The power system (3) as claimed in any of the preceding claims, wherein the converter unit (9) is adapted to deliver power to the vessel (1) when a power system frequency is below a predetermined threshold.

10. The power system (3) as claimed in any of claims 5-9, wherein the converter unit (9) comprises a variable-frequency drive for controlling the rotational speed of the induction motor (15).

11. A sectionalised power system (2) comprising at least two power systems (3) as claimed in any of claims 1-10, and at least one bustie (D), wherein the at least two power systems (3) are connectable by means of the at least one bustie (D).

12. A vessel (1) comprising a sectionalised power system (2) according to claim 11.

13. A method for dynamic positioning of a vessel which comprises a power system (3) comprising a first combustion engine driven generator (G1), a second combustion engine driven generator (G2), a battery unit (11), and a converter unit (9) arranged to provide power to the vessel (1) from the battery unit (11), wherein in a first operational state of the power system only the first combustion engine driven generator (G1) is arranged to deliver power to the vessel (1), and wherein in a second operational state in which the first combustion engine driven generator (G1) is subject to a failure, the second combustion engine driven generator (G2) is arranged to deliver power to the vessel (1), and wherein the method comprises:

delivering power, by means of the converter unit (9), to the vessel (1) during the transition from the first operational state to the second operational state.

14. The method as claimed in claim 13, wherein a control unit is arranged to control the switching of switching elements of the converter unit (9) such that a suitable power compensation can be provided to the vessel.

15. The method as claimed in claim 13 or 14, wherein the power system (3) comprises a rotary converter (12), wherein the converter unit (9) is connectable to the bus (13) via the rotary converter (12), and wherein the rotary converter (12) comprises a generator (17) and an induction machine (15) electrically coupled via a rotatable shaft (15-1) of the rotary converter (12).

16. The method as claimed in claim 15, wherein the converter unit (9) comprises a variable-frequency drive, the converter unit (9) delivering power to the induction machine (15) when a speed reference is below a lowest revolutions per minute, rpm, value which might normally occur in droop mode.