Claims

1. A method of operating an inductive power transfer system (1) for transferring power, wherein the inductive power transfer system (1) comprises a primary winding structure for generating an alternating electromagnetic field and a secondary winding structure for receiving the alternating electromagnetic field and generating an alternating current output voltage, wherein the alternating current output voltage is rectified and supplied to at least one energy storage element (12), wherein the rectified output voltage (U_C) is adjusted by varying a gap size of a gap between the primary winding structure and the secondary winding structure, wherein the gap size is adjusted to prepare an energy transfer process and/or to initiate an energy transfer process and/or to control an energy transfer process depending on charging characteristics of the at least one energy storage element (12),
   characterized in that
   the gap size is adjusted such that a desired rectified output voltage ($U_{C,des}$) is provided, wherein the gap size is held constant as long as a desired rectified output voltage ($U_{C,des}$) is providable by adjusting the input voltage (U_{WPC}) of the wayside power converter (4), wherein the input voltage (U_{WPC}) of the wayside power converter (4) is adjustable between given voltage limits.

2. The method according to claim 1, characterized in that the rectified output voltage (U_C) and/or the rectified output current is additionally adjusted by adjusting a least one field characteristic of the power transfer field.

3. The method according to claim 1 or 2 , characterized in that the rectified output voltage (U_C) and/or the rectified output current is additionally adjusted by adjusting an input voltage (U_{WPC}) of a wayside power converter (4).

4. The method according to claim 1 to 3, characterized in that the gap size is adjusted such that a minimal input voltage (U_{WPC}) of the wayside power converter (4) is transformed into a desired rectified output voltage ($U_{C,des}$) or such that a difference between a desired rectified output voltage ($U_{C,des}$) and the rectified output voltage (U_C) due to the minimal input voltage (U_{WPC}) of the wayside power

converter (4) is smaller than a predetermined threshold value.

5. The method according to claim 1 to 4, characterized in that the gap size is adjusted if the input voltage (U_{WPC}) of the wayside power converter (4) reaches a predetermined voltage limit.

6. The method according to one of the claims 1 to 5, characterized in that the gap size is adjusted such that the rectified output voltage (U_C) is equal to an actual total storage element voltage of the at least one energy storage element (12).

7. The method according to one of the claims 1 to 6, characterized in that the gap size is varied continuously or gradually.

8. The method according to one of the claims 1 to 7, characterized in that the input voltage (U_{WPC}) of the wayside power converter (4) is provided by a step-up converter (7) or a step-down converter or a combination thereof.

9. The method according to one of the claims 1 to 8, characterized in that the gap size is varied by a secondary side positioning means and/or by a primary side positioning means.

10. The method according to one of the claims 1 to 9, characterized in that the input voltage (U_{WPC}) of the wayside power converter (4) is controlled depending on a deviation between a desired transfer current ($I_{C,des}$) and an actual transfer current (I_C).

11. The method according to one of the claims 1 to 9, characterized in that a deviation between a desired input power ($P_{WPC,des}$) of the wayside power converter (4) and an actual input power of the wayside power converter (4) is determined, wherein the desired input power of the wayside power converter ($P_{WPC,des}$) is determined depending on the deviation between a desired input power of the energy storage element (12) and the actual input power of the energy storage element (12), wherein a desired input current ($I_{WPC,des}$) of the wayside power converter (4) is determined depending on a deviation between the desired input power ($P_{WPC,des}$) and the actual input power of the wayside power converter (4), wherein an input voltage (U_{WPC}) of the wayside power converter (4) is controlled depending on the

desired input current ($I_{C,des}$) of the wayside power converter (4).

12. The method according to claim 11, characterized in that an actual transfer current (I_C), a desired transfer current ($I_{C,des}$) and an actual input voltage (U_C) are transmitted from the secondary side to the primary side via a unidirectional communication.

13. An inductive power transfer system for transferring energy to a vehicle, wherein the inductive power transfer system (1) comprises a primary winding structure for generating an alternating electromagnetic field and a secondary winding structure for receiving the alternating electromagnetic field and generating an alternating current output voltage, wherein the alternating current output voltage is rectifiable and supplyable to at least one energy storage element (12), wherein the inductive power transfer system (1) comprises at least one means for adjusting a gap size of a gap between the primary winding structure and the secondary winding structure, wherein the rectified output voltage (U_C) is adjustable by varying the gap size, wherein the gap size is adjustable to prepare and/or to initiate and/or to control an energy transfer process depending on charging characteristics of the at least one energy storage element (12),
characterized in that
the inductive power transfer system (1) comprises at least one input voltage generating means for providing an adjustable input voltage (U_{WPC}) of a wayside power converter (4), wherein the wayside power converter (4) is connected to a voltage supply means (2, 13) via the at least one input voltage generating means, wherein the at least one input voltage generating means is provided by a step-up converter (7) or a step-down converter or a combination thereof.

14. The inductive power transfer system according to claim 13, characterized in that the at least one means for adjusting the gap size of a gap between the primary winding structure and the secondary winding structure is/are provided by a secondary side positioning means and/or a primary side positioning means.

15. The inductive power transfer system according to one of the claims 13 to 14, characterized in that the inductive power transfer system (1) comprises at least one means for a unidirectional communication between the secondary side and

the primary side.