[DESCRIPTION]

[Title of Invention]

CHARGE AND DISCHARGE CONTROL DEVICE AND CHARGE AND DISCHARGE CONTROL METHOD

[Technical Field]

[0001]

The present invention relates to charge and discharge control devices or the like. In particular, the present invention relates to a charge and discharge control device or the like that controls an output value which each of storage batteries is caused to output, to maintain a voltage value of a DC bus at a predetermined target voltage value.

[Background Art]

[0002]

A charge and discharge control device that controls an amount of charge or discharge (hereinafter, also referred to as charge and discharge) of a storage battery in a storage battery system has been disclosed so far (see Patent Literatures (PTLs) 1 to 3, for instance).

[Citation List]

[Patent Literature]

[0003]

[PTL 1] International Publication No. WO 2011/132311

[PTL 2] Japanese Unexamined Patent Application Publication No. 2008-42999

[PTL 3] Japanese Unexamined Patent Application Publication No. 2009-213288

[Summary of Invention]

[Technical Problem]

[0004]

However, in the charge and discharge device according to the conventional technique, the storage battery charges and discharges wastefully.

[0005]

Embodiments of~~In view of this,~~ the present invention ~~has an object to~~ provide a charge and discharge control device capable of controlling power wastefully charged and discharged by a storage battery.

[Solution to Problem]

[0006]

Disclosed herein is a~~A~~ charge and discharge control device ~~according to an aspect of the~~

~~present invention is a charge and discharge control device~~ that controls an output value indicating magnitude of current or power which each of storage batteries connected in parallel to a DC bus outputs when charging or discharging, to maintain a bus voltage value that is a voltage value of the DC bus at a predetermined target voltage value, the device including: a coordination unit configured to generate coordination information that is information for calculating the output value which each storage battery is caused to output, based on the bus voltage value and the target voltage value; a string output calculating unit configured to calculate, based on the coordination information, an output target value indicating the output value which the storage battery is caused to output to maintain the bus voltage value at the target voltage value; and a control unit configured to cause, among the storage batteries, a storage battery corresponding to the calculated output target value to output an output that is current or power having magnitude indicated by the calculated output target value, wherein the coordination unit is configured to generate the coordination information to avoid simultaneous presence of, among the storage batteries, a storage battery that outputs an output in a charge direction and a storage battery that outputs an output in a discharge direction.

[0006a]

According to a first aspect, there is provided a storage battery system comprising:

a plurality of storage battery units connected in parallel to a DC bus connected to an inverter; and

a coordination control unit configured to generate coordination information for determining an output target value for current or power which each of the storage battery units outputs in a charge direction or a discharge direction in order to approximate a bus voltage value to a predetermined target voltage value, and transmit the generated coordination information to the storage battery units, the bus voltage value being a voltage value of the DC bus,

wherein each storage battery unit includes:

at least one storage battery; and

a DC-DC converter that is provided between the at least one storage

battery and the DC bus and controls charging and discharging of the at least one storage battery based on the coordination information,

the DC-DC converter includes:

an output determining unit configured to determine, based on the coordination information transmitted by the coordination control unit, the output target value corresponding to current or power which the at least one storage battery connected to the DC-DC converter is caused to output; and

a control unit configured to cause the at least one storage battery to output the current or the power corresponding to the output target value, and

the coordination control unit is configured to cause directions of current or power output in order to approximate the bus voltage value to the target voltage value to be an identical direction in all the storage battery units, by transmitting the coordination information to the storage battery units, the identical direction being either the charge direction or the discharge direction.

[0006b]

According to a second aspect, there is provided a charge and discharge control method comprising:

generating coordination information

for determining an output target value for current or power which each of storage battery units connected in parallel to a DC bus connected to an inverter outputs in a charge direction or a discharge direction in order to approximate a bus voltage value to a predetermined target voltage value, and transmitting the generated coordination information to the storage battery units, the bus voltage value being a voltage value of the DC bus; and

controlling, in each storage battery unit, charging and discharging of at least one storage battery included in a corresponding storage battery unit, based on the coordination information,

wherein in the controlling, the output target value corresponding to current or power which the at least one storage battery is caused to output is determined based on the coordination information, and the at least one storage battery is caused to output the current or the power corresponding to the output target value, and

in the generating, directions of current or power output in order to approximate the bus voltage value to the target voltage value are caused to be an identical direction in all the storage battery units, by transmitting the coordination information to the storage battery units, the identical direction being either the charge direction or the discharge direction.

[0006c]

According to a third aspect, there is provided a charge and discharge control device comprising:

a coordination control unit configured to generate coordination information for determining an output target value for current or power which each of storage battery units connected in parallel to a DC bus connected to an inverter outputs in a charge direction or a discharge direction in order to approximate a bus voltage value to a predetermined target voltage value, and transmit the generated coordination information to the storage battery units, the bus voltage value being a voltage value of the DC bus; and

a plurality of DC-DC converters included in a plurality of storage battery units,

wherein each of the DC-DC converters is provided between the DC bus and at least one storage battery included in a corresponding one of the storage battery units, and controls charging and discharging of the at least one storage battery based on the coordination information,

each DC-DC converter includes:

an output determining unit configured to determine, based on the coordination information transmitted by the coordination control unit, the output target value corresponding to current or power which the at least one storage battery is caused to output; and

a control unit configured to cause the at least one storage battery to output the current or the power corresponding to the output target value, and

the coordination control unit is configured to cause directions of current or power output in order to approximate the bus voltage value to the target voltage value to be an identical direction in all the storage battery units, by transmitting the coordination information to the storage battery units, the identical direction being either the charge direction or the discharge direction.

[0007]

It is to be noted that embodiments of the present invention can be realized not only as such a charge and discharge control device, but also as a charge and discharge control method having, as steps, the characteristic units included in the charge and discharge control device, and as a program causing a computer to execute such characteristic steps. It goes without saying that such a program can be distributed through a recording medium such as a CD-ROM (Compact Disc Read Only Memory) and a transmission medium such as the Internet.

[0008]

Furthermore, embodiments of the present invention can be realized as a semiconductor integrated circuit (LSI) that achieves part or all of functions of the charge and discharge control device, and as a storage battery system including the charge and discharge control device.

[Advantageous Effects of Invention]

[0009]

As stated above, embodiments of the present invention provides a charge and discharge