been already developed. This technology has a problem that an existing terminal box or circuit breaker has to be replaced with this apparatus, resulting in burdensome costs and effort.

Disclosure

Technical Problem

Embodiments of the present invention have been made keeping in mind the above problems occurring in the prior art. Embodiments of the present invention provide a module type safety bus bar having the following advantages: (a) it provides an insulating handle to facilitate safe and convenient connection work when connecting a terminal box and a circuit breaker to each other; (b) it eliminates safety issues, which may arise in connection with conventional bus bars after the connection work is completed, by covering a portion of the bus bar which appears on the outside after the connection work is completed; and (c) it acquires information on use of each phase of power which is connected, for later use.

Embodiments of the invention provide a module type safety bus bar that can provide useful information for improvement of power quality by finding either a power line which causes excessive reactive power or a phase of power which is excessively consumed and by connecting loads in a manner so as to increase consumption of real power or to decrease the phase of reactive power.

Technical Solution

~~According to one aspect, there is provided a module type safety bus bar including: a vertical coupling portion which is a vertically extending rectangular parallelepiped insulating block, has an upper end provided with a first combining means, and has a middle portion into which a bus bar penetrates to be combined with the vertical coupling portion in the form of a cross, the bus bar connecting a terminal for one phase of power of a distributor and a terminal for one phase of power of a circuit breaker; and a horizontal coupling portion which is a horizontally extending rectangular parallelepiped insulating block and has a second combining means, which is to be~~

~~combined with the first combining means of the vertical coupling portion, in a middle portion of a lower end thereof, wherein the distributor and the circuit breaker are safely connected to each other by allowing an operator to hold the vertical coupling portion, and a metallic connection portion of the bus bar is covered by the horizontal coupling portion so as to be safe after the bus bar is connected.~~

According to an aspect of the present invention, there is provided a module type safety bus bar for connecting a terminal for one phase of power of a distributor and a terminal for one phase of power of a circuit breaker to each other, comprising: a vertical coupling portion which is a vertically-extending rectangular parallelepiped insulating block, and has a middle portion into which a bus bar penetrates to be combined with the vertical coupling portion, wherein the vertical coupling portion is adapted to be used as an insulating handle for safely connecting the distributor and the circuit breaker, wherein the vertical coupling portion has an upper end provided with a first combining means, the bus bar penetrates into the middle portion to be combined with the vertical coupling portion in the form of a cross shape; and a horizontal coupling portion which is a horizontally-extending rectangular parallelepiped insulating block and has a second combining means, which is to be combined with the first combining means of the vertical coupling portion, in a middle portion of a lower end thereof; wherein a metallic connection portion of the bus bar is covered by the horizontal coupling portion to be in a safe state after the bus bar is connected.

A sensor module portion which senses electrical information flowing to the bus bar is mounted inside the vertical coupling portion; a connector which transmits a

any one of current, temperature, and voltage.

~~According to another aspect, there is provided~~ Disclosed herein is a module type safety bus bar including: a vertical coupling portion which is a vertically-extending rectangular parallelepiped insulating block and has a middle portion into which a bus bar penetrates to be combined with the vertical coupling portion in the form of a cross, the bus bar connecting a terminal for one phase of power of a distributor to a terminal for one phase of power of a circuit breaker, wherein the terminals of the distributor and the circuit breaker are safely connected to each other by allowing the vertical coupling portion to be used as an insulating handle portion when connecting the terminals of the distributor and the circuit breaker to each other.

The module type safety bus bar may further include a horizontal coupling portion, an inside of which is provided with a sensor module portion and a PCB on which a measurement circuit portion is formed, the sensor module portion sensing electrical information flowing to an inside of the vertical coupling portion, the measurement circuit portion processing a signal output from the sensor module portion, wherein the module type safety bus bar obtains electrical information of the terminals for one phase of power which are connected to each other when connecting the terminals of the distributor and the circuit breaker to each other.

CLAIMS

1. A module type safety bus bar for connecting a terminal for one phase of power of a distributor and a terminal for one phase of power of a circuit breaker to each other, comprising:

a vertical coupling portion which is a vertically-extending rectangular parallelepiped insulating block, ~~has an upper end provided with a first combining means,~~ and has a middle portion into which a bus bar penetrates to be combined with the vertical coupling portion ~~in the form of a cross shape, the bus bar connecting a terminal for one phase of power of a distributor and a terminal for one phase of power of a circuit breaker to each other; and~~,

wherein the vertical coupling portion is adapted to be used as an insulating handle for safely connecting the distributor and the circuit breaker, wherein

the vertical coupling portion has an upper end provided with a first combining means,

the bus bar penetrates into the middle portion to be combined with the vertical coupling portion in the form of a cross shape; and

a horizontal coupling portion which is a horizontally-extending rectangular parallelepiped insulating block and has a second combining means, which is to be combined with the first combining means of the vertical coupling portion, in a middle portion of a lower end thereof;

~~wherein the distributor and the circuit breaker are safely connected to each other by using the vertical coupling portion as an insulating handle, and~~ wherein a metallic connection

portion of the bus bar is covered by the horizontal coupling portion to be in a safe state after the bus bar is connected.

2. The module type safety bus bar according to claim 1, wherein the vertical coupling portion is structured in a manner such that a sensor module portion which senses electrical information flowing to the bus bar is mounted inside the vertical coupling portion, and that a connector which transmits a sensed signal of the sensor module portion is disposed in the upper end of the vertical coupling portion;

wherein the horizontal coupling portion is structured in a manner such that a sensor connecting terminal to be connected to the connector of the vertical coupling portion is disposed in a middle portion of the lower end of the horizontal coupling portion so that the horizontal coupling portion is assembled with the vertical coupling portion and such that a PCB, on which a measurement circuit portion to process the sensed signal of the sensor module portion is formed, is inserted in the horizontal coupling portion; and

wherein electrical information of terminals for one phase of power is detected when the terminals of the distributor and the circuit breaker are connected to each other.

3. The module type safety bus bar according to claim 2, wherein the measurement circuit portion includes:

a transmitter circuit portion which receives and transmits a signal of the sensor connecting terminal of the horizontal coupling portion; and

a main circuit portion which interprets the signal

transmitted by the transmitter circuit portion.

4. The module type safety bus bar according to claim 3, wherein the transmitter circuit portion additionally has a function of receiving and transmitting a signal transmitted from a neighboring transmitter circuit portion.

5. The module type safety bus bar according to claim 4, wherein the transmitter circuit portion and the main circuit portion are formed in respective PCBs to form a transmitter circuit board, and wherein a main circuit board and the transmitter circuit board and the main circuit board are separately mounted inside the horizontal coupling portion.

6. The module type safety bus bar according to claim 5, wherein a plurality of the module type safety bus bars are used as a master bus bar which is mounted together with the transmitter circuit board and the main circuit board in one horizontal coupling portion and as slave bus bars, each of which is mounted together with the transmitter circuit board in one horizontal coupling portion,

wherein the master bus bar is connected to a terminal for one phase of power among three or four phases of power of the circuit breaker and the slave bus bars are connected to terminals for the other phases of power,

wherein the transmitter circuit board of the master bus bar and the transmitter circuit boards of the slave bus bars are connected to each other via a flat cable, and

wherein a sensed signal for each phase of power of the

circuit breaker is independently detected, and detected signals of the respective phases of power are collectively processed in the master bus bar.

7. The module type safety bus bar according to claim 5, wherein a plurality of the module type safety bus bars is used as a master bus bar which is mounted together with the transmitter circuit board and the main circuit board in one horizontal coupling portion, and slave bus bars, each of which is mounted together with the transmitter circuit board in one horizontal coupling portion, and

wherein the transmitter circuit board includes a near field wireless communication circuit portion and a unique code is embedded in each module type safety bus bar, so that electrical information of the module type safety bus bar which is arranged in parallel with the circuit breaker is wirelessly transmitted to the bus bar.

8. The module type safety bus bar according to claim 6 or 7, wherein the horizontal coupling portion is structured such that an upper portion thereof takes the form of an openable cover and that an inside space thereof is provided with a slot into which a PCB is mounted, and

wherein the main circuit board or the transmitter circuit board is inserted into the slot after the cover is opened.

9. The module type safety bus bar according to claim 8, wherein the horizontal coupling portion has recessed portions at upper ends of respective side plates, forming slot-like holes

when the cover is closed so that flat cables pass through the slot-like holes,

wherein the horizontal coupling portion has a front cover whose boundary is cut in the form of a chain cut line, in a front panel, so that the front cover is easily removable, and

wherein, when the main circuit board is inserted, the front cover is removed to form an external line connector so that the main circuit board is connected to an external line by the external line connector.

10. The module type safety bus bar according to claim 2, wherein the vertical coupling portion is divided in a longitudinal direction and reassembled, has a bus bar-combining hole, into which the bus bar is inserted to be combined with the vertical coupling portion, in a middle portion thereof, and has an inside space in which the sensor module portion is mounted.

11. The module type safety bus bar according to claim 10, wherein the sensor module portion has a rectangular parallelepiped shape,

wherein the sensor module portion includes: a bus bar-passing through-hole, into which the bus bar is inserted, in a side portion thereof; and a sensor fixing cylinder, which fixes a sensor, prevents electrical disturbance, and communicates with the bus bar-passing through hole, in an upper portion thereof, and

wherein the sensor module portion includes a metal piece which extends to the bus bar-passing through-hole so as to come into contact with the bus bar when the bus bar is inserted into

the bus bar-passing through-hole, thereby detecting voltage information.

12. The module type safety bus bar according to claim 10, wherein in the bus bar, a side surface of a middle portion thereof has a protrusion which protrudes from the side surface so that the middle portion has a larger width then the other portions thereof and thus the bus bar does not easily separate from the vertical coupling portion after a series of operations are performed that the vertical coupling portion is disassembled, the bus bar is inserted into the bus bar-combining hole, and the vertical coupling portion is reassembled.

13. The module type safety bus bar according to claim 11, wherein a sensor installed in the sensor module portion collects electrical information flowing to the bus bar in a contactless manner and interprets information on power by using a hall sensor or a Rogowskii coil.

14. The module type safety bus bar according to claim 11, wherein the sensor module portion is a sensor which detects any one of current, temperature, and voltage.

~~15. A module type safety bus bar comprising:~~

~~a vertical coupling portion which is a vertically-extending rectangular parallelepiped insulating block and has a middle portion through which a bus bar penetrates to be combined with the vertically coupling portion in the form of a cross, the bus bar connecting a terminal for one phase of power of a~~

~~distributor to a terminal for one phase of power of a circuit breaker,~~

~~wherein the terminals of the distributor and the circuit breaker are safely connected to each other using the vertical coupling portion as an insulating handle when connecting the terminals of the distributor and the circuit breaker to each other.~~