CLAIMS:

1. A gas supply system comprising:

a first gas mixing supply device and a second gas mixing supply device including a plurality of modules corresponding to each other, connected to a gas-based apparatus in parallel, and configured to supply supply gases, in which a plurality of types of gases are mixed, to the gas-based apparatus;

at least one connection line connecting the first gas mixing supply device and the second gas mixing supply device to complementarily connect modules corresponding to each other among the plurality of modules;

at least one connection line valve configured to open or close the at least one connection line; and

a controller configured to control driving of the at least one connection line valve to control whether the first gas mixing supply device and the second gas mixing supply device communicate with each other, to selectively form supply flow paths of the supply gases.

2. The gas supply system of claim 1, wherein the first gas mixing supply device and the second gas mixing supply device each include a mixing module configured to mix and supply a plurality of types of gases, a tank module configured to store the supply gas supplied from the mixing module, and a supply module configured to supply the supply gas stored in the tank module to the gas-based apparatus,

wherein the first gas mixing supply device and the second gas mixing supply device each include a first connection part to which the mixing module and the tank module are connected, a second connection part to which the tank module and the

supply module are connected, and a third connection part to which the supply module and the gas-based apparatus are connected, and

wherein the at least one connection line includes at least one of a first connection line connecting the first connection part of the first gas mixing supply device and the first connection part of the second gas mixing supply device, a second connection line connecting the second connection part of the first gas mixing supply device and the second connection part of the second gas mixing supply device, and a third connection line connecting the third connection part of the first gas mixing supply device and the third connection part of the second gas mixing supply device.

3. The gas supply system of claim 2, wherein the controller selects any one of the pair of mixing modules included in the first gas mixing supply device and the second gas mixing supply device and corresponding to each other, any one of the pair of tank modules included in the first gas mixing supply device and the second gas mixing supply device and corresponding to each other, and any one of the pair of supply modules included in the first gas mixing supply device and the second gas mixing supply device and corresponding to each other according to whether the plurality of modules are normally operated, and the controller sequentially connects the selected modules.

4. The gas supply system of claim 3, wherein the mixing modules include mixing gas supply lines allowing the supply gases, in which the plurality of types of gases are mixed, to flow to the tank modules and mixing gas concentration analysis units configured to measure concentrations of the supply gases flowing through the mixing gas supply lines, and

wherein the controller determines whether the mixing modules are normally operated by comparing the concentrations of the supply gases measured by the mixing gas concentration analysis units with a preset reference concentration range.

5. The gas supply system of claim 3, wherein the mixing modules include mixing gas supply lines allowing the supply gases, in which the plurality of types of gases are mixed, to flow to the tank modules and mixing gas pressure measurement units configured to measure pressures of the supply gases flowing through the mixing gas supply lines, and

wherein the controller determines whether the mixing modules are normally operated by comparing the pressures of the supply gases measured by the mixing gas pressure measurement units with pressures inside the tank modules.

6. The gas supply system of claim 3, wherein the tank modules include tank module pressure measurement units configured to measure gas pressures inside the tank modules, and

wherein the controller determines whether the tank modules are normally operated by comparing the pressures of the supply gases measured by the tank module pressure measurement units with a preset reference pressure range.

7. The gas supply system of claim 3, wherein the supply modules include tank gas supply lines allowing the supply gases stored in the tank modules to flow to the gas-based apparatus and tank gas concentration analysis units configured to measure concentrations of the supply gases flowing through the tank gas supply lines, and

wherein the controller determines whether the supply modules are normally operated by comparing the concentrations of the supply gases measured by the tank gas concentration analysis units with a preset reference concentration range.

8. The gas supply system of claim 2, further comprising first valves configured to open or close mixing module side connection flow paths of the first connection parts and second valves configured to open or close tank module side connection flow paths of the first connection parts,

wherein the controller controls the first valve to be opened and the second valve of the first gas mixing supply device to be closed and the first valve to be closed and the second valve of the second gas mixing supply device to be opened so that the supply gases flow from the mixing module of the first gas mixing supply device through the first connection line to the tank module of the second gas mixing supply device, and the controller controls the first valve and the second valve of the first gas mixing supply device to be opened and the first valve and the second valve of the second gas mixing supply device to be closed so that the supply gases flow from the mixing module of the first gas mixing supply device to the tank module of the first gas mixing supply device.

9. The gas supply system of claim 2, further comprising third valves configured to open or close tank module side connection flow paths of the second connection parts and fourth valves configured to open or close supply module side connection flow paths of the second connection parts,

wherein the controller controls the third valve to be opened and the fourth valve of the first gas mixing supply device to be closed and the third valve to be

closed and the fourth valve of the second gas mixing supply device to be opened so that the supply gases flow from the tank module of the first gas mixing supply device through the second connection line to the supply module of the second gas mixing supply device, and the controller controls the third valve and the fourth valve of the first gas mixing supply device to be opened and the third valve and the fourth valve of the second gas mixing supply device to be closed so that the supply gases flow from the tank module of the first gas mixing supply device to the supply module of the first gas mixing supply device.

10. The gas supply system of claim 2, further comprising fifth valves configured to open or close supply module side connection flow paths of the third connection parts,

wherein the controller controls the fifth valve of the first gas mixing supply device to be opened and the fifth valve of the second gas mixing supply device to be closed, in a state in which a first gas-based apparatus connection part to which the first gas mixing supply device and the gas-based apparatus are connected is closed and a second gas-based apparatus connection part to which the second gas mixing supply device and the gas-based apparatus are connected is opened so that the supply gases flow from the supply module of the first gas mixing supply device to the third connection line and are supplied to the gas-based apparatus through the second gas-based apparatus connection part, and the controller controls the fifth valve of the first gas mixing supply device to be opened and the fifth valve of the second gas mixing supply device to be closed, in a state in which the first gas-based apparatus connection part is opened and the second gas-based apparatus connection part is closed so that the supply gases are supplied from the supply module of the first gas

mixing supply device through the first gas-based apparatus connection part to the gas-based apparatus.

11. The gas supply system of claim 4, wherein the mixing modules include mixing gas supply line valves configured to open or close the mixing gas supply lines, mixing gas vent lines branched off from the mixing gas supply lines and connected to an external unit, and mixing gas vent line valves configured to open or close the mixing gas vent lines, and

wherein the controller opens the mixing gas supply line valves and closes the mixing gas vent line valves when the concentrations of the supply gases measured by the mixing gas concentration analysis units satisfy the preset reference concentration range, and the controller closes the mixing gas supply line valves and opens the mixing gas vent line valves when the concentrations of the supply gases measured by the mixing gas concentration analysis units do not satisfy the reference concentration range.

12. The gas supply system of claim 5, wherein the mixing modules include mixing gas supply line valves configured to open or close the mixing gas supply lines, mixing gas vent lines branched off from the mixing gas supply lines and connected to an external unit, and mixing gas vent line valves configured to open or close the mixing gas vent lines, and

wherein the controller opens the mixing gas supply line valves and closes the mixing gas vent line valves when the pressures of the supply gases measured by the mixing gas pressure measurement units are larger than or equal to pressures inside the tank modules, and the controller closes the mixing gas supply line valves and

opens the mixing gas vent line valves when the pressures of the supply gases measured by the mixing gas pressure measurement units are smaller than the pressures inside the tank modules.

13. The gas supply system of claim 4 or 11, wherein the mixing modules include mixing gas concentration analysis lines branched off from the mixing gas supply lines and connected to an external unit, and mixing gas concentration analysis line valves configured to open or close the mixing gas concentration analysis lines,

wherein the mixing gas concentration analysis units measure the concentrations of the supply gases when the supply gases flow from the mixing gas supply lines to the mixing gas concentration analysis lines, and

wherein the controller controls driving of the mixing gas concentration analysis line valves to control whether to supply the supply gases to the mixing gas concentration analysis lines so as to control whether to measure the concentrations of the supply gases through the mixing gas concentration analysis units.

14. The gas supply system of claim 5 or 12, wherein the mixing modules include mixing gas pressure measurement lines branched off from the mixing gas supply lines and connected to an external unit and mixing gas pressure measurement line valves configured to open or close the mixing gas pressure measurement lines,

wherein the mixing gas pressure measurement units measure the pressures of the supply gases when the supply gases flow from the mixing gas supply lines to the mixing gas pressure measurement lines, and

wherein the controller controls driving of the mixing gas pressure measurement line valves to control whether to measure the pressures of the supply

gases through the mixing gas pressure measurement units.

15. The gas supply system of claim 11 or 12, wherein the mixing modules further include mixing gas vent mass flow controllers configured to adjust opening degrees of the mixing gas vent lines to adjust discharge amounts of the supply gases discharged through the mixing gas vent lines.

16. The gas supply system of claim 2, wherein the mixing modules include a plurality of source gas supply lines to which a plurality of different types of source gases are supplied, mixing units in which the plurality of different types of source gases supplied from the plurality of source gas supply lines are mixed to form the supply gases, and mixing gas supply lines connecting the mixing units and the tank modules.

17. The gas supply system of claim 2, wherein the supply modules include tank gas concentration analysis units configured to measure concentrations of the supply gases flowing through tank gas supply lines connecting the tank modules and the gas-based apparatus, and

wherein the controller determines whether concentrations of the supply gases supplied to the gas-based apparatus are appropriate by comparing the concentrations of the supply gases measured by the tank gas concentration analysis units with a preset reference concentration range.

18. The gas supply system of claim 7, wherein the supply modules include tank gas supply line valves configured to open or close the tank gas supply lines,

tank gas vent lines branched off from the tank gas supply lines and connected to an external unit, and tank gas vent line valves configured to open or close the tank gas vent lines, and

wherein the controller opens the tank gas supply line valves and closes the tank gas vent line valves when the concentrations of the supply gases measured by the tank gas concentration analysis units satisfy the preset reference concentration range, and the controller closes the tank gas supply line valves and opens the tank gas vent line valves when the concentrations of the supply gases measured by the tank gas concentration analysis units do not satisfy the reference concentration range.

19. The gas supply system of claim 7 or 18, wherein the supply modules include tank gas concentration analysis lines branched off from the tank gas supply lines and connected to an external unit and tank gas concentration analysis line valves configured to open or close the tank gas concentration analysis lines,

wherein the tank gas concentration analysis units measure the concentrations of the supply gases when the supply gases flow from the tank gas supply lines to the tank gas concentration analysis lines, and

wherein the controller controls driving of the tank gas concentration analysis line valves to control whether to measure the concentrations of the supply gases through the tank gas concentration analysis units.

20. The gas supply system of claim 2, wherein the first gas mixing supply device and the second gas mixing supply device are modular devices in which the mixing modules, the tank modules, and the supply modules are independently configured but coupled to each other.