CLAIMS

1. A refrigerant control system for controlling a refrigerant flowing through a circulation passage connected to a compression section and circulating the refrigerant so as to exchange heat between a cooling target and the refrigerant compressed by the compression section, comprising:

a storing section which stores the refrigerant;

a first pipe which is connected to an outlet side pipe constituting the circulation passage and located on the side of an outlet of the compression section and flows the refrigerant in the outlet side pipe to the storing section through the first pipe;

a second pipe which is connected to an inlet side pipe constituting the circulation passage and located on the side of an inlet of the compression section and flows the refrigerant in the storing section to the inlet side pipe through the second pipe;

a first opening/closing valve which is provided in the first pipe and is capable of switching whether to flow the refrigerant in the outlet side pipe to the storing section;

a second opening/closing valve which is provided in the second pipe and is capable of switching whether to flow the refrigerant in the storing section to the inlet side pipe; and

an opening/closing control section which controls an opening/closing state of the first opening/closing valve and the second opening/closing valve on the basis of a setting temperature of the cooling target set according to a predetermined method,

wherein the opening/closing control section opens the first opening/closing valve and closes the second opening/closing valve when the setting temperature of the cooling target is higher than a threshold temperature of the refrigerant and closes the

first opening/closing valve and opens the second opening/closing valve when the setting temperature of the cooling target is lower than the threshold temperature of the refrigerant..

2. The refrigerant control system according to claim 1,

wherein the opening/closing control section opens the first opening/closing valve and closes the second opening/closing valve in any one of a case in which an operation pressure value of the compression section acquired according to a predetermined method is larger than the threshold value or a case in which the setting temperature of the cooling target is higher than the threshold temperature of the refrigerant and closes the first opening/closing valve and opens the second opening/closing valve in any one of a case in which the operation pressure value of the compression section is smaller than the threshold value or a case in which the setting temperature of the cooling target is lower than the threshold temperature of the refrigerant.

3. The refrigerant control system according to claim 1 or 2, further comprising:

a temperature adjusting section which adjusts a temperature of the refrigerant in the storing section.

4. The refrigerant control system according to any one of claims 1 to 3,

wherein the refrigerant is carbon dioxide.

5. The refrigerant control system according to any one of claims 1 to 4,

wherein the cooling target is a cooling refrigerant of a semiconductor

fabrication system.

6. A cooling system for cooling the cooling target using the refrigerant, comprising:

a compression section which compresses the refrigerant;

a circulation passage which is connected to the compression section, includes a cooling target side pipe located on the side of the cooling target, and circulates the refrigerant so as to exchange heat between the cooling target and the refrigerant compressed by the compression section;

the refrigerant control system according to any one of claims 1 to 5; and

a heat exchanging section which is provided in the cooling target side pipe and exchanges heat between the cooling target and the refrigerant in the cooling target side pipe.

7. The cooling system according to claim 6,

wherein the heat exchanging section includes a first heat exchanging section which is capable of cooling the cooling target and a second heat exchanging section which is capable of heating the cooling target cooled by the first heat exchanging section,

wherein the cooling target side pipe includes a first cooling target side pipe which is located on the side of the first heat exchanging section and a second cooling target side pipe which is located on the side of the second heat exchanging section,

wherein the cooling system further comprises:

a detecting section which detects a temperature in the outlet side pipe or a temperature in the inlet side pipe;

a third pipe which is connected to the inlet side pipe and an upstream portion in relation to the first heat exchanging section in the first cooling target side pipe; and

a third opening/closing valve which is provided in the third pipe and is capable of adjusting an amount of the refrigerant existing in the cooling target side pipe and flowing to the inlet side pipe, and

wherein the opening/closing control section controls an opening degree of the third opening/closing valve on the basis of a detection result of the detecting section.

8. The cooling system according to claim 7, further comprising:

a fourth opening/closing valve which is provided in an upstream portion in relation to the first heat exchanging section in the first cooling target side pipe and is capable of adjusting an amount of the refrigerant existing in the first cooling target side pipe and flowing to the first heat exchanging section; and

a fifth opening/closing valve which is provided in a downstream portion in relation to the second heat exchanging section in the second cooling target side pipe and is capable of adjusting an amount of the refrigerant subjected to the heat exchange by the second heat exchanging section and flowing to the inlet side pipe,

wherein the opening/closing control section controls an opening degree of the fourth opening/closing valve and the fifth opening/closing valve on the basis of a temperature of the cooling target acquired according to a predetermined method.

9. The cooling system according to claim 7 or 8, further comprising:

a refrigerant heat exchanging section which exchanges heat between the refrigerant in an upstream portion in relation to the first heat exchanging section in the first cooling target side pipe and the refrigerant in a downstream portion in relation to

the second heat exchanging section in the second cooling target side pipe.

10. The cooling system according to any one of claims 7 to 9, further comprising:

a compression control section which controls the compression section on the basis of the detection result of the detecting section and the temperature of the cooling target acquired according to a predetermined method.