P A T E N T C L A I M S

1. A thermal system for a marine vessel, comprising:

a thermal liquid circuit (10);

a pump system (11) for circulating a thermal liquid in the thermal liquid circuit (10);

a number of thermal consumers (20), said thermal consumers (20) being arranged in parallel in said thermal liquid circuit (10), and said thermal consumers (20) being arranged in series with respective Pressure Independent Control Valves (PICVs) (30); and

a control device (12) for controlling the pump system (11), c h a r a c t e r i z e d by

a differential pressure sensor (13) adapted to sense a differential pressure indicative for the differential pressure over a critical one of said Pressure Independent Control Valves (30.1a), whereby a signal from said differential pressure sensor (13) is used by the control device (12) as basis for controlling the pump system.

2. A thermal system according to claim 1, wherein the thermal liquid is water, preferably fresh water.

3. A thermal system according to claim 1 or 2, wherein each of the thermal consumers (20.1, 20.2, 20.3, 20.3a) are arranged in series with a Pressure Independent Control Valve (30.1, 30.1a, 30.2, 30.3) whereby the total amount of thermal liquid flow is controlled and balanced by the Pressure Independent Control Valves (30.1, 30.1a, 30.2, 30.3).

4. A thermal system according to any one of claims 1 to 3, wherein at least one first thermal consumer (20.1) is arranged in series with a controllable Pressure Independent Control Valve (30.1, 30.1a), and preferably a pressure and/or temperature sensor (20.11) is attached to said first thermal consumer (20.1) to provide a control signal to control the controllable Pressure Independent Control Valve (30.1, 30.1a).

5. A thermal system according to any one of claim 1 to 4, wherein a second thermal consumer (20.2) comprises more minor thermal consumers (20.2a,20.2b) arranged in parallel and/or series for said minor thermal consumers (20.2a,20.2b) to be commonly arranged in series with a respective second

Pressure Independent Control Valve (30.2).

6. A thermal system according to any one of claims 1 to 5, wherein more differential pressure sensors (13, 13a) are provided adapted to sense respective differential pressures indicative for the differential pressure over respective Pressure Independent Control Valves, and wherein preferably the control device for controlling the pump system is adapted to use the indicated differential pressure that is closest to the differential pressure demanded for the respective Pressure Independent Control Valve as basis for controlling the pump system.

7. A thermal system according to any one of claims 1 to 6, further comprising:

a central thermal unit (40);

a branch (10.1) of the thermal liquid circuit (10) passing through the central thermal unit (40);

a bypass (10.2) of the thermal liquid circuit (10), bypassing the central thermal unit (40);

a 3-way valve (10.3) controlling a rate of flow through said branch (10.1) and flow through said bypass (10.2);

a temperature sensor (10.4) measuring a flow temperature downstream of said branch (10.1) and said bypass (10.2); and

a controller (10.5) for controlling said 3-way valve (10.3) in response to a signal from the temperature sensor (10.4).

8. A thermal system according to any one of claims 1 to 6, further comprising:

a central thermal unit (40);

the central thermal unit (40) comprising a heat exchanger (40.1) with a primary side (40.1a) and a secondary side (40.1b), the primary side (40.1a) being part of the thermal liquid circuit (10) of the thermal system, the secondary side (40.1b) of the central thermal unit (40) being fed with a second thermal liquid by a heat exchanger pump system (40.2);

a branch (10.1) of the thermal liquid circuit (10) passing through the central thermal unit (40);

a bypass (10.2) of the thermal liquid circuit (10), bypassing the central thermal unit (40);

a 3-way valve (10.3) controlling a rate of flow through said branch (10.1) and flow through said bypass (10.2);

a temperature sensor (10.4) measuring a flow temperature downstream of said branch (10.1) and said bypass (10.2); and

a controller (12) for controlling the heat exchanger pump system (40.2) in response to a signal from the temperature sensor (10.4).

9. A thermal system according to claim 8, wherein the controller (12) is adapted to control also said 3-way valve (10.3) in response to at least a signal from the temperature sensor (10.4).

10. A thermal system according to any one of claims 1 to 9 wherein the thermal system is a cooling system.

11. A thermal system according to any one of claims 1 to 10, wherein said thermal system is installed in a marine vessel.

12. A marine vessel comprising a thermal system according to any one of claims 1 to 11.

13. A method of controlling a thermal system according to any one of claims 1 to 11, comprising:

circulating a thermal liquid in the thermal liquid circuit (10) by means of the pump system (11);

obtaining a signal from the differential pressure sensor (13) indicating the differential pressure over the critical one of said Pressure Independent Control Valves (30.1a);

adjusting the power of the pump system (11) to obtain a signal of a value within an intended range from the differential pressure sensor (13).

14. A method according to claim 13, wherein the thermal system comprises more differential pressure sensors (13, 13a) adapted to sense respective differential pressures indicative for the differential pressure over respective Pressure Independent Control Valves (30), the method comprising determining for each of the differential pressure sensors a required minimum value of the signal provided by the respective differential pressure sensors, and adjusting

the power of the pump system in dependence of the signal of the one of the differential pressure sensors providing the signal of the lowest value relative to the respective required minimum value.

15. A method according to claim 13 or 14, wherein at least one first thermal consumer (20.1) is arranged in series with a controllable Pressure Independent Control Valve (30.1, 30.1a), and a pressure and/or temperature sensor (20.11) is attached to said first thermal consumer (201), the method comprising obtaining a control signal from the pressure and/or temperature sensor (20.11) and adjusting said controllable Pressure Independent Control Valve (30.1, 30.1a) in dependence of the control signal from said pressure and/or temperature sensor (20.11).

16. A method according to any one of claims 13 to 15, wherein the thermal system comprises:

a central thermal unit (40);

a branch (10.1) of the thermal liquid circuit (10) passing through the central thermal unit (40);

a bypass (10.2) of the thermal liquid circuit (10), bypassing the central thermal unit (40);

a 3-way valve (10.3) controlling a rate of flow through said branch (10.1) and flow through said bypass (10.2); and

a temperature sensor (10.4) measuring a flow temperature downstream of said branch (10.1) and said bypass (10.2),

the method comprising obtaining a temperature signal from said temperature sensor (10.4) and controlling said 3-way valve (10.3) in response to the temperature signal from the temperature sensor (10.4).

17. A method according to any one of claims 13 to 16, wherein the thermal system comprises:

a central thermal unit (40);

the central thermal unit (40) comprising a heat exchanger (40.1) with primary side (40.1a) and a secondary side (40.1b), the primary side (40.1a) being part of the thermal liquid circuit (10) of the thermal system, the secondary side (40.1b) of the central thermal unit (40) being fed with a second thermal

liquid by a heat exchanger pump system (40.2);

a branch (10.1) of the thermal liquid circuit (10) passing through the central thermal unit (40);

a bypass (10.2) of the thermal liquid circuit (10), bypassing the central thermal unit (40);

a 3-way valve (10.3) controlling a rate of flow through said branch (10.1) and flow through said bypass (10.2); and

a temperature sensor (10.4) measuring a flow temperature downstream of said branch (10.1) and said bypass (10.2),

the method comprising obtaining a temperature signal from said temperature sensor (10.4) and controlling the heat exchanger pump system (40.2) in response to said signal from said temperature sensor (10.4).

18. A control device (10.5, 12) for a thermal system according to any one of claims 1 to 11, said control device being adapted to perform the method according to any one of claims 13 to 17.