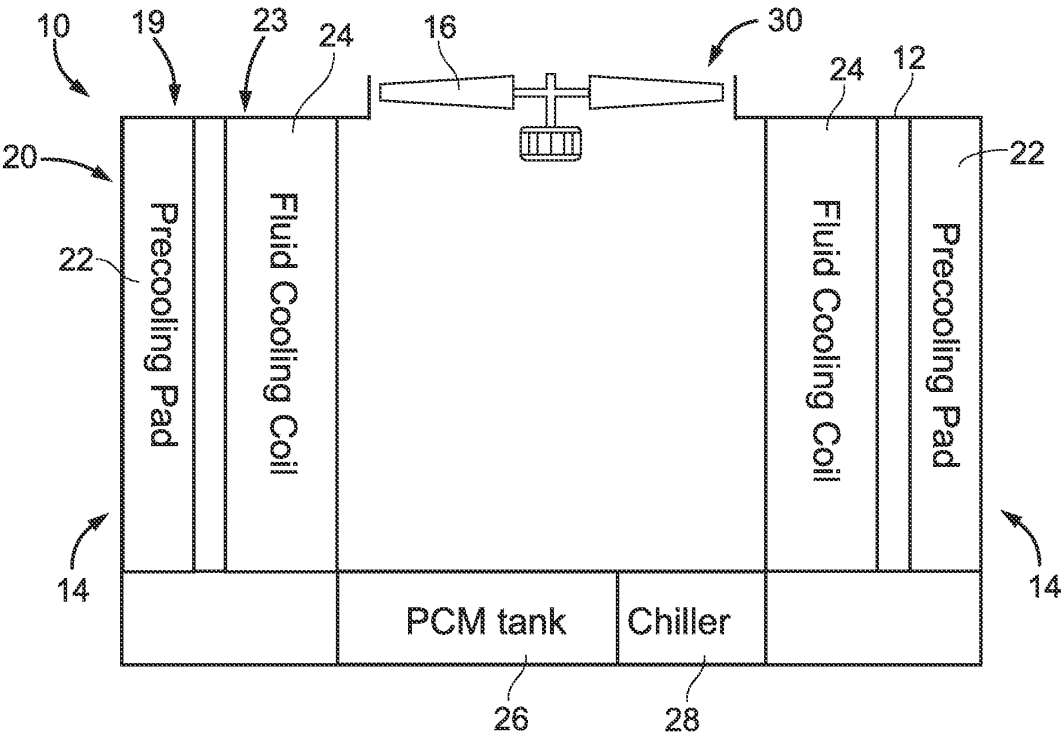
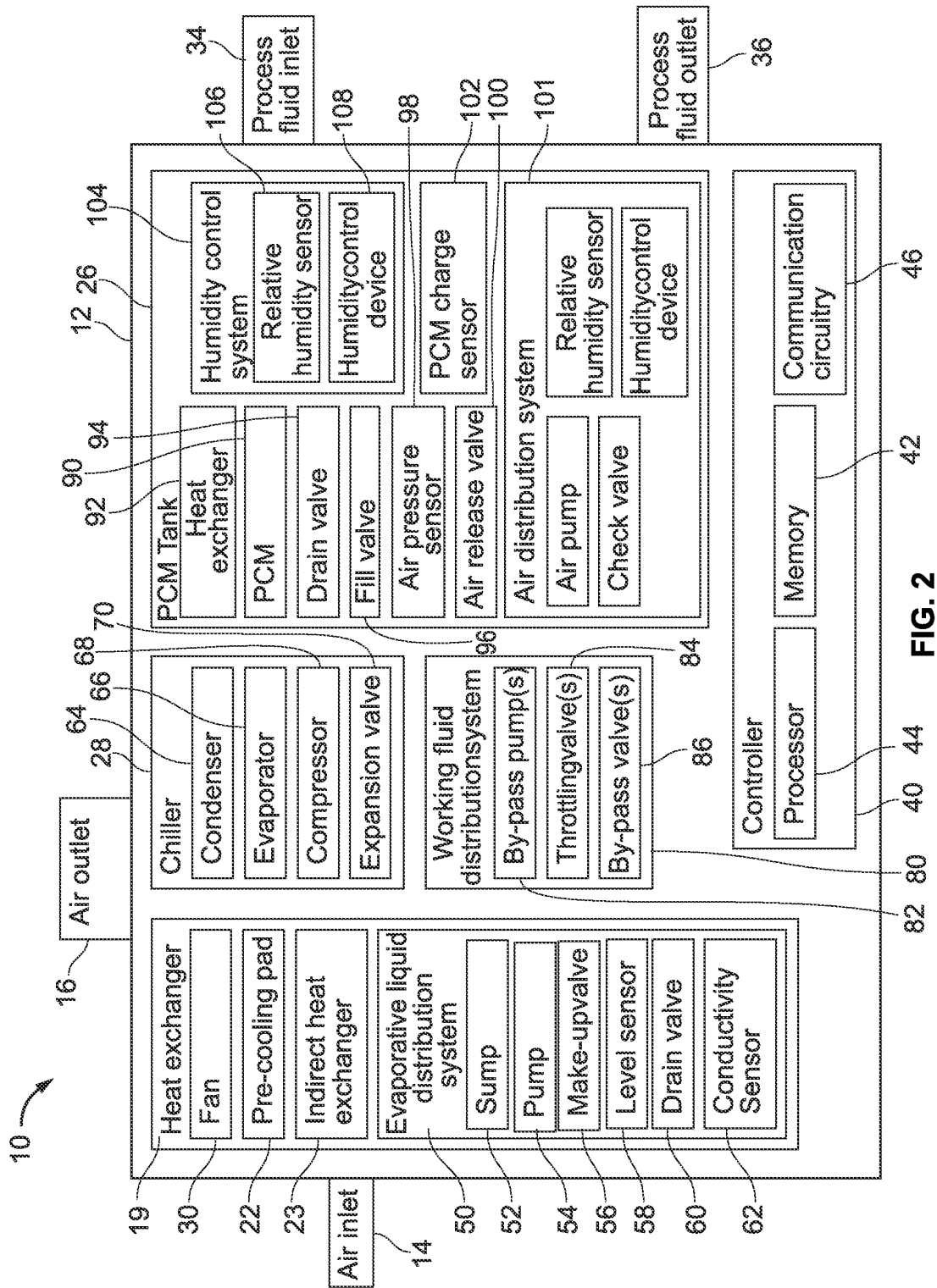
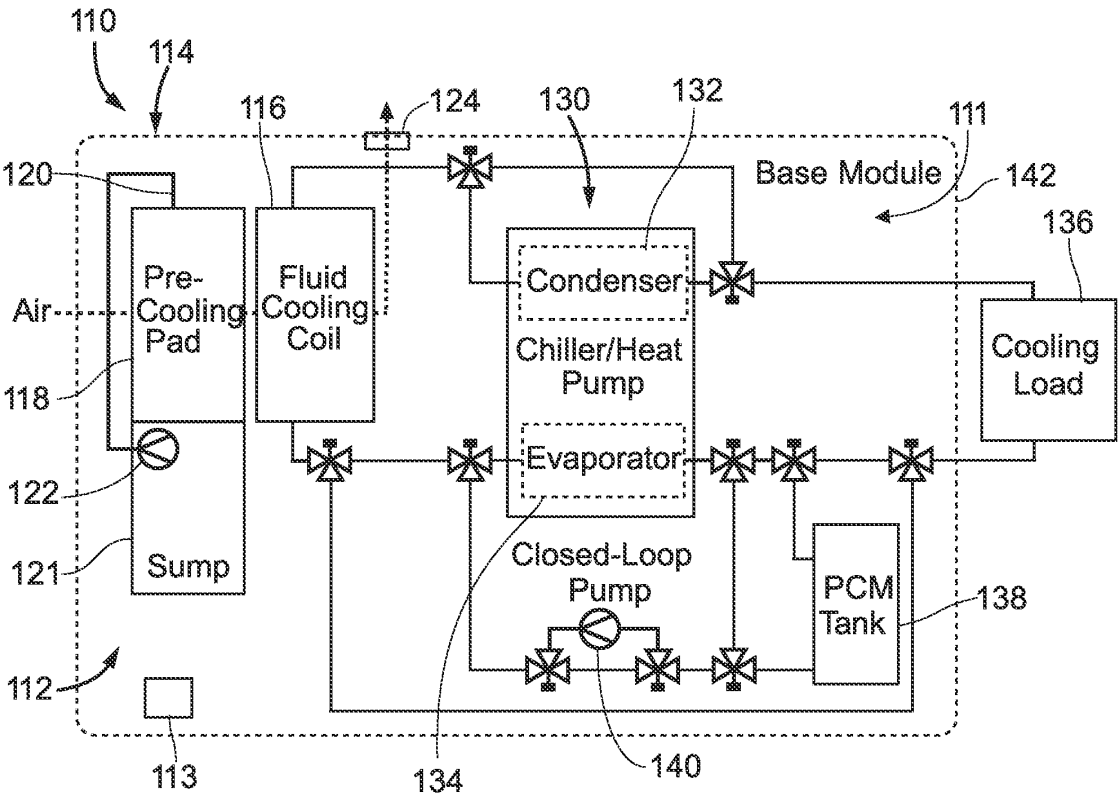




Approach 1
FIG. 1





Approach 1 – Example 1

FIG. 3

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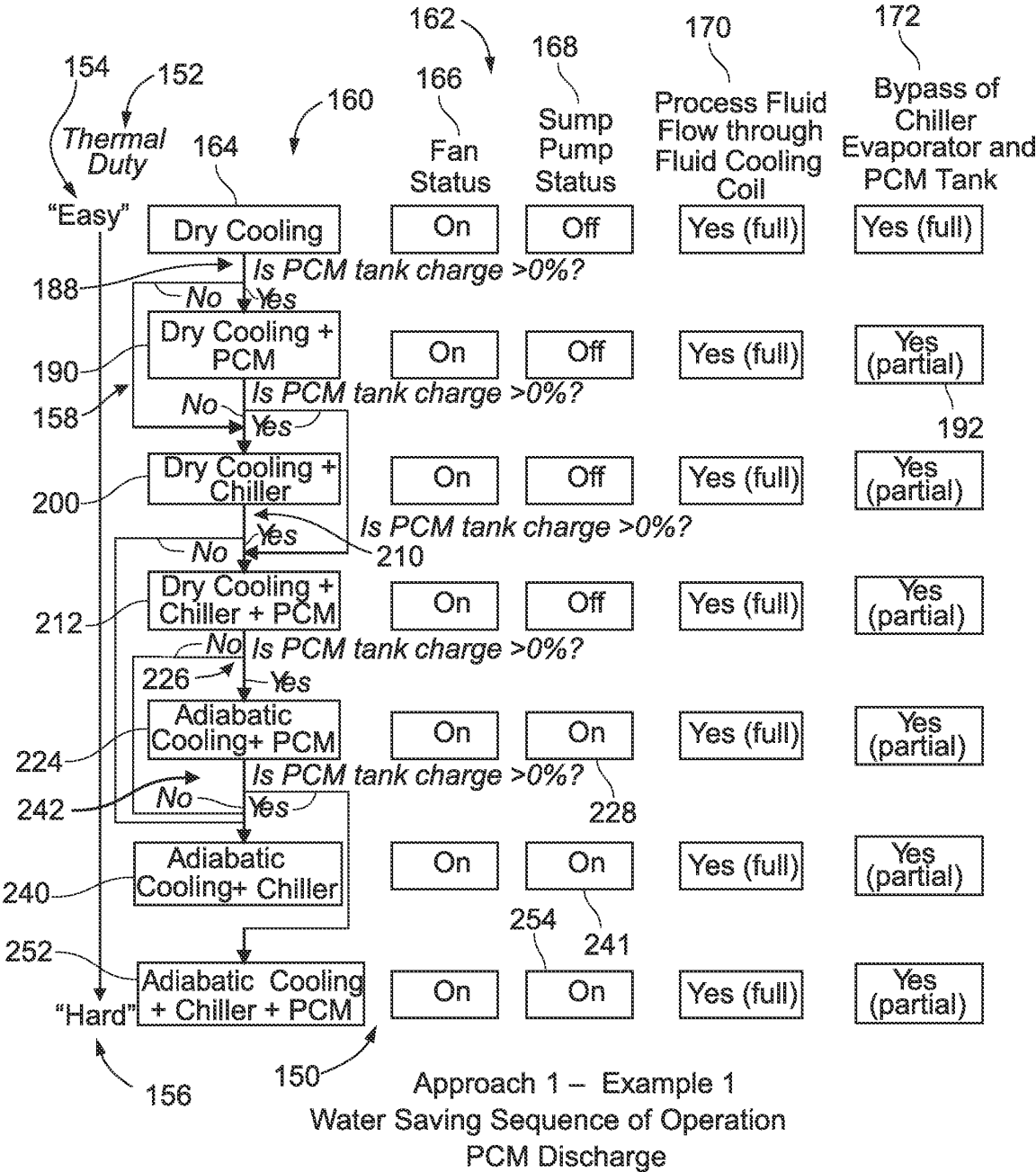


FIG. 4A

4A 4B

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174 Chiller Status	176 Closed-Loop Pump Status	178 Process Fluid Flow through Chiller Condenser	180 Process Fluid Flow through Chiller Evaporator	182 Process Fluid Flow through PCM Tank	184 PCM Tank Charge	186 PCM Tank Mode
Off	Off	No	No	No	≥0%	n/a
Off	Off	No	No	Yes (partial)	>0%	Discharge
On	Off	Yes (partial)	Yes (partial)	194 No	0%	196 n/a
206 On	Off	202 Yes (partial)	204 Yes (partial)	208 Yes (partial)	>0%	Discharge
218 Off	Off	214 No	216 No	220 Yes (partial)	>0%	222 Discharge
230 On	Off	232 Yes (partial)	234 Yes (partial)	236 No	0%	238 n/a
256 244 On	Off	258 246 Yes (partial)	260 248 Yes (partial)	262 250 Yes (partial)	>0%	264 Discharge

Approach 1 – Example 1
Water Saving Sequence of Operation
PCM Discharge

FIG. 4B

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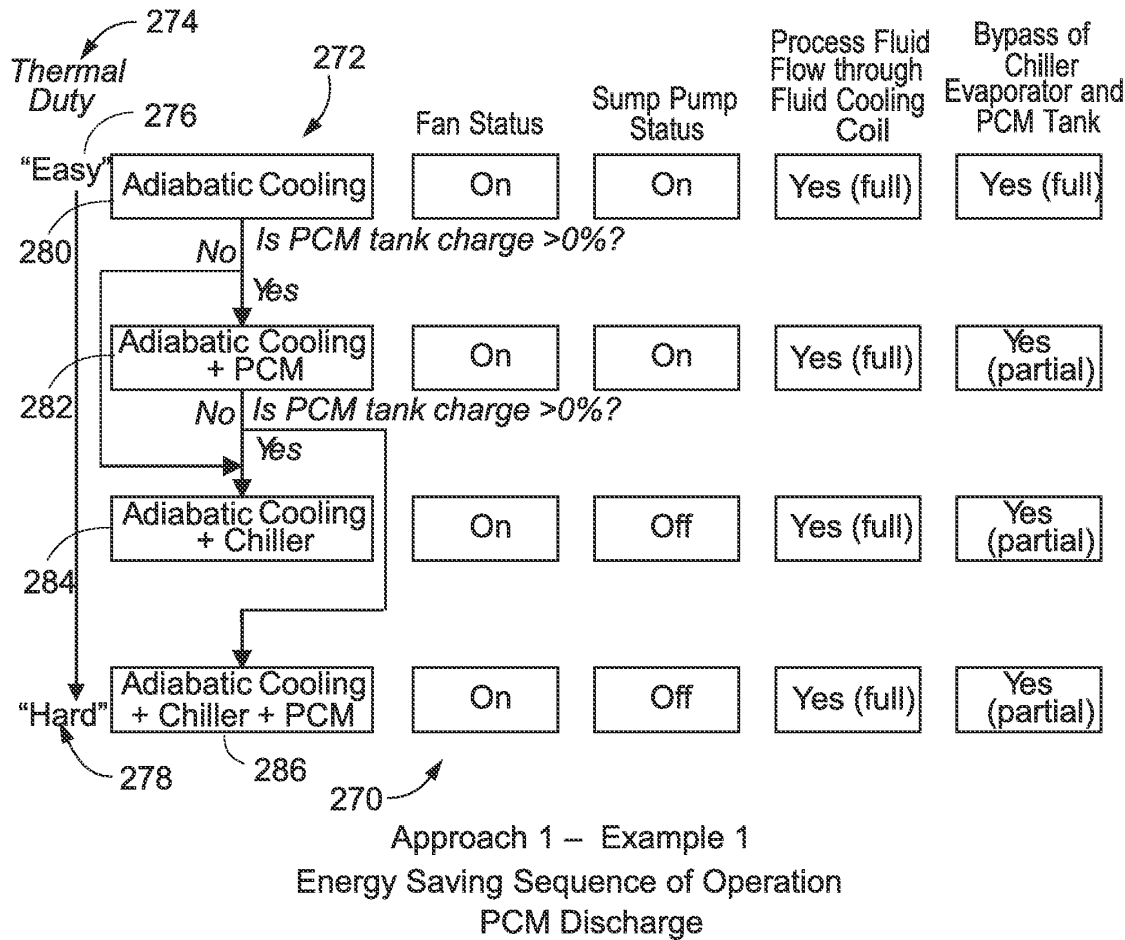


FIG. 5A

5A 5B

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Chiller Status	Closed-Loop Pump Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	Off	No	No	No	≥0%	n/a
Off	Off	No	No	Yes (partial)	>0%	Discharge
On	Off	Yes (partial)	Yes (partial)	No	0%	n/a
On	Off	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge

Approach 1 – Example 1
Energy Saving Sequence of Operation
PCM Discharge

FIG. 5B

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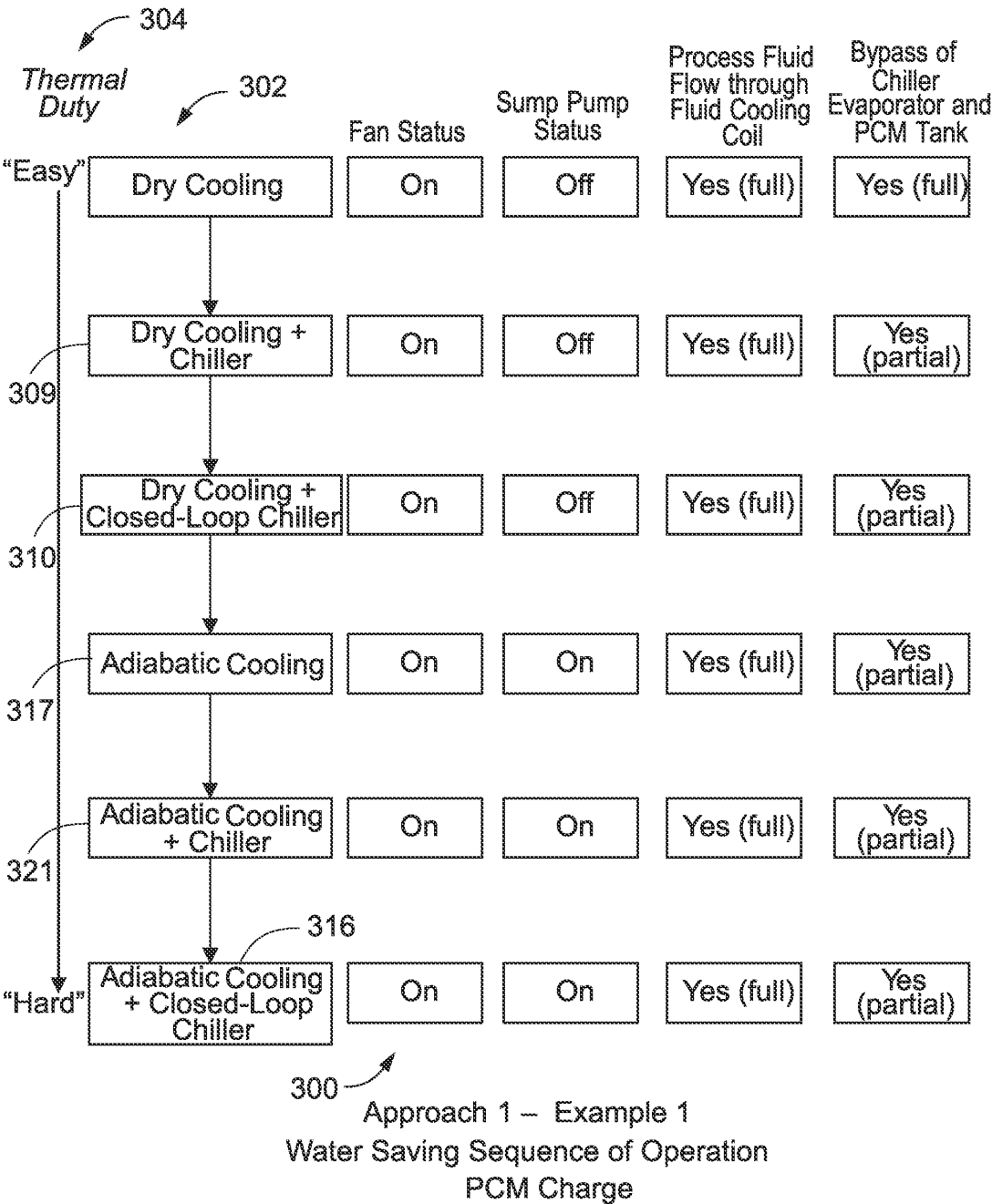


FIG. 6A

6A 6B

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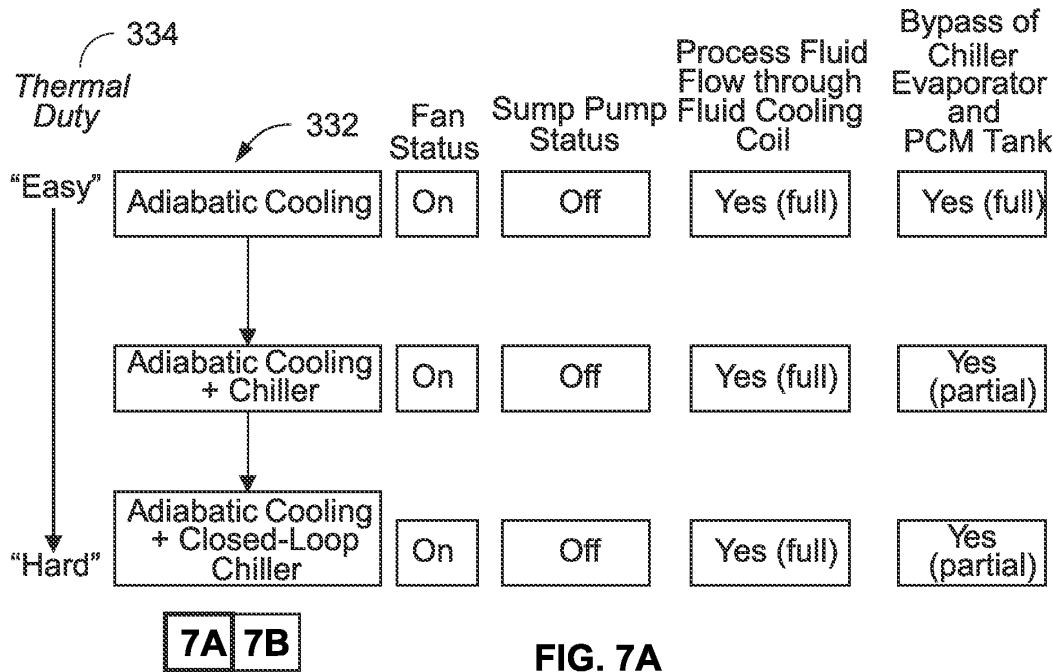
306		Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Chiller Status	Closed-Loop Pump Status	No	No	Yes (partial)	<100%	Charge
On	Off	Yes (partial)	Yes (partial) 311	Yes (partial) 313	<100%	Charge
On	On 316	Yes (partial)	No (closed- loop) 312	No (closed- loop) 314	<100%	Charge
Off	Off	No	No	Yes (partial) 319	<100%	Charge
On	Off	Yes (partial)	Yes (partial)	Yes (partial) 323	<100%	Charge
On	On	Yes (partial)	No (closed- loop) 318	No (closed- loop) 320	<100%	Charge

Approach 1 – Example 1
Water Saving Sequence of Operation
PCM Charge

FIG. 6B

6A 6B

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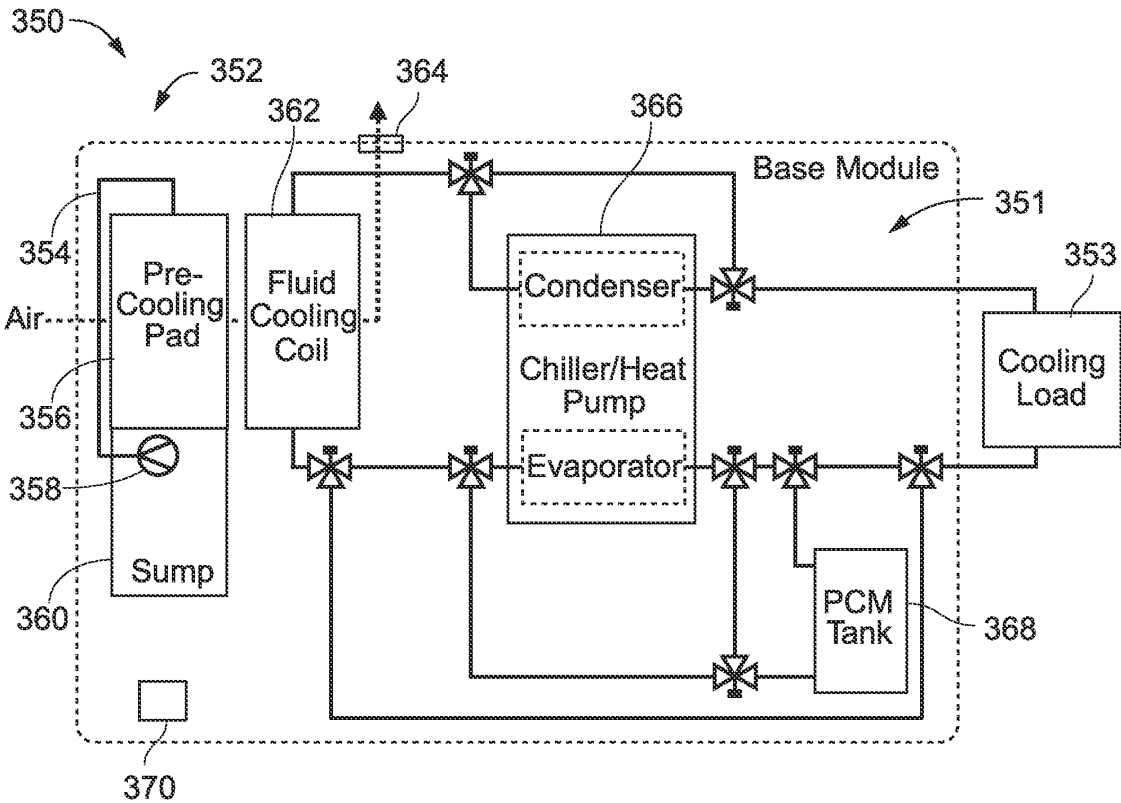
Chiller Status	Closed-Loop Pump Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	Off	No	No	Yes (partial)	<100%	Charge
On	Off	Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge
On	On	Yes (partial)	No (closed-loop)	No (closed-loop)	<100%	Charge

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Approach 1 – Example 1
Energy Saving Sequence of Operation
PCM Charge

7A 7B

FIG. 7B



Approach 1 – Example 2

FIG. 8

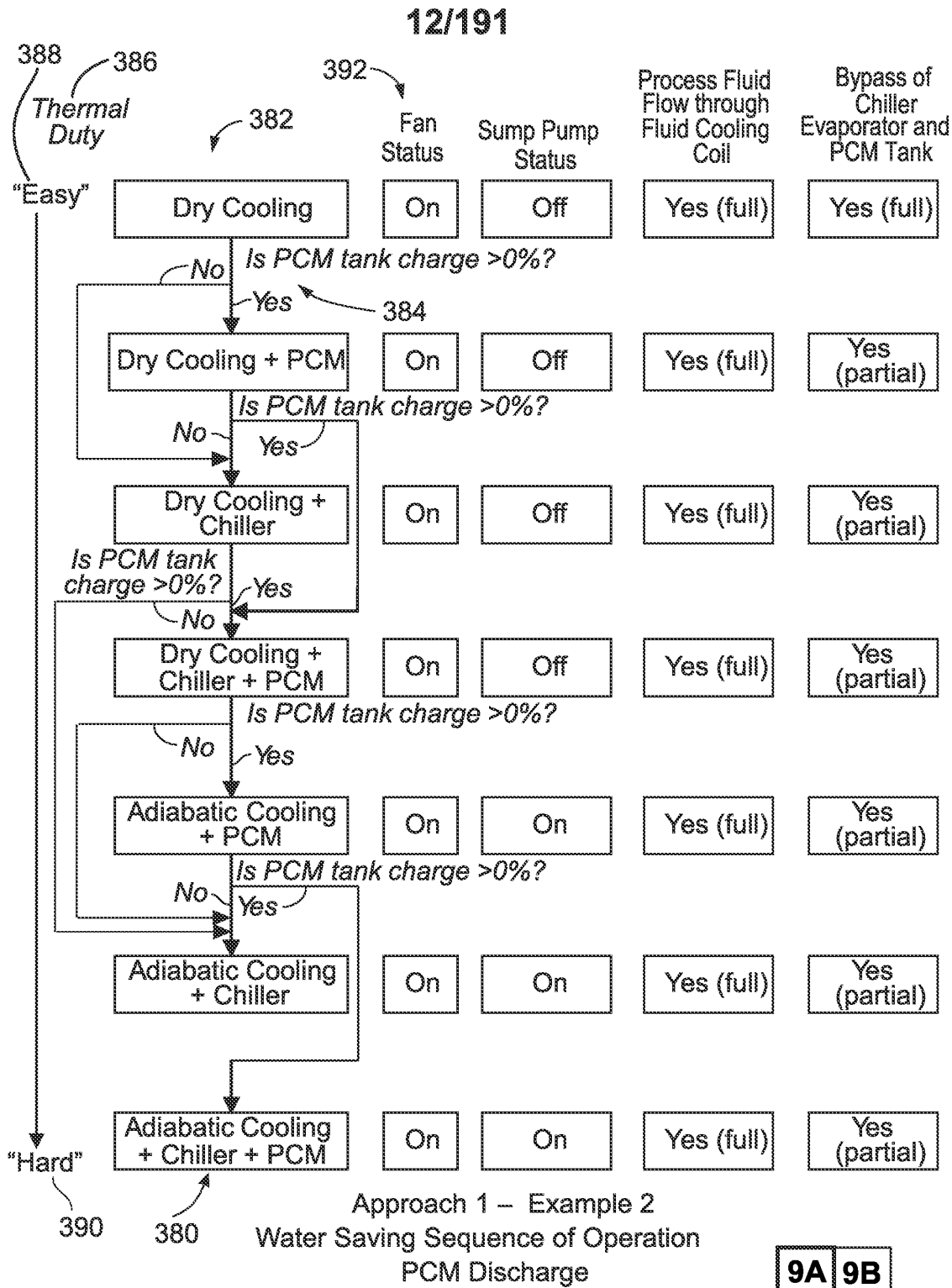


FIG. 9A

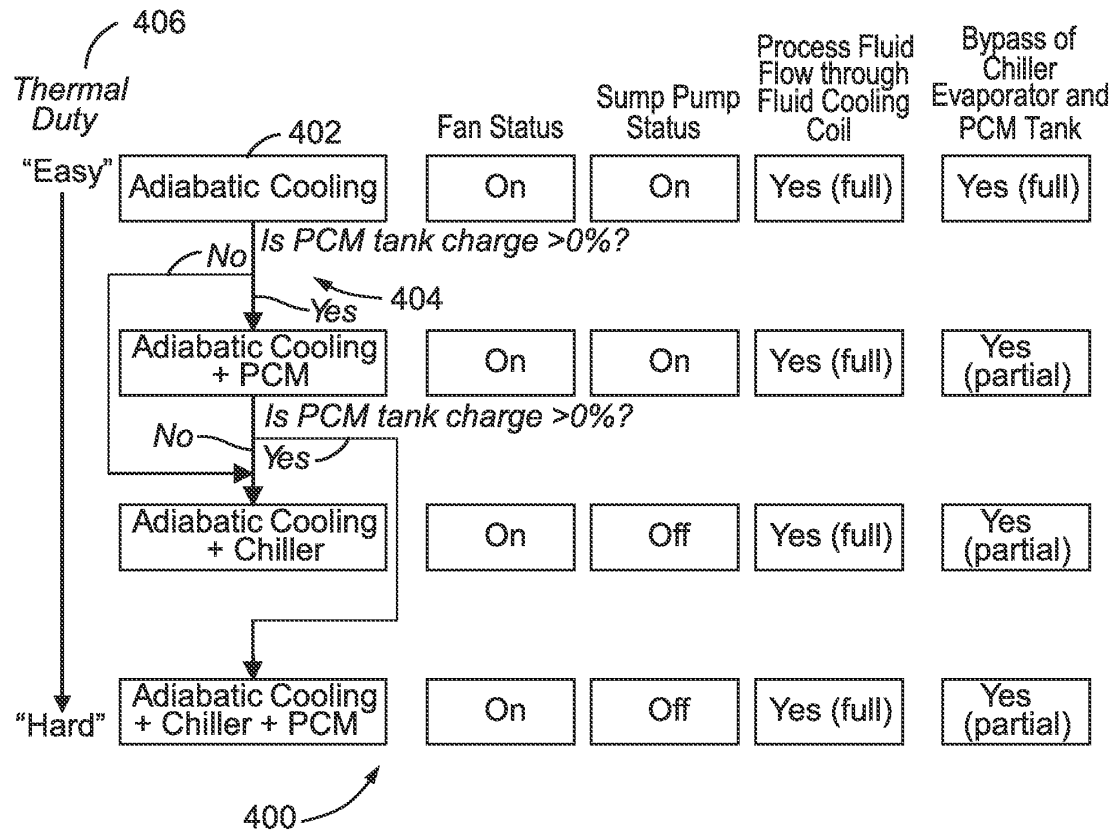
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Chiller Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	No	No	No	≥0%	n/a
Off	No	No	Yes (partial)	>0%	Discharge
On	Yes (partial)	Yes (partial)	No	0%	n/a
On	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge
Off	No	No	Yes (partial)	>0%	Discharge
On	Yes (partial)	Yes (partial)	No	0%	n/a
On	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge

Approach 1 – Example 2
Water Saving Sequence of Operation
PCM Discharge

9A 9B

FIG. 9B



Approach 1 – Example 2
Energy Saving Sequence of Operation
PCM Discharge

FIG. 10A

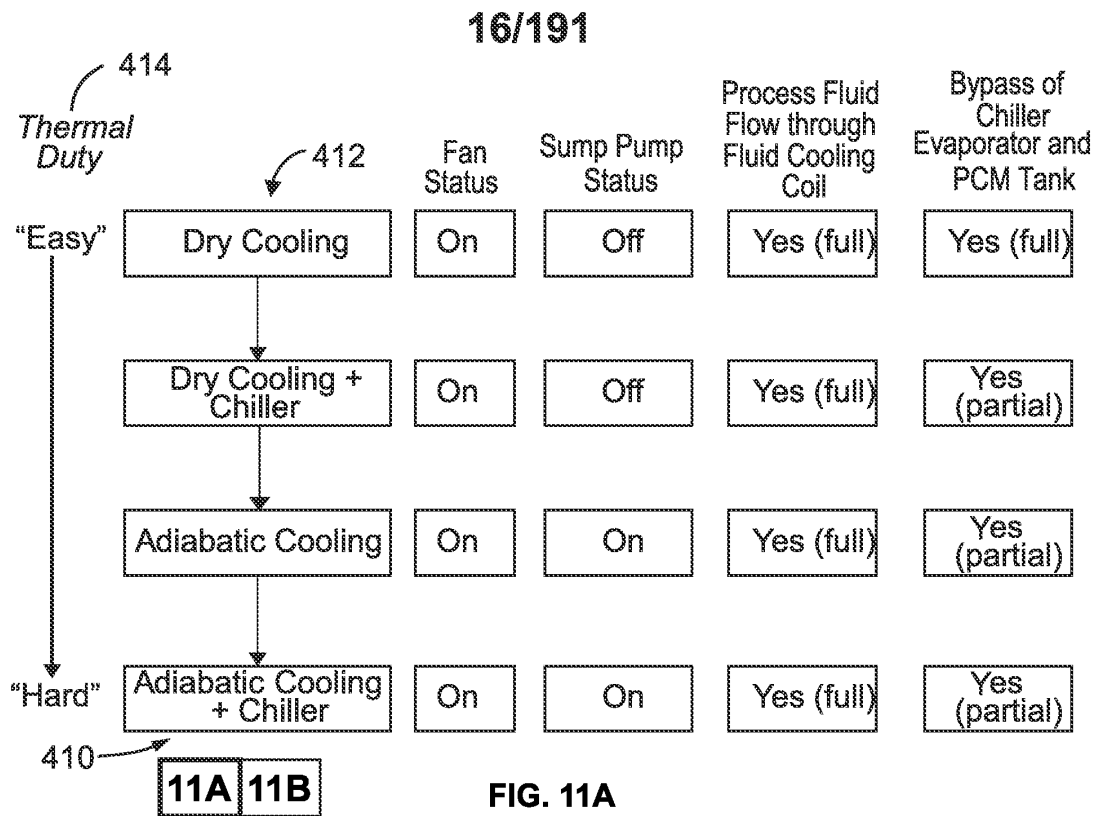
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Chiller Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	No	No	No	≥0%	n/a
Off	No	No	Yes (partial)	>0%	Discharge
On	Yes (partial)	Yes (partial)	No	0%	n/a
On	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge

Approach 1 – Example 2
Energy Saving Sequence of Operation
PCM Discharge

FIG. 10B



Chiller Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	No	No	Yes (partial)	<100%	Charge
On	Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge
Off	No	No	Yes (partial)	<100%	Charge
On	Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge

Approach 1 – Example 2

Water Saving Sequence of Operation

PCM Charge

11A 11B

FIG. 11B

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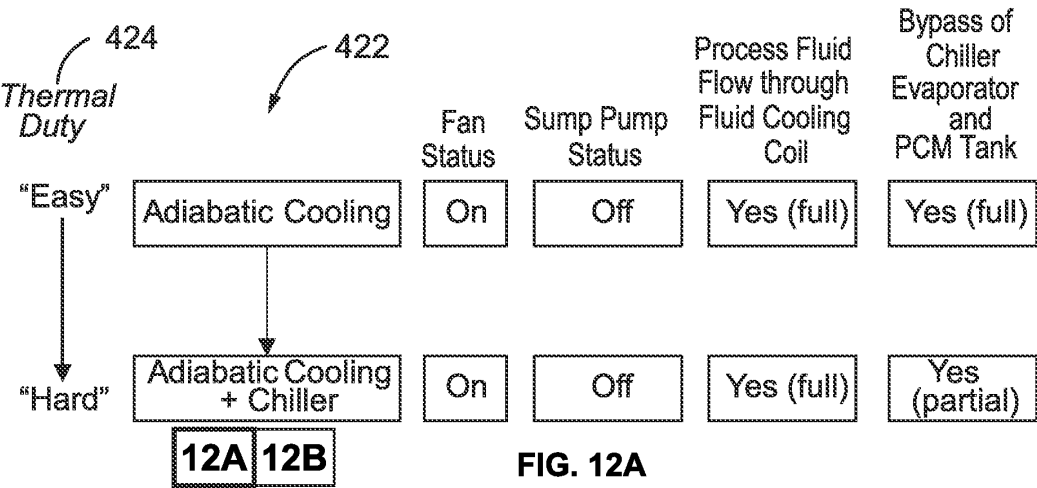


FIG. 12A

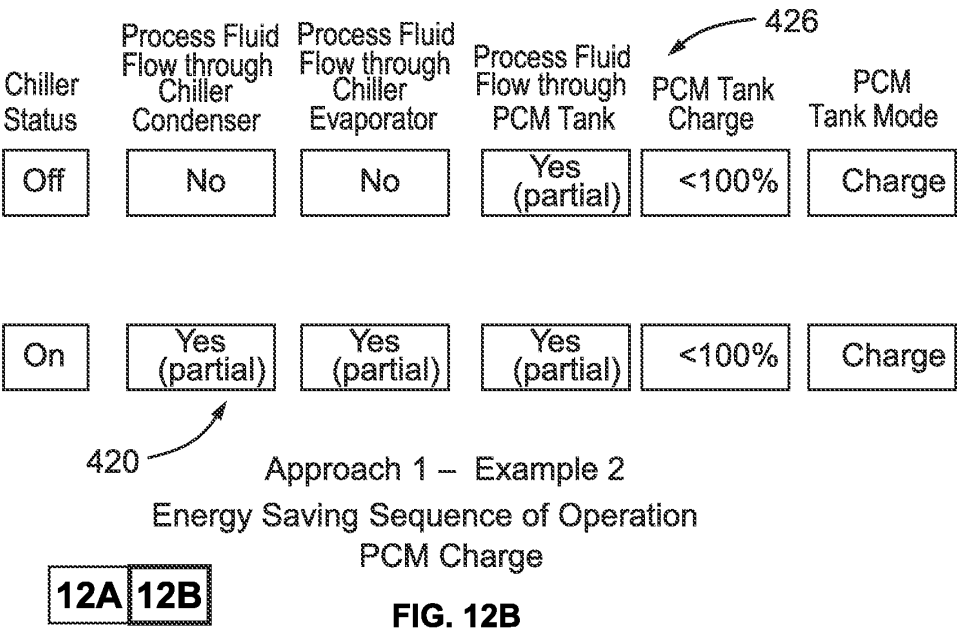


FIG. 12B

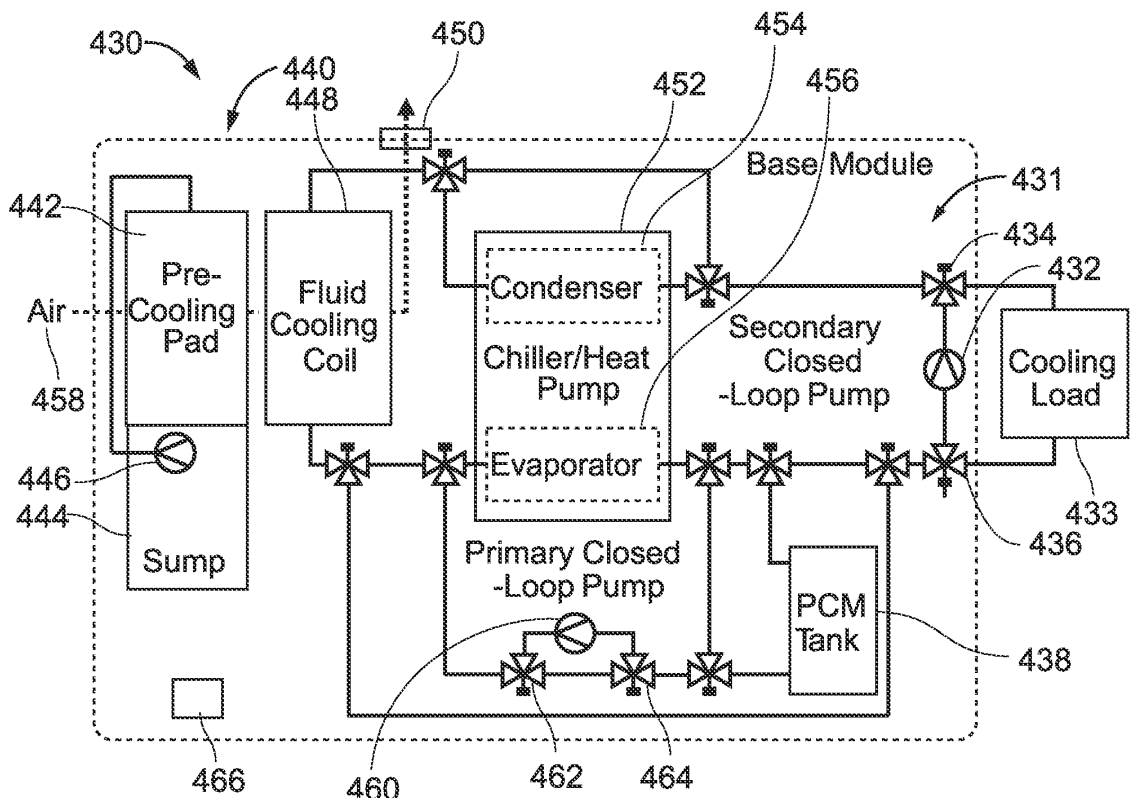


FIG. 13

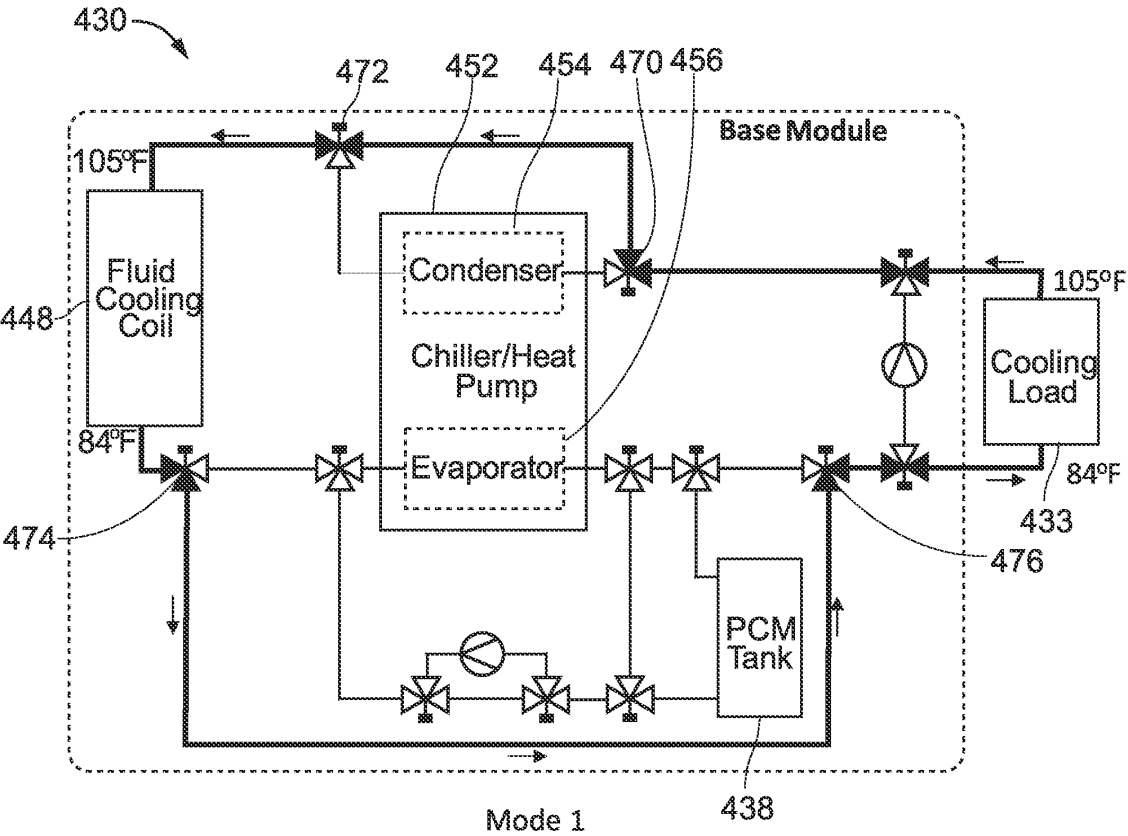


FIG. 14

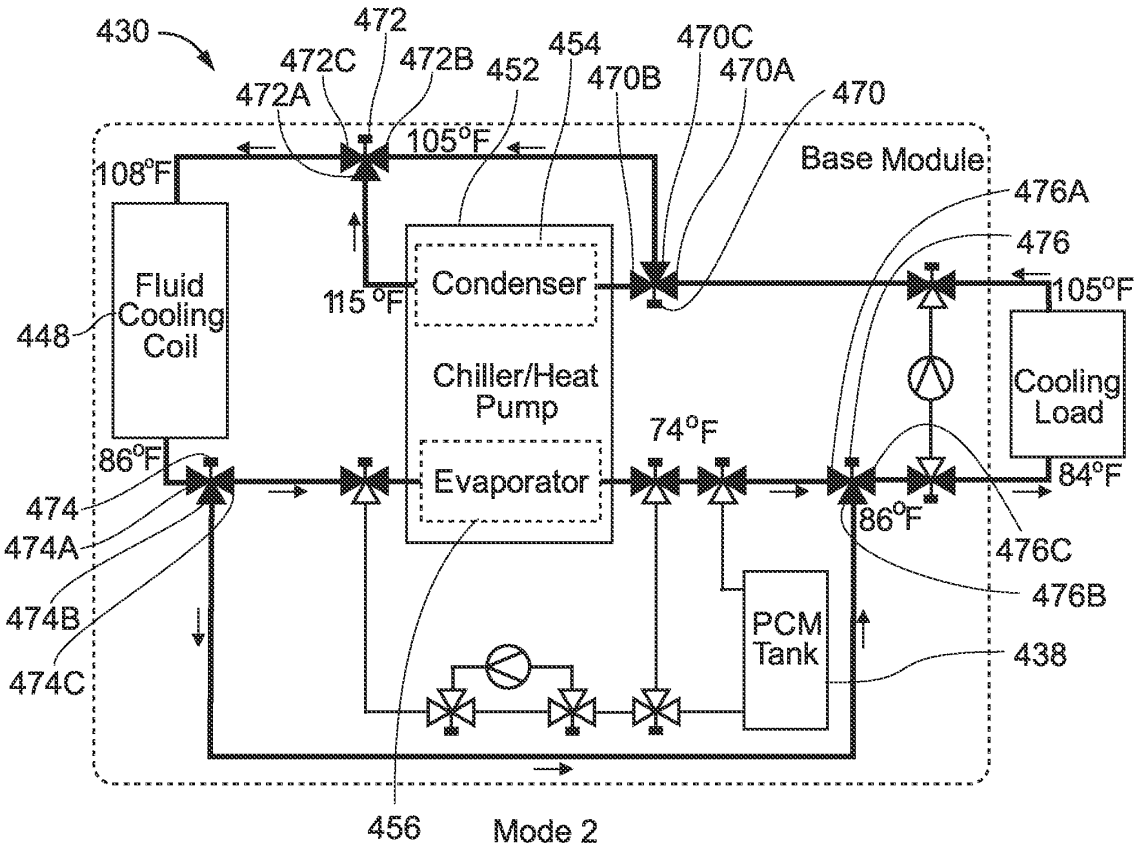


FIG. 15

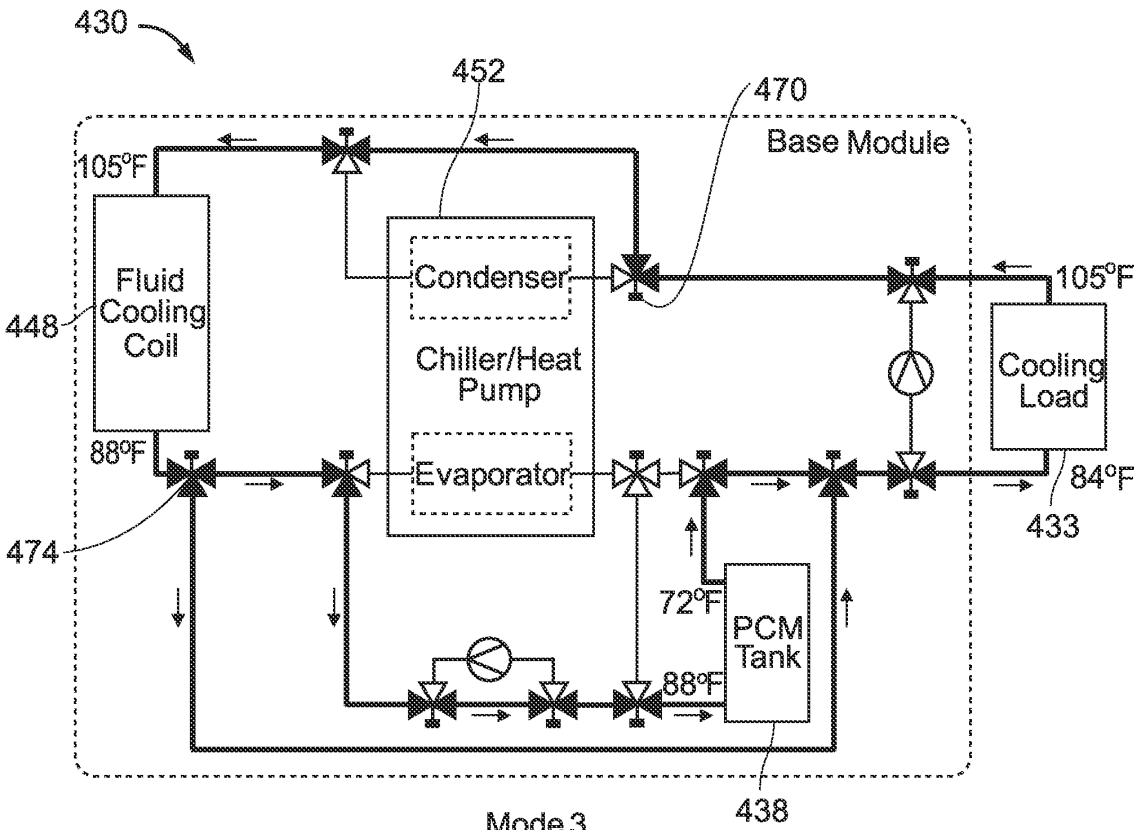
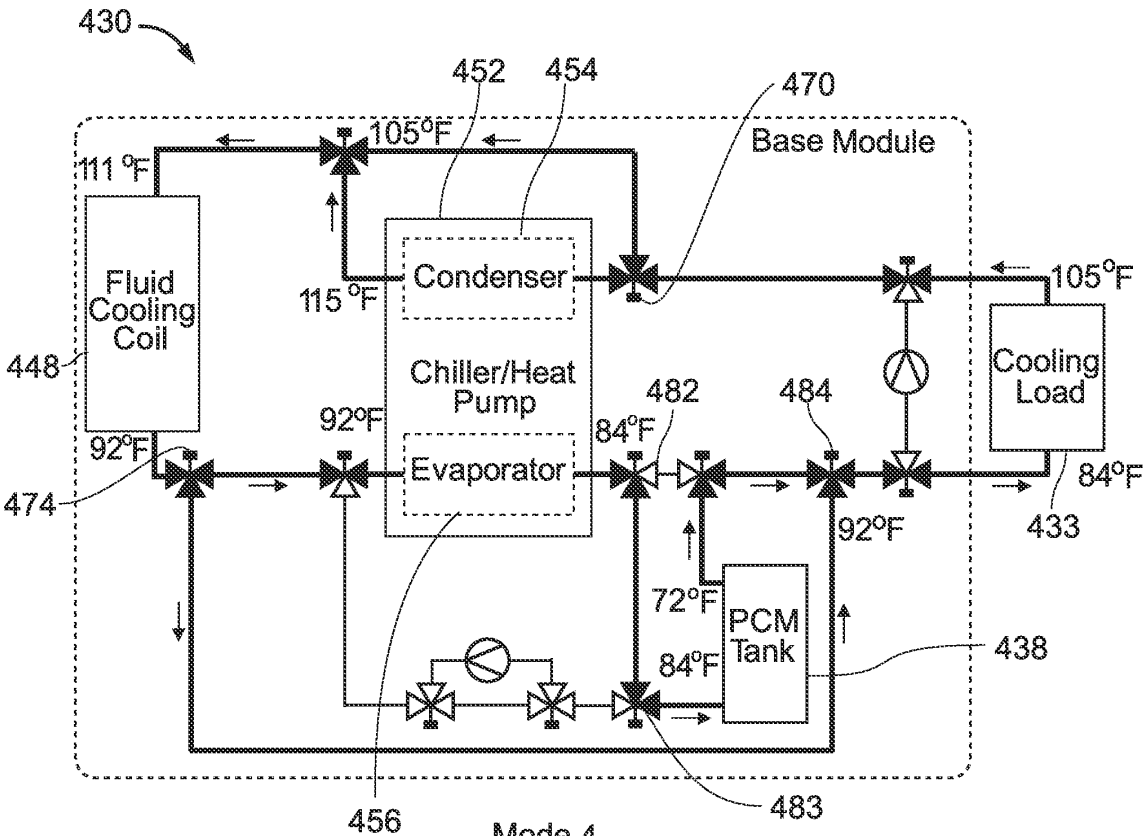
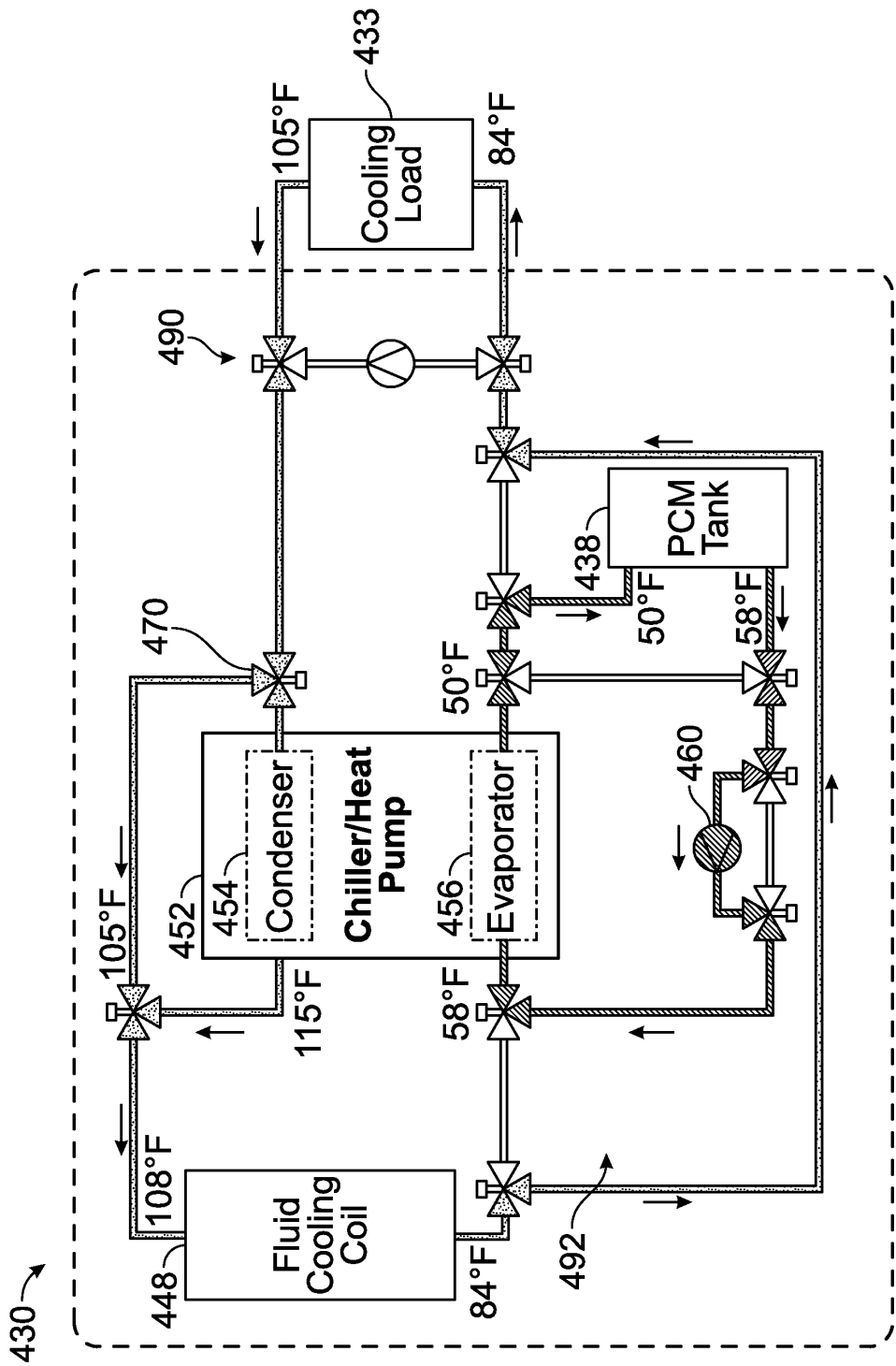


FIG. 16

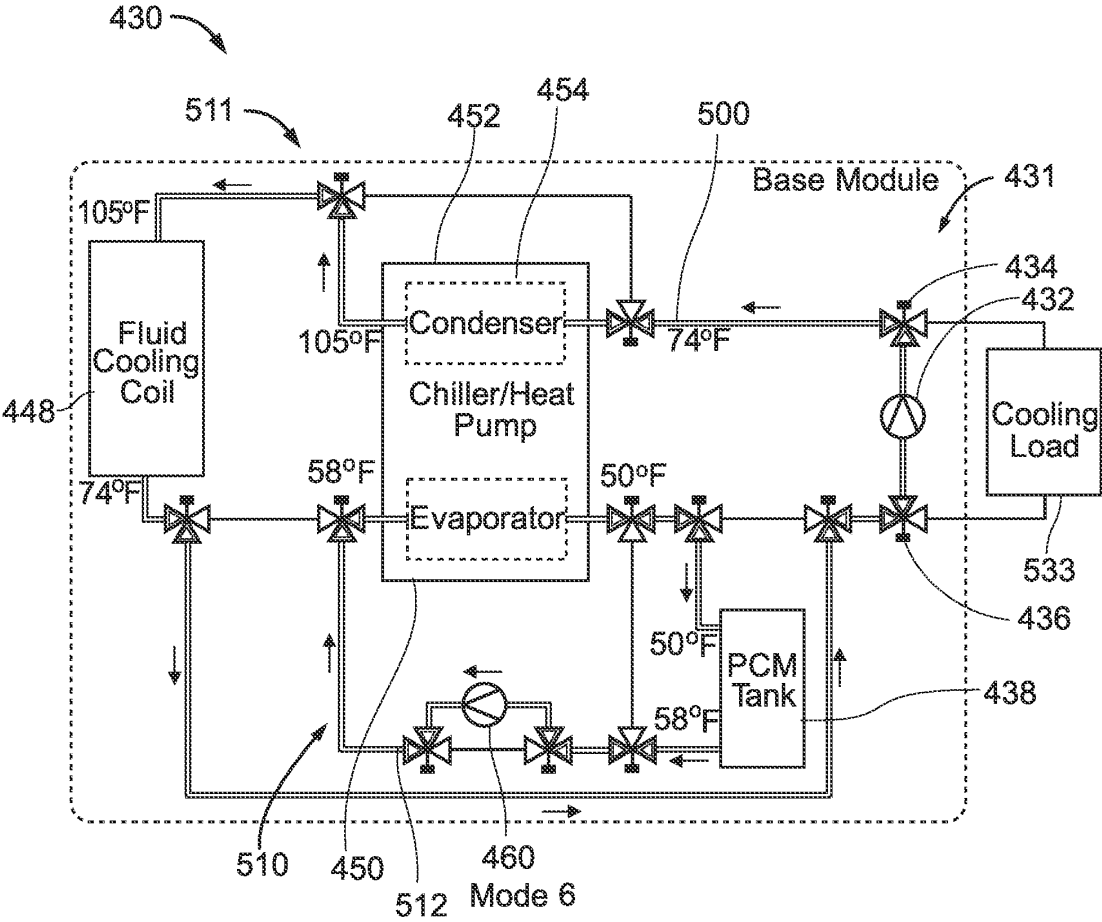


Mode 4

FIG. 17



Mode 5
FIG. 18



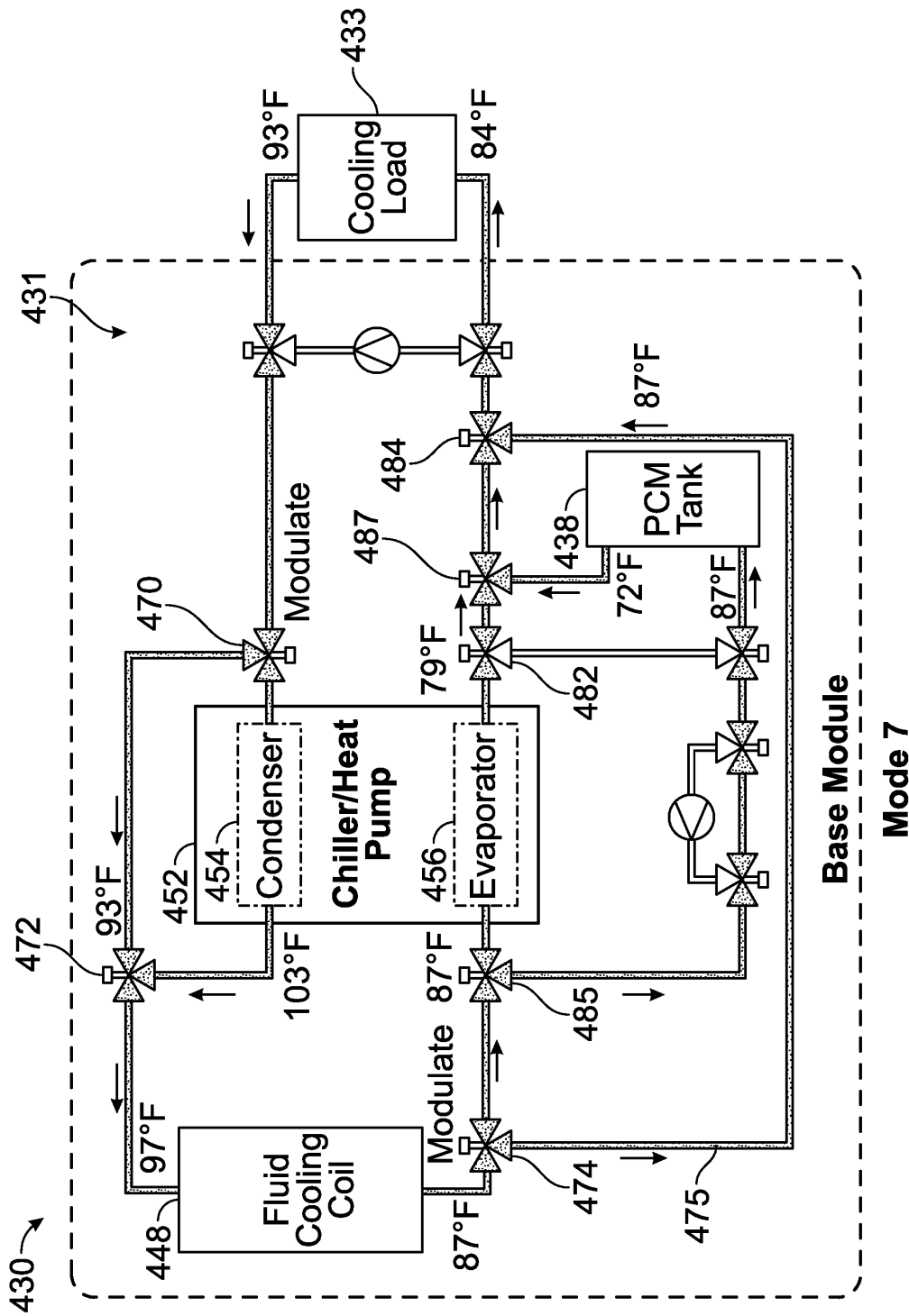
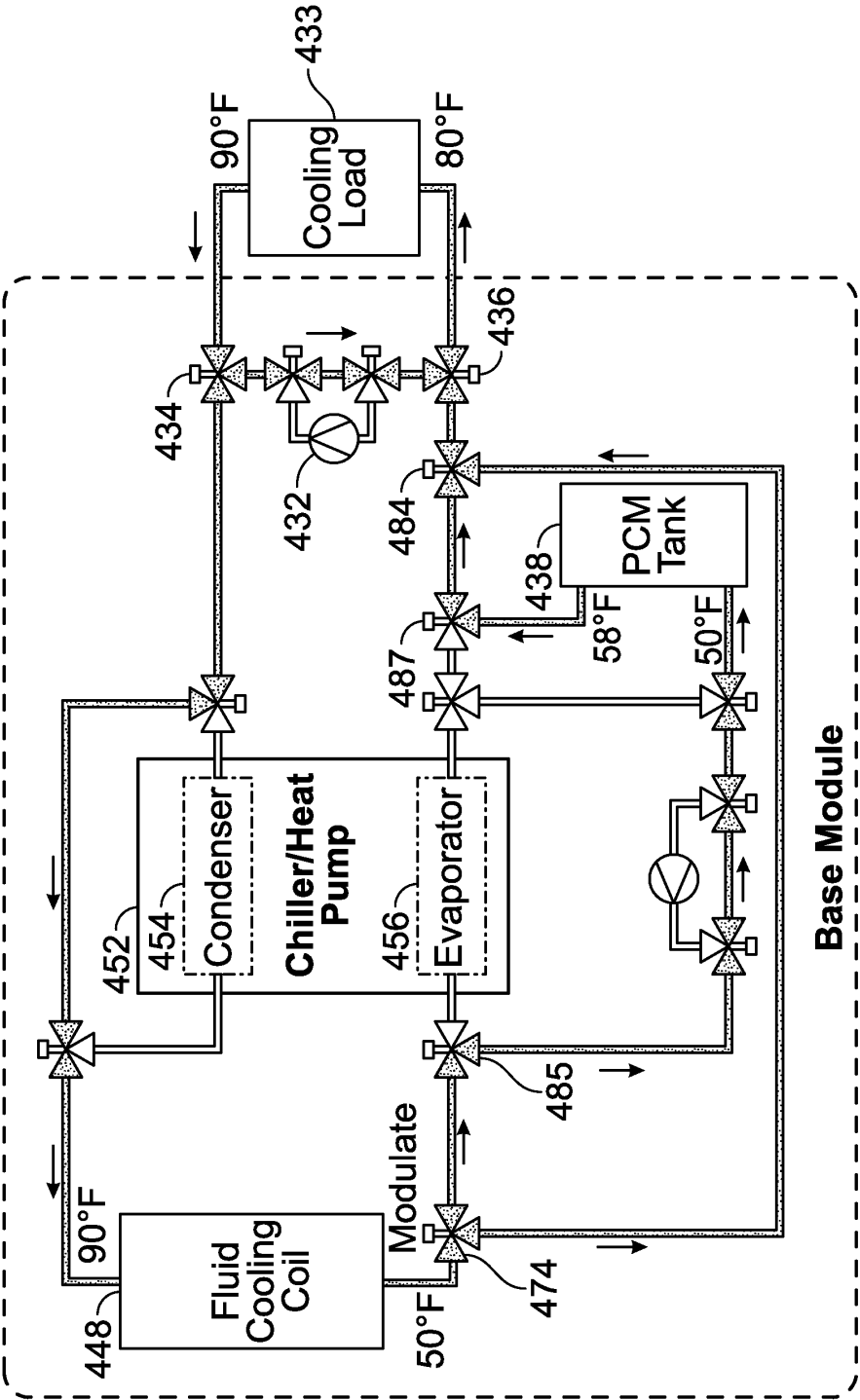
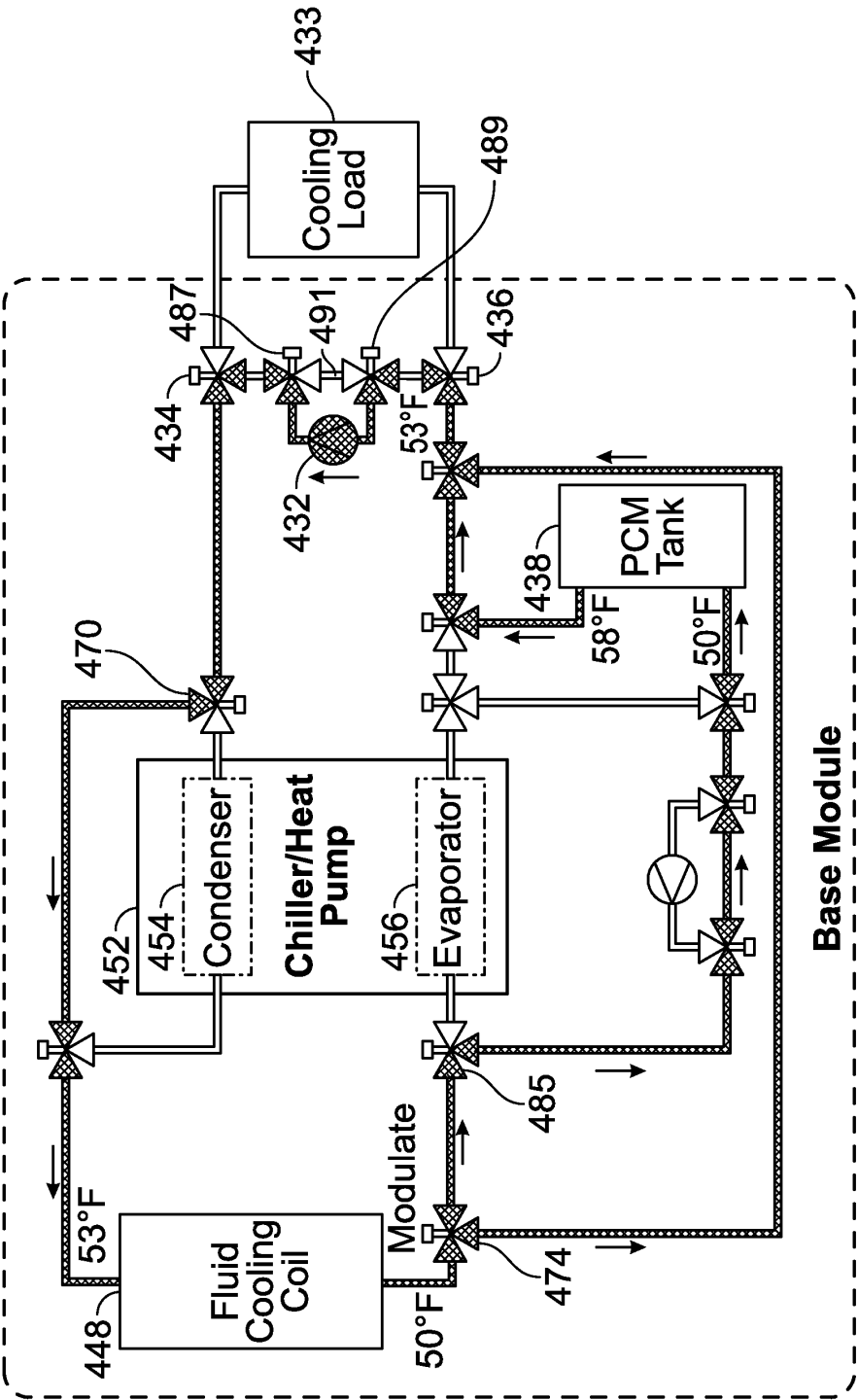


FIG. 19B



Base Module
Mode 8
FIG. 19C



Base Module
Mode 9
FIG. 19D

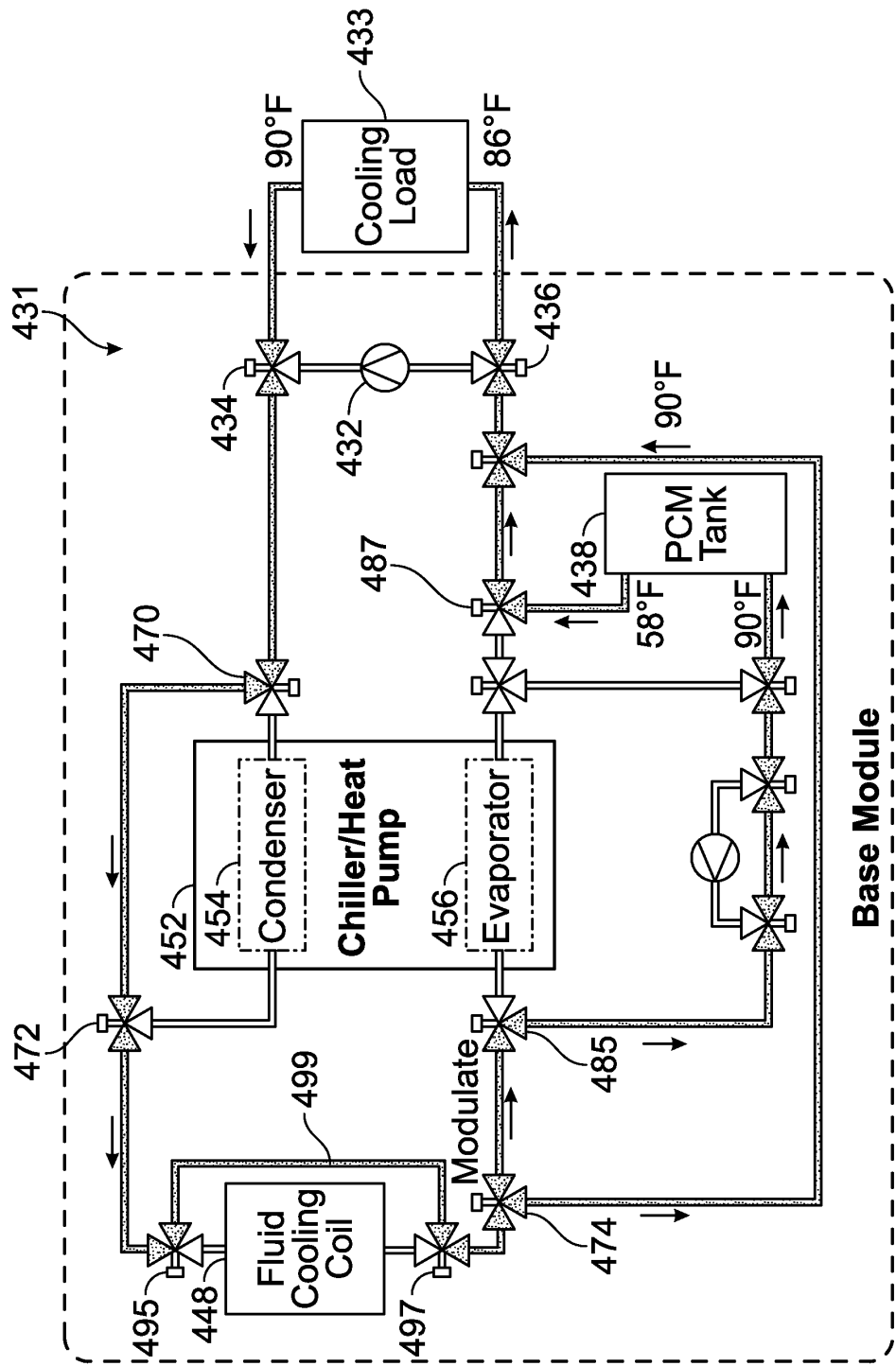


FIG. 19E

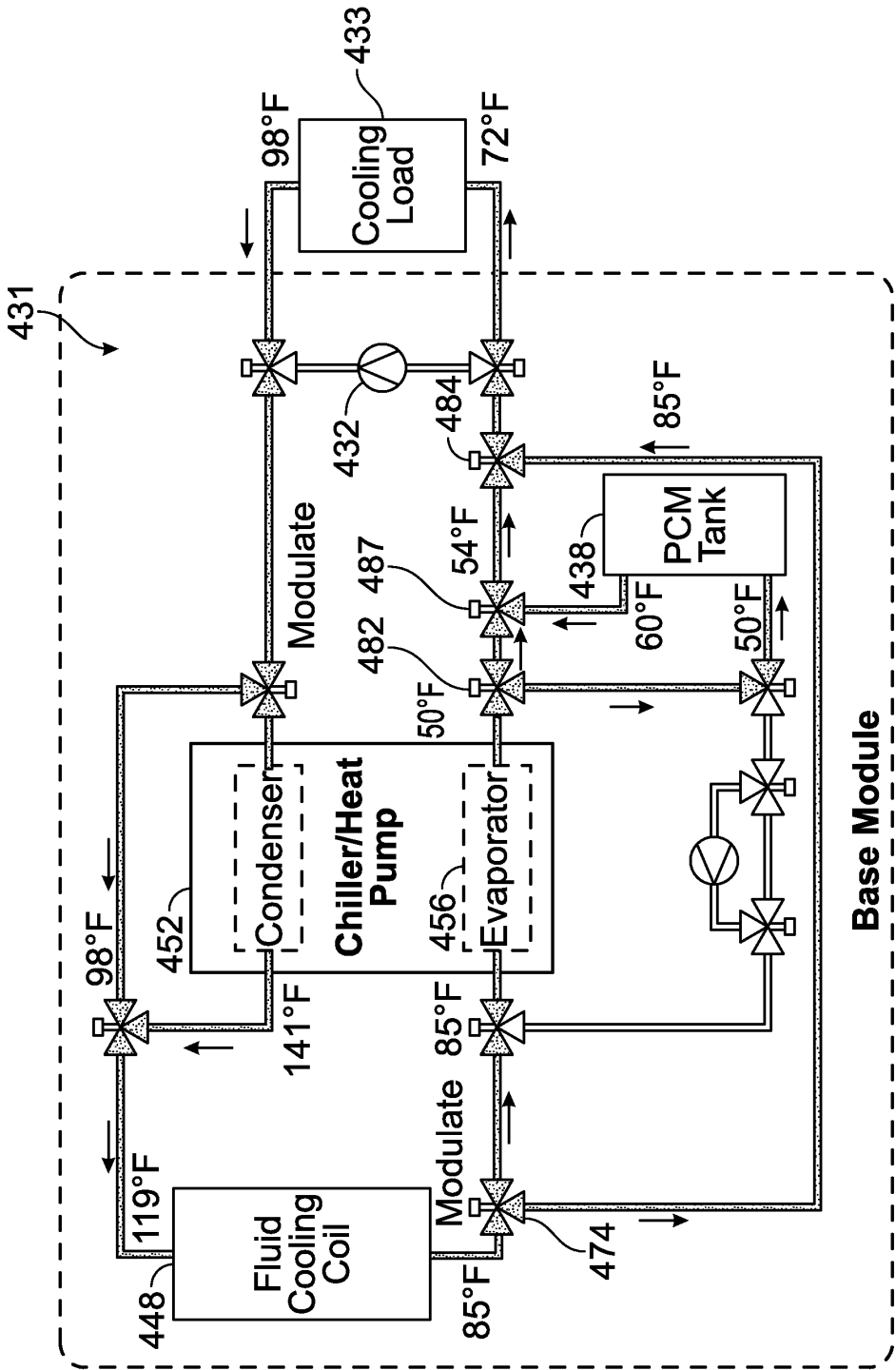
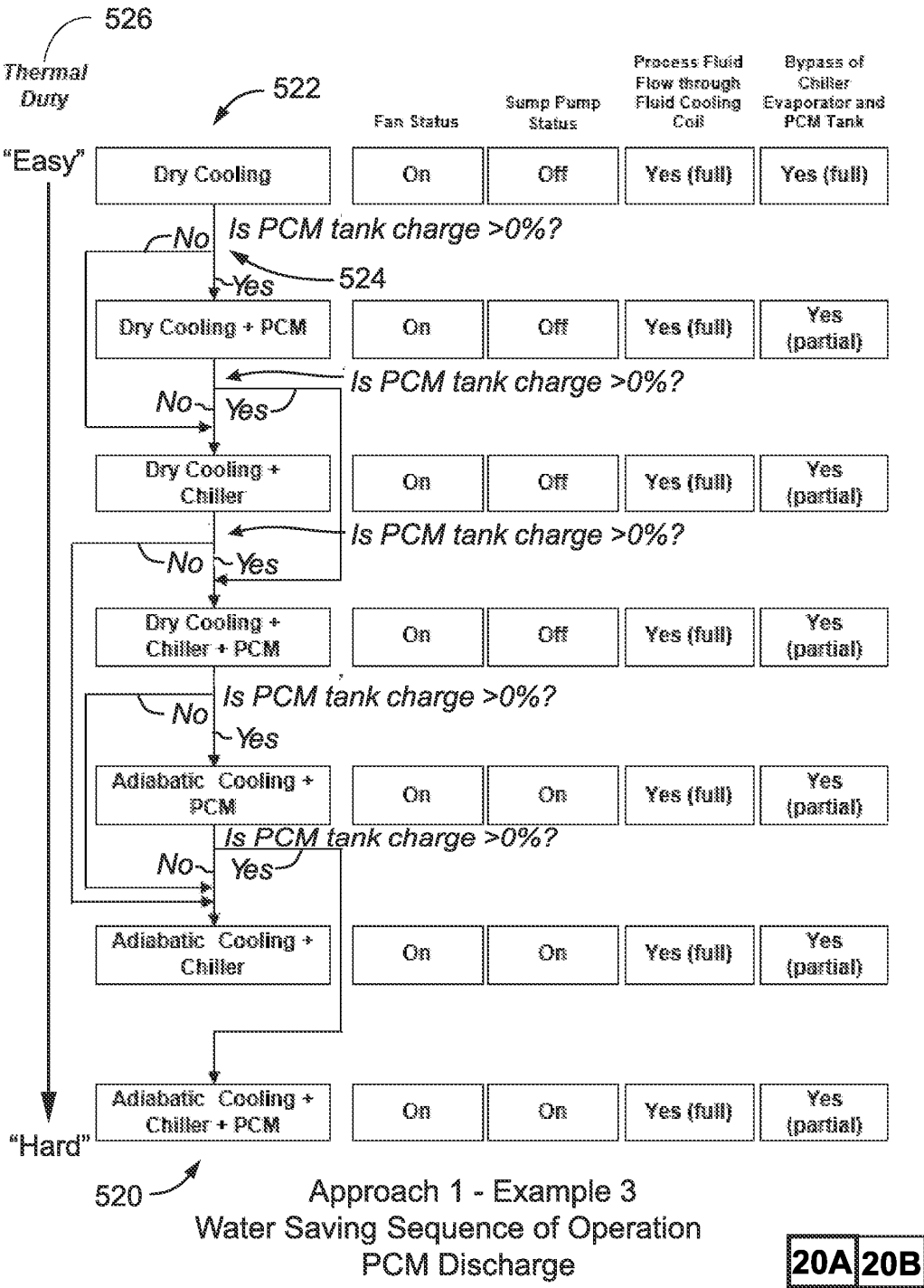


FIG. 19F

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Chiller Status	Primary Closed-Loop Pump Status	Secondary Closed-Loop Pump Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	Off	Off	No	No	No	≥0%	n/a
Off	Off	Off	No	No	Yes (partial)	>0%	Discharge
On	Off	Off	Yes (partial)	Yes (partial)	No	0%	n/a
On	Off	Off	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge
Off	Off	Off	No	No	Yes (partial)	>0%	Discharge
On	Off	Off	Yes (partial)	Yes (partial)	No	0%	n/a
On	Off	Off	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge

Approach 1 - Example 3
Water Saving Sequence of Operation
PCM Discharge

20A 20B

FIG. 20B

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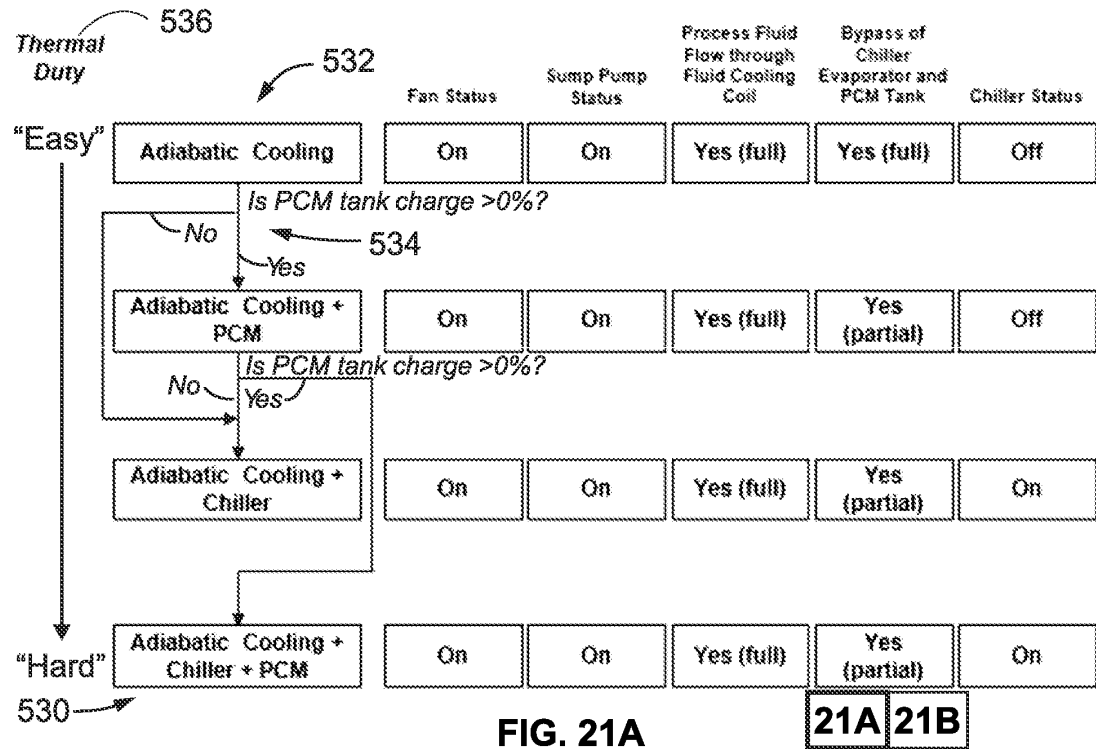


FIG. 21A

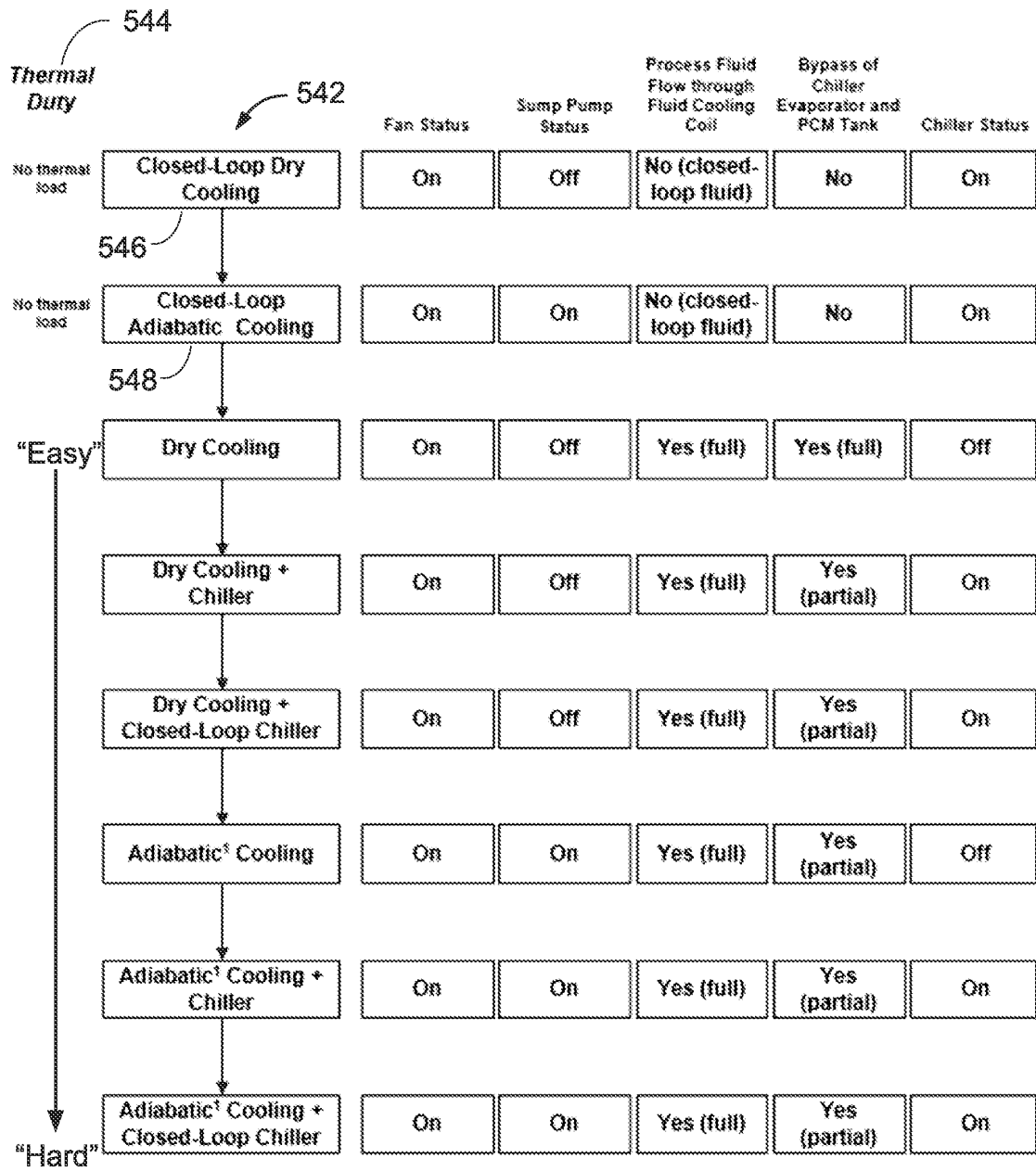
21A 21B

Primary Closed-Loop Pump Status	Secondary Closed-Loop Pump Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
Off	Off	No	No	No	>0%	n/a
Off	Off	No	No	Yes (partial)	>0%	Discharge
Off	Off	Yes (partial)	Yes (partial)	No	0%	n/a
Off	Off	Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge

Approach 1 - Example 3
Energy Saving Sequence of Operation
PCM Discharge

FIG. 21B

21A 21B



540 Approach 1 - Example 3
Water Saving Sequence of Operation
PCM Charge

22A 22B

FIG. 22A

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545

Primary Closed-Loop Pump Status	Secondary Closed-Loop Pump Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
On	On	No (closed-loop fluid)	No (closed-loop fluid)	No (closed-loop fluid)	<100%	Charge
On	On	No (closed-loop fluid)	No (closed-loop fluid)	No (closed-loop fluid)	<100%	Charge
Off	Off	No	No	Yes (partial)	<100%	Charge
Off	Off	Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge
On	Off	No (closed-loop fluid)	No (closed-loop fluid)	No (closed-loop fluid)	<100%	Charge
Off	Off	No	No	Yes (partial)	<100%	Charge
Off	Off	Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge
On	Off	Yes (partial)	No (closed-loop fluid)	No (closed-loop fluid)	<100%	Charge

Approach 1 - Example 3
Water Saving Sequence of Operation
PCM Charge

22A 22B

FIG. 22B

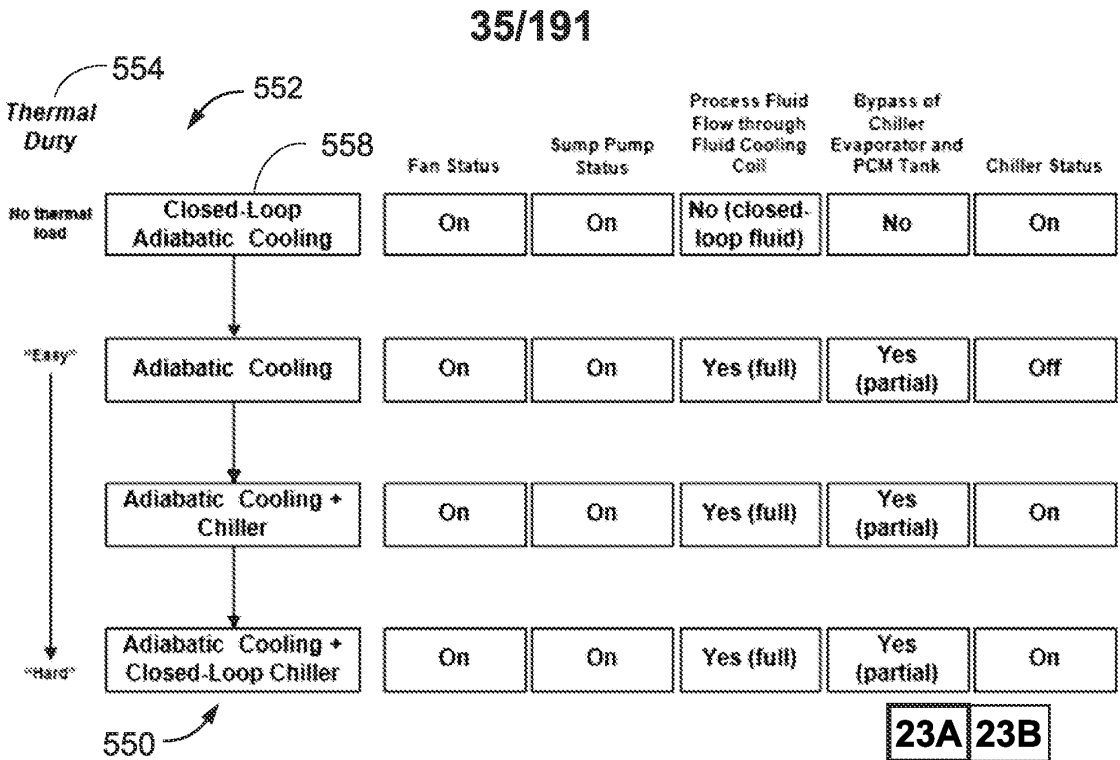


FIG. 23A

556

Primary Closed-Loop Pump Status	Secondary Closed-Loop Pump Status	Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode
On	On	No (closed-loop fluid)	No (closed-loop fluid)	No (closed-loop fluid)	<100%	Charge
Off	Off	No	No	Yes (partial)	<100%	Charge
Off	Off	Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge
On	Off	Yes (partial)	No (closed-loop fluid)	No (closed-loop fluid)	<100%	Charge

Approach 1 - Example 3
Energy Saving Sequence of Operation
PCM Charge

FIG. 23B

23A 23B

		559					559A						23C	23D
457	557						Fan Status	Sump Pump Status	Process Fluid Flow through Fluid Cooling Coil	Bypass of Chiller Evaporator and PCM Tank	Chiller Status	Closed-Loop Pump Status	23E	23F
	Fluid Cooler + Chiller + PCM Charging (Mode 5, dry)	On	Off	Yes (full)	Yes (partial)	On	On	Off	Yes (full)	Yes (partial)	On	On		
	Fluid Cooler + Chiller + PCM Charging (Mode 5, wet)	On	On	Yes (full)	Yes (partial)	On	On	On	Yes (full)	Yes (partial)	On	On		
	Fluid Cooler Only (Mode 1, dry)	On	Off	Yes (full)	Yes (full)	On	On	Off	Yes (full)	Yes (full)	Off	Off		
	Fluid Cooler + PCM Discharging (Mode 3, dry)	On	Off	Yes (full)	Yes (full)	On	On	Off	Yes (full)	Yes (full)	Off	Off		
	Fluid Cooler + Chiller (Mode 2, dry)	On	Off	Yes (full)	Yes (partial)	On	On	Off	Yes (full)	Yes (partial)	On	Off		
	Fluid Cooler + Chiller + PCM Discharging (Mode 4, dry)	On	Off	Yes (full)	Yes (partial)	On	On	Off	Yes (full)	Yes (partial)	On	Off		
	Fluid Cooler + Chiller + PCM Discharging (Mode 7, dry)	On	Off	Yes (full)	Yes (partial)	On	On	Off	Yes (full)	Yes (partial)	On	Off		
	Fluid Cooler Only (Mode 1, wet)	On	On	Yes (full)	Yes (full)	On	On	On	Yes (full)	Yes (full)	Off	Off		
	Fluid Cooler + PCM Discharging (Mode 3, wet)	On	On	Yes (full)	Yes (full)	On	On	On	Yes (full)	Yes (full)	Off	Off		
	Fluid Cooler + Chiller (Mode 2, wet)	On	On	Yes (full)	Yes (partial)	On	On	On	Yes (full)	Yes (partial)	On	Off		
	Fluid Cooler + Chiller + PCM Discharging (Mode 4, wet)	On	On	Yes (full)	Yes (partial)	On	On	On	Yes (full)	Yes (partial)	On	Off		
	Fluid Cooler + Chiller + PCM Discharging (Mode 7, wet)	On	On	Yes (full)	Yes (partial)	On	On	On	Yes (full)	Yes (partial)	On	Off		

23C	23D
23E	23F

FIG. 23C

457

559				559A	
Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode	Pump (for No-Heat-Load) Status
Yes (partial)	No (closed-loop)	No (closed-loop)	<100%	Charge	Off
Yes (partial)	No (closed-loop)	No (closed-loop)	<100%	Charge	Off
No	No	No	≥0%	n/a	Off
No	No	Yes (partial)	>0%	Discharge	Off
Yes (partial)	Yes (partial)	No	0%	n/a	Off
Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge	Off
Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge	Off
No	No	No	≥0%	n/a	Off
No	No	Yes (partial)	>0%	Discharge	Off
Yes (partial)	Yes (partial)	No	0%	n/a	Off
Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge	Off
Yes (partial)	Yes (partial)	Yes (partial)	>0%	Discharge	Off

23C23D23E23F

FIG. 23D

457	557	559							
			Fan Status	Sump Pump Status	Process Fluid Flow through Fluid Cooling Coil	Bypass of Chiller Evaporator and PCM Tank	Chiller Status	Closed-Loop Pump Status	
	Fluid Cooler + PCM Charging (Mode 8, dry)	On	Off	Yes (full)	Yes (full)	Off	Off	Off	23C 23D
	Fluid Cooler + PCM Charging (Mode 8, wet)	On	On	Yes (full)	Yes (full)	Off	Off	Off	
	Fluid Cooler + PCM Charging When No Heat Load (Mode 9, dry)	On	Off	Yes (full)	Yes (full)	Off	Off	Off	
	Fluid Cooler + PCM Charging When No Heat Load (Mode 9, wet)	On	On	Yes (full)	Yes (full)	Off	Off	Off	
	Fluid Cooler + Chiller + PCM Charging When No Heat Load (Mode 6, dry)	On	Off	Yes (full)	Yes (partial)	On	On	On	
	Fluid Cooler + Chiller + PCM Charging When No Heat Load (Mode 6, wet)	On	On	Yes (full)	Yes (partial)	On	On	On	
	PCM Discharging (Mode 10)	Off	Off	No	Yes (full)	Off	Off	Off	23E 23F
	Fluid Cooler + Chiller + PCM Charging (Mode 11, dry)	On	Off	Yes (full)	Yes (partial)	On	On	Off	
	Fluid Cooler + Chiller + PCM Charging (Mode 11, wet)	On	On	Yes (full)	Yes (partial)	On	On	Off	

FIG. 23E

457

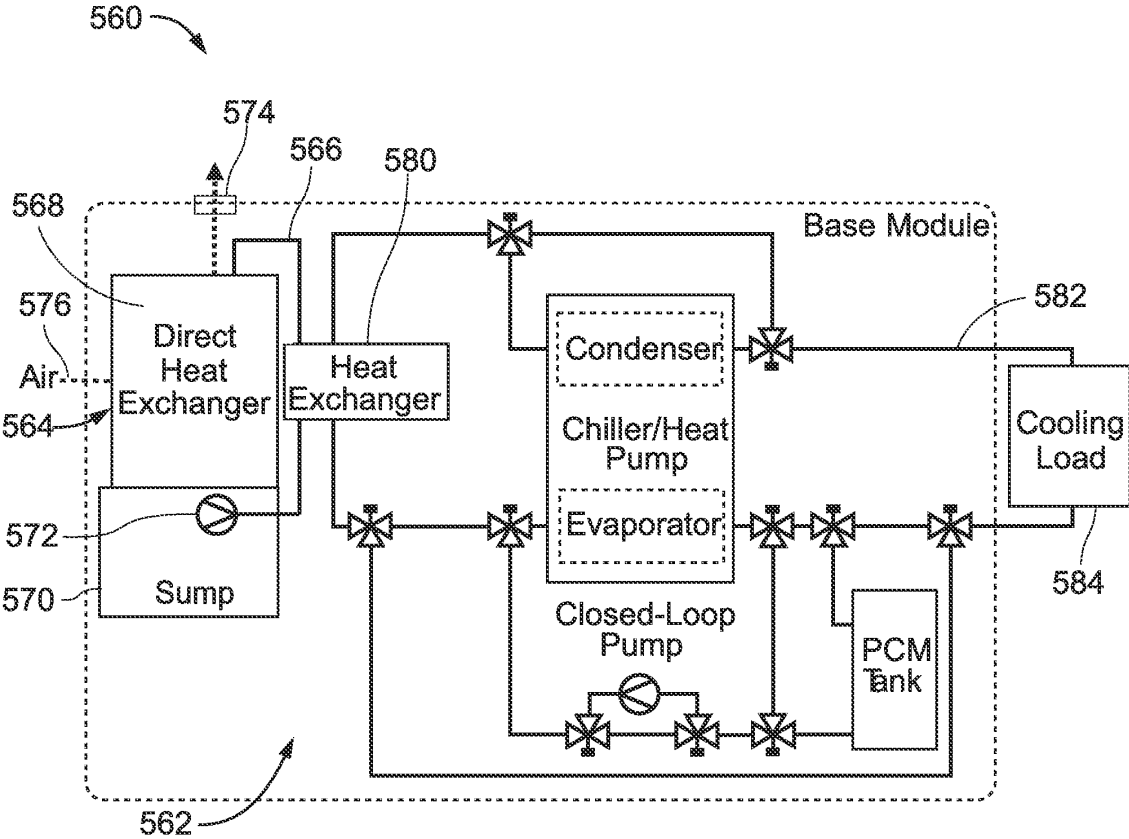
559

Process Fluid Flow through Chiller Condenser	Process Fluid Flow through Chiller Evaporator	Process Fluid Flow through PCM Tank	PCM Tank Charge	PCM Tank Mode	Pump (for No-Heat-Load) Status
No	No	Yes (partial)	<100%	Charge	Off
No	No	Yes (partial)	<100%	Charge	Off
No	No	No (closed-loop)	<100%	Charge	On
No	No	No (closed-loop)	<100%	Charge	On
No (closed-loop)	No (closed-loop)	No (closed-loop)	<100%	Charge	On
No (closed-loop)	No (closed-loop)	No (closed-loop)	<100%	Charge	On
No	No	Yes (partial)	>0%	Discharge	Off
Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge	Off
Yes (partial)	Yes (partial)	Yes (partial)	<100%	Charge	Off

23C23D23E23F

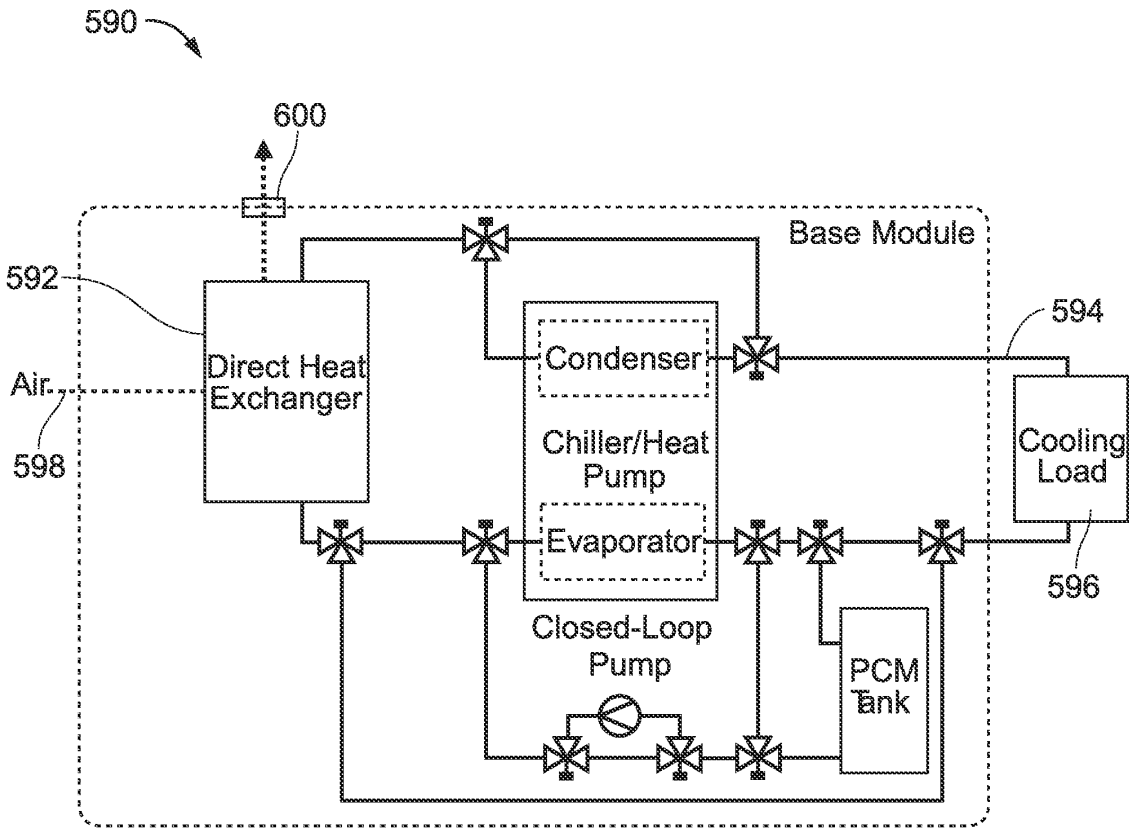
FIG. 23F

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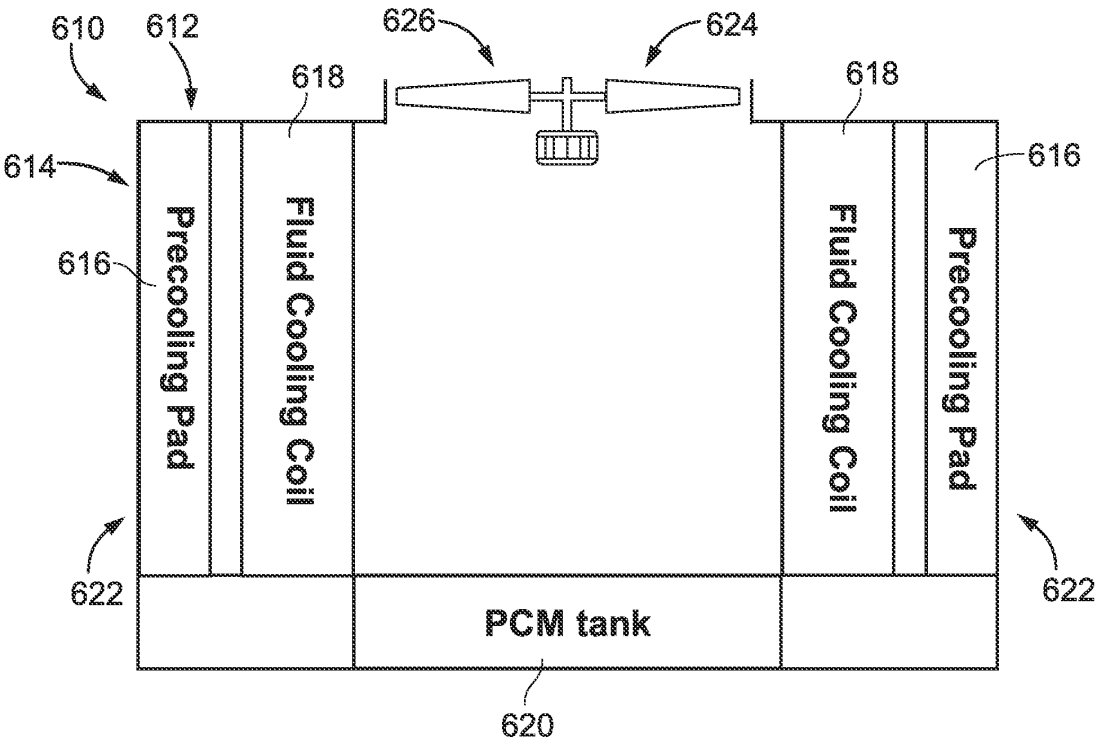
Approach 1 – Example 4

FIG. 24



Approach 1 – Example 5
FIG. 25

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Approach 2
FIG. 26

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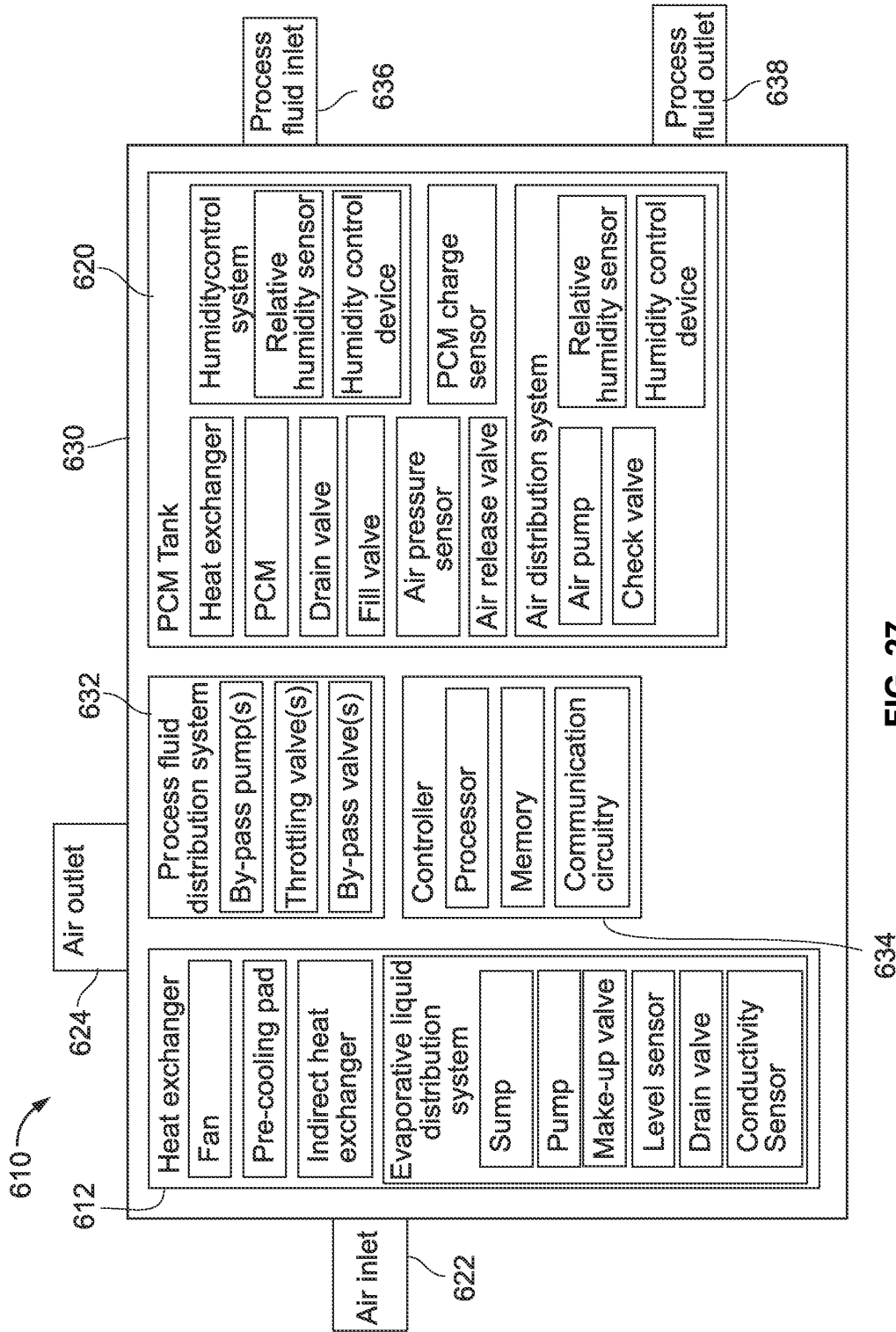


FIG. 27

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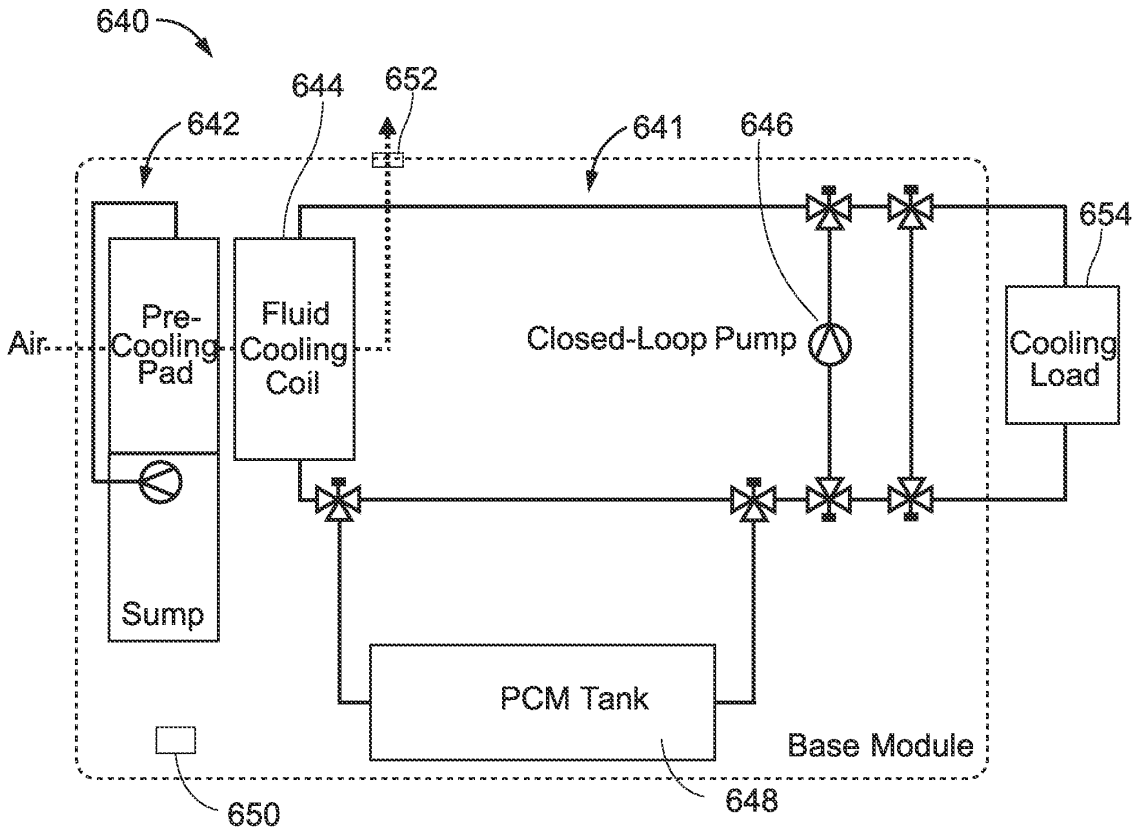


FIG. 28

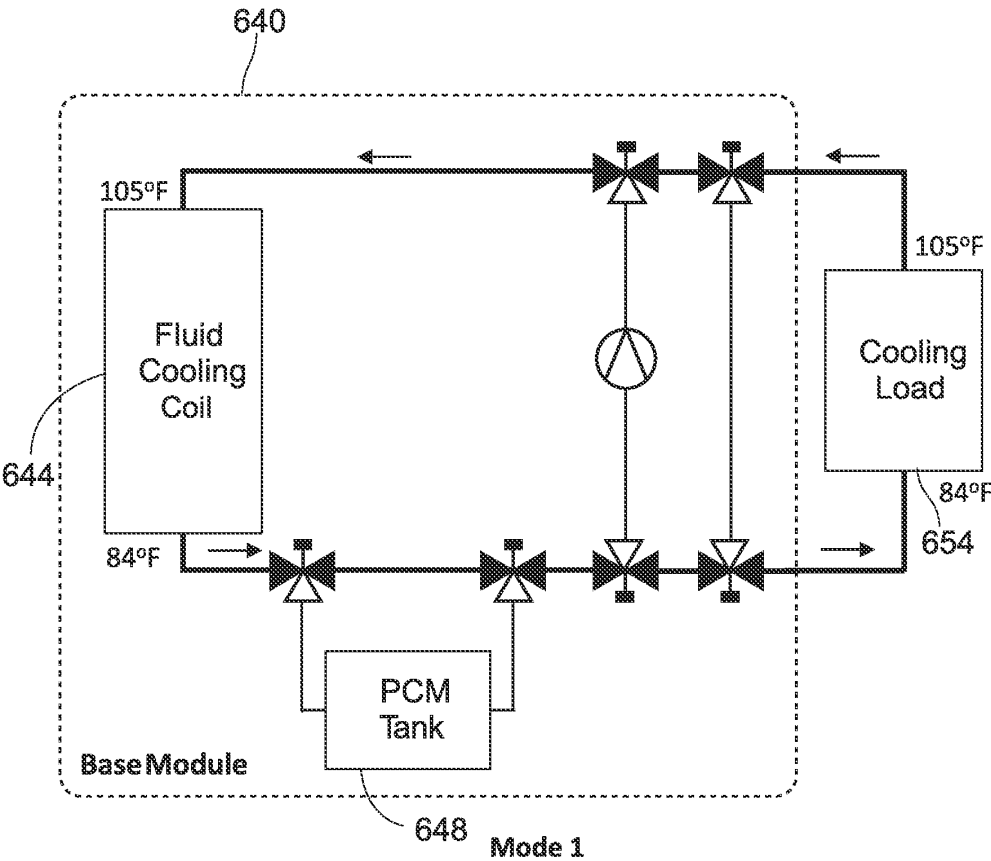


FIG. 29

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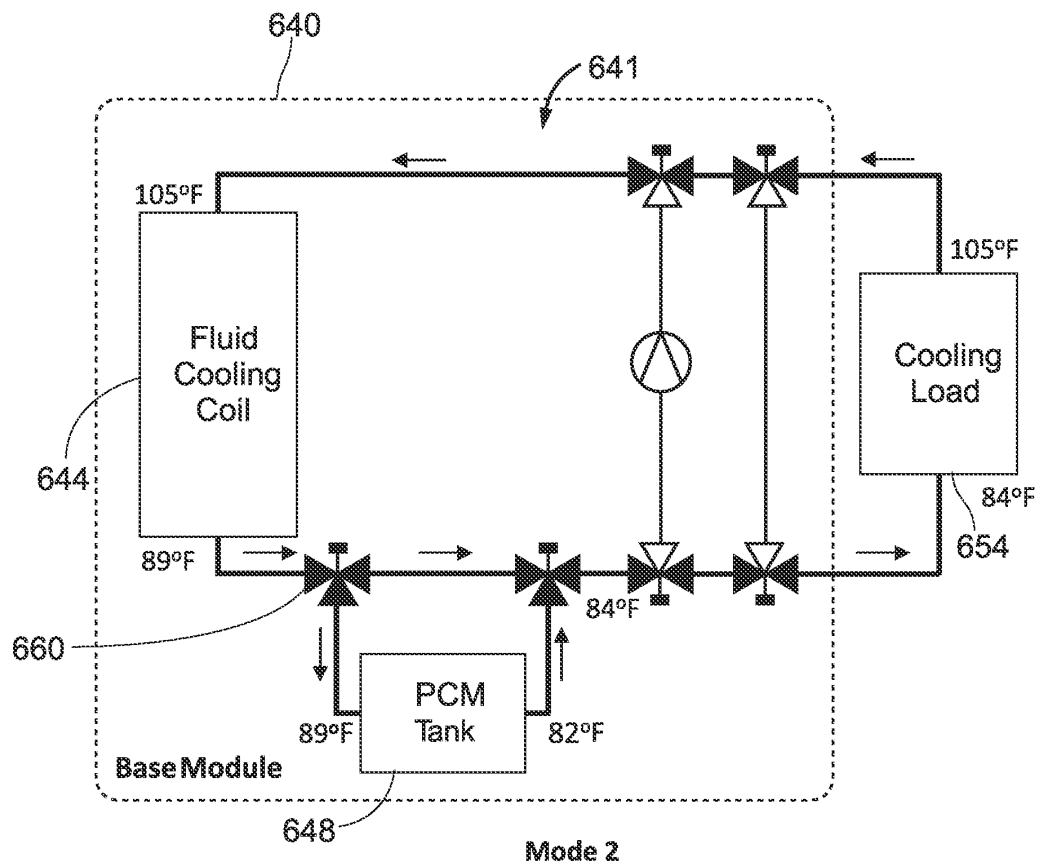
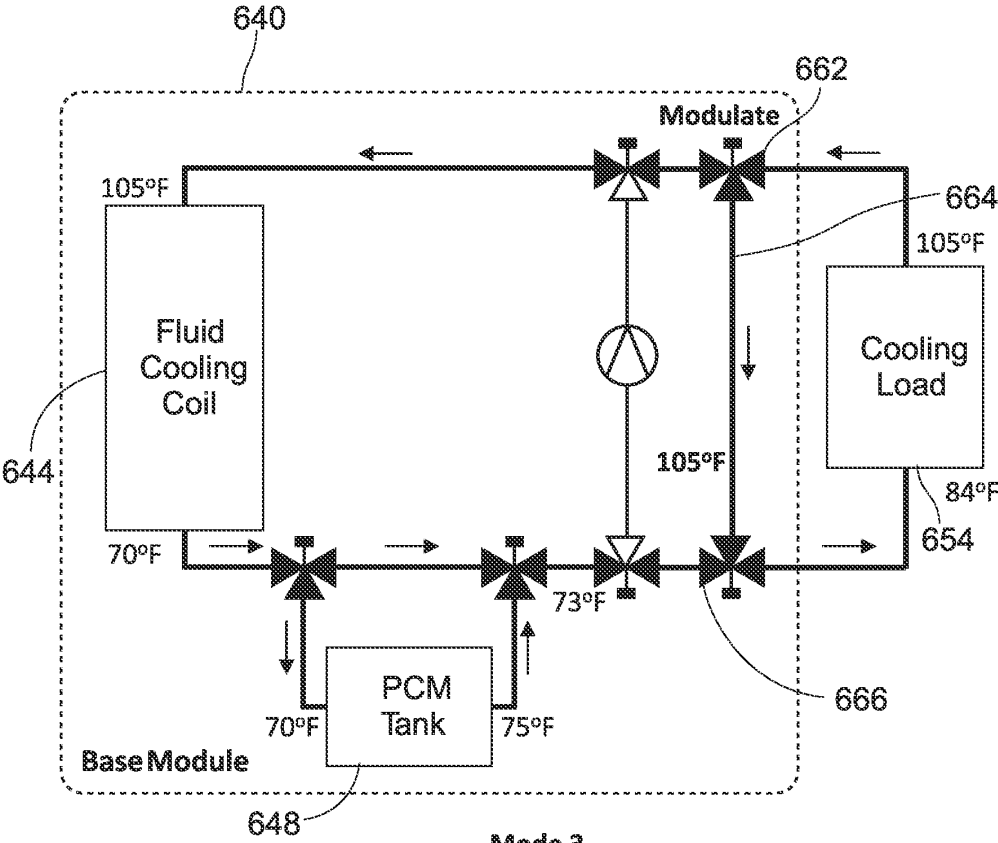
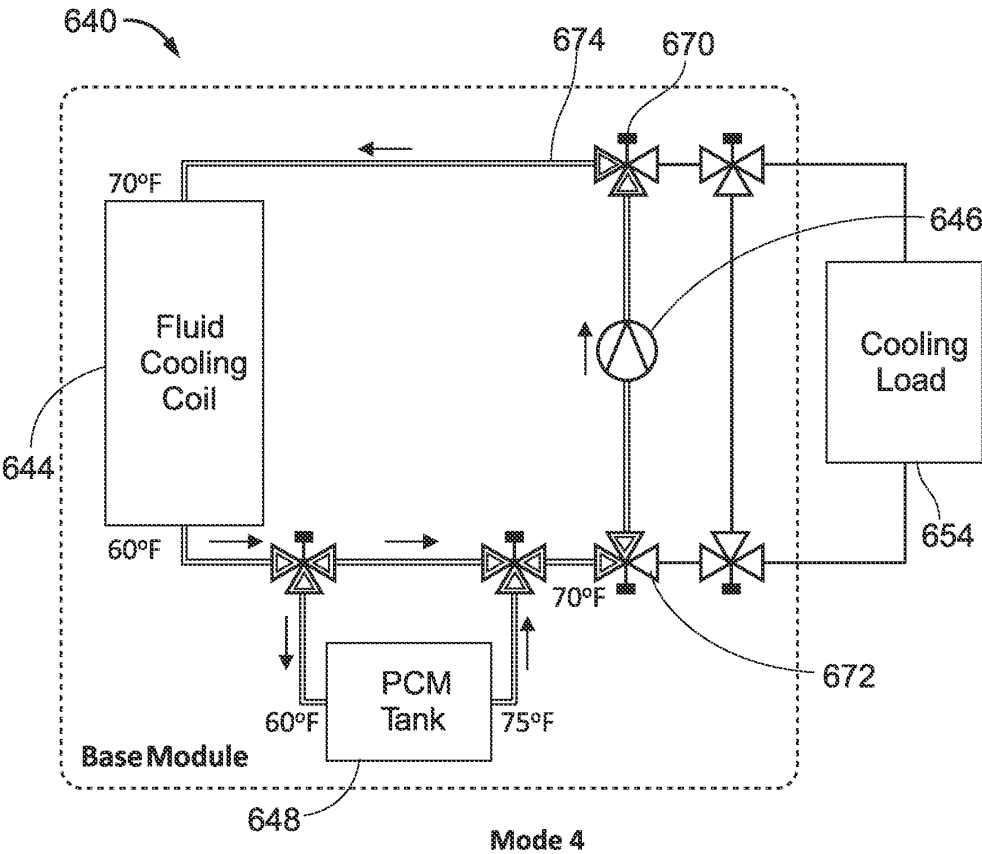


FIG. 30



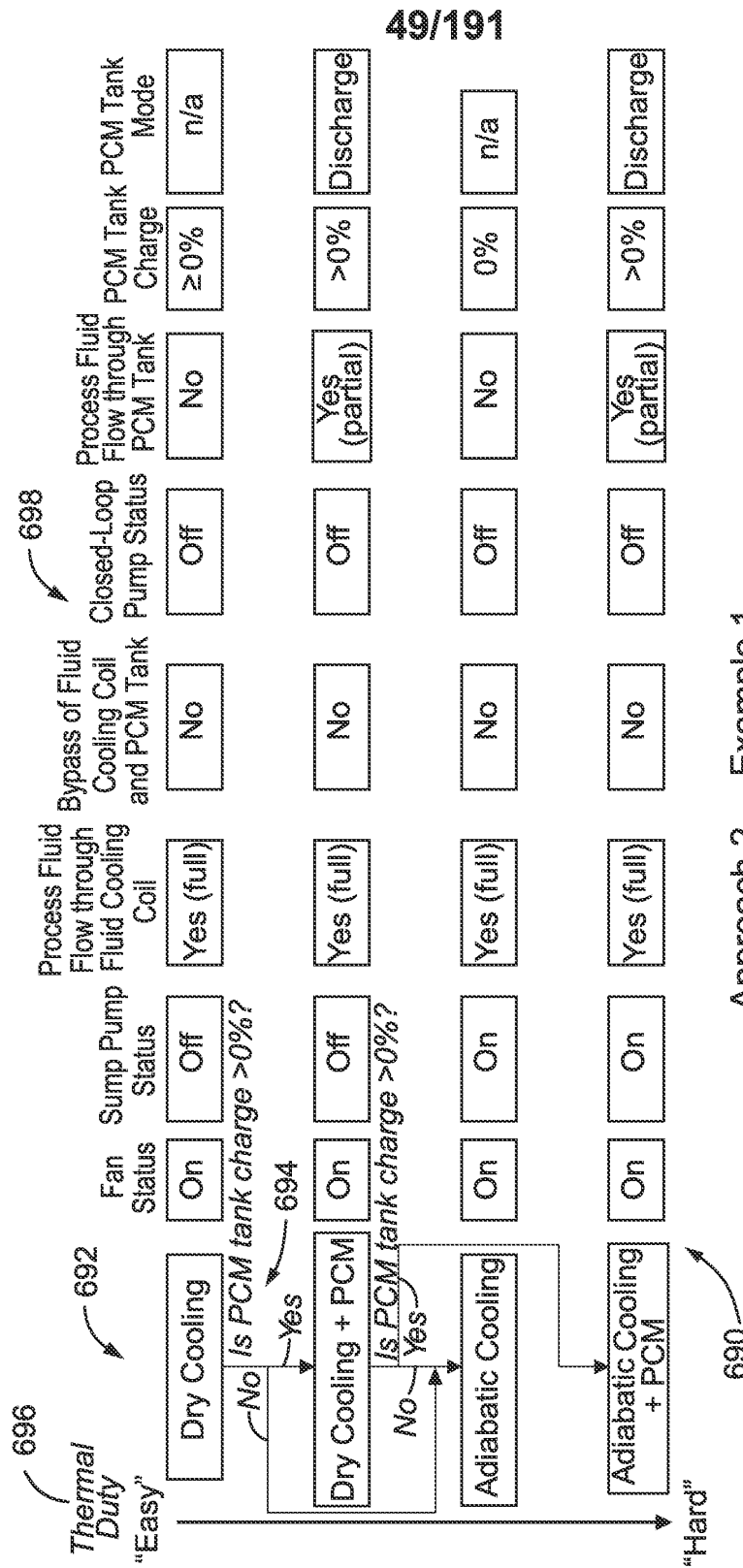
Mode 3

FIG. 31



Mode 4

FIG. 32



Approach 2 --- Example 1

FIG. 33

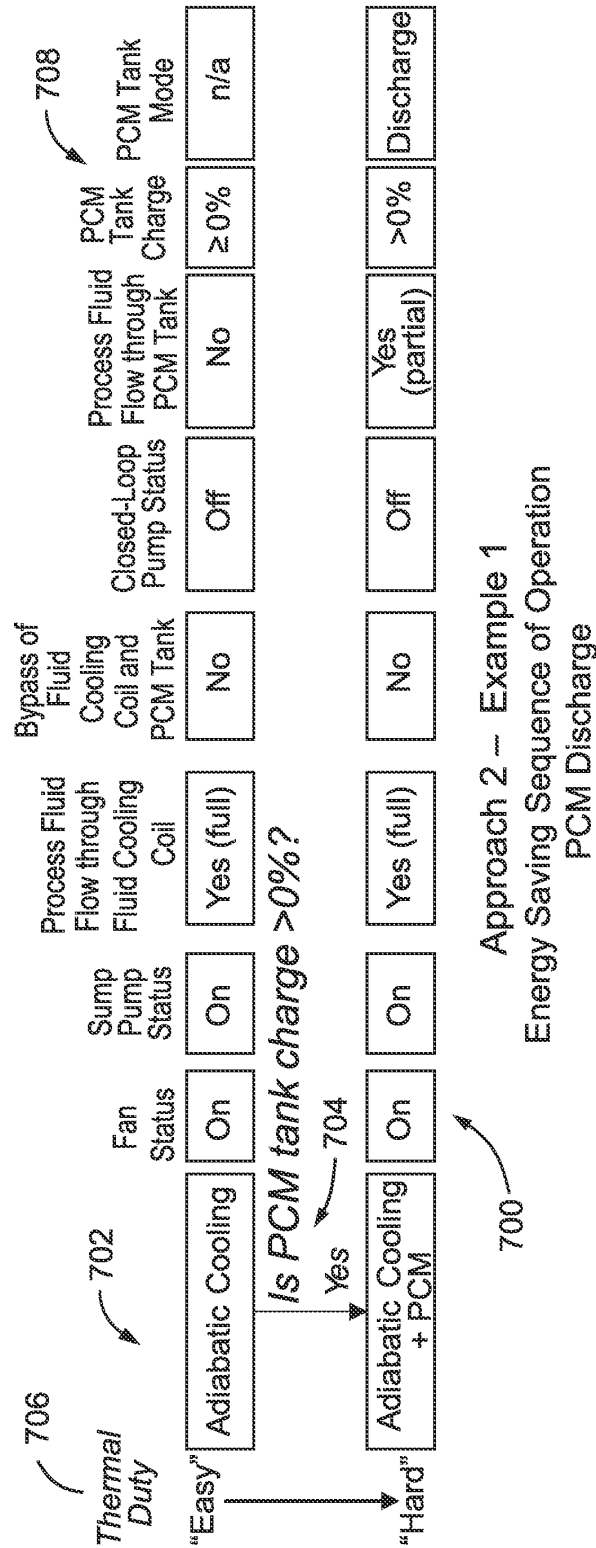
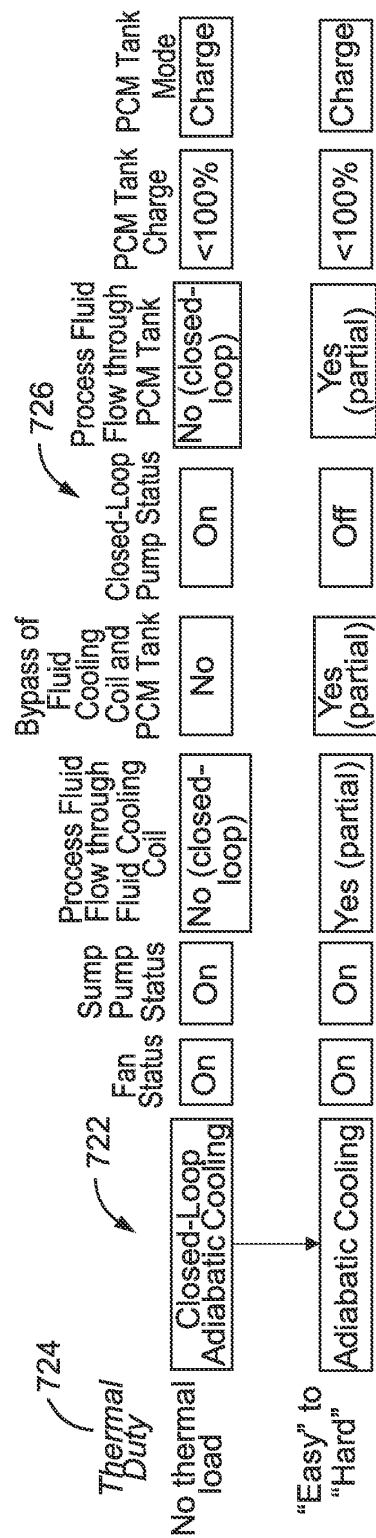


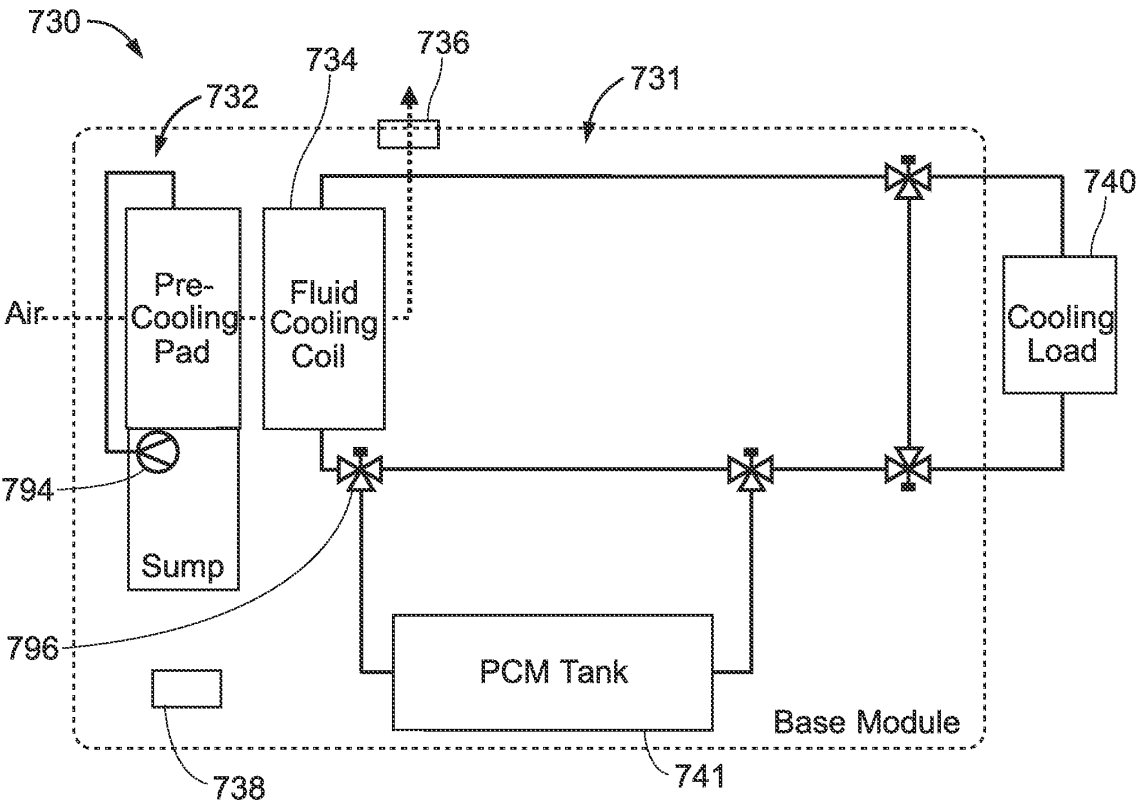
FIG. 34



Approach 2 – Example 1
Energy Saving Sequence of Operation
PCM Charge

FIG. 36

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Approach 2 – Example 2

FIG. 37

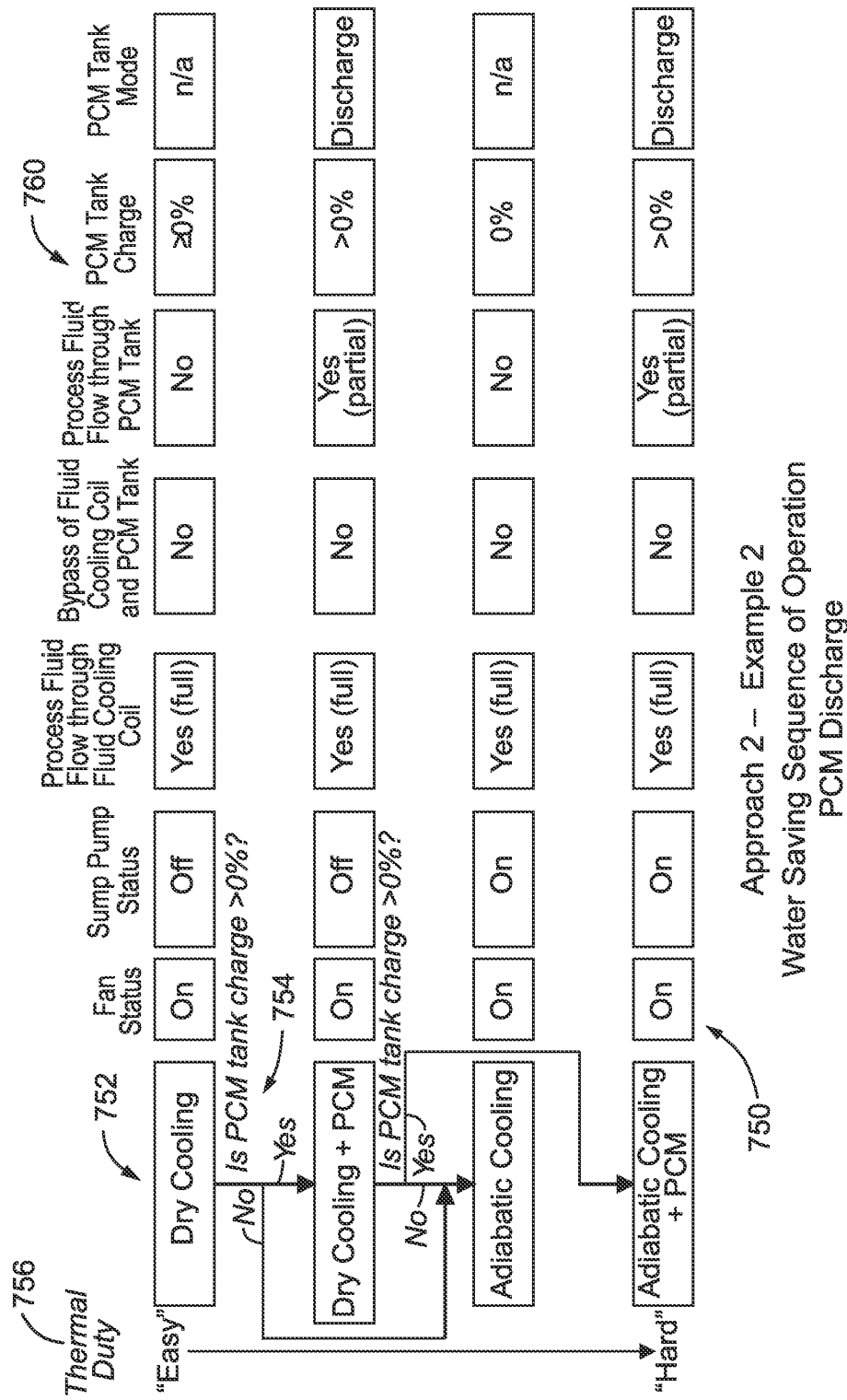


FIG. 38

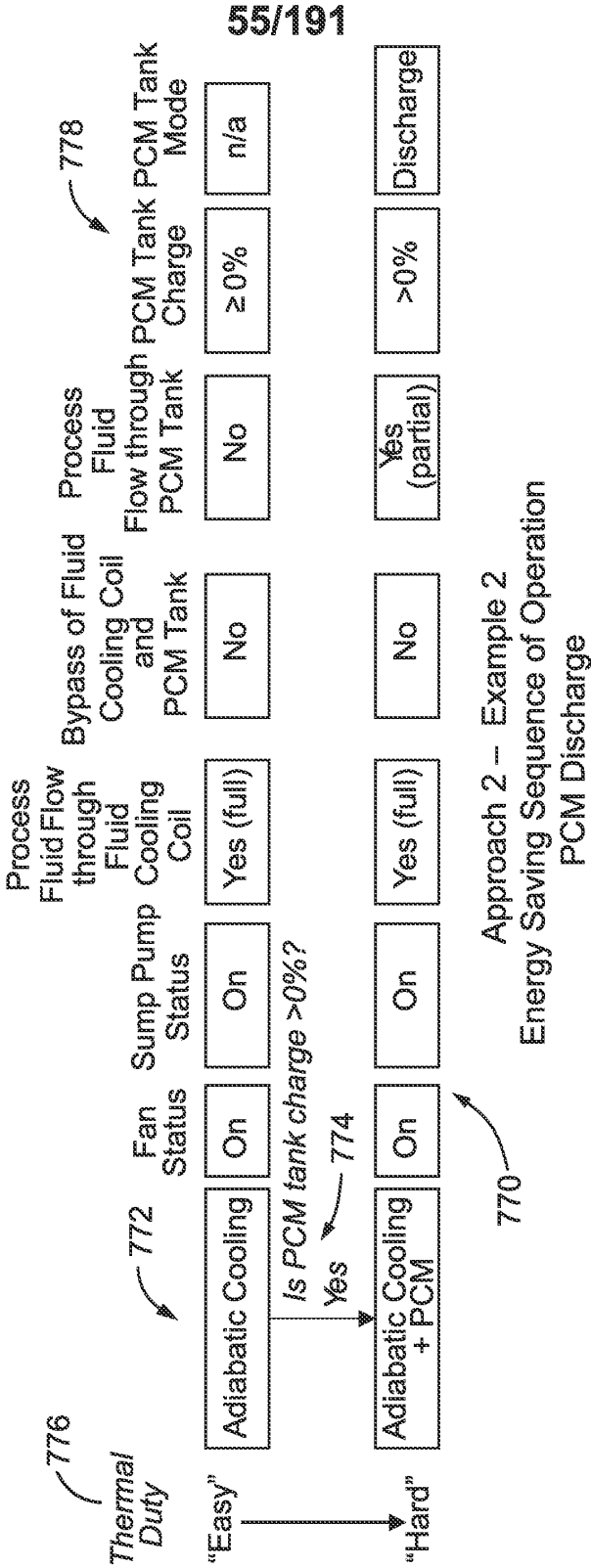


FIG. 39

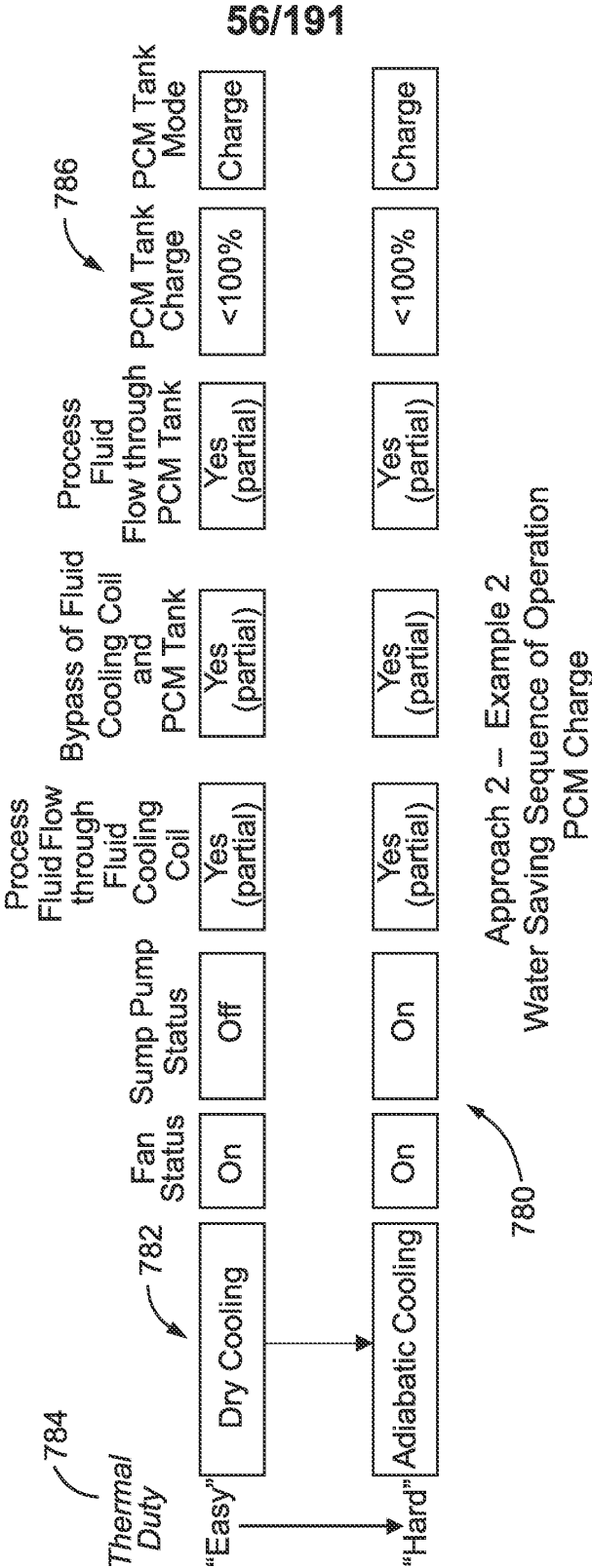
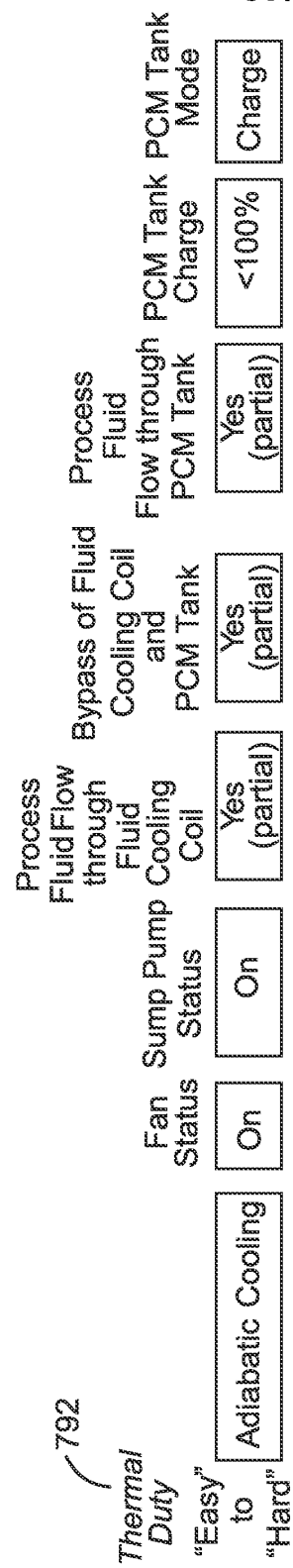


FIG. 40

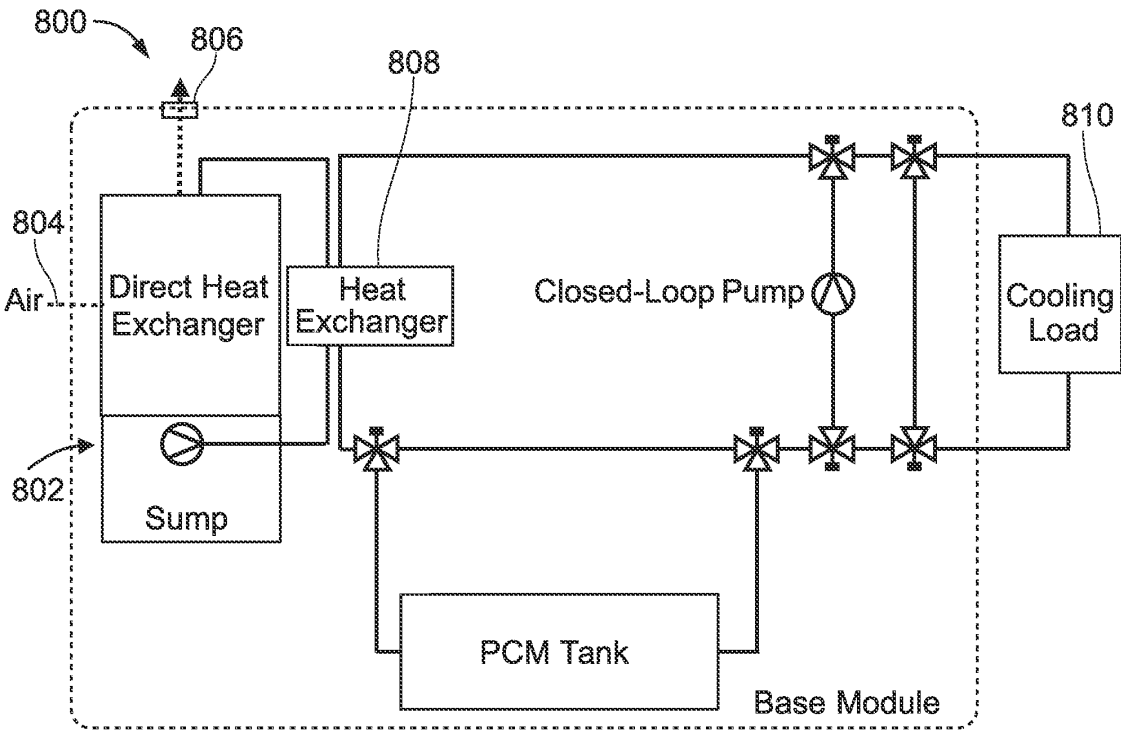


Approach 2 -- Example 2

FIG. 41

067

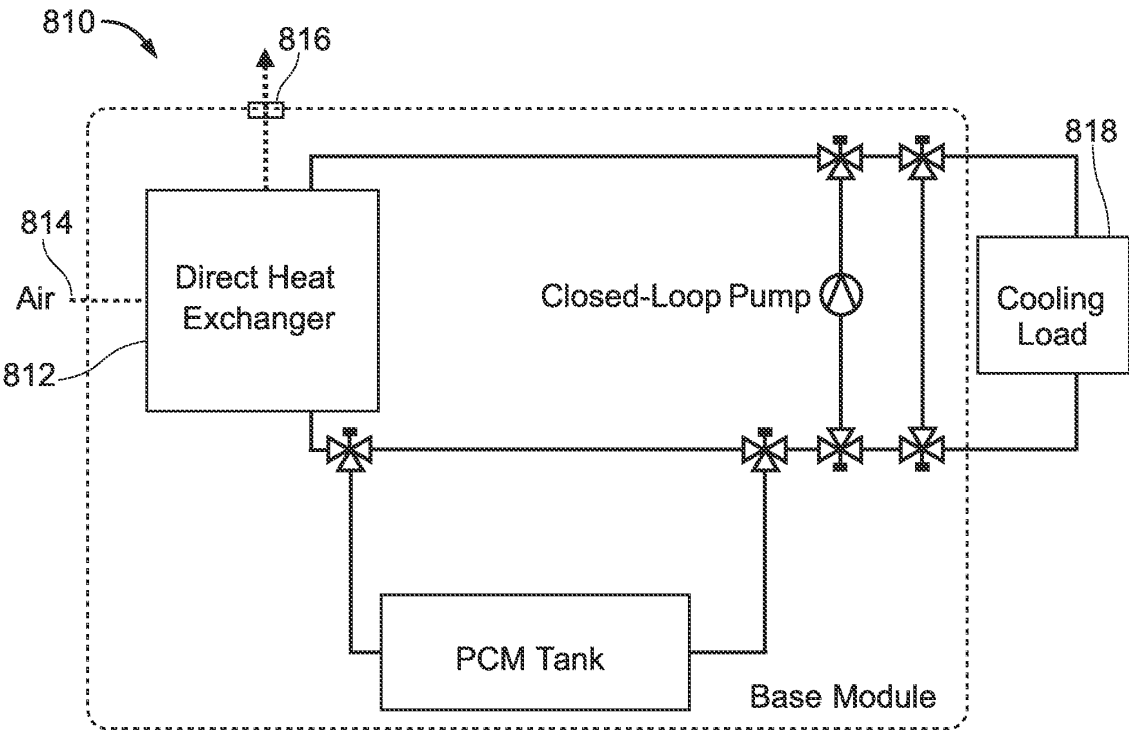
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Approach 2 –Example 3

FIG. 42

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Approach 2 – Example 4

FIG. 43

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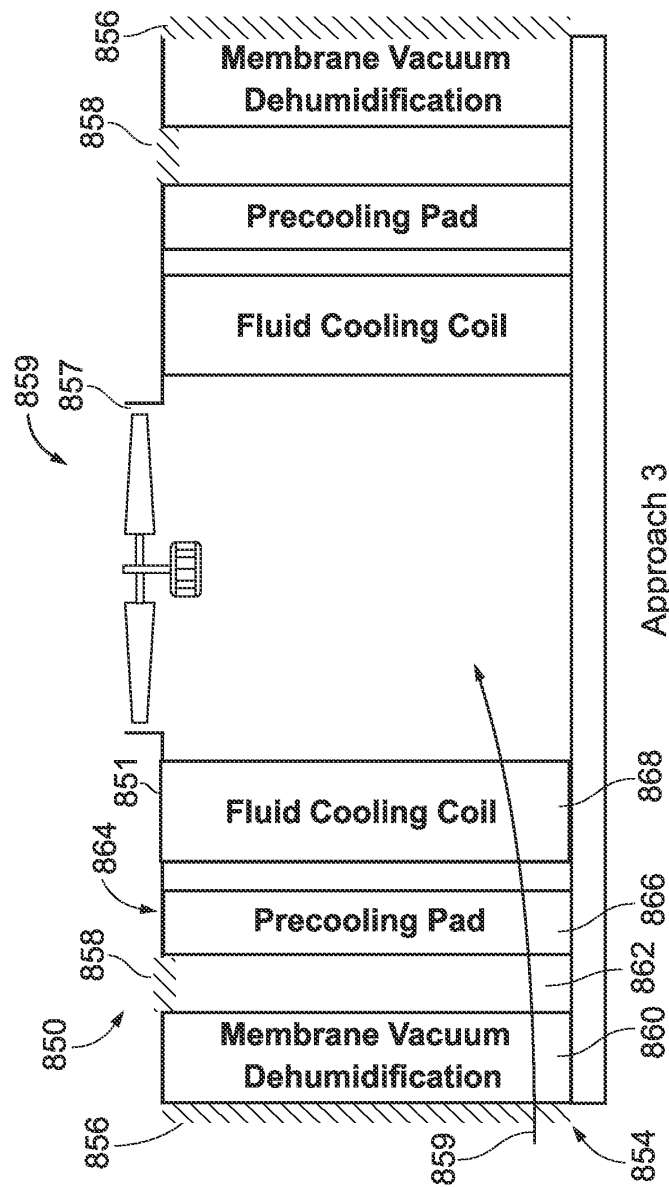
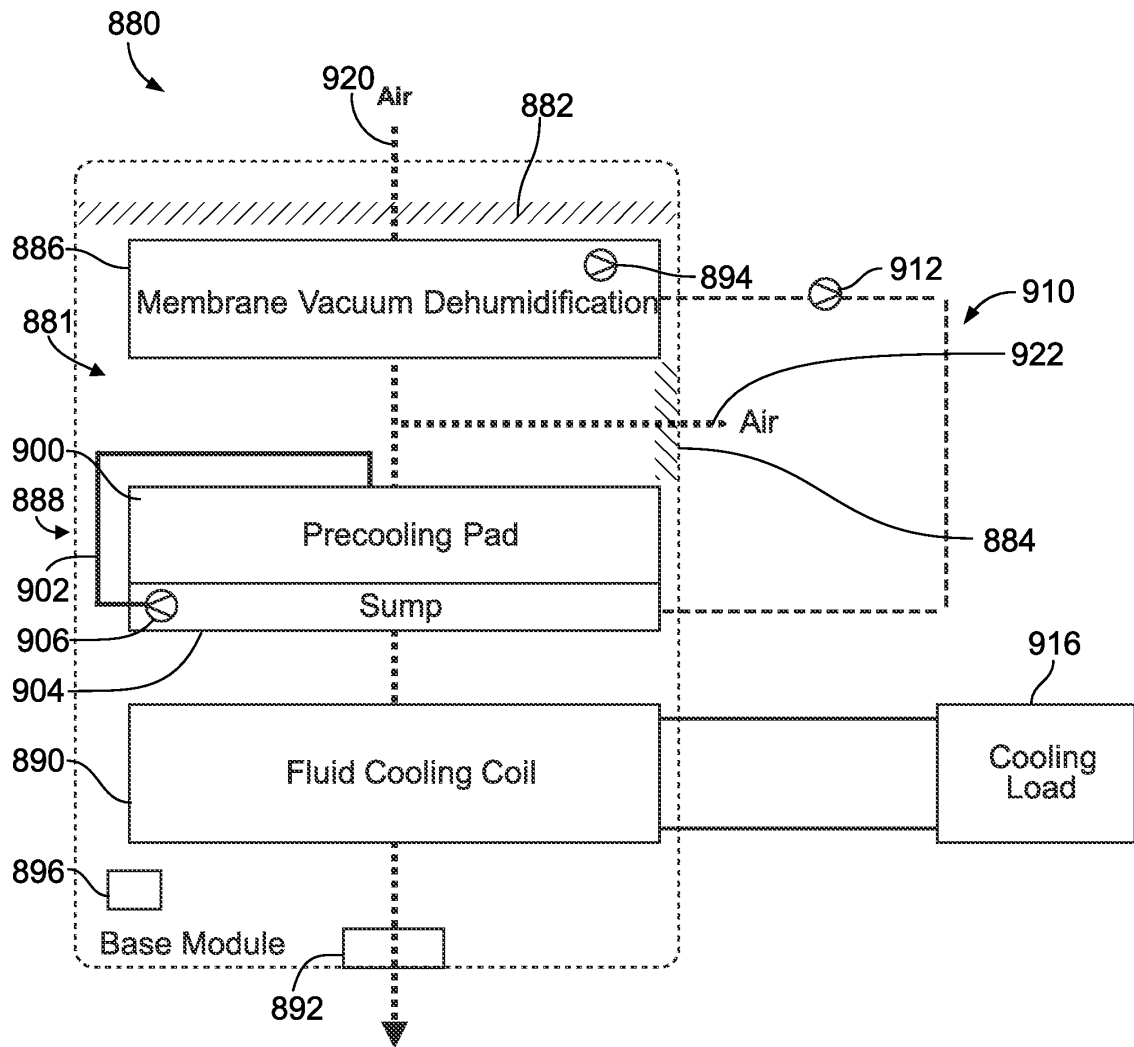


FIG. 44

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Approach 3 – Example 1
FIG. 45

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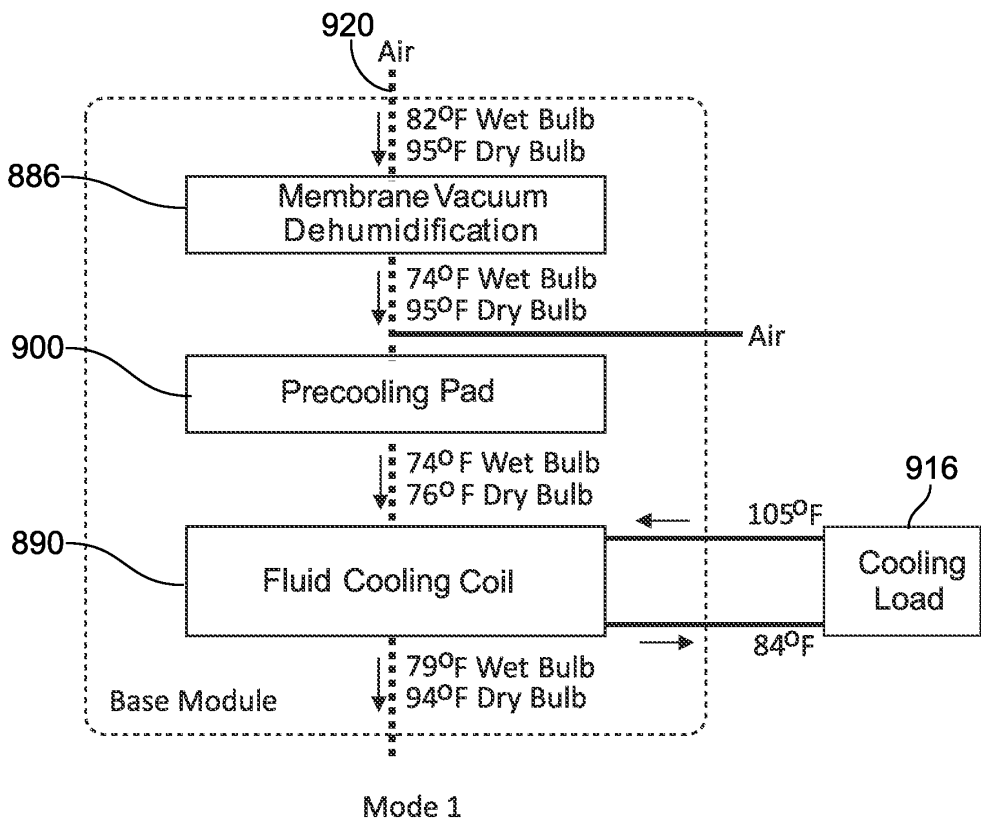


FIG. 46

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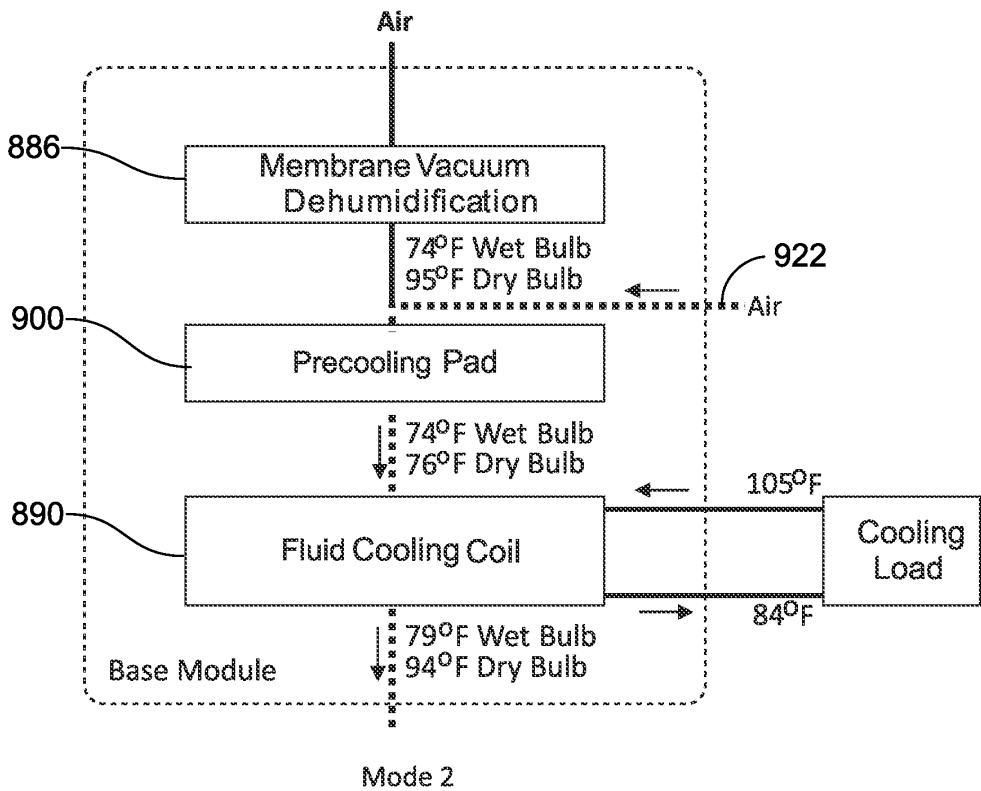


FIG. 47

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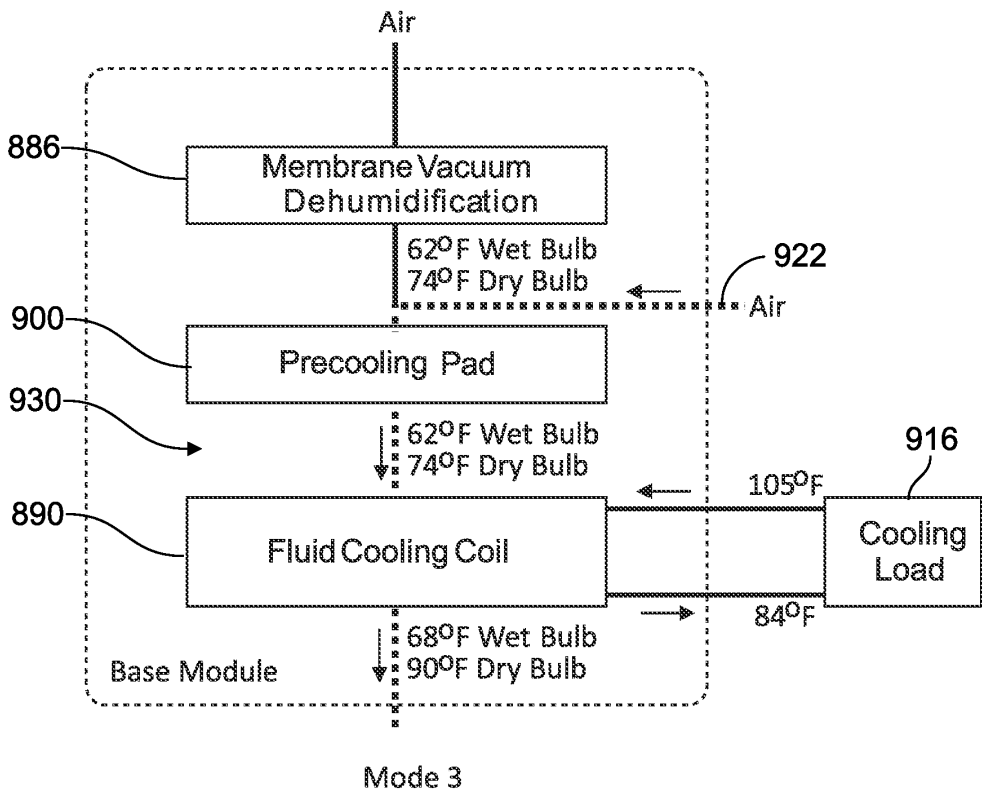


FIG. 48

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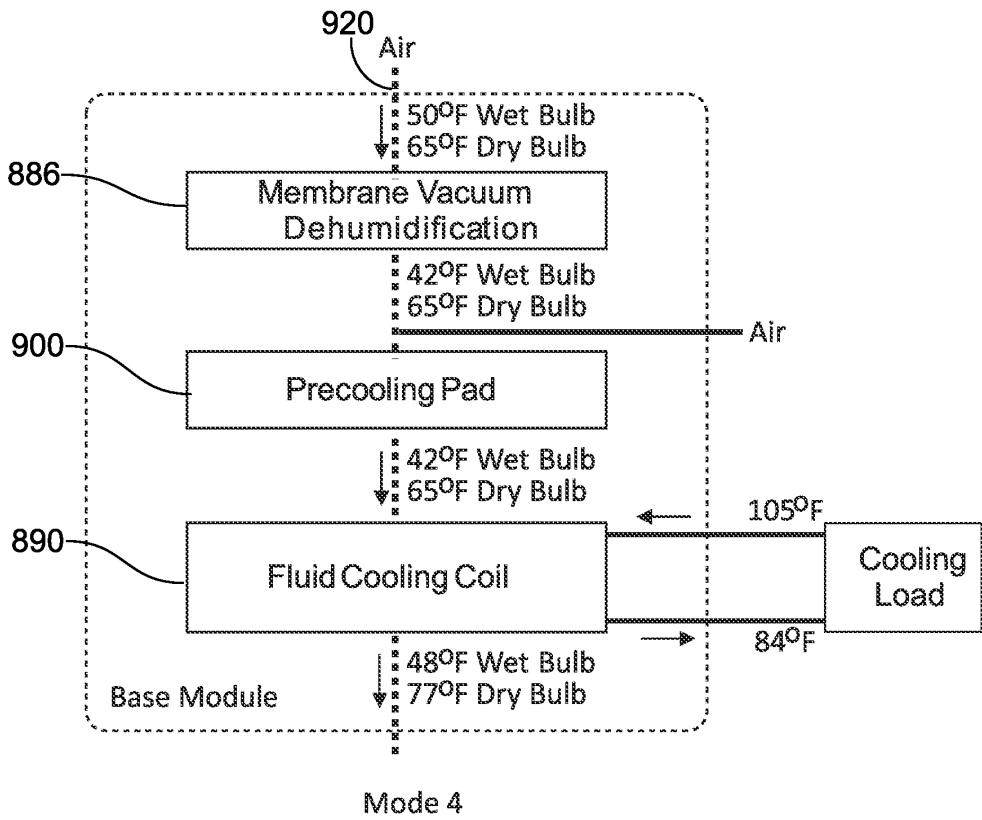


FIG. 49

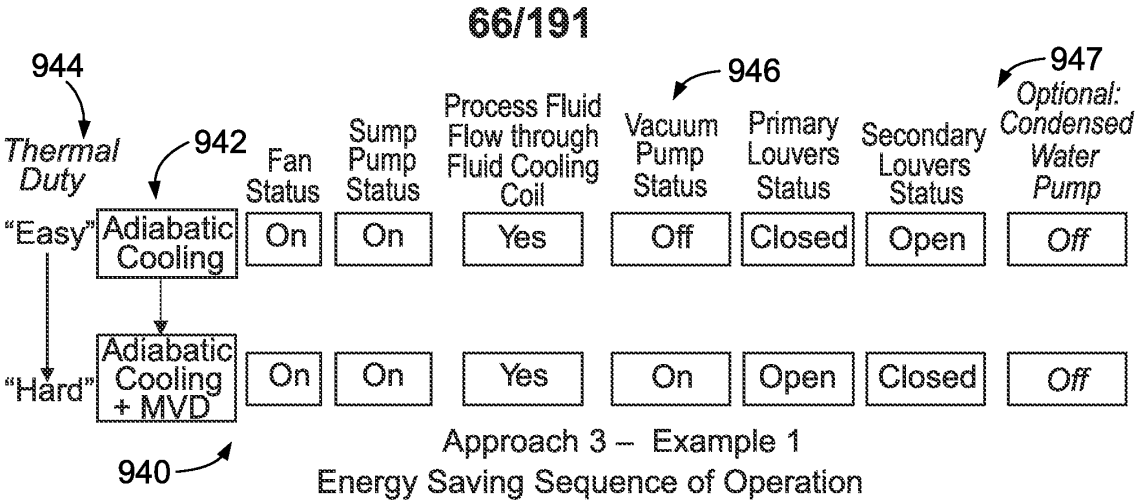


FIG. 50

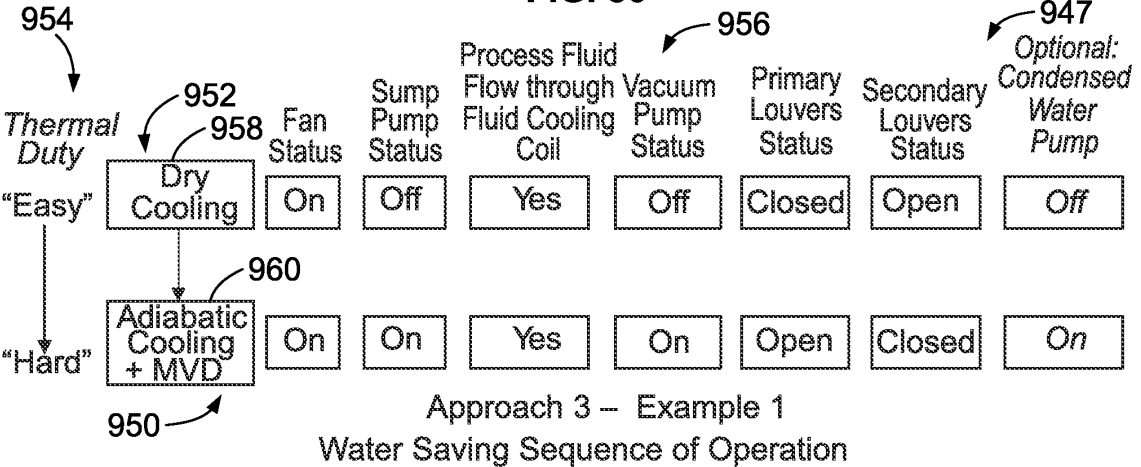


FIG. 51

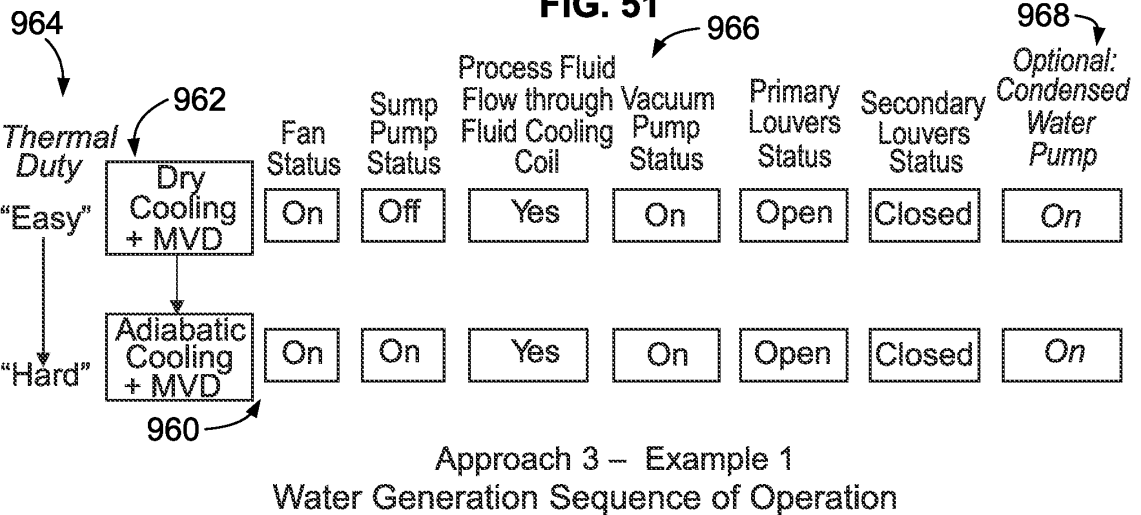
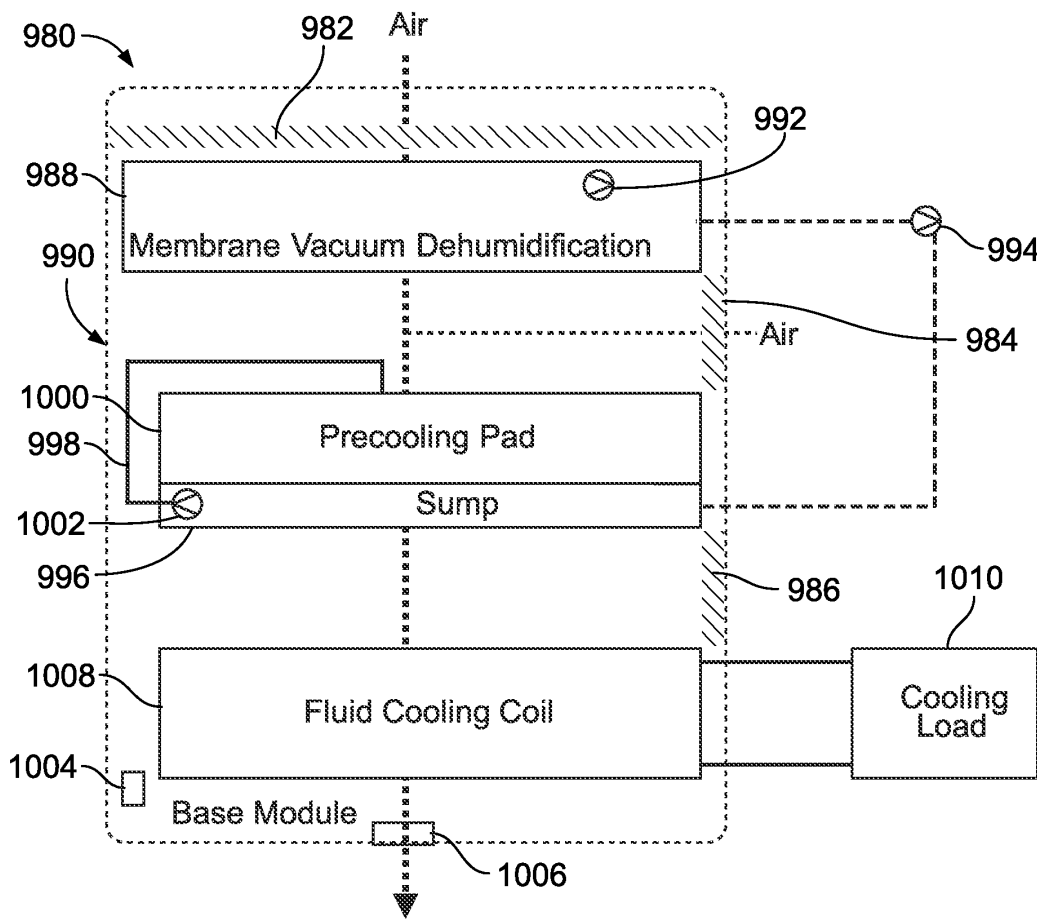


FIG. 52

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Approach 3 – Example 2

FIG. 53

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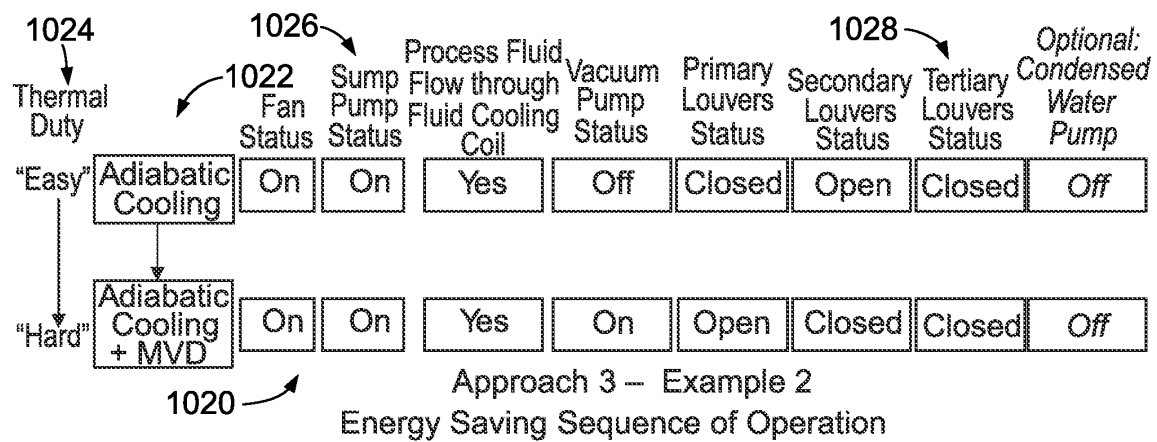


FIG. 54

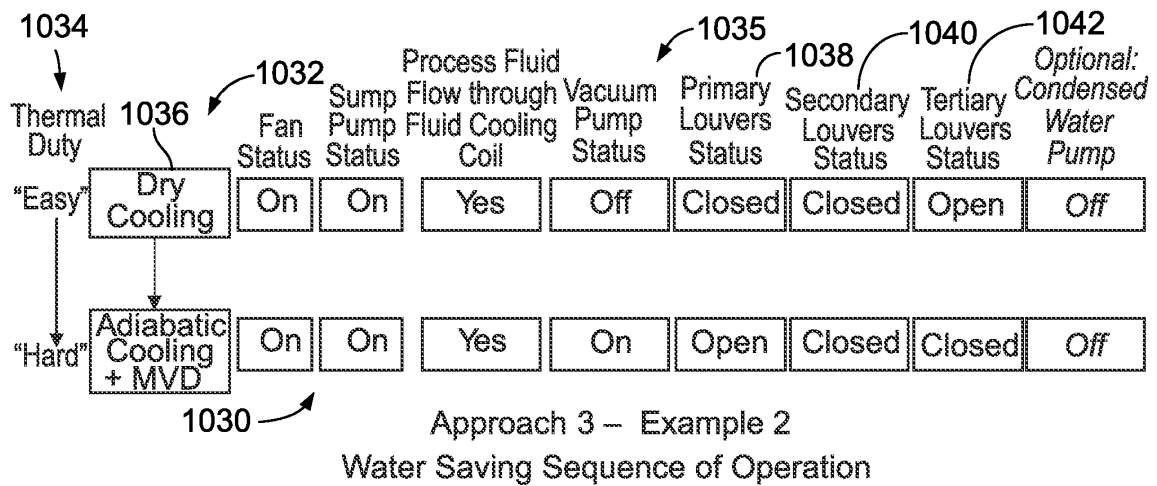


FIG. 55

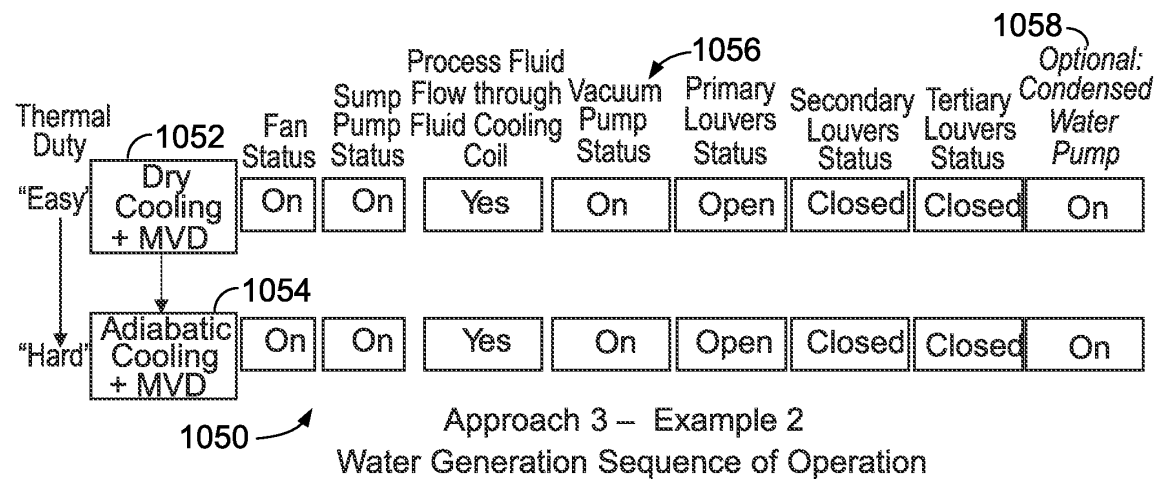
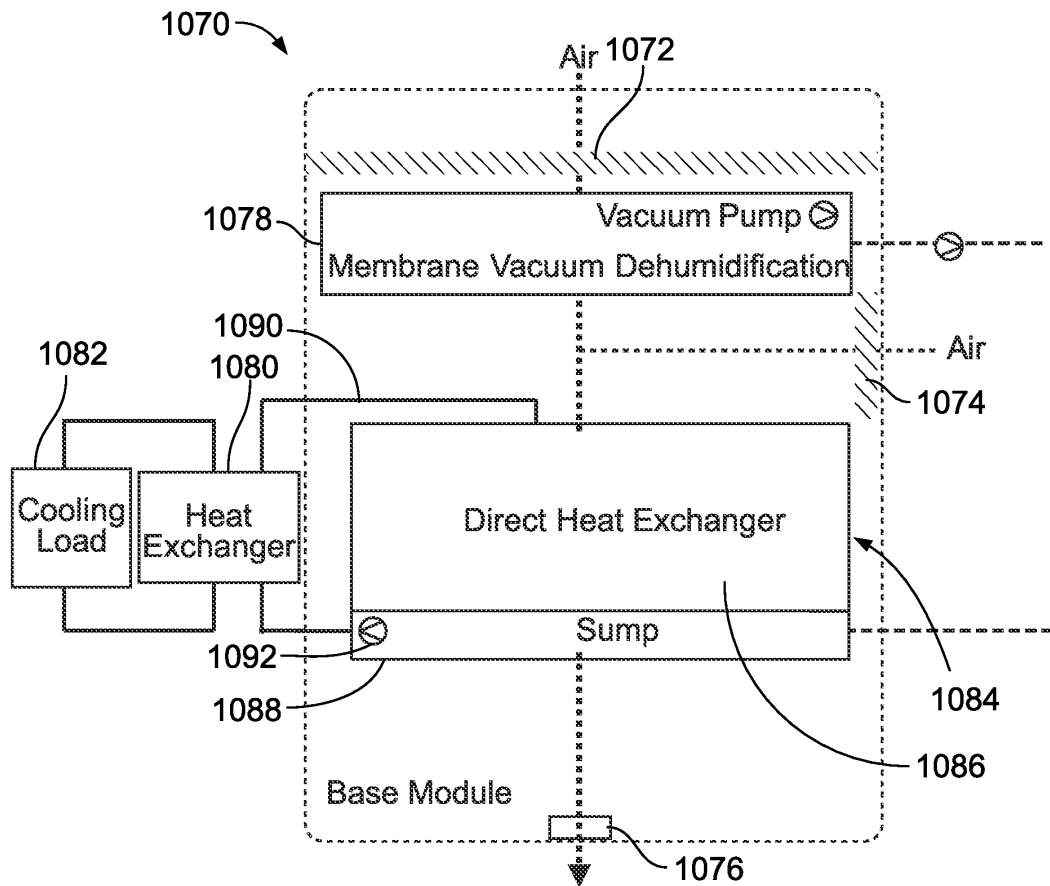


FIG. 56

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Air 1072

1078-

Vacuum Pump

Membrane Vacuum Dehumidification

1082

1090

1080

10 20 30 Air

- 1074

Cooling Load

Heat Exchanger

Direct Heat Exchanger

Sump

1092-

1088

1084

1086

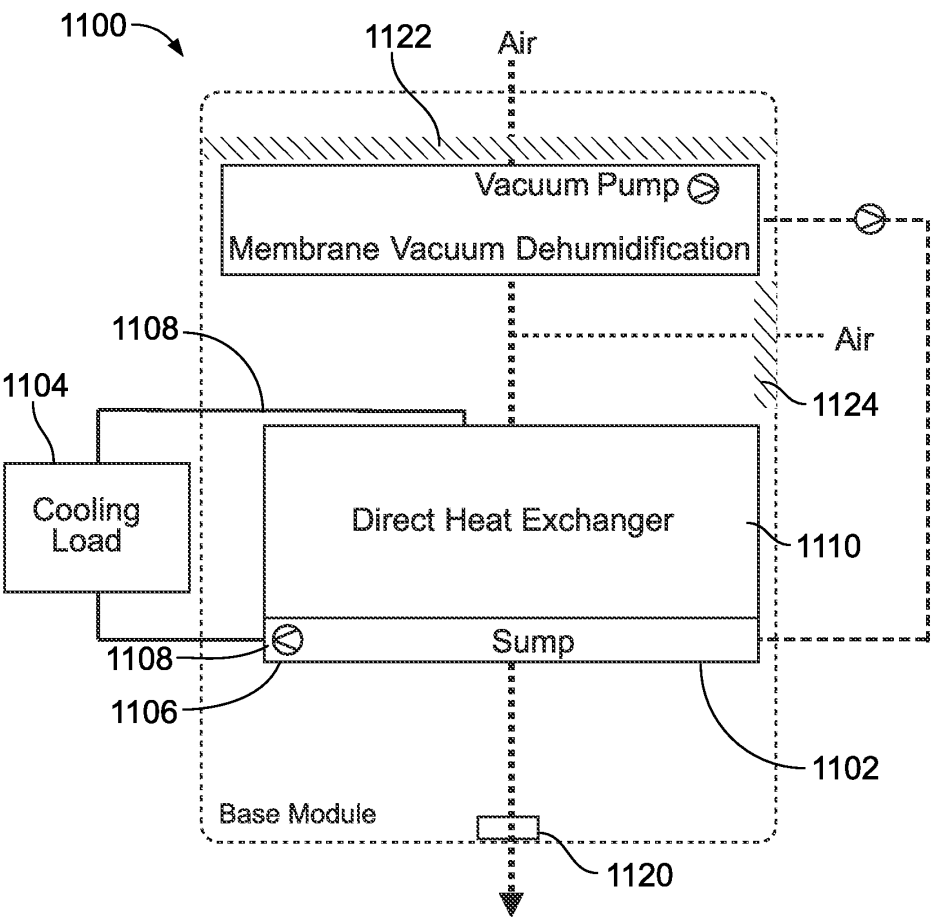
Base Module

- 1076

Approach 3 – Example 3

FIG. 57

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Approach 3 – Example 4

FIG. 58

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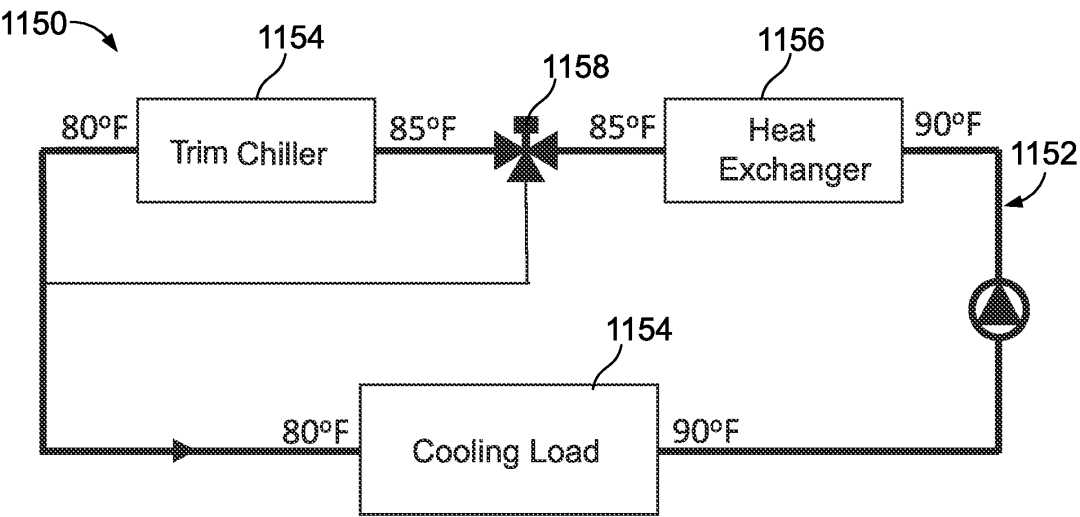


FIG. 59

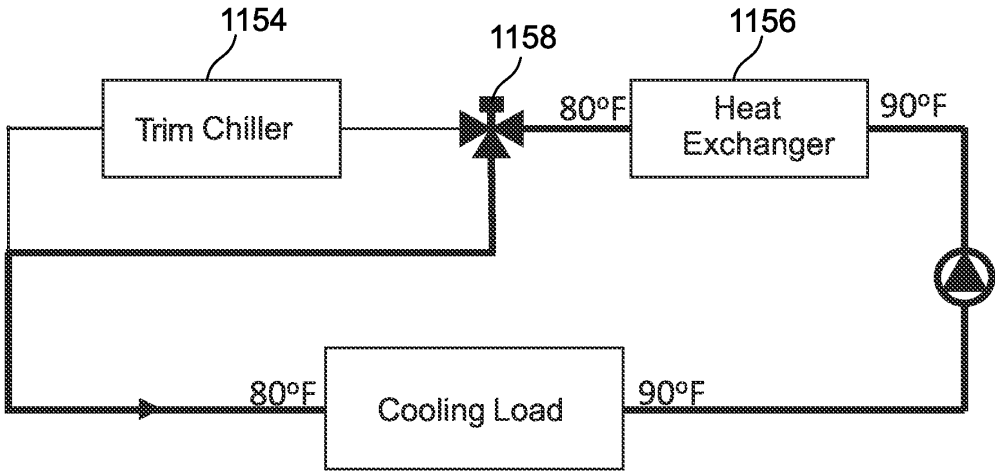


FIG. 60

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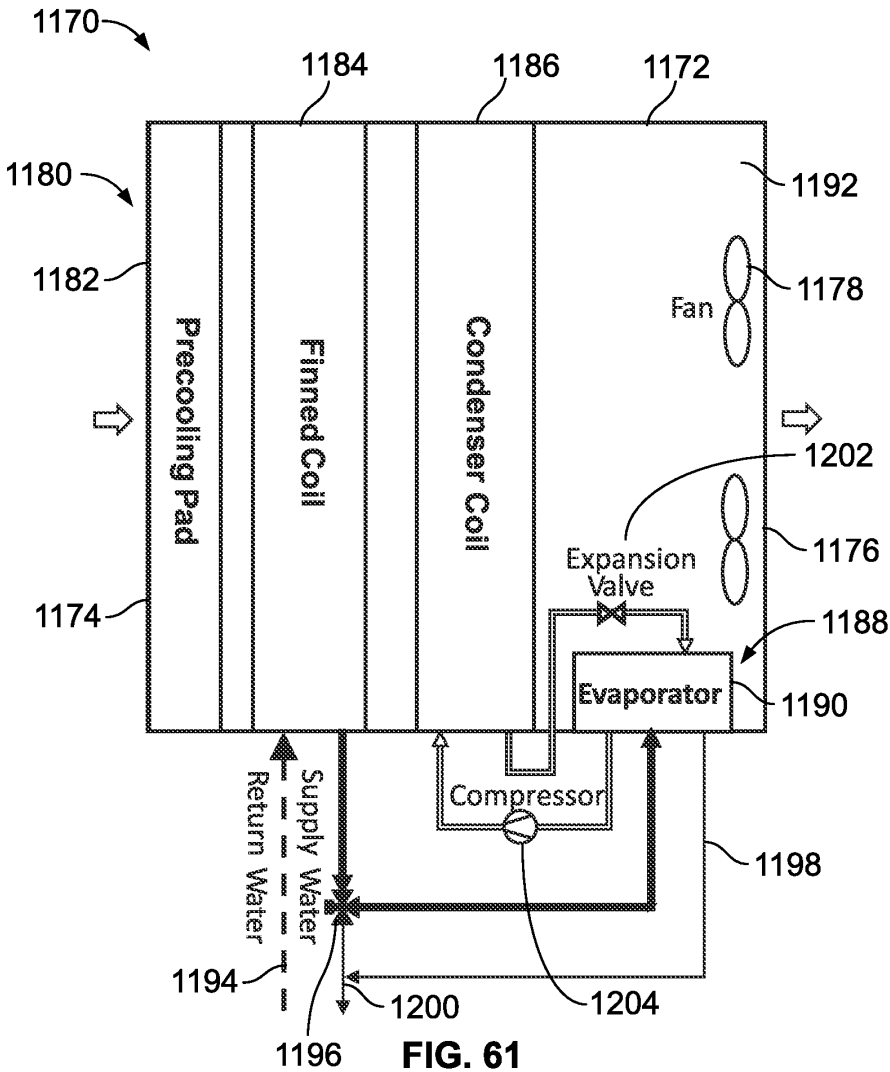
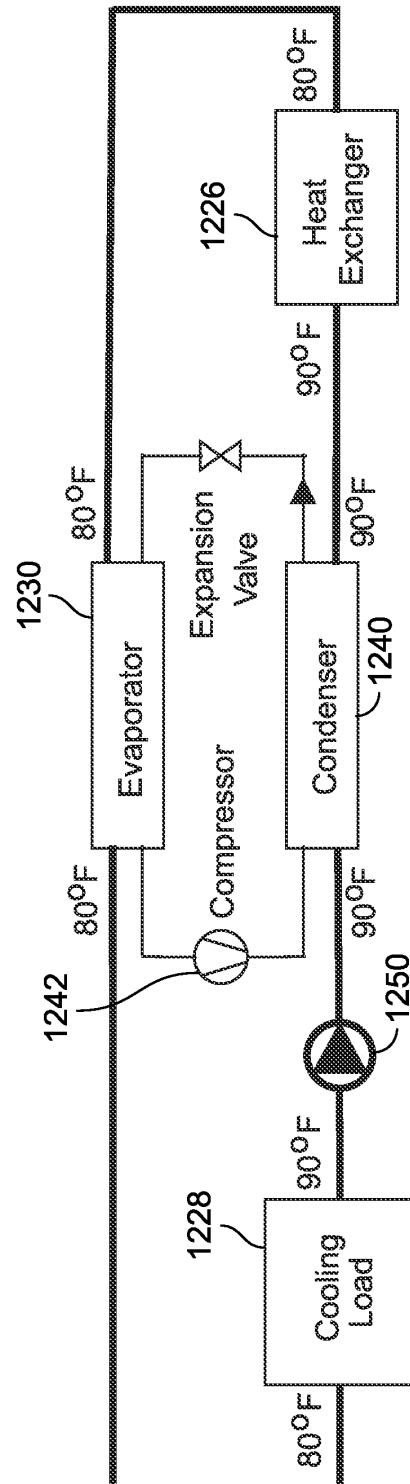
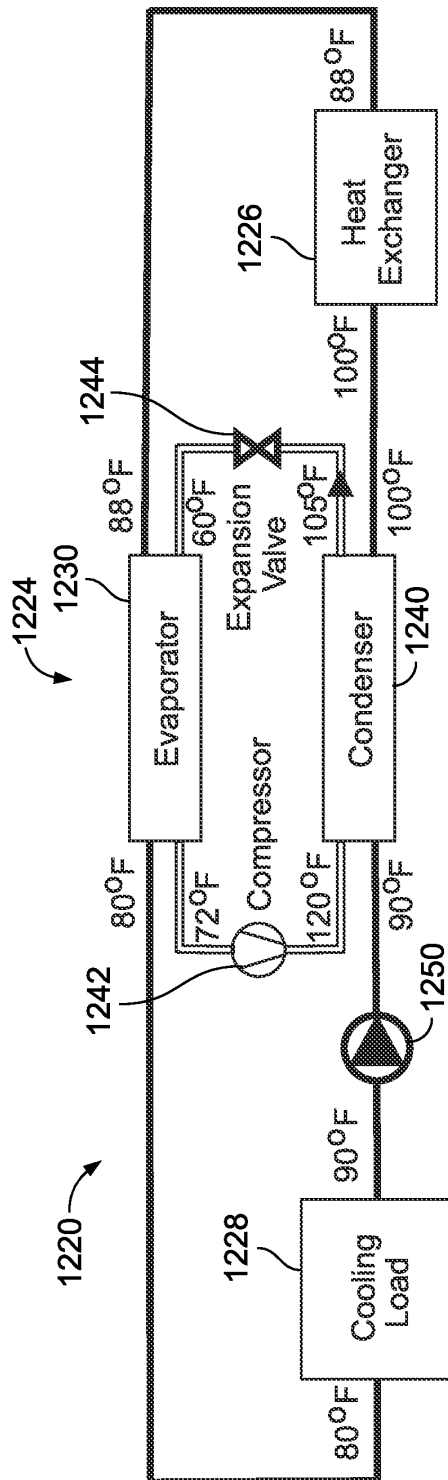


FIG. 61



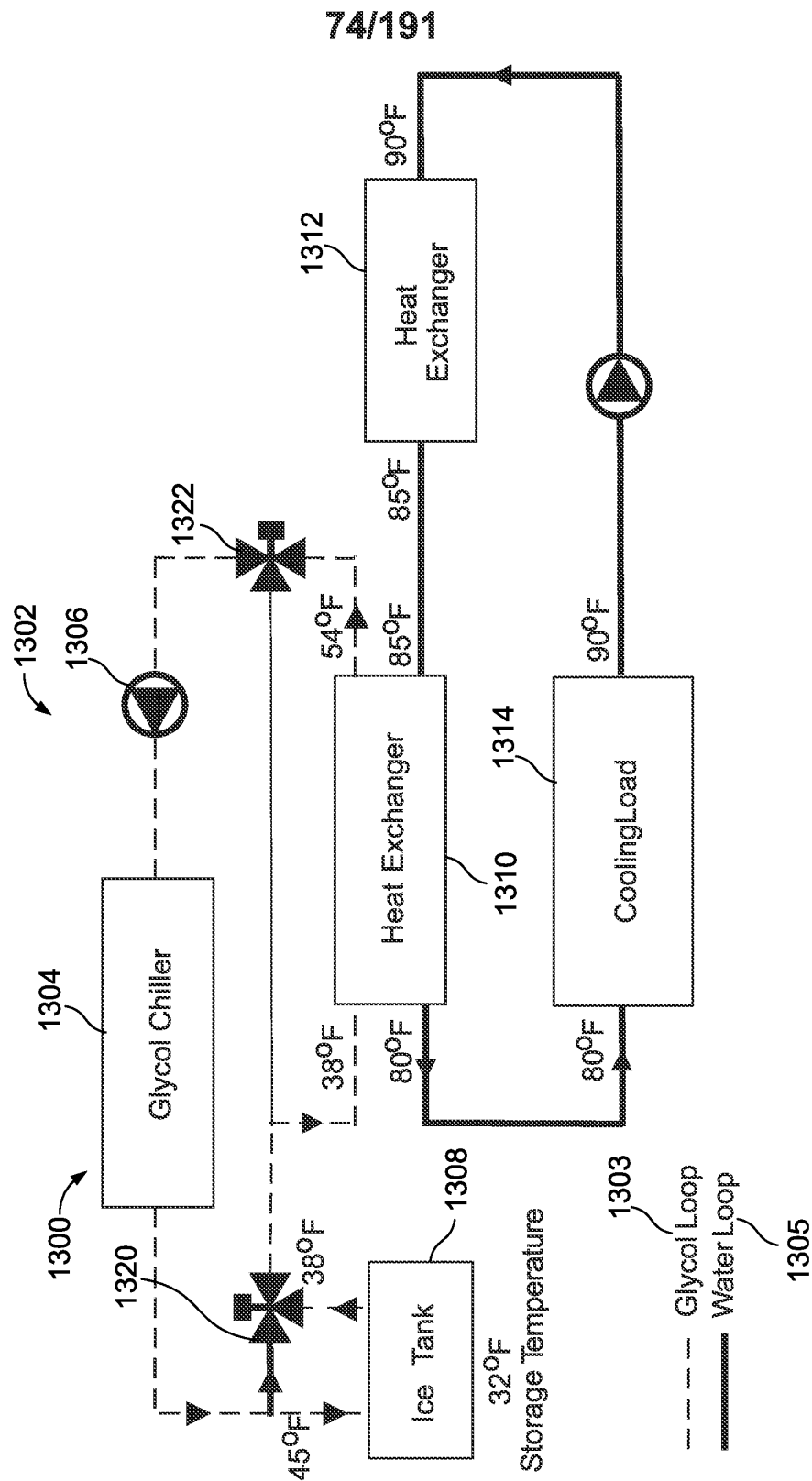


FIG. 64

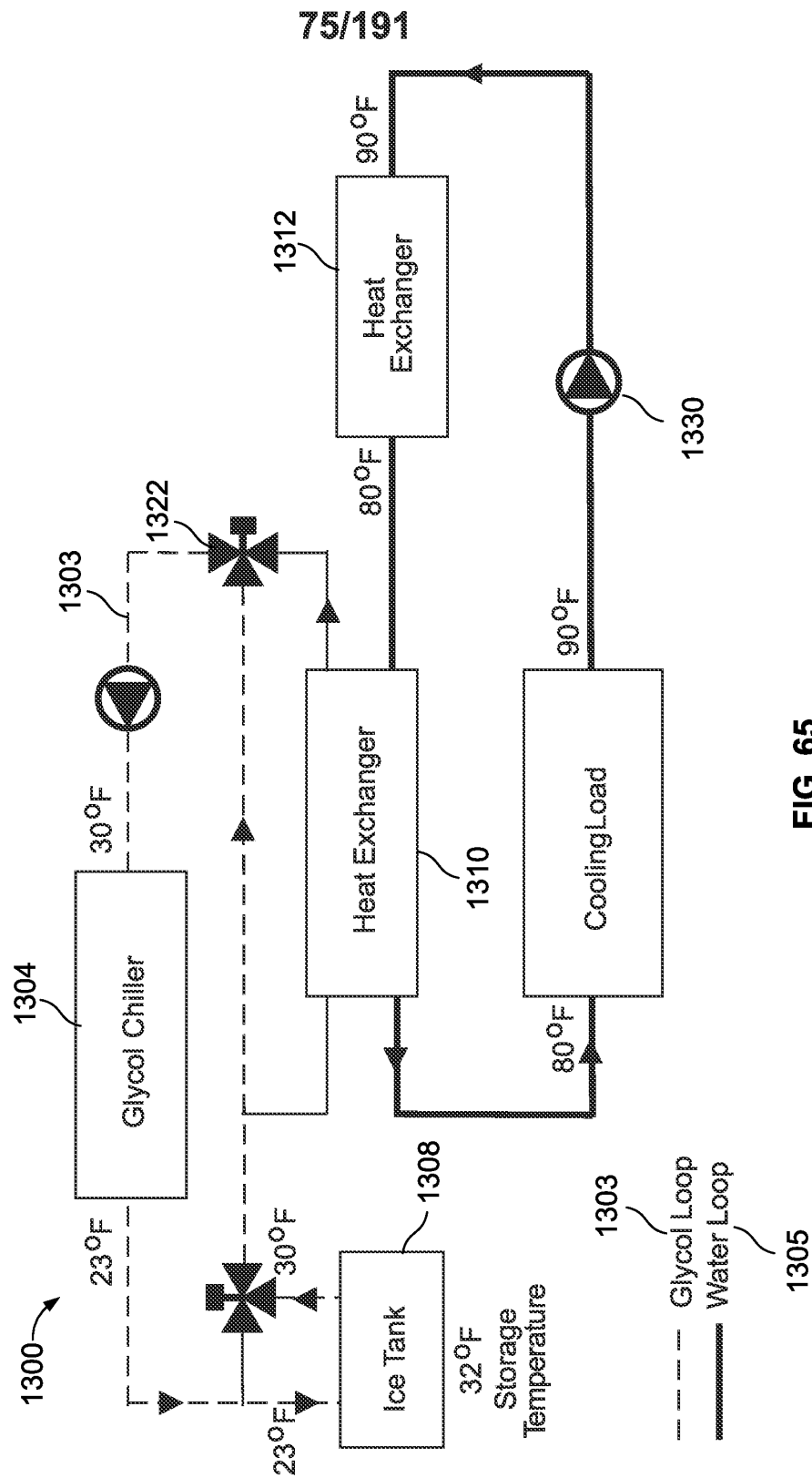


FIG. 65

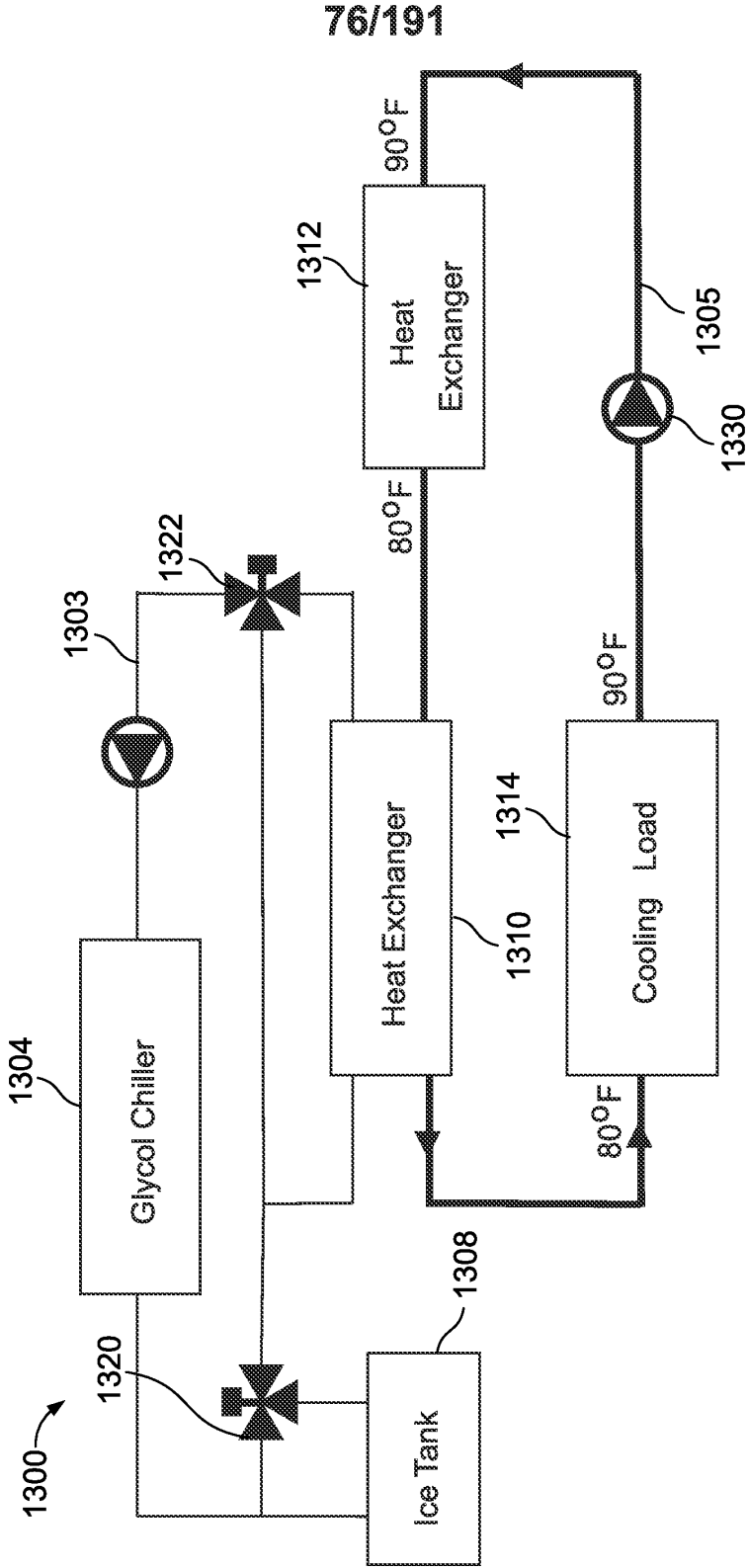


FIG. 66

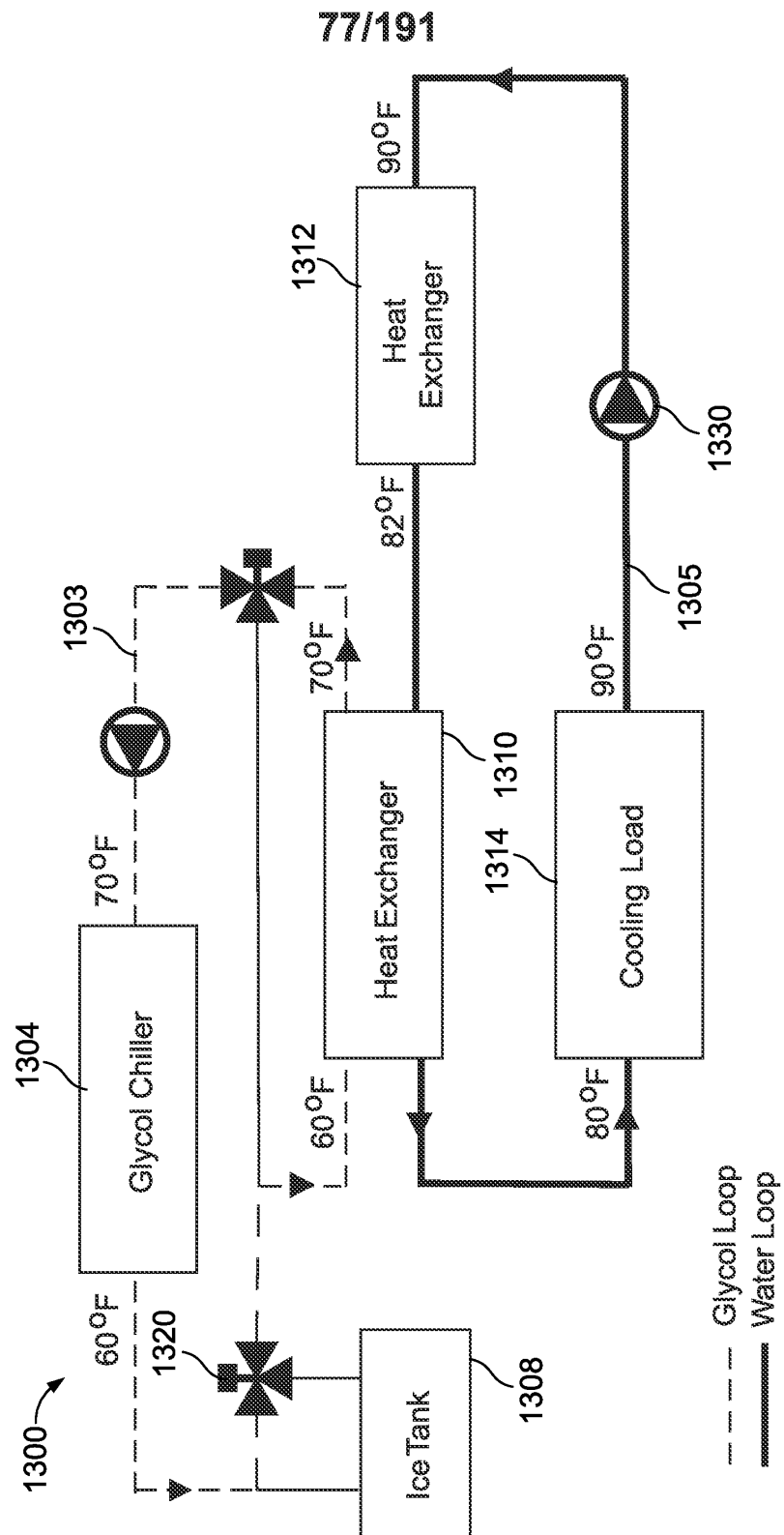


FIG. 67

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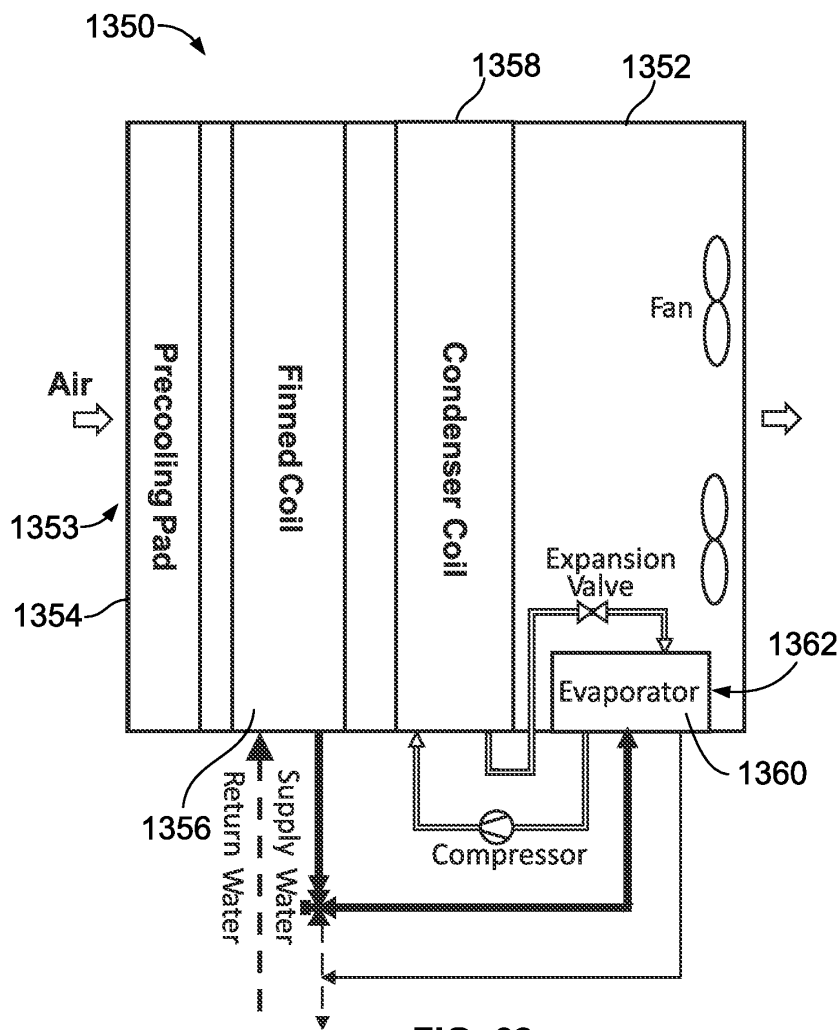


FIG. 68

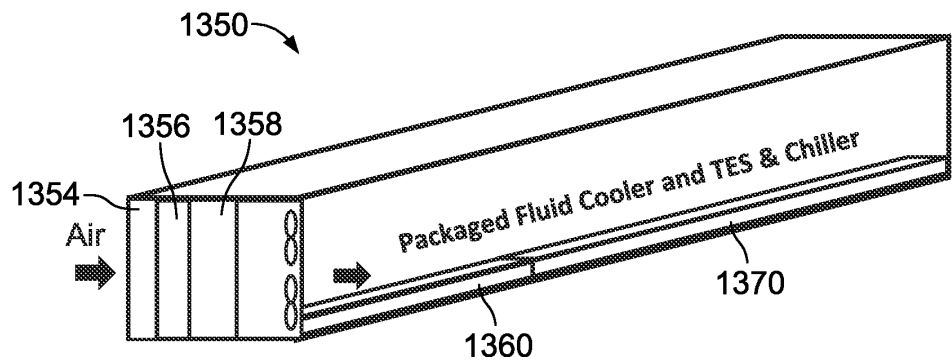


FIG. 69

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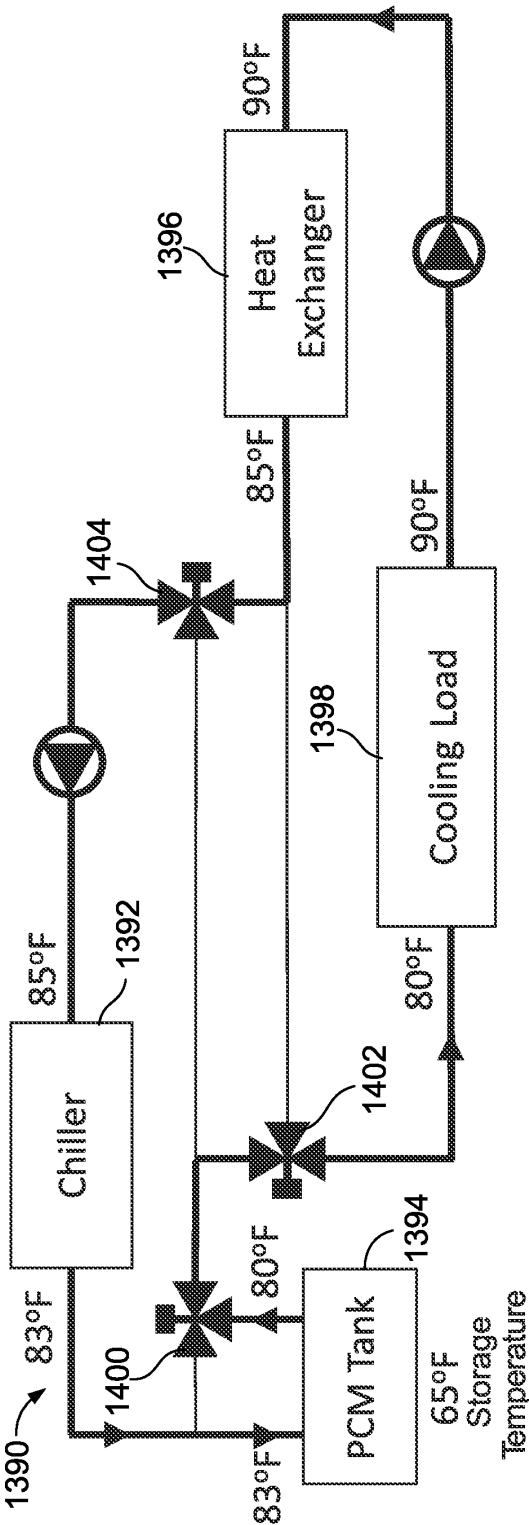


FIG. 70

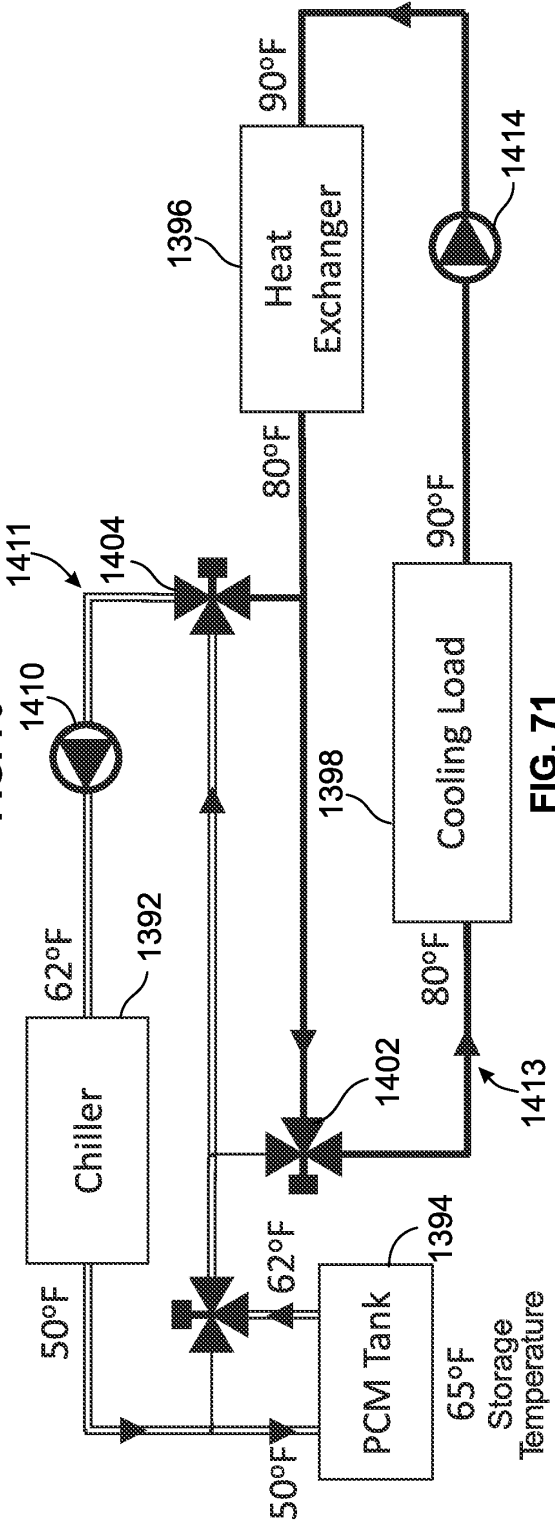


FIG. 71

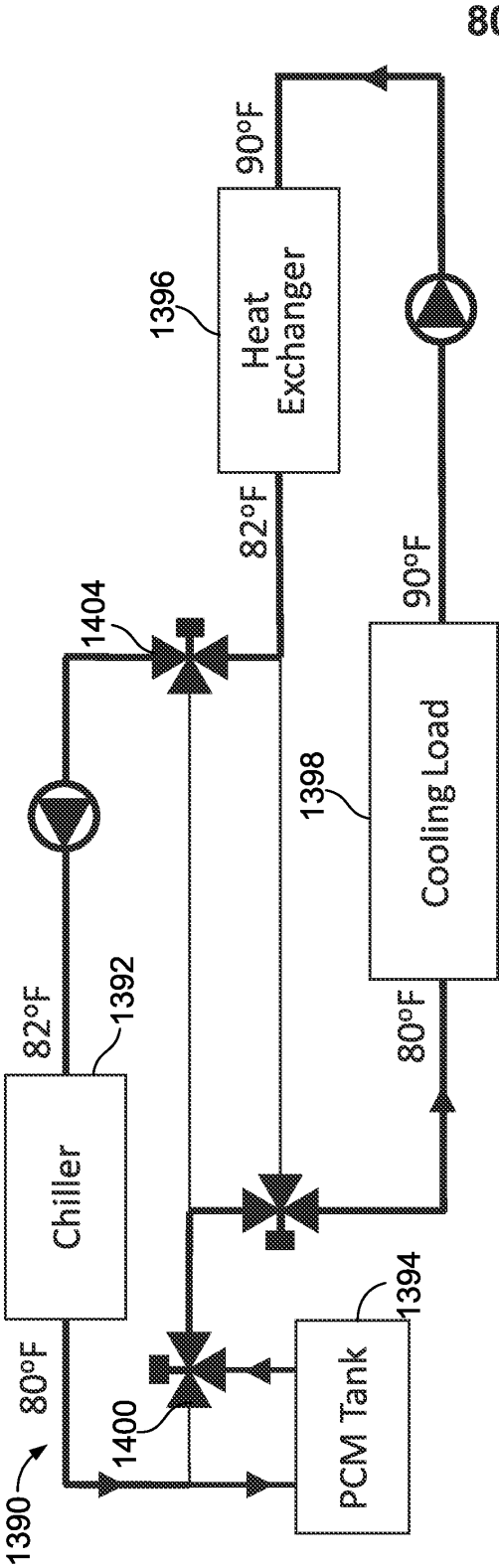


FIG. 72

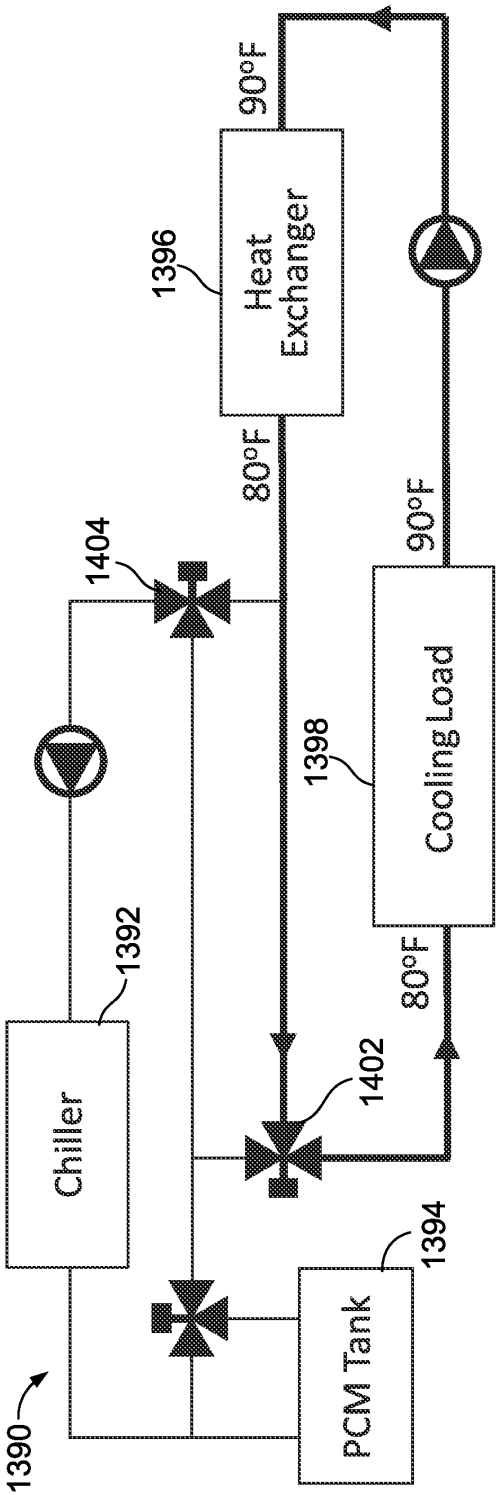


FIG. 73

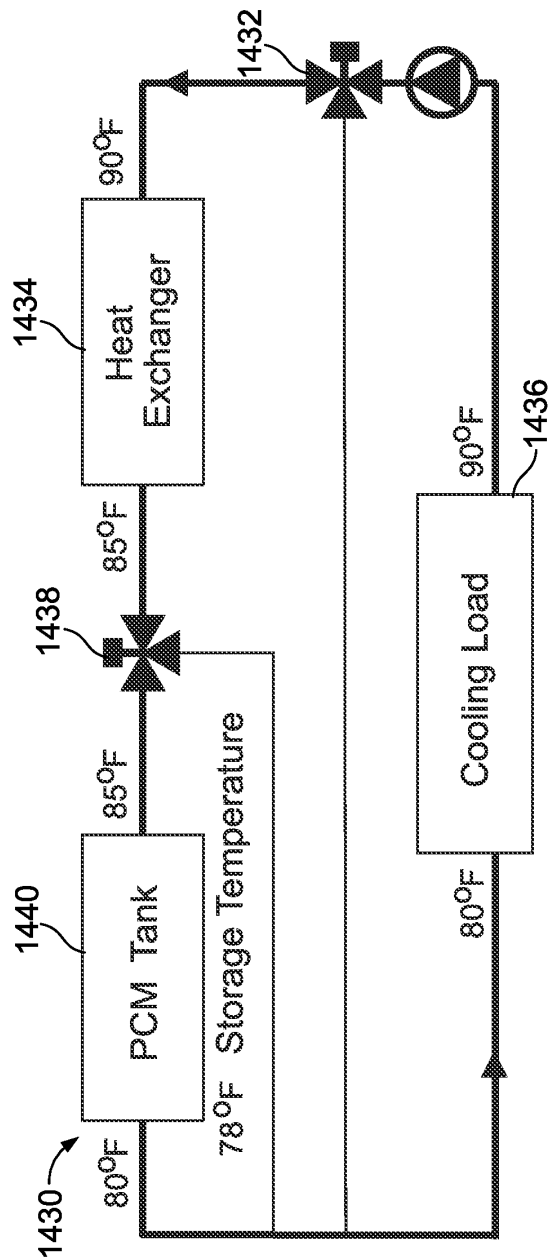


FIG. 74

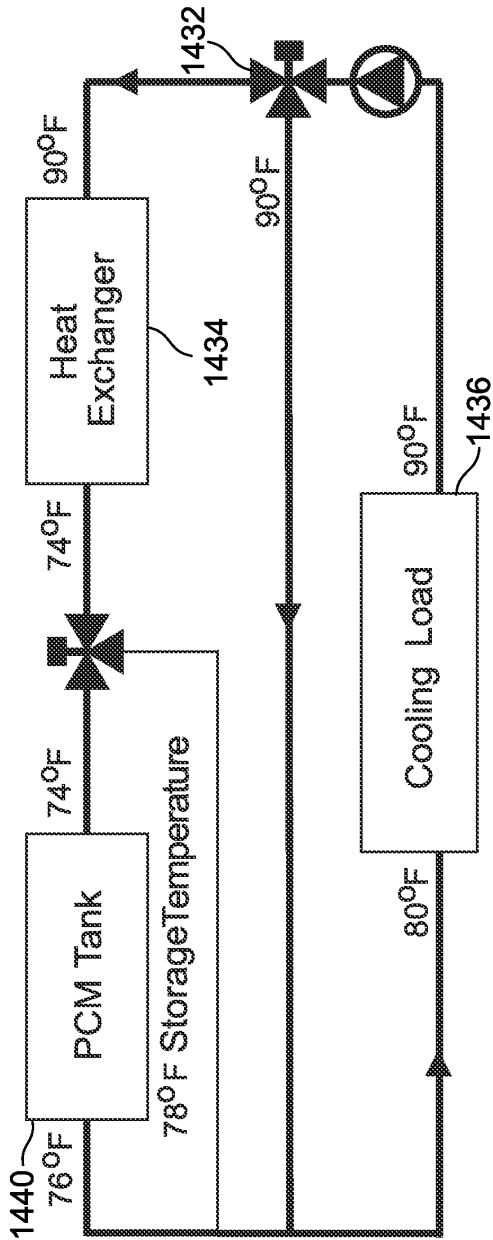


FIG. 75

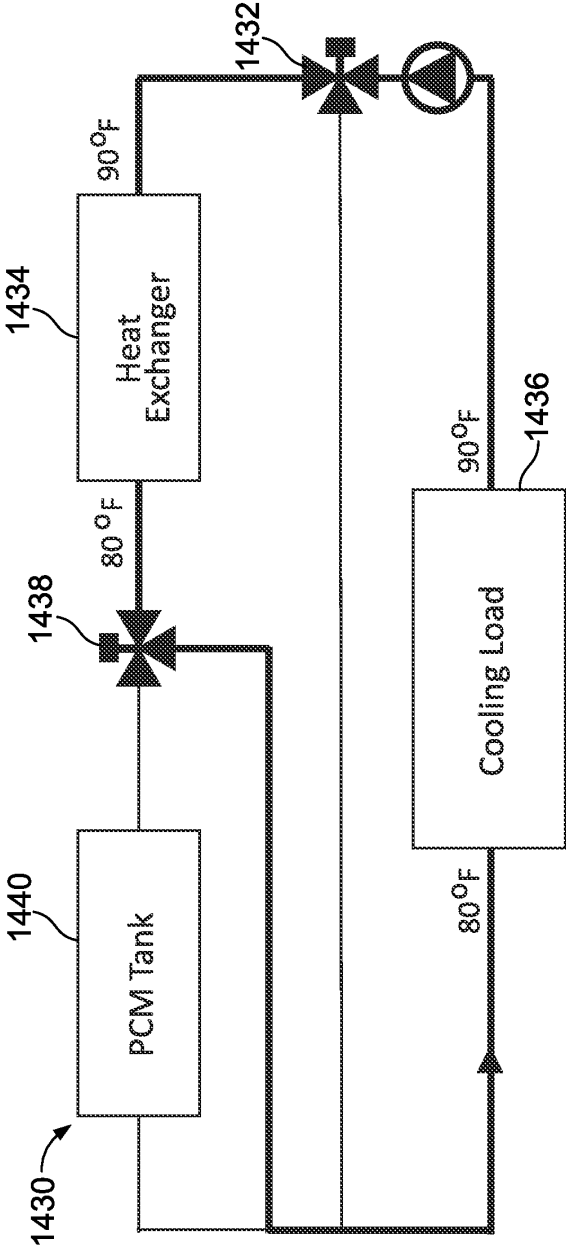


FIG. 76

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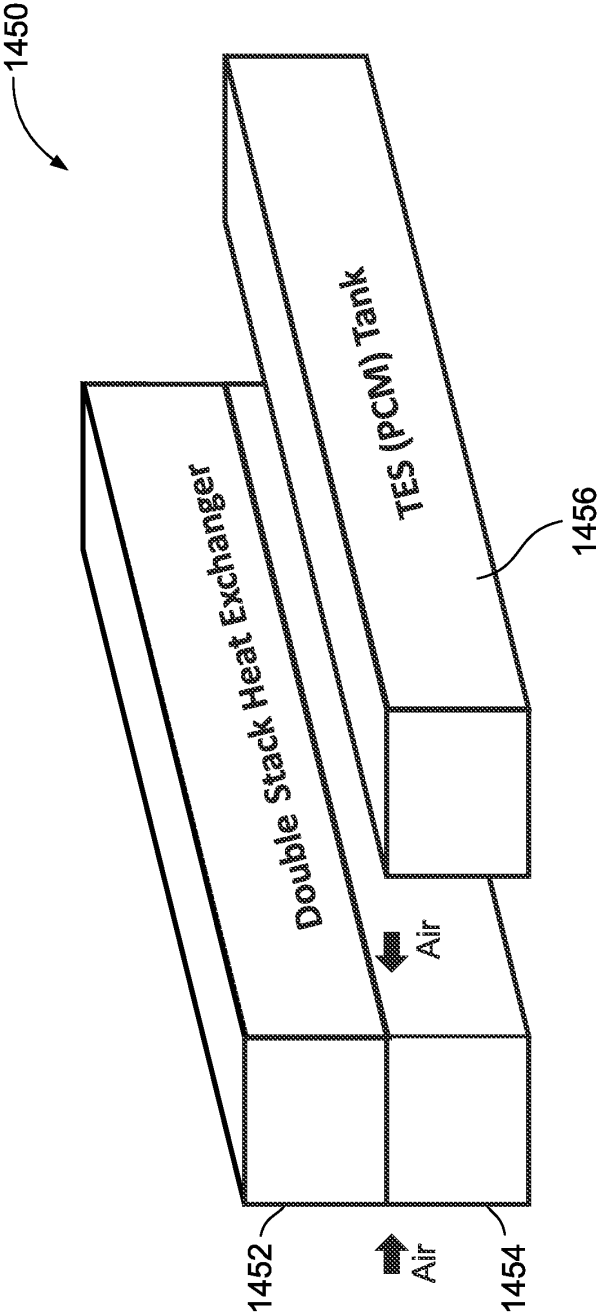


FIG. 77

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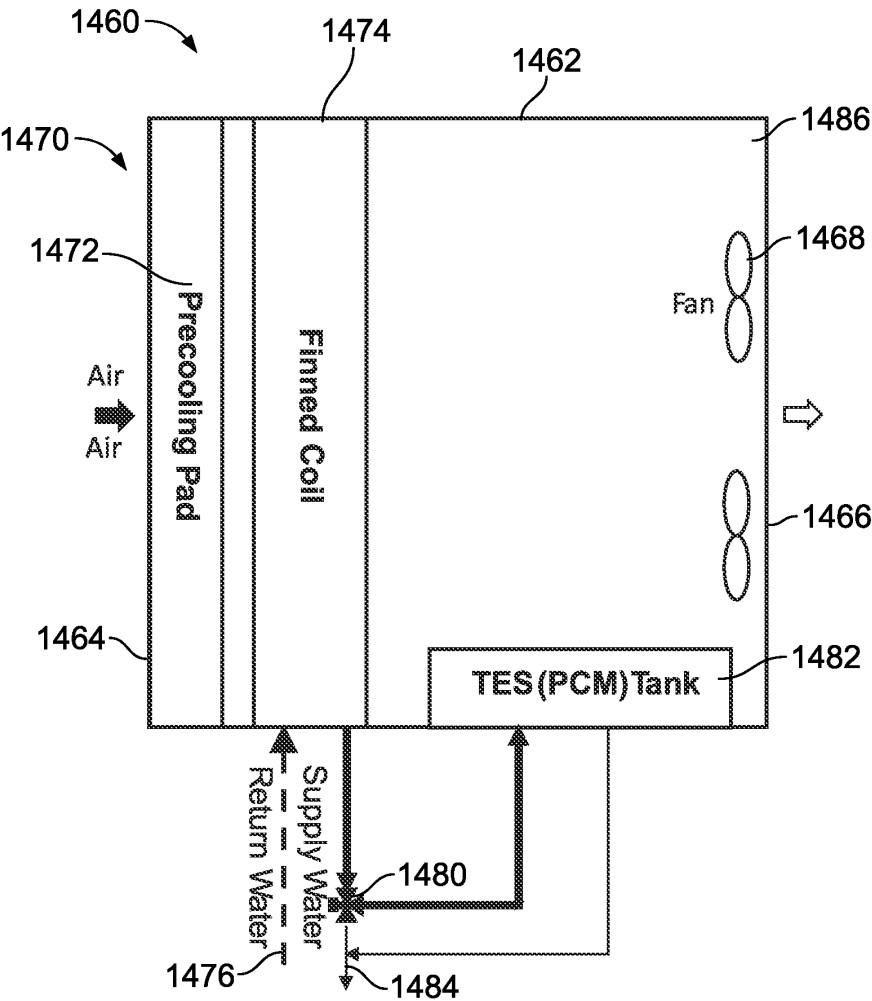


FIG. 78

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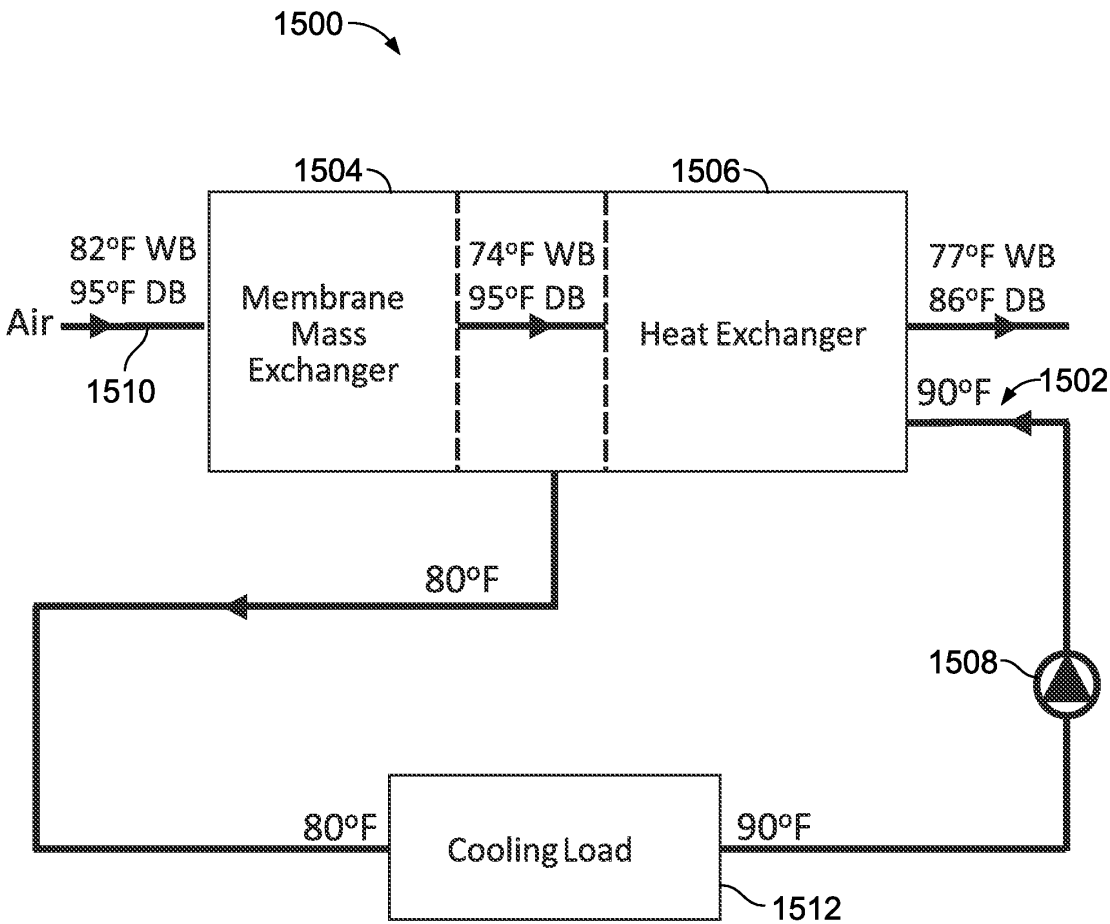


FIG. 79

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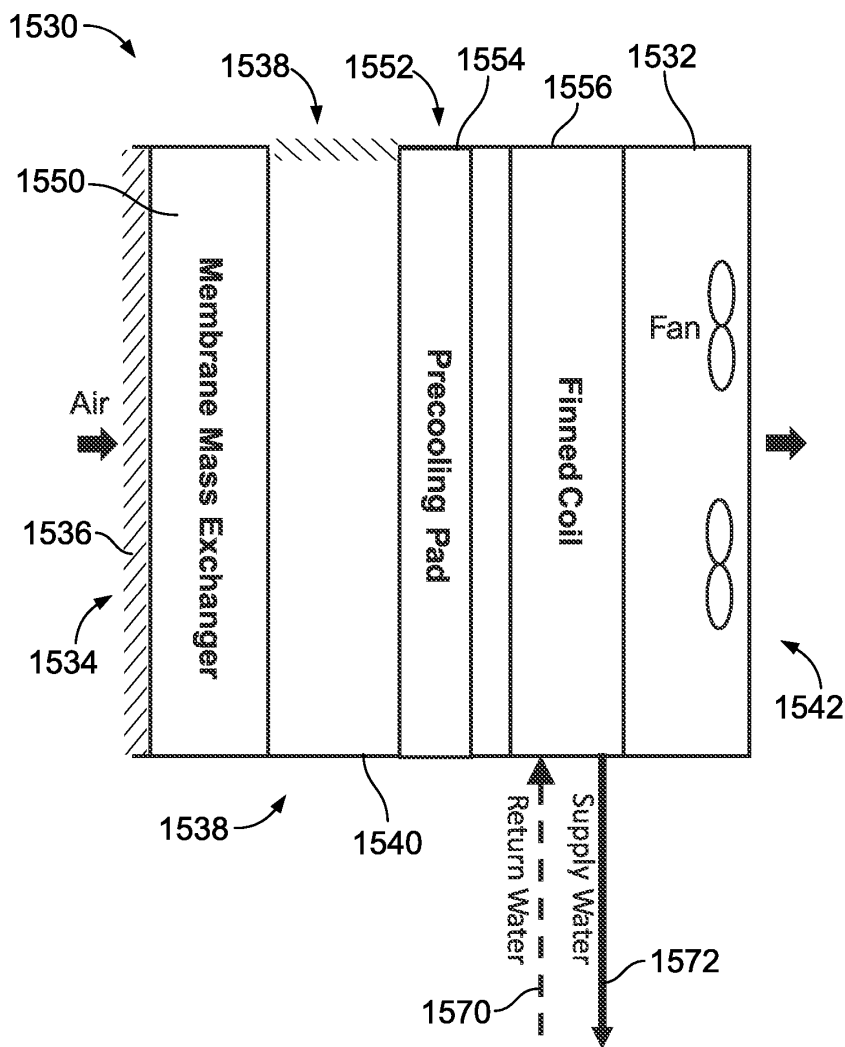


FIG. 80

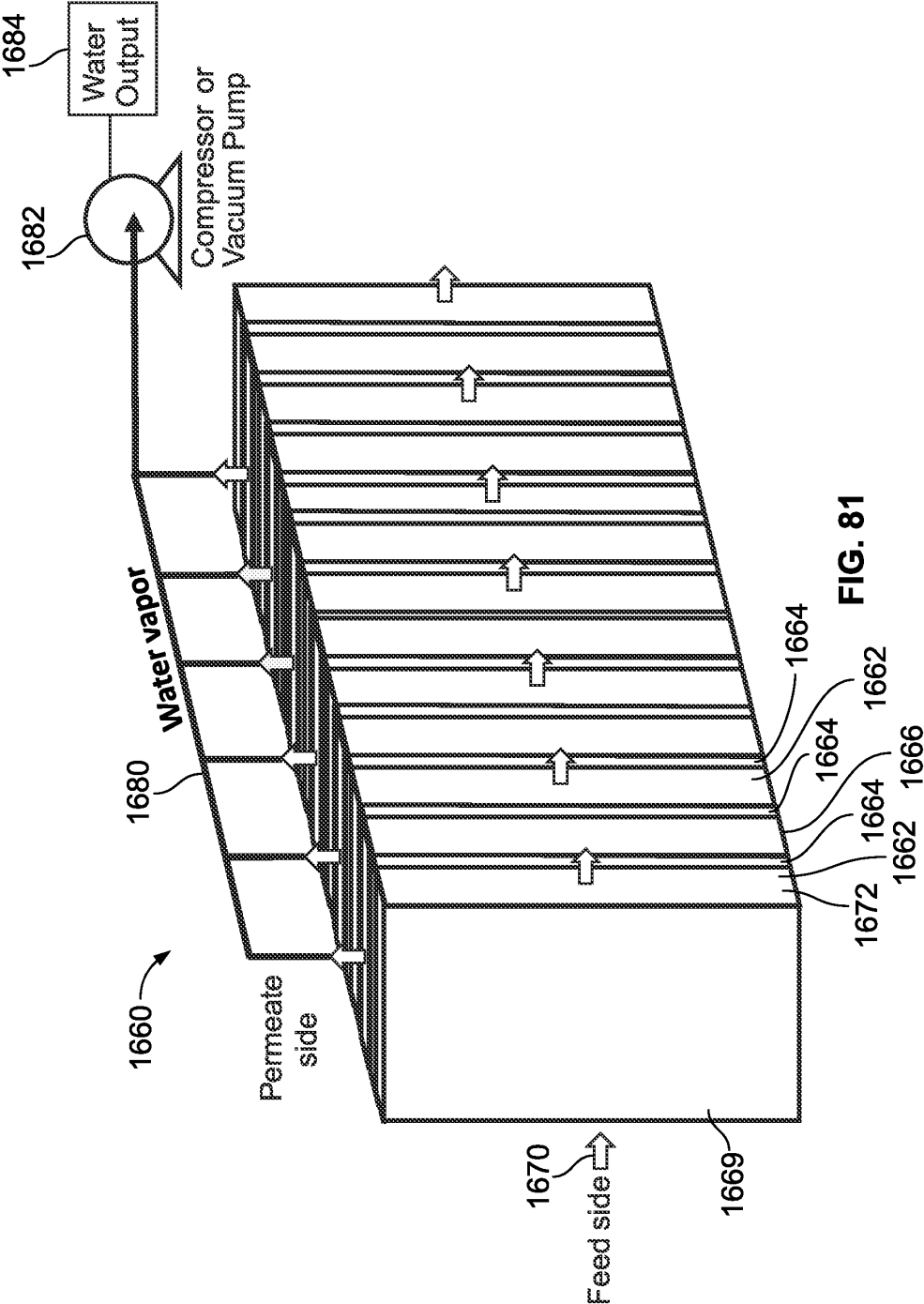
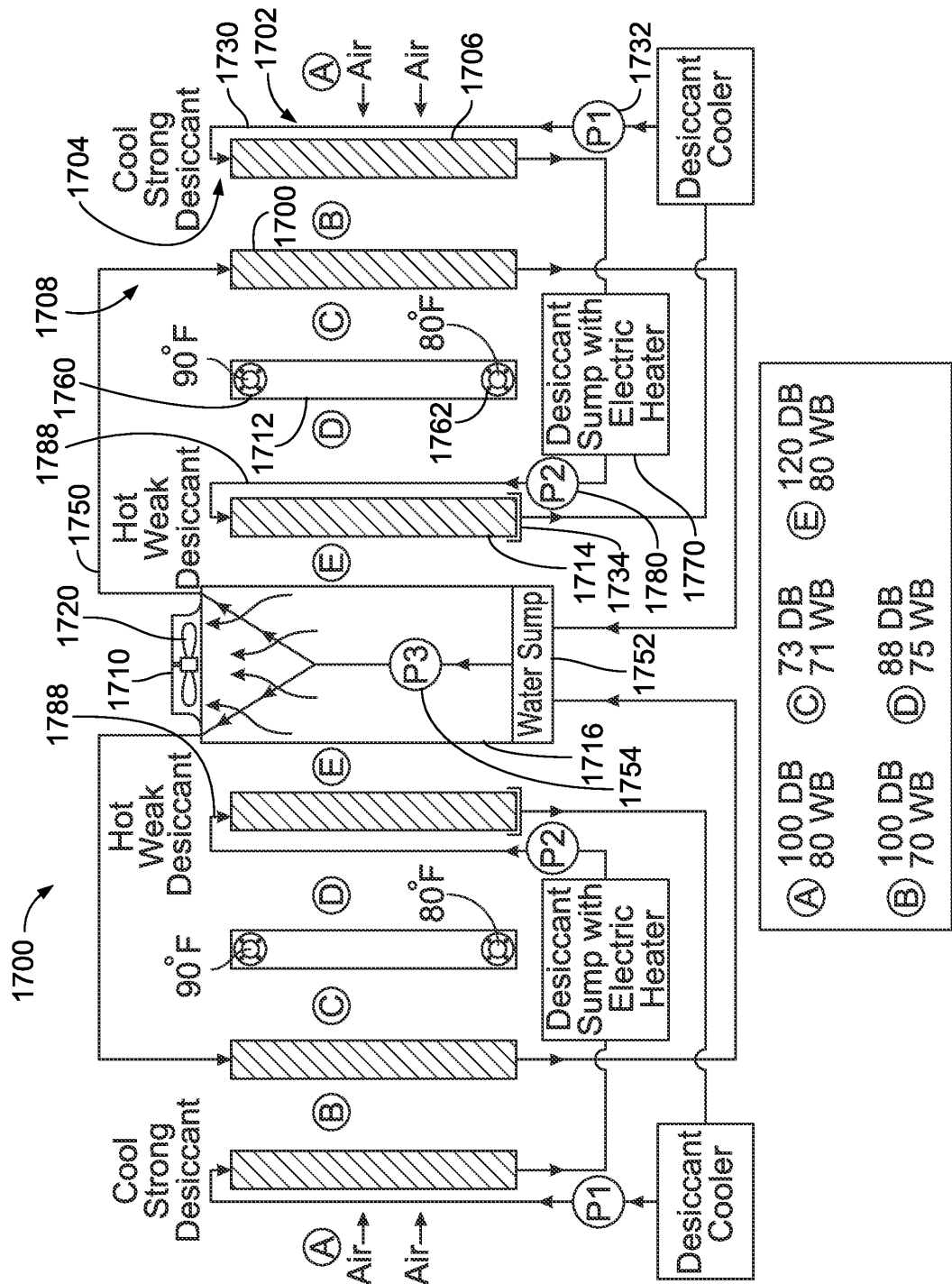


FIG. 81



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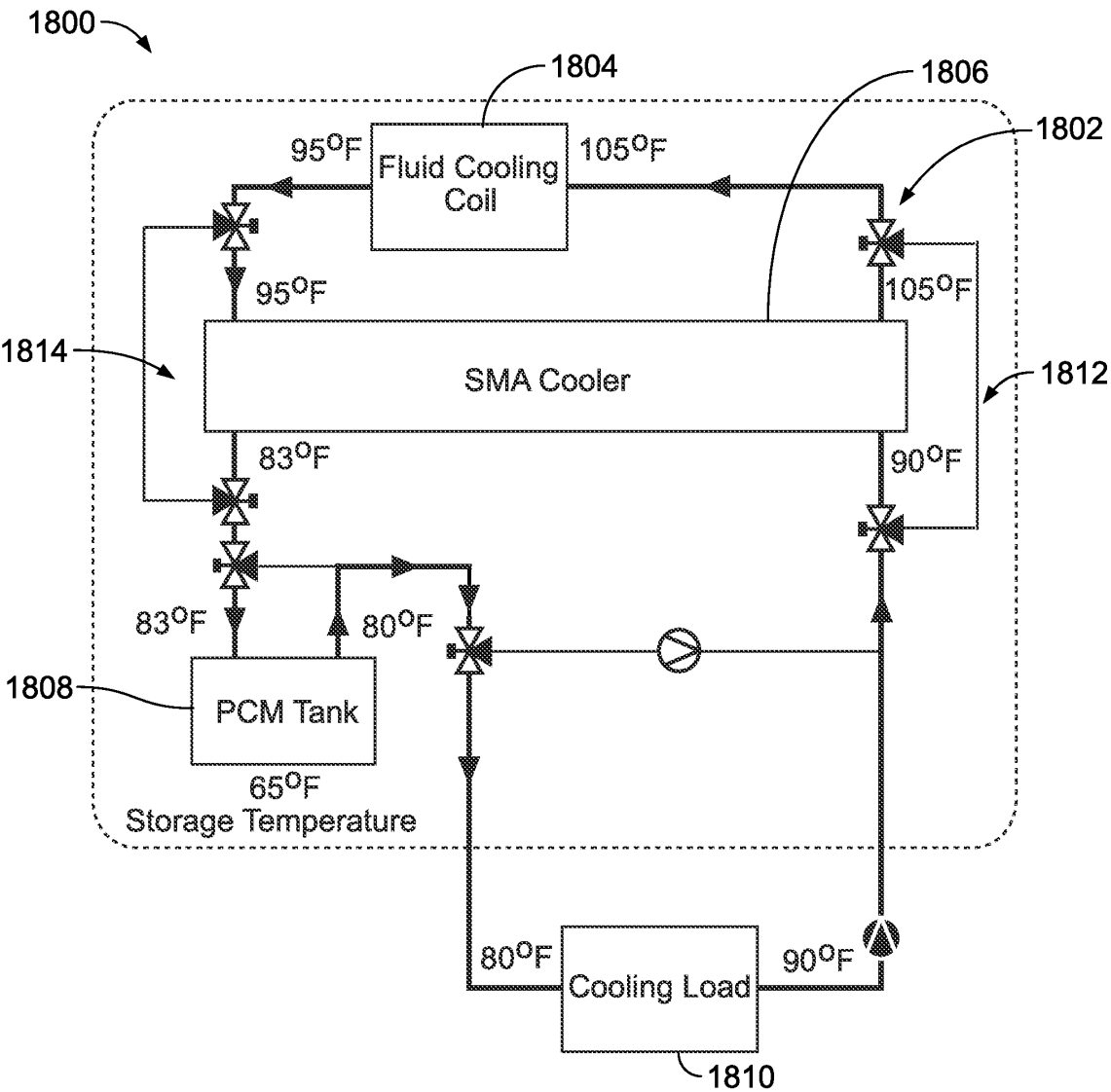


FIG. 83

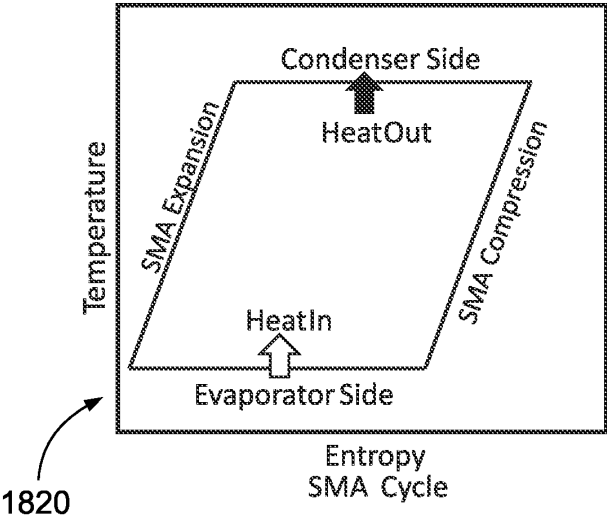
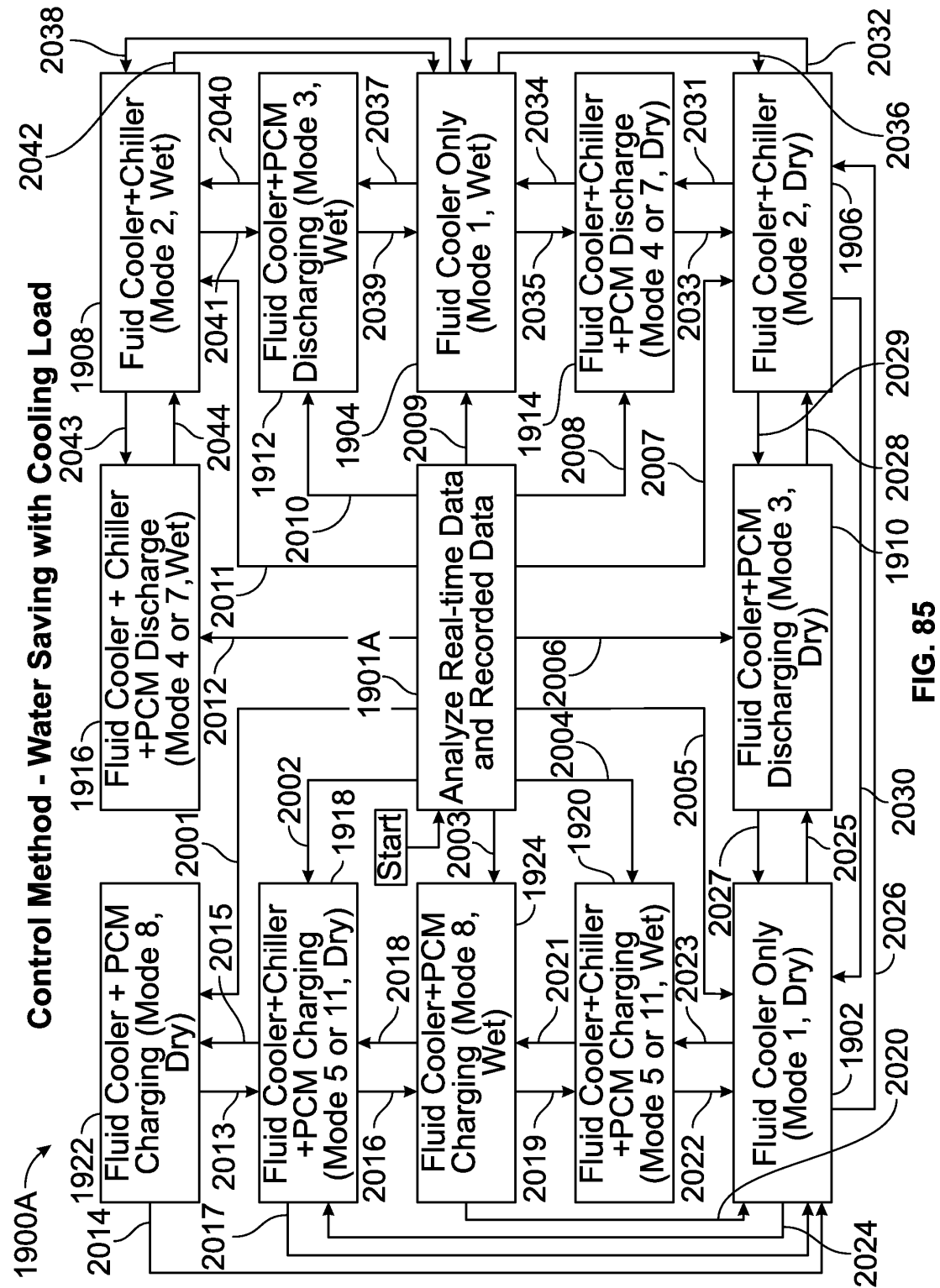


FIG. 84



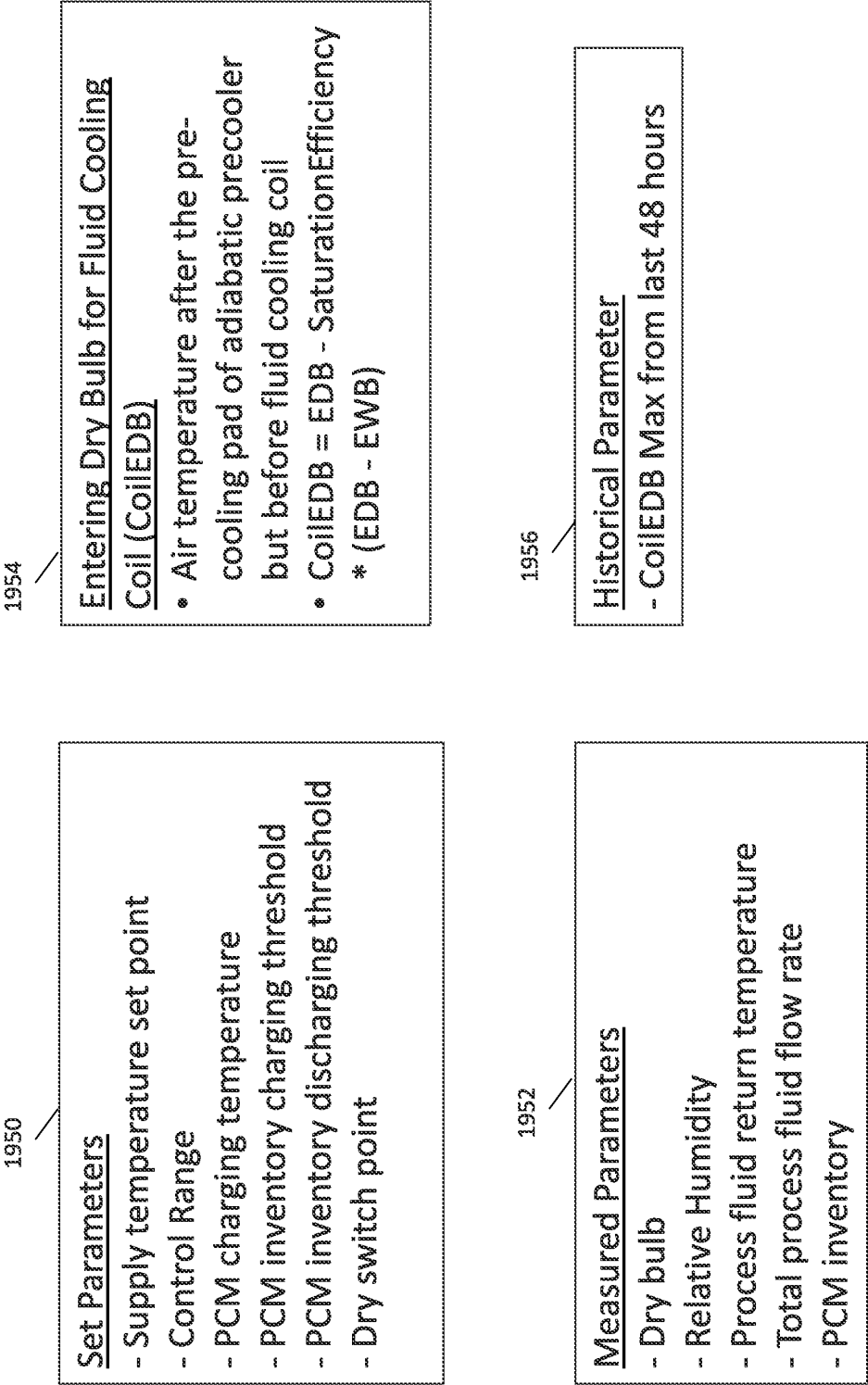


FIG. 86

1960 1961	1962	1964	1964A
Control Method - Water Saving with Cooling Load			
1962A Determination of Initial Operating Mode			
Ref.	Condition	Initial Mode	
2001	If Current PCM Inventory Is Less than the PCM Inventory Charging Threshold (Pre-set, E.g., 90% Inventory) and CoiledB (Air Temperature After the Pre-Cooling Pad But Before Fluid Cooling Coil) Is No Greater than CoiledB_SP_8d (CoiledB Setpoint for Mode 8 (Dry))	1922 - Fluid Cooler + PCM Charging (Mode 8, dry)	
2002	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_8D But no Greater than CoiledB_SP_5D (CoiledB Setpoint for Mode 5 (Dry))	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, dry)	
2003	If current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_5D But no Greater than CoiledB_SP_8W (CoiledB Setpoint for Mode 8 (Wet)) and Air Dry Bulb is not Less than Dry Switch Point (e.g., 35F)	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	
2004	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_8W But no Greater than CoiledB_SP_5W (CoiledB Setpoint for Mode 5 (Wet)) and Air Dry Bulb is not Less than Dry Switch Point	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	
(A)	(B)	(C)	(D)

FIG. 87

(A)	(B)	(C)	(D)
2005	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Either Greater than CoiledB_SP_5W or (CoiledB is Greater than CoiledB_SP_5D But no Greater than CoiledB_SP_5W and Air Dry Bulb is Less than Dry Switch Point), or if Current PCM Inventory is no Less than the PCM Inventory Charging Threshold and CoiledB is no Greater than CoiledB_SP_1D (CoiledB Setpoint for Mode 1 (Dry))		1902 - Fluid Cooler Only (Mode 1, Dry)
2006	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold (Pre-Set, e.g., 10%) and CoiledB is Greater than CoiledB_SP_1D But no Greater than CoiledB_SP_3D (CoiledB Setpoint for Mode 3 (Dry))		1910 - Fluid Cooler + PCM Discharging (Mode 3, dry)
2007	If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_1D But no Greater than CoiledB_SP_3D, or if CoiledB is Greater than CoiledB_SP_3D but no Greater than CoiledB_SP_2D (CoiledB Setpoint for Mode 2 (Dry))		1906 - Fluid Cooler + Chiller (Mode 2, dry)
2008	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_2D But no Greater than CoiledB_SP_4D (CoiledB Setpoint for Mode 4 (dry))		1914 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Dry)
(E)	(F)	(G)	(H)

FIG. 87 (Continued)

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(E)	(F)	(G)	(H)
2009	(If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_2D But no Greater than CoiledB_SP_4D, or if CoiledB is Greater than CoiledB_SP_4D But no Greater than CoiledB_SP_1W (CoiledB Setpoint for Mode 1 (Wet)) and Air Dry Bulb is no less than Dry Switch Point		1904 - Fluid Cooler Only (Mode 1, Wet)
2010	(If Current PCM Inventory is no less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_1W but no Greater than CoiledB_SP_3W (CoiledB Setpoint for Mode 3 (Wet)) and Air Dry bulb is no Less than Dry Switch Point		1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)
2011	((If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_1W But no Greater than CoiledB_SP_3W), Or if CoiledB is Greater than CoiledB_SP_3W But no Greater than CoiledB_SP_2W (CoiledB Setpoint for Mode 2 (wet)), or if CoiledB is Greater than CoiledB_SP_2W but Current PCM Inventory is Less than the PCM Inventory Discharging Threshold) and Air Dry Bulb is no Less than Dry Switch Point		1908 - Fluid Cooler + Chiller (Mode 2, Wet)
2012	(If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_2W and Air Dry Bulb is no Less than Dry Switch Point		1916 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, wet)

FIG. 87 (Continued)

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**Control Method - Water Saving with Cooling Load
Determination of Next Operating Mode - 1 of 3**

Ref.	Current Mode	Condition	Next Mode
2013	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range (Pre-Set, e.g., 3.6F))	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)
2014	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry)	If Current PCM Inventory is 100%	1902 - Fluid Cooler Only (Mode 1, Dry)
2015	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry)
2016	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is No Less than Dry Switch Point	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)
2017	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	If Current PCM Inventory is 100%, or (If Current PCM Inventory is Less than 100% and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is No Less than Dry Switch Point)	1902 - Fluid Cooler Only (Mode 1, Dry)

FIG. 88A

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(A)	(B)	(C)	(D)	(E)
2018	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	If Current PCM Inventory is Less than 100% and supply temperature is Lower than (Supply Temperature Setpoint - Control Range)	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	
2019	1924 - Fluid Cooler + PCM Charging (Mode 8, wet)	If Current PCM Inventory is less than 100% and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is No Less than Dry Switch Point	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	
2020	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	If Current PCM inventory is 100%, or (If Current PCM Inventory is Less than 100% and Supply Temperature is greater than (Supply Temperature Setpoint + Control Range) and EDB is No Less than Dry Switch Point)	1902 - Fluid Cooler Only (Mode 1, Dry)	
2021	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	If Current PCM Inventory is Less than 100% and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and EDB is No Less than Dry Switch Point	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	
2022	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	If Current PCM Inventory is 100%, or If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range)	1902 - Fluid Cooler Only (Mode 1, Dry)	

FIG. 88A (Continued)

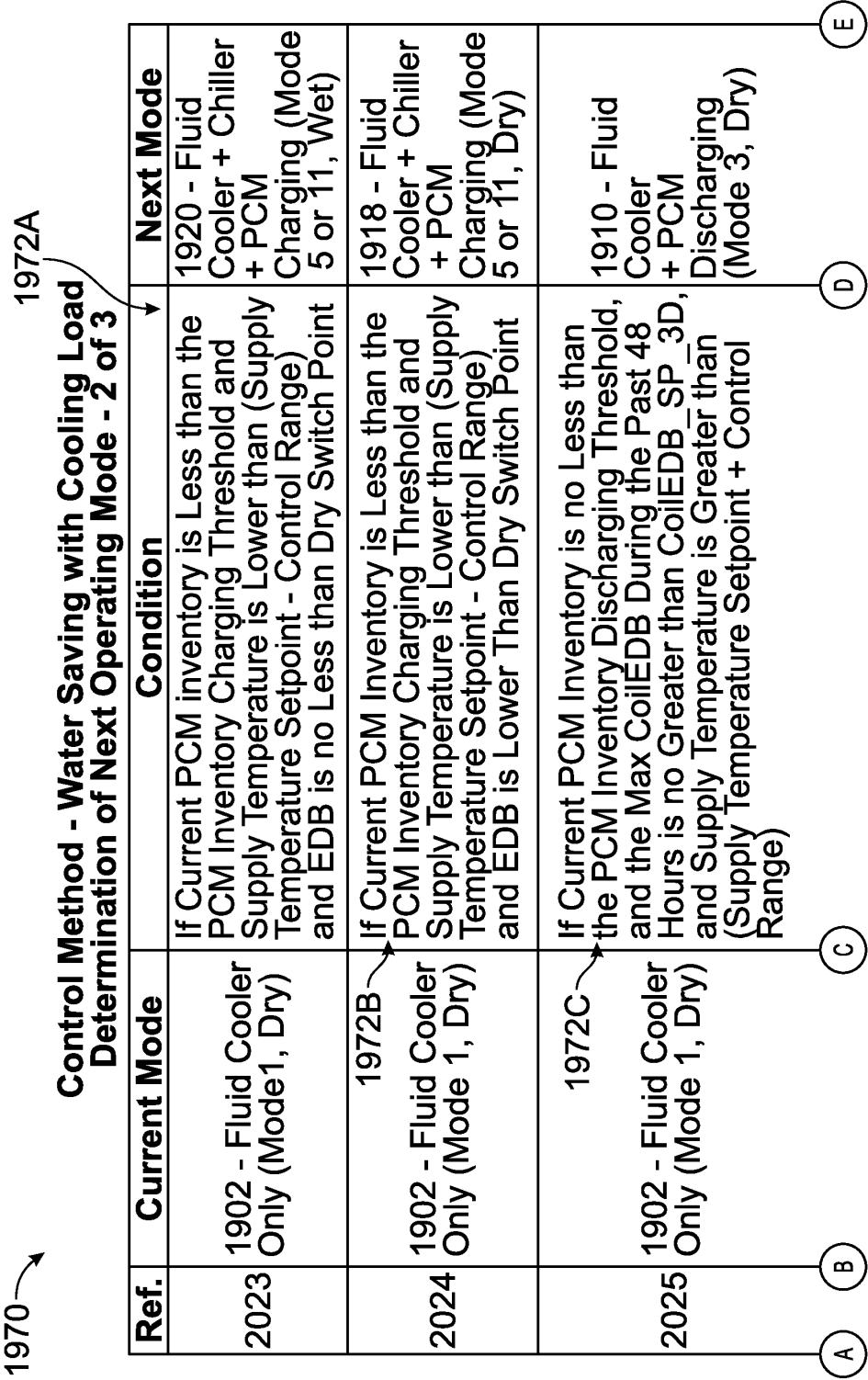


FIG. 88B

(A)	(B)	(C)	(D)	(E)
2026	1902 - Fluid Cooler Only (Mode 1, Dry)	1972D (If Current PCM Inventory is Less than the Max CoiledB Discharging Threshold or Hours is Greater than CoiledB_SP_3D) and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range)	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
2027	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	1902 - Fluid Cooler Only (Mode 1, Dry)	
2028	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range)	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
2029	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply Temperature Setpoint - Control range)	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)	
2030	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	1902 - Fluid Cooler Only (Mode 1, Dry)	

FIG. 88B
(Continued)

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(F)	(G)	(H)	(I)	(J)
2031	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold, and the Max CoiledB During the Past 48 hours is No Greater than CoiledB_SP_4D, and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range)	1914 - Fluid Cooler + Chiller + PCM Discharge (Mode 4 or 7, Dry)	
2032	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	(If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold or the Max CoiledB During the Past 48 Hours is Greater than CoiledB_SP_4D) and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)	
2033	1914 - Fluid Cooler + Chiller + PCM Discharge (Mode 4 or 7, Dry)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
2034	1914 - Fluid Cooler + Chiller + PCM Discharge (Mode 4 or 7, Dry)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)	

FIG. 88B
(Continued)

1970 →

Control Method - Water Saving with Cooling Load Determination of Next Operating Mode - 3 of 3			
Ref.	Current Mode	Description	Next Mode
2035	1904 - Fluid Cooler Only (Mode 1, Wet)	If Current PCM inventory is no less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	1914 - Fluid Cooler + Chiller + PCM Discharge (Mode 4 or 7, Dry)
2036	1904 - Fluid Cooler Only (Mode 1, Wet)	If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply temperature Setpoint - Control Range)	1906 - Fluid Cooler + Chiller (Mode 2, Dry)
2037	1904 - Fluid Cooler Only (Mode 1, Wet)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold, and the Max CoilEDB During the Past 48 Hours is no Greater than CoilEDB_SP_3W, and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range), and EDB is no Less than Dry Switch Point	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)

A

B

C

D

E

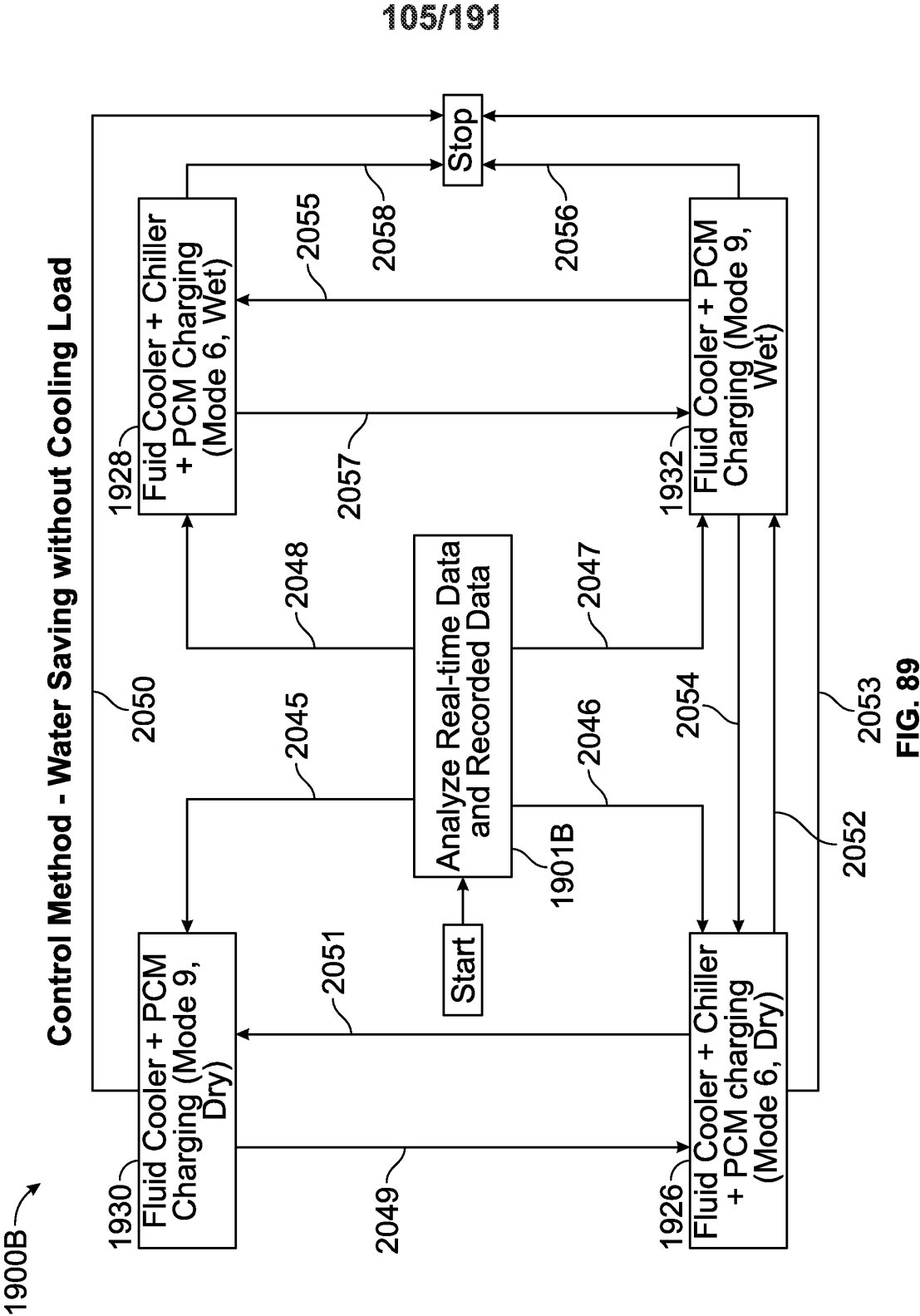
FIG. 88C

(A)	(B)	(C)	(D)	(E)
2038	1904 - Fluid Cooler Only (Mode 1, Wet)	(If Current PCM inventory is Less than the PCM Inventory Discharging Threshold or the Max CoiledB During the Past 48 Hours is Greater than CoiledB_SP_3W) and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	
2039	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and EDB is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)	
2040	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	
2041	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply temperature Setpoint - Control Range) and EDB is no Less than Dry Switch Point	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)	
(F)	(G)	(H)	(I)	(J)

FIG. 88C
(Continued)

(F)	(G)	(H)	(I)	(J)
2042	1908 - Fluid Cooler + Chiller (Mode 2, Wet)		If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and EDB is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)
2043	1908 - Fluid Cooler + Chiller (Mode 2, Wet)		If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1916 - Fluid Cooler + Chiller + PCM Discharge (Mode 4 or 7, Wet)
2044	1916 - Fluid Cooler + Chiller + PCM Discharge (Mode 4 or 7, Wet)		(If Current PCM Inventory is 0% or Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)) and EDB is no Less than Dry Switch Point	1908 - Fluid Cooler + Chiller (Mode 2, Wet)

FIG. 88C
(Continued)



1980

Control Method - Water Saving without Cooling Load
Determination of Initial Operating Mode

198119821984

1982A

Ref.	Condition	Initial Mode
2045	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is no Greater than CoiledB_SP_9D (CoiledB Setpoint for Mode 9 (Dry))	1930 - Fluid Cooler + PCM Charging (Mode 9, Dry)
2046	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is greater than CoiledB_SP_9D But no Greater than CoiledB_SP_6D (CoiledB Setpoint for Mode 6 (Dry))	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)
2047	If Current PCM inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_6D But no Greater than CoiledB_SP_9W (CoiledB Setpoint for Mode 9 (Wet)) and Air Dry Bulb is no Less than Dry Switch Point	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)
2048	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_9W But no Greater than CoiledB_SP_6W (CoiledB Setpoint for Mode 6 (Wet)) and Air Dry Bulb is no Less than Dry Switch Point	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Wet)

FIG. 90

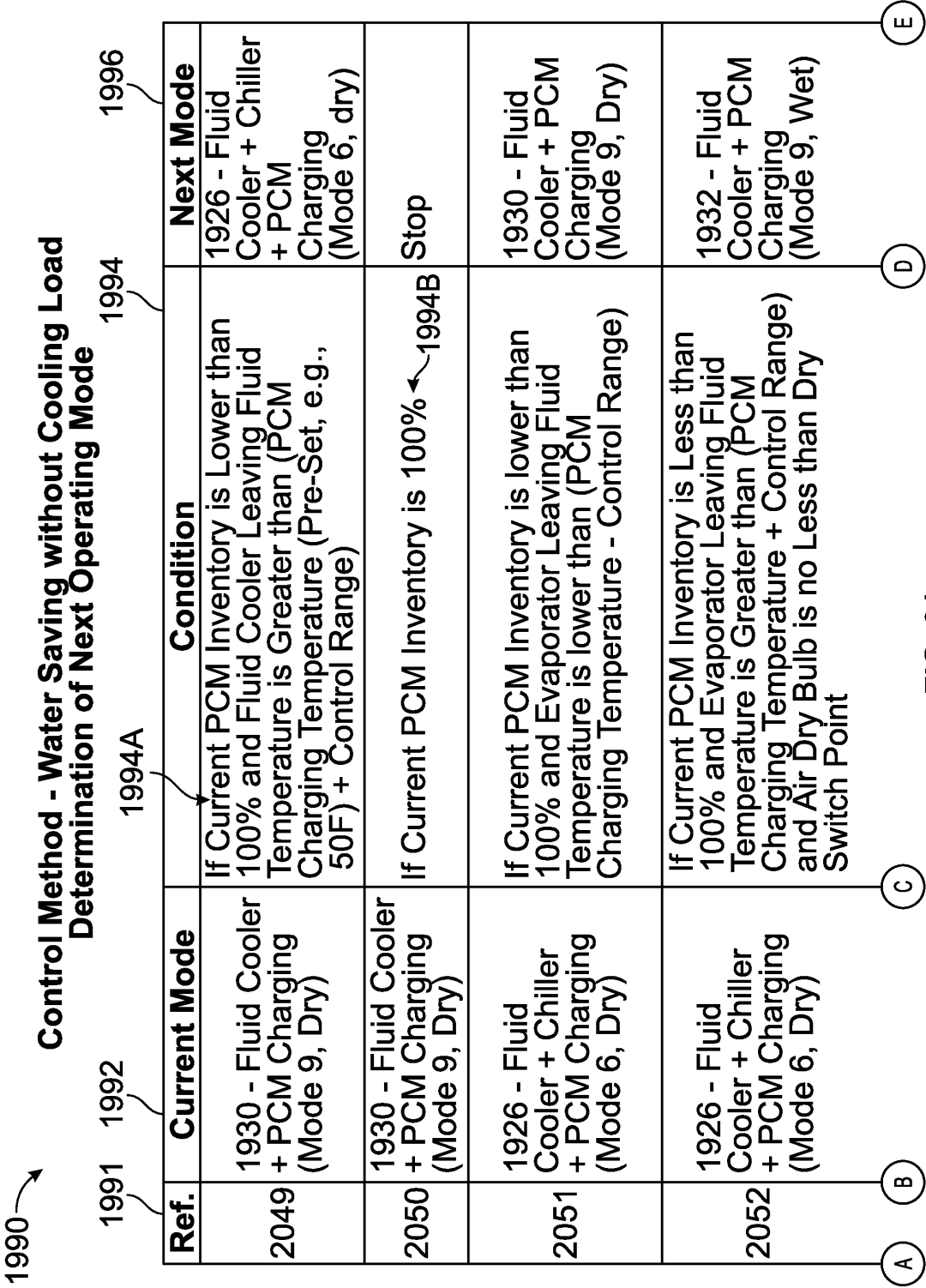


FIG. 91

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A	B	C	D	E
2053	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	If Current PCM Inventory is 100%, or (If Current PCM Inventory is less than 100% and Evaporator Leaving Fluid Temperature is Greater than (PCM Charging Temperature + Control Range) and Air Dry Bulb is Less than Dry Switch Point)	Stop	
2054	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	If Current PCM Inventory is Lower than 100% and Fluid Cooler Leaving Fluid Temperature is Lower than (PCM Charging Temperature - Control Range)	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	
2055	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	If Current PCM Inventory is Less than 100% and Fluid Cooler Leaving Fluid Temperature is Greater than (PCM Charging Temperature + Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, wet)	
2056	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	If Current PCM Inventory is 100%	Stop	
2057	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, wet)	If Current PCM Inventory is Less than 100% and Evaporator Leaving Fluid Temperature is Lower than (PCM Charging Temperature - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	
2058	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Wet)	If Current PCM Inventory is 100%	Stop	

FIG. 91 (Continued)

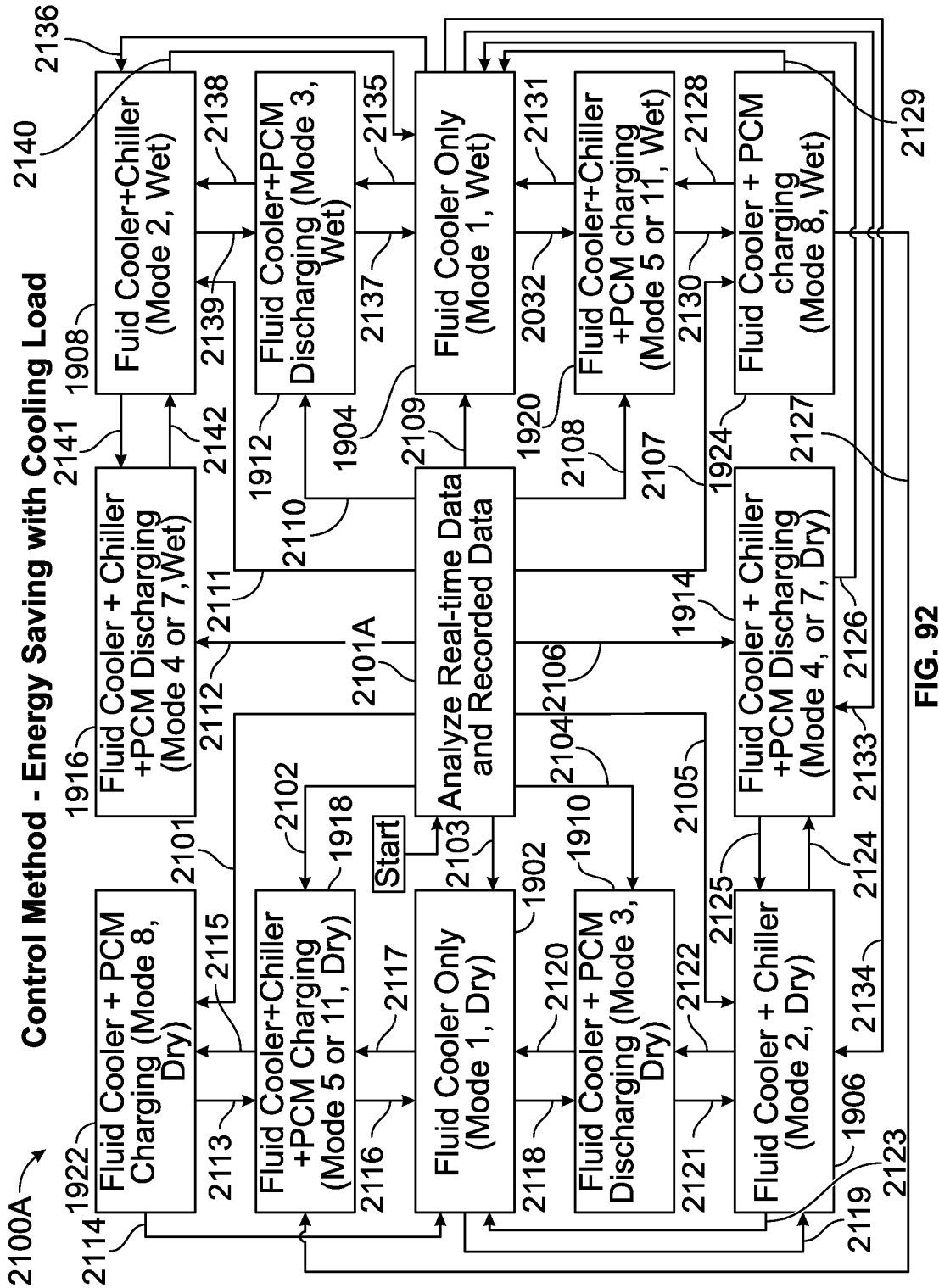


FIG. 92

2070

2072

2074

Control Method - Energy Saving with Cooling Load

2076

Determination of Initial Operating Mode

Ref.	Condition	Initial Mode
2101	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold (Pre-Set, e.g., 90% Inventory) and CoiledB (Air Temperature After the Pre-Cooling Pad But Before Fluid Cooling coil) is no Greater than CoiledB_SP_8D (CoiledB Setpoint for Mode 8 (Dry)) and Air Dry Bulb is Less than Dry Switch Point	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry) 2074A
2102	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_8D But no Greater than CoiledB_SP_5D (CoiledB Setpoint for Mode 5 (Dry)) and Air Dry Bulb is Less than Dry Switch Point	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)
2103	((If Current PCM inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_5D) or (if Current PCM Inventory is no Less than the PCM Inventory Charging Threshold and CoiledB is no Greater than CoiledB_SP_1D (CoiledB Setpoint for Mode 1 (dry))) and Air Dry bulb is Less than Dry Switch Point	1902 - Fluid Cooler Only (Mode 1, Dry)
2104	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold (Pre-Set, e.g., 10%) and CoiledB is Greater than CoiledB_SP_1D But no Greater than CoiledB_SP_3D (CoiledB Setpoint for Mode 3 (Dry)) Air Dry Bulb is Less than Dry Switch Point	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)

A

B

C

D

FIG. 93

(A)	(B)	(C)	(D)
2105	(If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and (CoilEDB is Greater than CoilEDB_SP_1D But no Greater than CoilEDB_SP_3D or if CoilEDB is Greater than CoilEDB_SP_3D But no Greater than CoilEDB_SP_2D (CoilEDB Setpoint for Mode 2 (Dry))) and Air Dry Bulb is Less than Dry Switch Point	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
2106	(If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and CoilEDB is Greater than CoilEDB_SP_2D But no Greater than CoilEDB_SP_4D (CoilEDB Setpoint for Mode 4 (Dry)) and Air Dry Bulb is Less than Dry Switch Point	1914 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Dry)	
2107	(If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoilEDB is no Greater than CoilEDB_SP_8W (CoilEDB Setpoint for Mode 8 (wet)) and Air Dry Bulb is no Less than Dry Switch Point	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	
2108	(If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoilEDB is Greater than CoilEDB_SP_8W But no Greater than CoilEDB_SP_5W (CoilEDB Setpoint for Mode 5 (Wet)) and Air Dry Bulb is no Less than Dry Switch Point	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	
(E)	(F)	(G)	(H)

FIG. 93 (Continued)

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(E)	(F)	(G)	(H)
2109	((If current PCM inventory is less than the PCM Inventory Charging Threshold and CoiledB is greater than CoiledB_SP_5W) or (if current PCM inventory is no less than the PCM Inventory Charging Threshold and CoiledB is no greater than CoiledB_SP_1W (CoiledB setpoint for Mode 1 (wet))) and air dry bulb is no less than dry switch point		1904 - Fluid Cooler Only (Mode 1, Wet)
2110	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_1W But no Greater than CoiledB_SP_3W (CoiledB Setpoint for Mode 3 (wet)) and Air Dry Bulb is no Less than Dry Switch Point		1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)
2111	((If current PCM inventory is less than the PCM Inventory Discharging Threshold and CoiledB is greater than CoiledB_SP_1W but no greater than CoiledB_SP_3W), or if CoiledB is greater than CoiledB_SP_3W but no greater than CoiledB_SP_2W (CoiledB setpoint for Mode 2 (wet)), or if CoiledB is greater than CoiledB_SP_2W but current PCM inventory is less than the PCM Inventory Discharging Threshold) and air dry bulb is no less than dry switch point		1908 - Fluid Cooler + Chiller (Mode 2, Wet)
2112	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and CoiledB is Greater than CoiledB_SP_2W and air Dry Bulb is no Less than Dry Switch Point		1916 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Wet)

FIG. 93 (Continued)

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Control Method - Energy Saving with Cooling Load Determination of Next Operating Mode - 1 of 3

2080	2082 2084	2086 2088	
Ref.	Current Mode	Description	Next Mode
2113	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is greater than (supply Temperature Setpoint + Control Range (Pre-set, e.g., 3.6F)) and Air Dry Bulb is Less than Dry Switch Point	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)
2114	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry)	If Current PCM Inventory is 100% and Air Dry Bulb is Less than Dry Switch Point	1902 - Fluid Cooler Only Mode (Mode 1, Dry)
2115	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1922 - Fluid Cooler + PCM Charging (Mode 8, Dry)
2116	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is Greater than (Supply Temperature setpoint + Control Range) and Air Dry Bulb is Less than Dry Switch Point	1902 - Fluid Cooler Only (Mode 1, Dry)
A	B	C	D
			E

FIG. 94A

(A)	(B)	(C)	(D)	(E)
2117	1902 - Fluid Cooler Only (Mode 1, Dry)	If Current PCM Inventory is Less than 100% and Supply Temperature is Lower than (Supply Temperature Setpoint - Control range) and Air Dry Bulb is less than Dry Switch Point	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)	
2118	1902 - Fluid Cooler Only (Mode 1, Dry)	If Current PCM Inventory is no Less than the PCM Inventory Charging Threshold, and the Max CoiledB During the Past 48 Hours is no Greater than CoiledB_SP_3D, and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is Less than Dry Switch Point	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)	
2119	1902 - Fluid Cooler Only (Mode 1, Dry)	(If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold or the Max CoiledB During the past 48 Hours is Greater than CoiledB_SP_3D) and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is Less than Dry Switch Point	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
(F)	(G)	(H)	(I)	(J)

FIG. 94A
(Continued)

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(F)	(G)	(H)	2086A	(I)	(J)
2120	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)		If Supply Temperature is Lower than (Supply Temperature setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1902- Fluid Cooler Only (Mode 1, Dry)	
2121	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)		If Supply Temperature is Greater than (Supply Temperature setpoint + Control Range) and Air Dry Bulb is Less than Dry Switch Point ← 2086B	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
2122	1906 - Fluid Cooler + Chiller (Mode 2, Dry)		If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply Temperature Setpoint - Control range) and Air Dry Bulb is Less than Dry Switch Point	1910 - Fluid Cooler + PCM Discharging (Mode 3, Dry)	
2123	1906 - Fluid Cooler + Chiller (Mode 2, Dry)		If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (supply Temperature Setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1902 - Fluid Cooler Only (Mode 1, Dry)	
2124	1906 - Fluid Cooler + Chiller (Mode 2, Dry)		If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is Less than Dry Switch Point	1914 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Dry)	

FIG. 94A
(Continued)

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2080 → **Control Method - Energy Saving with Cooling Load
Determination of Next Operating Mode - 2 of 3**

Ref.	Current Mode	Condition	Next Mode
2125	1914-Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, dry)	If Supply Temperature is Less than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1906 - Fluid Cooler + Chiller (Mode 2, Dry)
2126	1914-Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, dry)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)
2127	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	If Current PCM Inventory is Less than 100% and Supply Temperature is Less than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1918 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Dry)
2128	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	If Current PCM Inventory is Less than 100% and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)

FIG. 94B

(A)	(B)	(C)	(D)	(E)
2129	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	If Current PCM Inventory is 100% and Air Dry Bulb is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)	(E)
2130	1920-Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	If Current PCM Inventory is Less than 100% and Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1924 - Fluid Cooler + PCM Charging (Mode 8, Wet)	
2131	1920-Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	(If Current PCM Inventory is 100% or Supply Temperature is Greater than (Supply Temperature setpoint + Control Range)) and Air Dry Bulb is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)	
2132	1904-Fluid Cooler Only (Mode 1, Wet)	If Current PCM inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Lower than (Supply Temperature setpoint - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1920 - Fluid Cooler + Chiller + PCM Charging (Mode 5 or 11, Wet)	
(F)	(G)	(H)	(I)	(J)

FIG. 94B
(Continued)

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(F)	(G)	(H)	(I)	(J)
2133	1904-Fluid Cooler Only (Mode 1, Wet)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Less than (Supply temperature Setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1914 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Dry)	
2134	1904-Fluid Cooler Only (Mode 1, Wet)	If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Less than (Supply Temperature setpoint - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1906 - Fluid Cooler + Chiller (Mode 2, Dry)	
2135	1904-Fluid Cooler Only (Mode 1, Wet)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold, and the Max CoilEDB During the past 48 Hours is no Greater than CoilEDB_SP_3W and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)	
2136	1904-Fluid Cooler Only (Mode 1, Wet)	(If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold or the Max CoilEDB During the Past 48 Hours is Greater than CoilEDB_SP_3W) and Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	

FIG. 94B
(Continued)

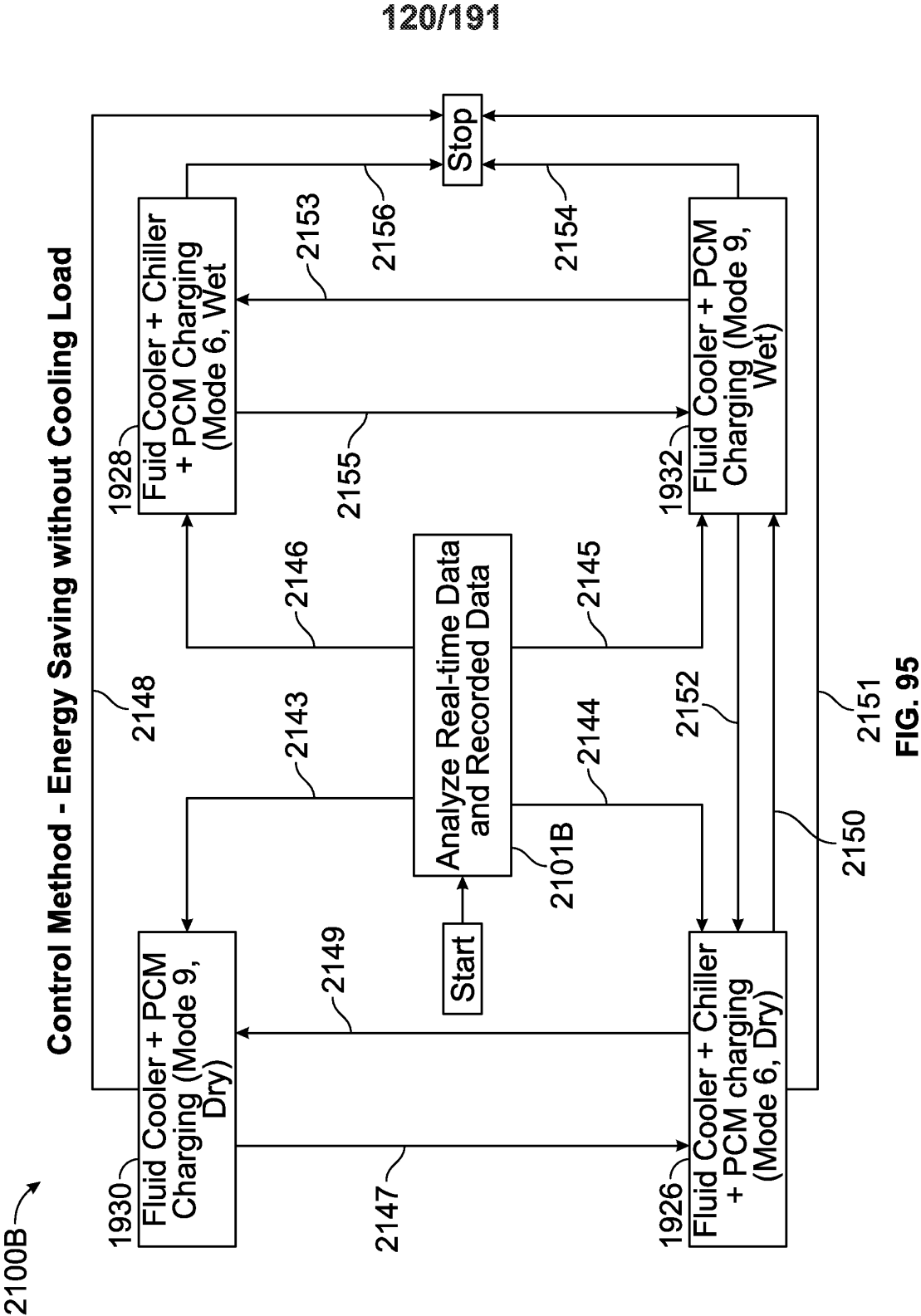
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2080 →

**Control Method - Energy Saving with Cooling Load
Determination of Next Operating Mode - 3 of 3**

Ref.	Current Mode	Condition	Next Mode
2137	1912 - Fluid Cooler + PCM Discharging (Mode 3, wet)	If Supply Temperature is Less than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)
2138	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1908 - Fluid Cooler + Chiller (Mode 2, Wet)
2139	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold and Supply Temperature is Less than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1912 - Fluid Cooler + PCM Discharging (Mode 3, Wet)
2140	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	If Current PCM Inventory is Less than the PCM Inventory Discharging Threshold and Supply Temperature is Less than (Supply Temperature Setpoint - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1904 - Fluid Cooler Only (Mode 1, Wet)
2141	1908 - Fluid Cooler + Chiller (Mode 2, Wet)	If Current PCM Inventory is no Less than the PCM Inventory Discharging Threshold And supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is no Less than Dry Switch Point	1916 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Wet)
2142	1916 - Fluid Cooler + Chiller + PCM Discharging (Mode 4 or 7, Wet)	(If Current PCM Inventory is 0% or Supply Temperature is less than (Supply Temperature Setpoint - Control Range)) and EDB is no Less than Dry Switch Point	1908 - Fluid Cooler + Chiller (Mode 2, Wet)

FIG. 94C



2180
2182
2184
2186

Control Method - Energy Saving without Cooling Load
Determination of Initial Operating Mode

Ref.	Condition	Initial Mode
2143	If current PCM inventory is less than the PCM Inventory Charging Threshold and CoiledB is no greater than CoiledB_SP_9D (CoiledB setpoint for Mode 9 (dry)) and air dry bulb is less than dry switch point	1930 - Fluid Cooler + PCM Charging (Mode 9, Dry)
2144	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_9D But no Greater than CoiledB_SP_6D (CoiledB Setpoint for Mode 6 (Dry)) and Air Dry Bulb is Less than Dry Switch Point	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)
2145	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is no Greater than CoiledB_SP_9W (CoiledB Setpoint for Mode 9 (Wet)) and Air Dry Bulb is no Less than Dry Switch Point	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)
2146	If Current PCM Inventory is Less than the PCM Inventory Charging Threshold and CoiledB is Greater than CoiledB_SP_9W But no Greater than CoiledB_SP_6W (CoiledB Setpoint for Mode 6 (Wet)) and Air Dry Bulb is no Less than Dry Switch Point	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Wet)

FIG. 96

2190

Control Method - Energy Saving without Cooling Load
Determination of Next Operating Mode

2192 2194 2196 2198

Ref.	Current Mode	Condition	Next Mode	
2147	1930 - Fluid Cooler + PCM Charging (Mode 9, Dry)	If Current PCM inventory is Lower than 100% and Fluid Cooler Leaving Fluid Temperature is Greater than (PCM Charging Temperature (Pre-Set, e.g., 50F) + Control Range) and Air Dry Bulb is Less than Dry Switch Point	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	
2148	1930 - Fluid Cooler + PCM Charging (Mode 9, Dry)	If Current PCM Inventory is 100%	2196A Stop	
2149	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	If Current PCM Inventory is Lower than 100% and Evaporator Leaving Fluid Temperature is Lower than (PCM Charging Temperature - Control Range) and Air Dry Bulb is Less than Dry Switch Point	1930 - Fluid Cooler + PCM Charging (Mode 9, Dry)	
2150	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	If Current PCM Inventory is Lower than 100% and Air Dry Bulb is no Less than Dry Switch Point	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	
A	B	C	D	E

FIG. 97

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(A)	(B)	(C)	(D)	(E)
2151	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	If Current PCM Inventory is 100%, or (If Current PCM Inventory is Less than 100% and Evaporator Leaving Fluid Temperature is Greater than (PCM Charging Temperature + Control Range) and Air Dry Bulb is Less than Dry Switch Point)	Stop	
2152	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	If Current PCM Inventory is Lower than 100% and Air Dry Bulb is Less than Dry Switch Point	1926 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Dry)	
2153	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	If Current PCM Inventory is Less than 100% and Fluid Cooler Leaving Fluid Temperature is Greater than (PCM Charging Temperature + Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1928- Fluid Cooler + Chiller + PCM Charging (Mode 6, Wet)	
2154	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	If Current PCM Inventory is 100%	Stop	
2155	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Wet)	If Current PCM Inventory is Less than 100% and Evaporator Leaving Fluid Temperature is Lower than (PCM Charging Temperature - Control Range) and Air Dry Bulb is no Less than Dry Switch Point	1932 - Fluid Cooler + PCM Charging (Mode 9, Wet)	
2156	1928 - Fluid Cooler + Chiller + PCM Charging (Mode 6, Wet)	If Current PCM Inventory is 100%	Stop	

FIG. 97 (Continued)

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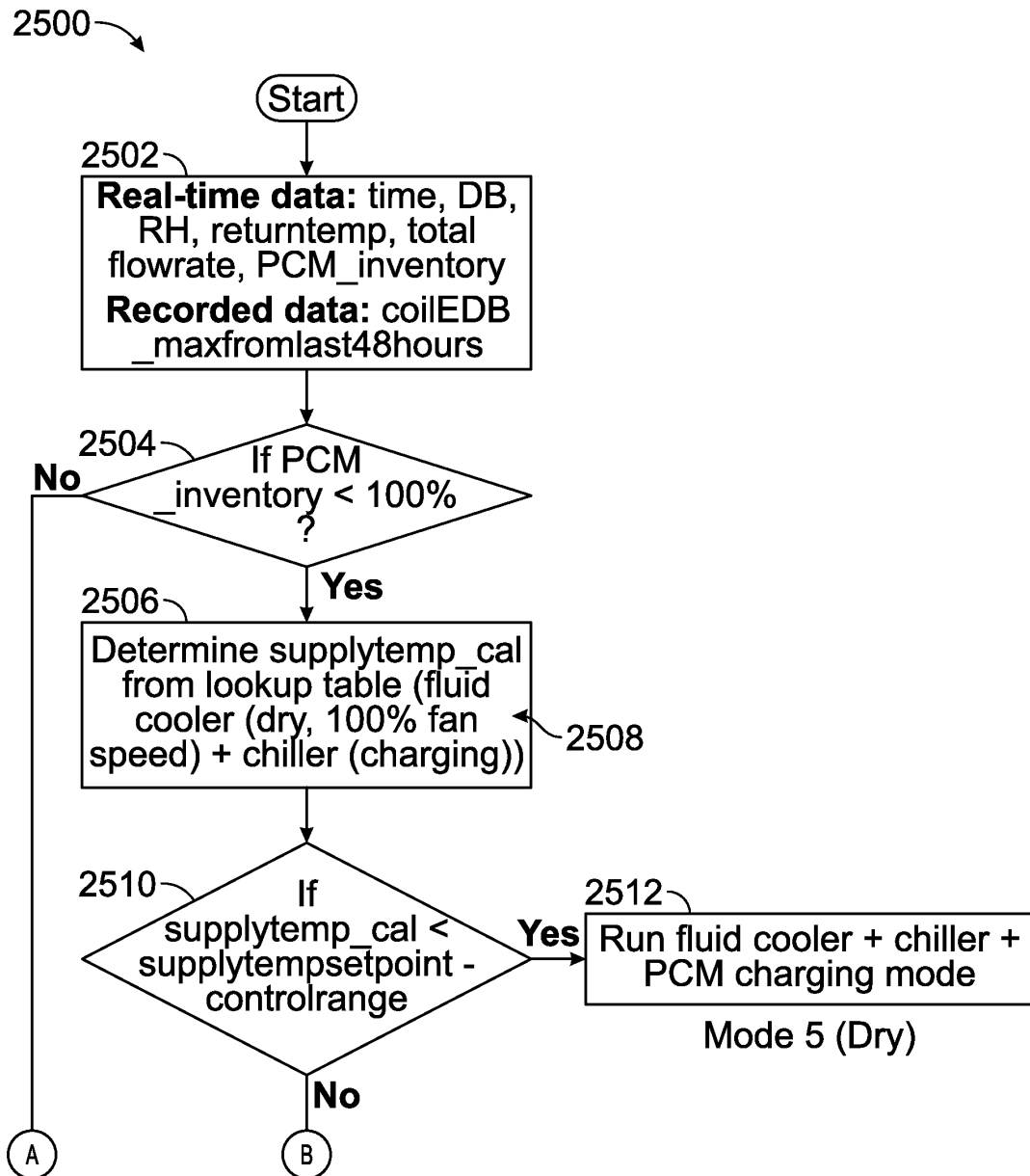


FIG. 98A

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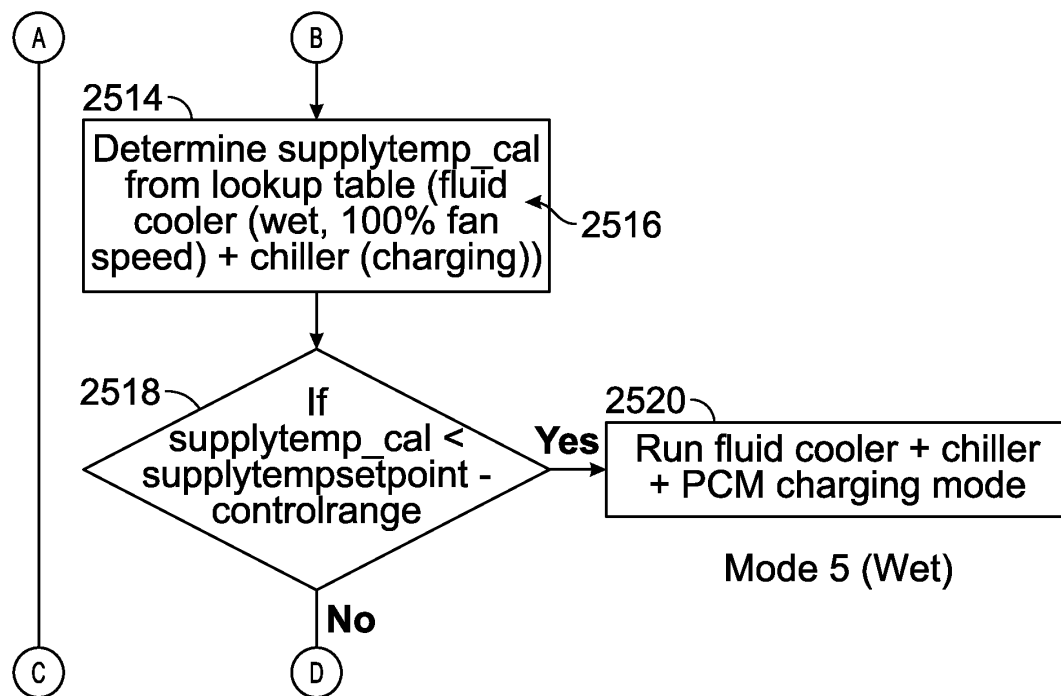
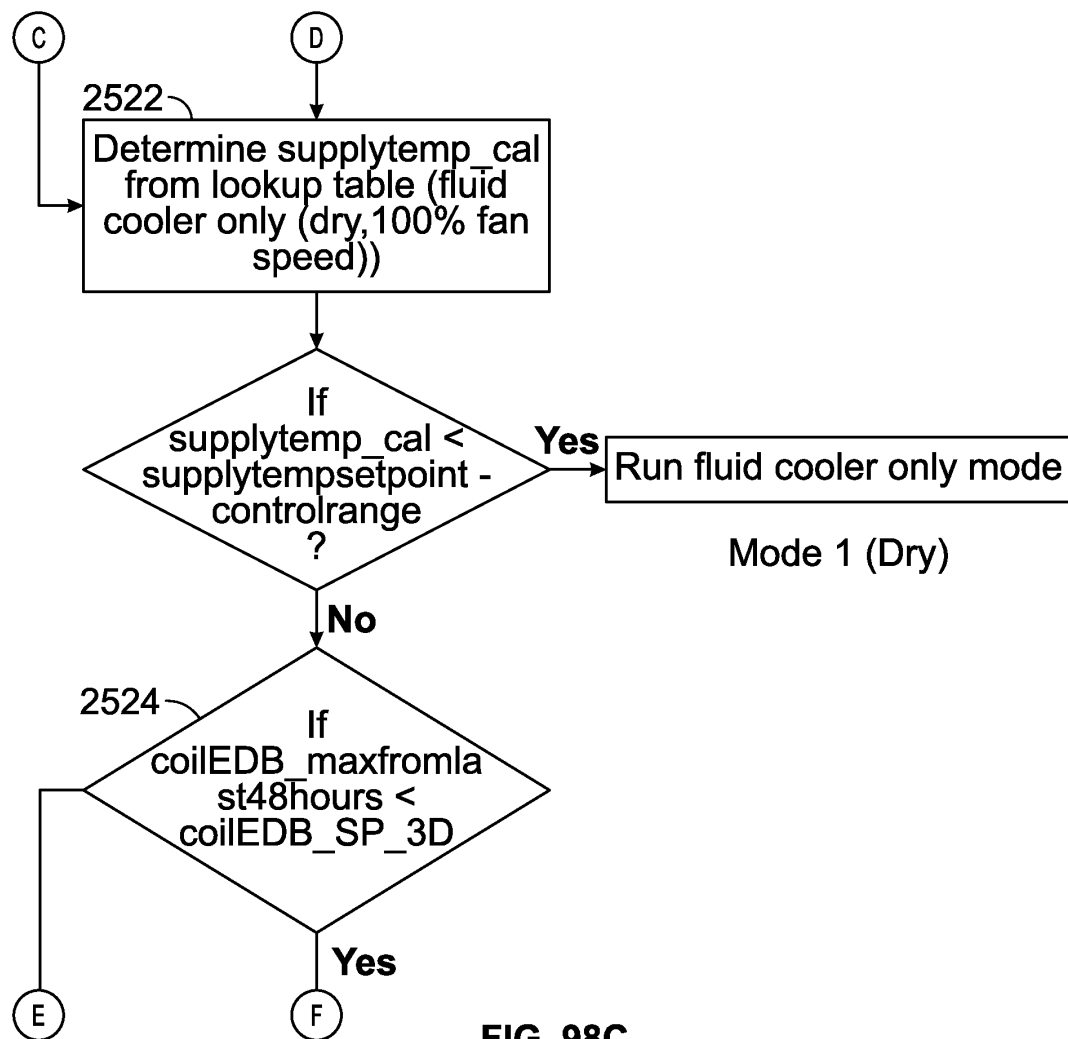


FIG. 98B

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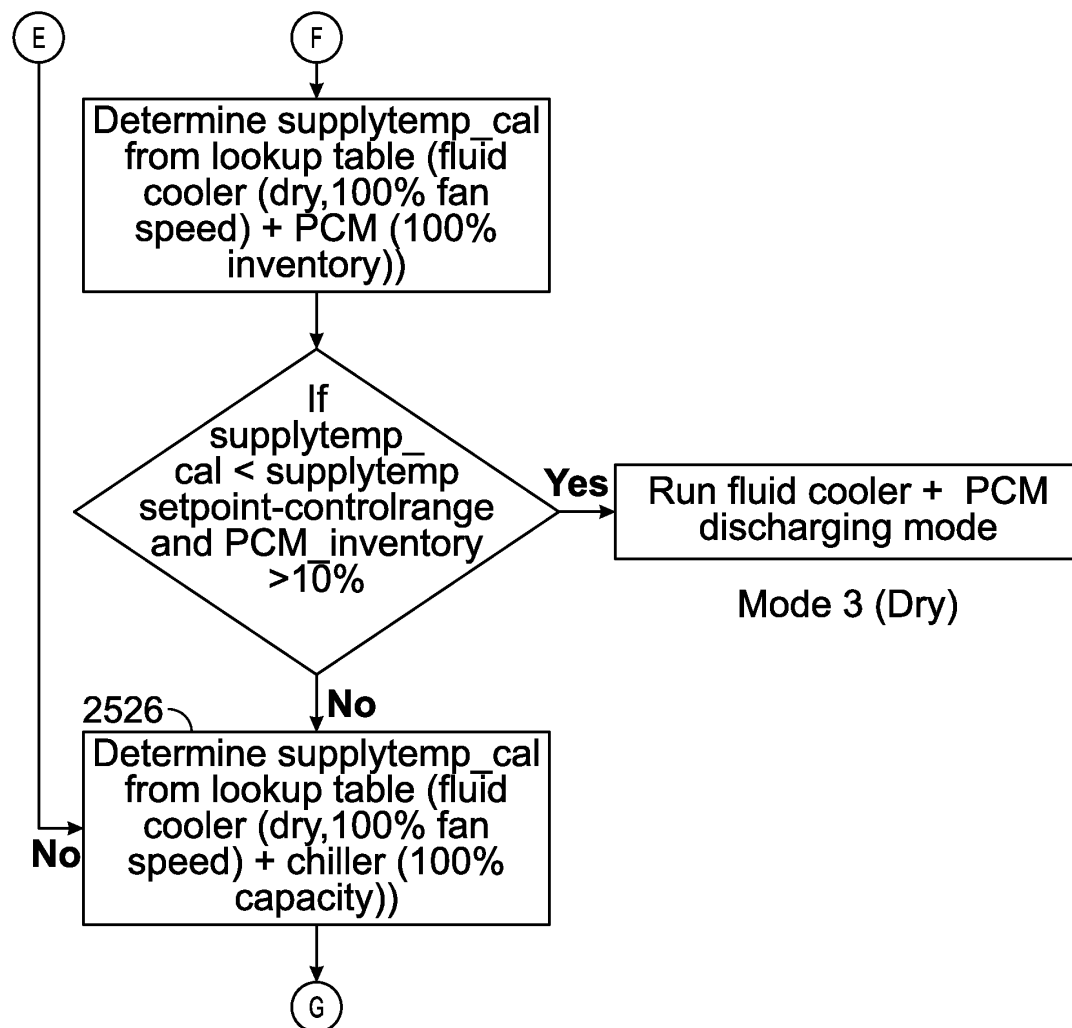


FIG. 98D

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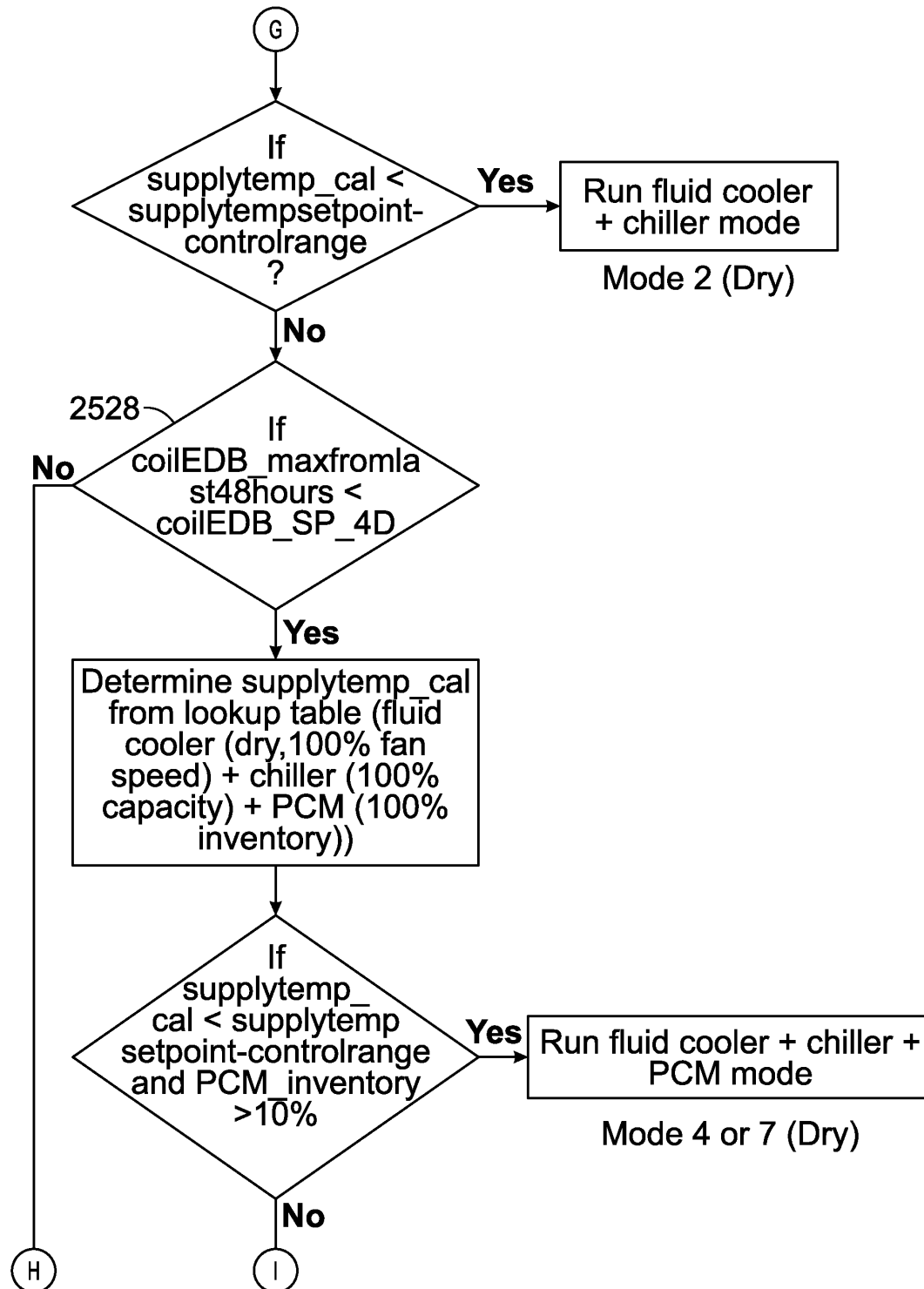


FIG. 98E

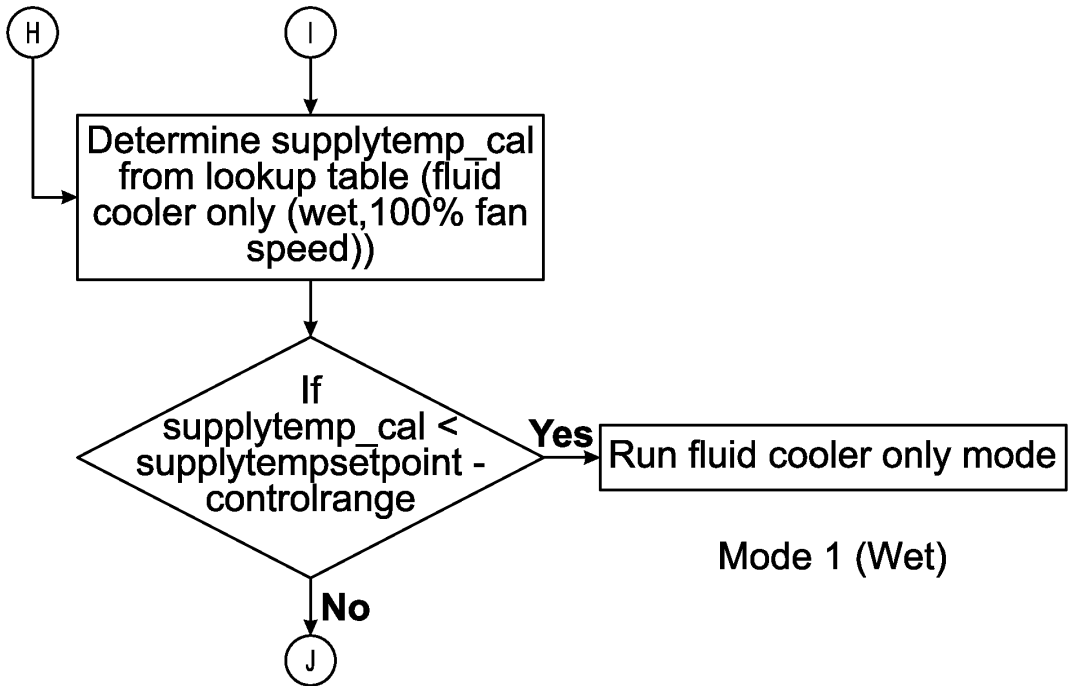


FIG. 98F

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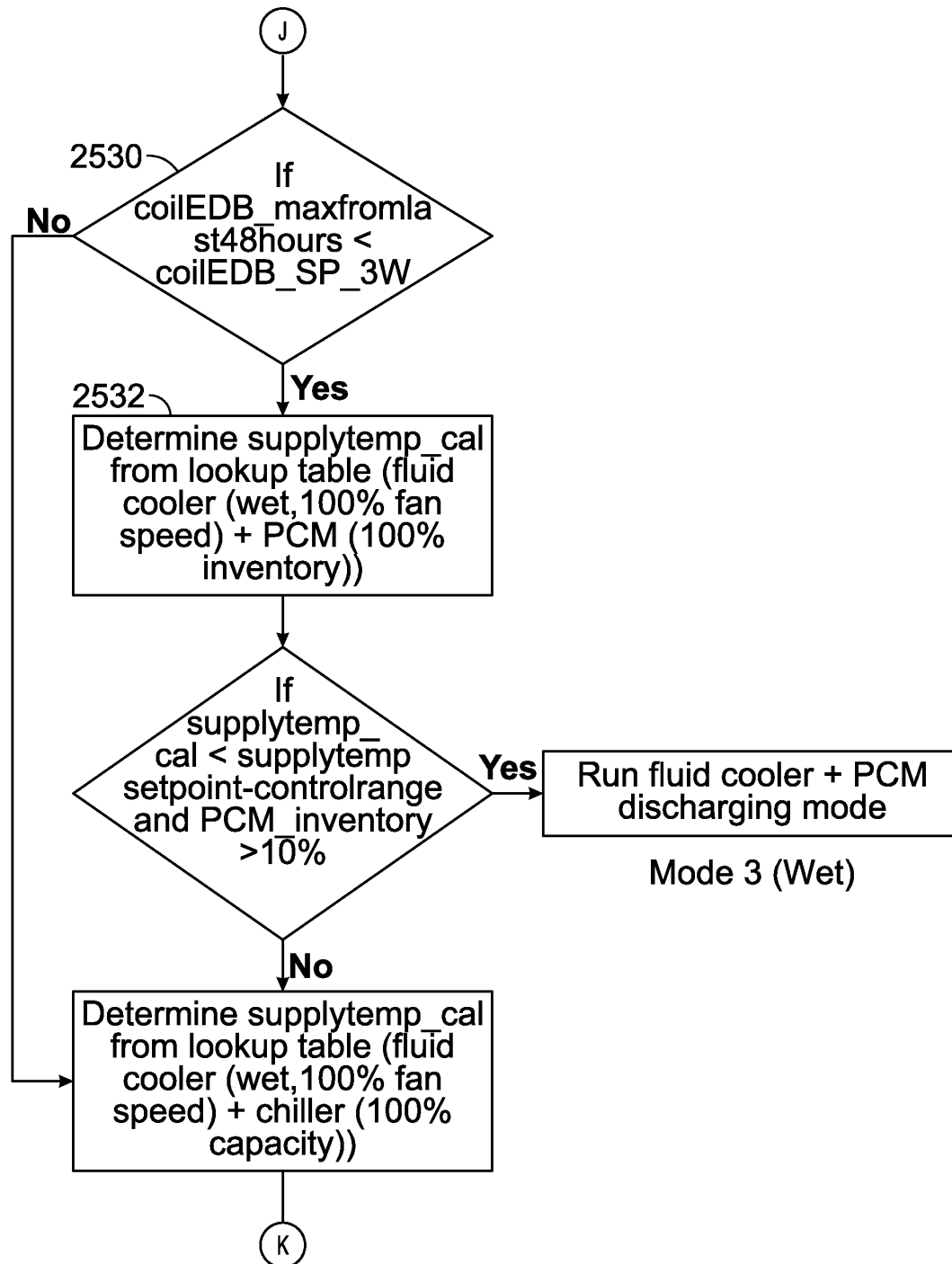


FIG. 98G

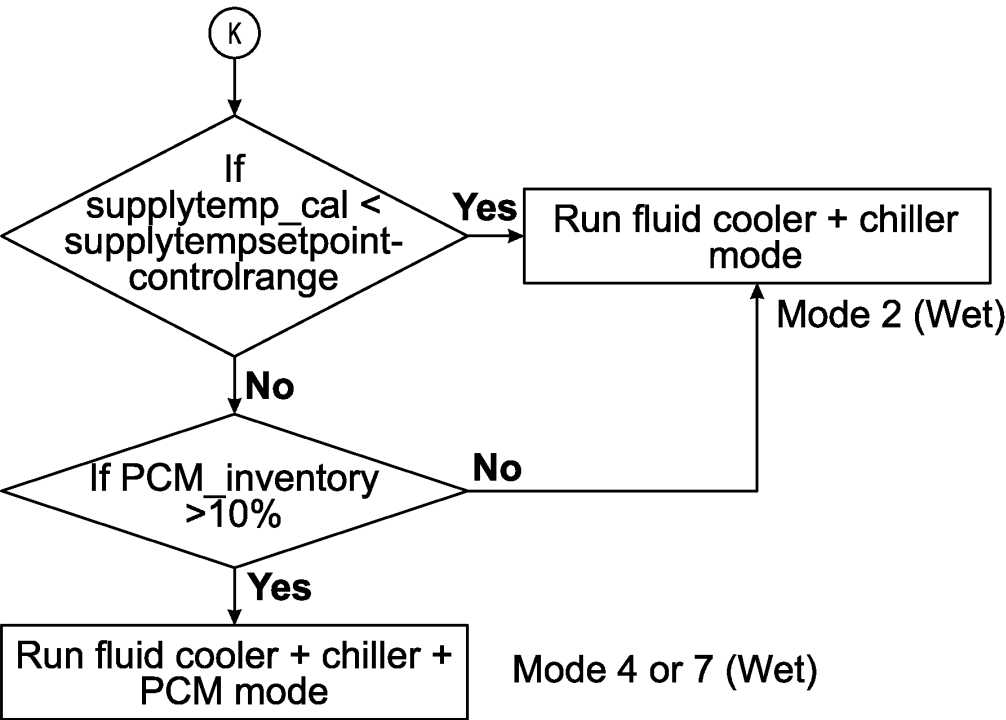


FIG. 98H

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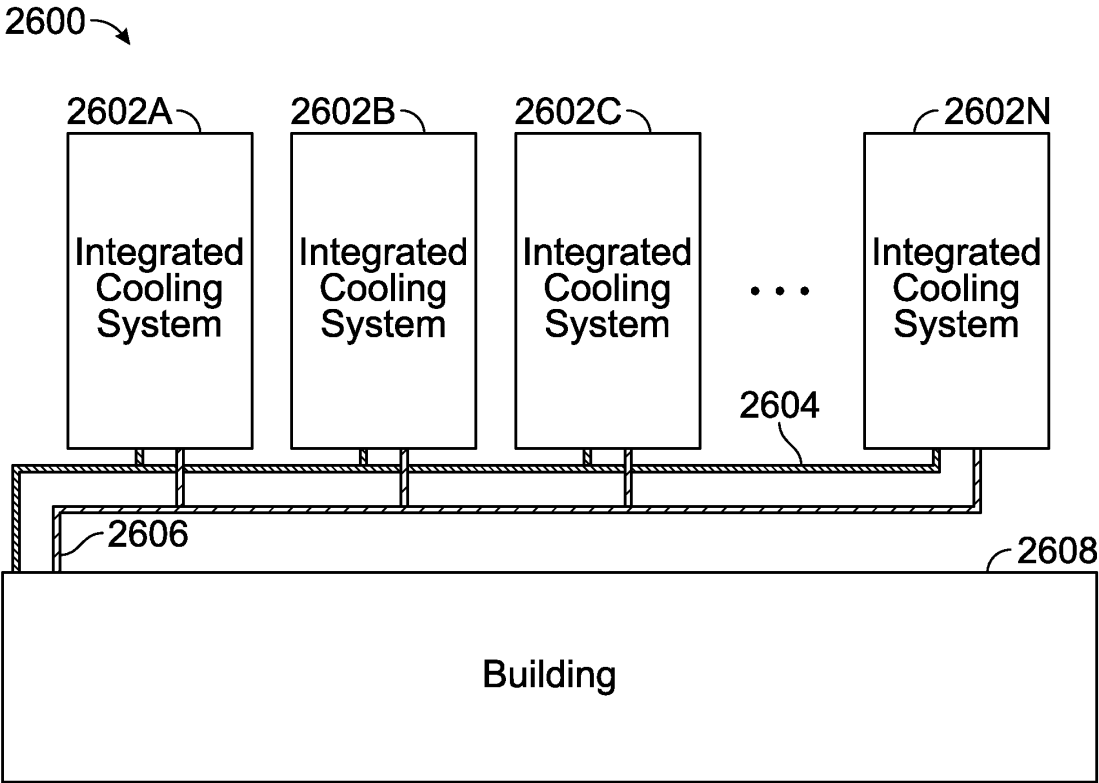


FIG. 99

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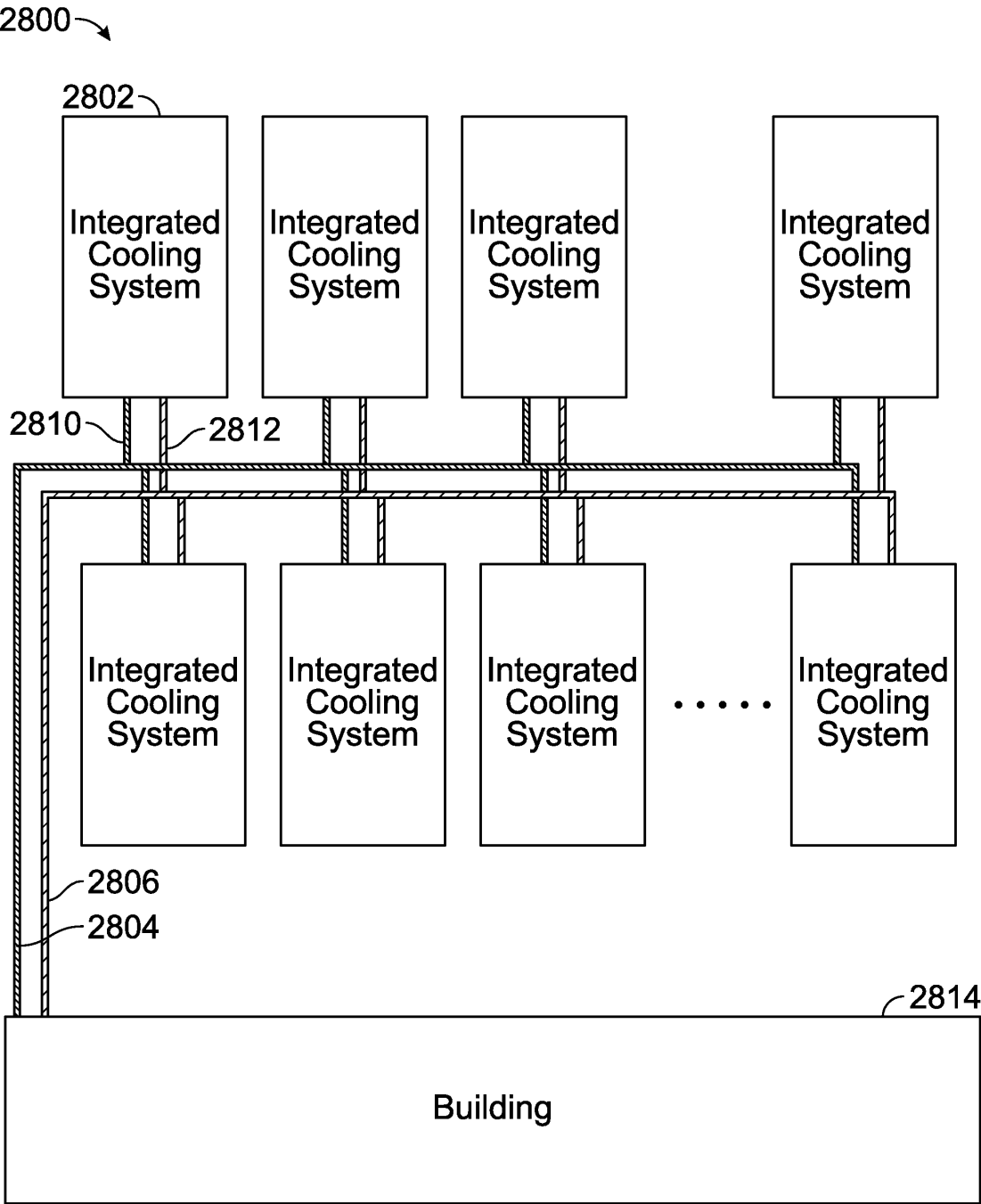


FIG. 100

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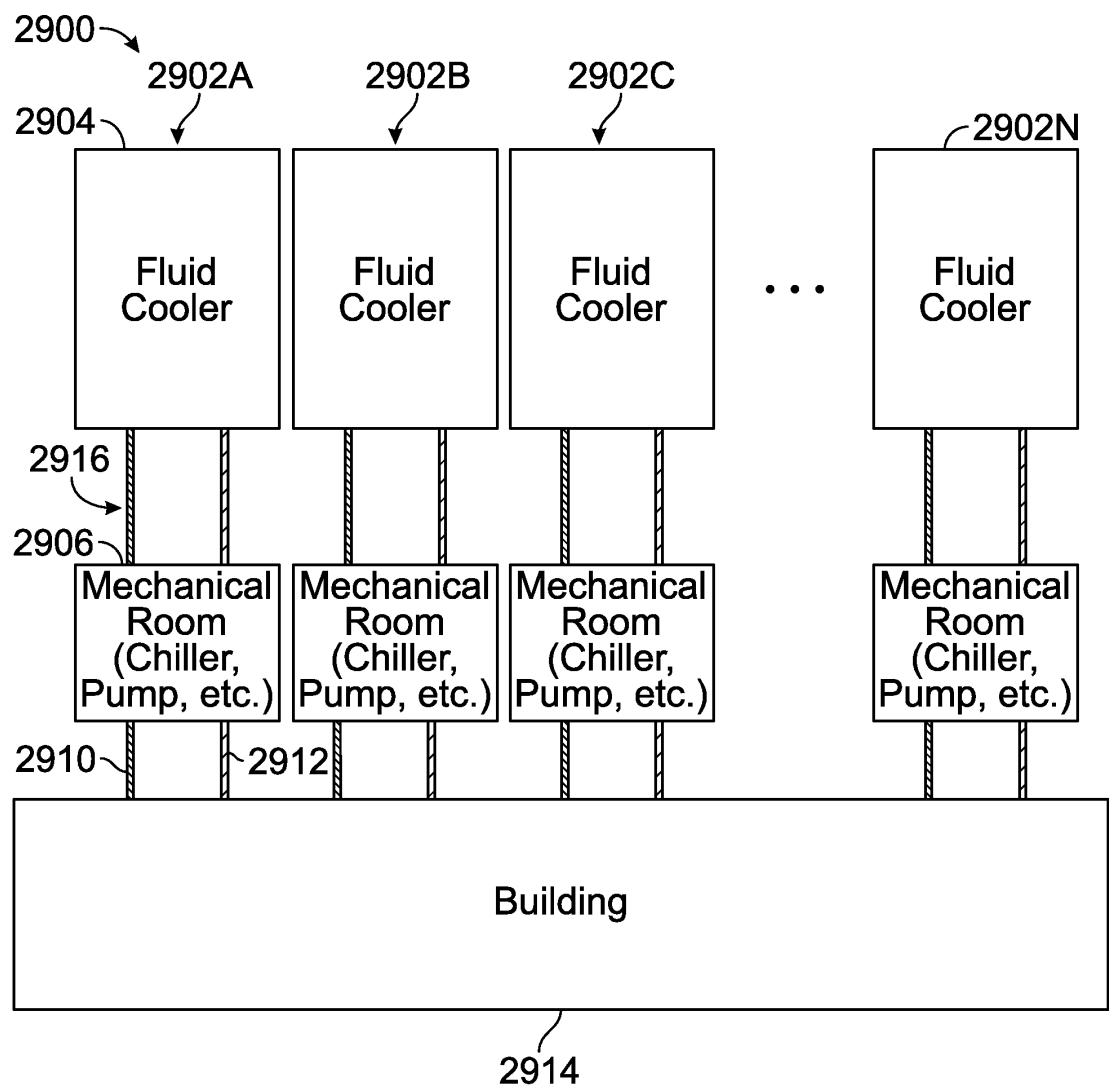


FIG. 101

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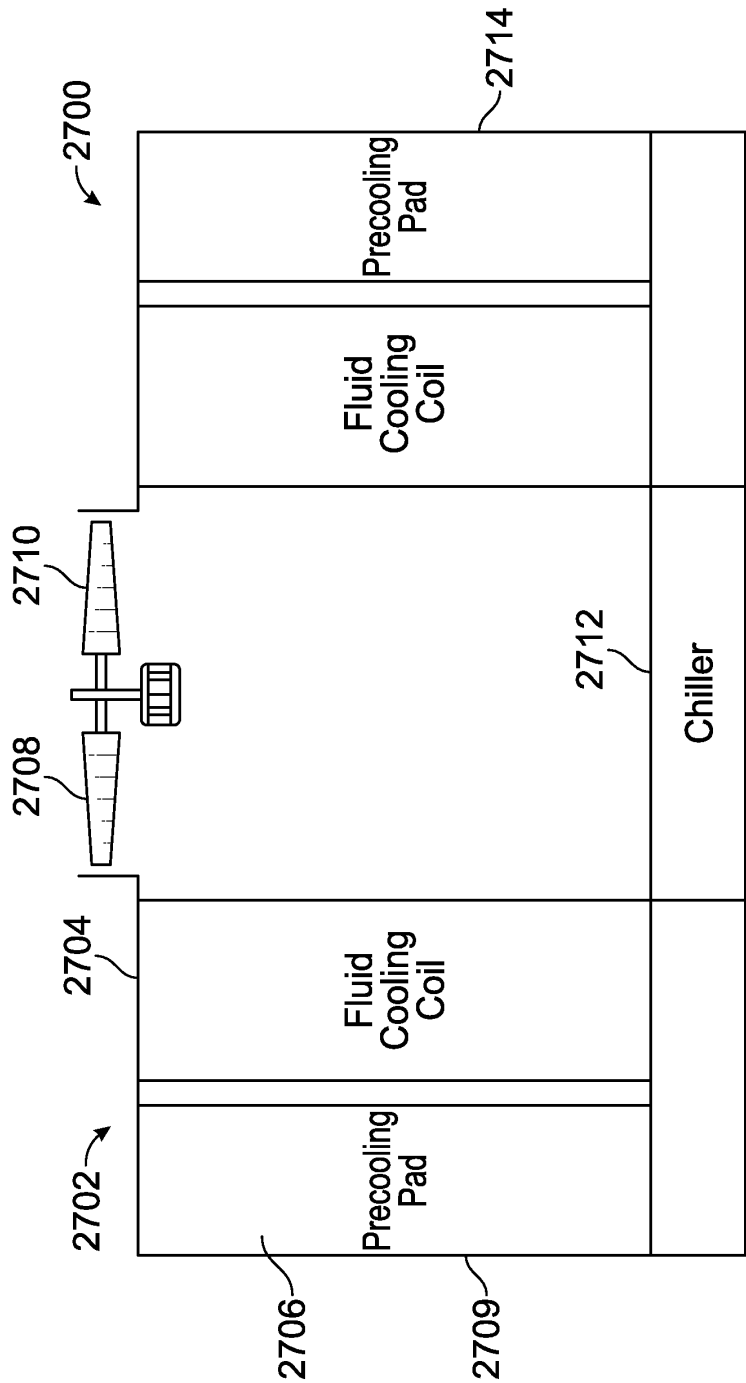
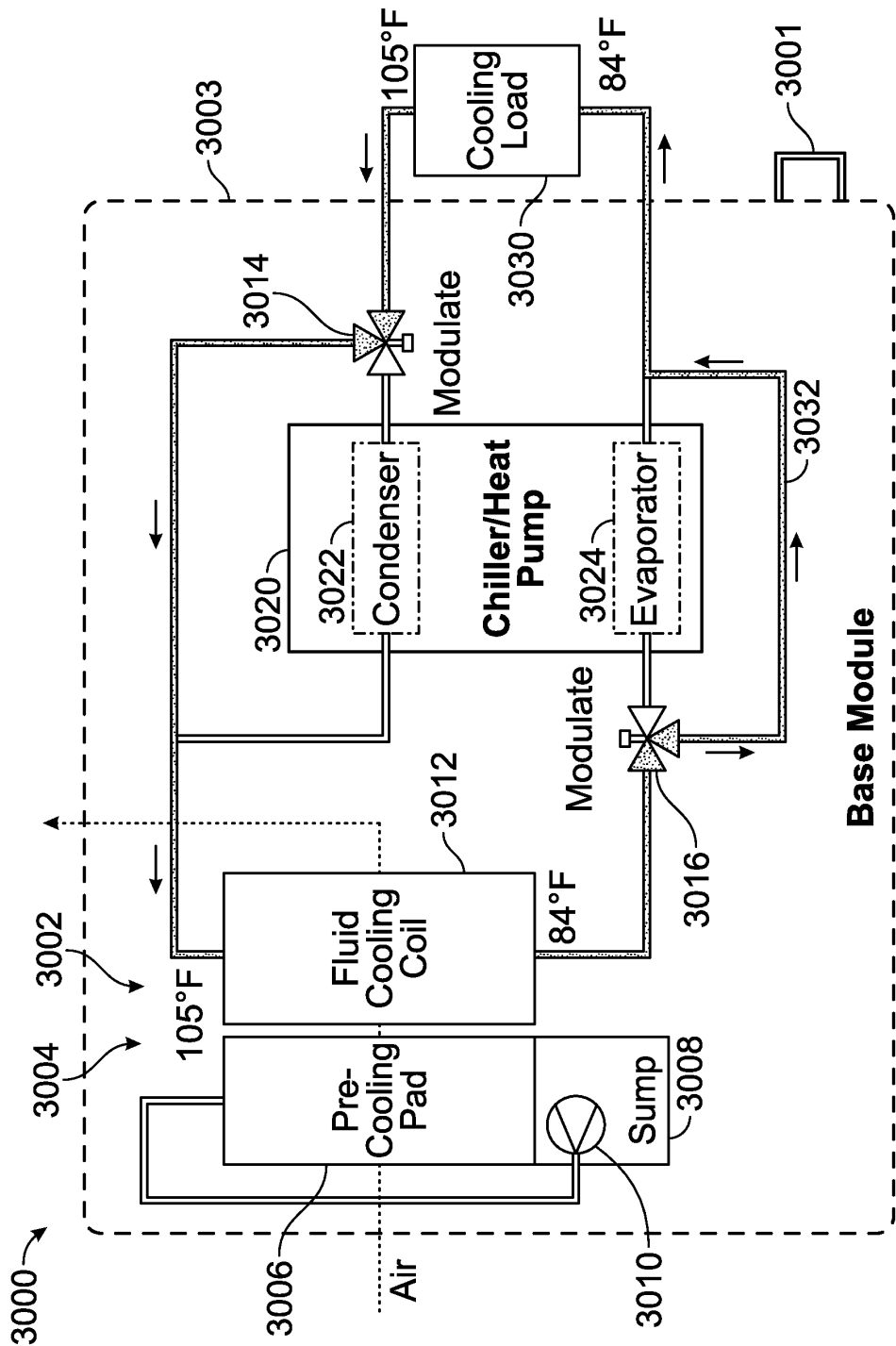


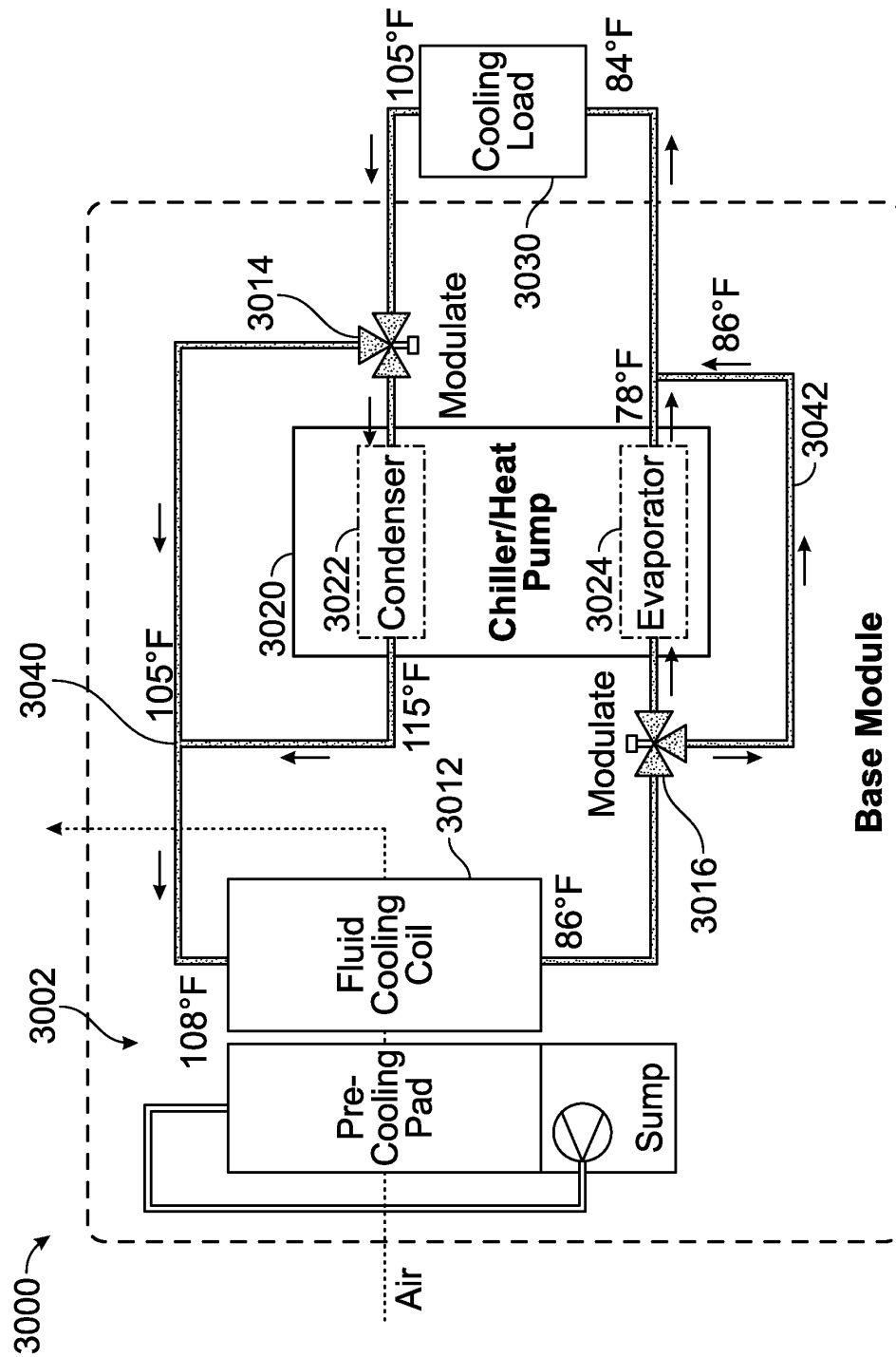
FIG. 102

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Mode 1
FIG. 103

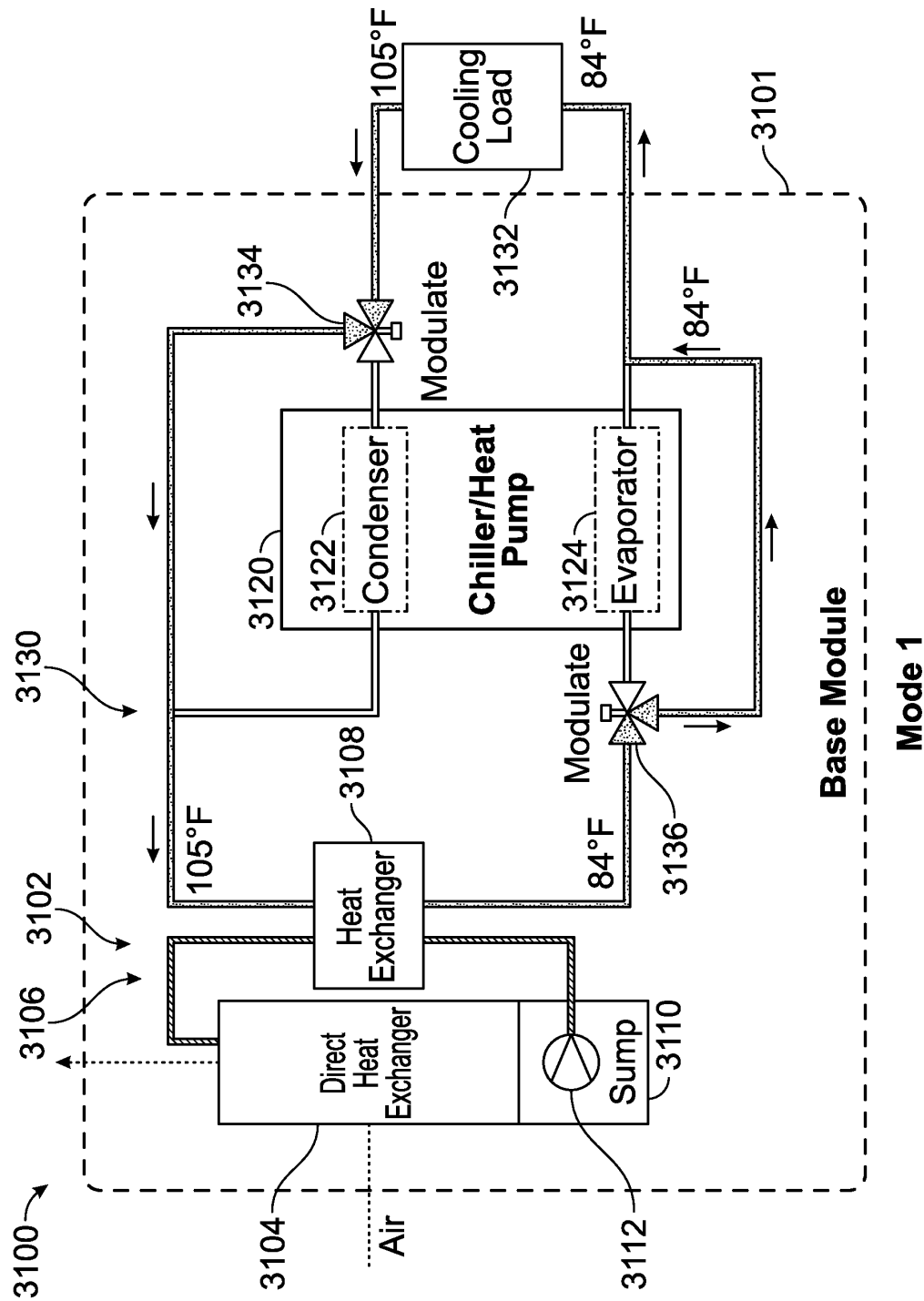
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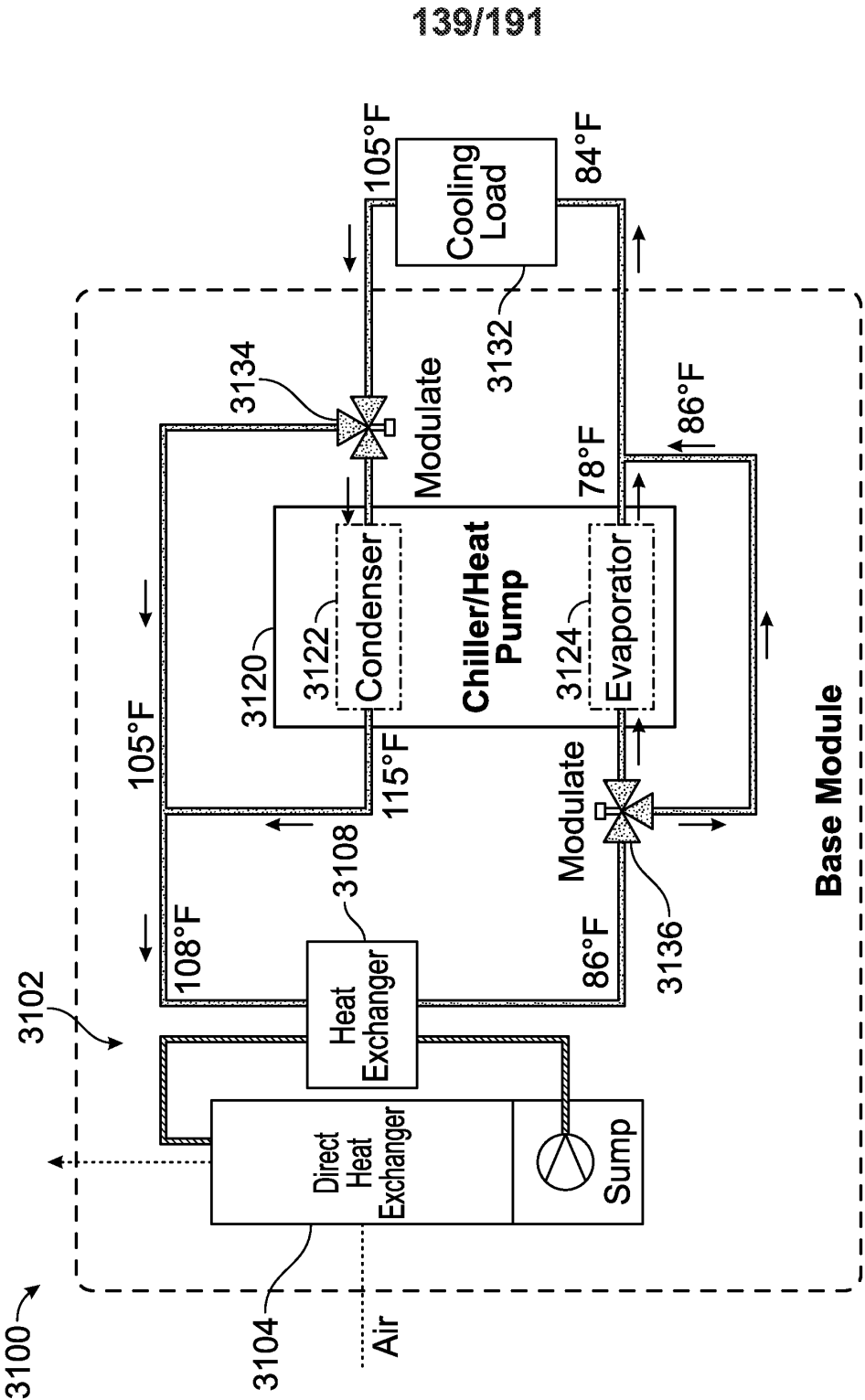


Mode 2

FIG. 104

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Mode 2
FIG. 106

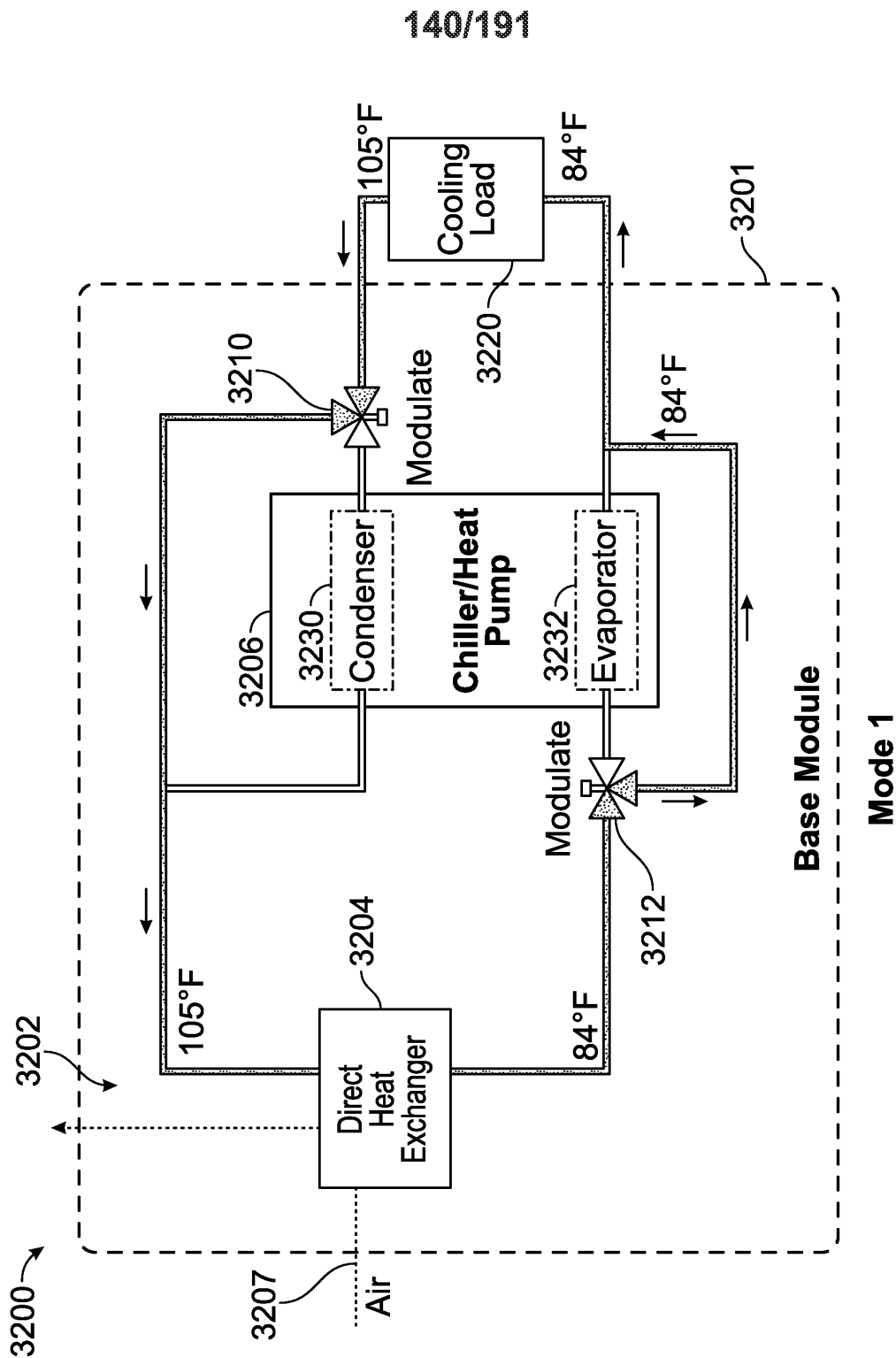


FIG. 107

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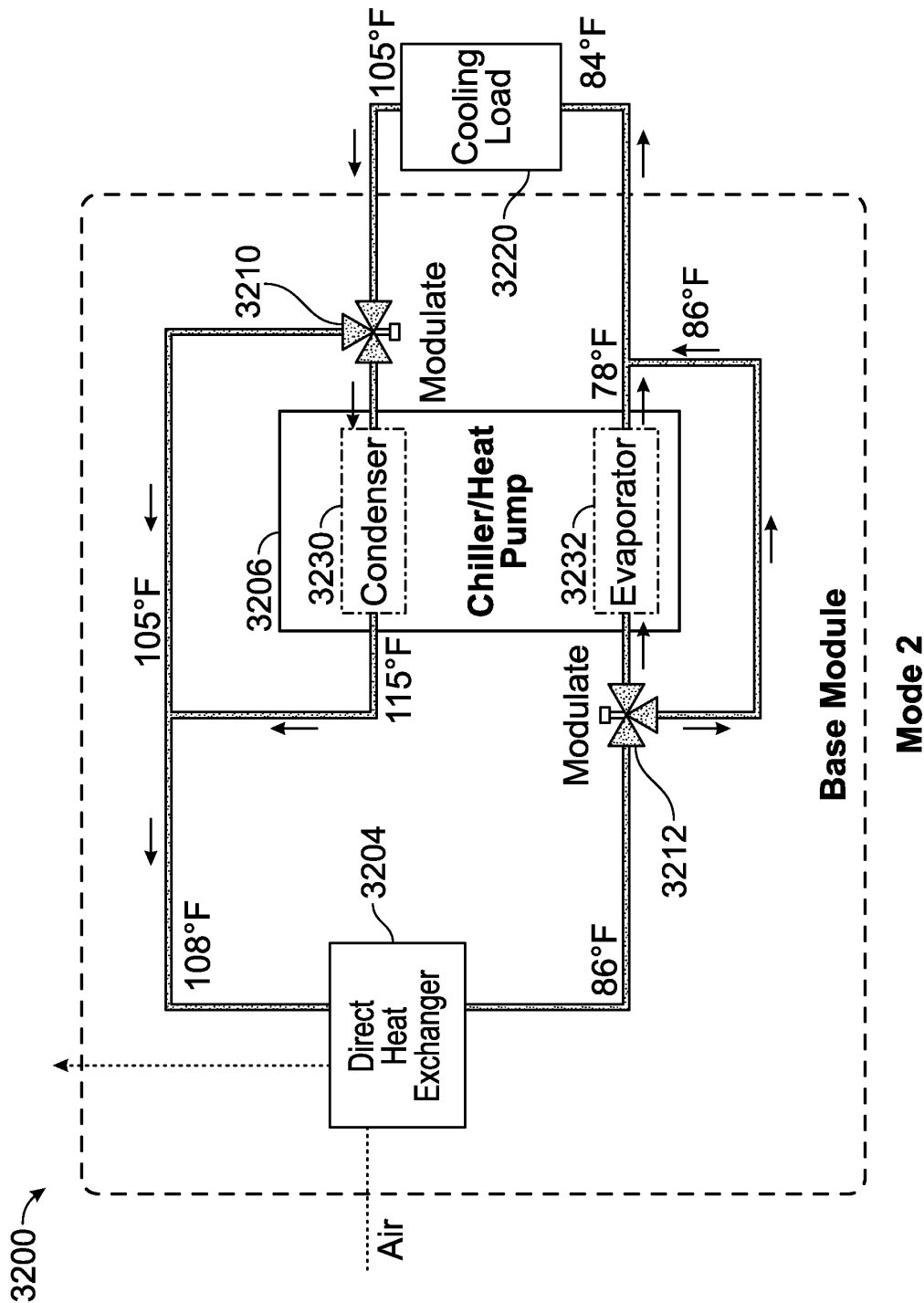
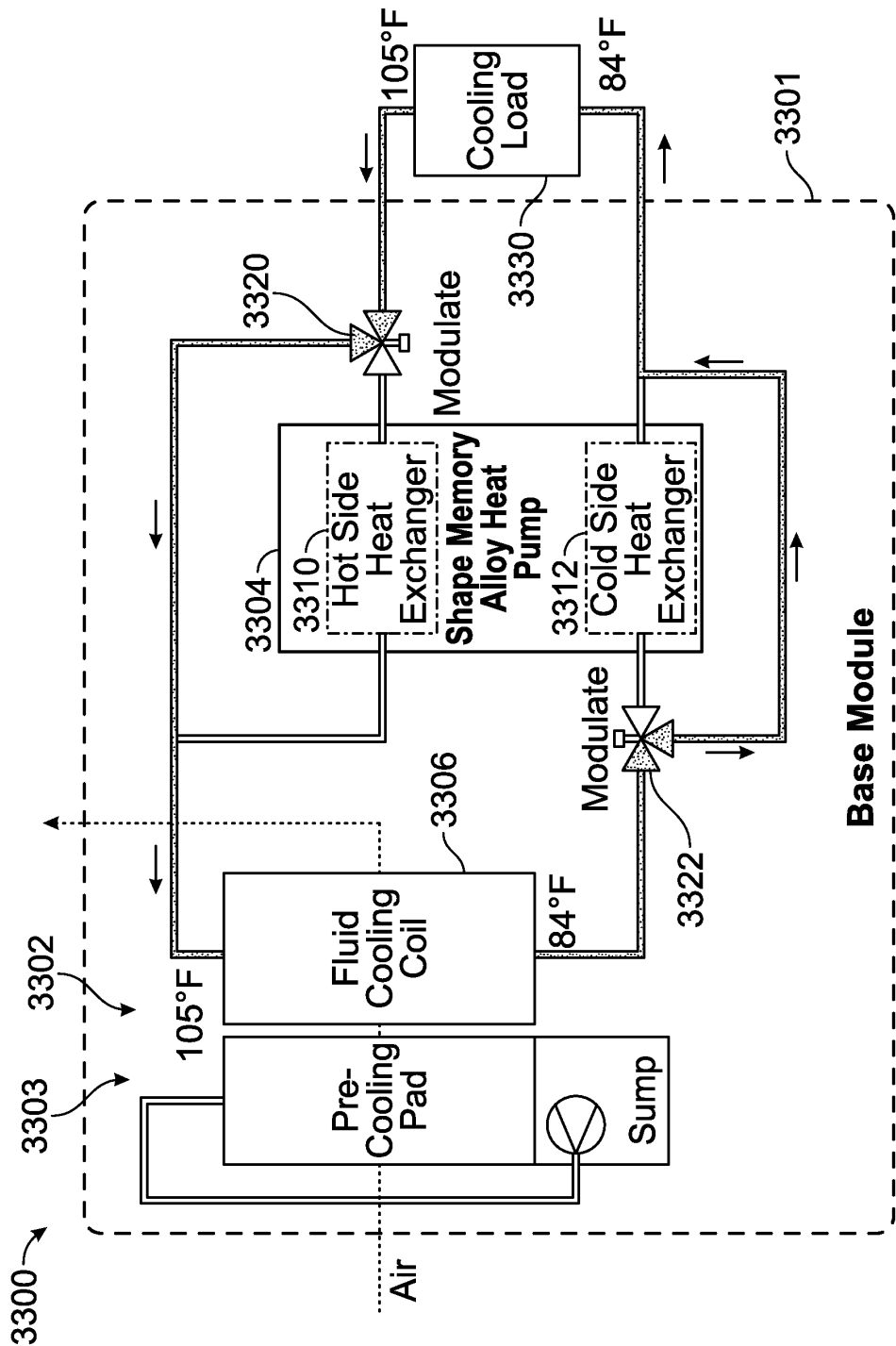
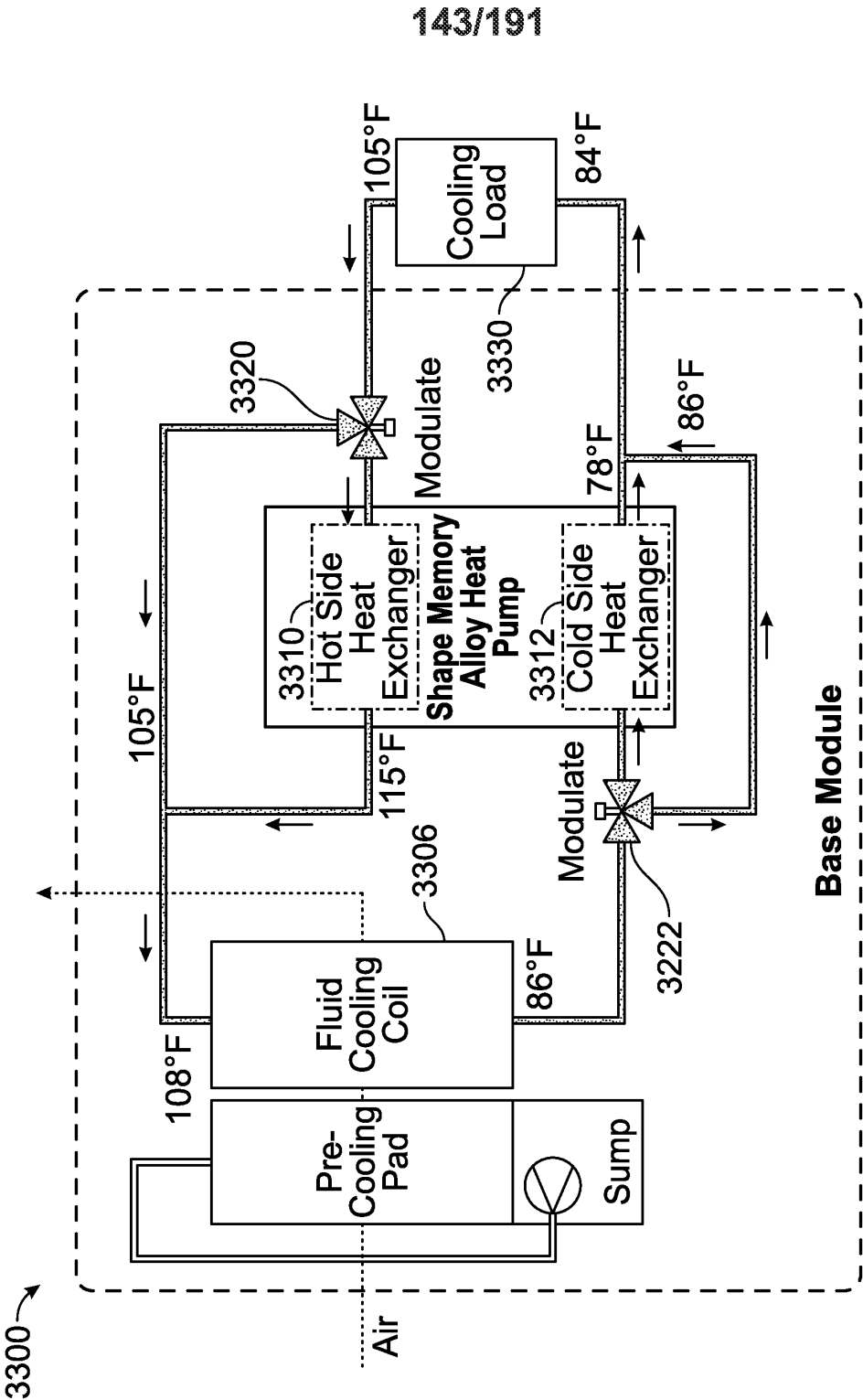


FIG. 108

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Mode 1
FIG. 109



Mode 2

FIG. 110

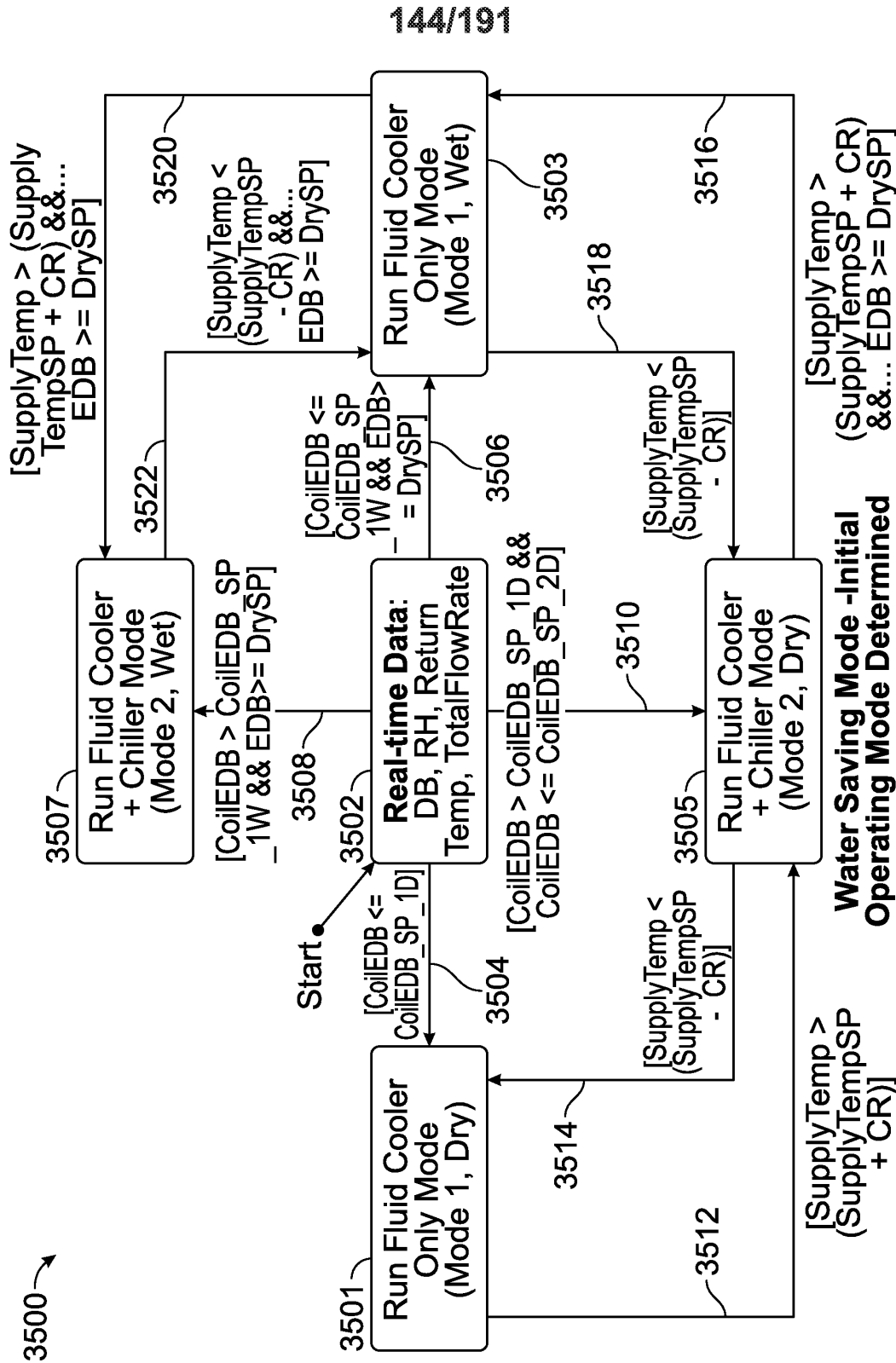


FIG. 111

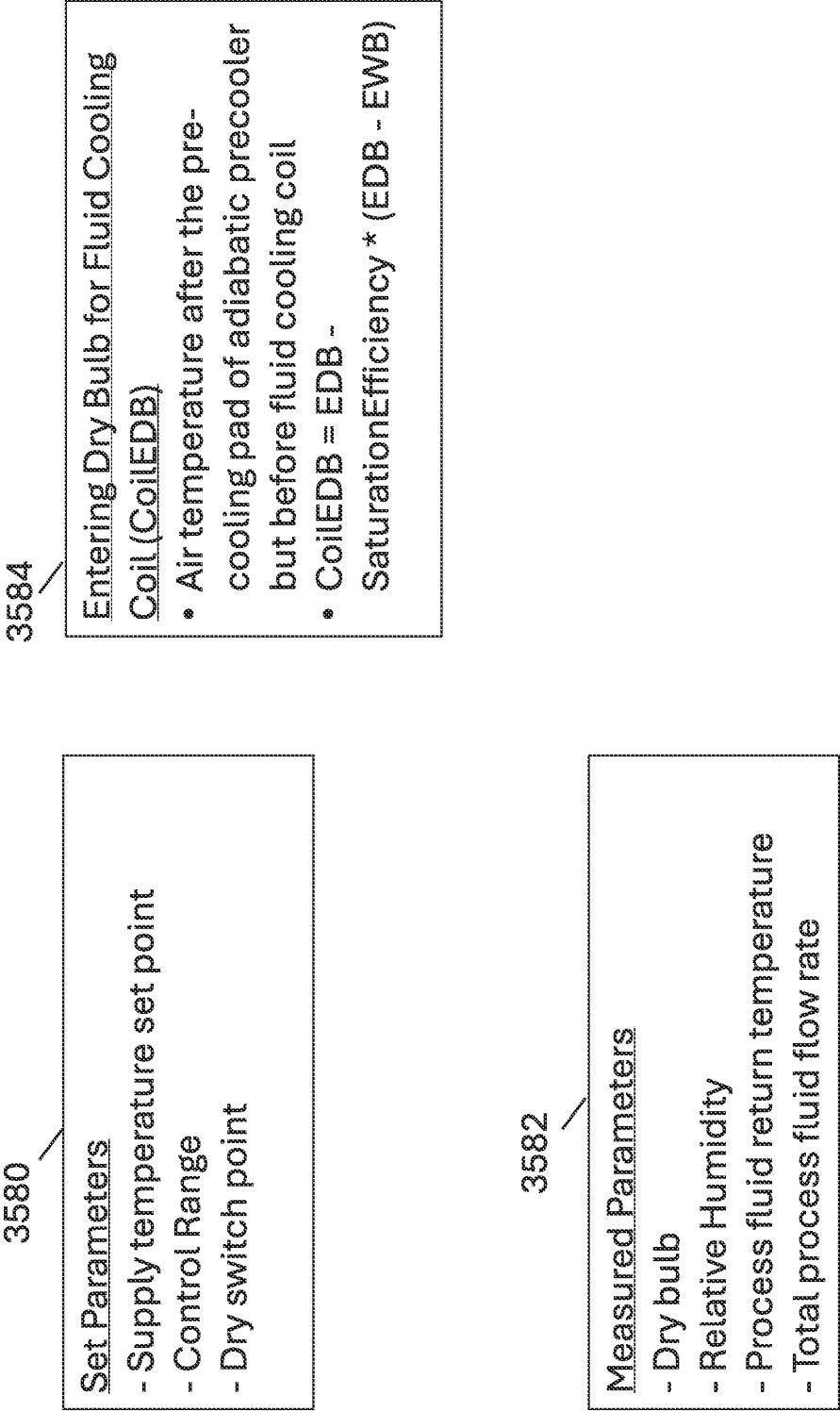


FIG. 112

3550 →

Control Method - Water Saving
Determination of Initial Operating Mode

3552 3554 3556 3558

Ref.	Condition	Initial Mode
3504	If CoiledB is No Greater than CoiledB_SP_1D (CoiledB Setpoint for Mode 1 (Dry))	3501 – Fluid Cooler (Mode 1, Dry)
3506	If CoiledB is No Greater than CoiledB_SP_1W (CoiledB Setpoint for Mode 1 (Wet)) and Air Dry Bulb is No Smaller than Dry Switch Point	3503 – Fluid Cooler (Mode 1, Wet)
3508	If CoiledB is Greater than CoiledB_SP_1W and Air Dry Bulb is No Lower than Dry Switch Point	3507 – Fluid cooler + Chiller (Mode 2, Wet)
3510	If CoiledB is Greater than CoiledB_SP_1D But No Greater than CoiledB_SP_2D (CoiledB Setpoint for Mode 2 (Dry))	3505 – Fluid Cooler + Chiller (Mode 2, Dry)

FIG. 113

3570→

3572

3574

3576

3577

3578

Ref.	Current Mode	Condition	Next Mode
3512	3501 – Fluid Cooler (Mode 1, Dry)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range)	3505 – Fluid Cooler + Chiller (Mode 2, Dry)
3514	3505 – Fluid Cooler + Chiller (Mode 2, Dry)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	3501 – Fluid cooler (Mode 1, dry)
3516	3505 – Fluid Cooler + Chiller (Mode 2, Dry)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is No Lower than Dry Switch Point	3503 – Fluid cooler (Mode 1, Wet)
3518	3503 – Fluid Cooler (Mode 1, Wet)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range)	3505 – Fluid cooler + Chiller (Mode 2, dry)
3520	3503 – Fluid Cooler (Mode 1, Wet)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is No Lower than Dry Switch Point	3507 – Fluid cooler + Chiller (Mode 2, wet)
3522	3507 – Fluid Cooler + Chiller (Mode 2, Wet)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and EDB is No Lower than Dry Switch Point	3503 – Fluid cooler (Mode 1, Wet)

FIG. 114

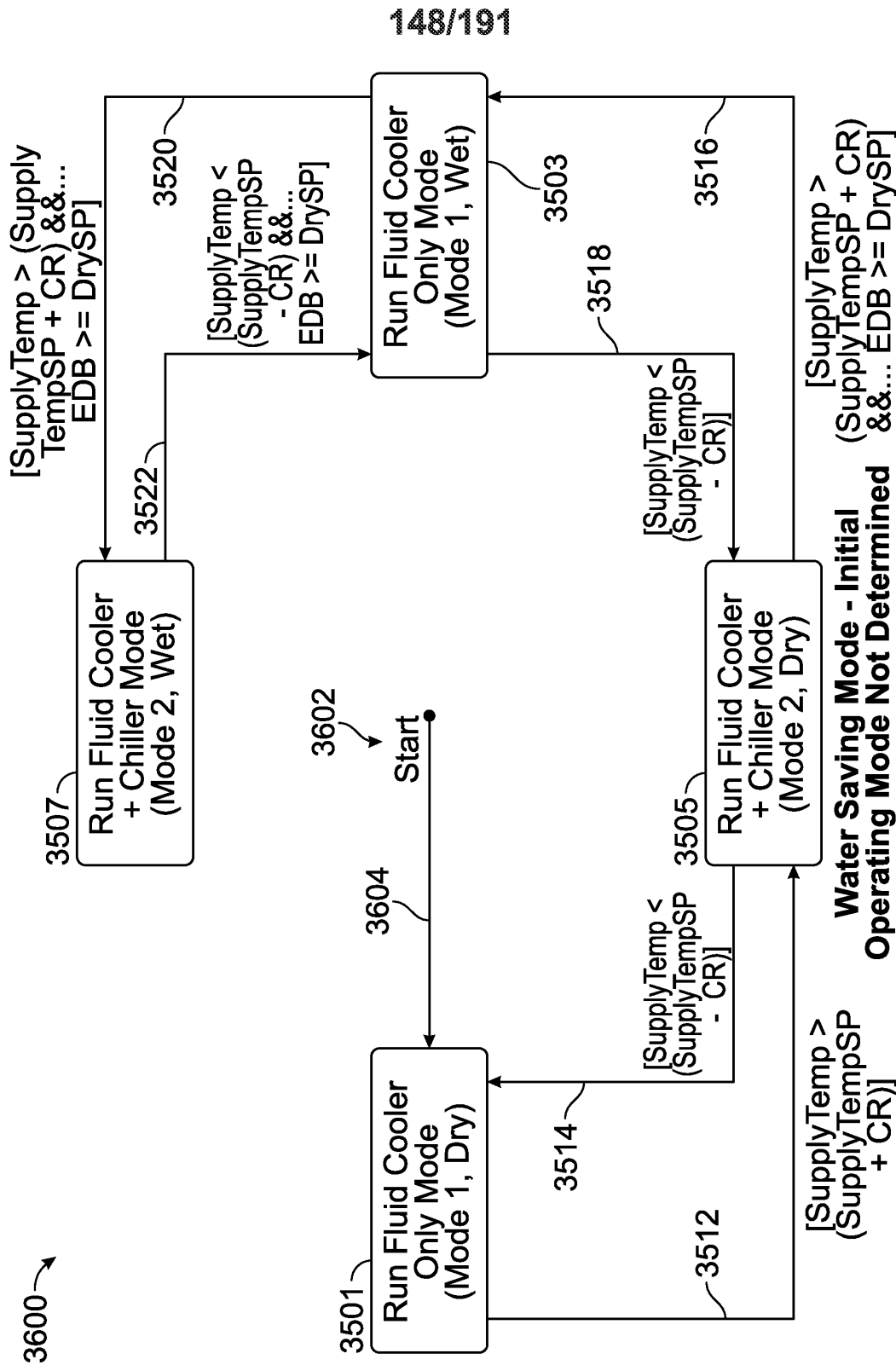
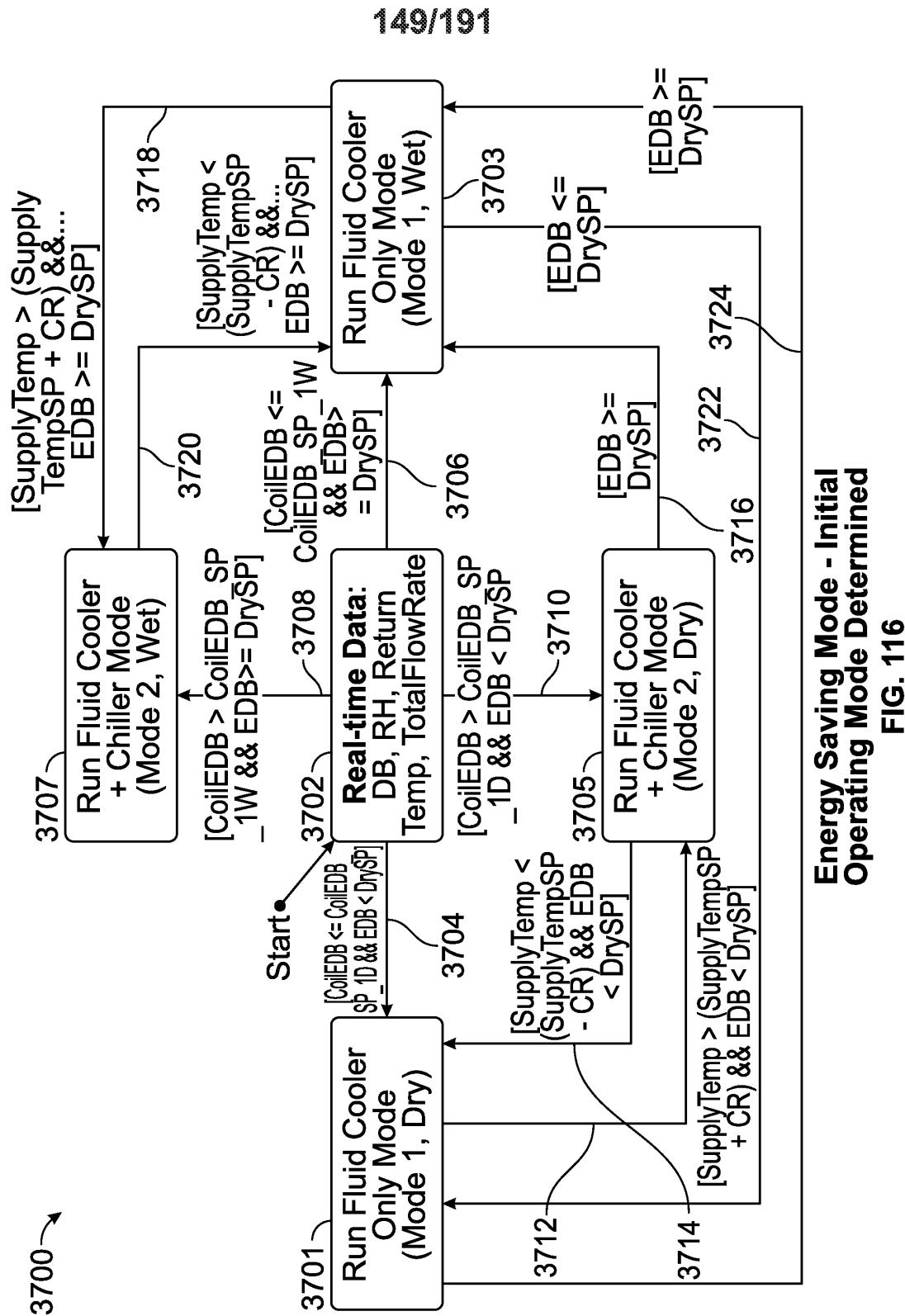


FIG. 115



3750

Control Method - Energy Saving
Determination of Initial Operating Mode

3754

3752	3756	3760	3758
Ref.	Condition	Initial Mode	
3704	If CoiledB is No Greater than CoiledB_SP_1D (CoiledB Setpoint for Mode 1 (Dry)) and Air Dry Bulb is Lower than Dry Switch Point	3701 – Fluid Cooler (Mode 1, Dry)	
3706	If CoiledB is No Greater than CoiledB_SP_1W (CoiledB Setpoint for Mode 1 (Wet)) and Air Dry Bulb is No Lower than Dry Switch Point	3703 – Fluid Cooler (Mode 1, Wet)	
3708	If CoiledB is Greater than CoiledB_SP_1W and Air Dry Bulb is No Lower than Dry Switch Point	3707 – Fluid cooler + Chiller (Mode 2, Wet)	
3710	If CoiledB is Greater than CoiledB_SP_1D and Air Dry Bulb is Lower than Dry Switch Point	3705 – Fluid Cooler + Chiller (Mode 2, Dry)	

FIG. 117

3770

3772

3774

3776

3778

3780

Ref.	Current Mode	Condition	Next Mode
3712	3701 – Fluid Cooler (Mode 1, Dry)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and Air Dry Bulb is Lower than Dry Switch Point	3705 – Fluid Cooler + Chiller (Mode 2, Dry)
3714	3705 – Fluid Cooler + Chiller (Mode 2, Dry)	If Supply Temperature is Lower than (Supply Temperature Setpoint – Control Range) and Air Dry Bulb is Lower than Dry Switch Point	3701 – Fluid Cooler (Mode 1, Dry)
3716	3705 – Fluid Cooler + Chiller (Mode 2, Dry)	If EDB is No Smaller than Dry Switch Point	3703 – Fluid Ccooler (Mode 1, Wet)
3718	3703 – Fluid Cooler (Mode 1, Wet)	If Supply Temperature is Greater than (Supply Temperature Setpoint + Control Range) and EDB is No Lower than Dry Switch Point	3707 – Fluid Cooler + Chiller (Mode 2, Wet)
3720	3707 – Fluid cooler + Chiller (Mode 2, wet)	If Supply Temperature is Lower than (Supply Temperature Setpoint - Control Range) and EDB is No Lower than Dry Switch Point	3703 – Fluid Cooler (Mode 1, Wet)
3722	3703 – Fluid Cooler (Mode 1, Wet)	If Air Dry Bulb is Lower than Dry Switch Point	3701 – Fluid Cooler (Mode 1, Dry)
3724	3701 – Fluid Cooler (Mode 1, Dry)	If EDB is No Smaller than Dry Switch Point	3703 – Fluid Cooler (Mode 1, Wet)

FIG. 118

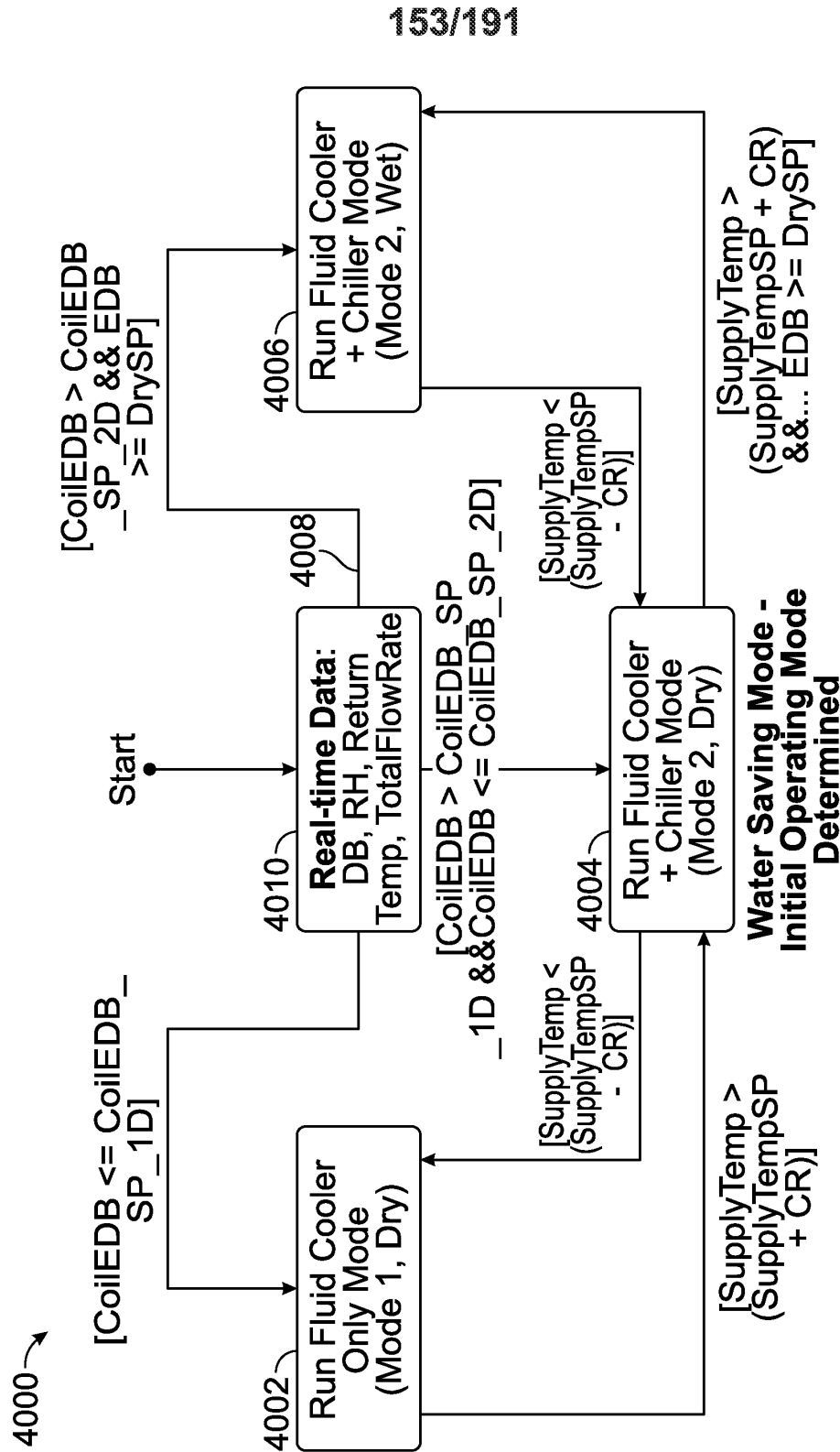


FIG. 120

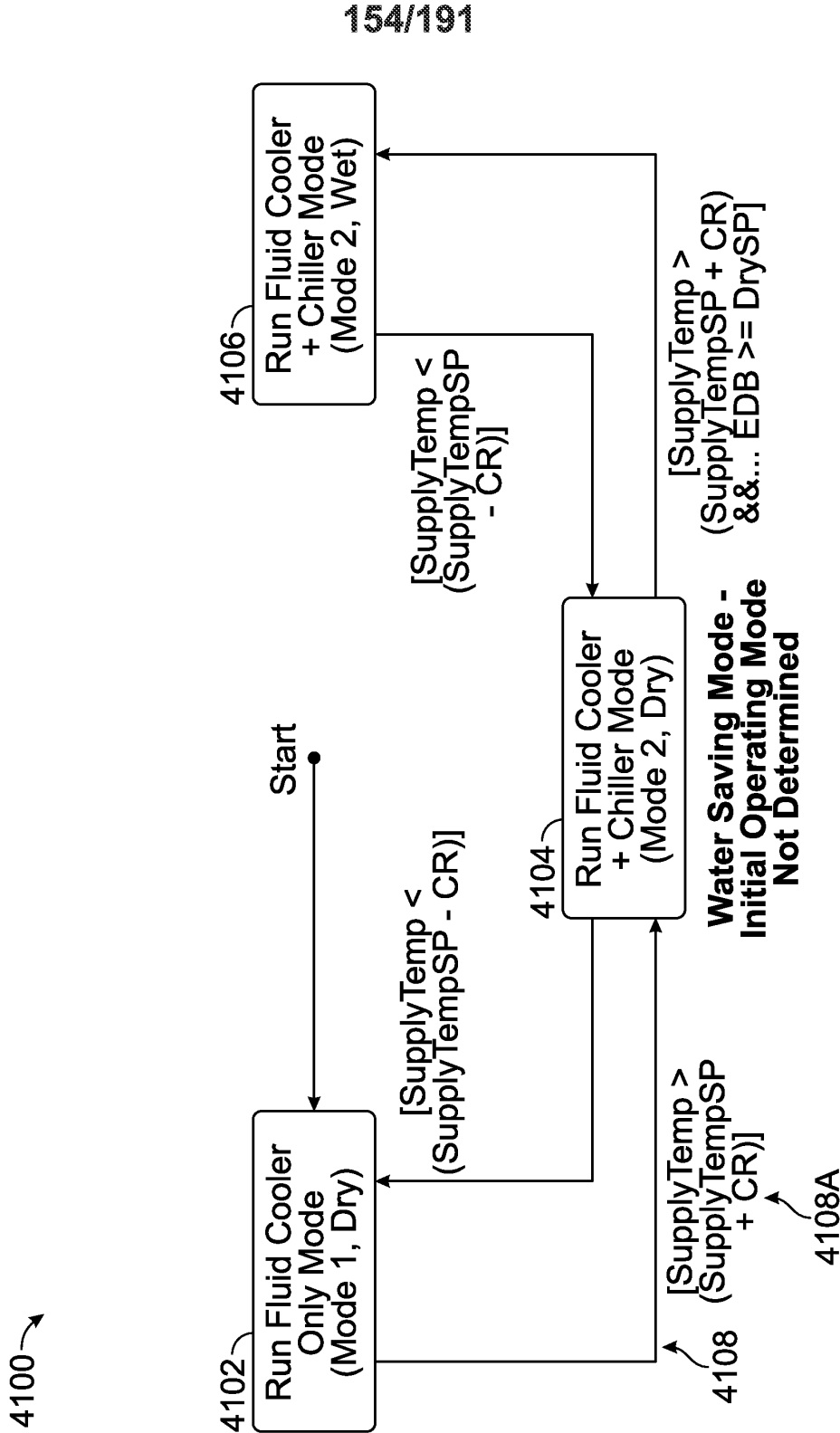


FIG. 121

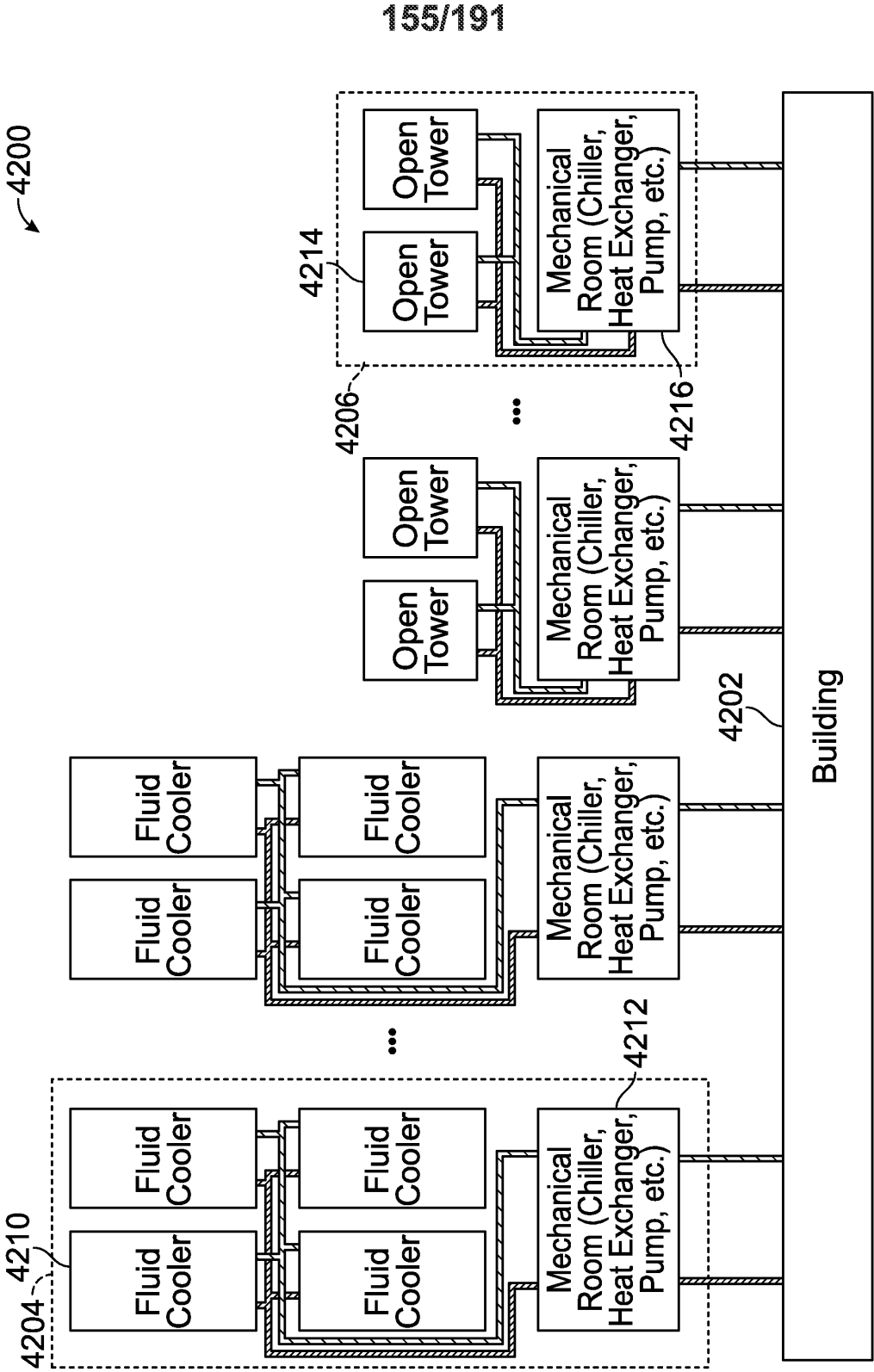


FIG. 122

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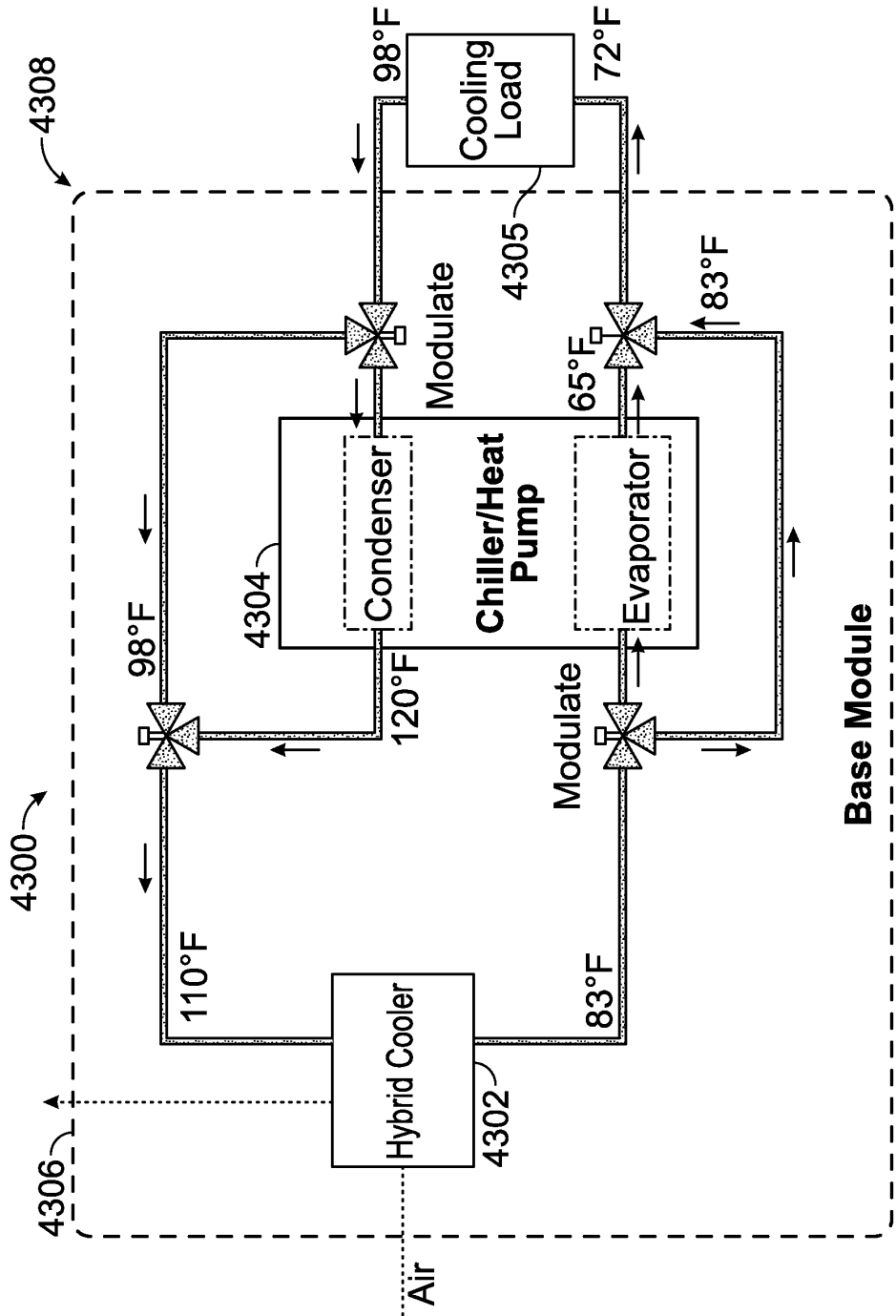


FIG. 123

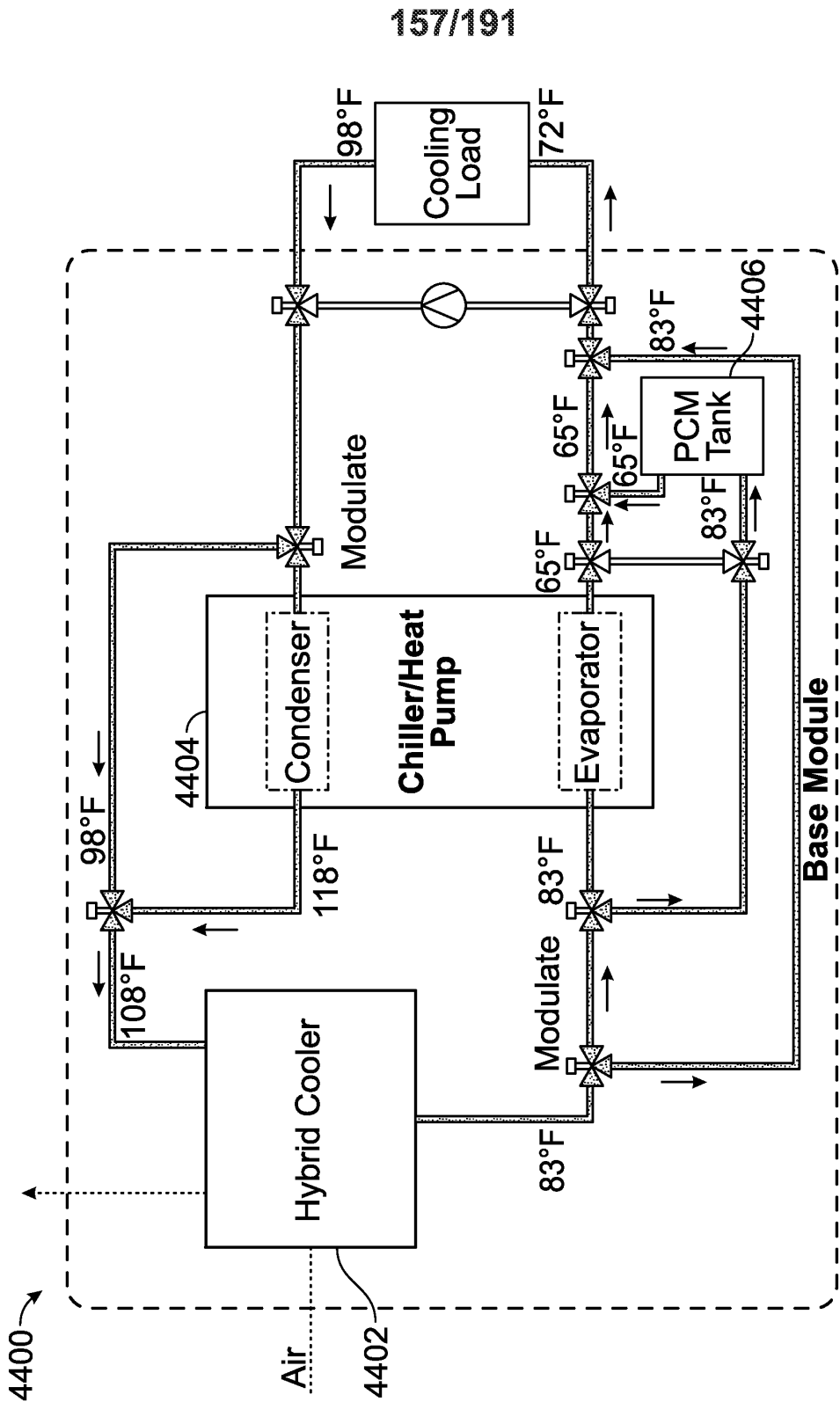


FIG. 124

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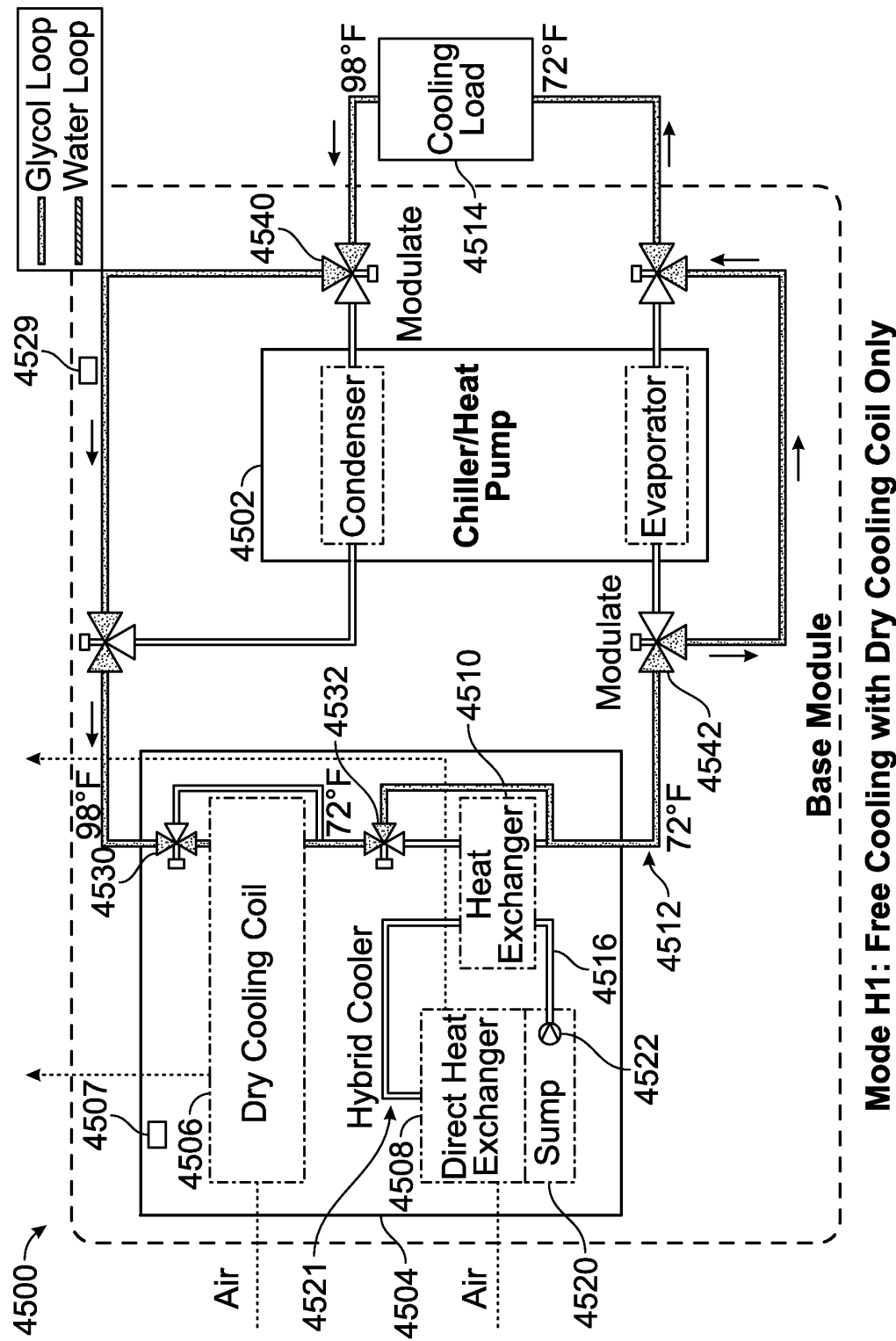


FIG. 125

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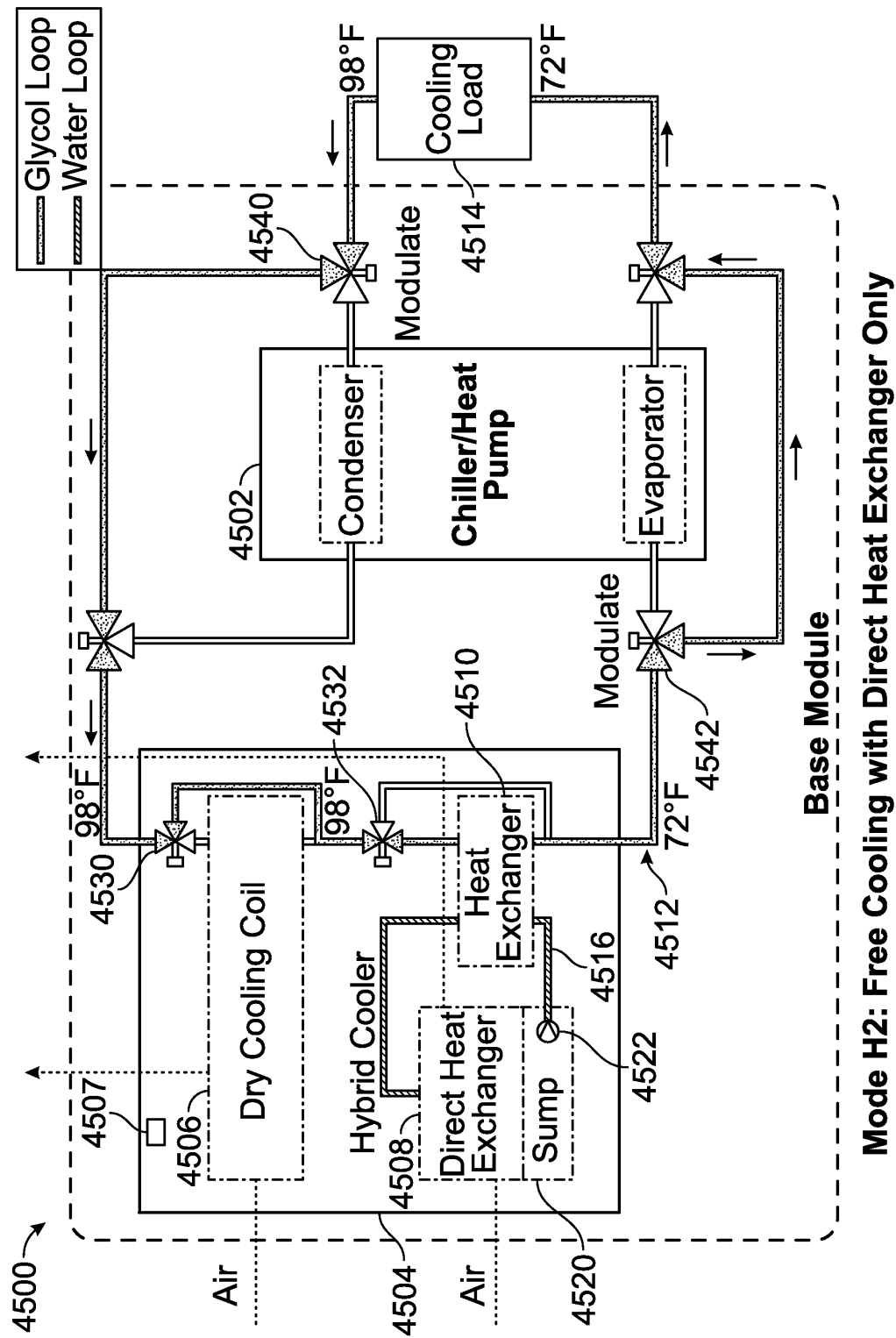
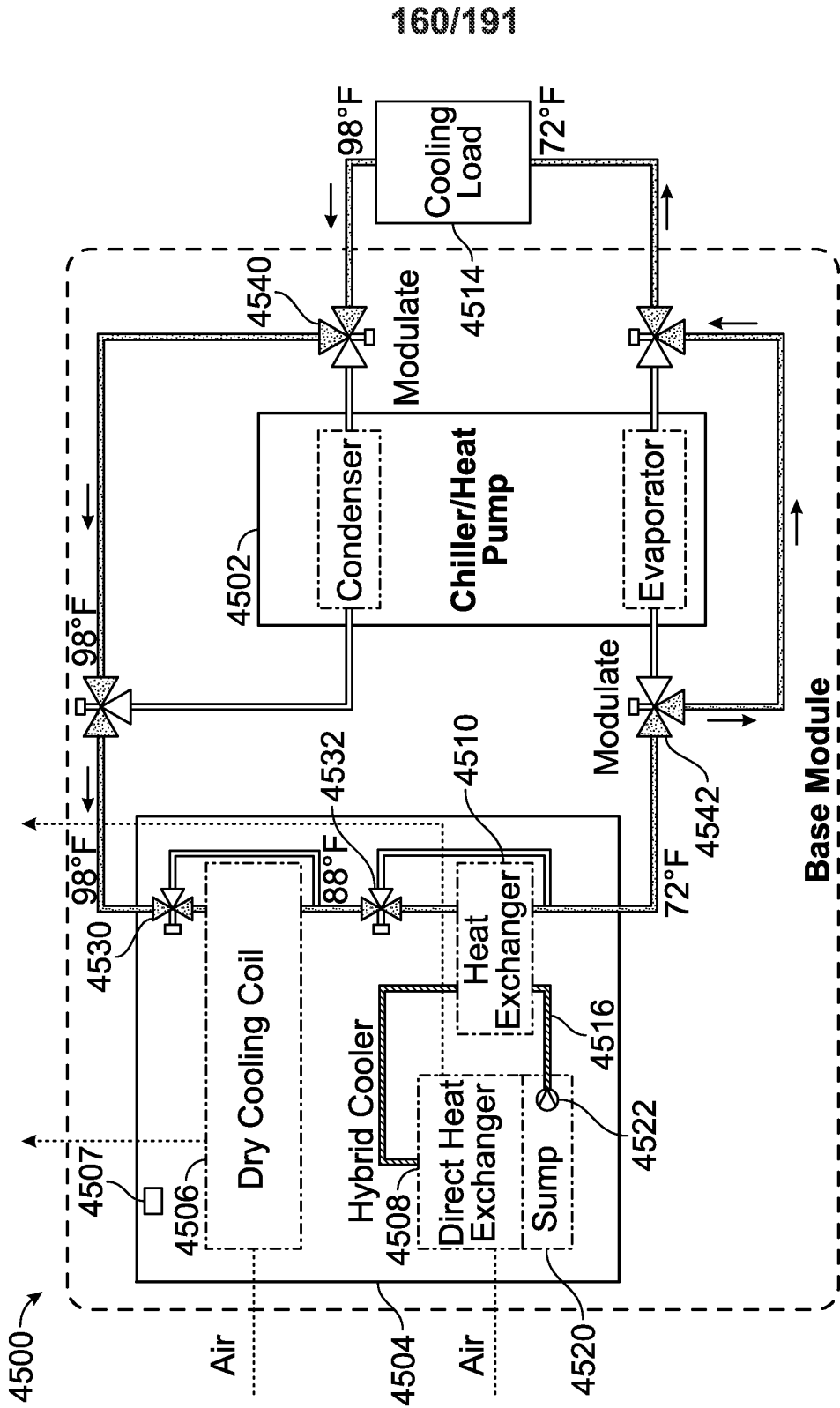
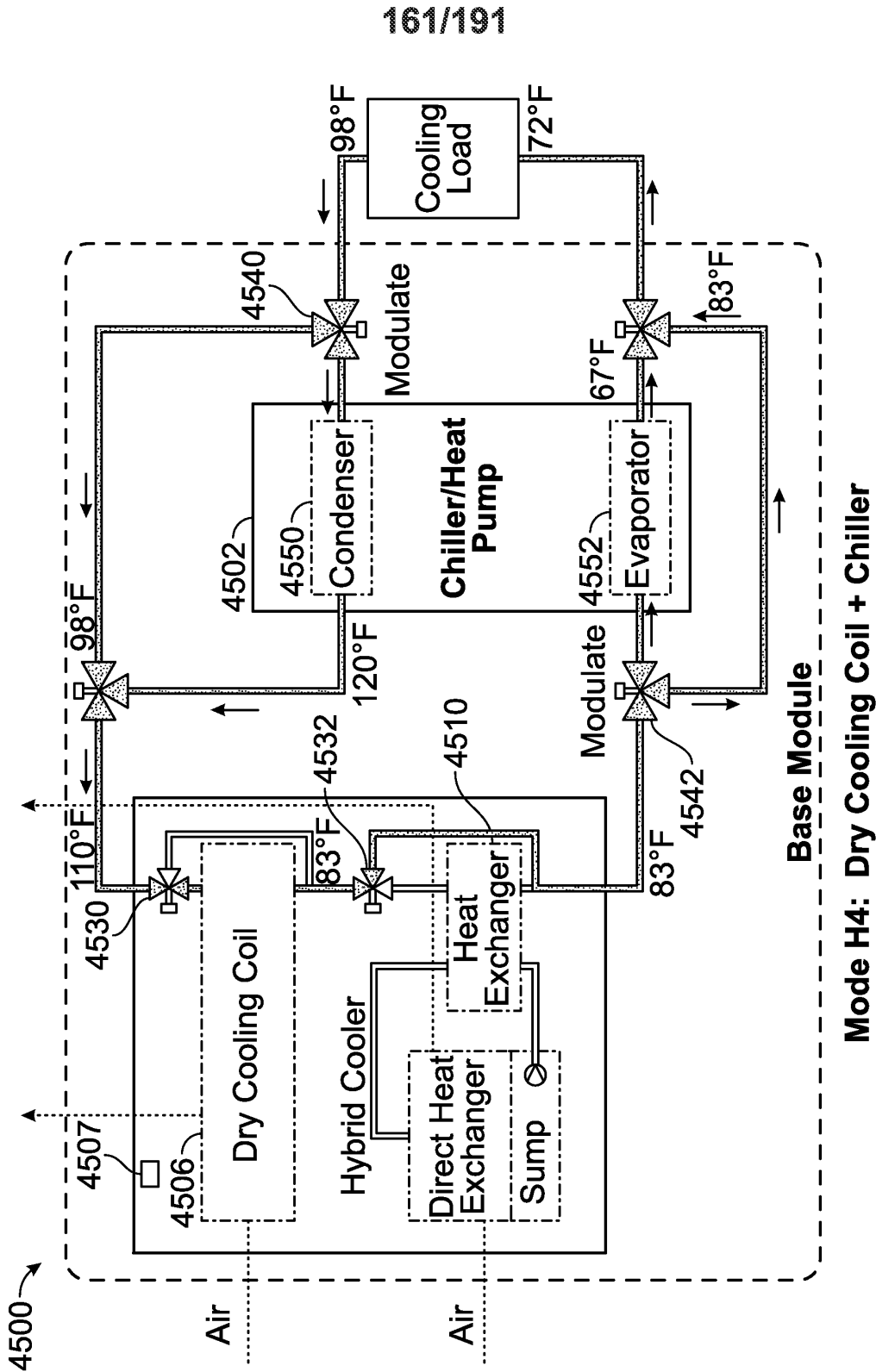


FIG. 126



Mode H3: Free Cooling with Dry Cooling Coil and Direct Heat Exchanger

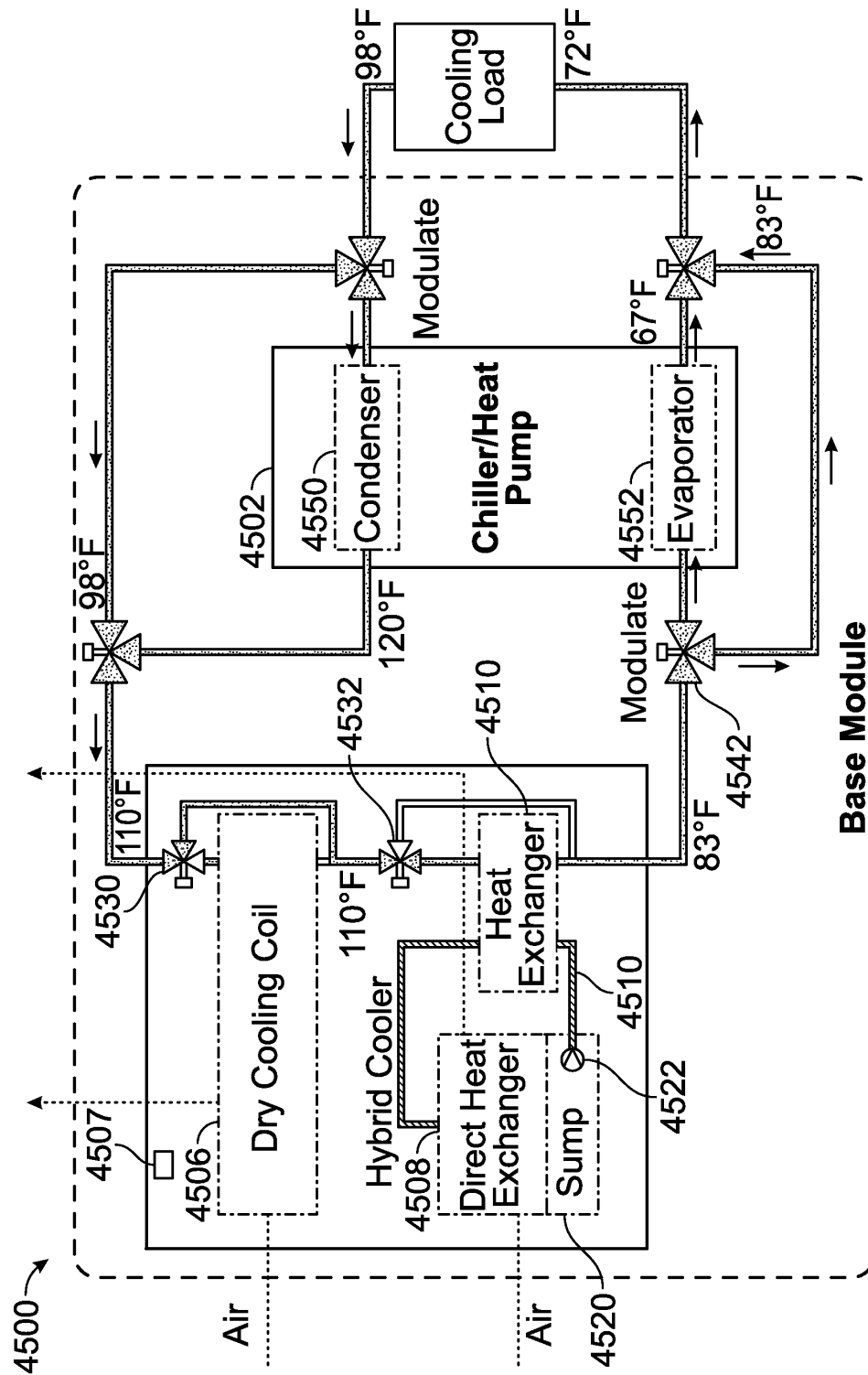
FIG. 127



Mode H4: Dry Cooling Coil + Chiller

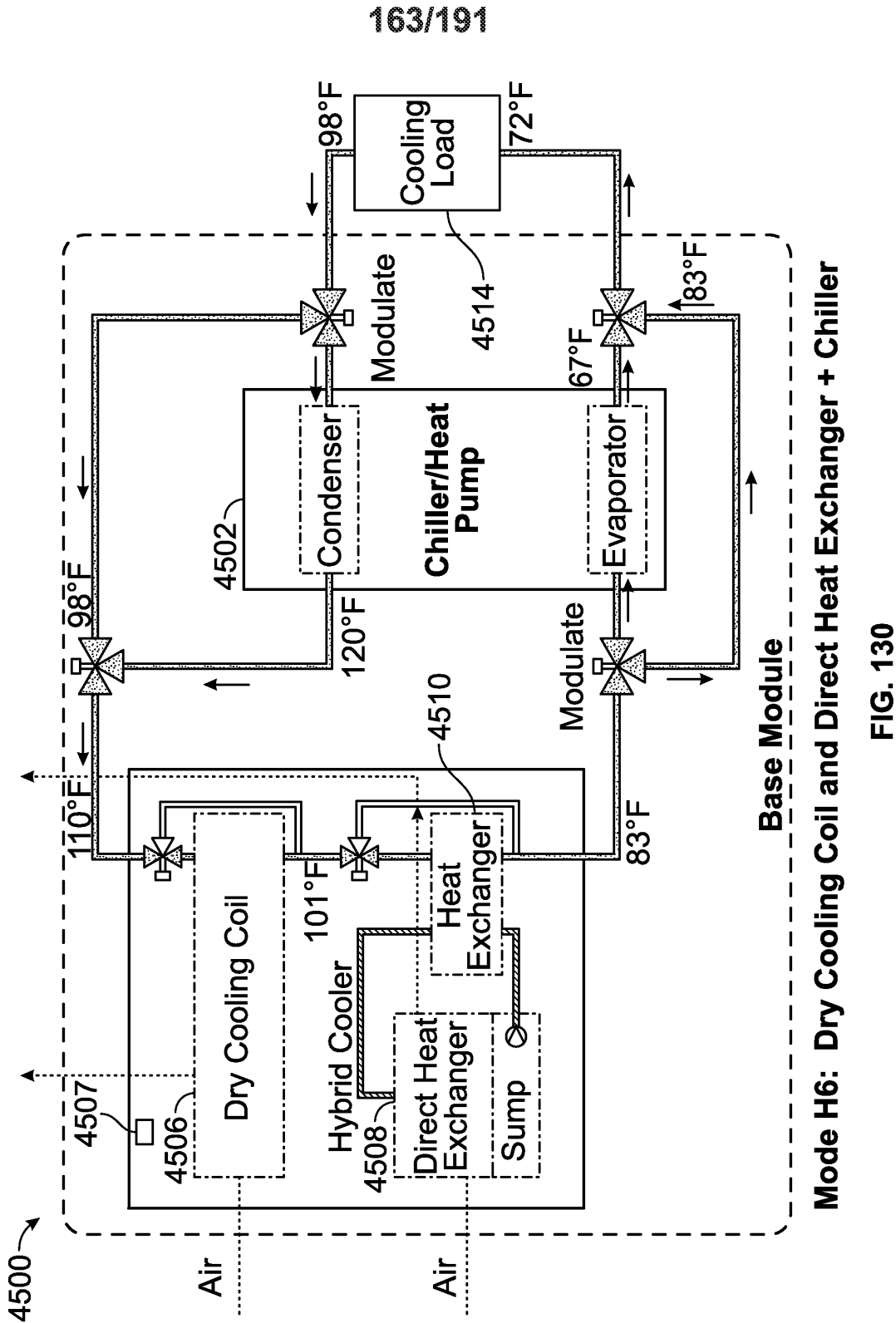
FIG. 128

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Mode H5: Direct Heat Exchanger + Chiller

FIG. 129



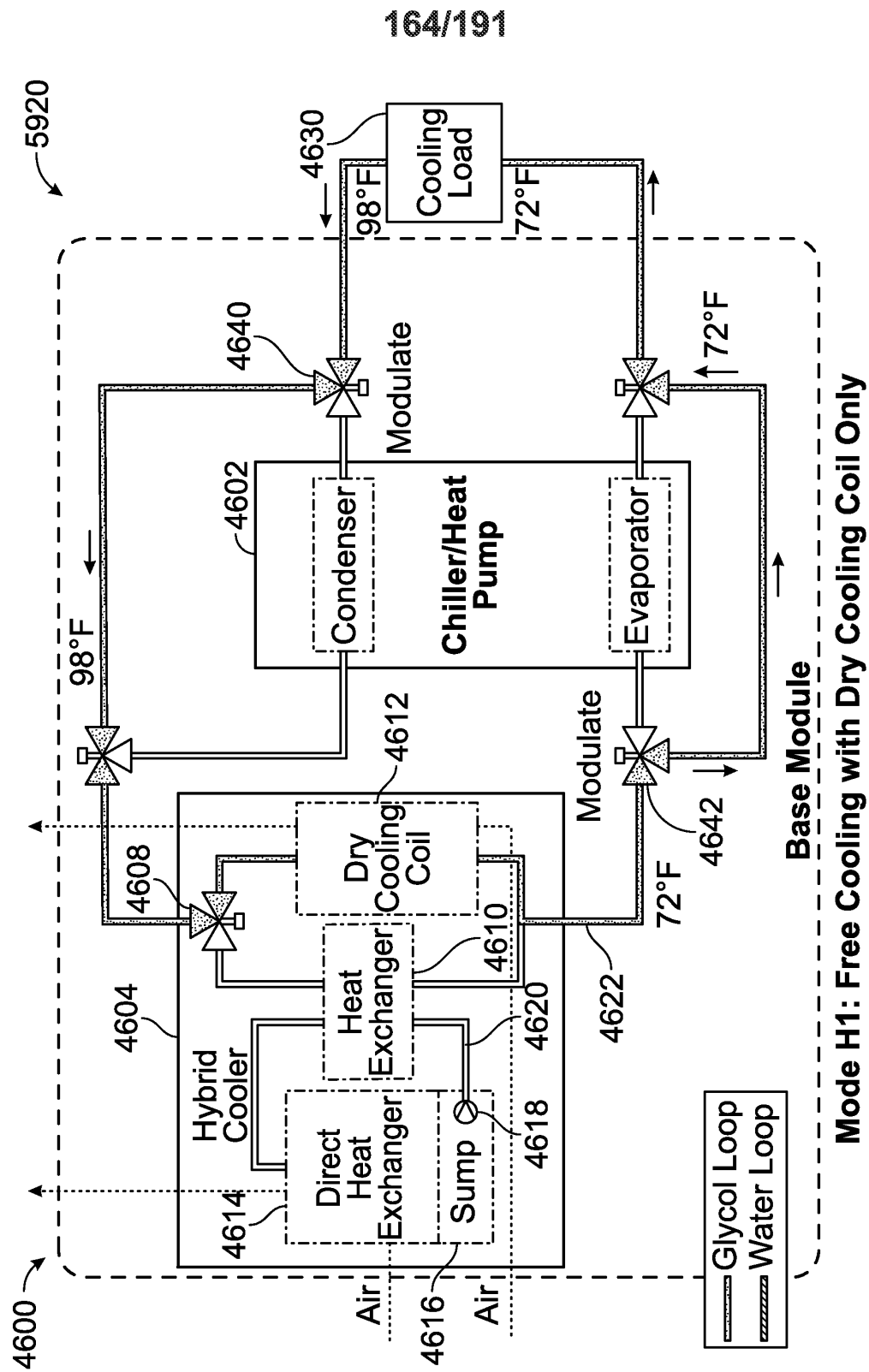


FIG. 131

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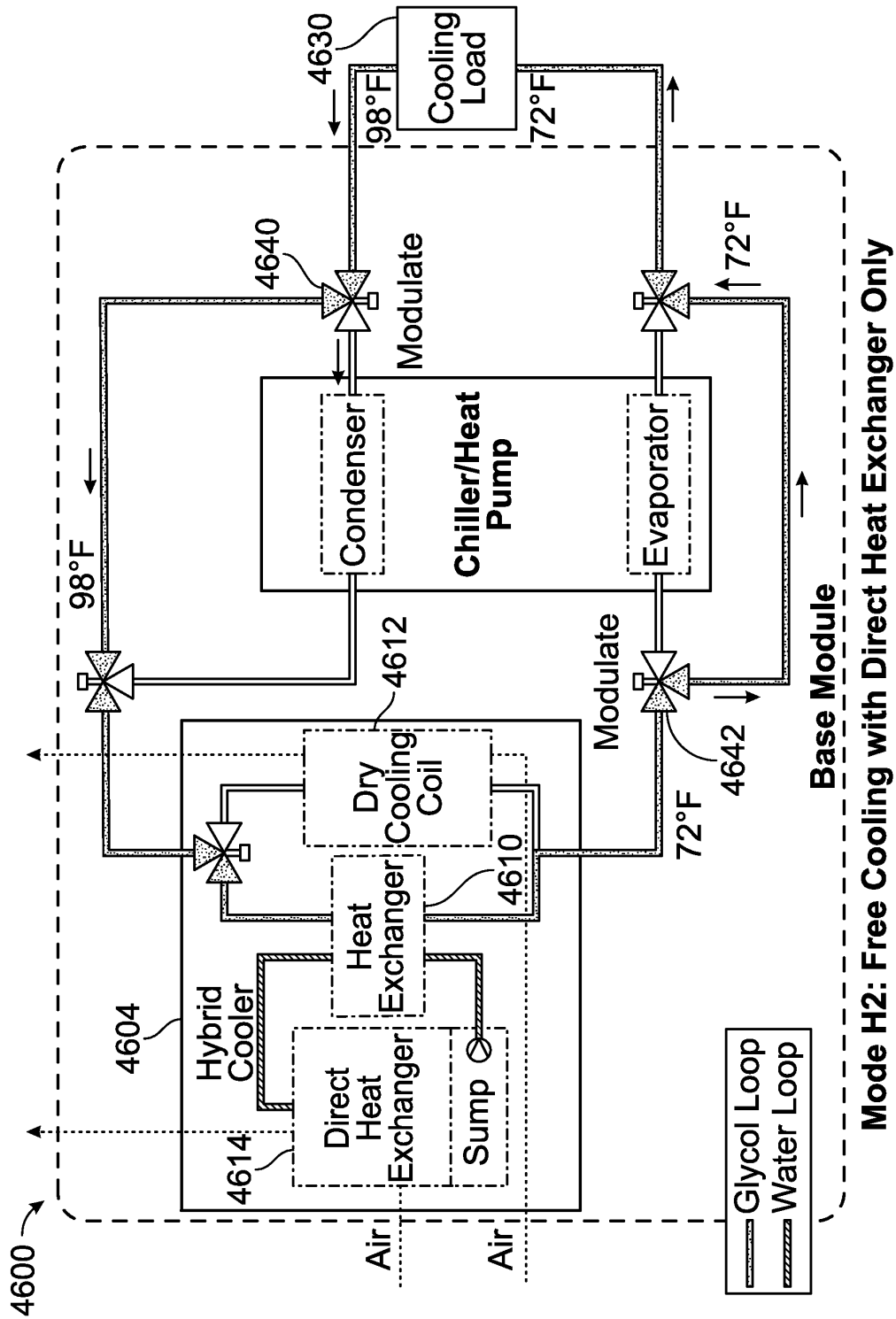


FIG. 132

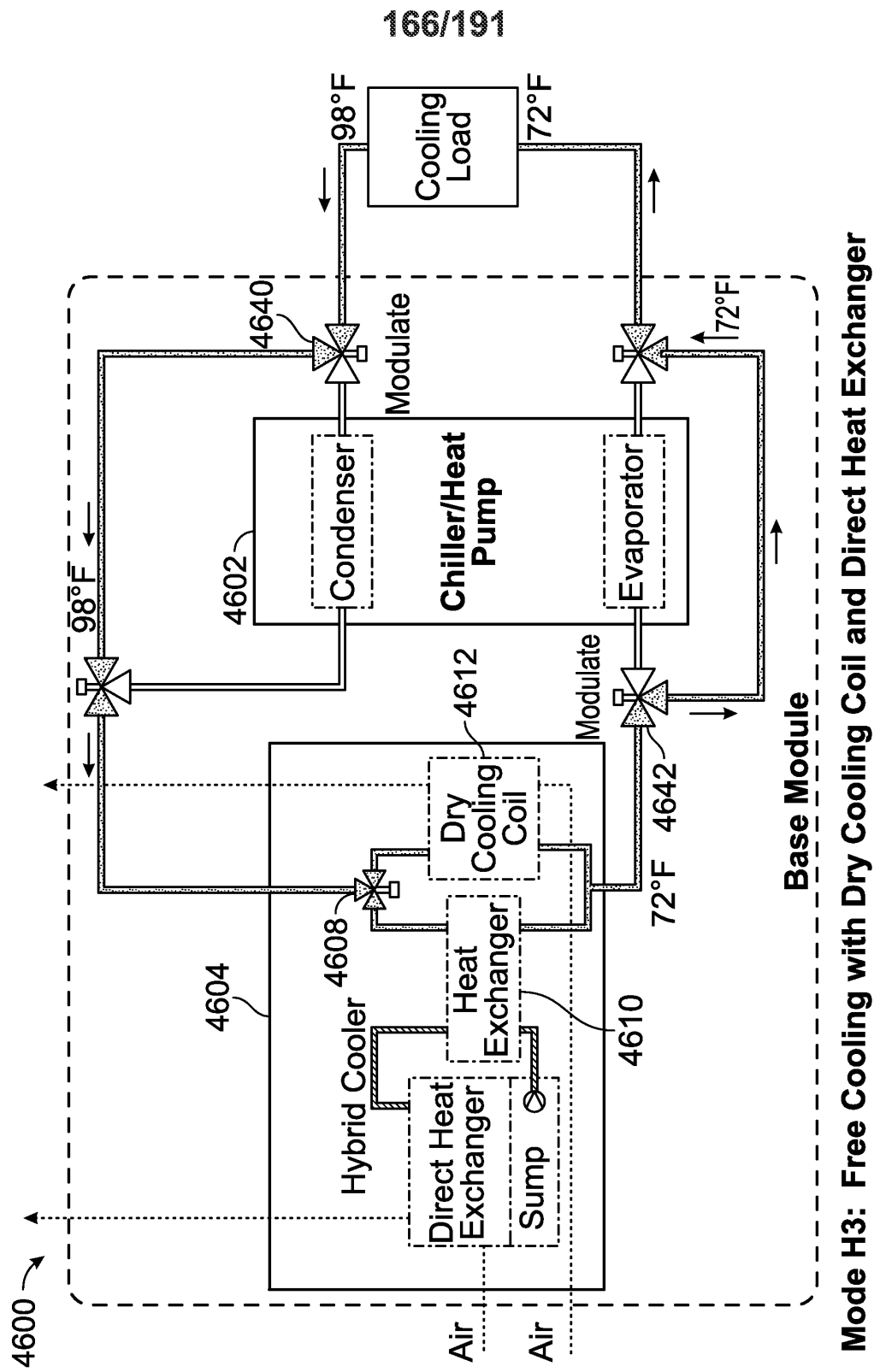
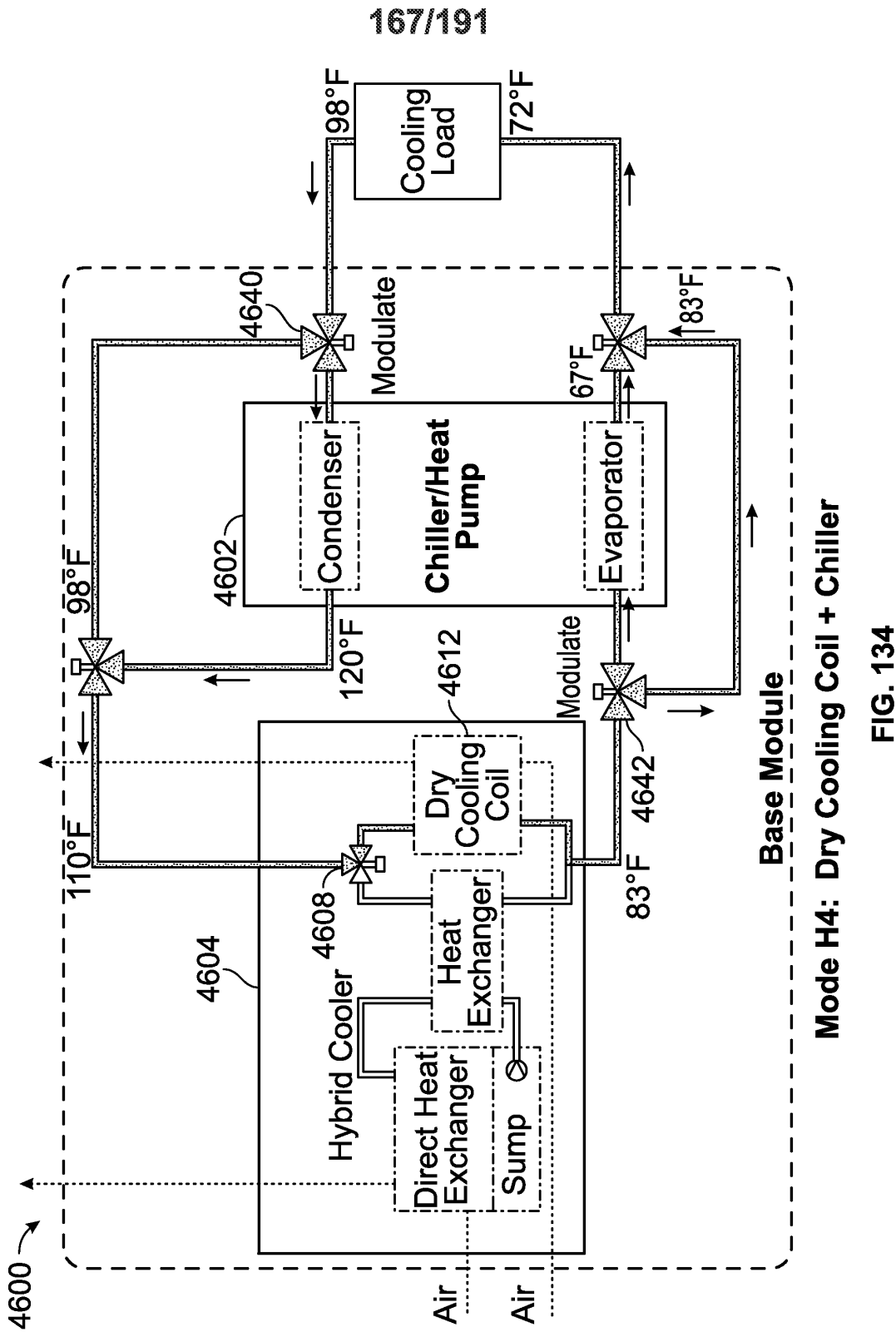
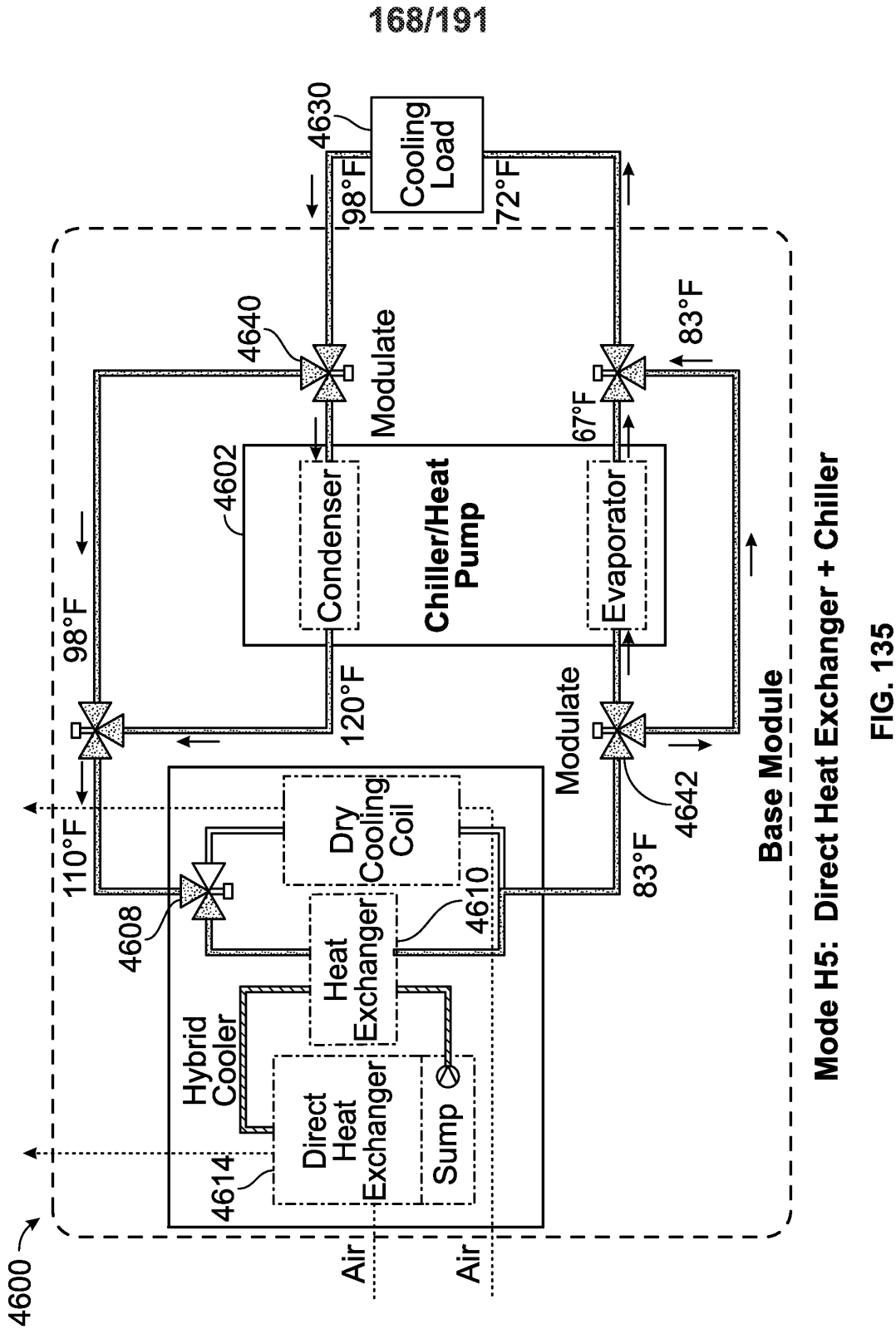


FIG. 133



Mode H4: Dry Cooling Coil + Chiller

FIG. 134



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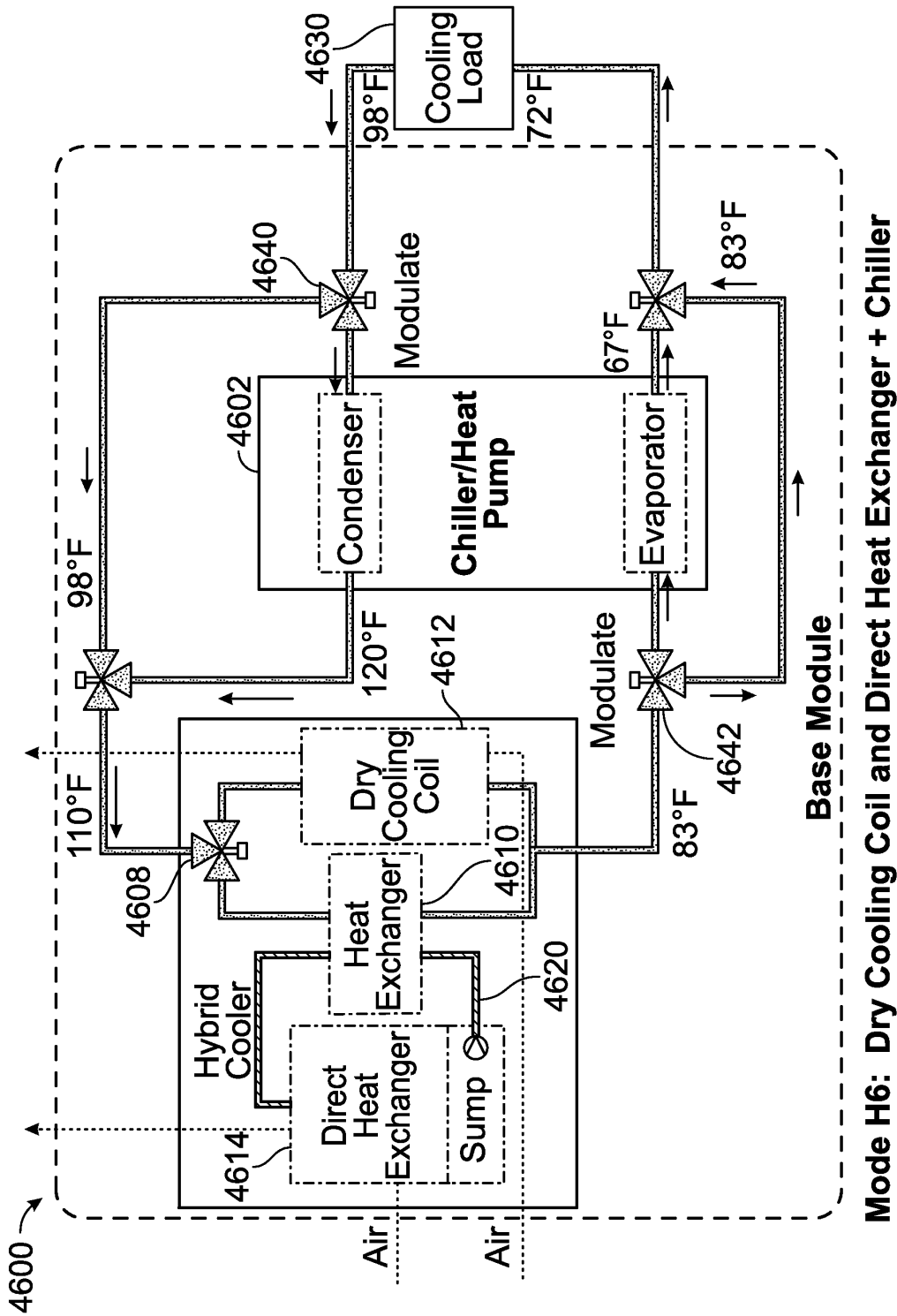
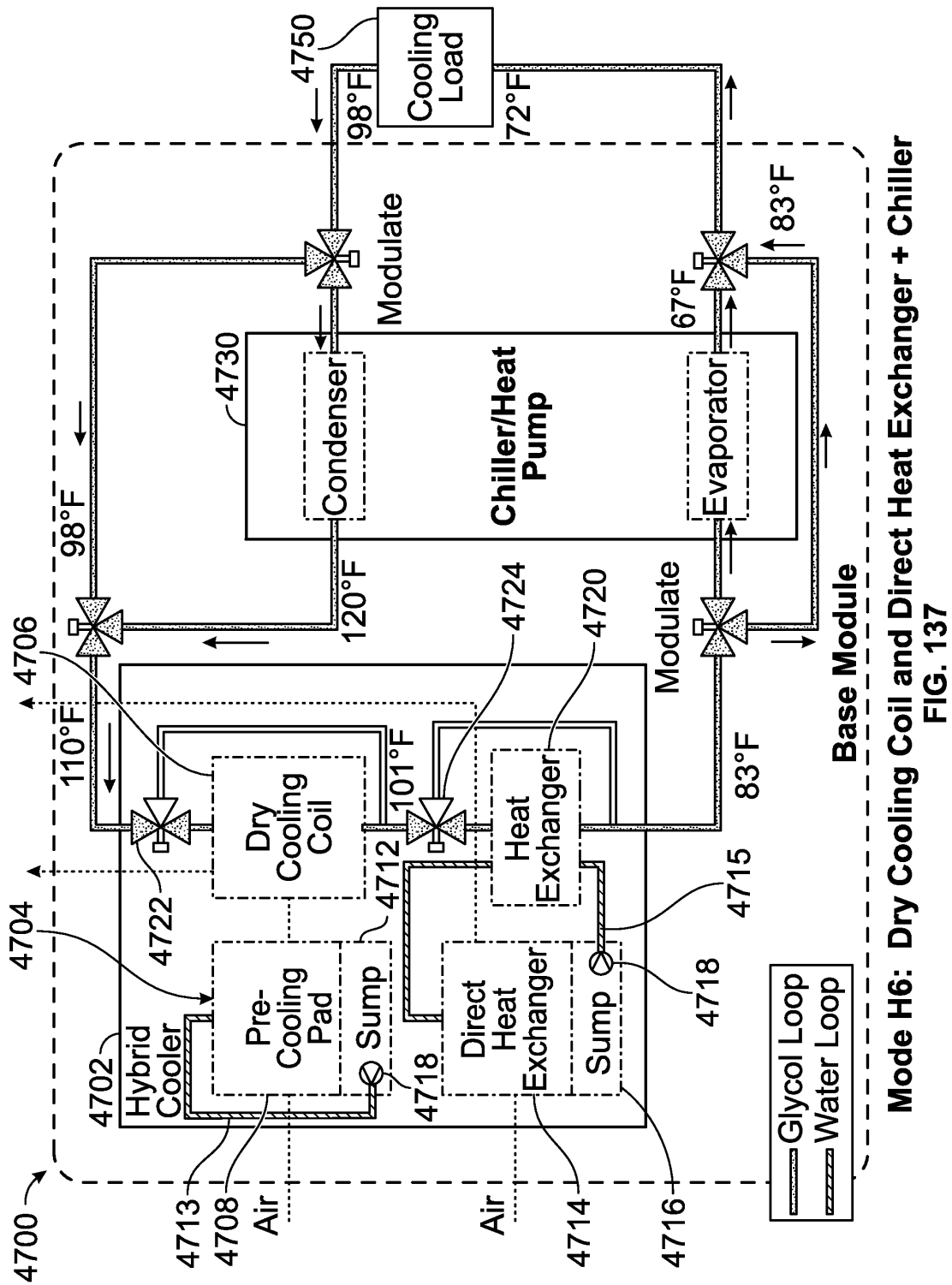
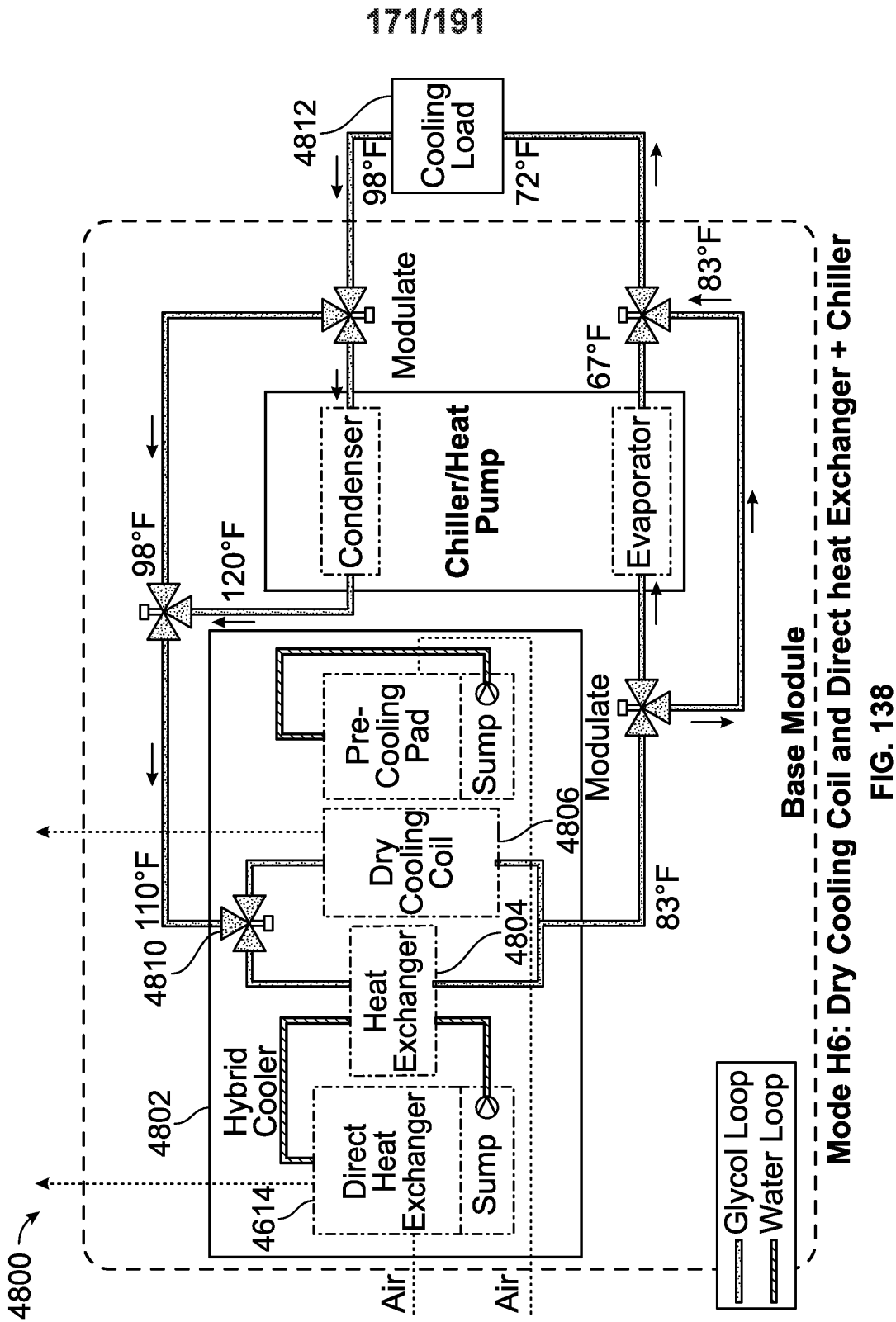
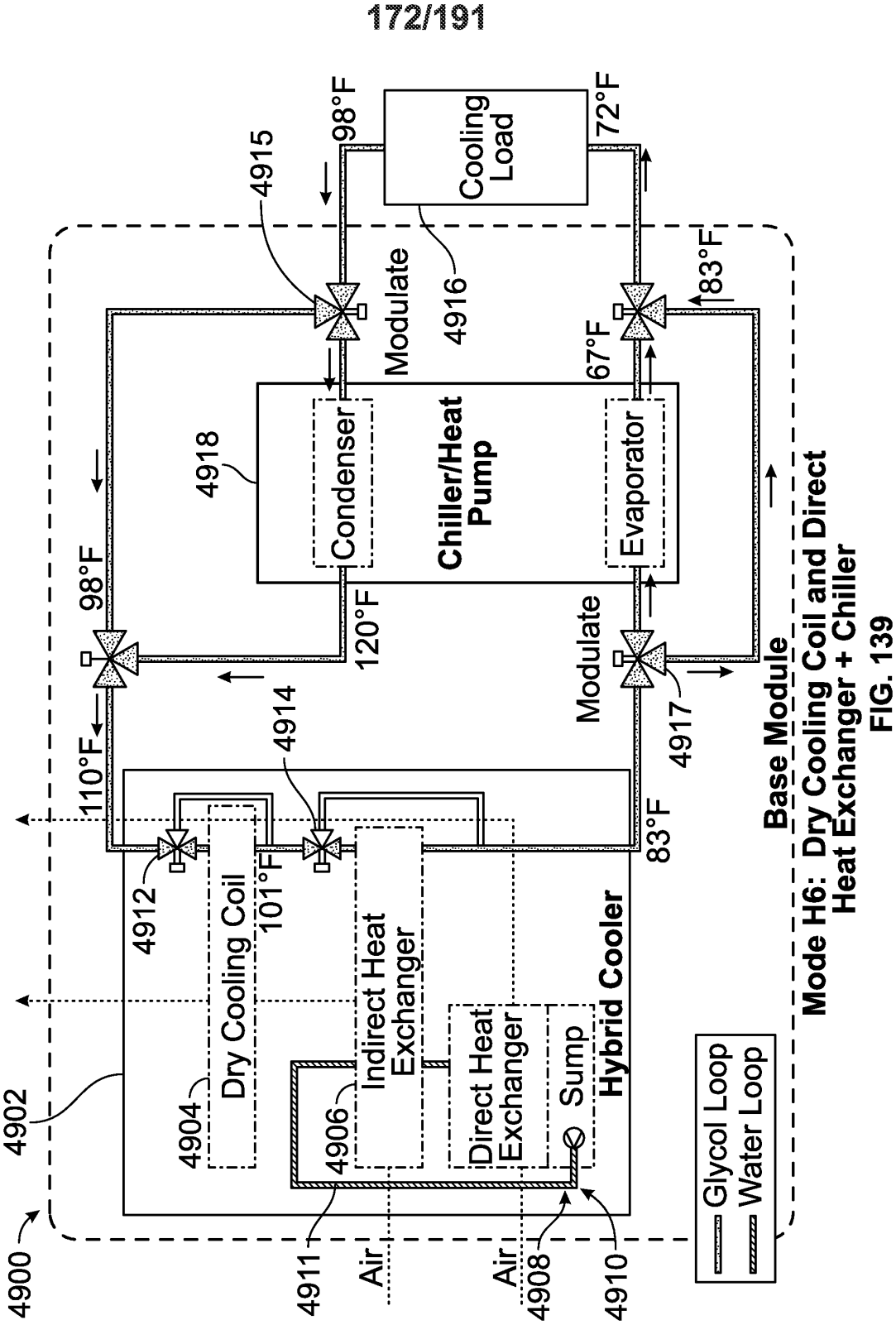


FIG. 136

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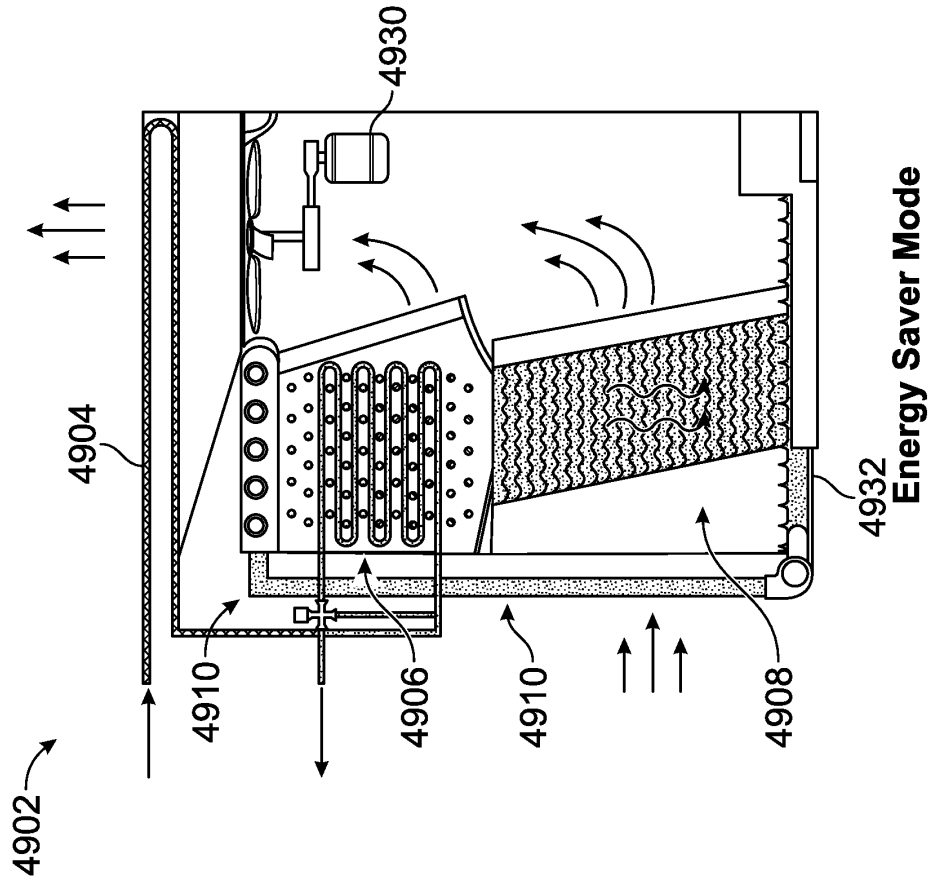
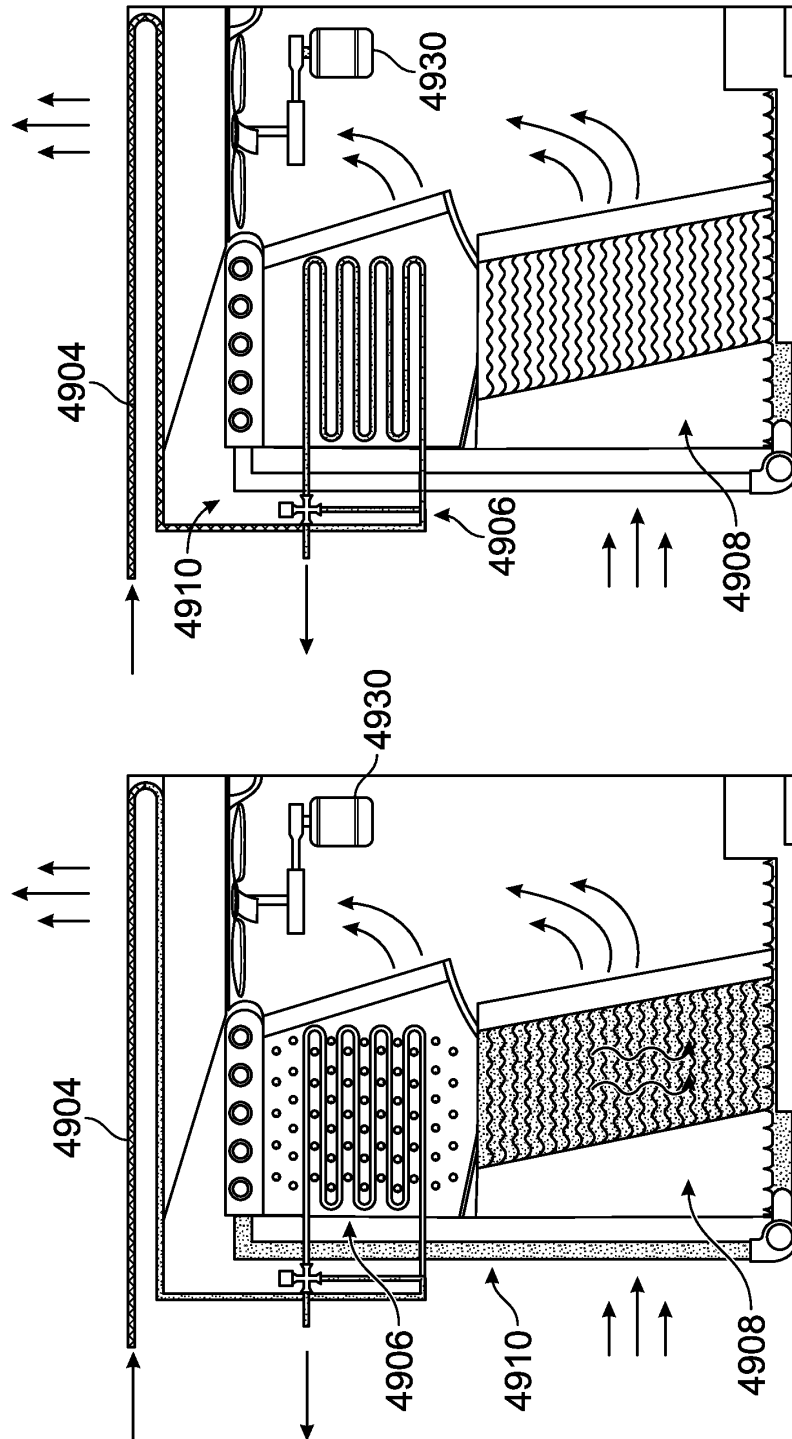
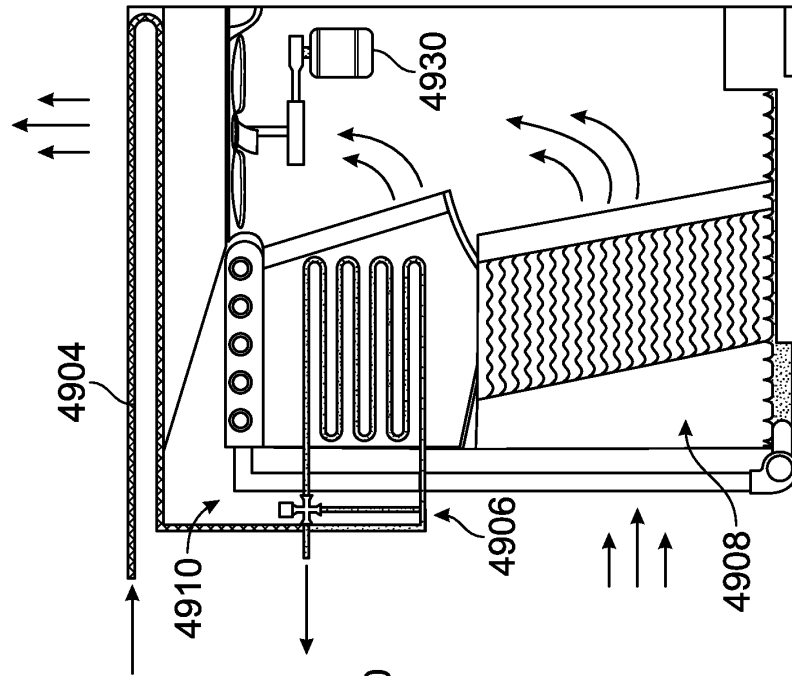


FIG. 140

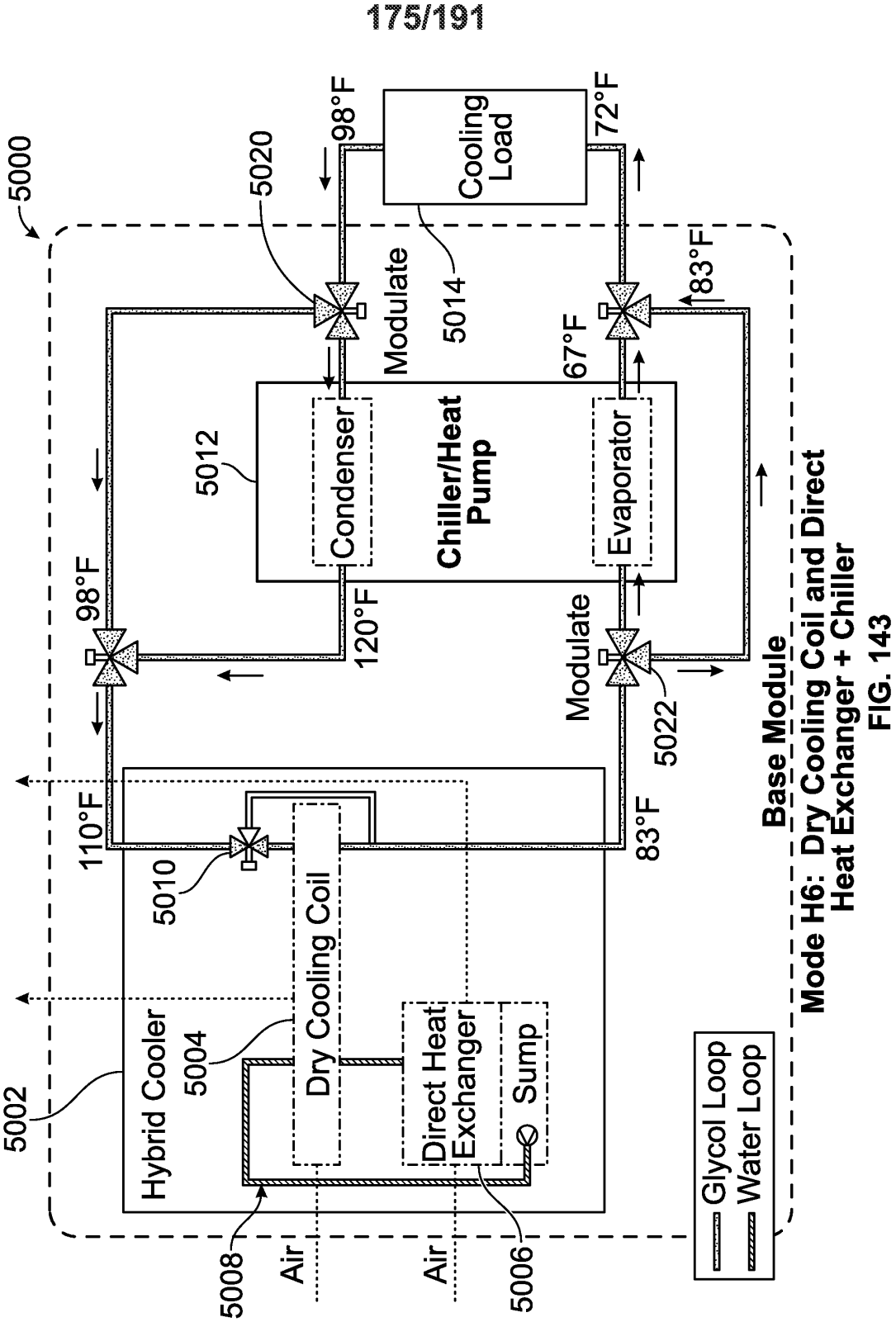
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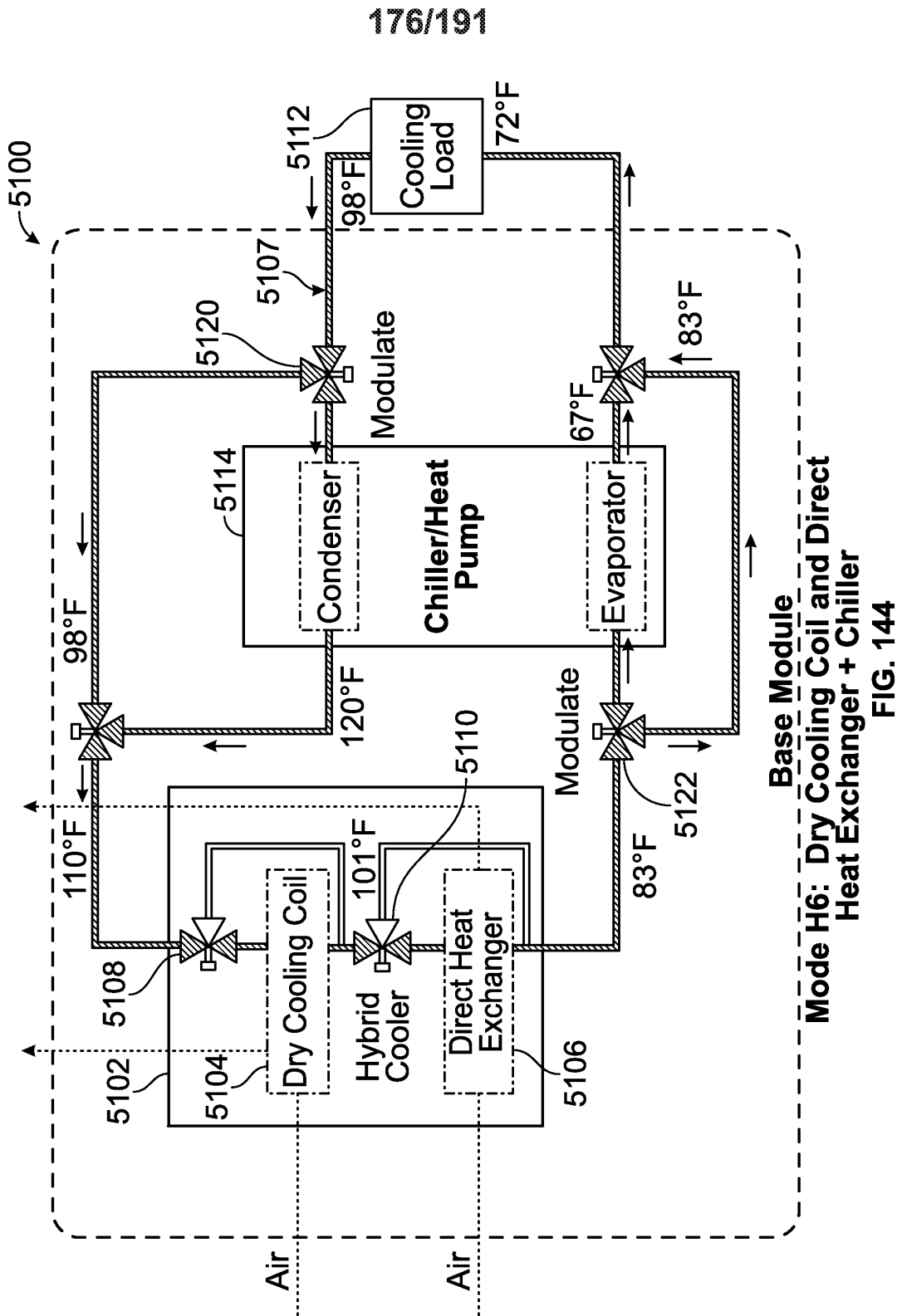


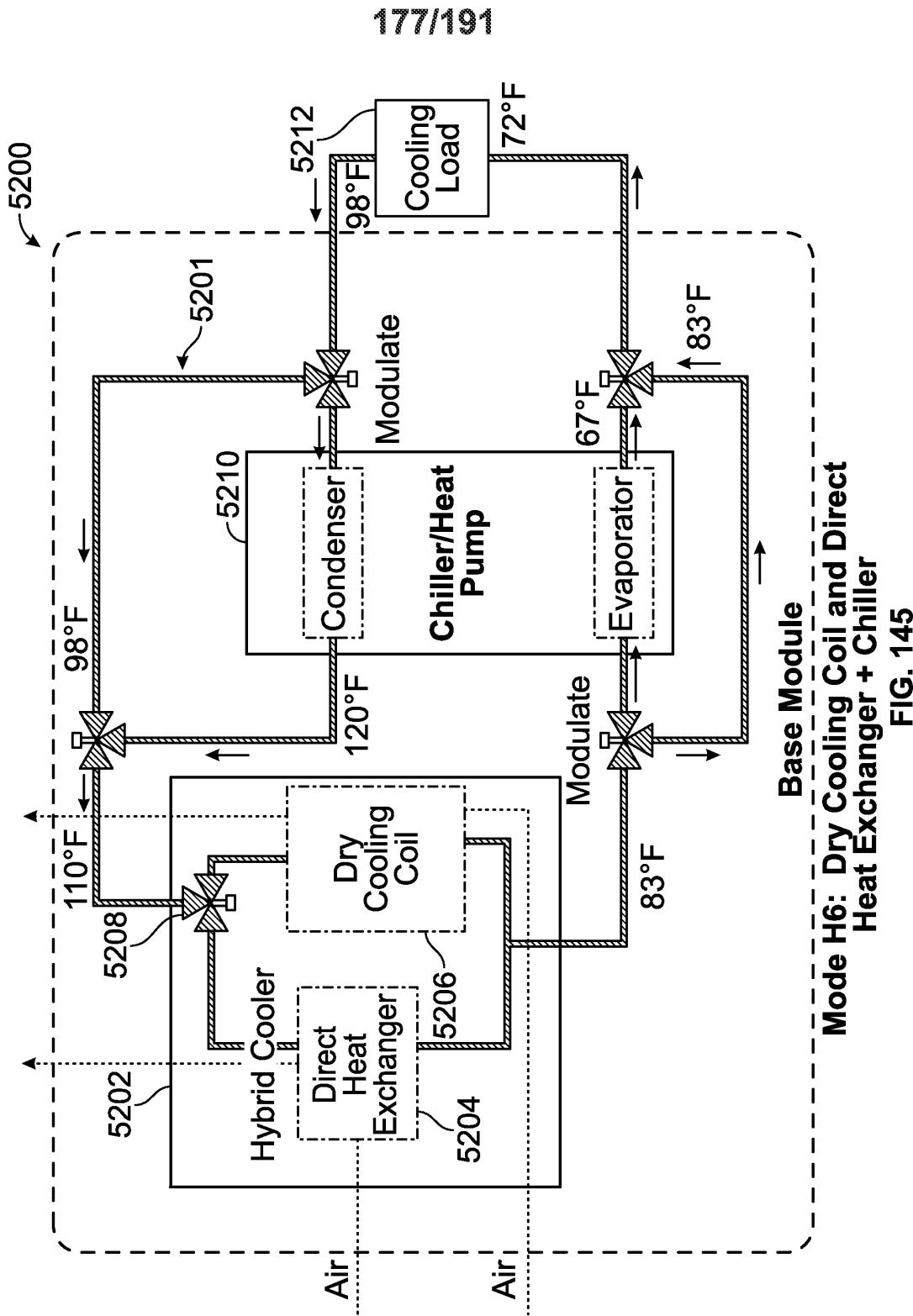
Adiabatic Mode

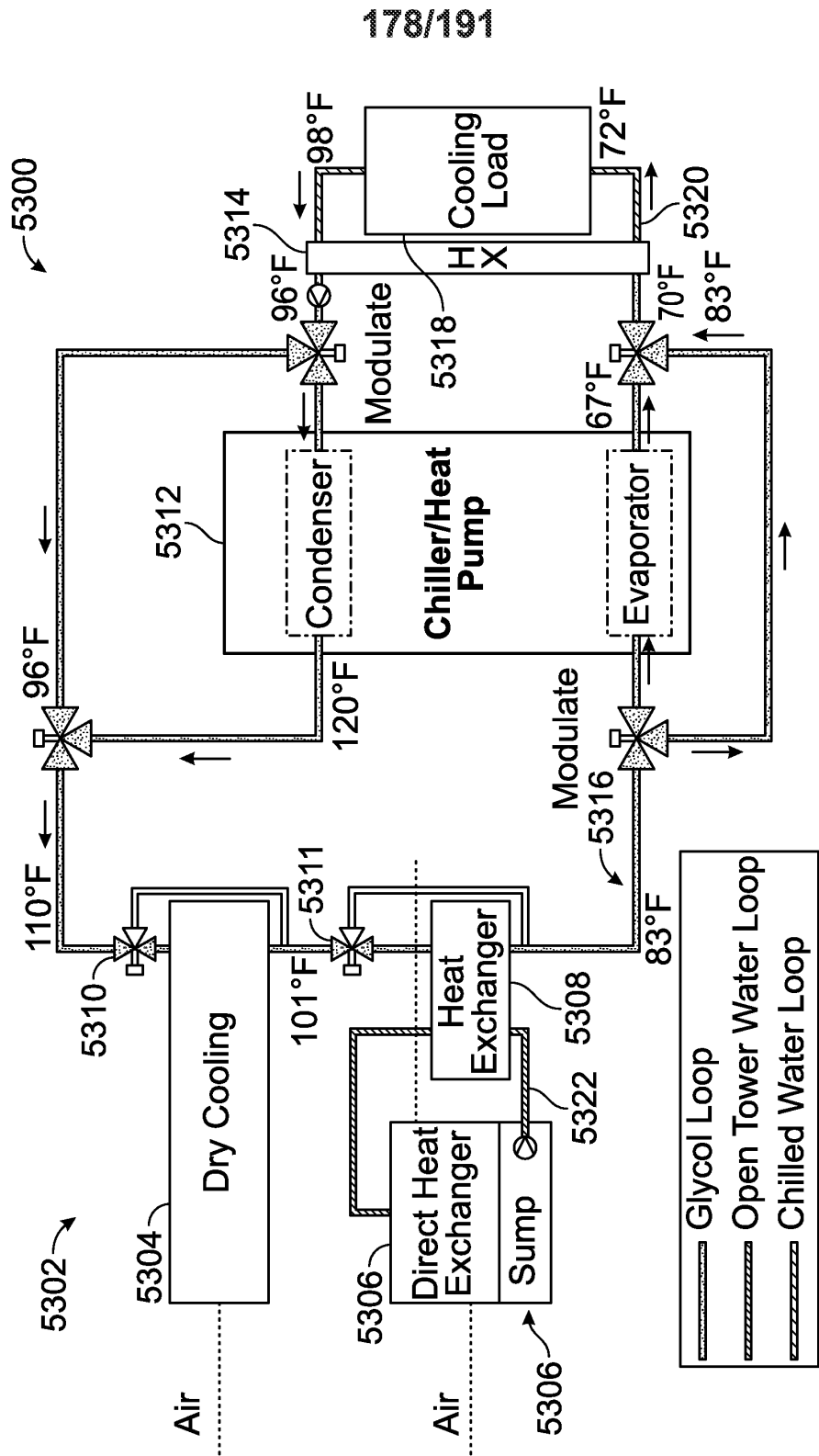


Water Saver Mode



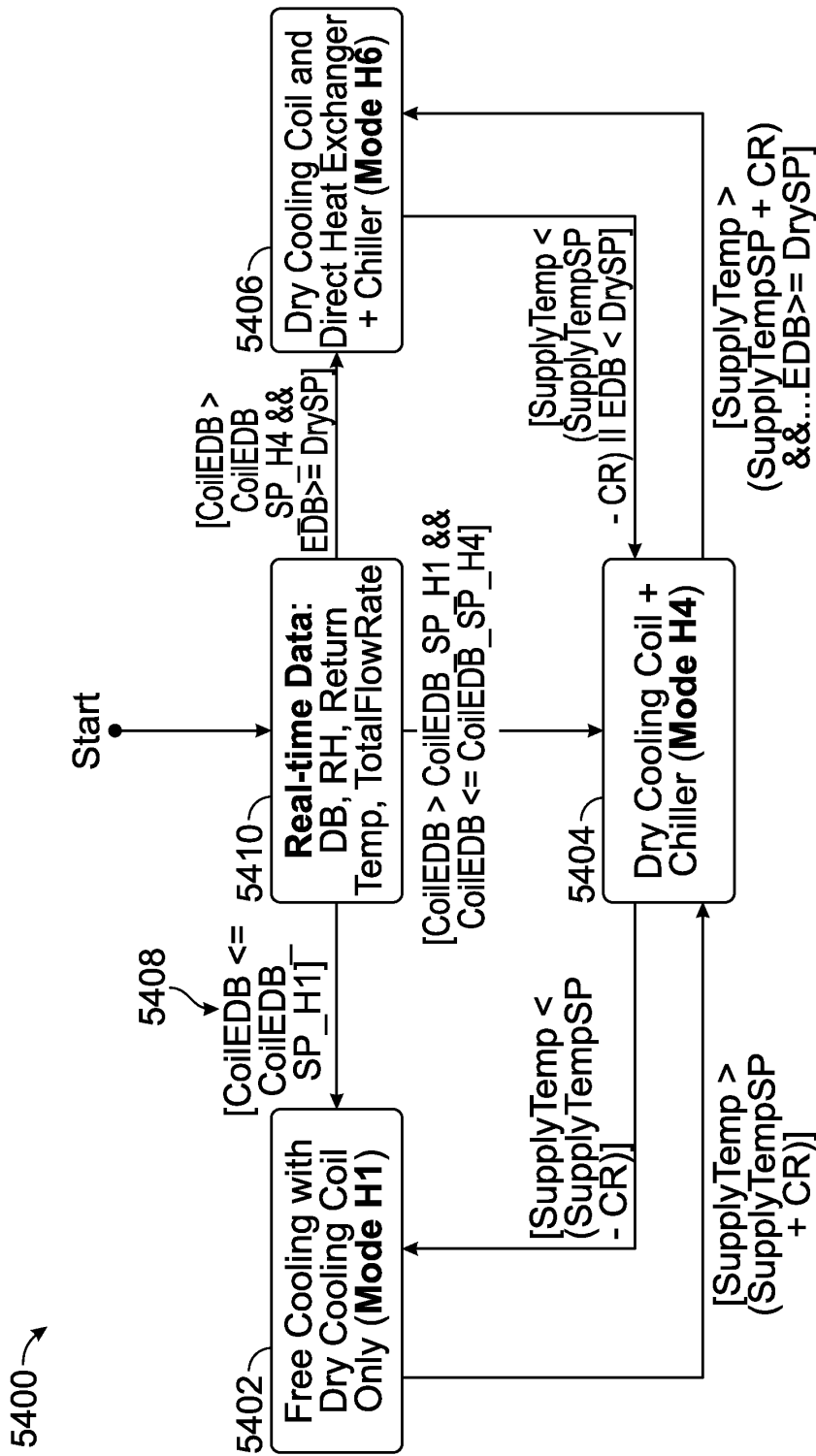




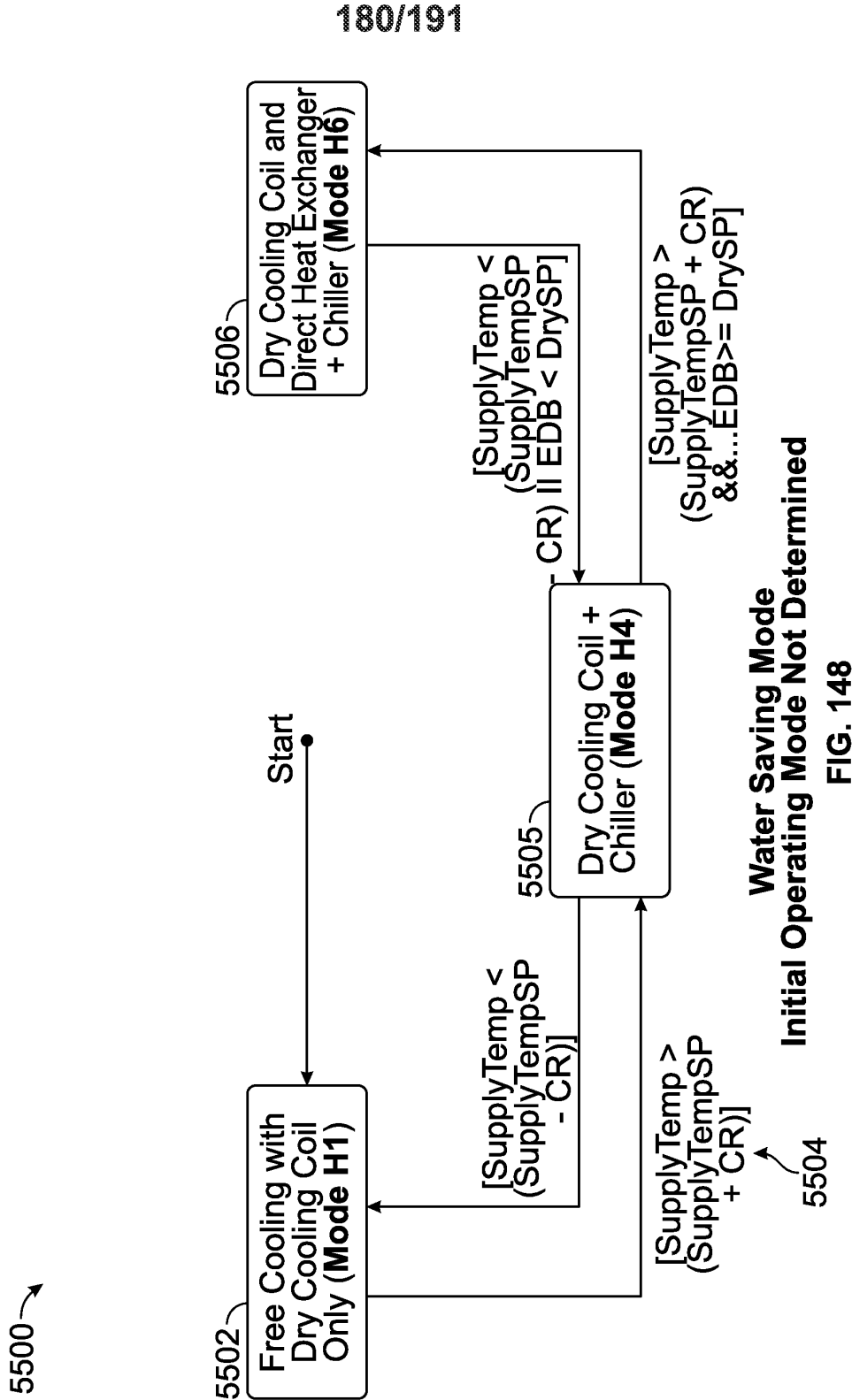


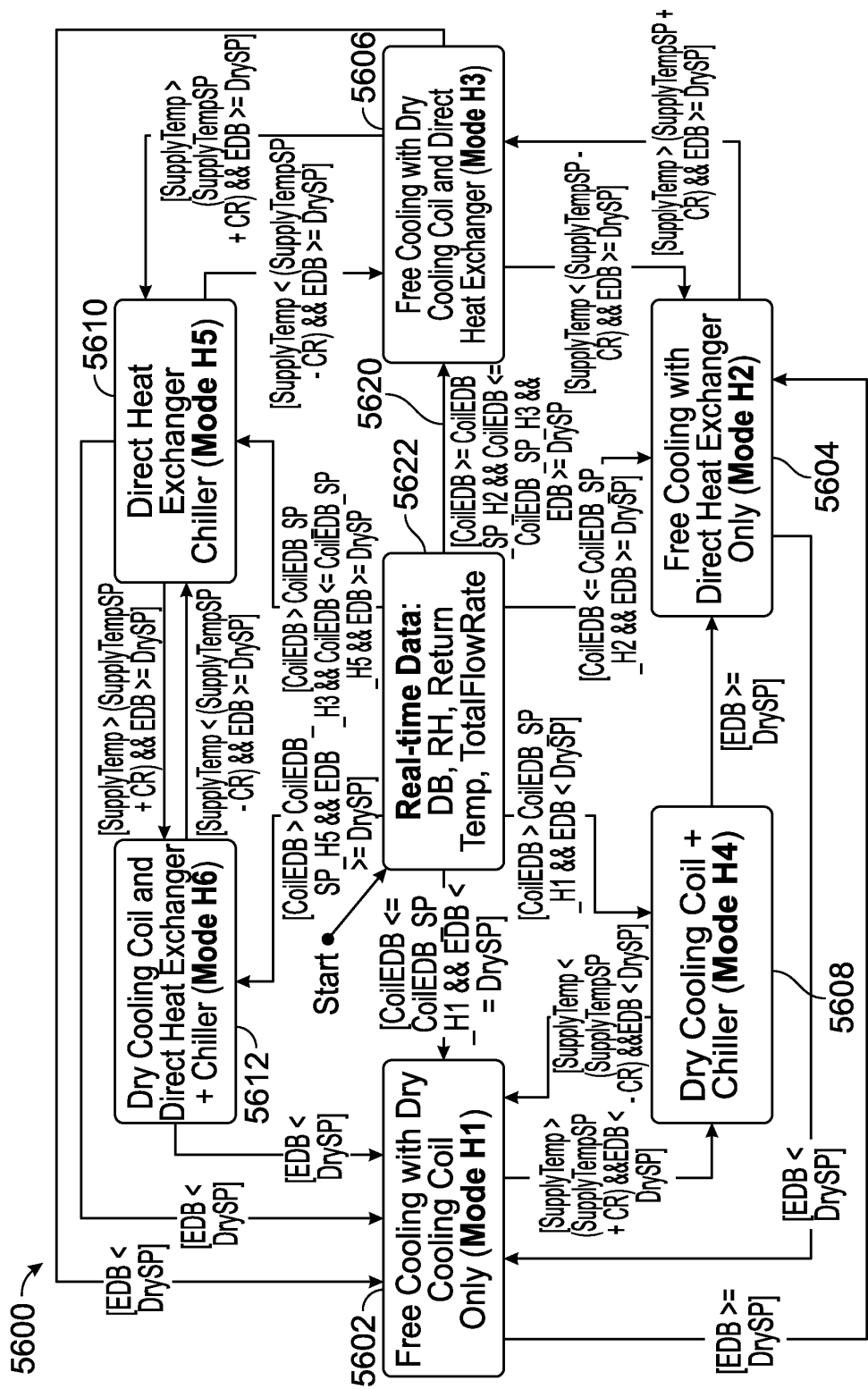
Mode H6: Dry Cooling Coil and Direct Heat Exchanger + Chiller

FIG. 146

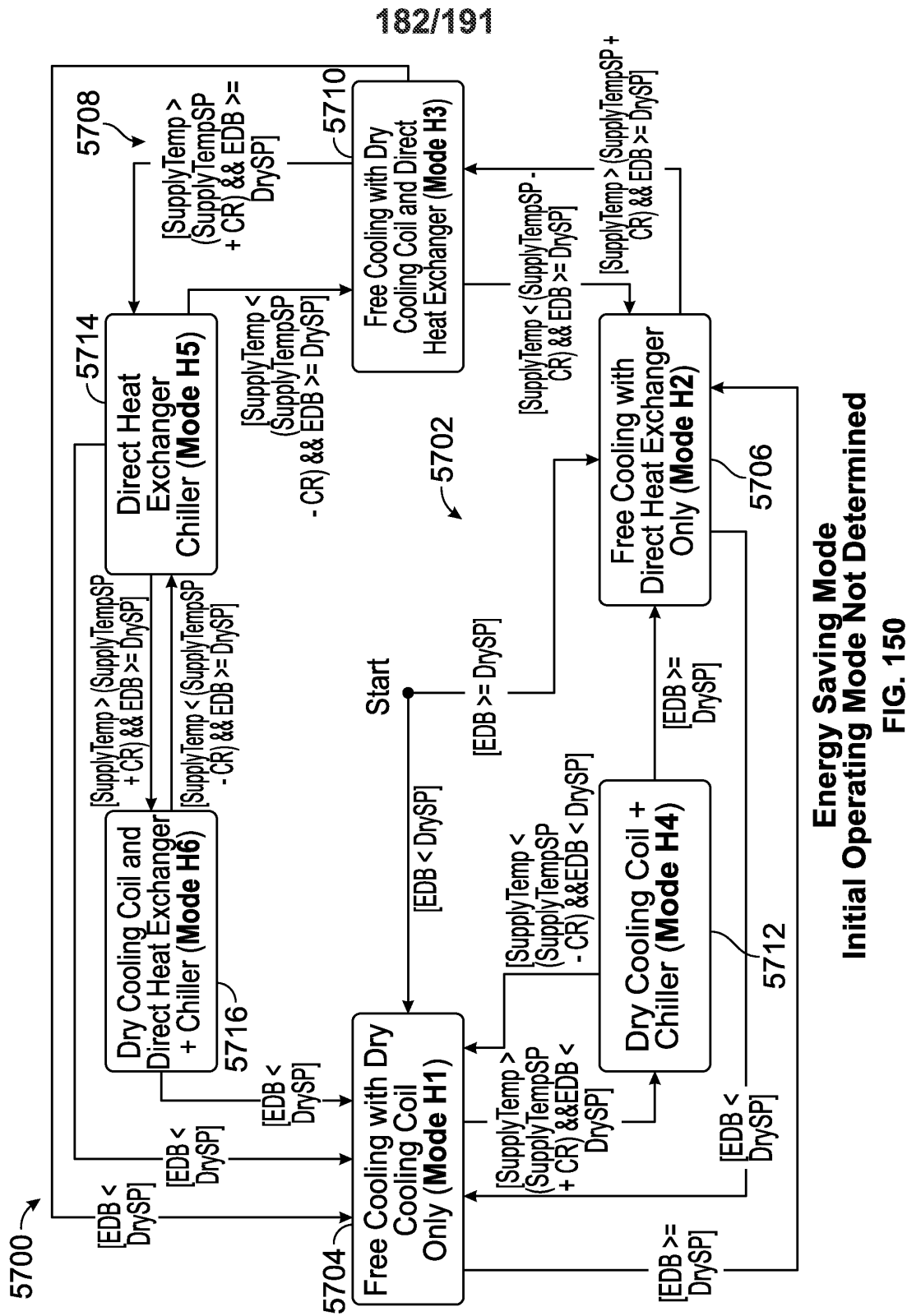


Water Saving Mode
Initial Operating Mode Determined
FIG. 147





Energy Saving Mode
Initial Operating Mode Determined
FIG. 149



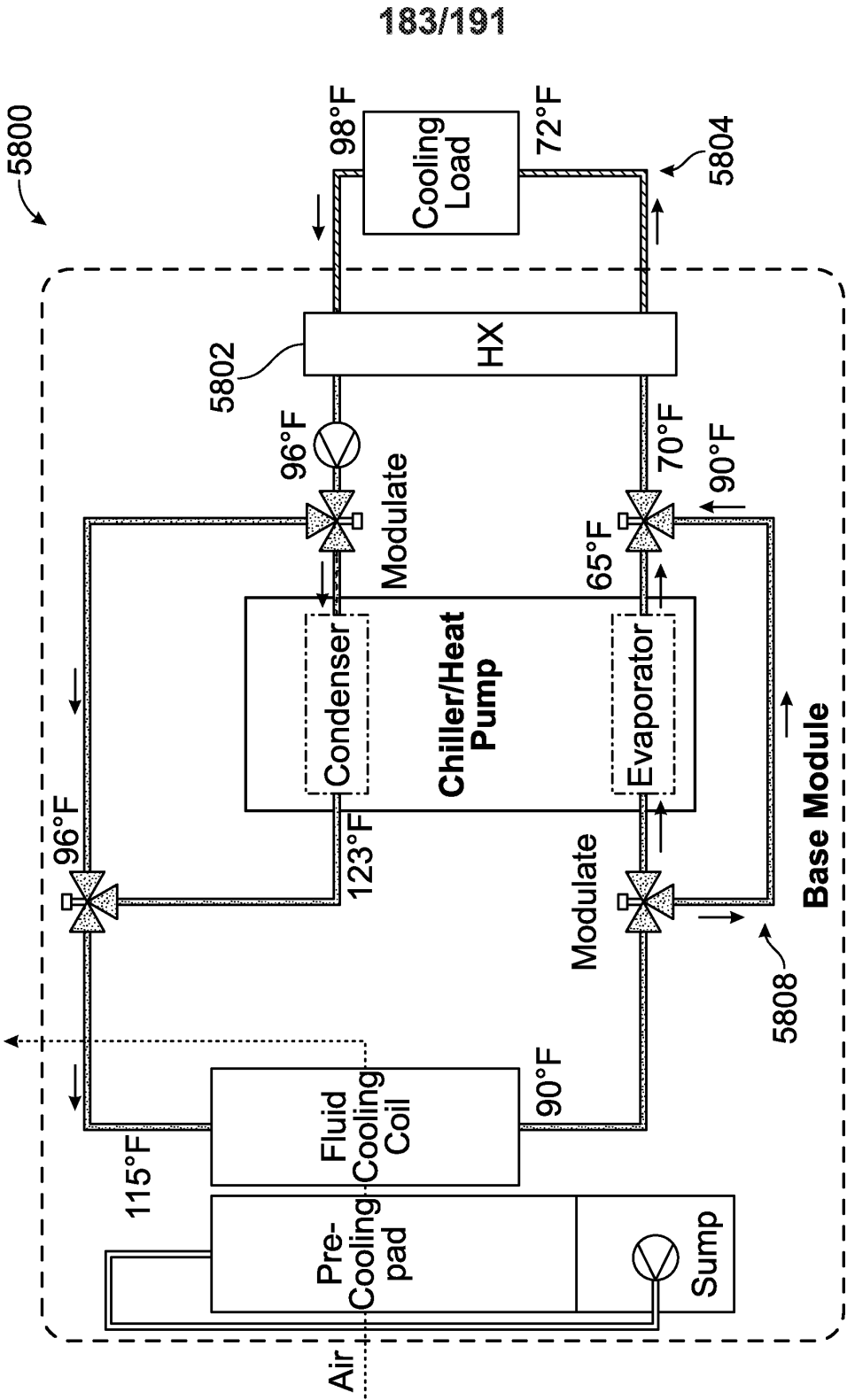


FIG. 151

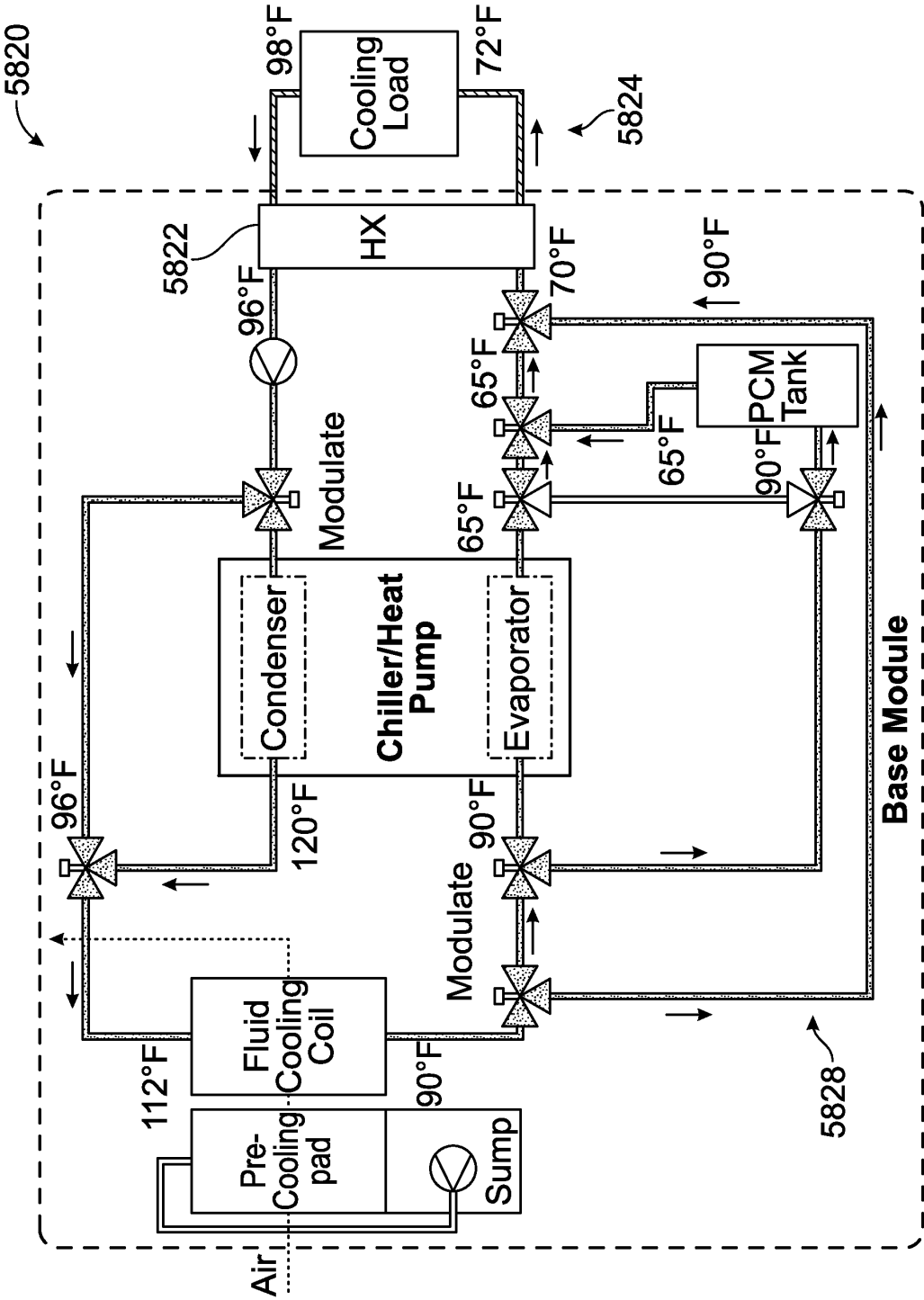


FIG. 152

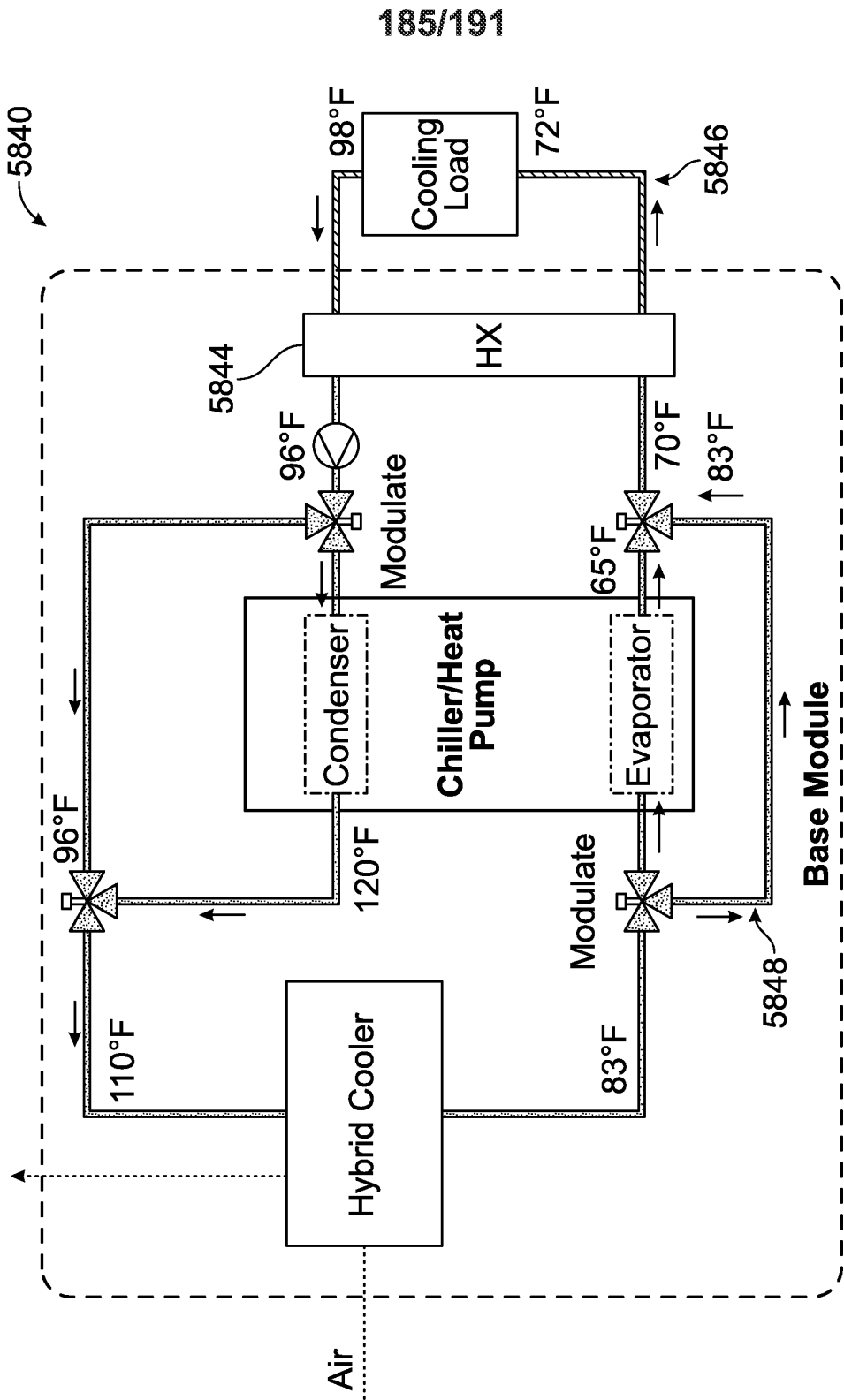
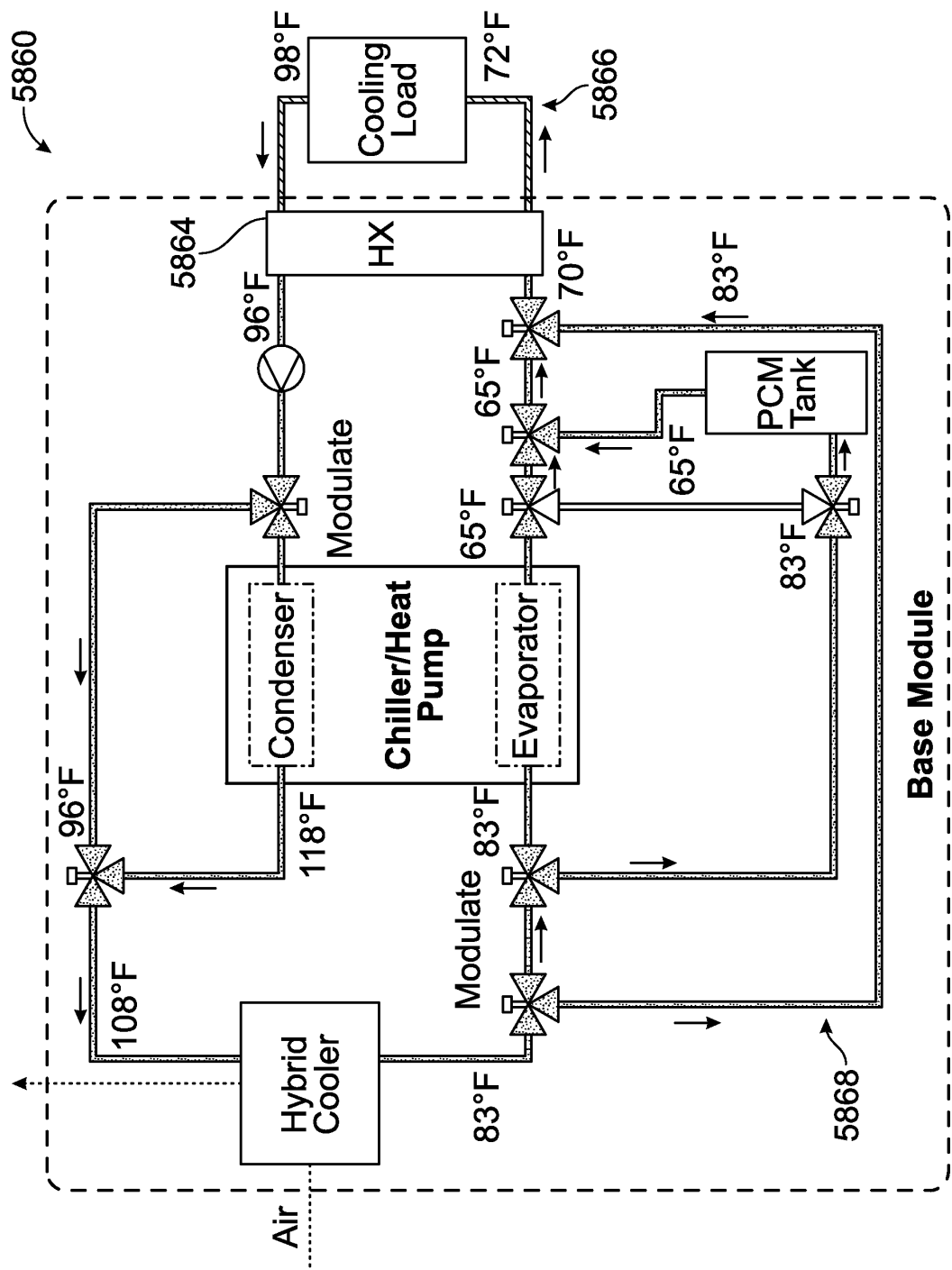


FIG. 153



Base Module
FIG. 154

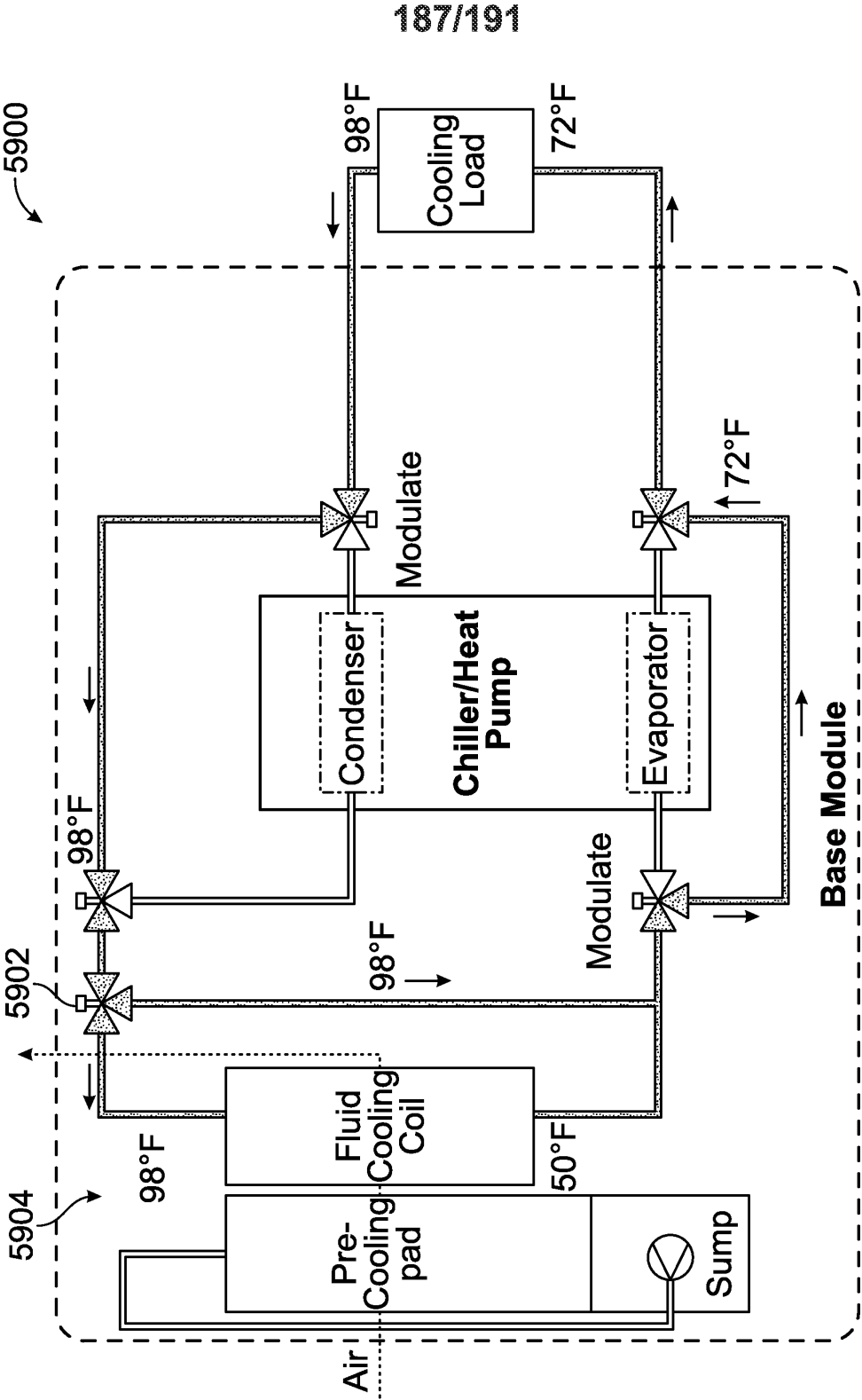


FIG. 155

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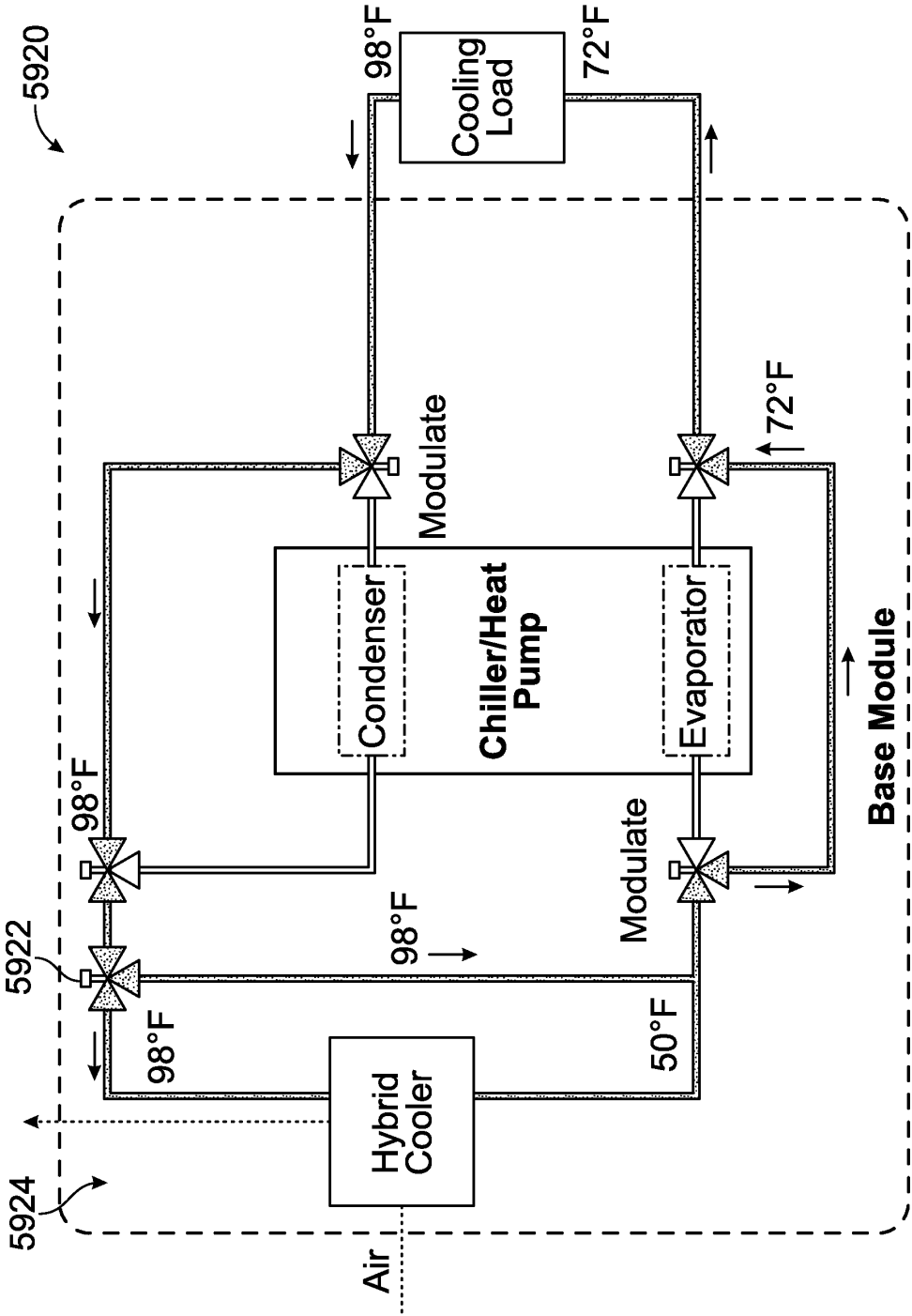


FIG. 156

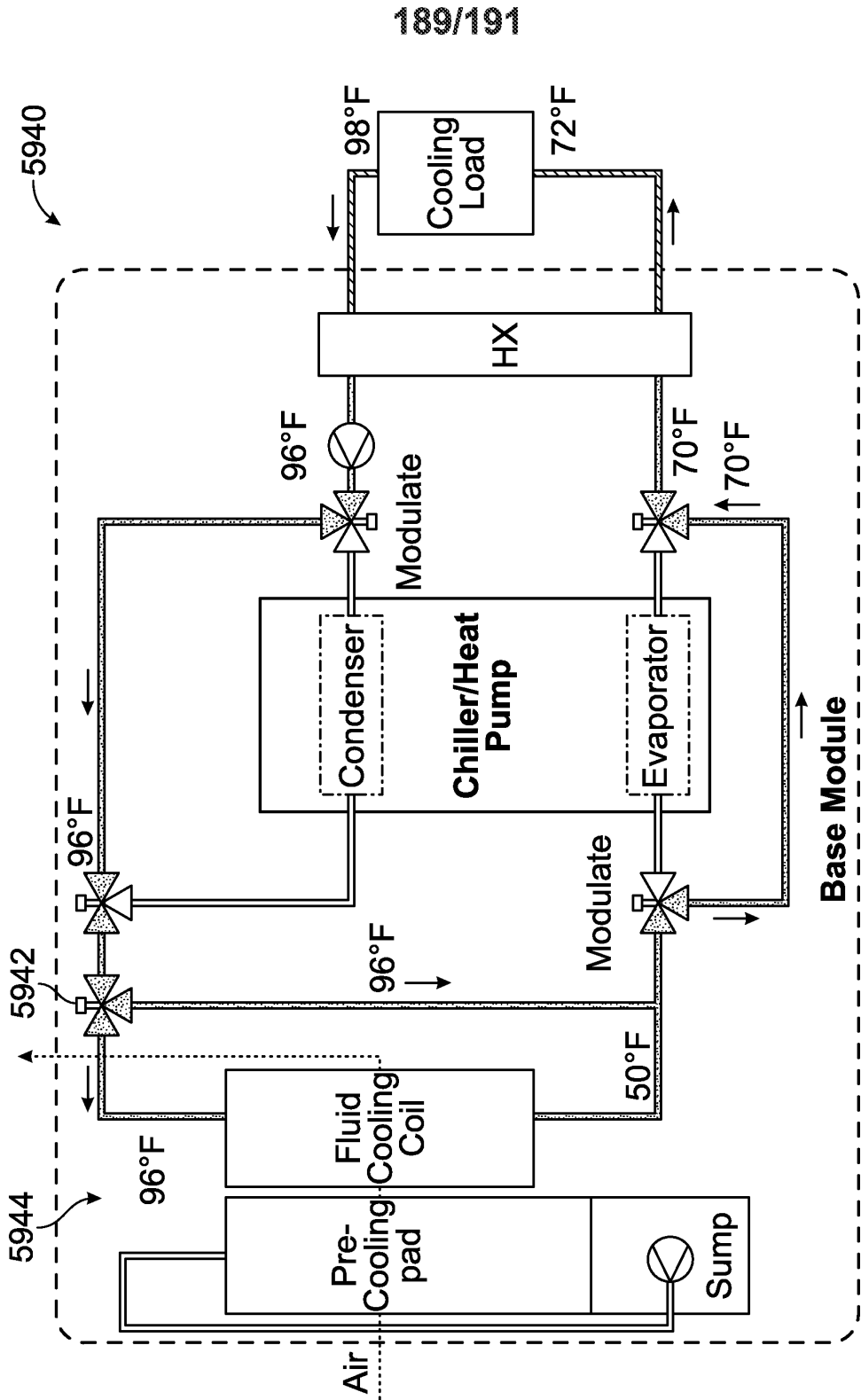


FIG. 157

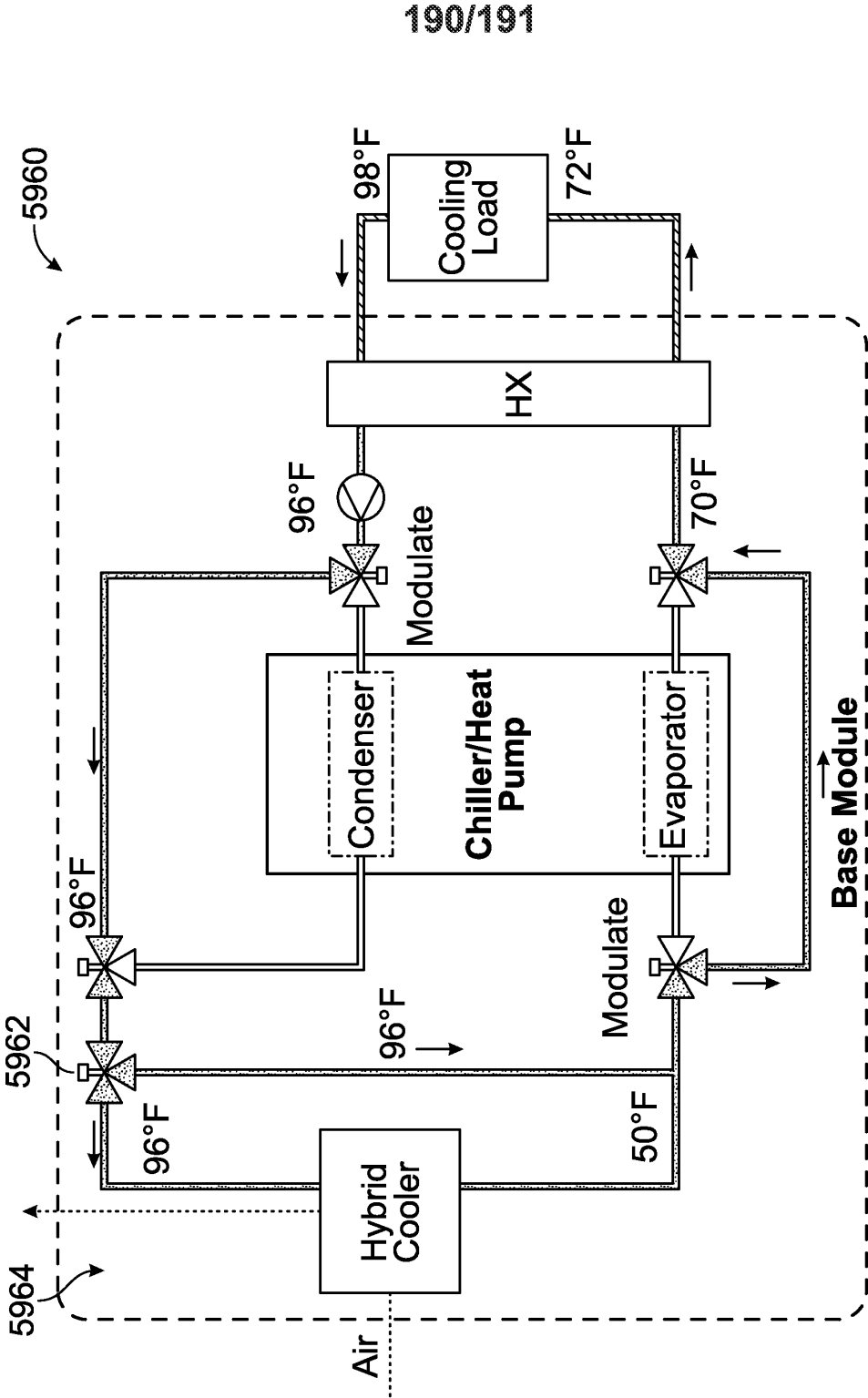


FIG. 158

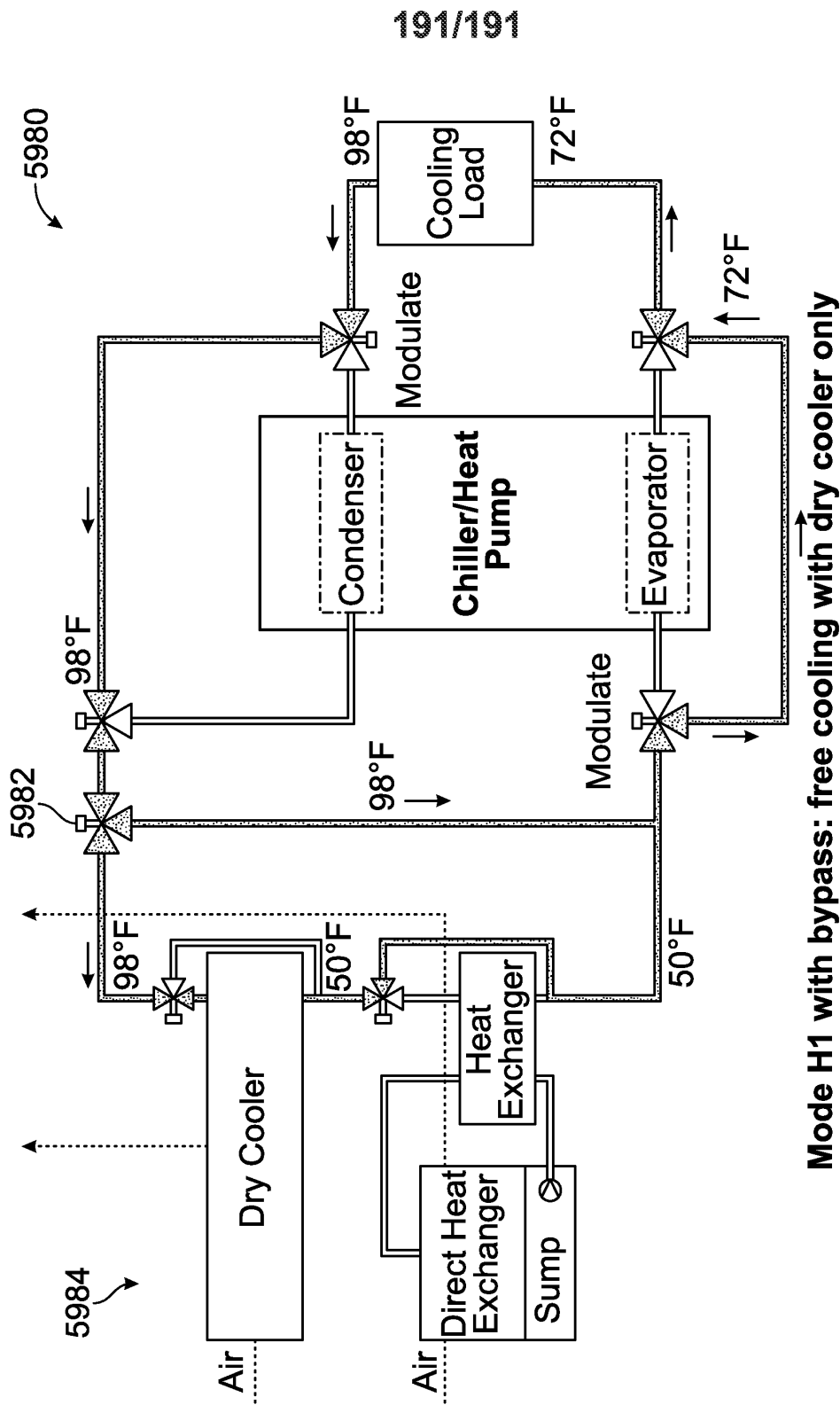


FIG. 159