

Commercial Piping Diagram

Summer 2024

***For proper formatting,
download to computer and
view in Adobe Acrobat***



Disclaimer:

These piping diagrams are an example of possible configurations which may not work in all applications. Local codes and authorities should be always be verified with a qualified engineer's consultation on all installation details including piping schematics. Please consult Patterson-Kelley, LLC Boiler & Water-Heater Owner's Manuals for correct operational standards for all P-K boilers and water-heaters. Patterson-Kelley LLC cannot, and will not, be held liable for any lack of due diligence of any party involved in the installation of its products.

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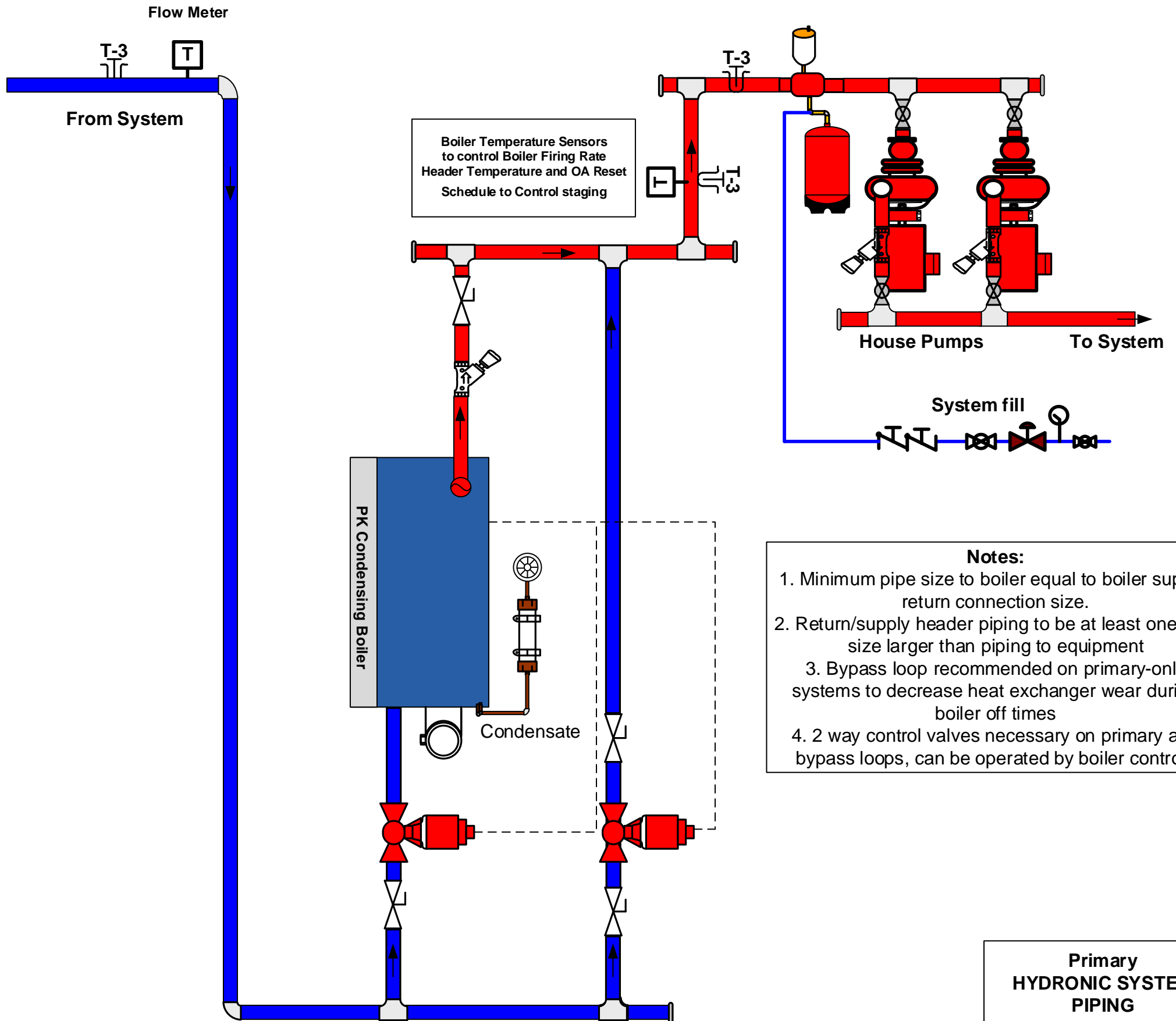
Section 4; Starting on Page 20: Primary Condensing System Water Heater (Direct Fired)

Section 5; Starting on Page 29: Primary Non-Condensing System Water Heater (Direct Fired)

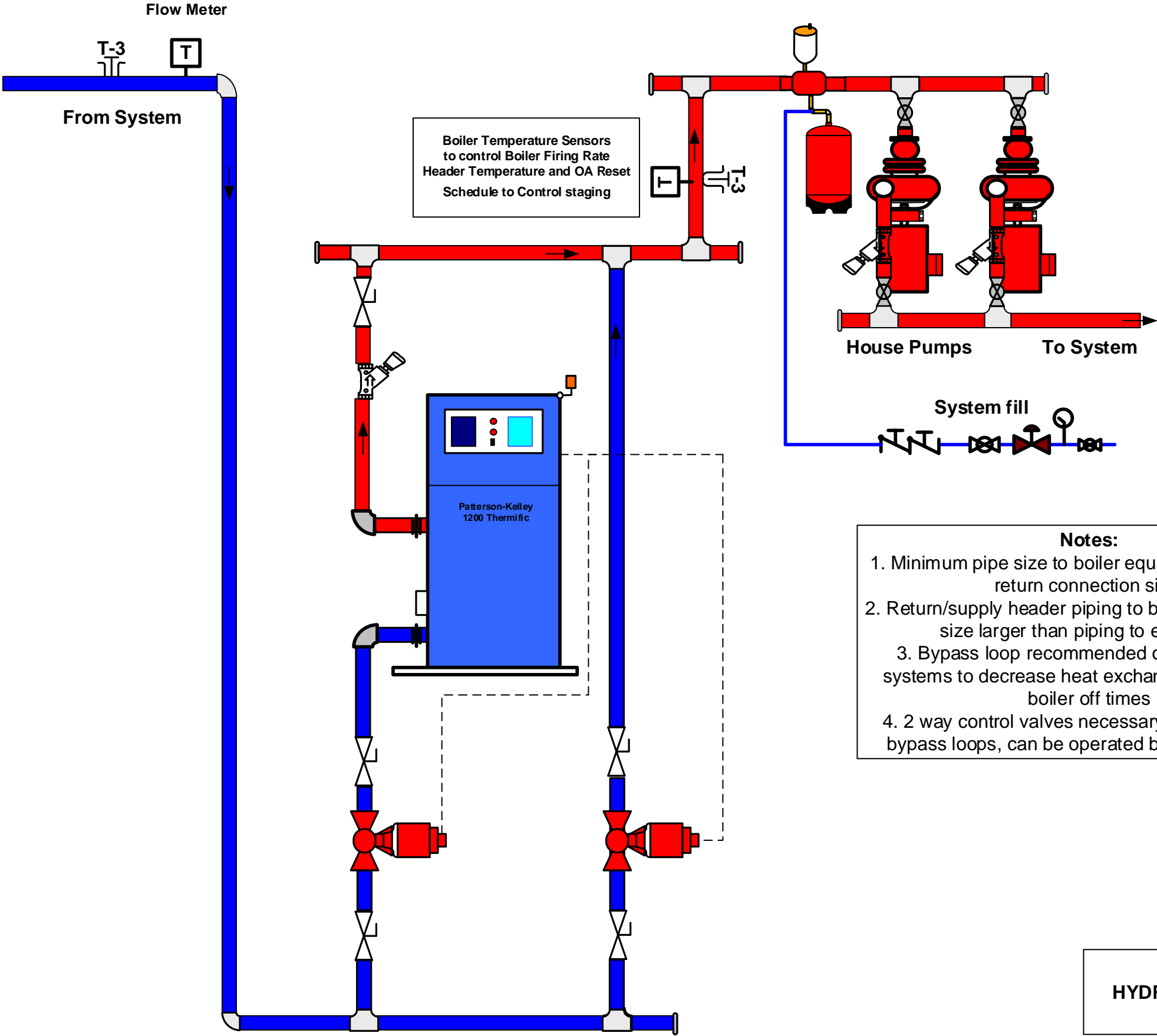
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Primary loop diagram



Primary loop diagram

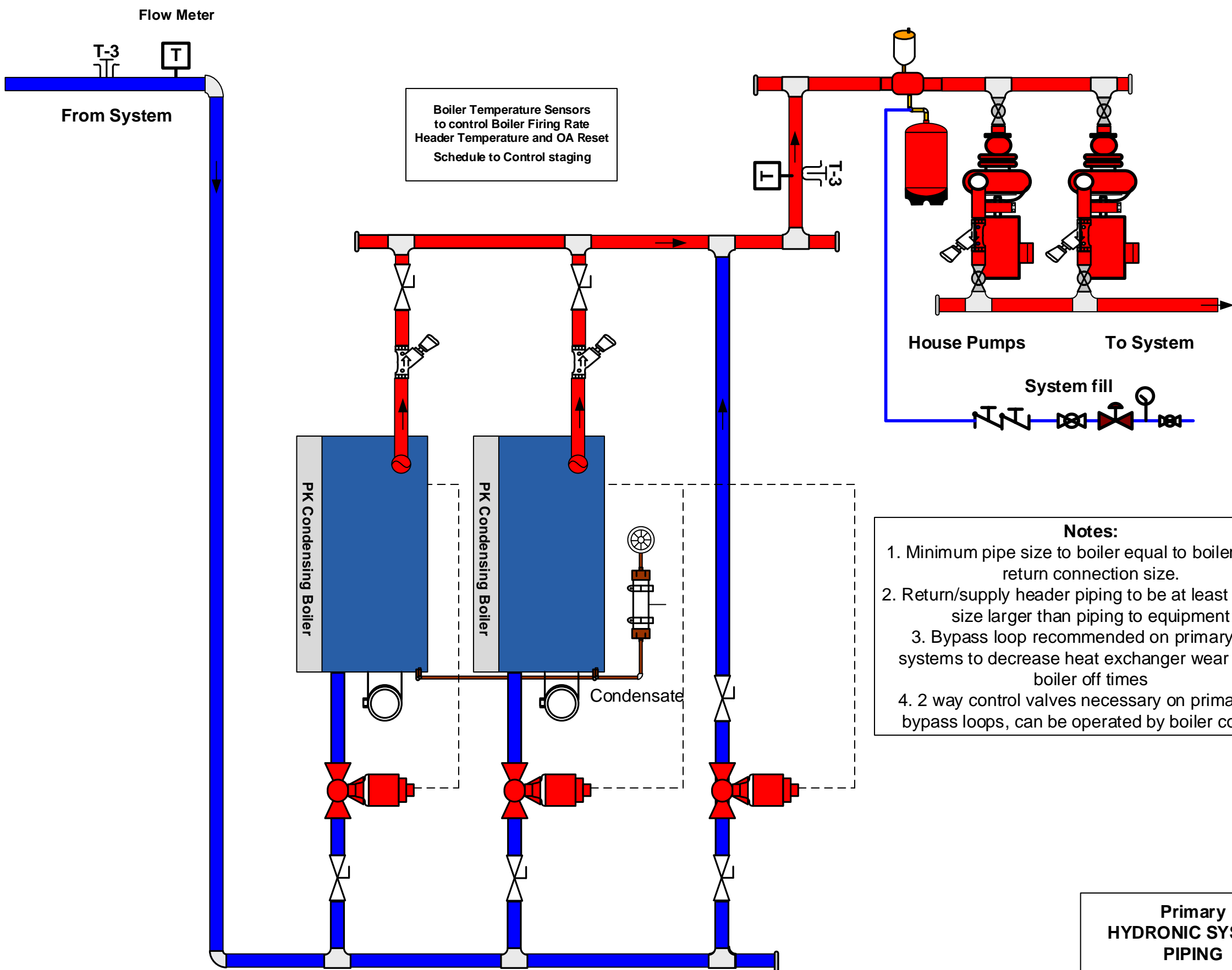


Notes:

1. Minimum pipe size to boiler equal to boiler supply/ return connection size.
2. Return/supply header piping to be at least one pipe size larger than piping to equipment
3. Bypass loop recommended on primary-only systems to decrease heat exchanger wear during boiler off times
4. 2 way control valves necessary on primary and bypass loops, can be operated by boiler controls

Primary
HYDRONIC SYSTEM
PIPING

Primary loop diagram

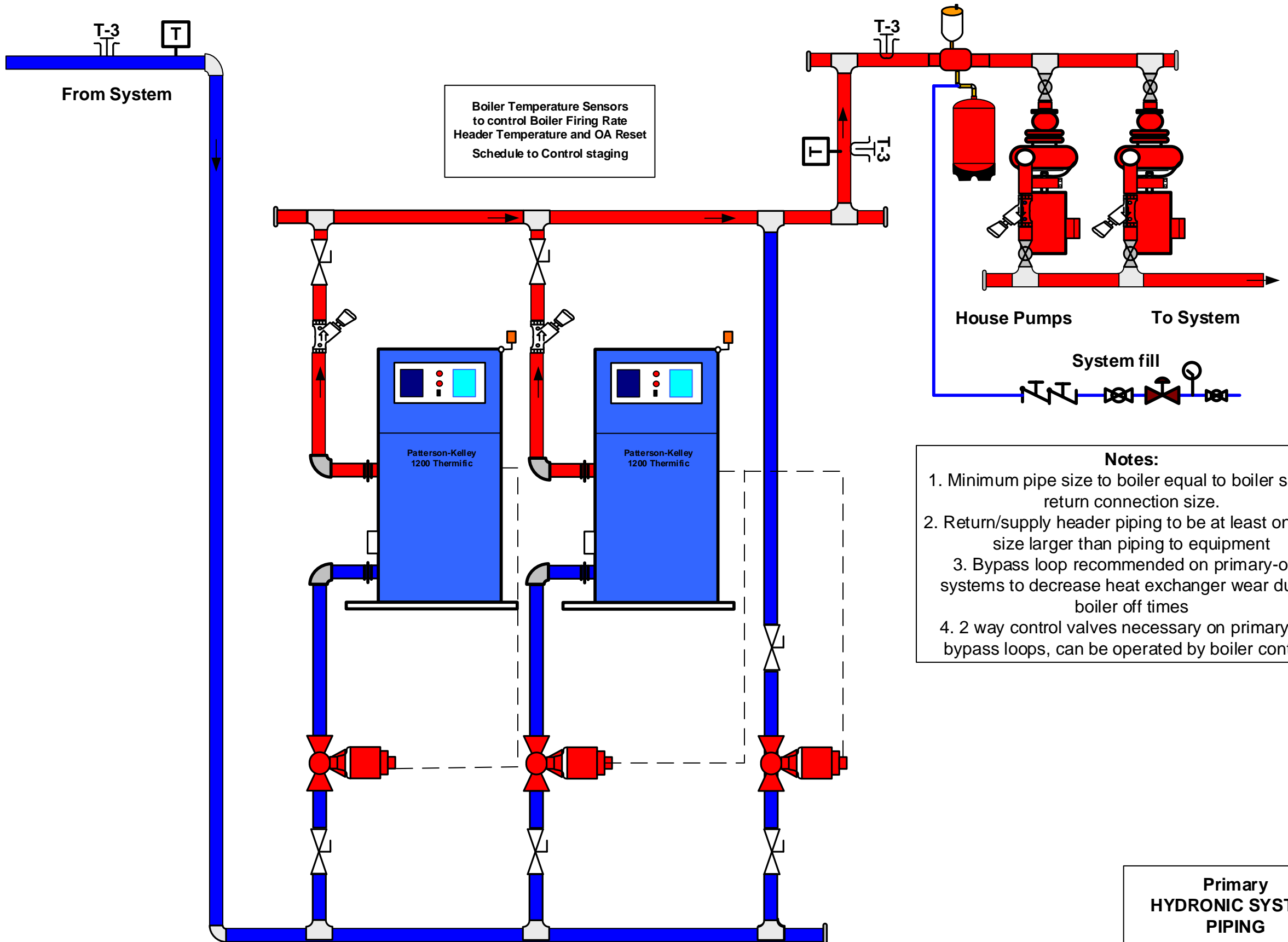


Boiler Temperature Sensors
to control Boiler Firing Rate
Header Temperature and OA Reset
Schedule to Control staging

- Notes:**
- 1. Minimum pipe size to boiler equal to boiler supply/ return connection size.
 - 2. Return/supply header piping to be at least one pipe size larger than piping to equipment
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Primary
HYDRONIC SYSTEM
PIPING

Primary loop diagram

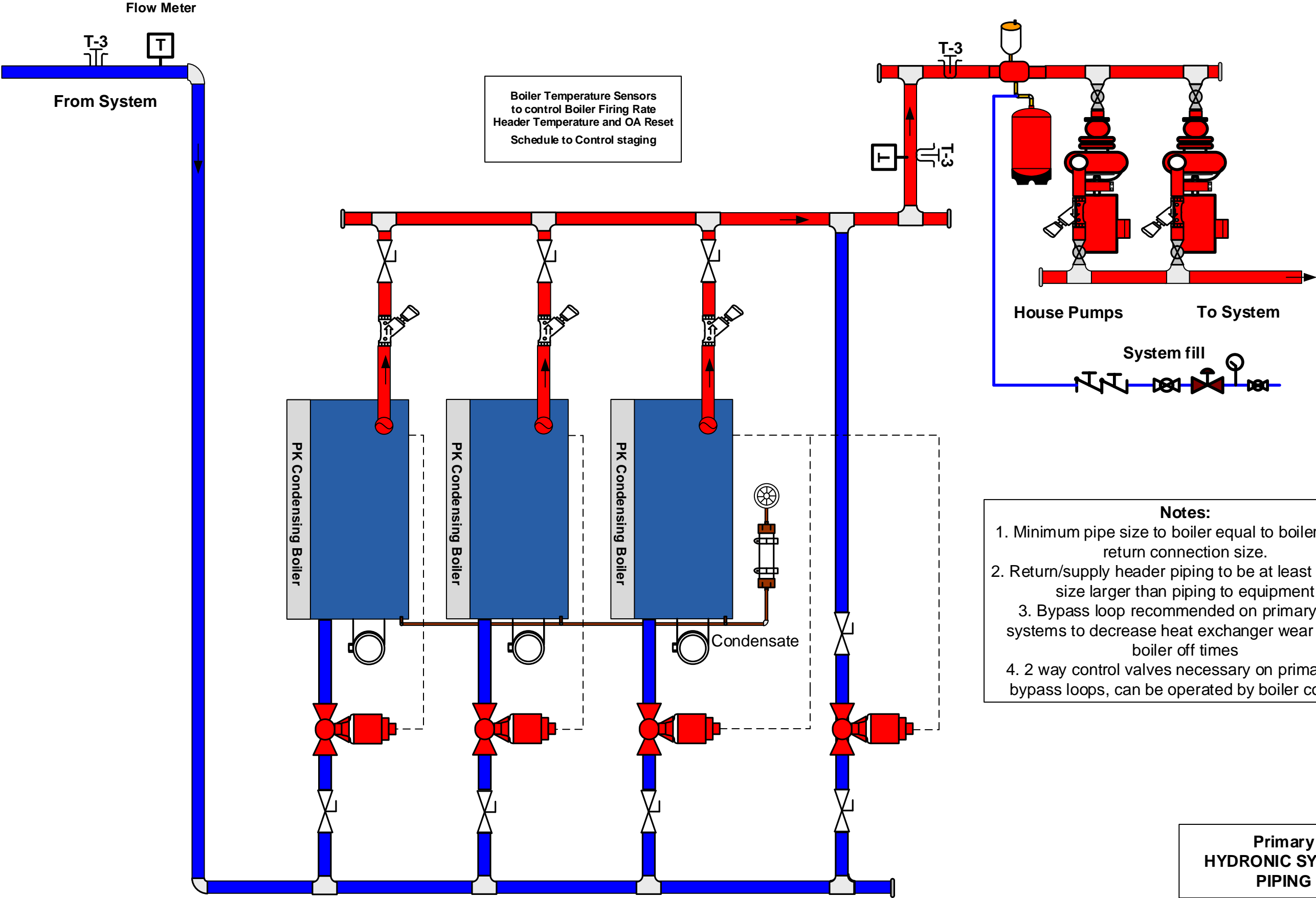


Notes:

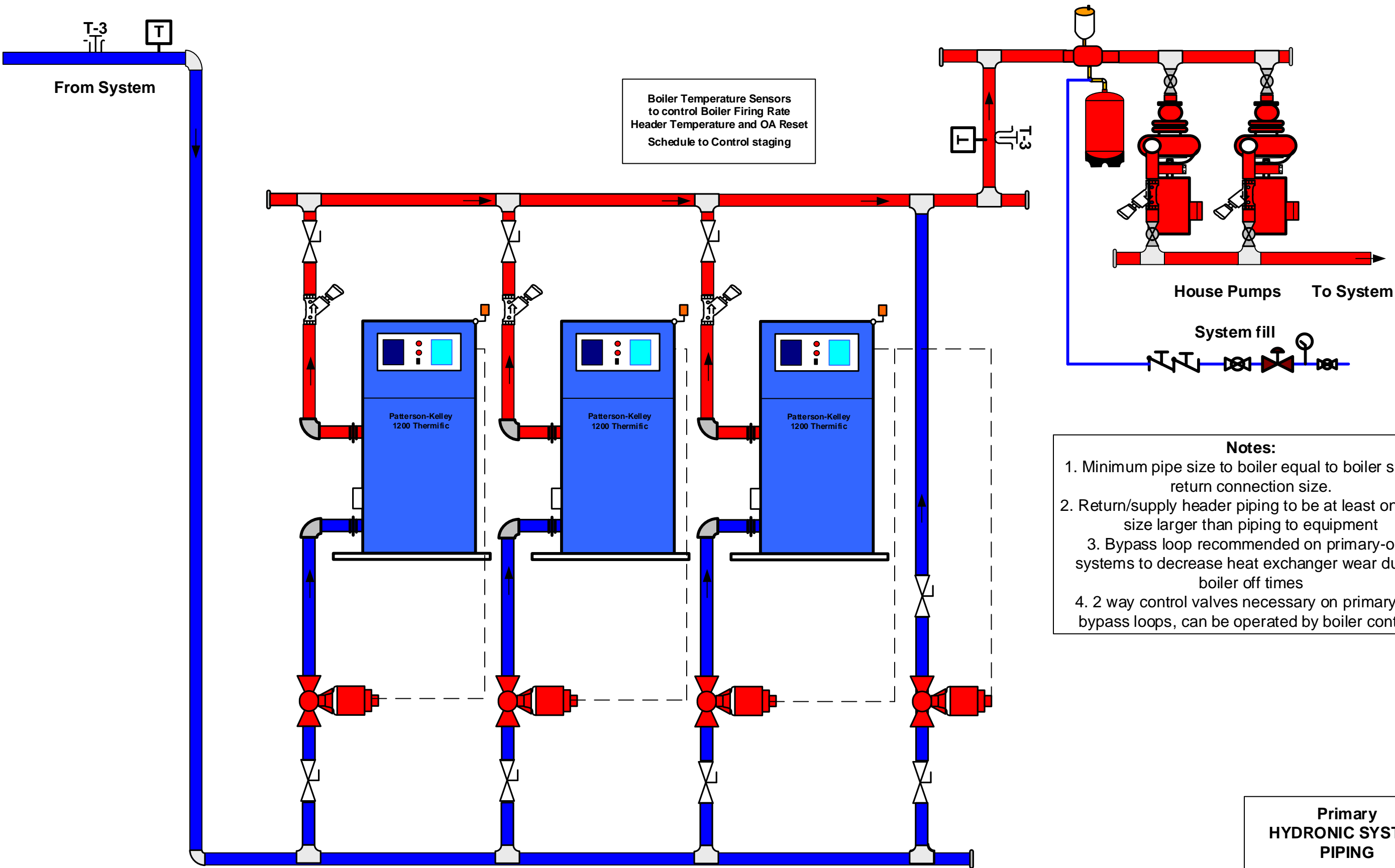
1. Minimum pipe size to boiler equal to boiler supply/ return connection size.
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3. Bypass loop recommended on primary-only systems to decrease heat exchanger wear during boiler off times
4. 2 way control valves necessary on primary and bypass loops, can be operated by boiler controls

**Primary
HYDRONIC SYSTEM
PIPING**

Primary loop diagram



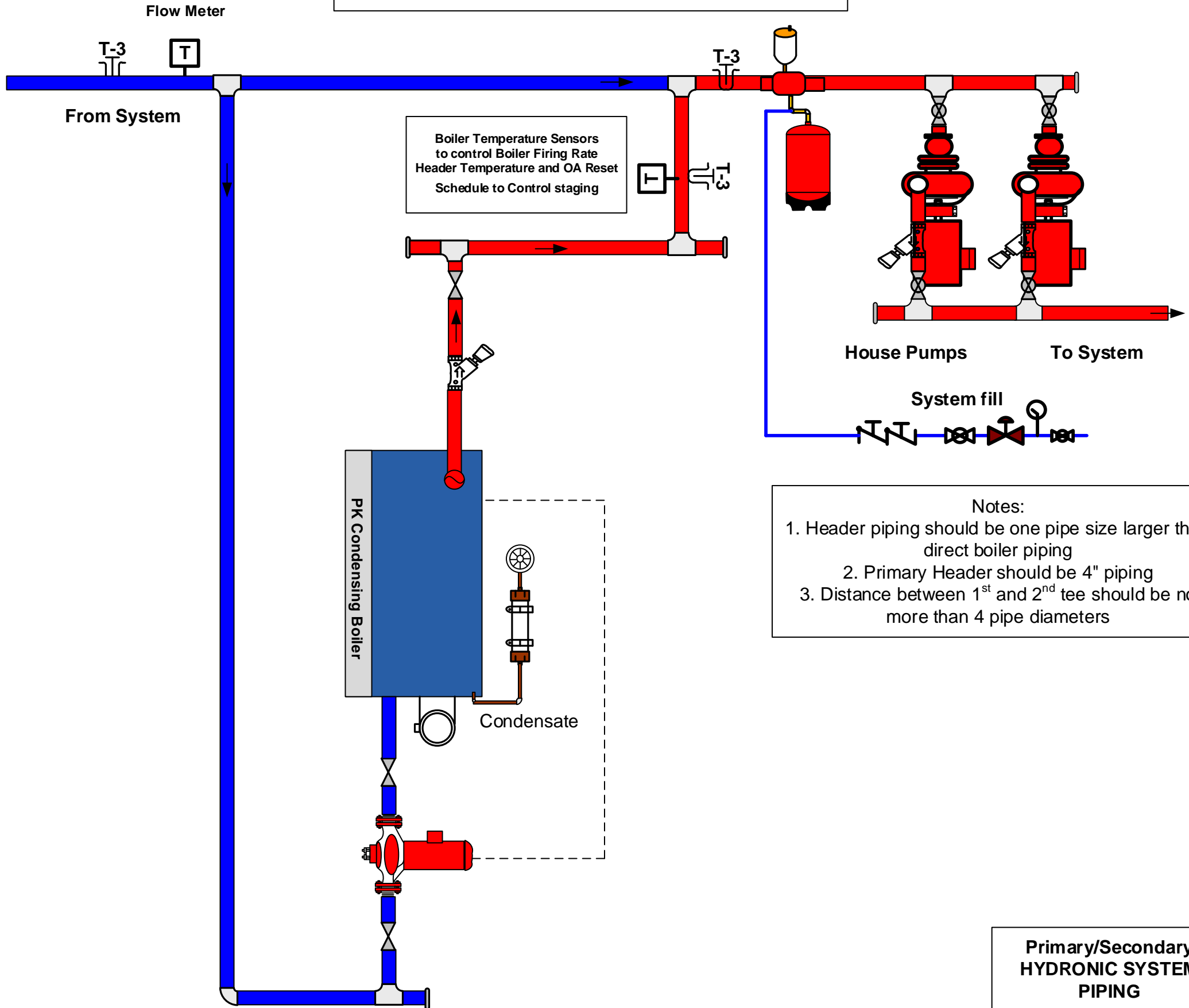
Primary loop diagram



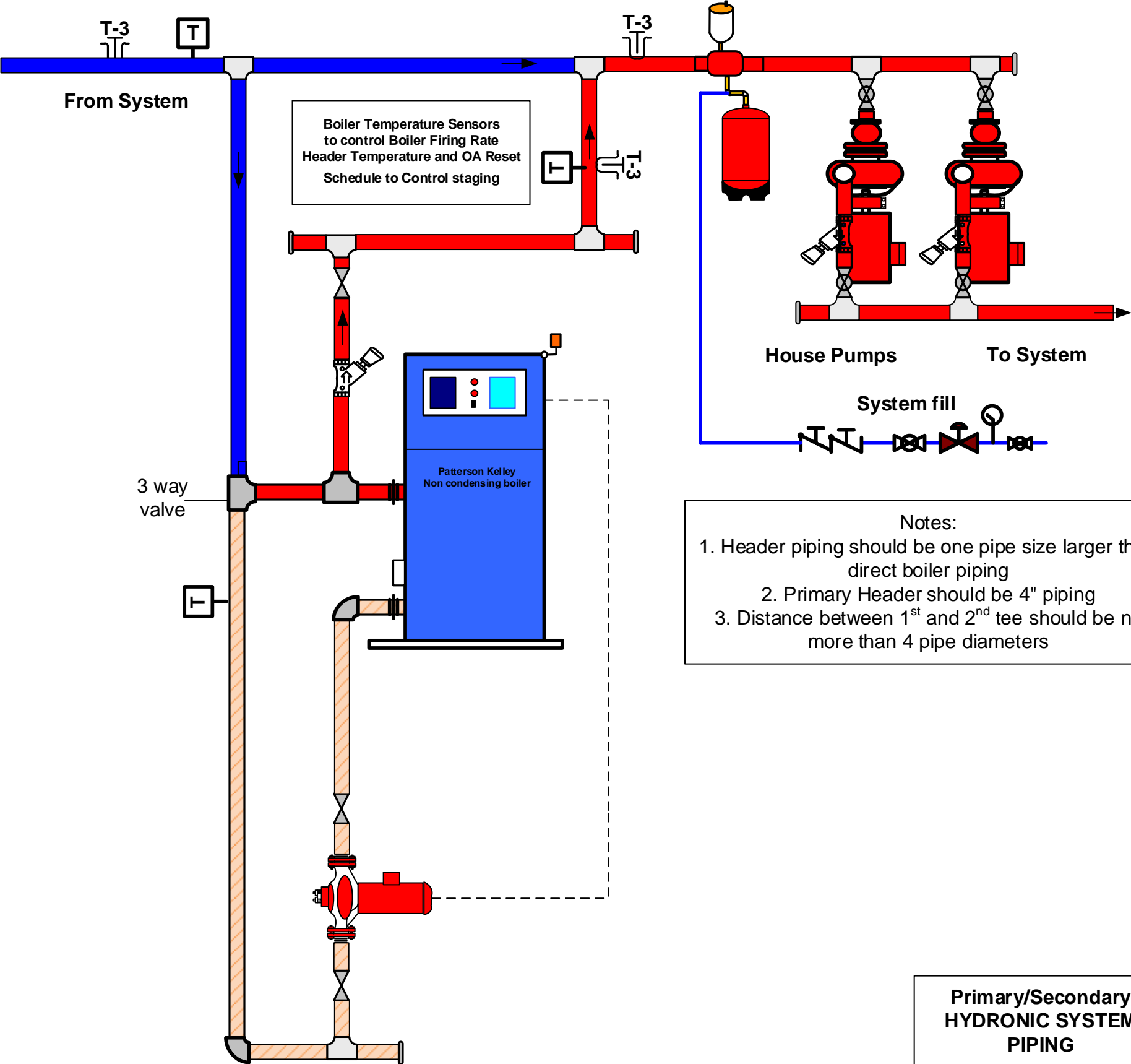
- Notes:**
- 1. Minimum pipe size to boiler equal to boiler supply/ return connection size.
 - 2. Return/supply header piping to be at least one pipe size larger than piping to equipment
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Primary
HYDRONIC SYSTEM
PIPING

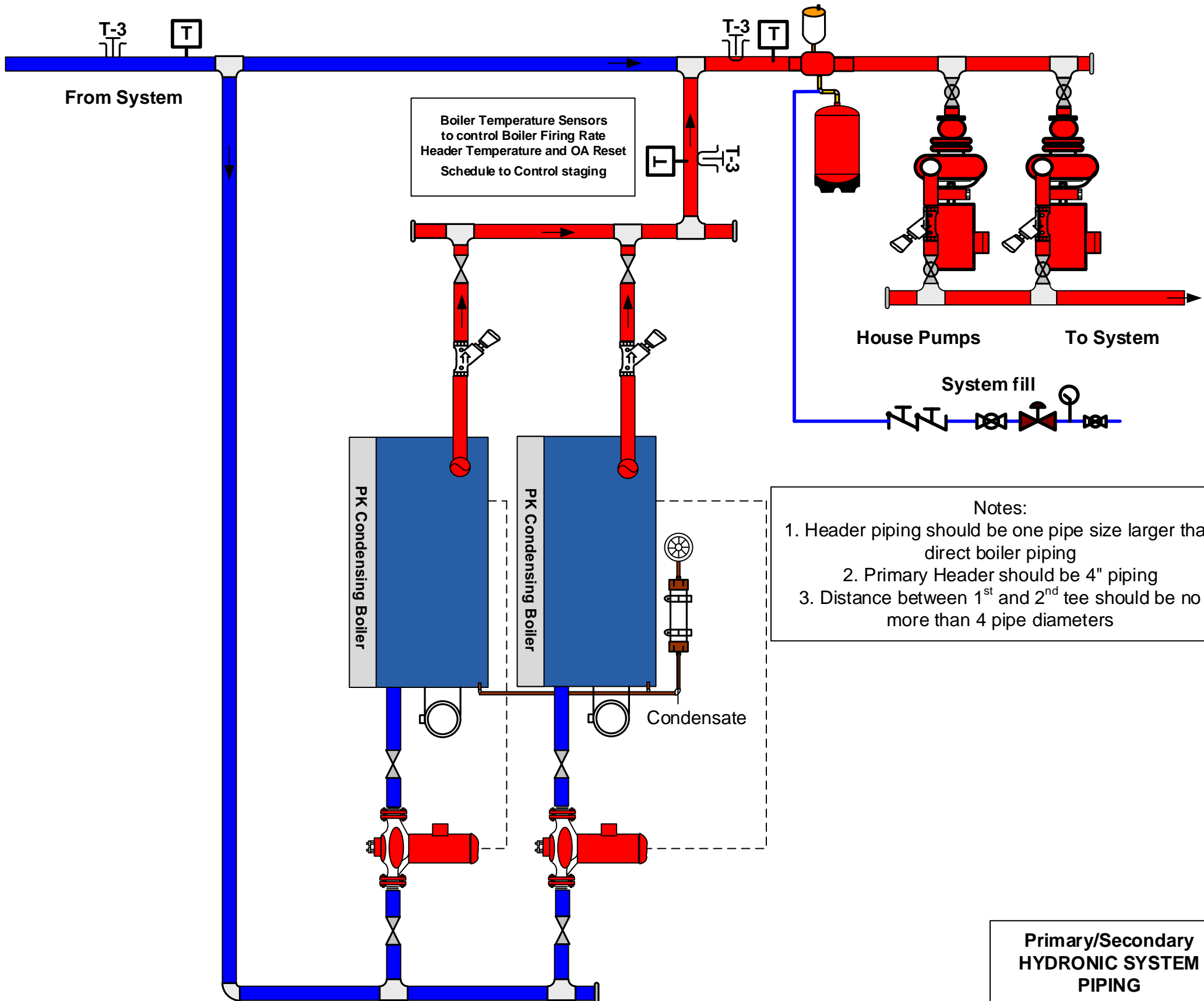
Primary/Secondary loop diagram



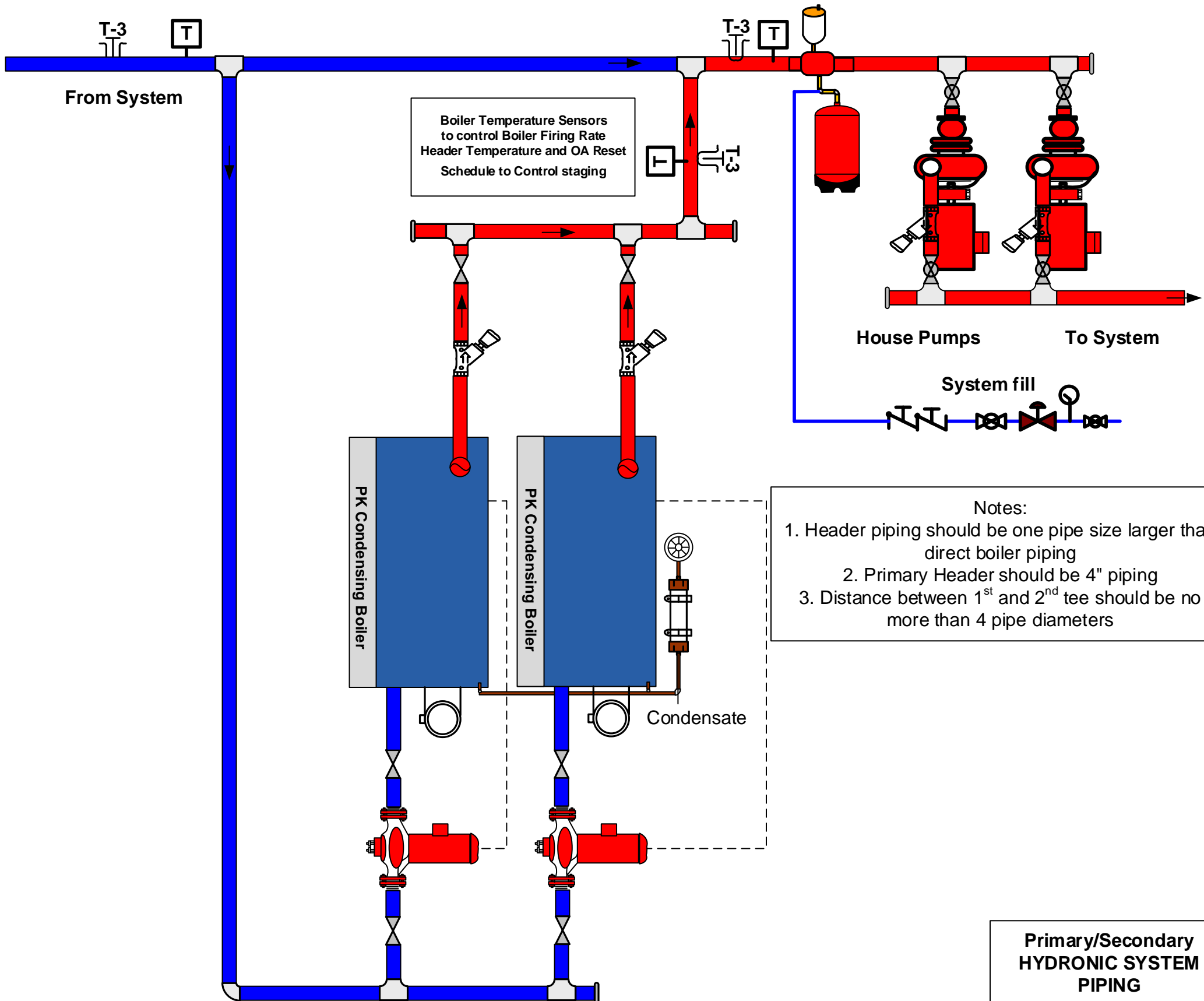
Primary/Secondary loop diagram



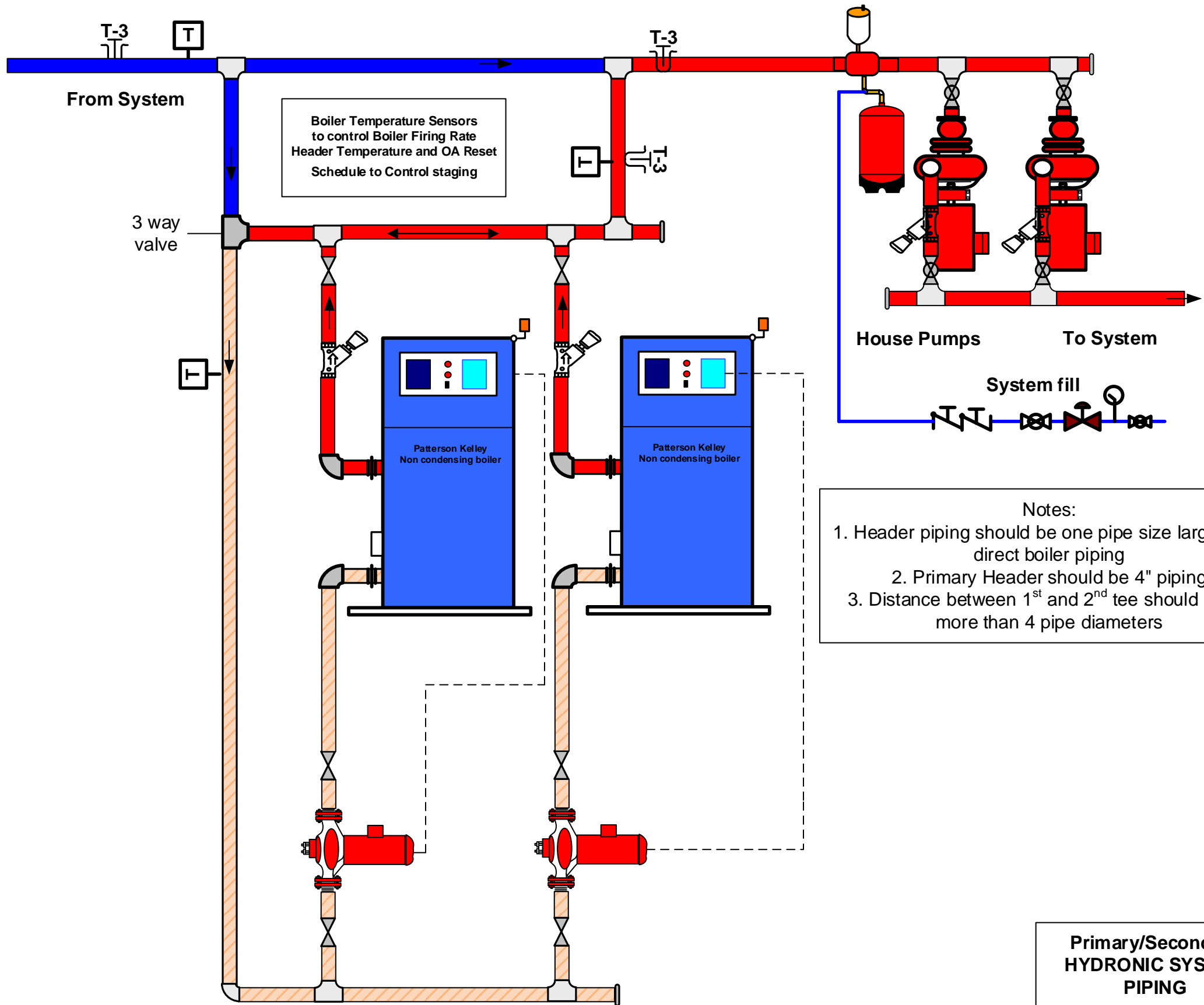
Primary/Secondary loop diagram



Primary/Secondary loop diagram

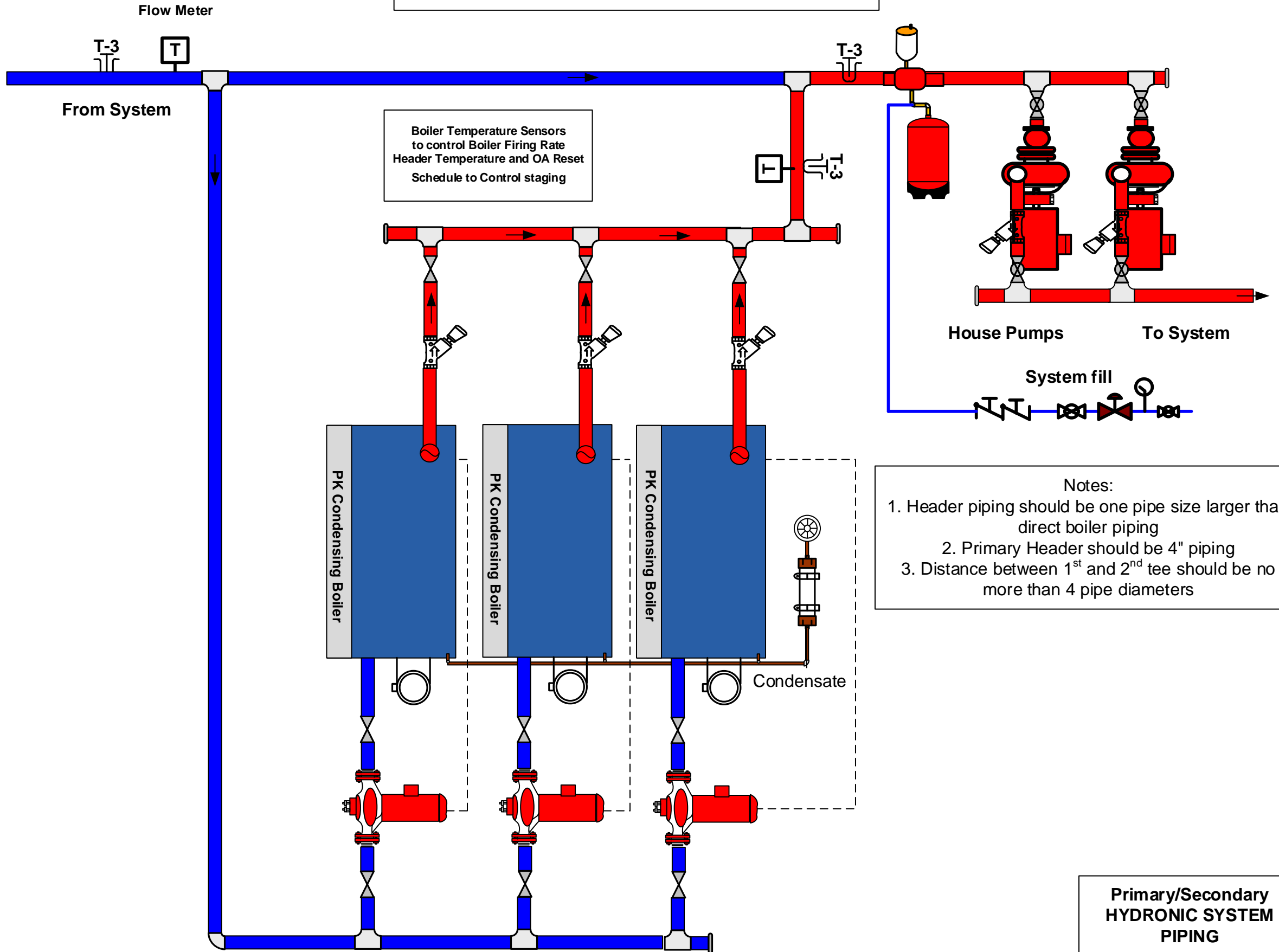


Primary/Secondary loop diagram

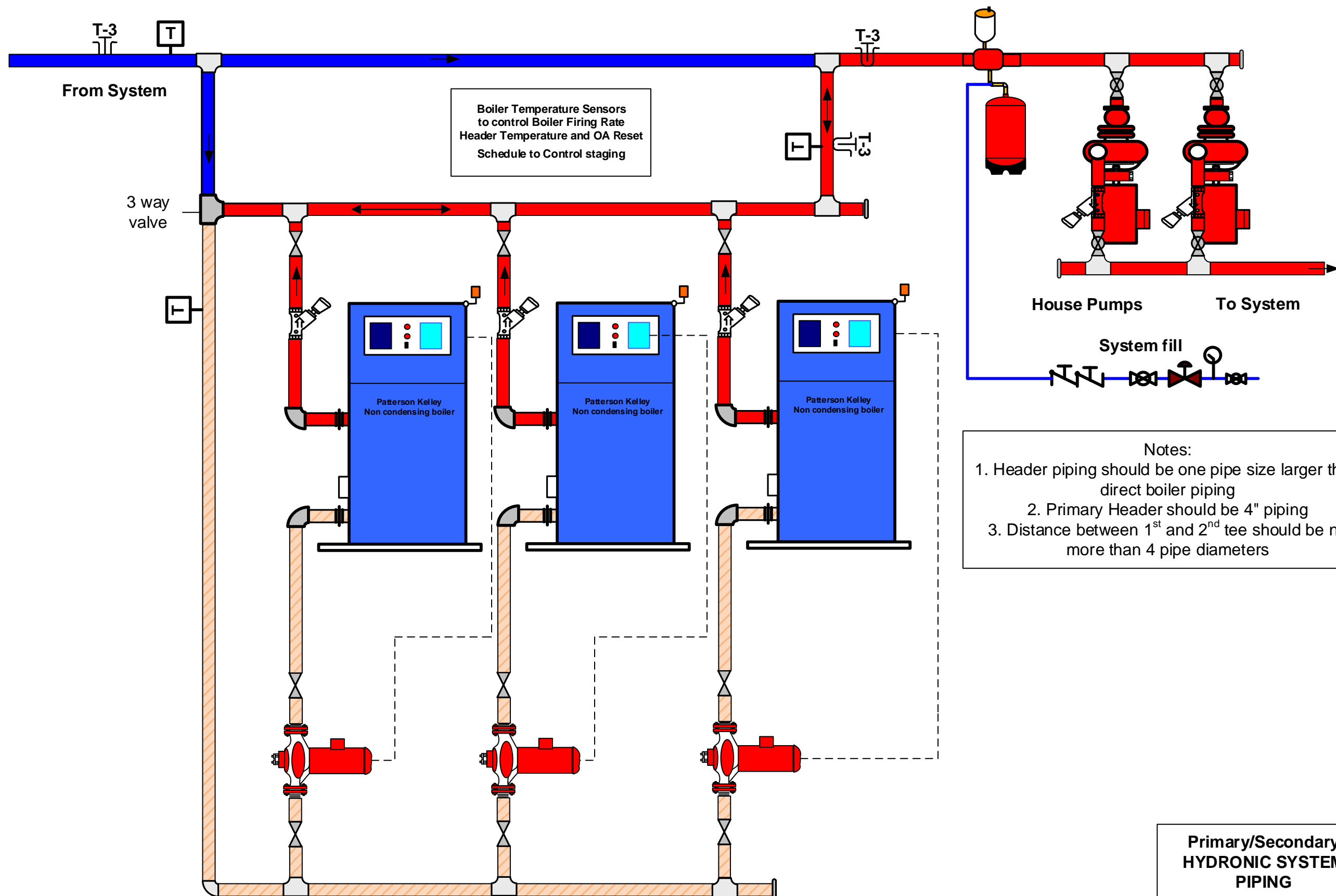


**Primary/Secondary
HYDRONIC SYSTEM
PIPING**

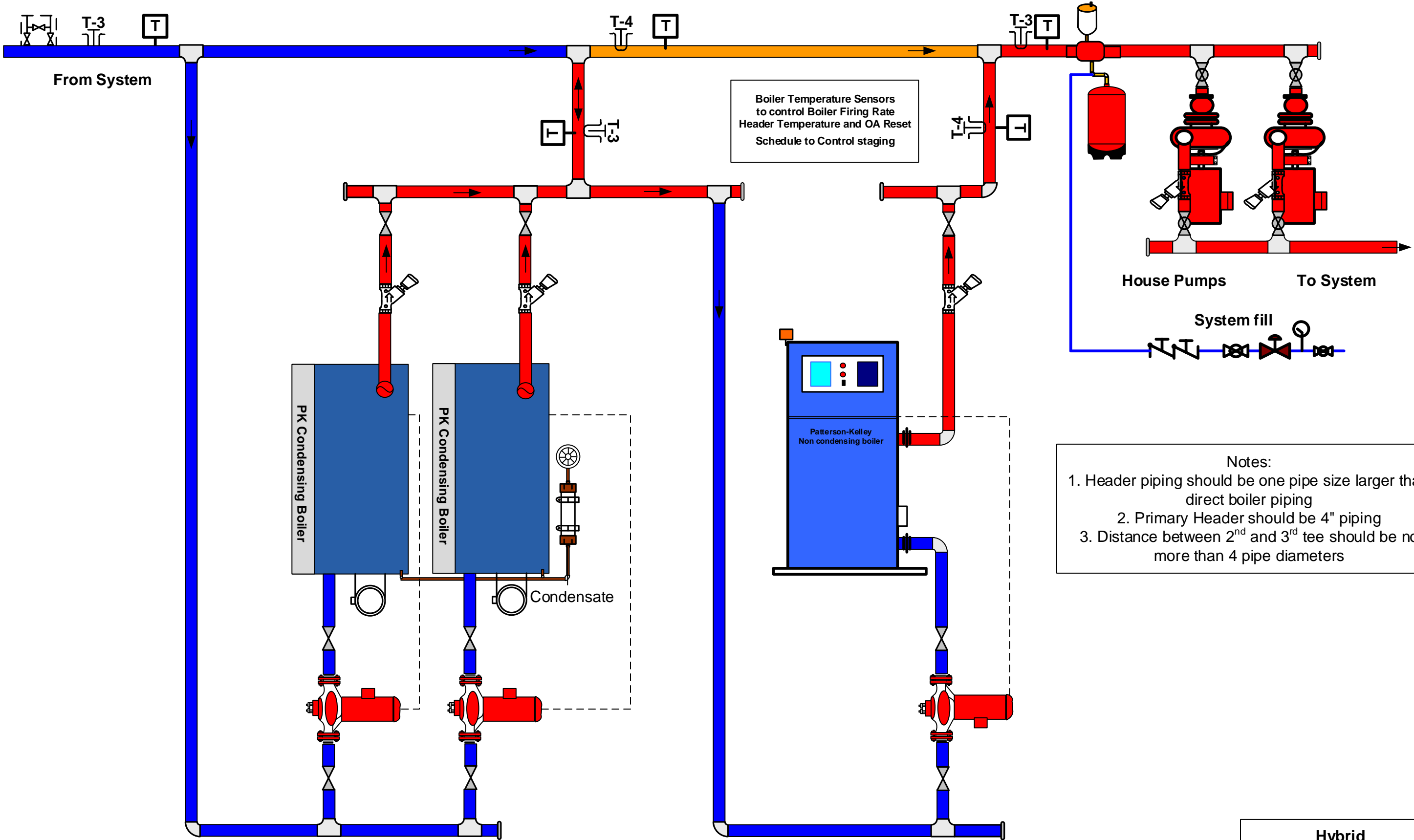
Primary/Secondary loop diagram



Primary/Secondary loop diagram



Three Tee Piping allows for pre-heating from Condensing Boilers to Non-condensing Boilers



Boiler Temperature Sensors
to control Boiler Firing Rate
Header Temperature and OA Reset
Schedule to Control staging

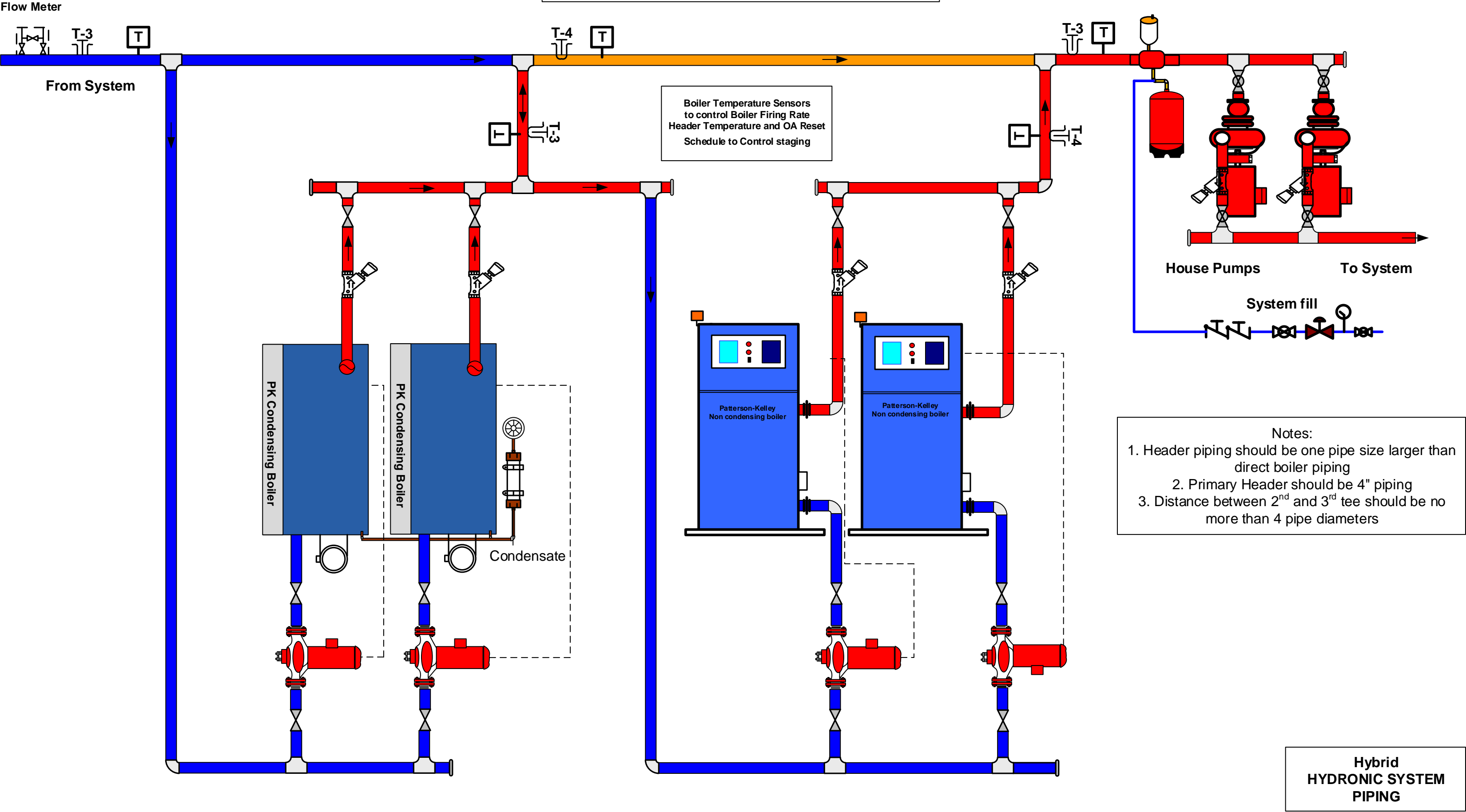
House Pumps To System

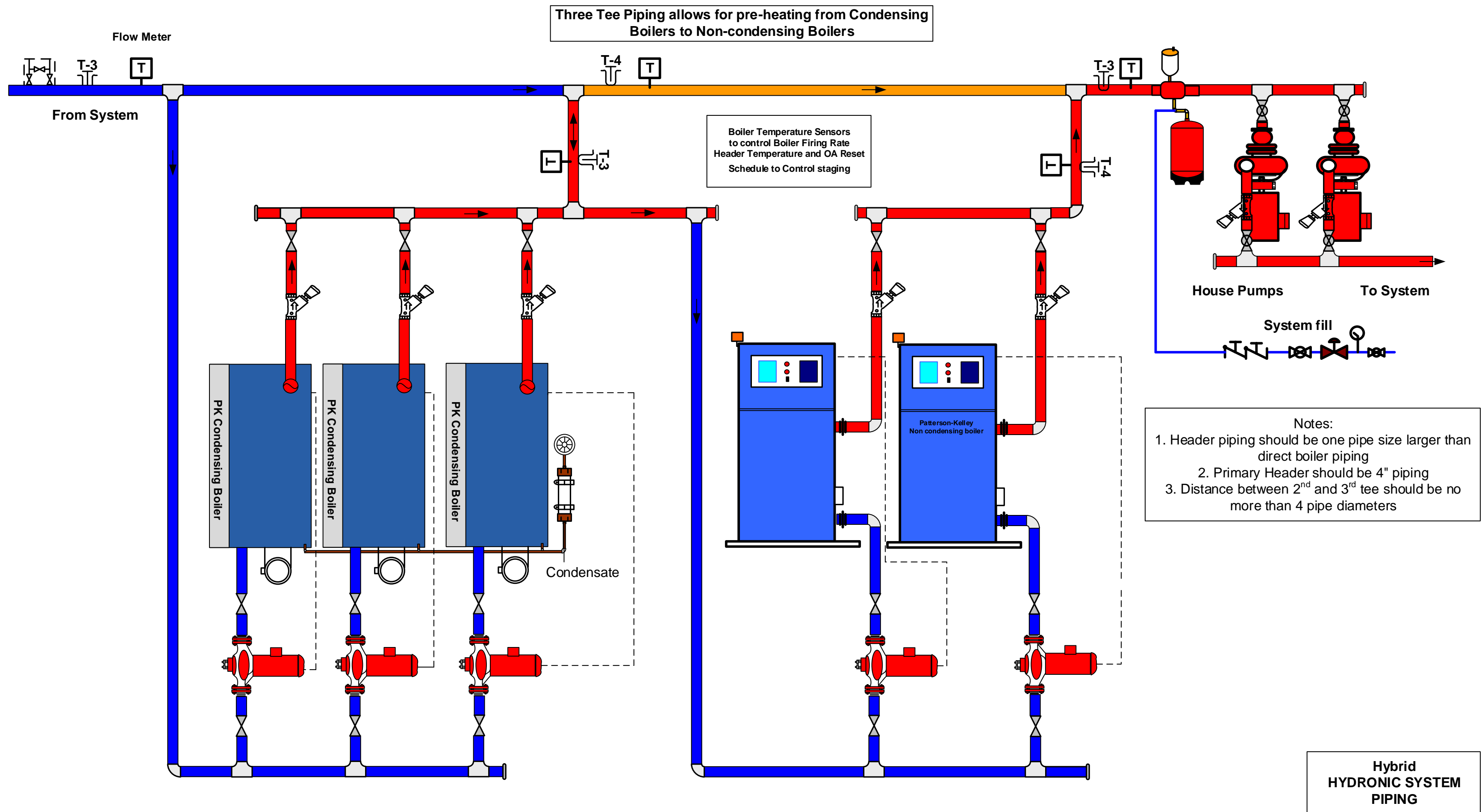
System fill

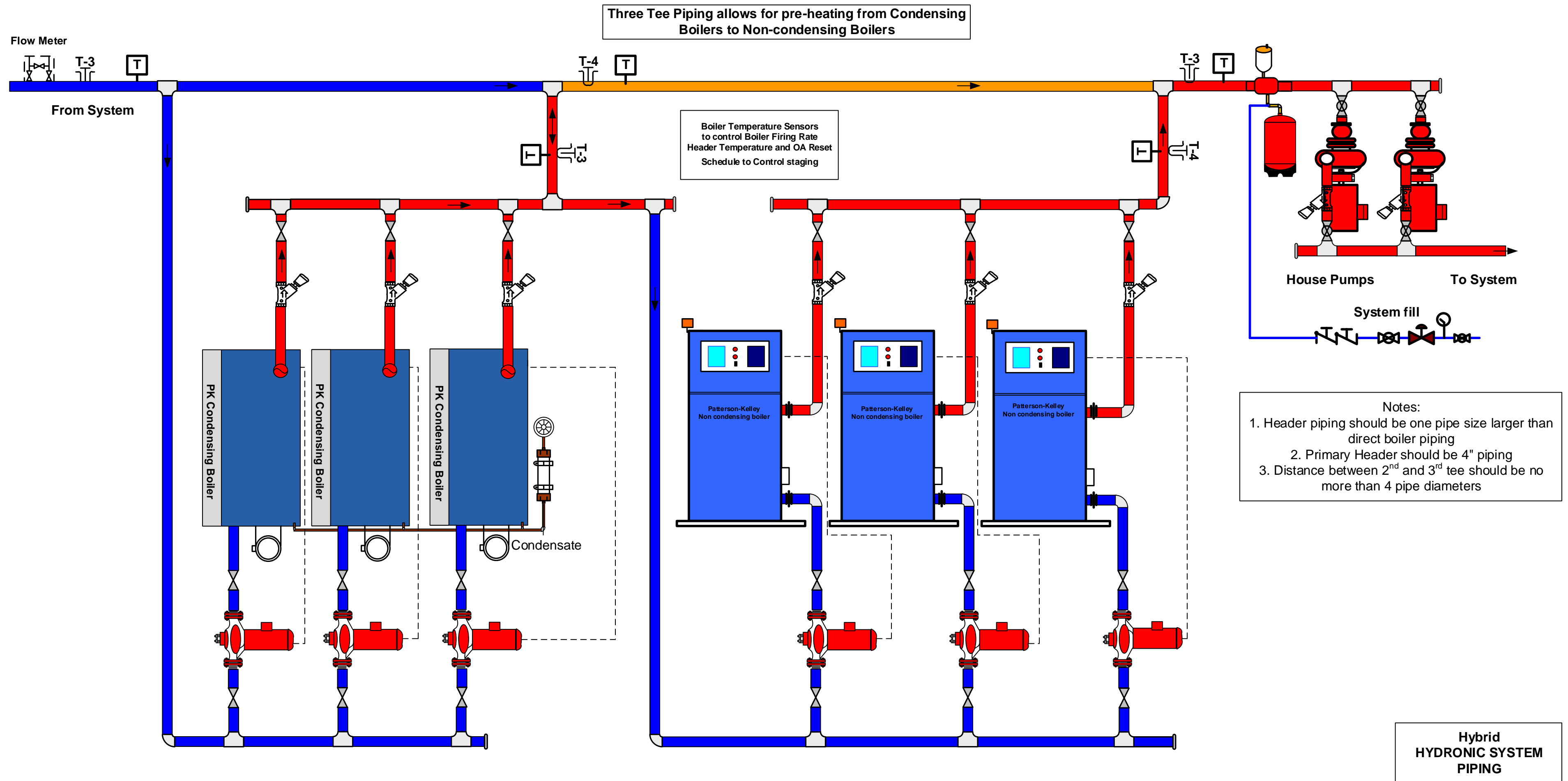
- Notes:
1. Header piping should be one pipe size larger than direct boiler piping
 2. Primary Header should be 4" piping
 3. Distance between 2nd and 3rd tee should be no more than 4 pipe diameters

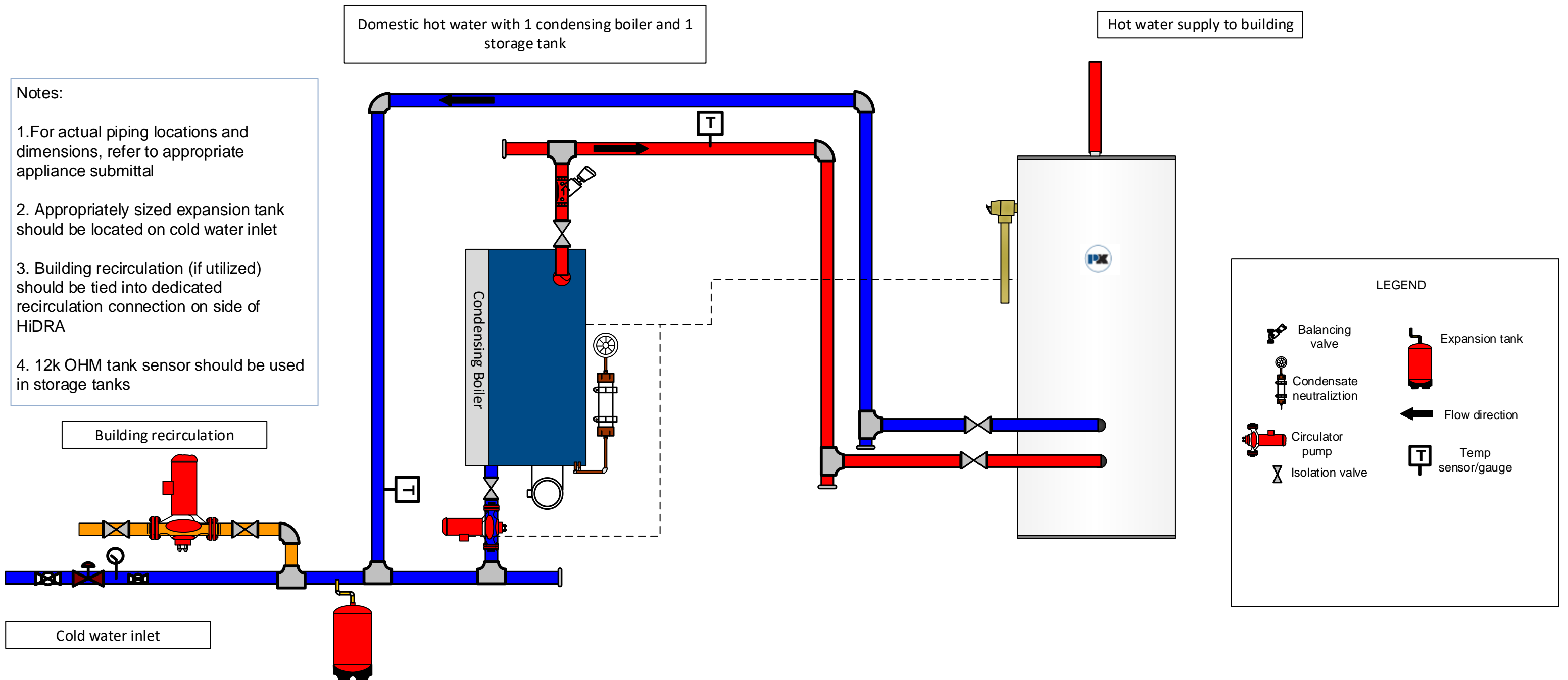
Hybrid
HYDRONIC SYSTEM
PIPING

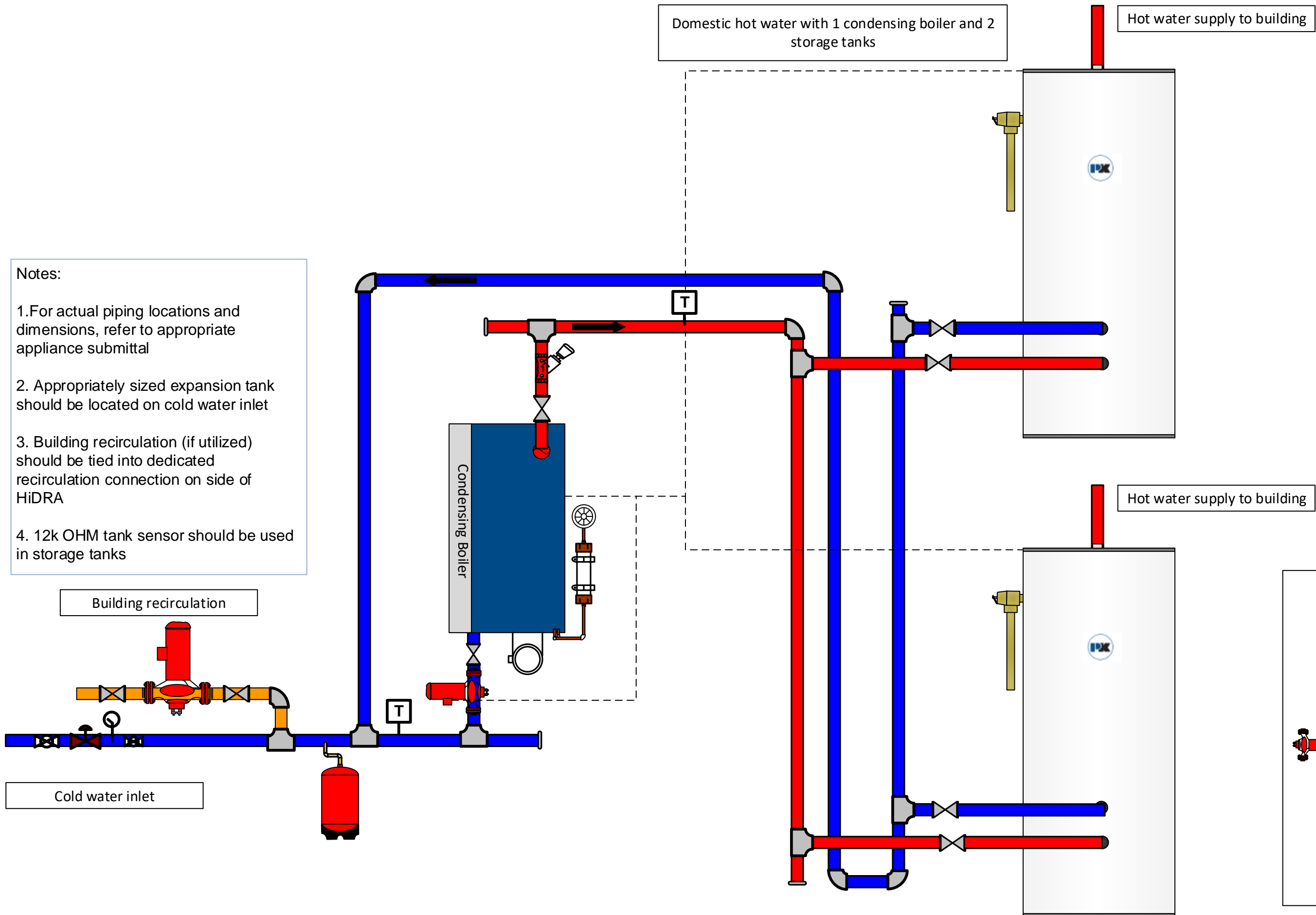
Three Tee Piping allows for pre-heating from Condensing Boilers to Non-condensing Boilers








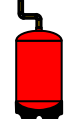


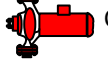






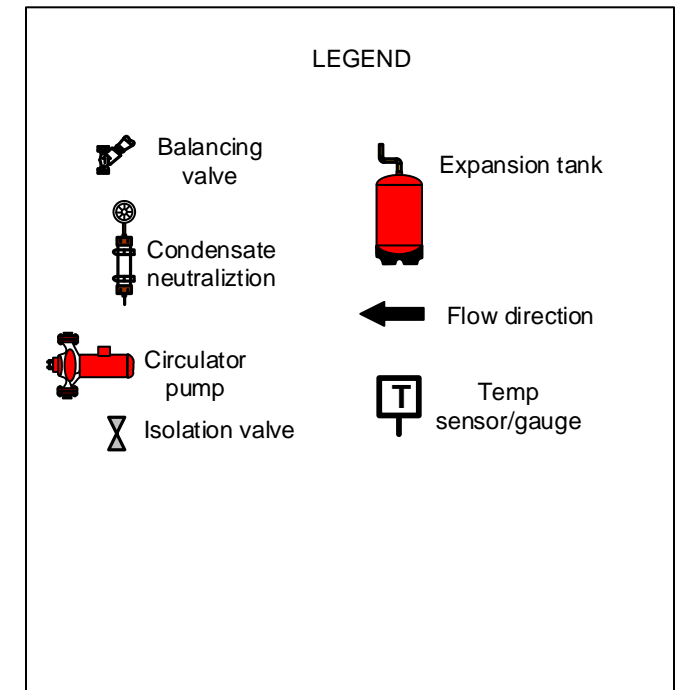
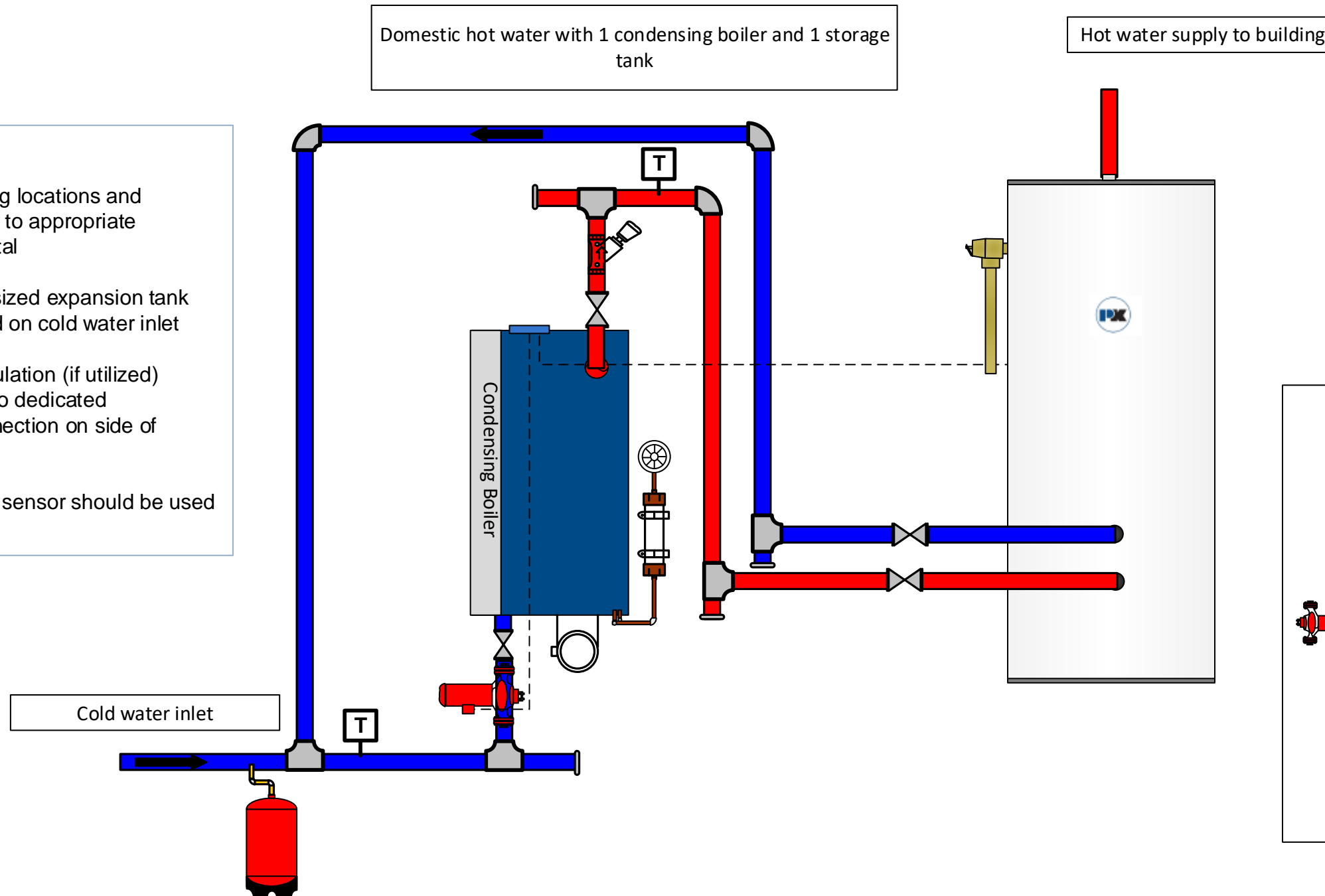
Notes:

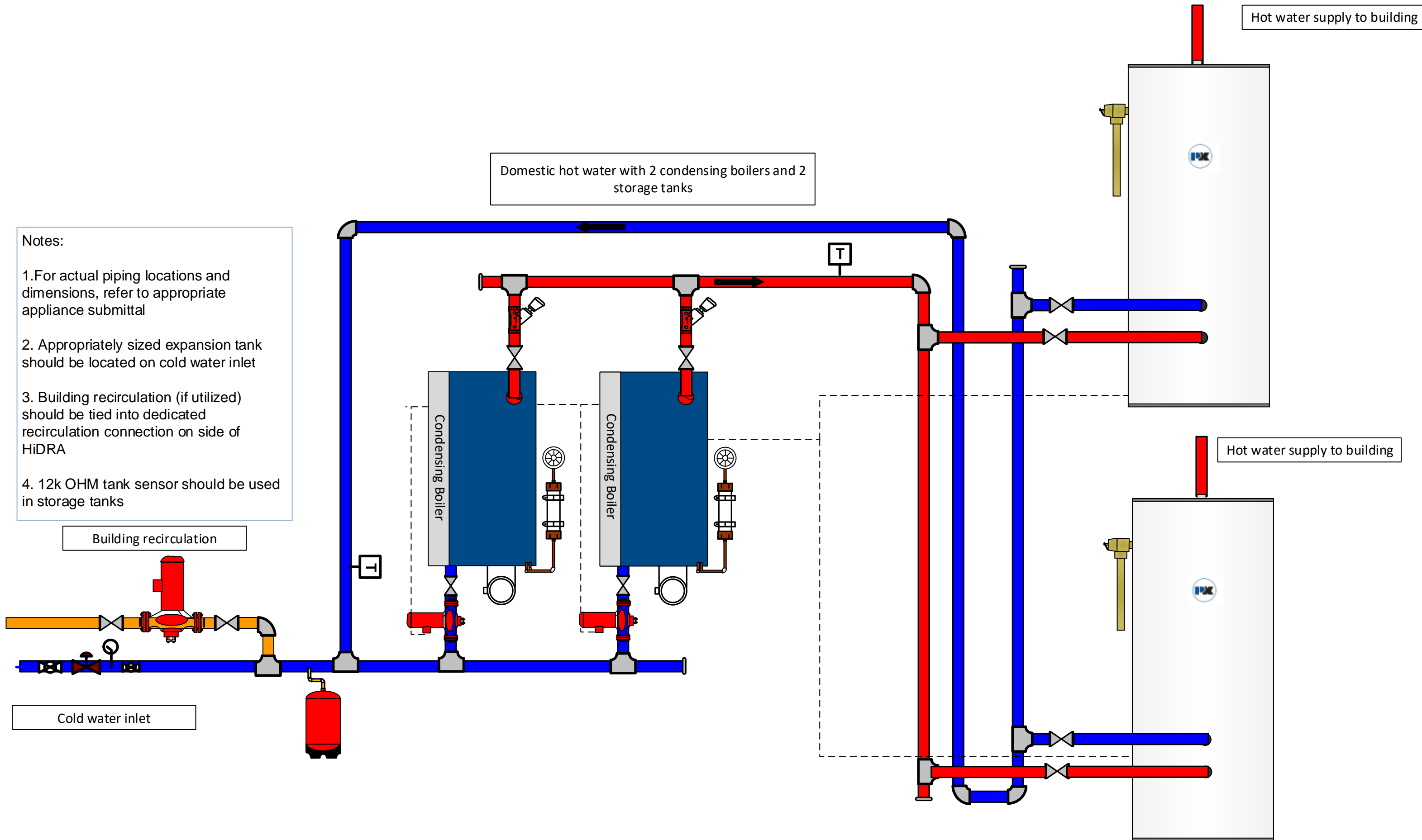
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should be used in storage tanks

LEGEND

- | | |
|---|---|
|  Balancing valve |  Expansion tank |
|  Condensate neutralization |  Flow direction |
|  Circulator pump |  Temp sensor/gauge |
|  Isolation valve | |

- Notes:
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






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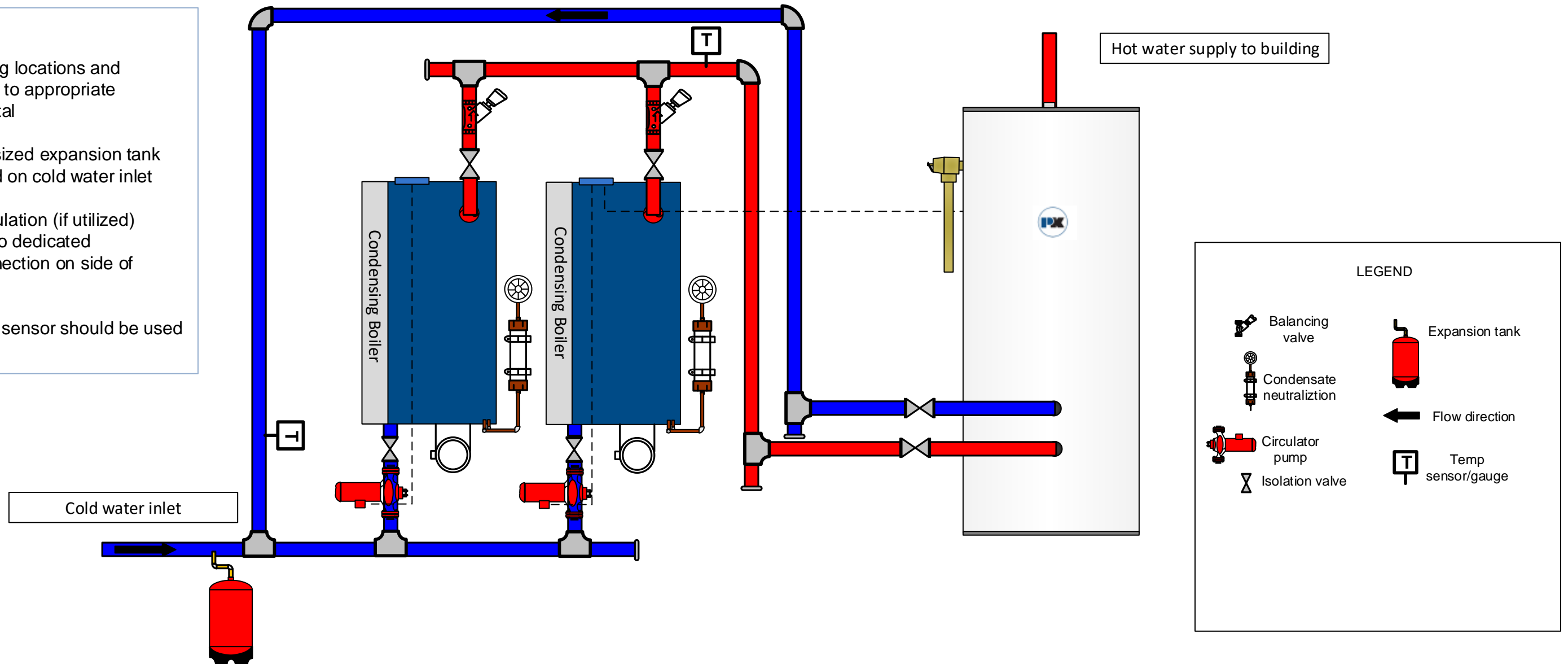
LEGEND

- | | | | |
|---|---------------------------|---|-------------------|
|  | Balancing valve |  | Expansion tank |
|  | Condensate neutralization |  | Flow direction |
|  | Circulator pump |  | Temp sensor/gauge |
|  | Isolation valve | | |

Domestic hot water with 2 condensing boiler and 1 storage tank

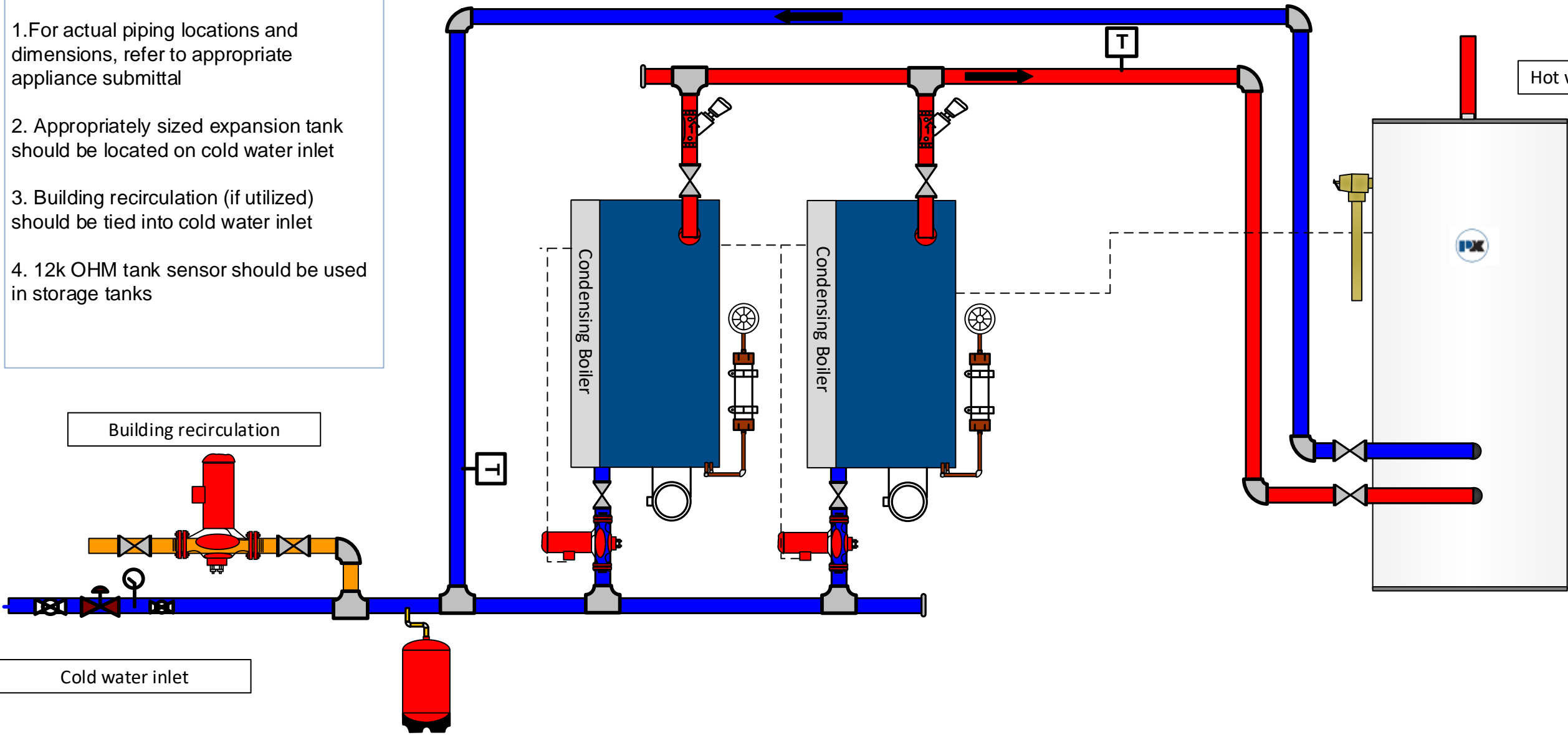
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
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Domestic hot water with 2 condensing boilers and 1 storage tank

- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet
 - 3. Building recirculation (if utilized) should be tied into cold water inlet
 - 4. 12k OHM tank sensor should be used in storage tanks

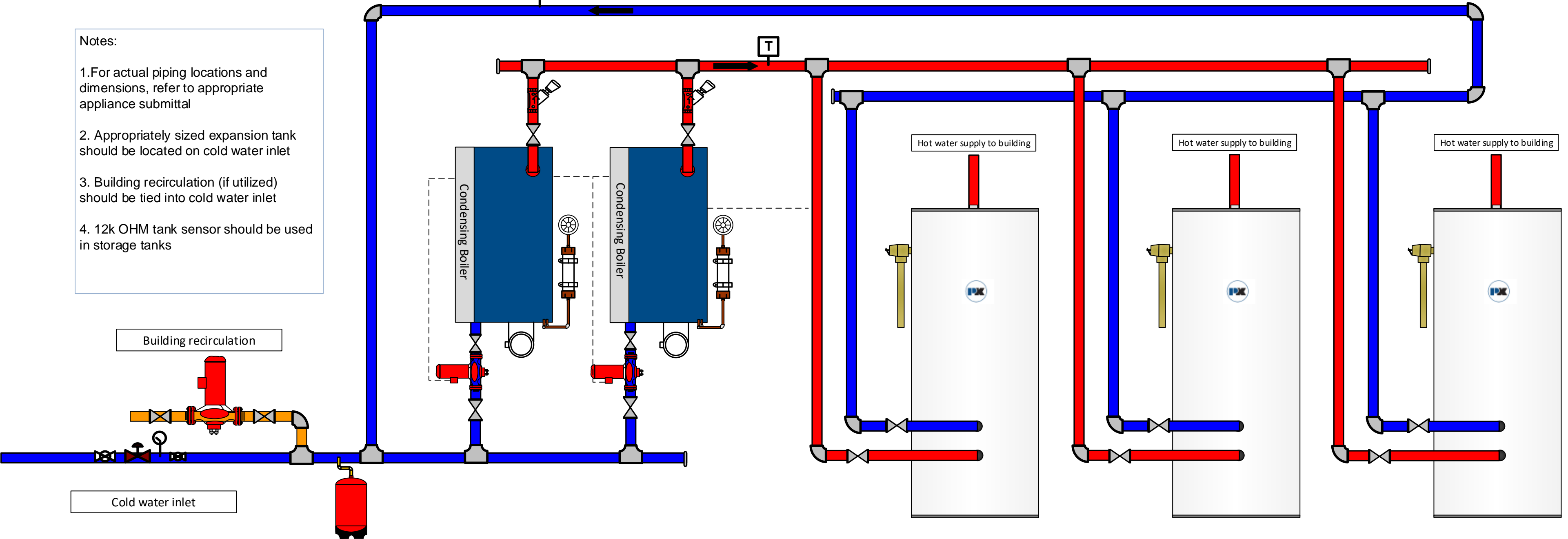


LEGEND

	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

Domestic hot water with 2 condensing boilers and 3 storage tanks

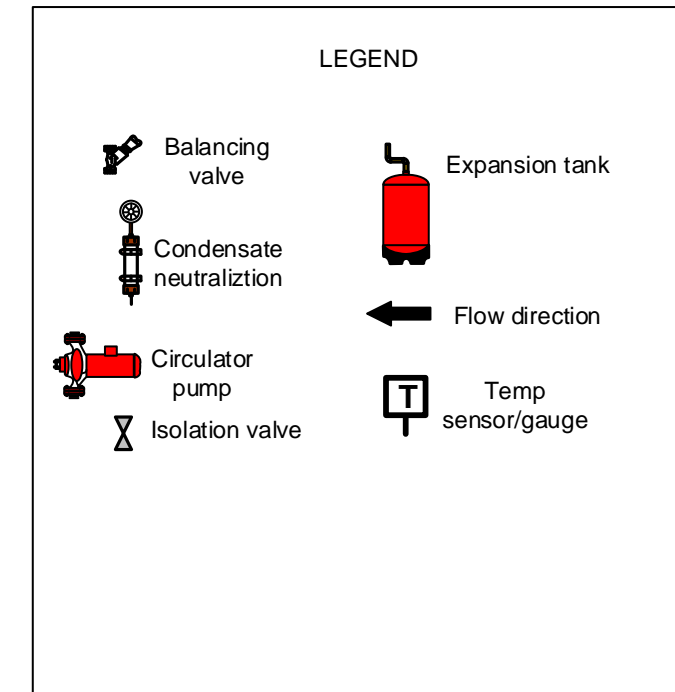
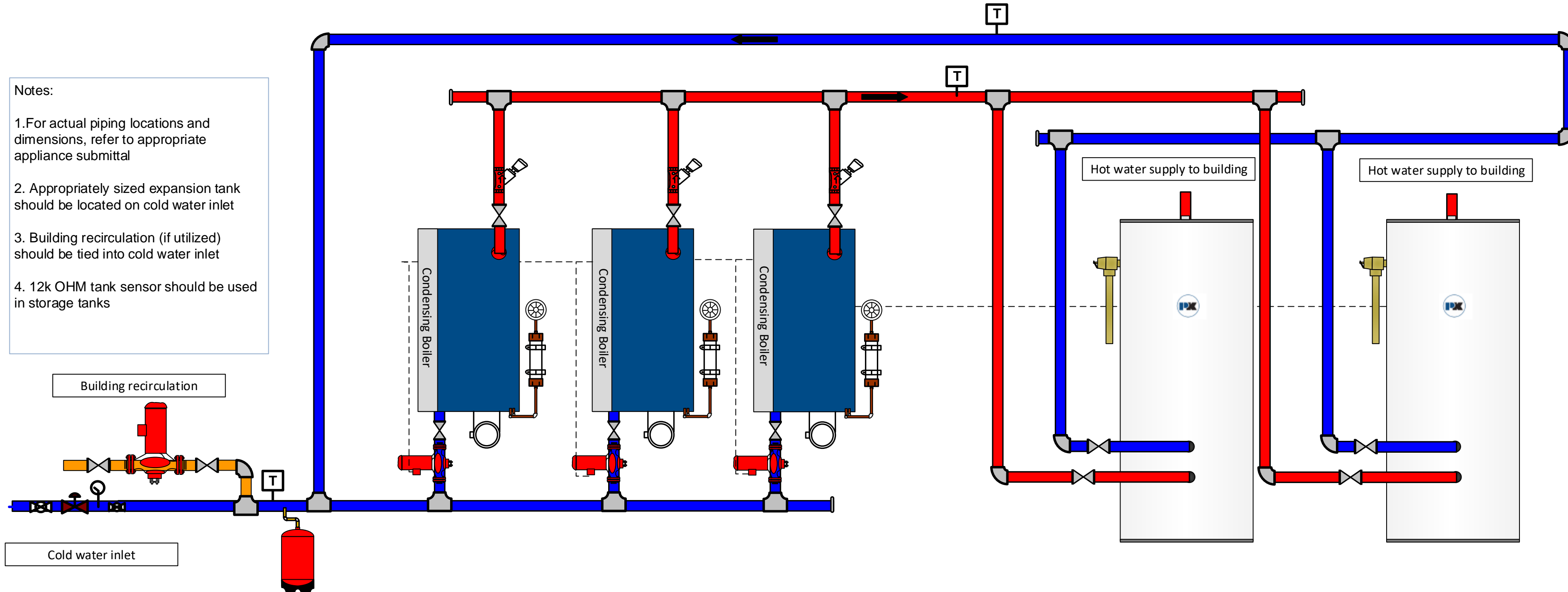
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet
 - 3. Building recirculation (if utilized) should be tied into cold water inlet
 - 4. 12k OHM tank sensor should be used in storage tanks

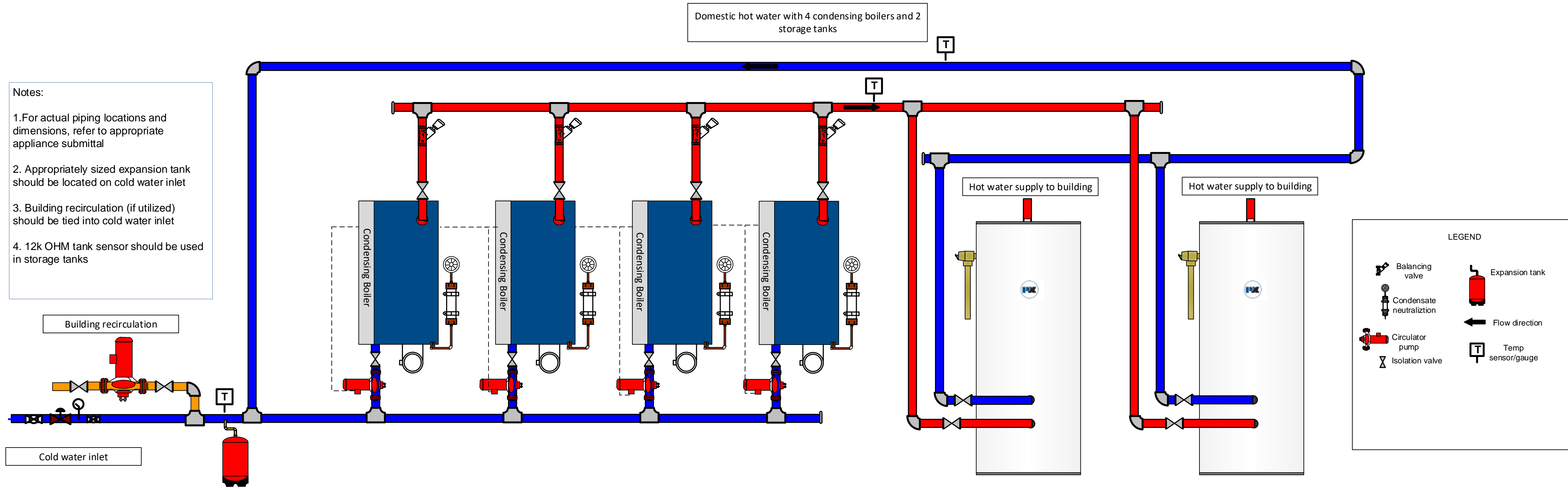


LEGEND

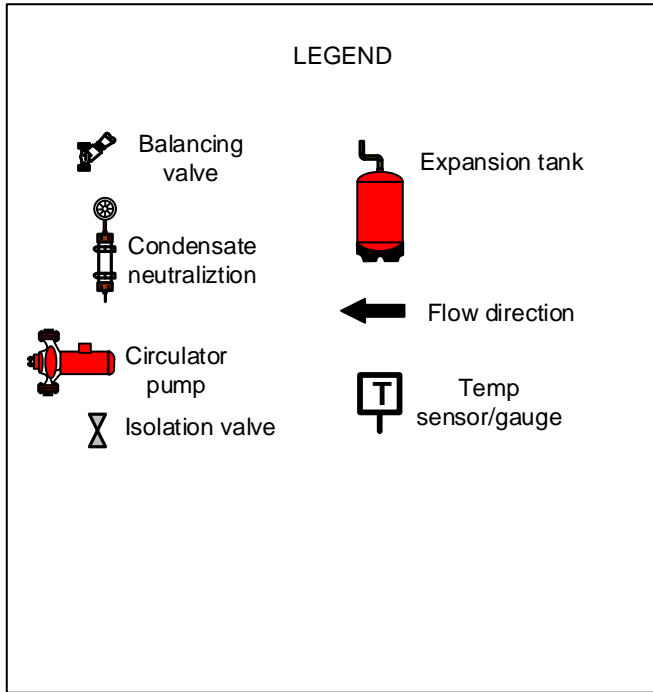
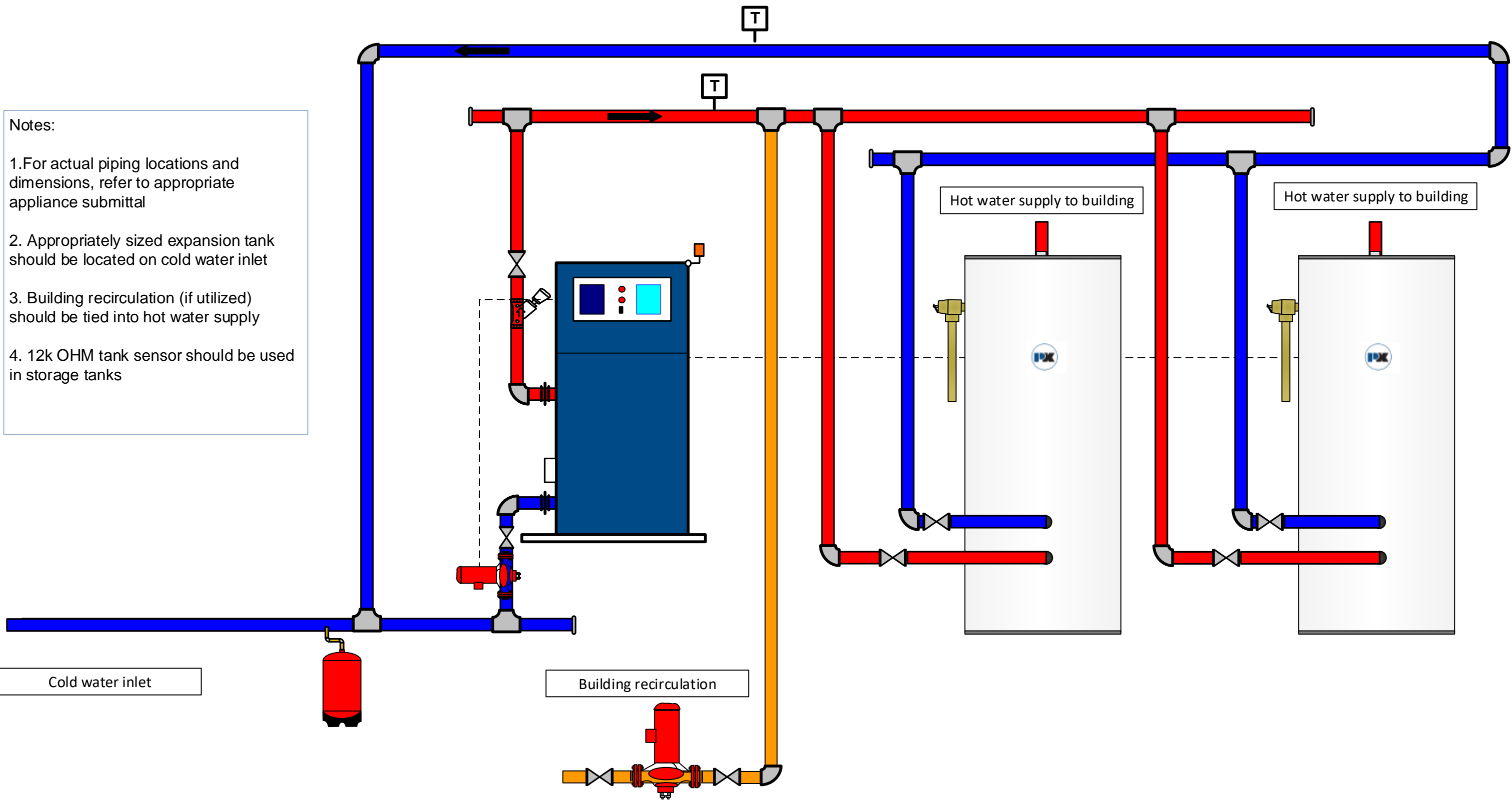
	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

Domestic hot water with 3 condensing boilers and 2 storage tanks



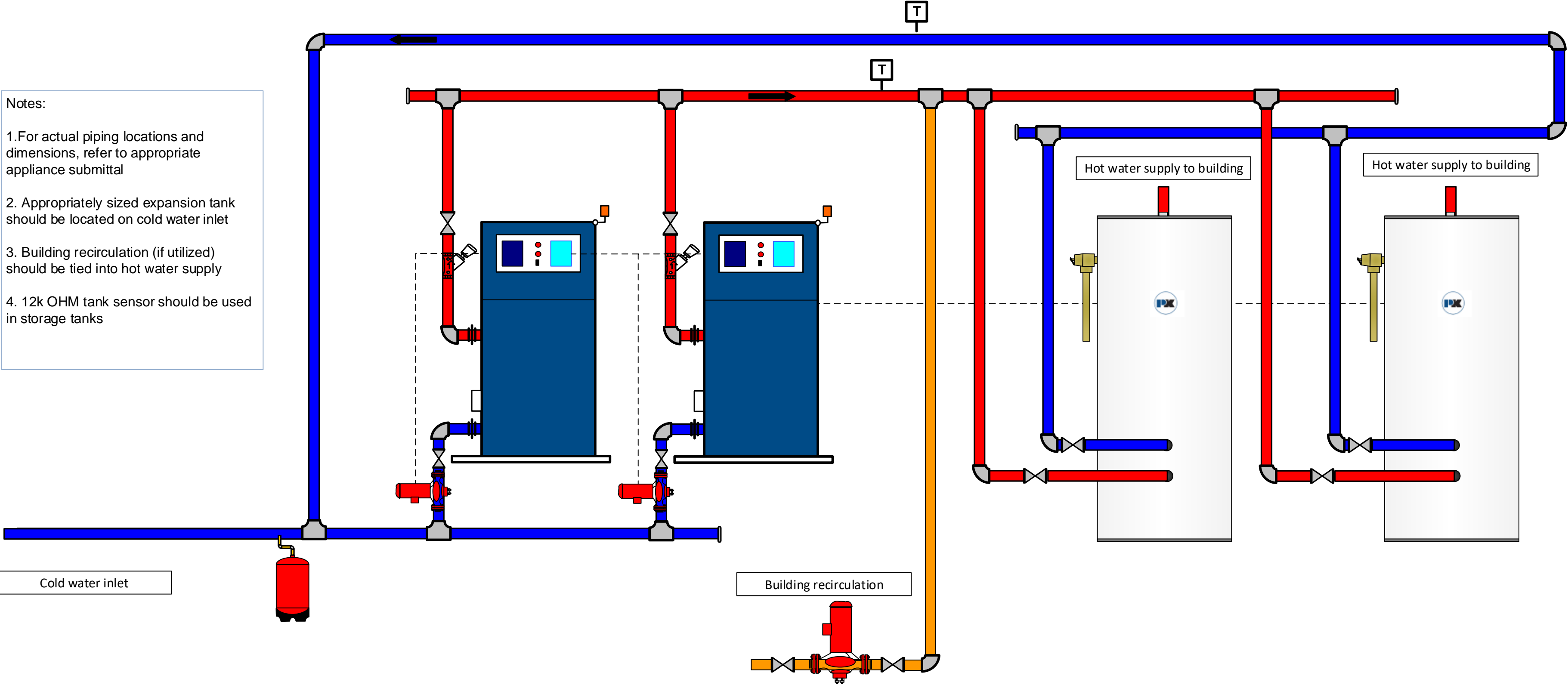


Domestic hot water with 1 non-condensing boiler and 2 storage tanks



Domestic hot water with 1 non-condensing boiler
and 2 storage tanks

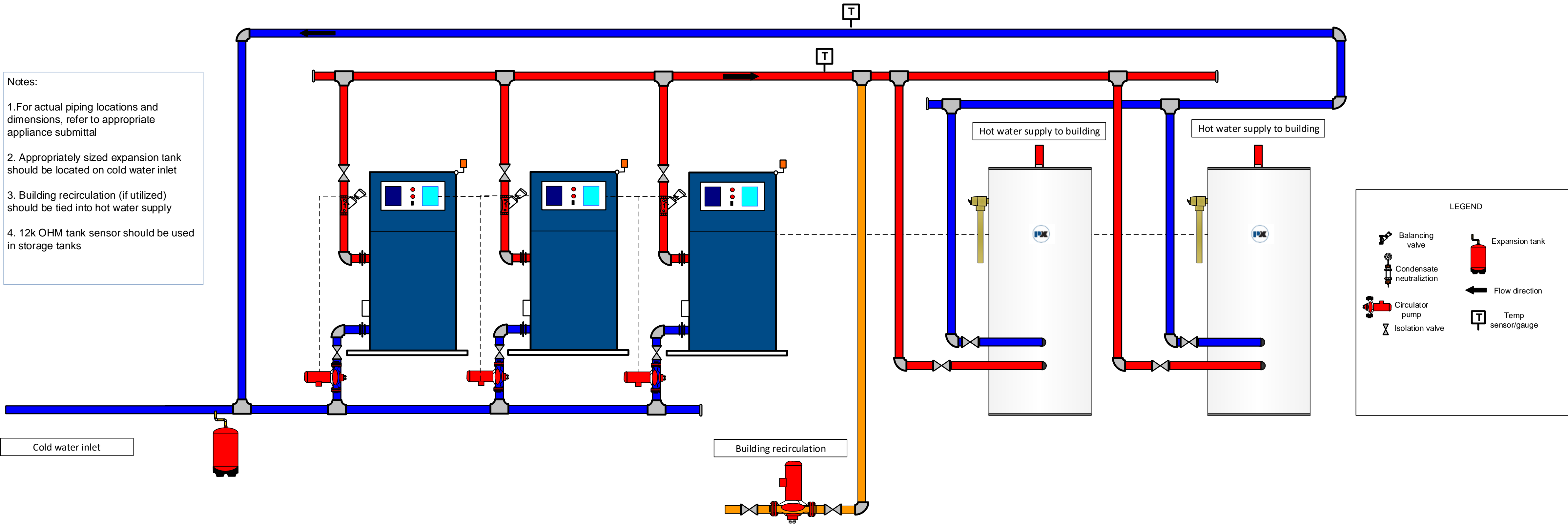
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet
 - 3. Building recirculation (if utilized) should be tied into hot water supply
 - 4. 12k OHM tank sensor should be used in storage tanks



LEGEND

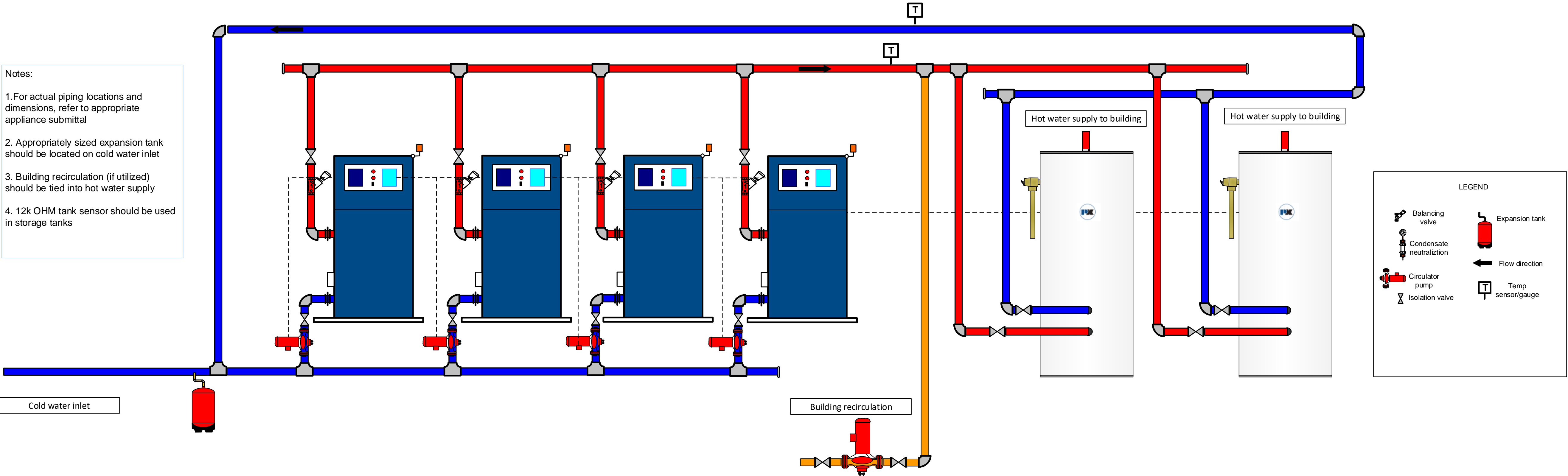
	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

Domestic hot water with 1 non-condensing boiler
and 2 storage tanks



Domestic hot water with 1 non-condensing boiler
and 2 storage tanks

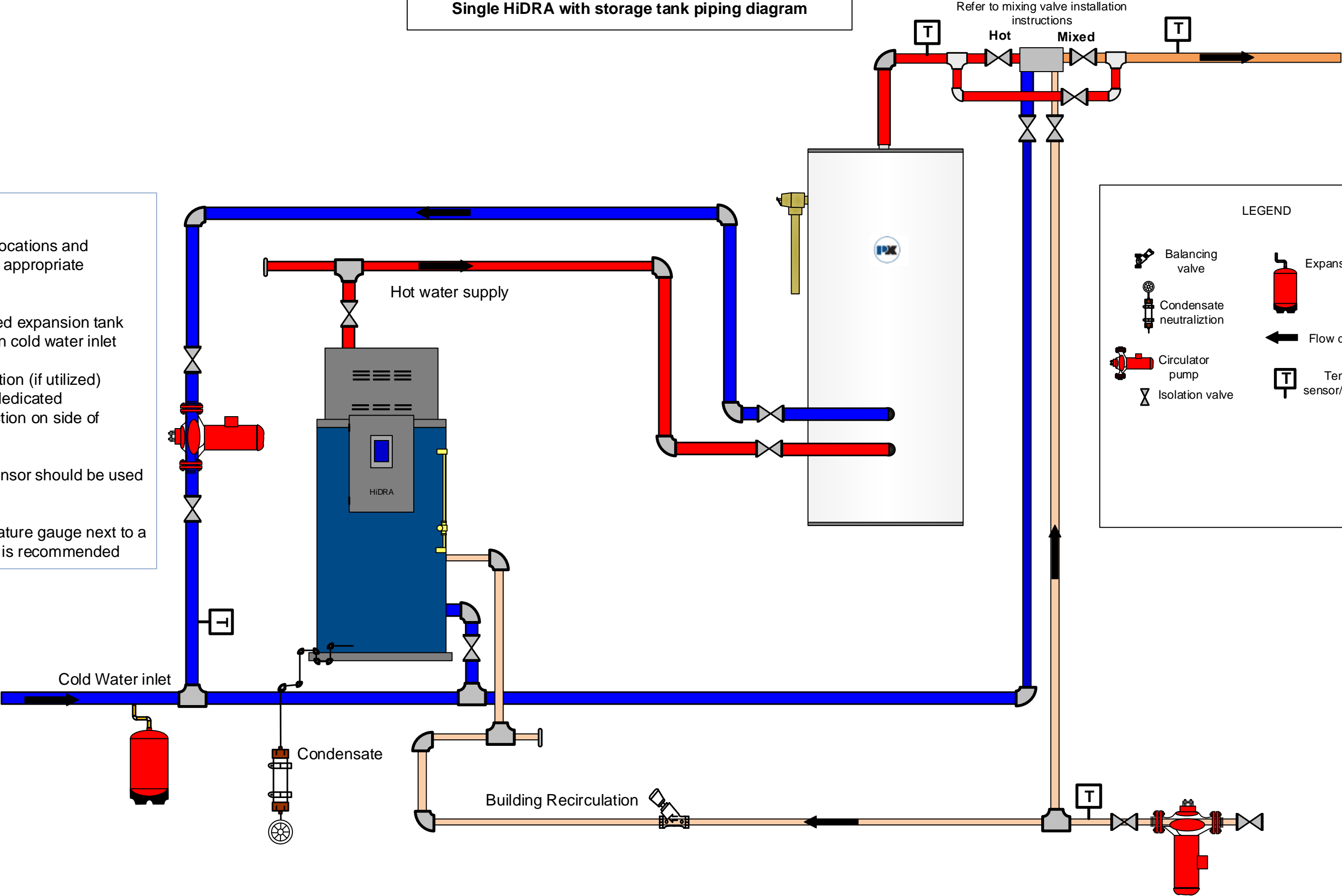
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet
 - 3. Building recirculation (if utilized) should be tied into hot water supply
 - 4. 12k OHM tank sensor should be used in storage tanks





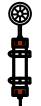

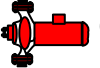


Single HiDRA with storage tank piping diagram

Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should be used in storage tanks
5. Placing a temperature gauge next to a temperature sensor is recommended



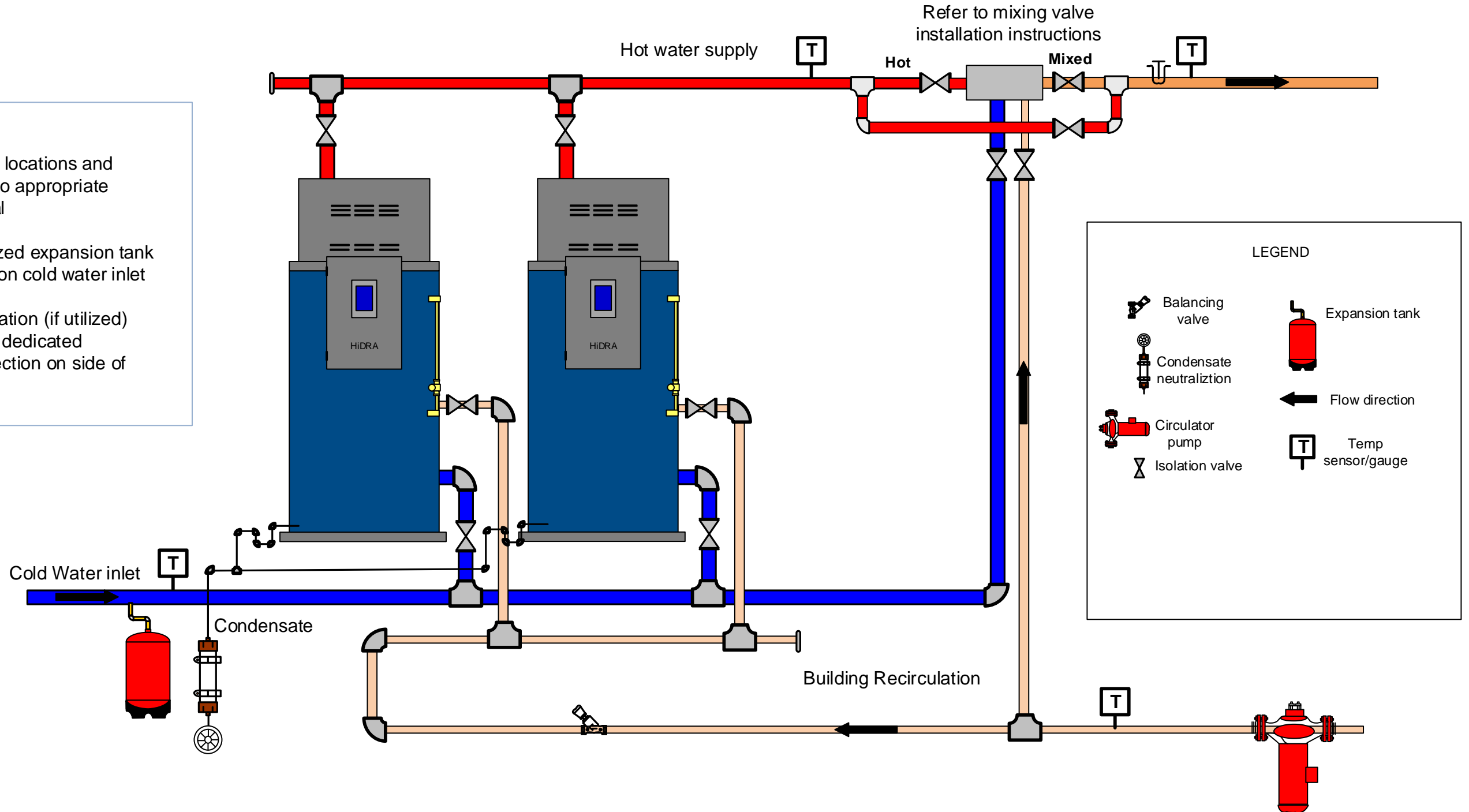
LEGEND

- | | |
|---|---|
|  Balancing valve |  Expansion tank |
|  Condensate neutralization |  Flow direction |
|  Circulator pump |  Temp sensor/gauge |
|  Isolation valve | |

Double HiDRA piping diagram

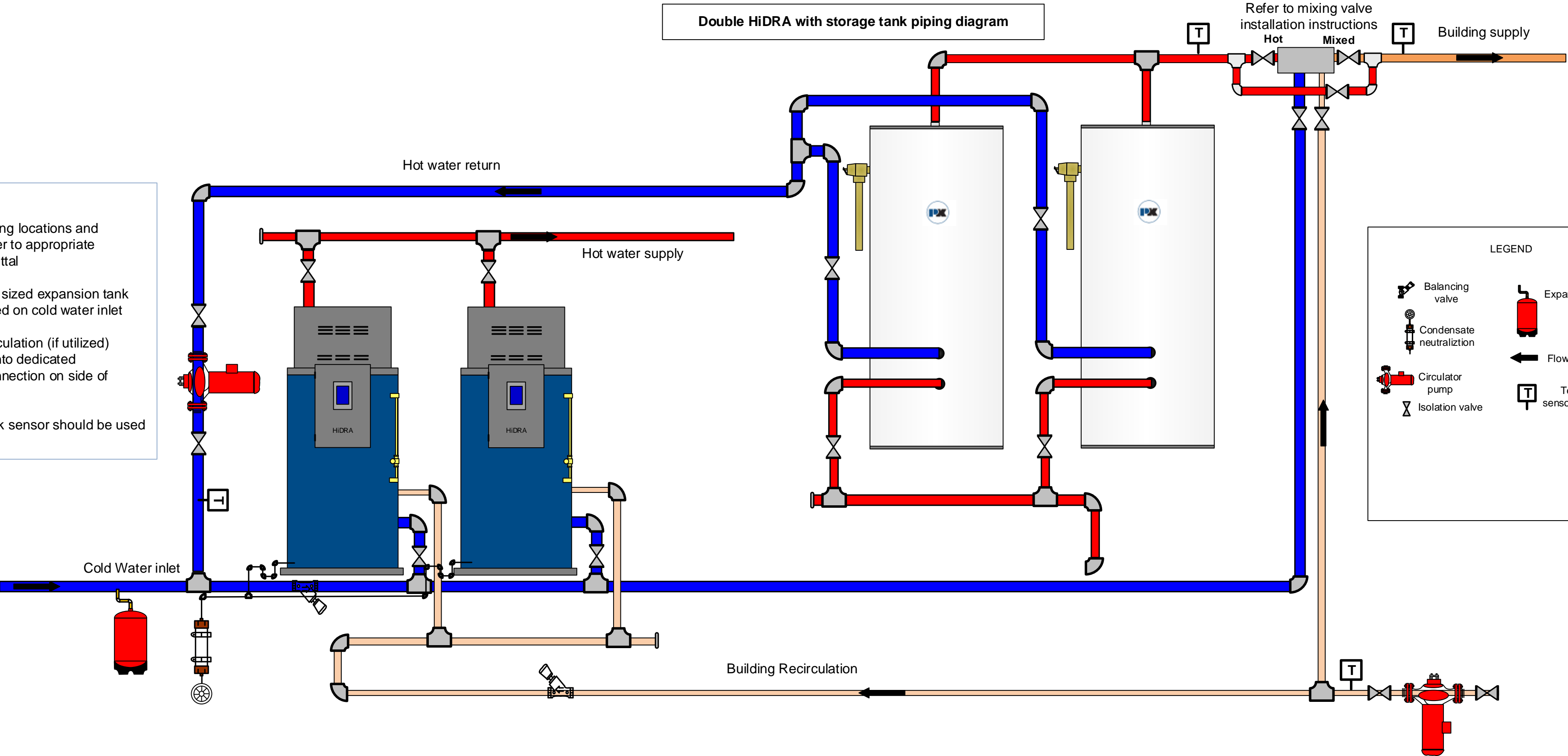
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA



Double HiDRA with storage tank piping diagram

- Notes:
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 - 2. Appropriately sized expansion tank should be located on cold water inlet
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 - 4. 12k OHM tank sensor should be used in storage tanks



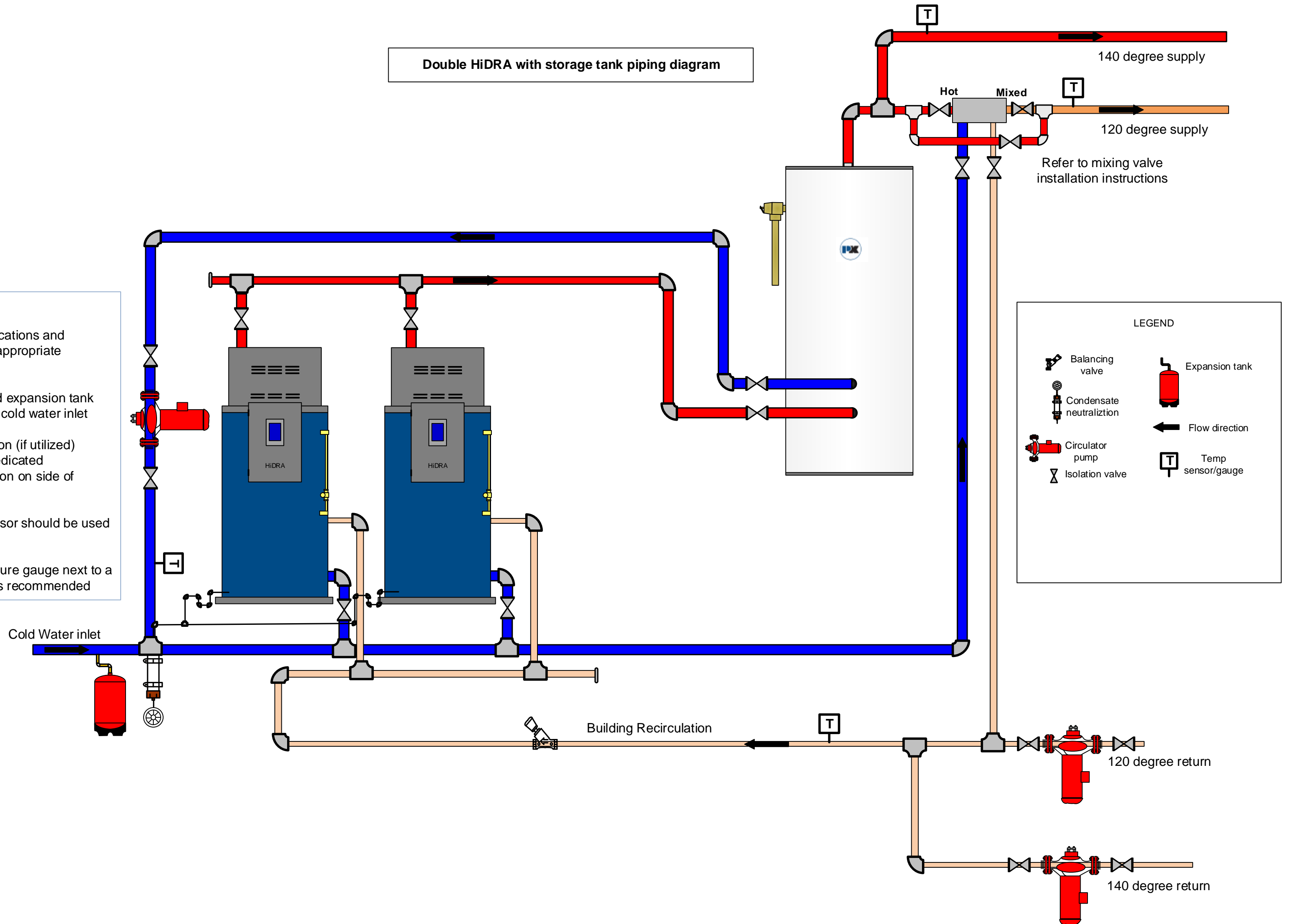
LEGEND

	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

Double HiDRA with storage tank piping diagram

Notes:

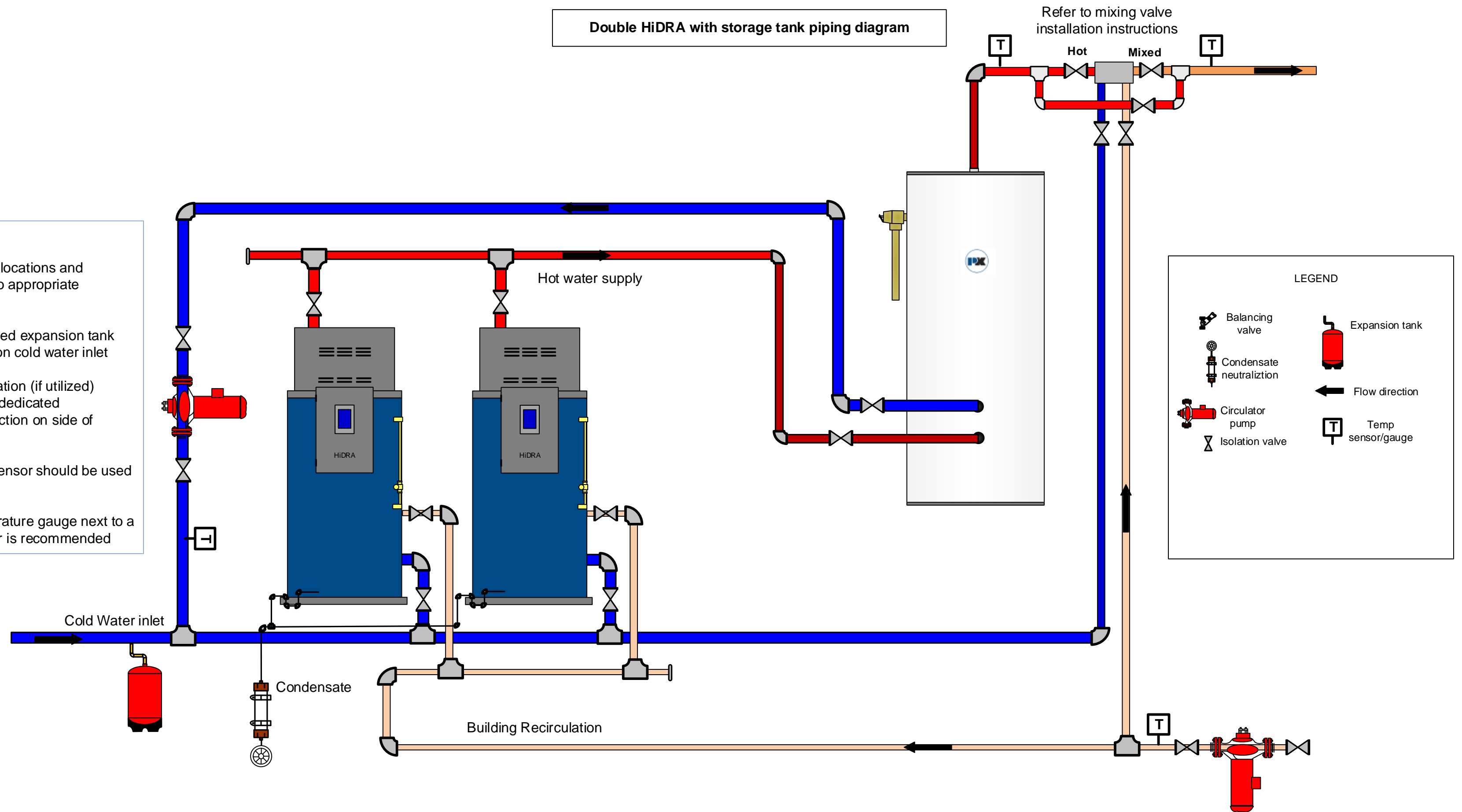
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should be used in storage tanks
5. Placing a temperature gauge next to a temperature sensor is recommended



Double HiDRA with storage tank piping diagram

Notes:

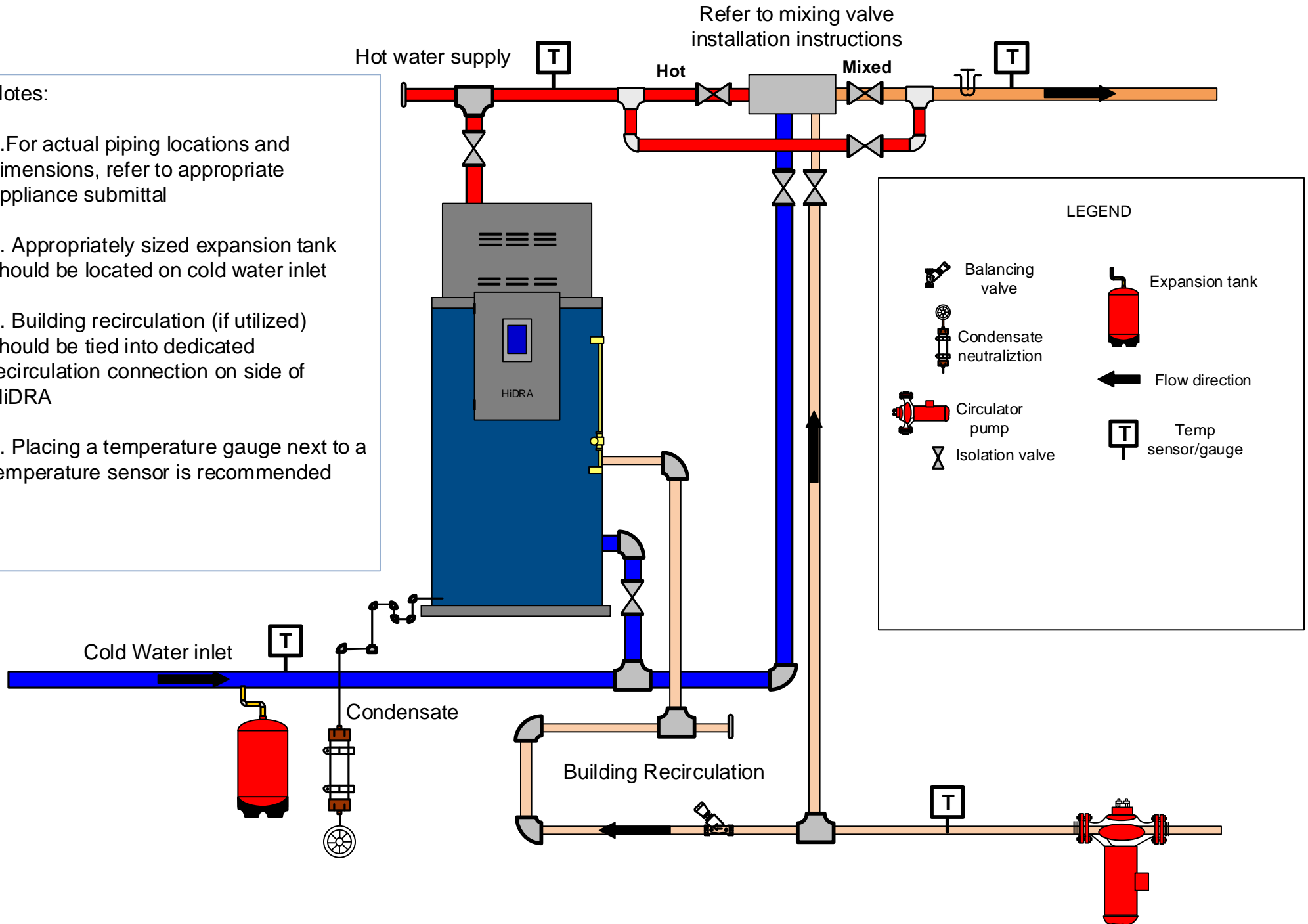
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should be used in storage tanks
5. Placing a temperature gauge next to a temperature sensor is recommended



Single HiDRA piping diagram

Notes:

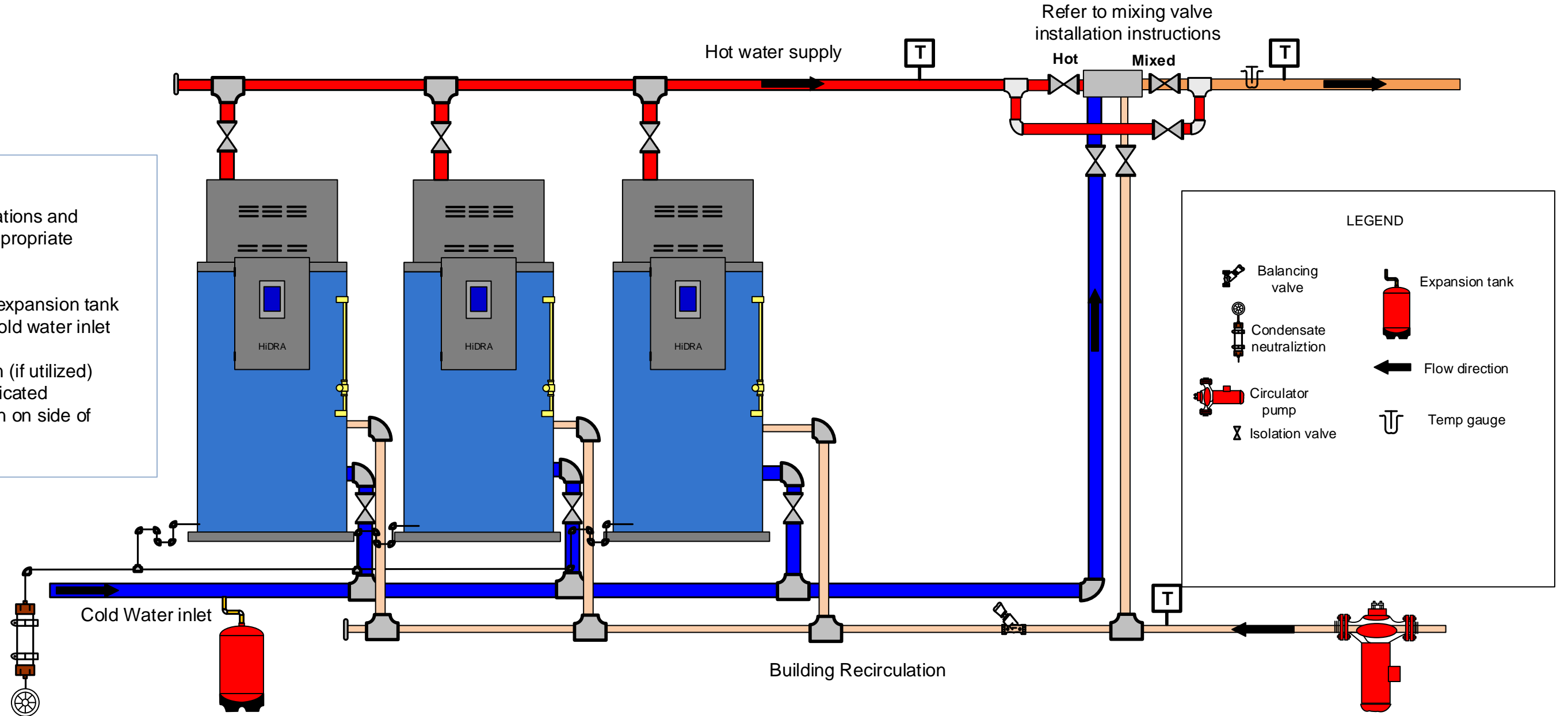
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. Placing a temperature gauge next to a temperature sensor is recommended



Triple HiDRA piping diagram direct return

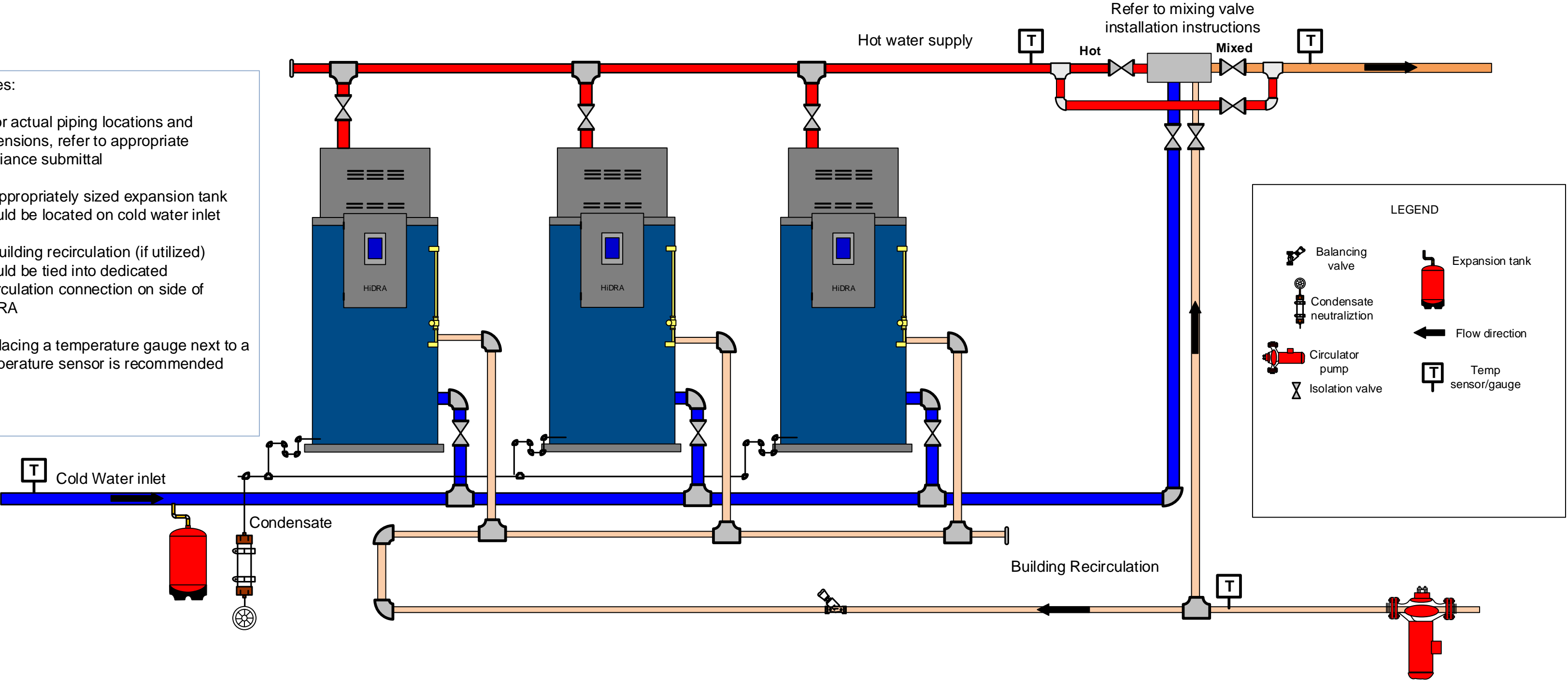
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA



Triple HiDRA piping diagram

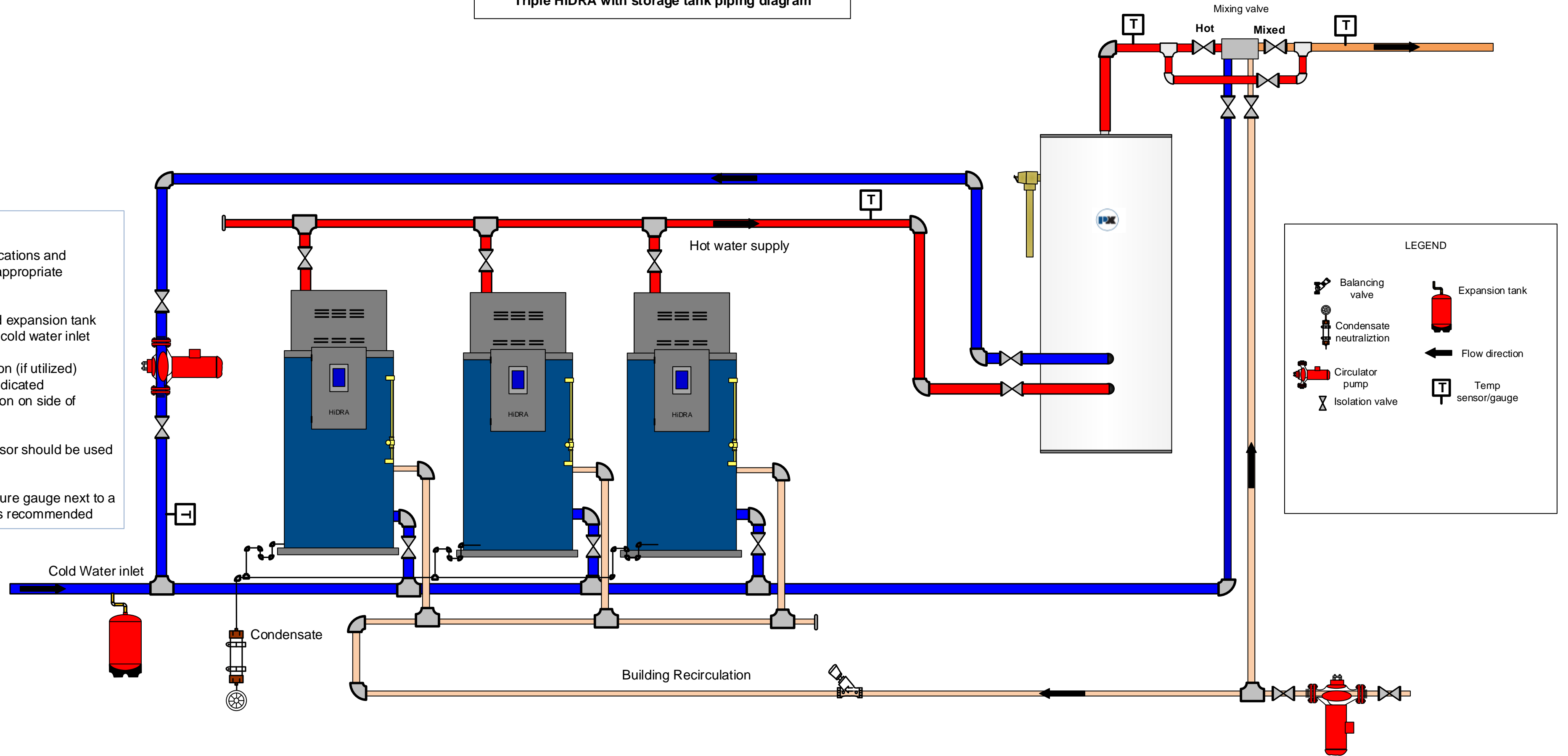
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet
 - 3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
 - 4. Placing a temperature gauge next to a temperature sensor is recommended



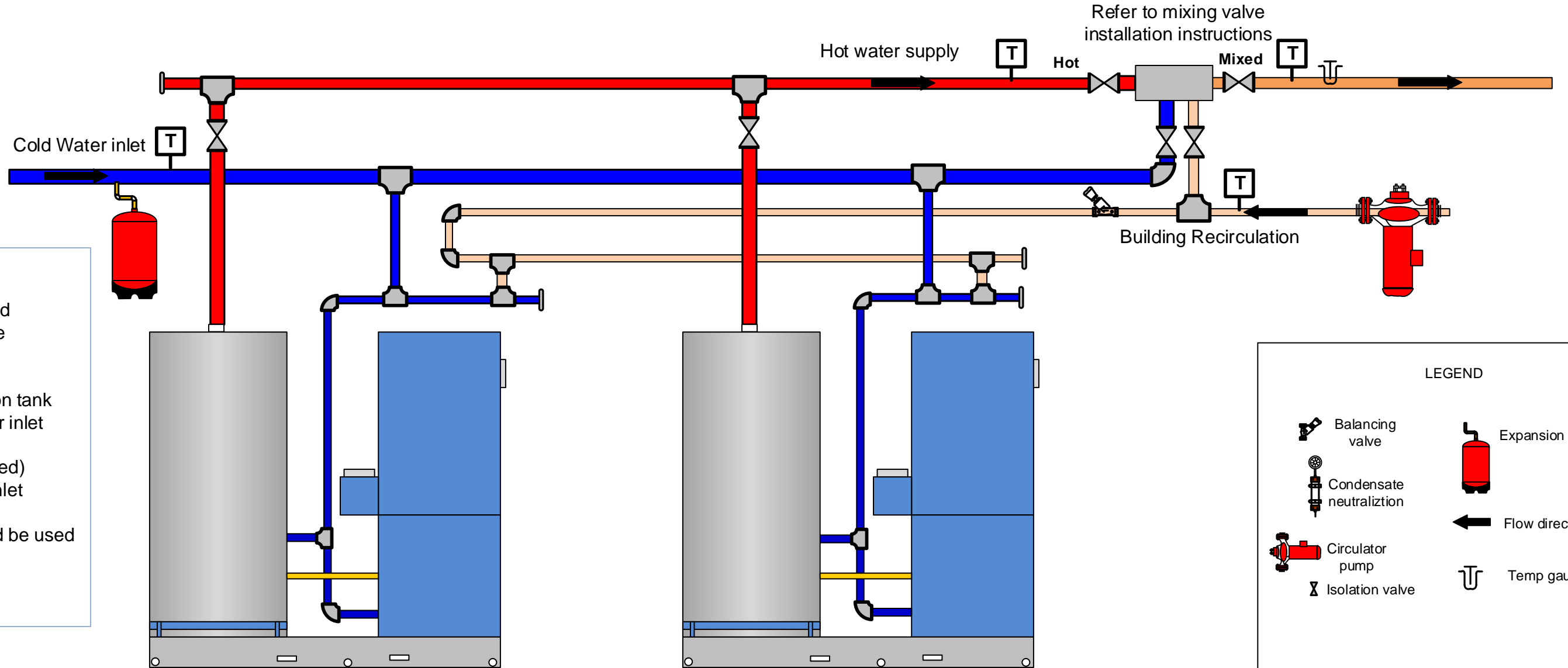
Triple HiDRA with storage tank piping diagram

Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should be used in storage tanks
5. Placing a temperature gauge next to a temperature sensor is recommended



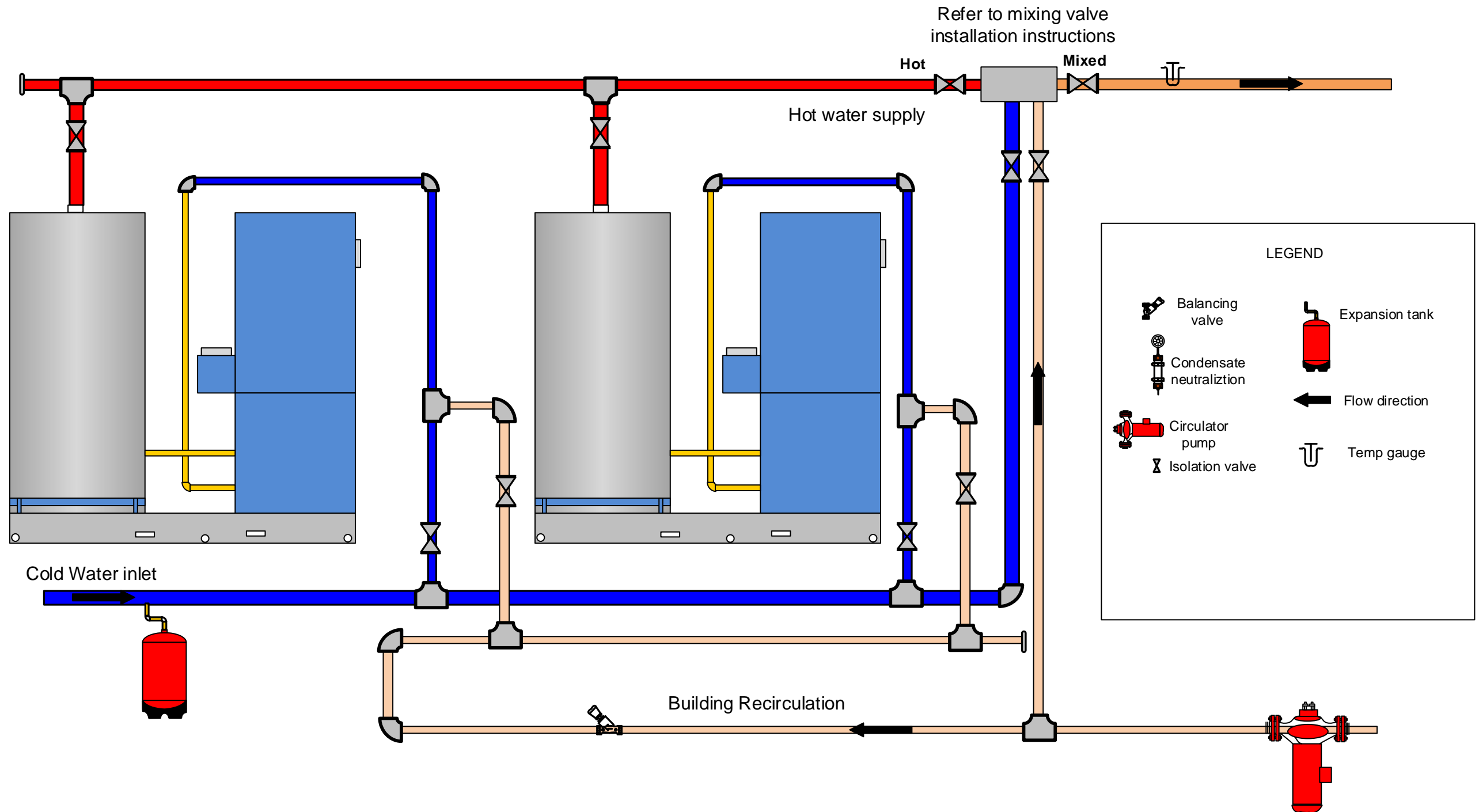
Double Mach N Roll with 200 gallon tank piping diagram



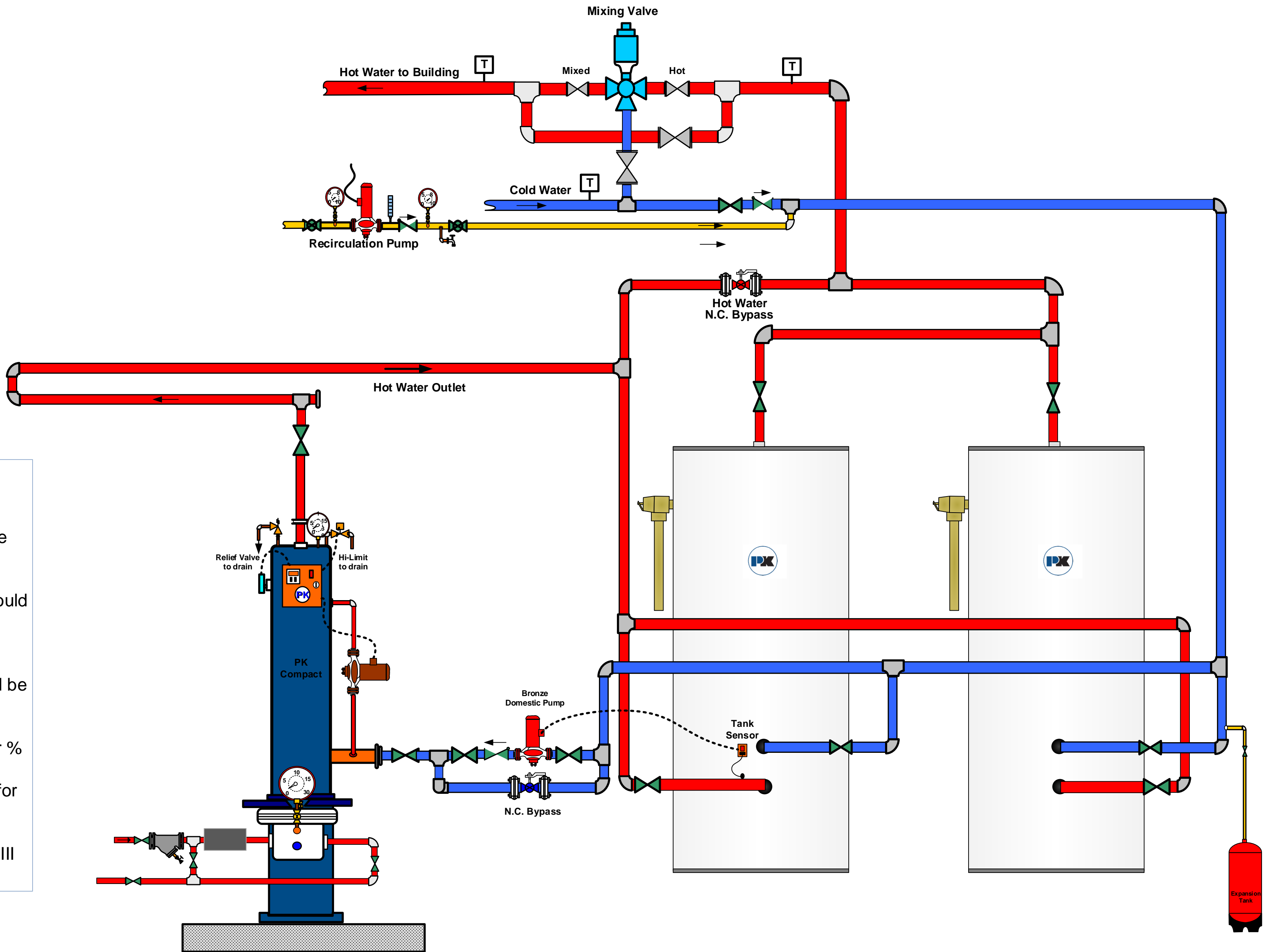
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into cold water inlet
4. 12k OHM tank sensor should be used in storage tanks

Double Mach N Roll with 200 gallon tank piping diagram

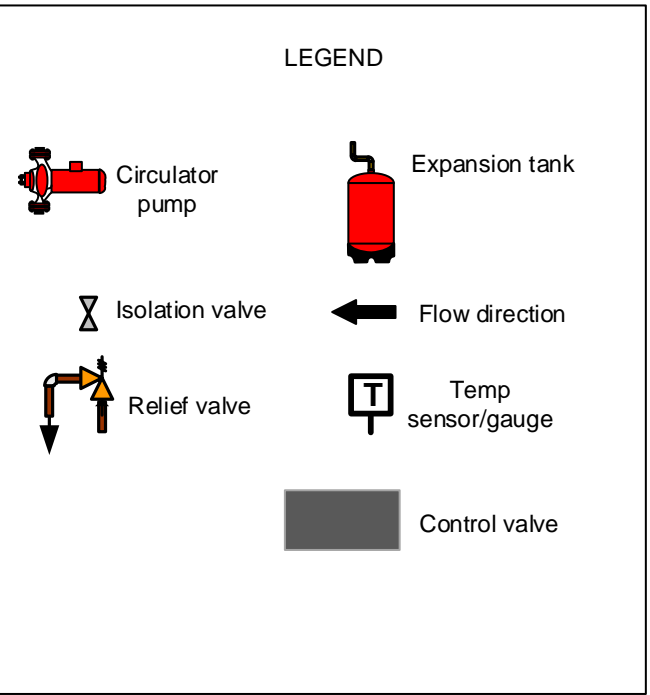


Single water to water 2 way valve Compact with 2 storage tanks

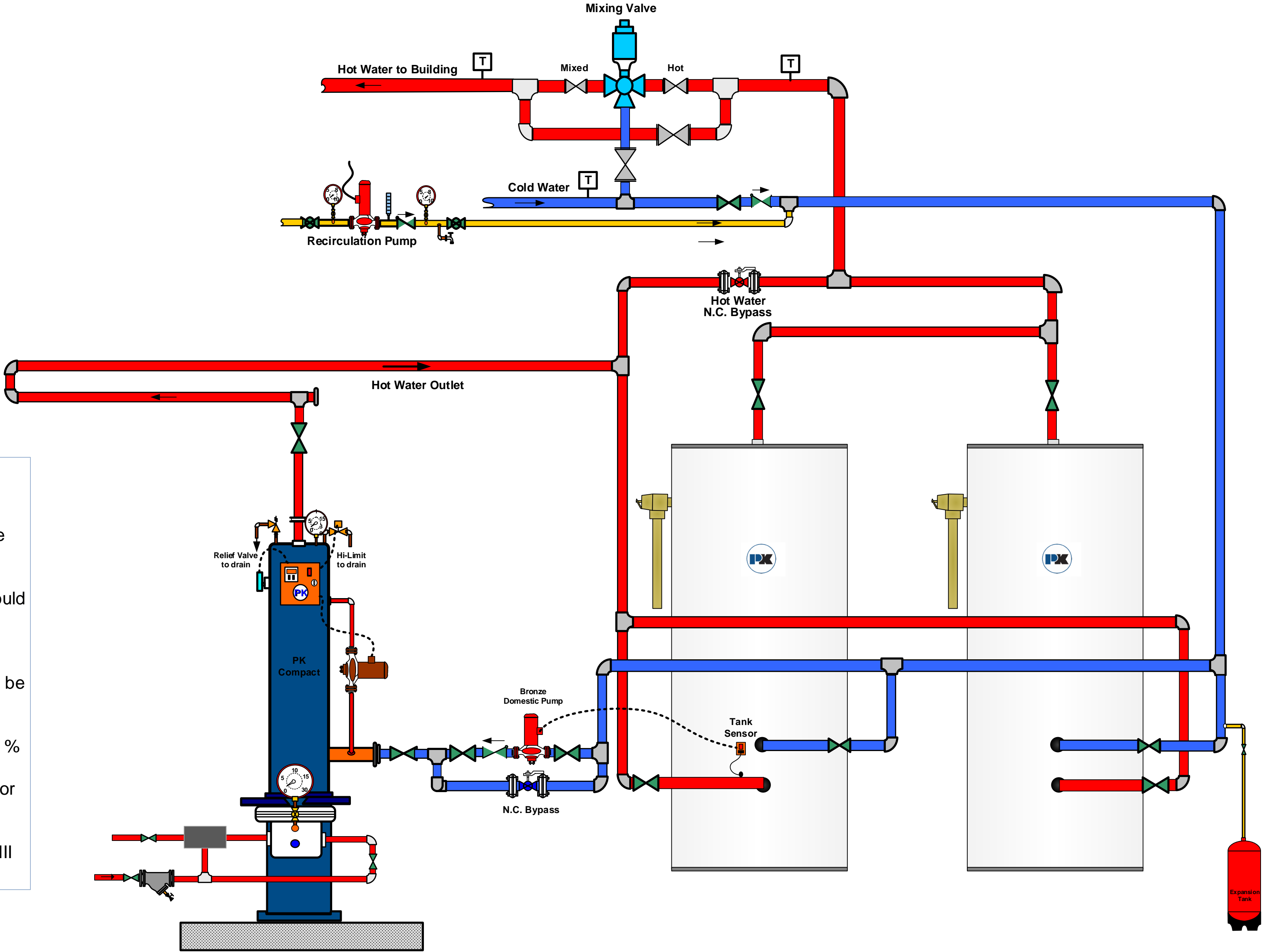


Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream



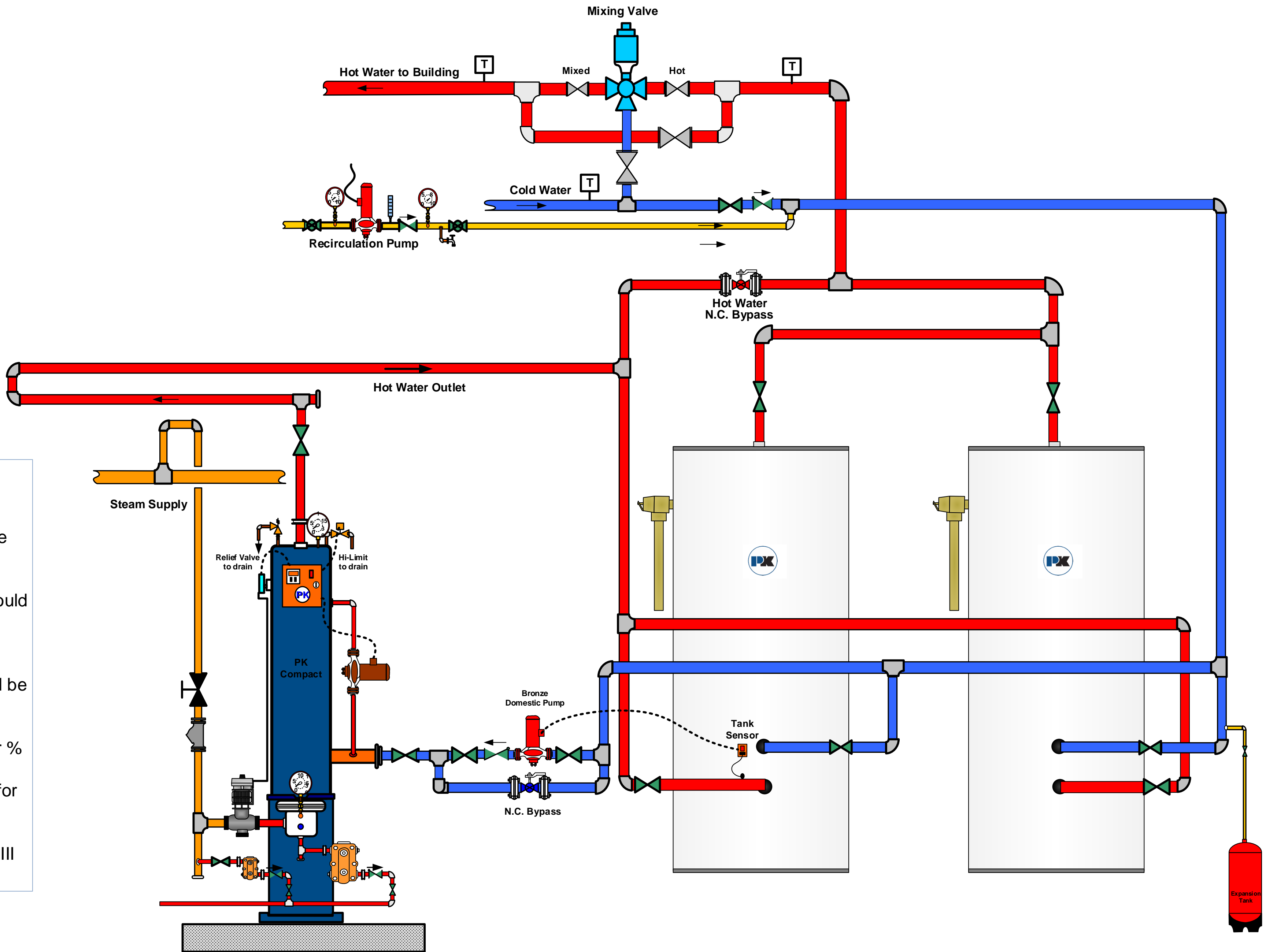
Single water to water 3 way valve Compact with 2 storage tanks



Notes:

- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
- 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
- 3. Building recirculation (if utilized) should be tied into cold water make up
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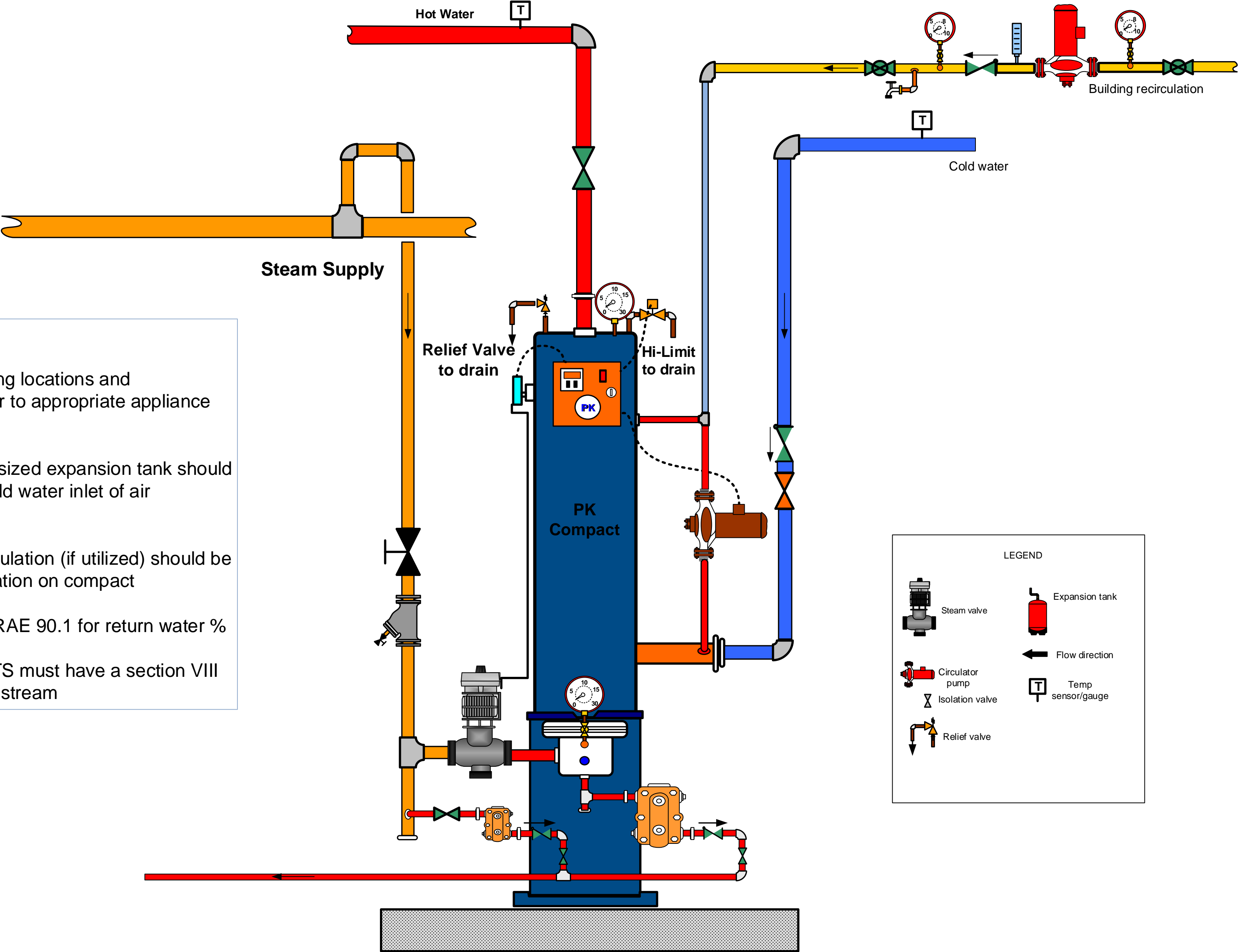
Single Compact with 2 storage tanks



Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream

Single Compact with NY TRIM



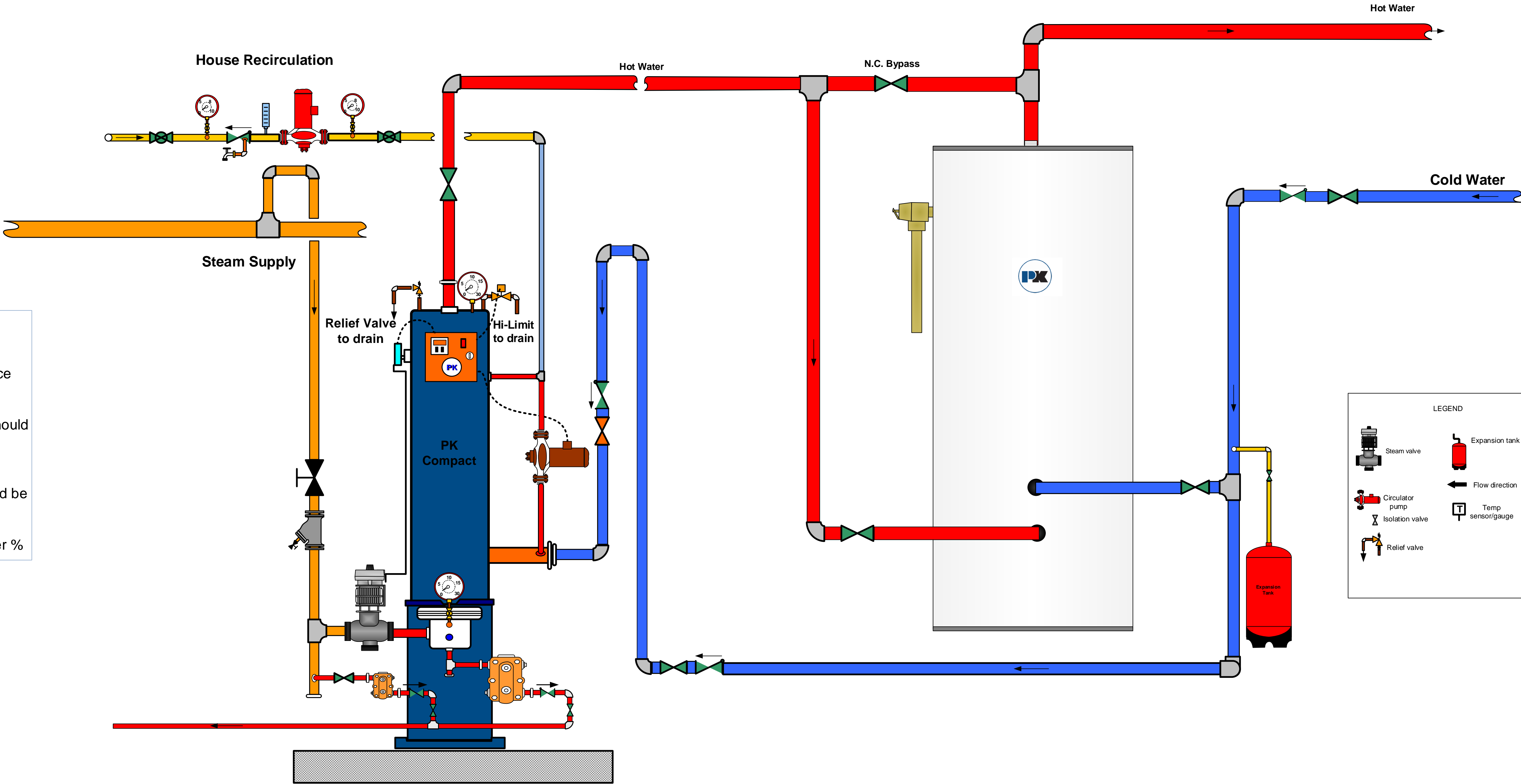
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into recirculation on compact
4. Refer to ASHRAE 90.1 for return water %
5. All COMPACTS must have a section VIII relief valve downstream

LEGEND

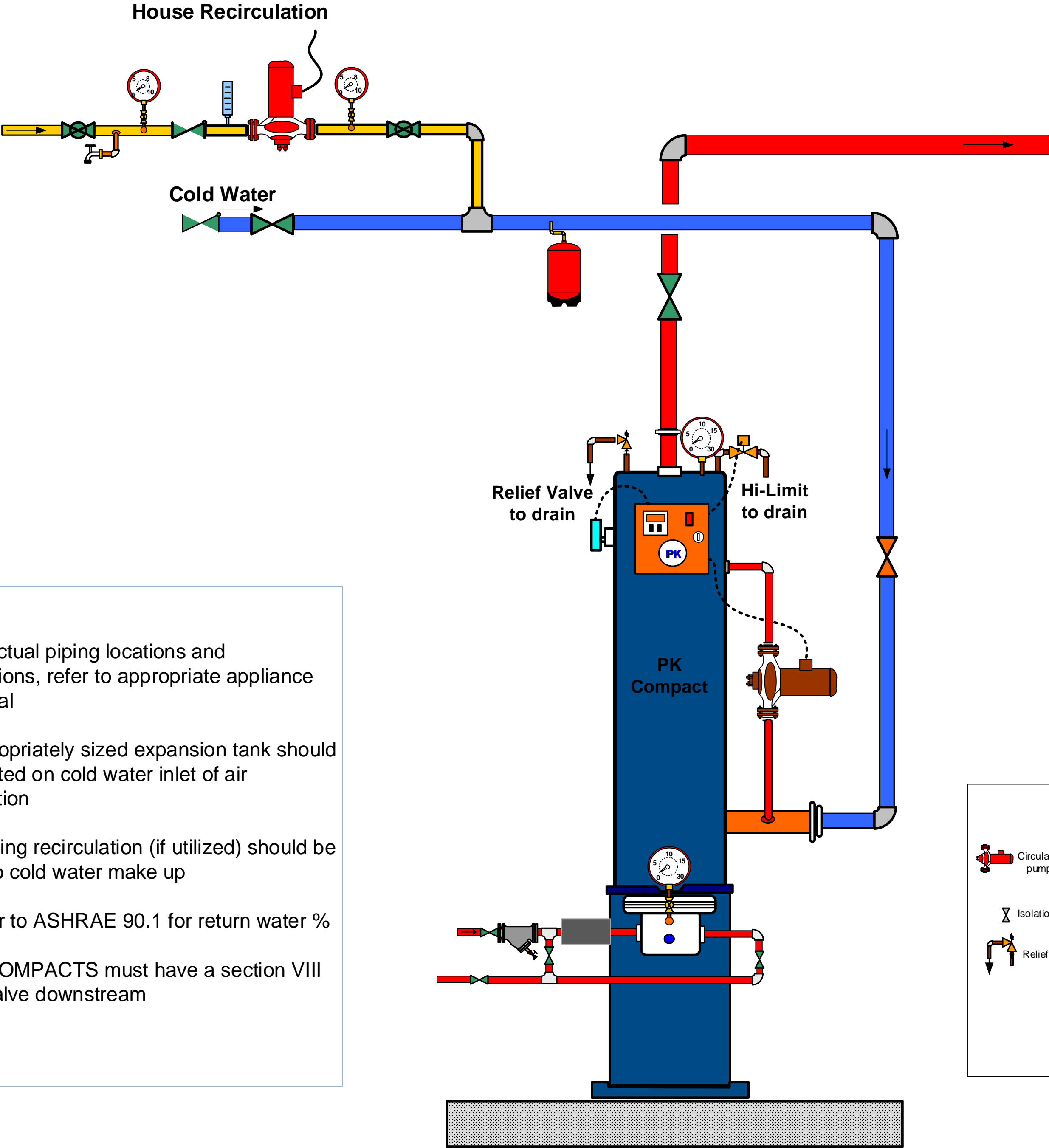
	Steam valve		Expansion tank
	Circulator pump		Flow direction
	Isolation valve		Temp sensor/gauge
	Relief valve		

Single Compact with NY TRIM and Hot water storage tank



- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 3. Building recirculation (if utilized) should be tied into compact recirculation
 - 4. Refer to ASHRAE 90.1 for return water %


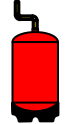





Single Water to Water with 2 way valve Compact installation



Notes:

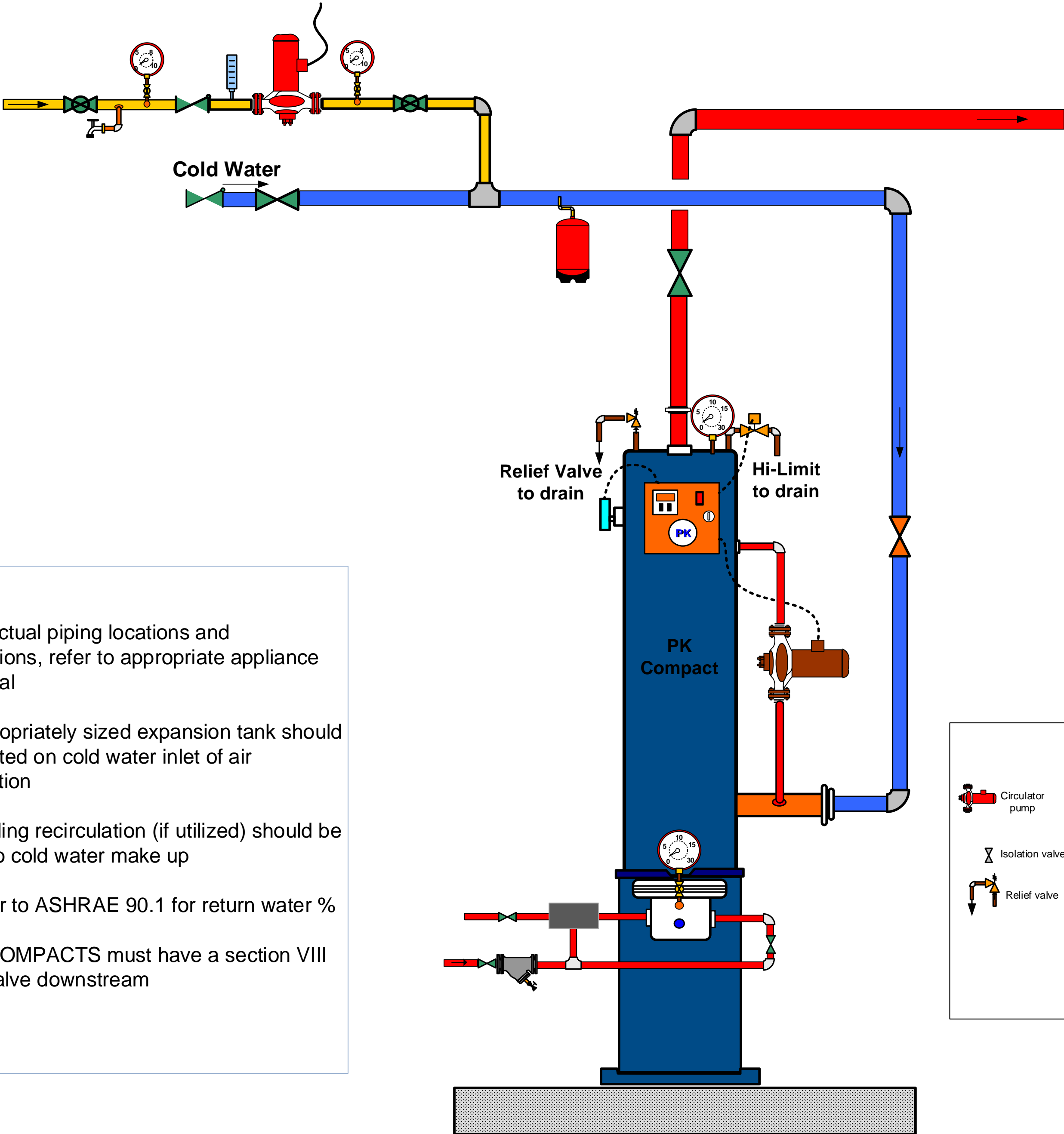
- 1.For actual piping locations and dimensions, refer to appropriate appliance submittal
- 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
- 3. Building recirculation (if utilized) should be tied into cold water make up
- 4. Refer to ASHRAE 90.1 for return water %
- 5. All COMPACTS must have a section VIII relief valve downstream

LEGEND

	Circulator pump		Expansion tank
	Isolation valve		Flow direction
	Relief valve		Temp sensor/gauge
			Control valve

Single Water to Water with 3 way valve Compact installation

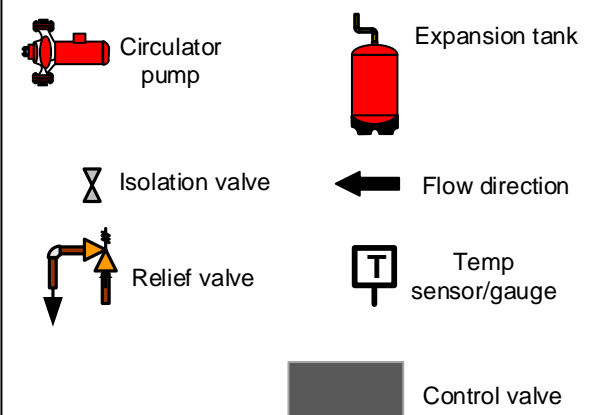
House Recirculation



Notes:

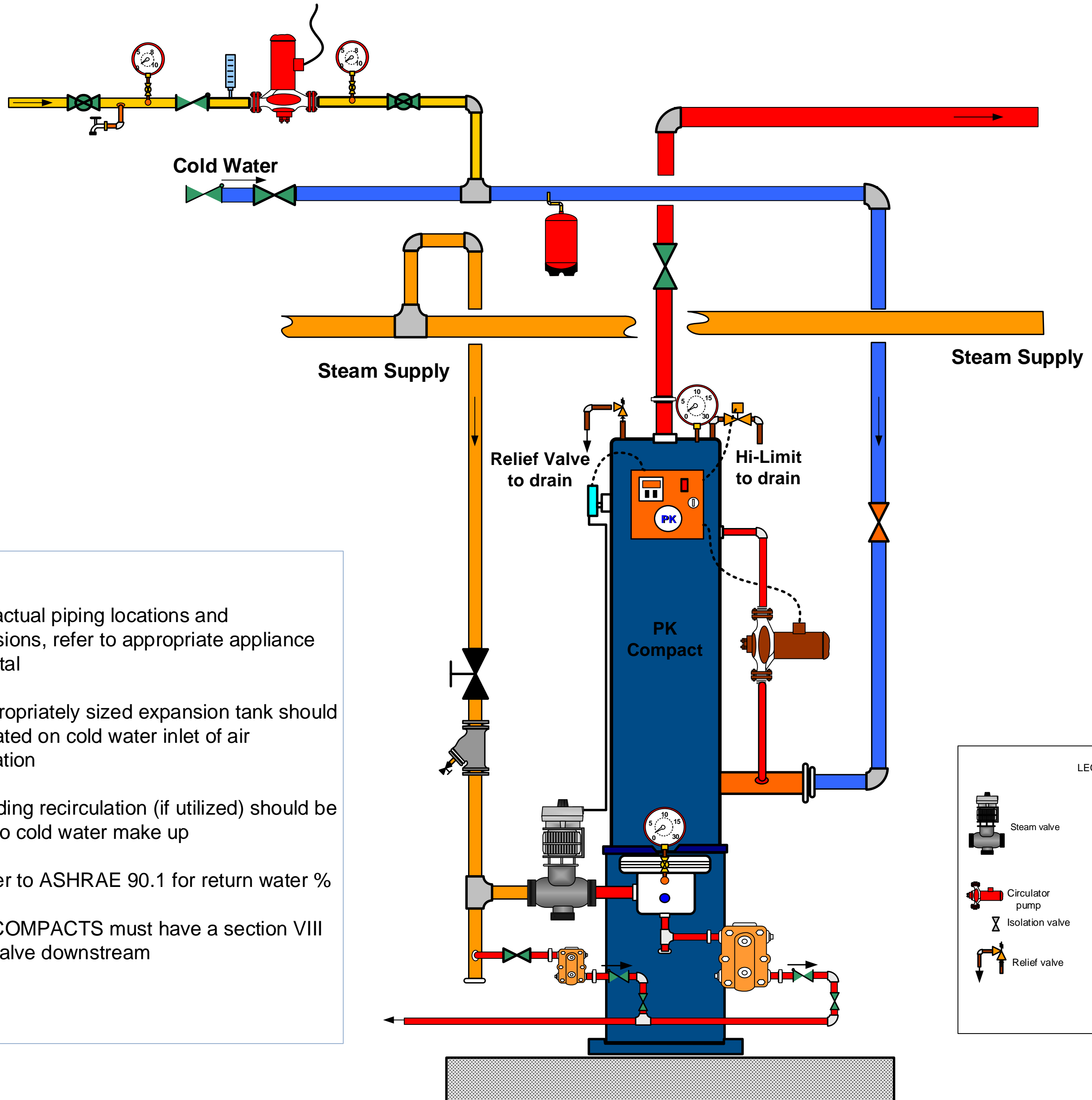
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. All COMPACTS must have a section VIII relief valve downstream

LEGEND



Single Compact installation

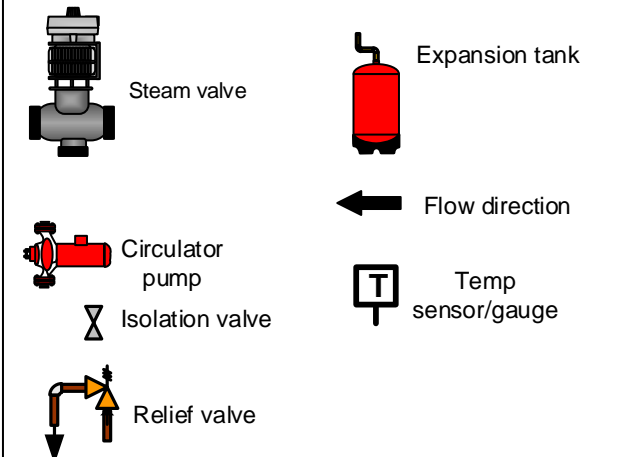
House Recirculation



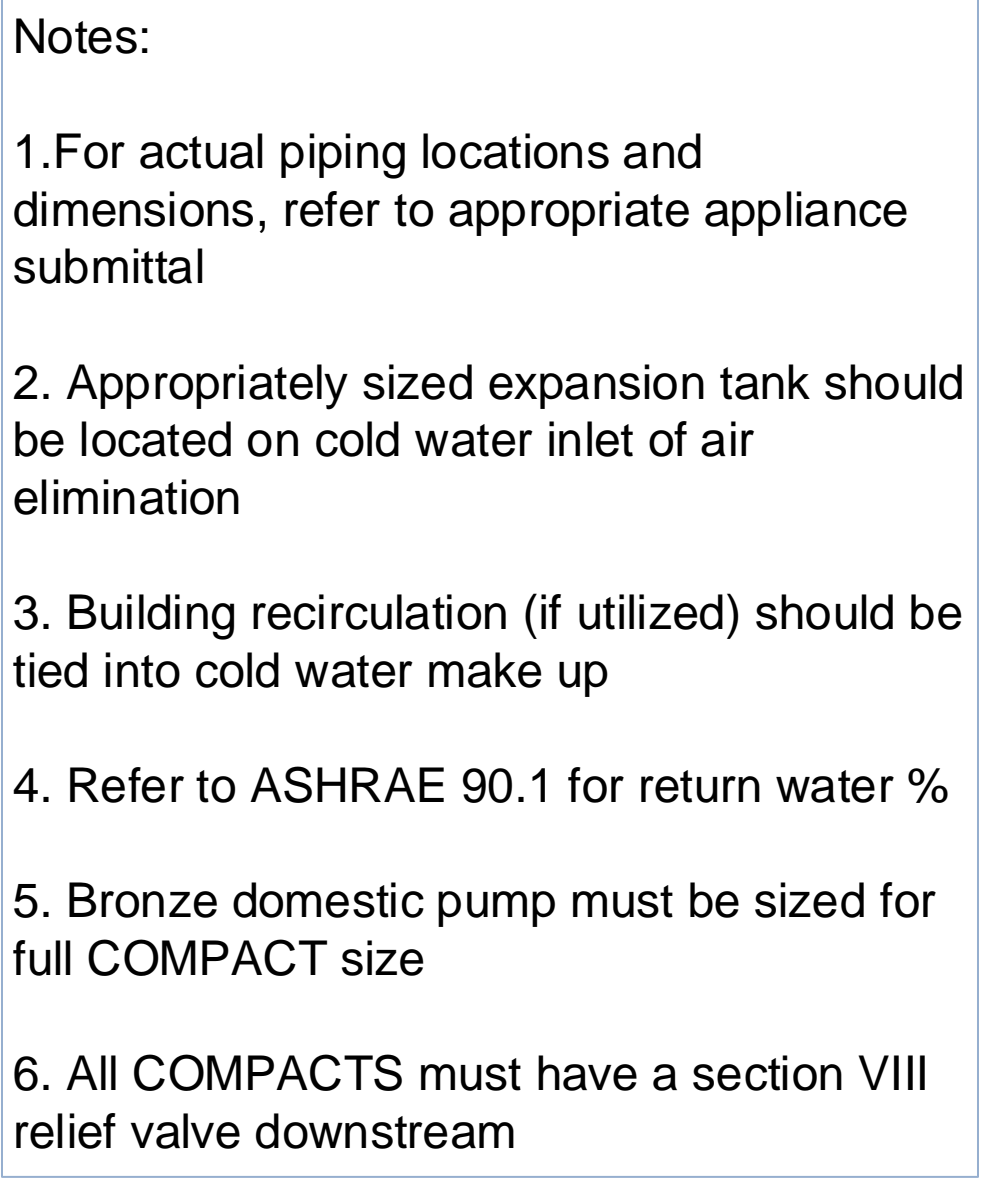
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. All COMPACTS must have a section VIII relief valve downstream

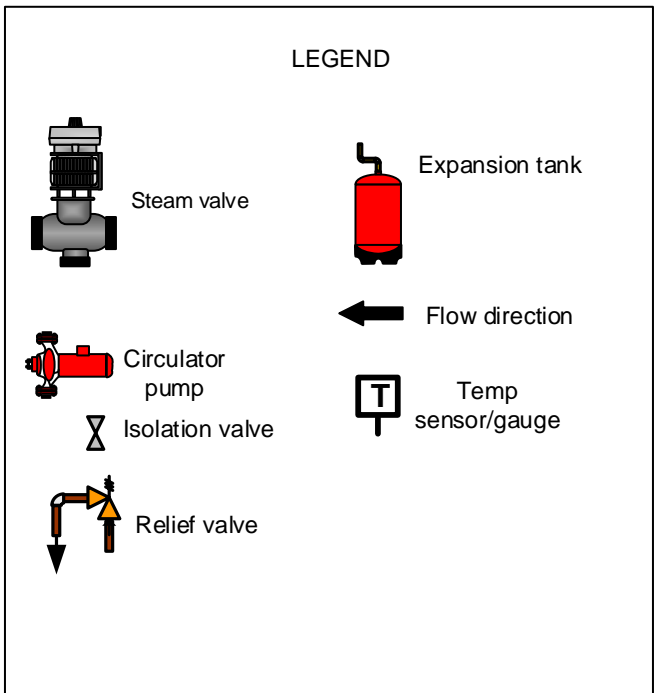
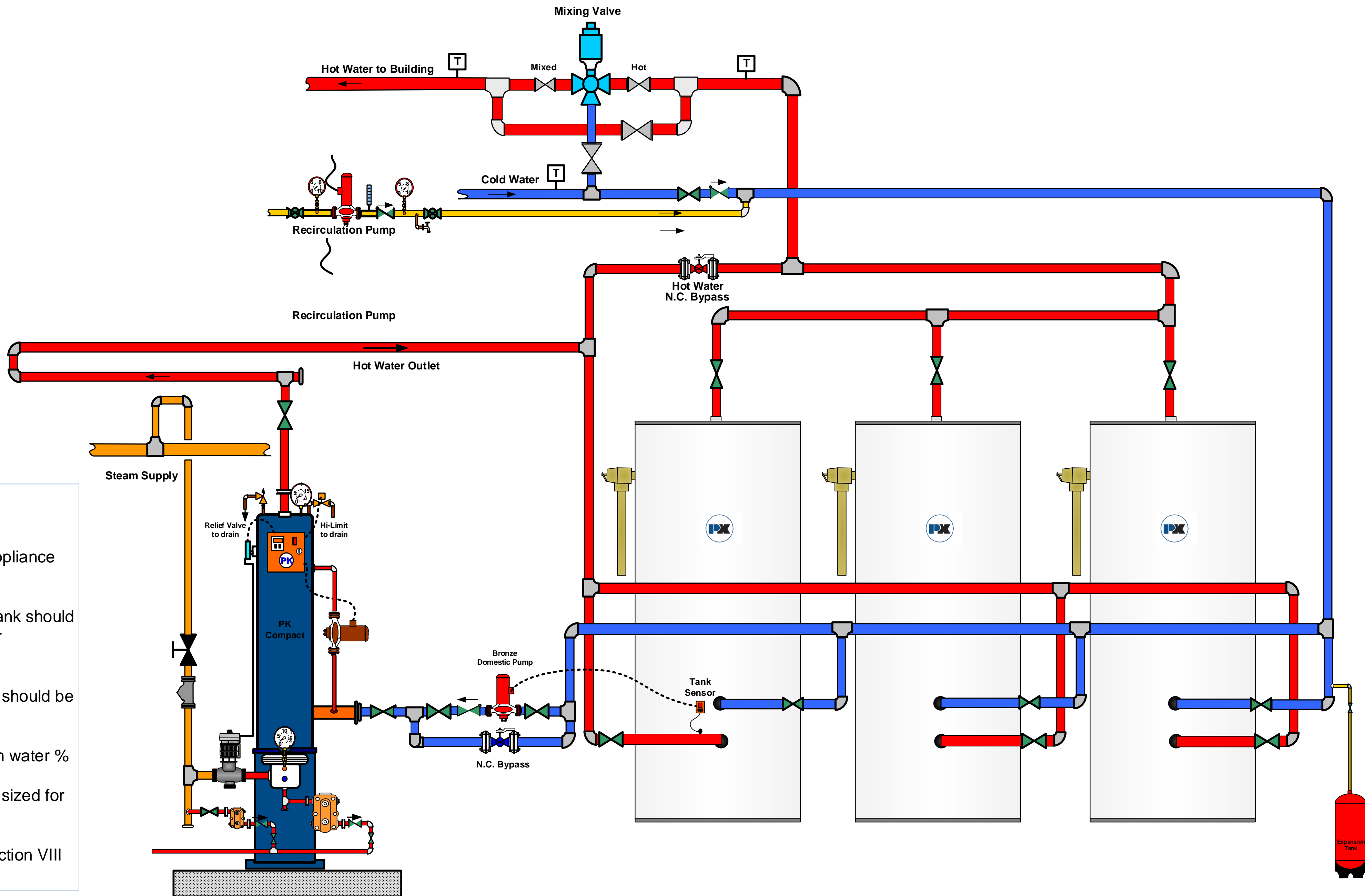
LEGEND



1 Compact with Hot water storage tank



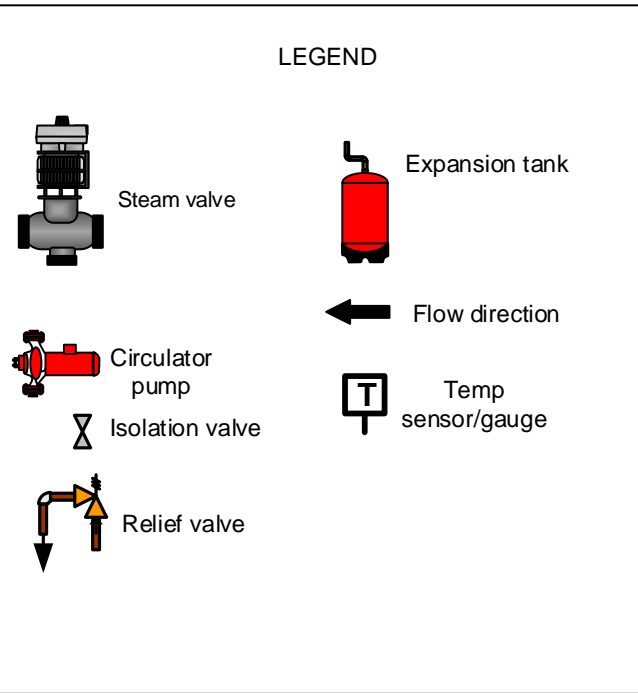
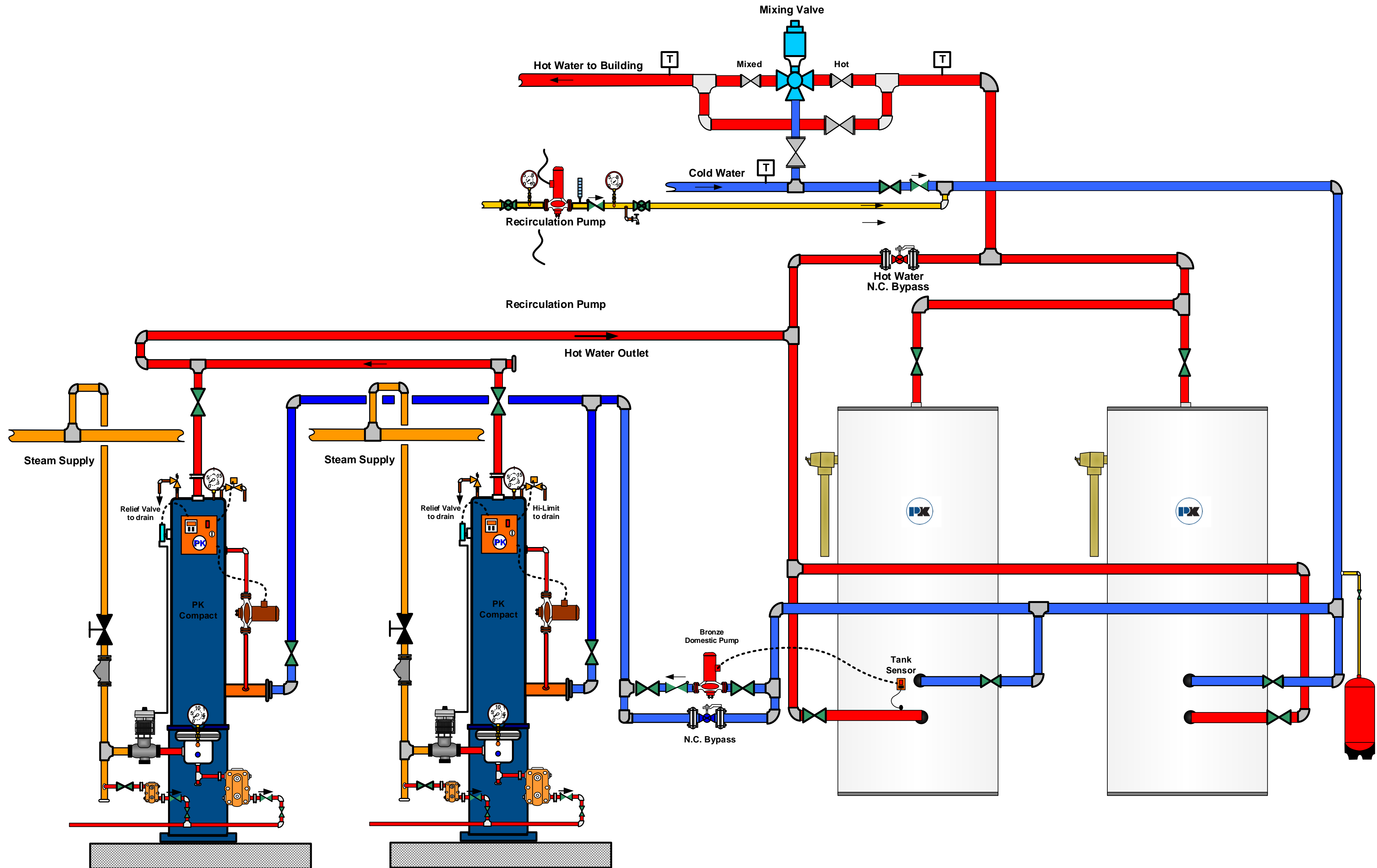
Single Compact with 3 storage tanks



Notes:

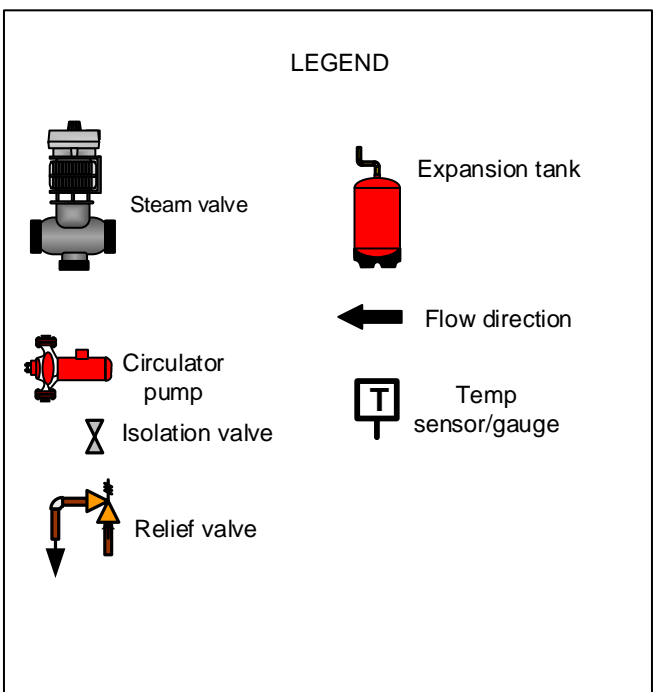
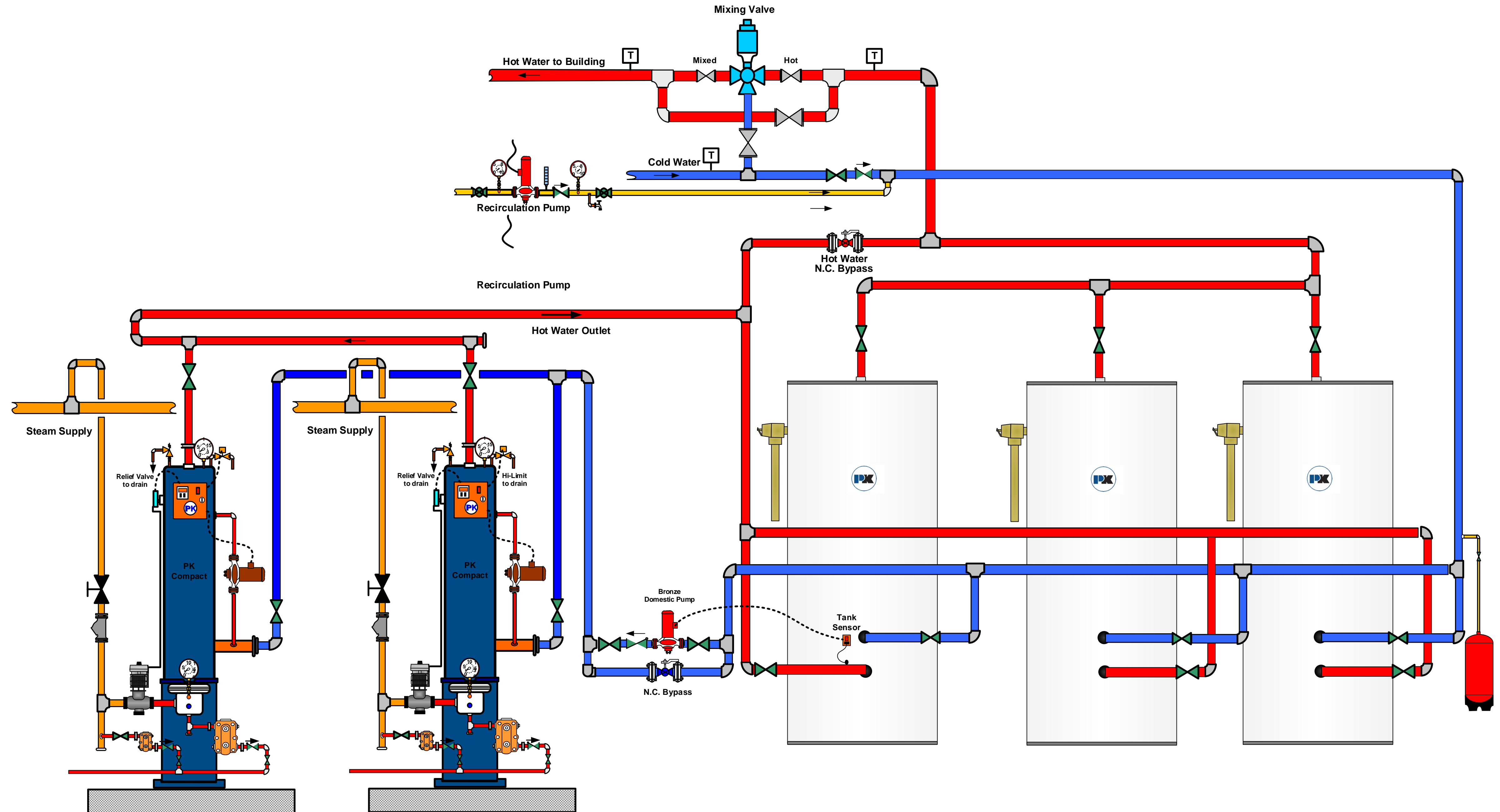
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream

2 Compacts with 2 storage tanks



- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. Refer to ASHRAE 90.1 for return water %
 5. Bronze domestic pump must be sized for full COMPACT size
 6. All COMPACTS must have a section VIII relief valve downstream

2 Compacts with 3 storage tanks



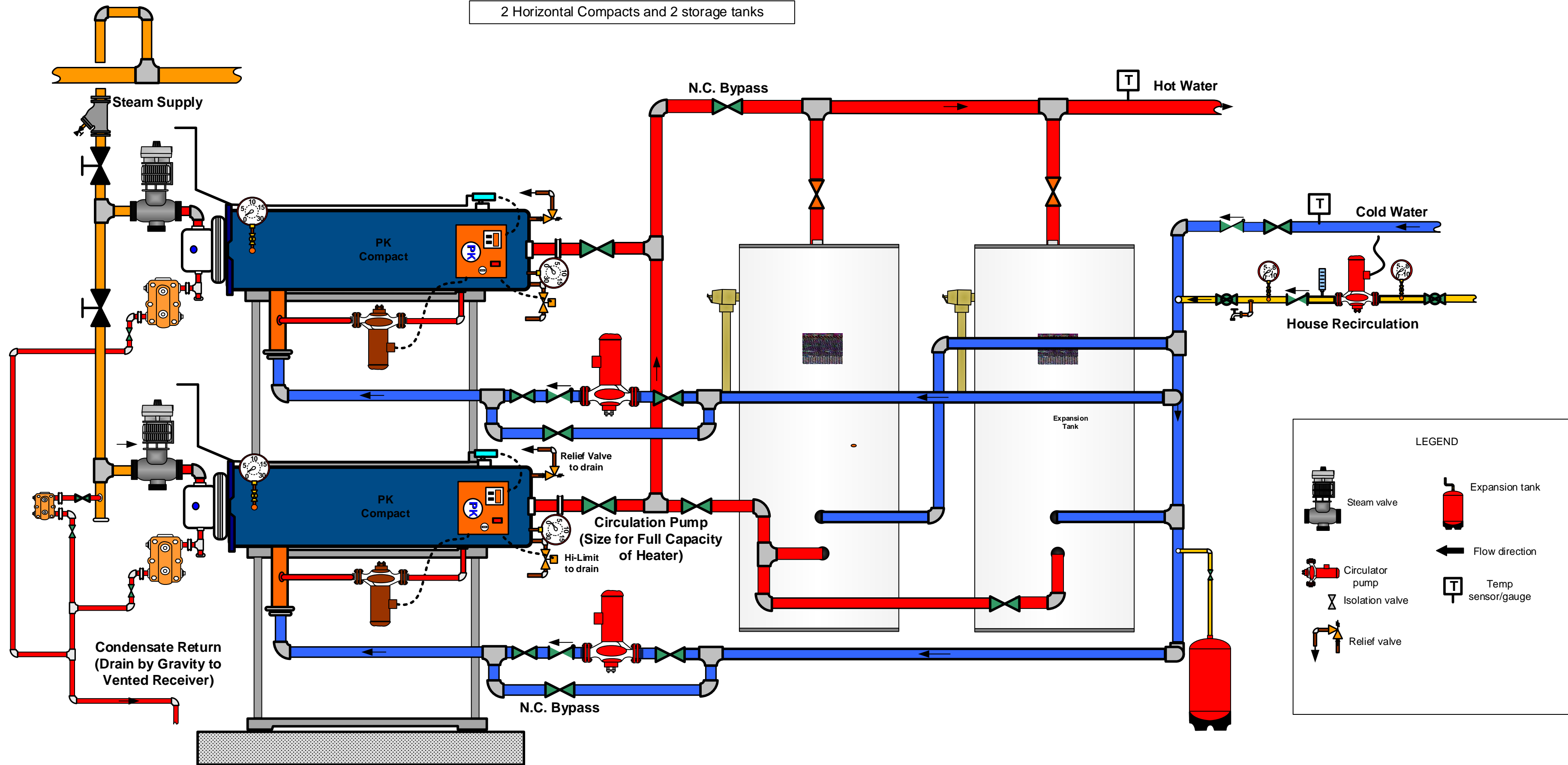
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream

2 Horizontal Compacts and 2 storage tanks

Notes:

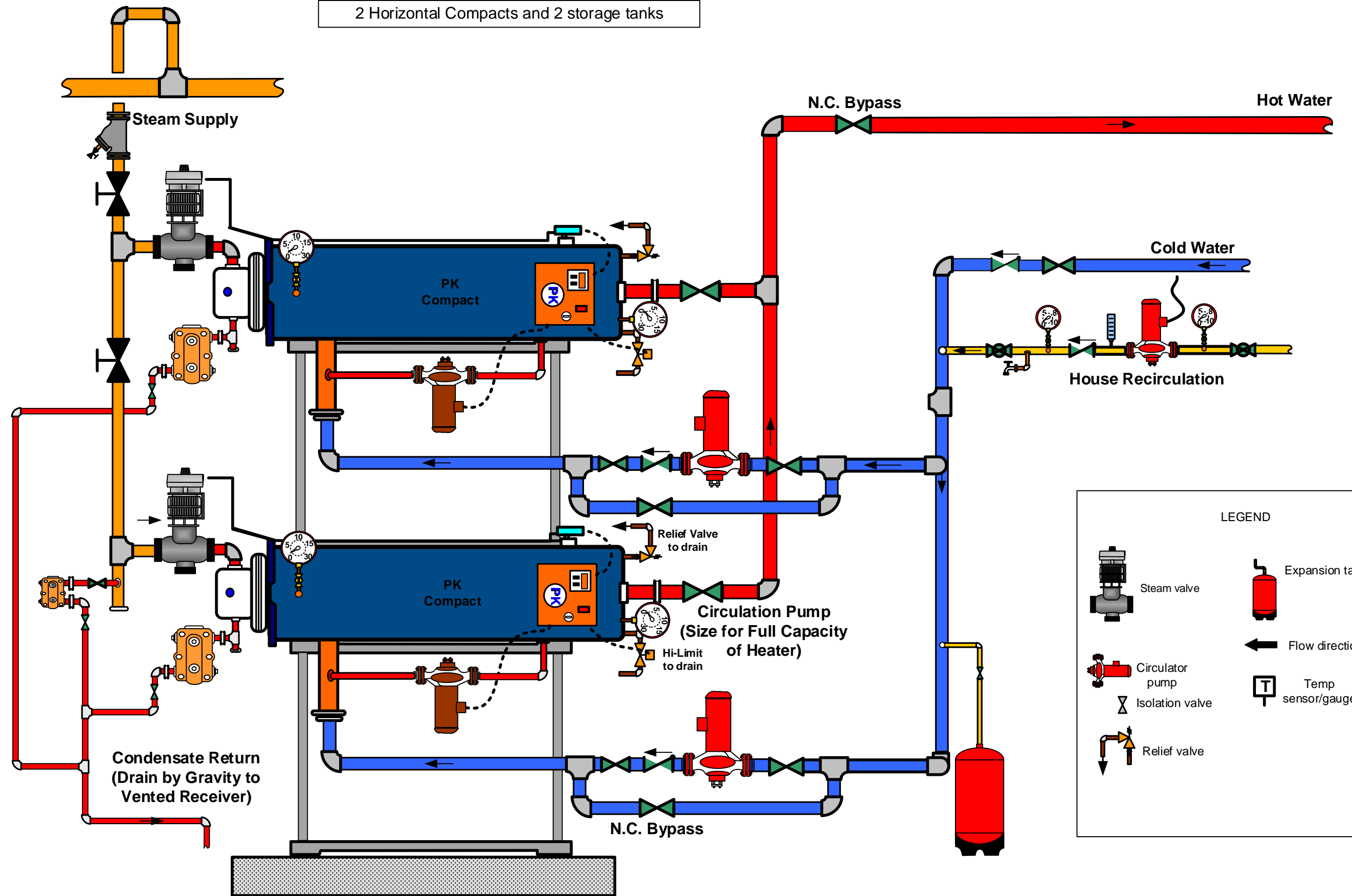
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream



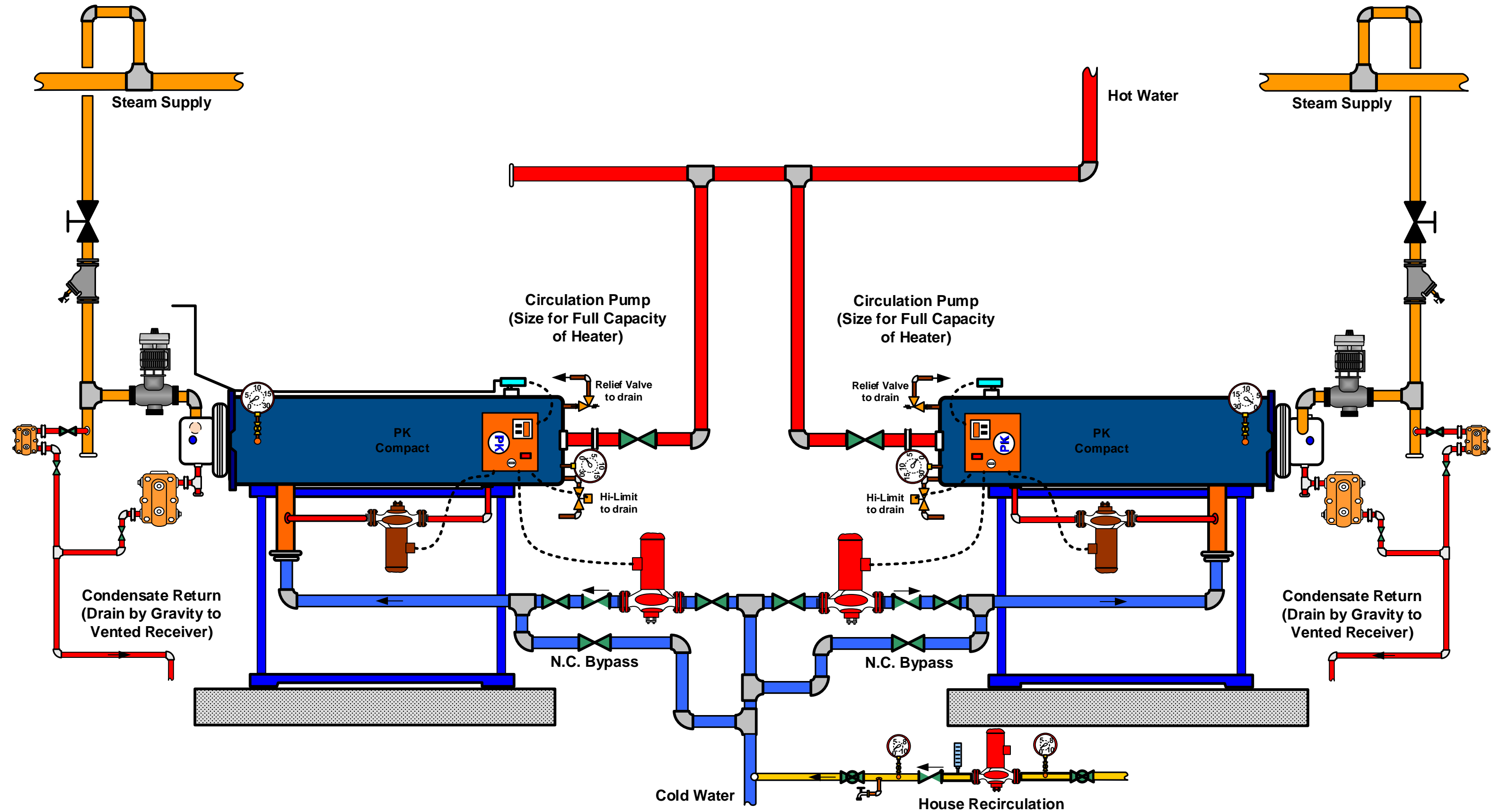
2 Horizontal Compacts and 2 storage tanks

Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream



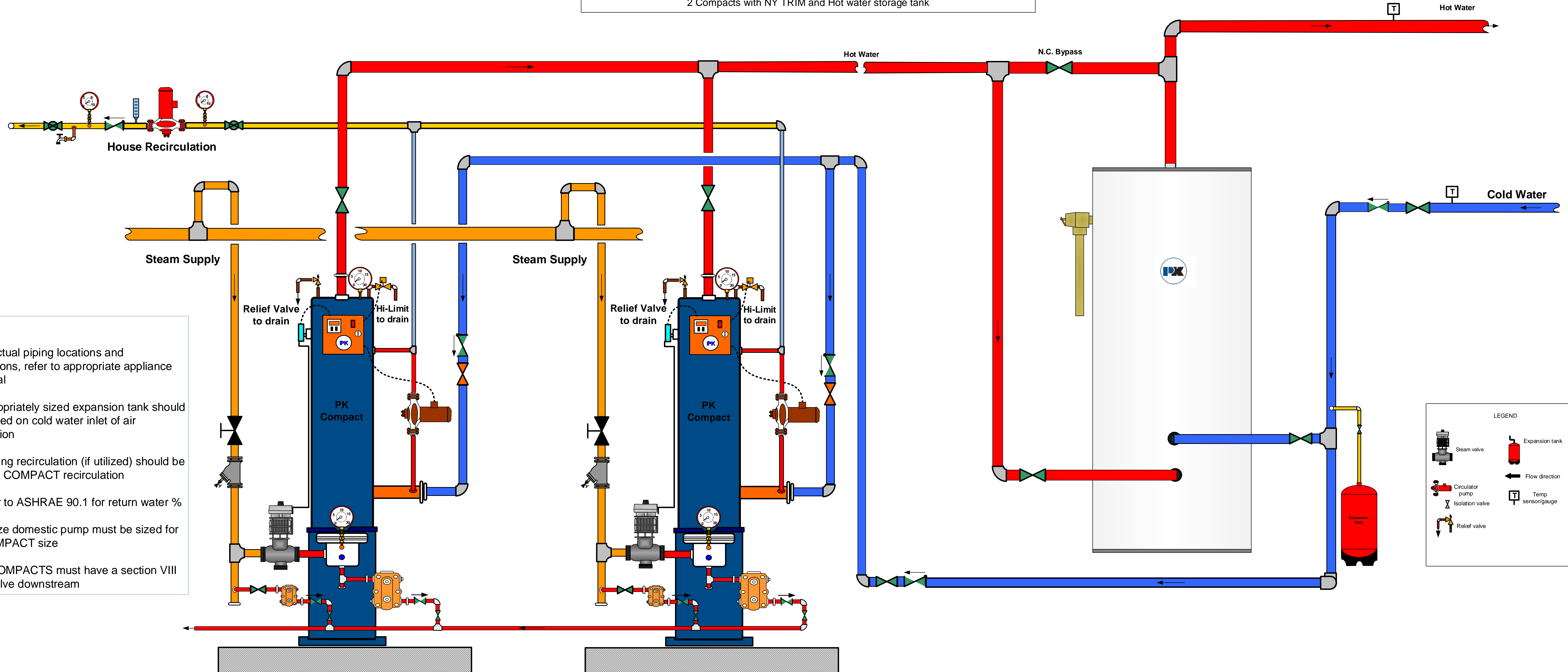
2 Horizontal Compacts



Notes:

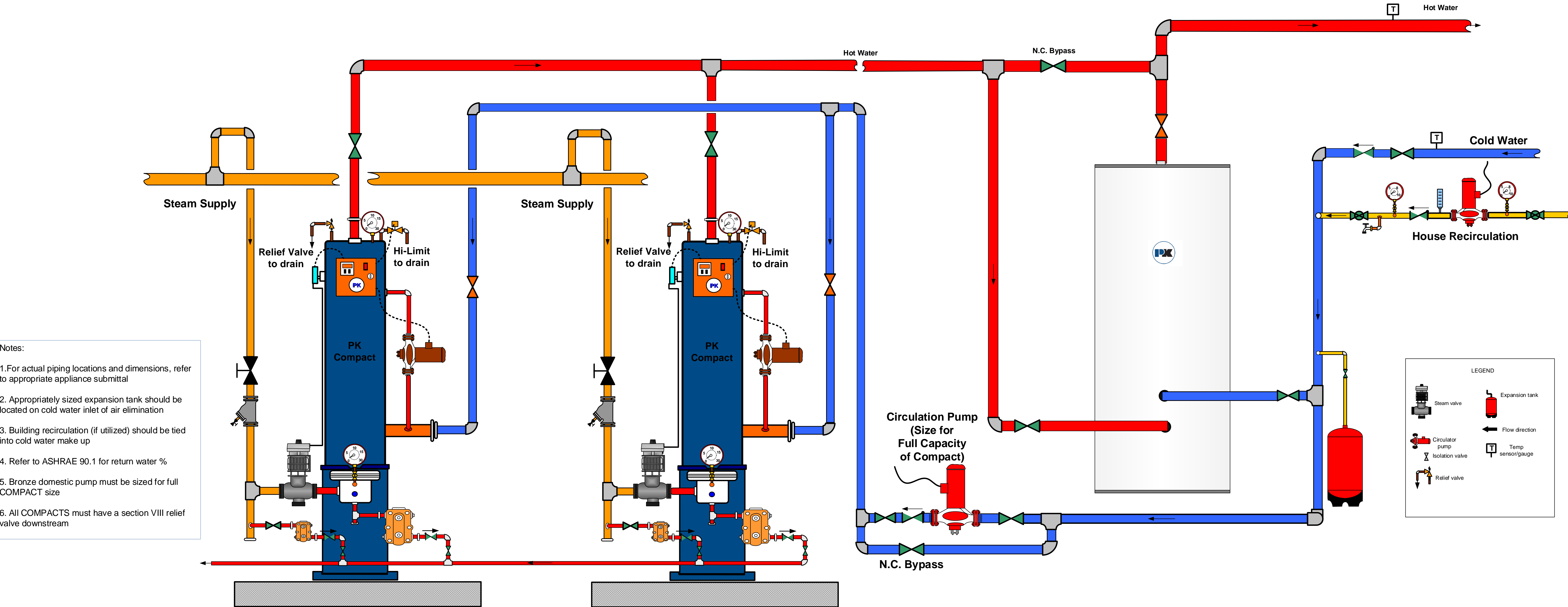
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.

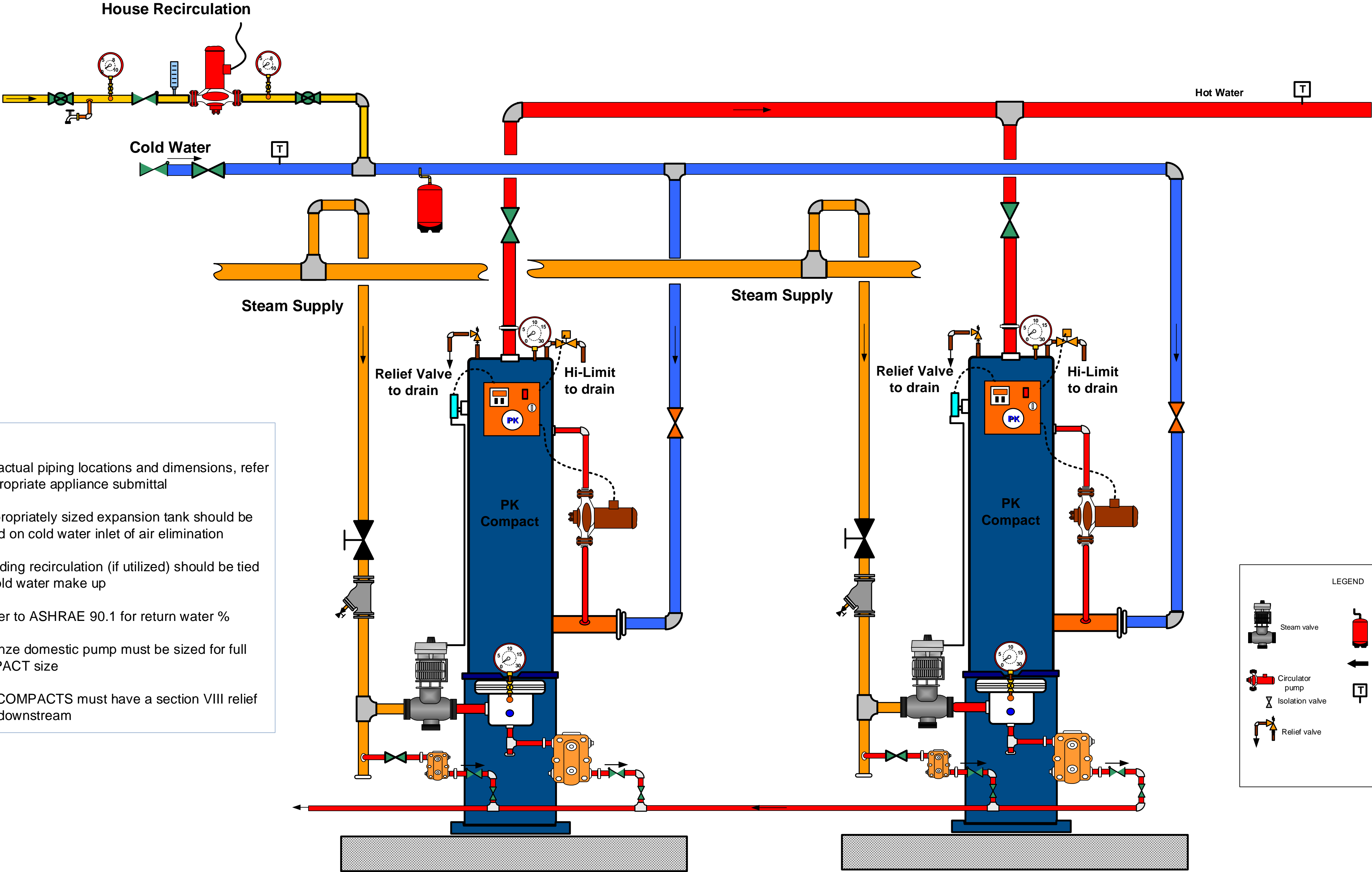
2 Compacts with NY TRIM and Hot water storage tank



Notes:








1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into COMPACT recirculation
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream



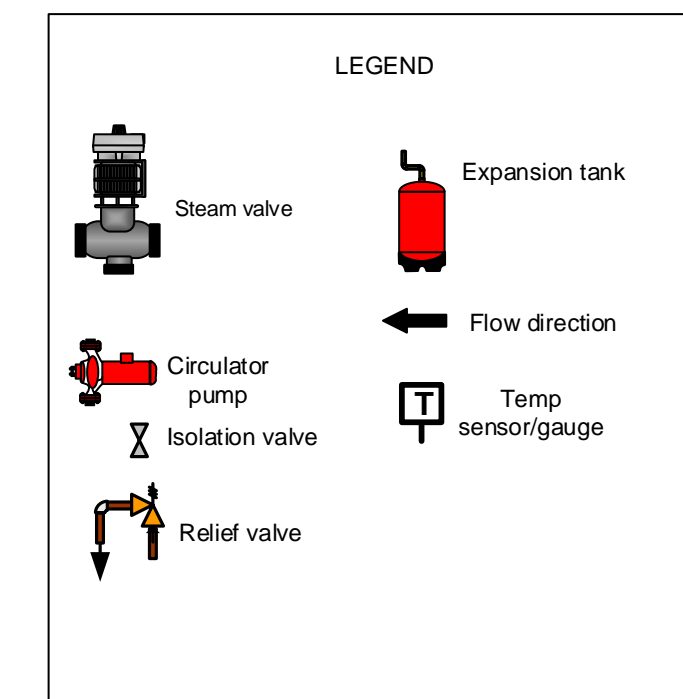
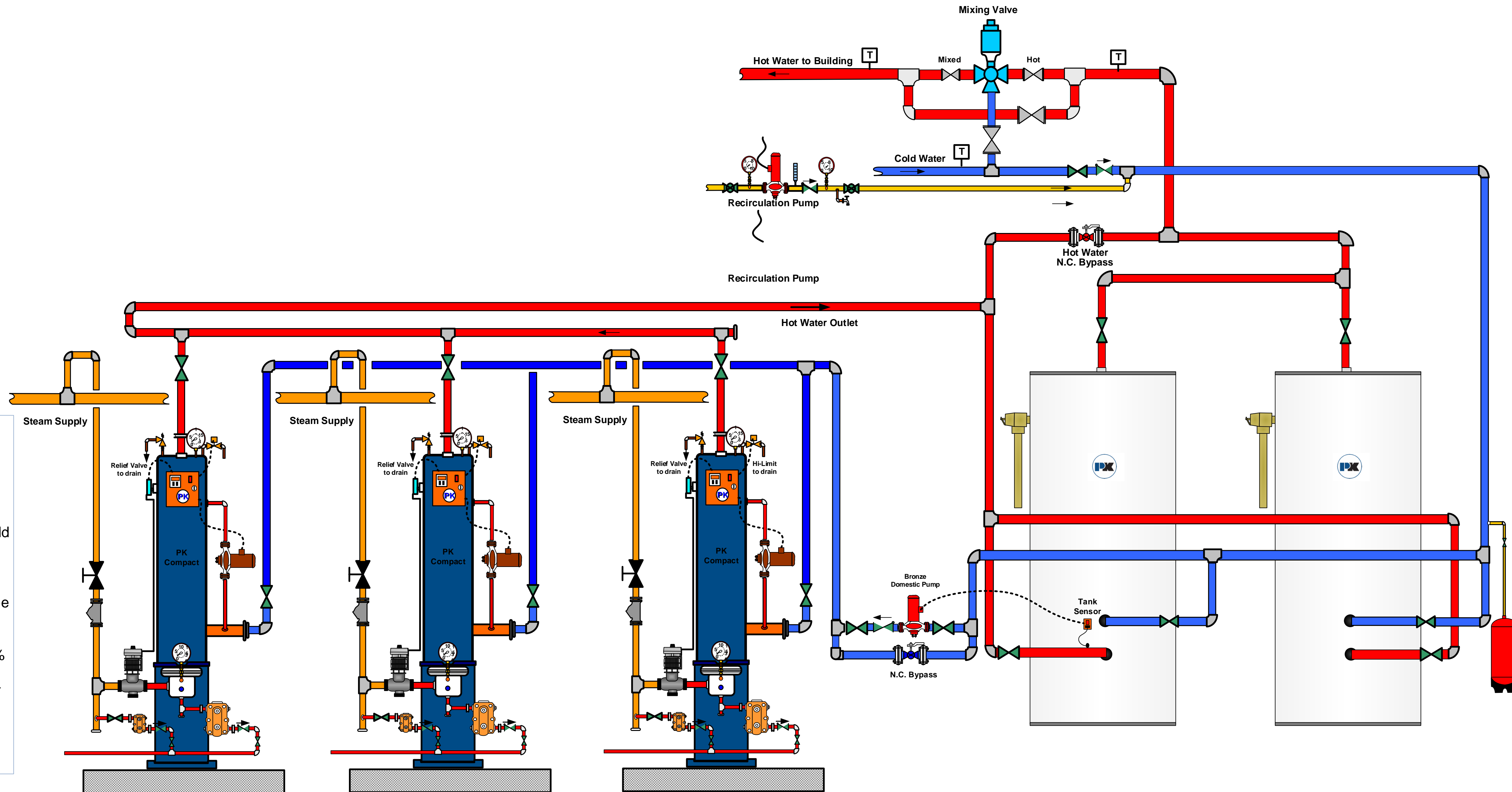


- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 3. Building recirculation (if utilized) should be tied into cold water make up
 - 4. Refer to ASHRAE 90.1 for return water %
 - 5. Bronze domestic pump must be sized for full COMPACT size
 - 6. All COMPACTS must have a section VIII relief valve downstream

LEGEND

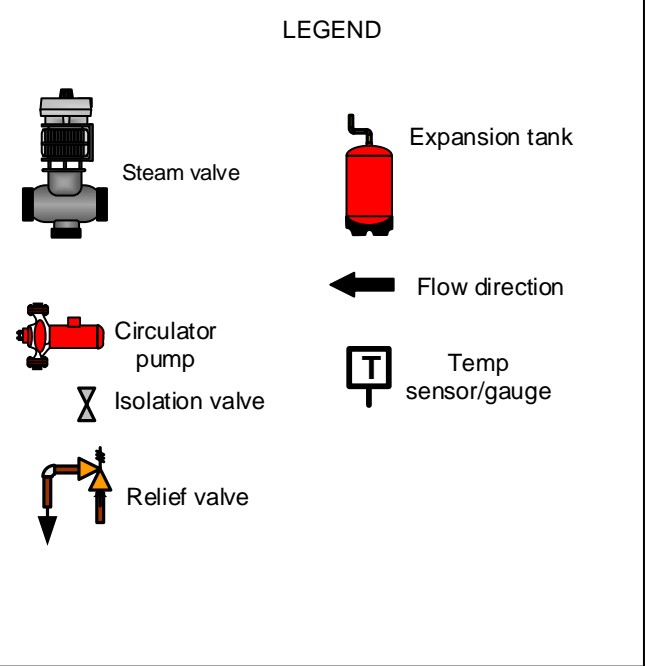
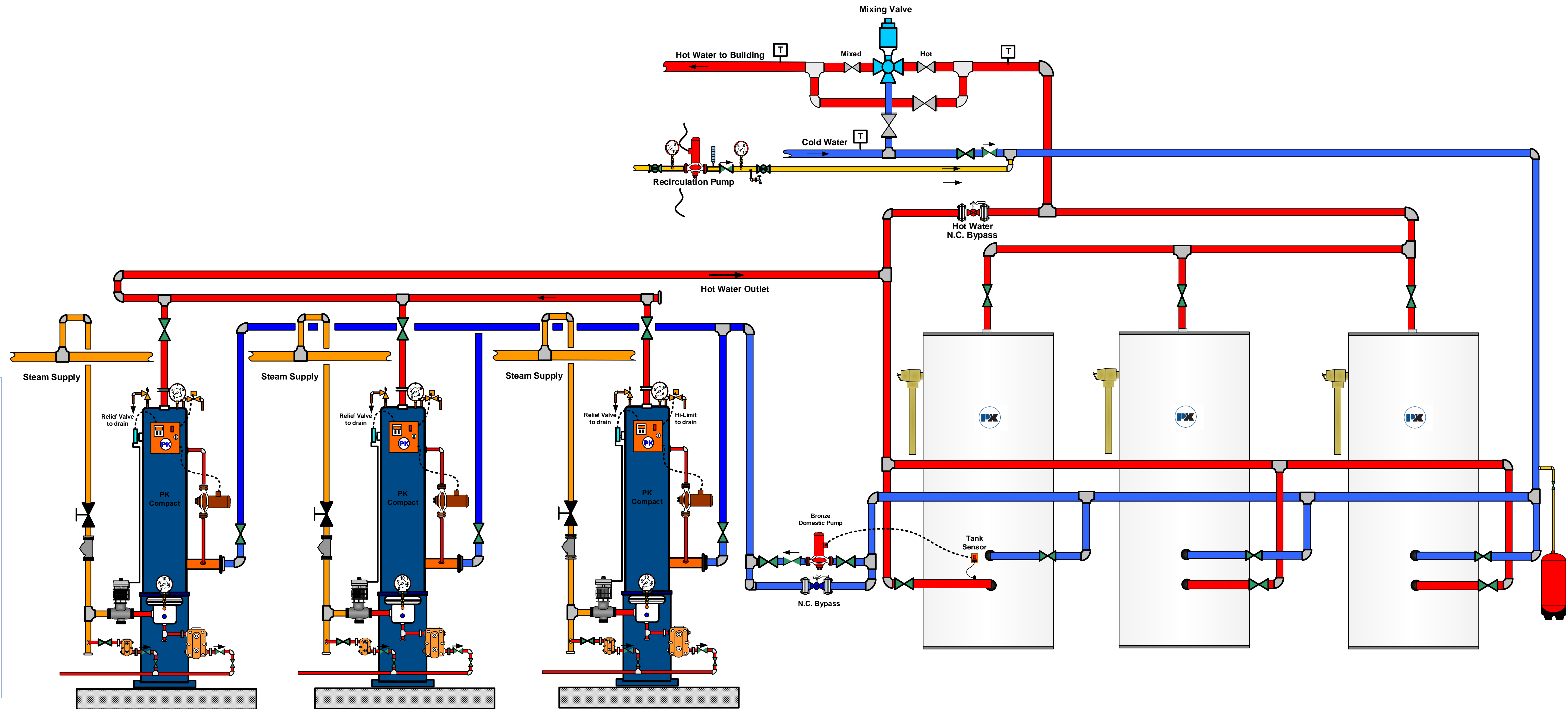
	
	
	
	

3 Compacts with 2 storage tanks



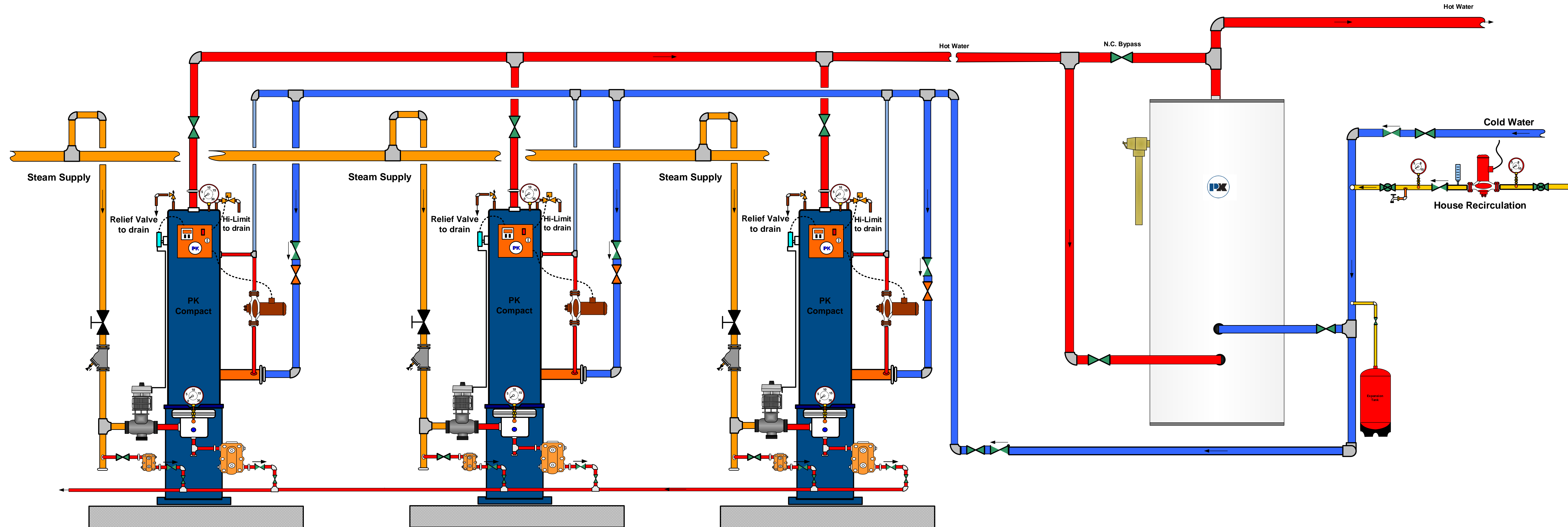
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. Refer to ASHRAE 90.1 for return water %
 5. Bronze domestic pump must be sized for full COMPACT size
 6. All COMPACTS must have a section VIII relief valve downstream

3 Compacts with 3 storage tanks



Notes:

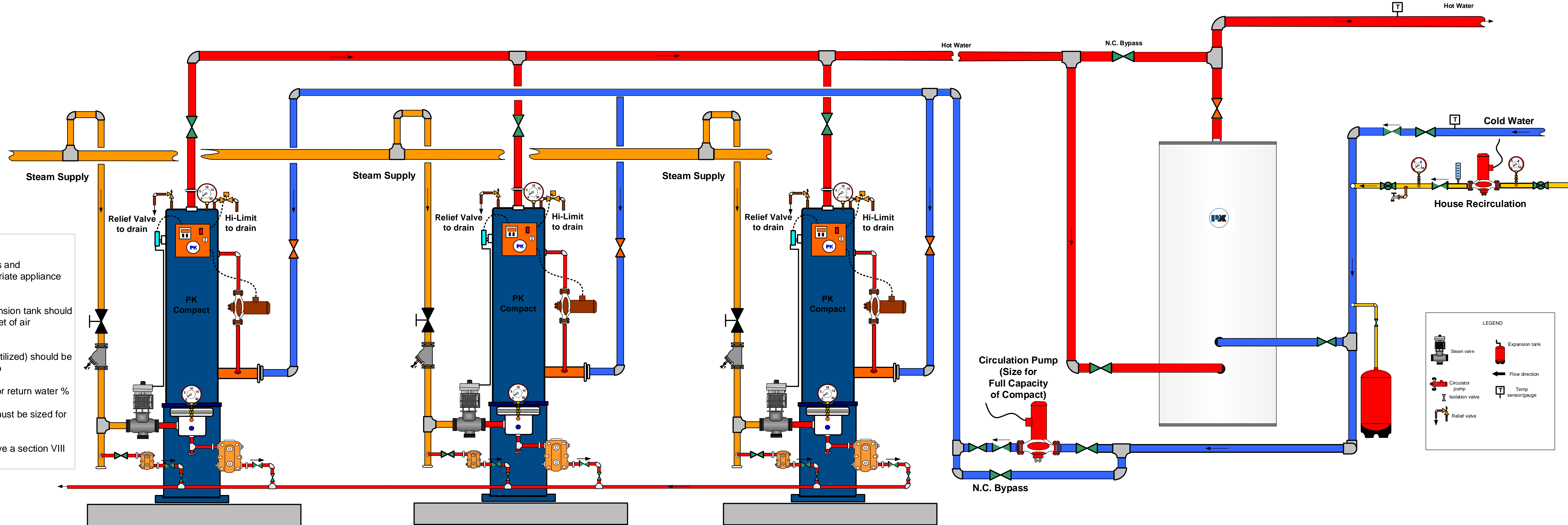
- 1.For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water %
5. Bronze domestic pump must be sized for full COMPACT size
6. All COMPACTS must have a section VIII relief valve downstream



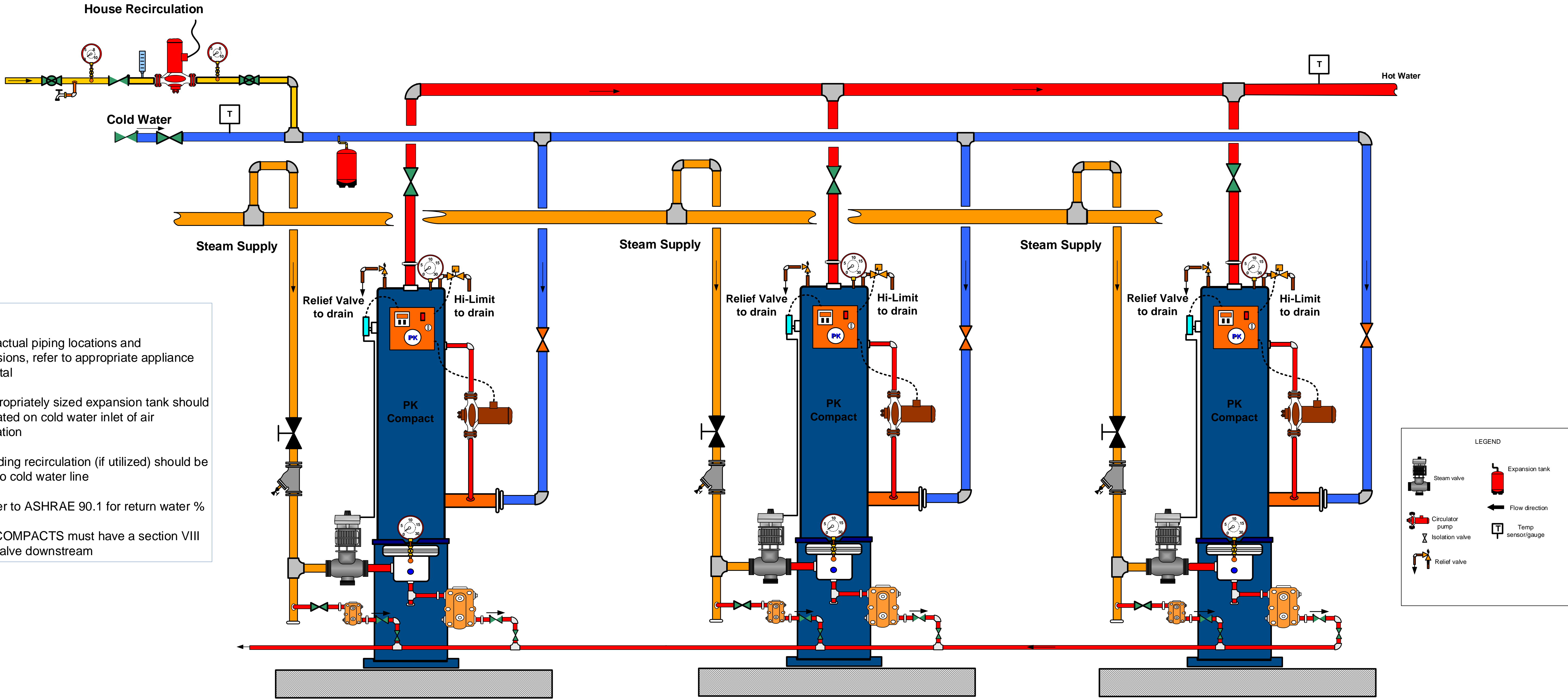
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.

- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. Refer to ASHRAE 90.1 for return water %
 5. Bronze domestic pump must be sized for full COMPACT size
 6. All COMPACTS must have a section VIII relief valve downstream

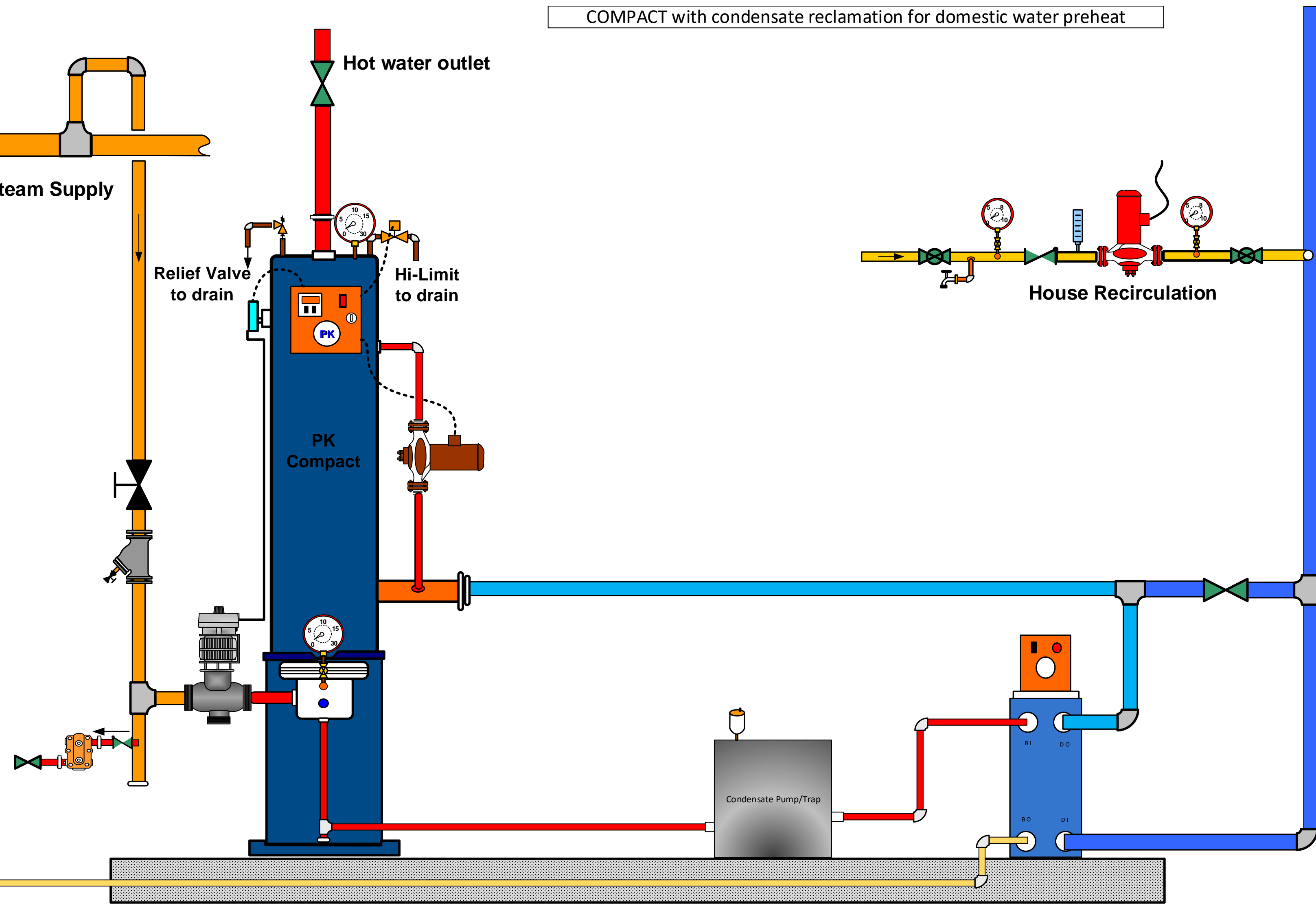


3 Compacts parallel installation



COMPACT with condensate reclamation for domestic water preheat

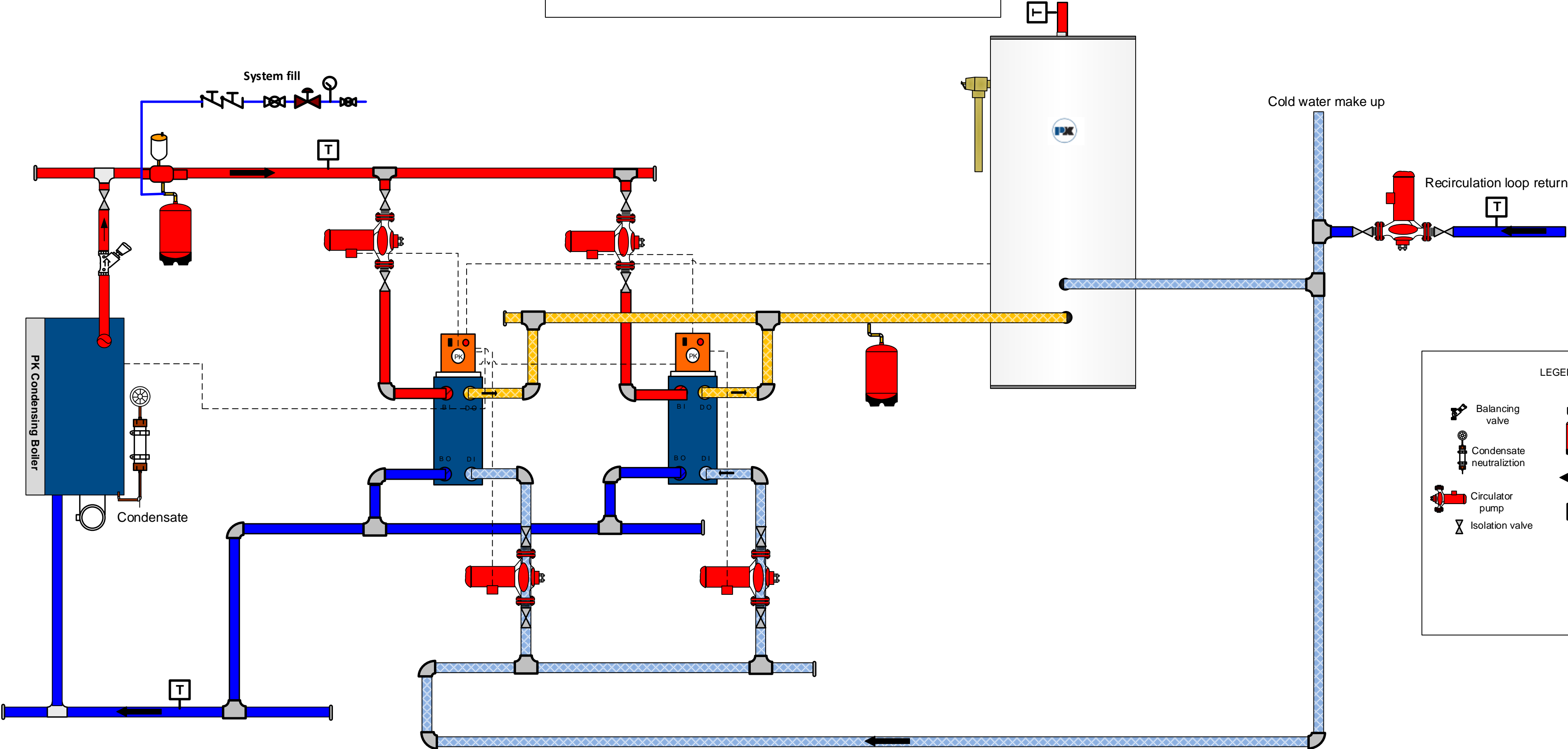
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 3. Building recirculation (if utilized) should be tied into cold water make up
 - 4. Refer to ASHRAE 90.1 for return water %
 - 5. Bronze domestic pump must be sized for full COMPACT size
 - 6. All COMPACTS must have a section VIII relief valve downstream



LEGEND

	Steam valve		Expansion tank
	Circulator pump		Flow direction
	Isolation valve		Temp sensor/gauge
	Relief valve		

Single condensing boiler with 2 Duration III and hot water storage tank



- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. 12k ohm tank sensor must be used.
 5. Refer to ASHRAE 90.1 for return water %

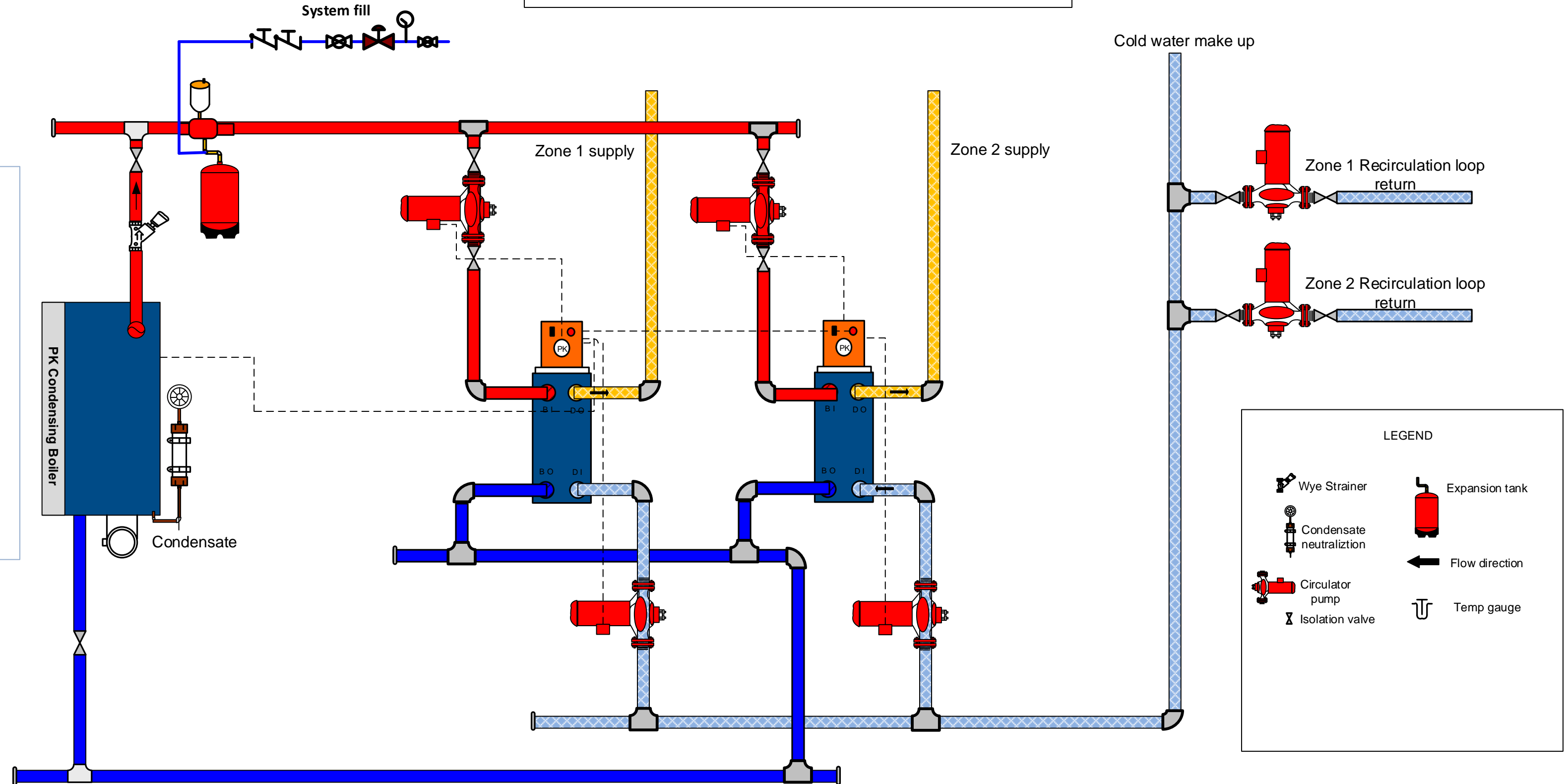
LEGEND

	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

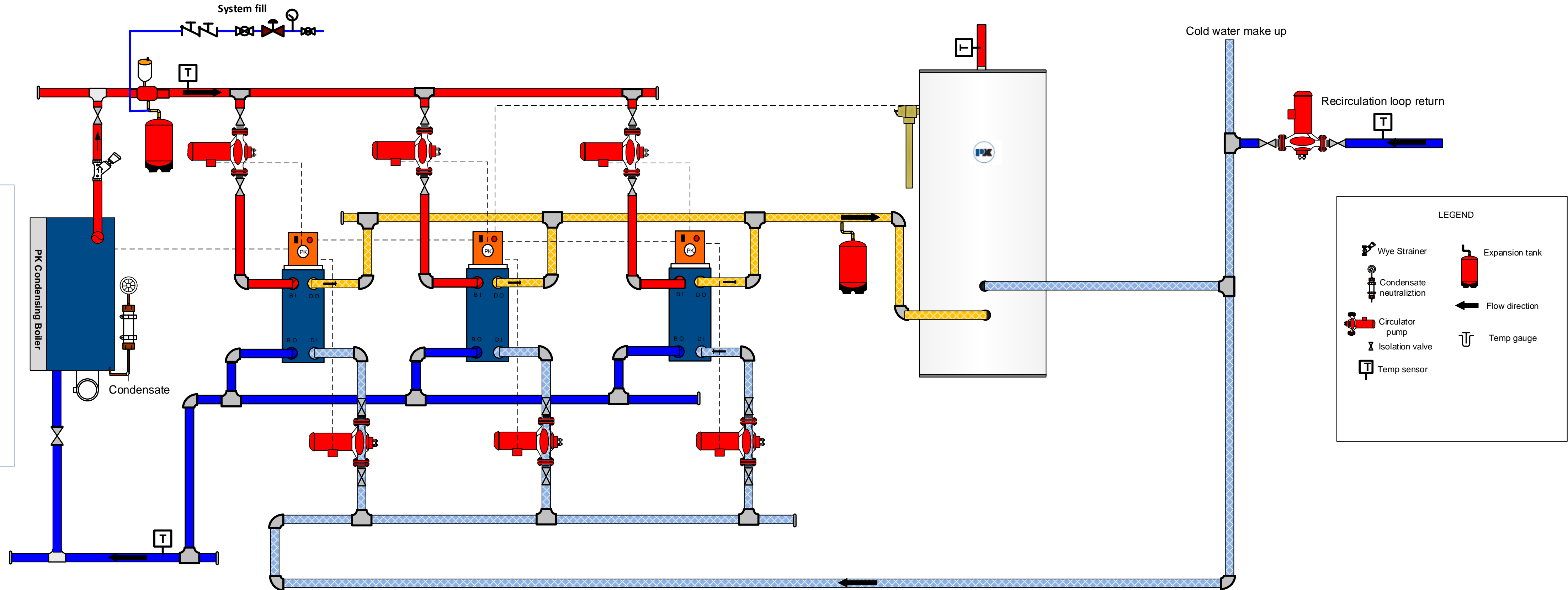
Single condensing boiler with 2 Duration III independent zones

Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.



Single condensing boiler with 2 Duration III and hot water storage tank



Notes:

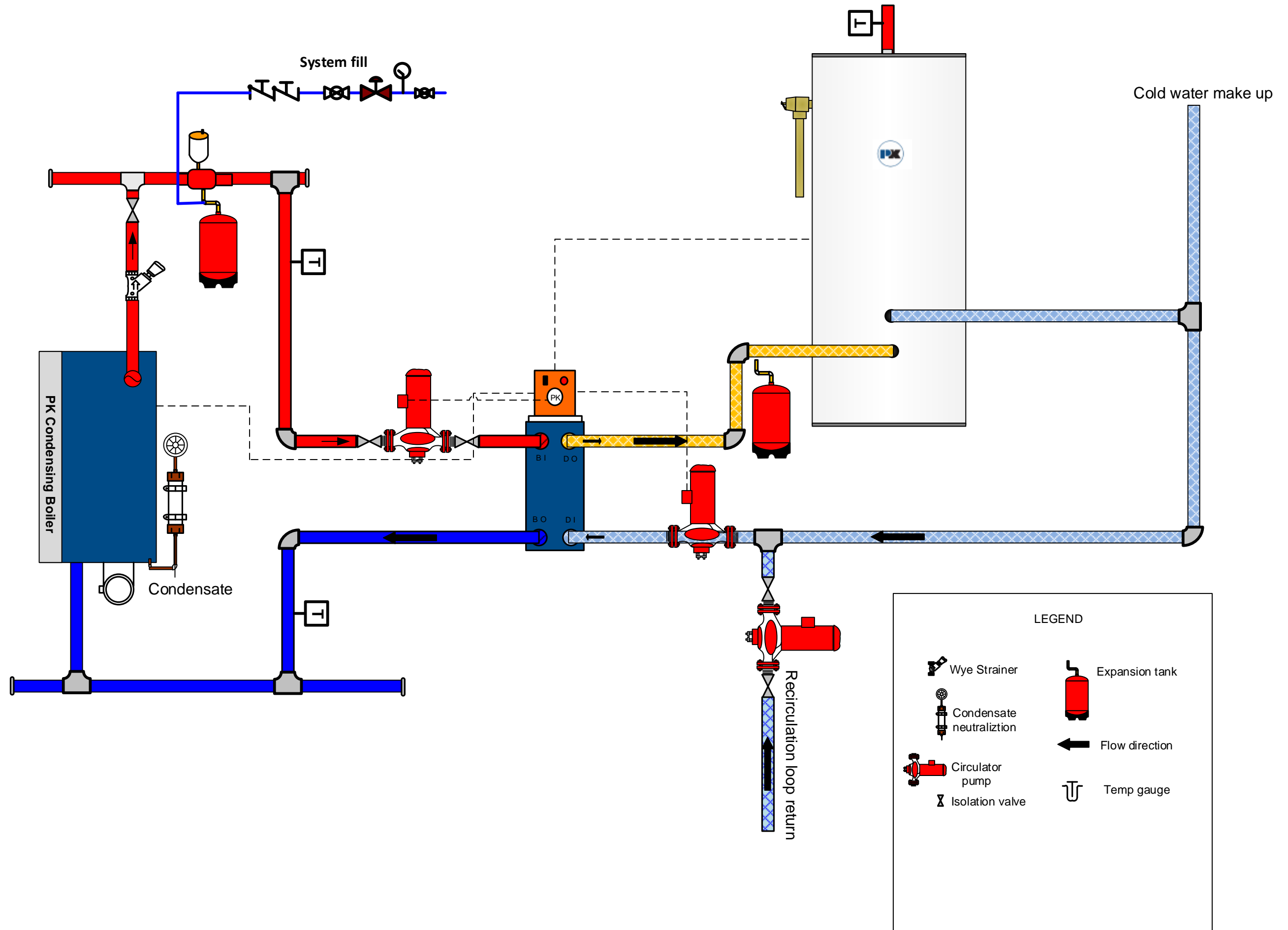
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.

- ## Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. 12k ohm tank sensor must be used.
 5. Refer to ASHRAE 90.1 for return water %
 6. Domestic water side must have a volume of water on supply side.

Single condensing boiler with Duration III and hot water storage tank

Notes:

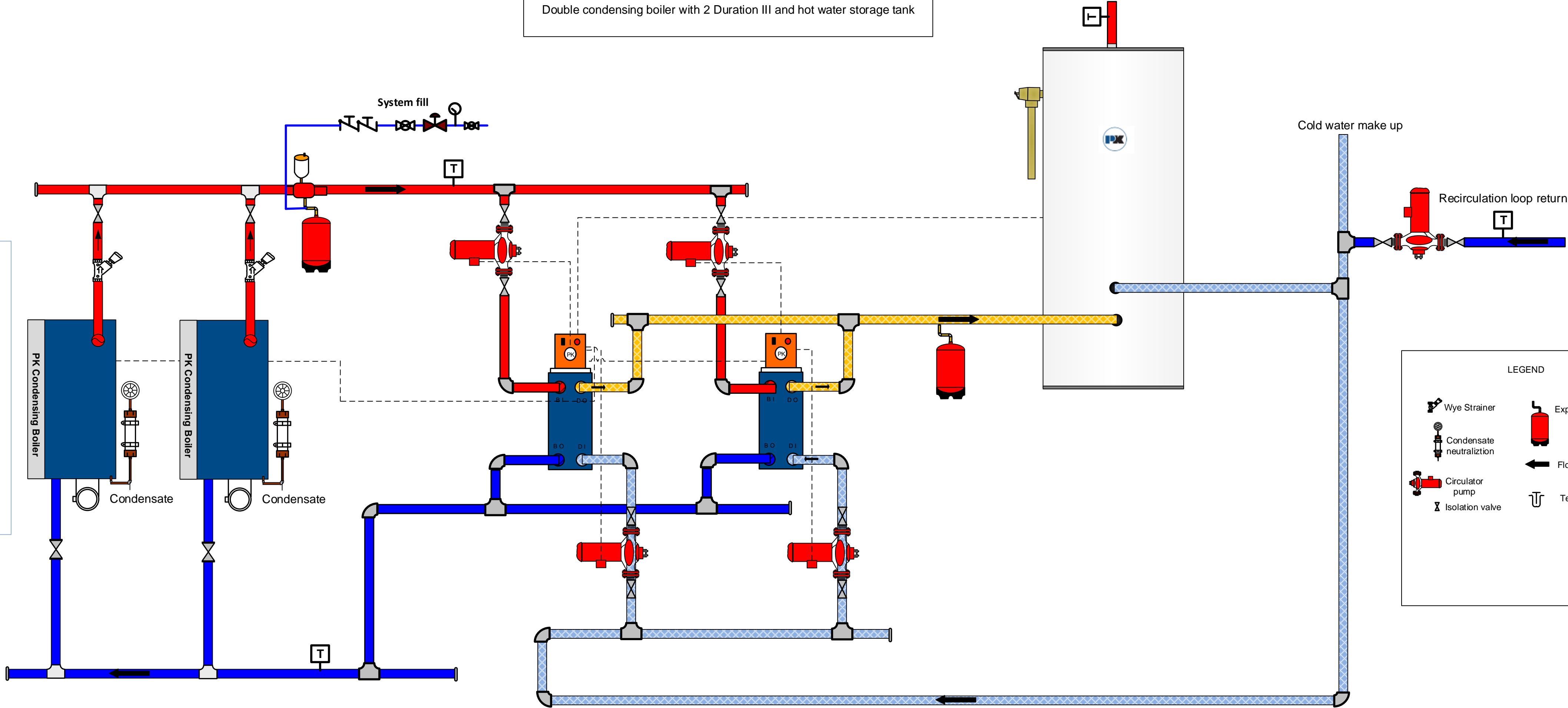
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.



Double condensing boiler with 2 Duration III and hot water storage tank

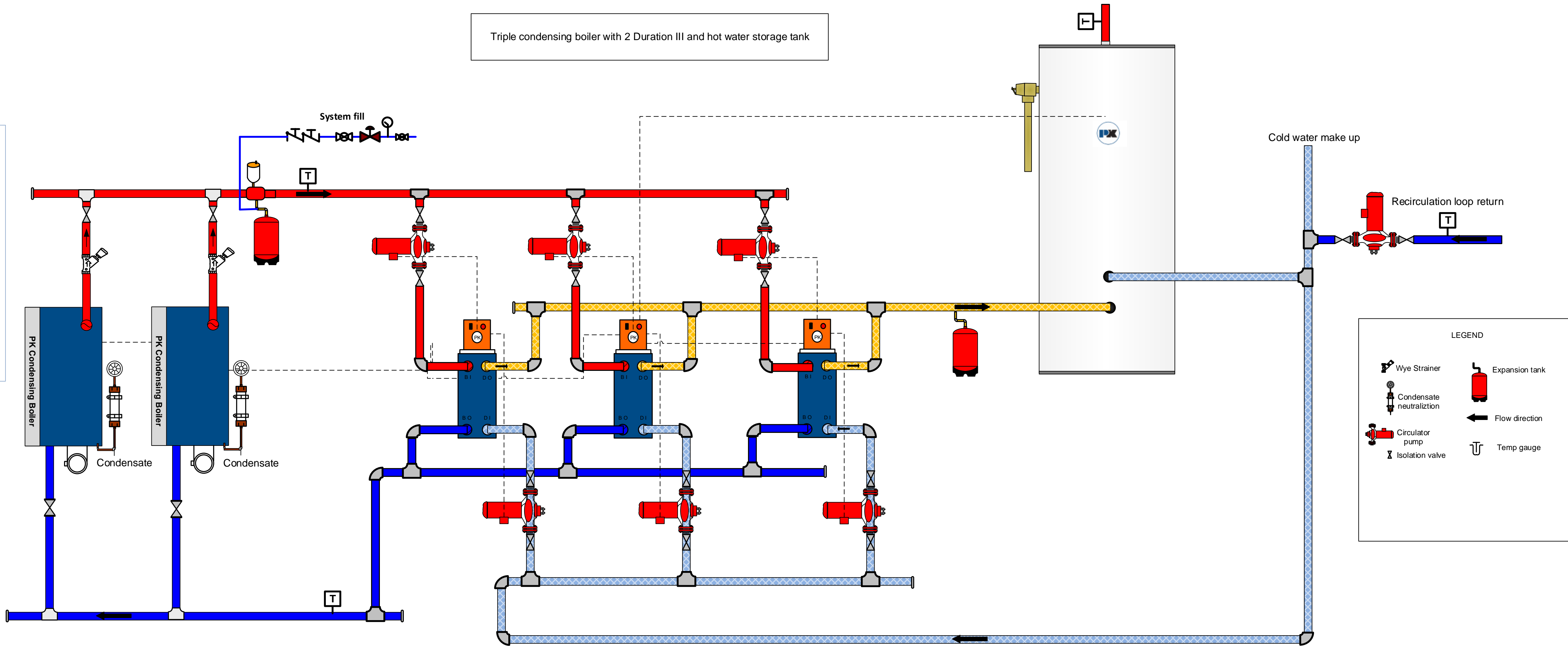
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.



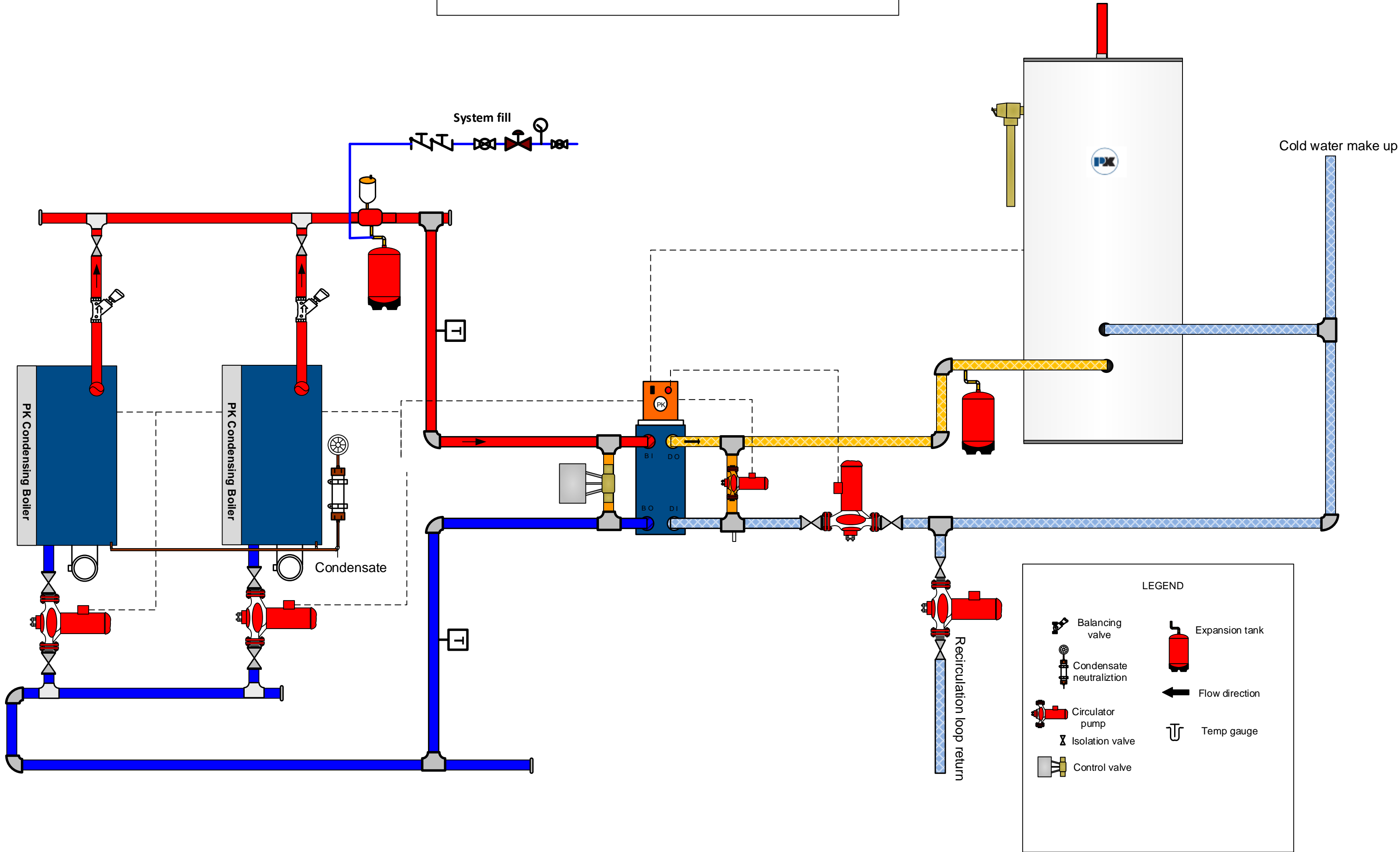
Triple condensing boiler with 2 Duration III and hot water storage tank

- Notes:
- 1.For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. 12k ohm tank sensor must be used.
 5. Refer to ASHRAE 90.1 for return water %
 - 6.Domestic water side must have a volume of water on supply side.



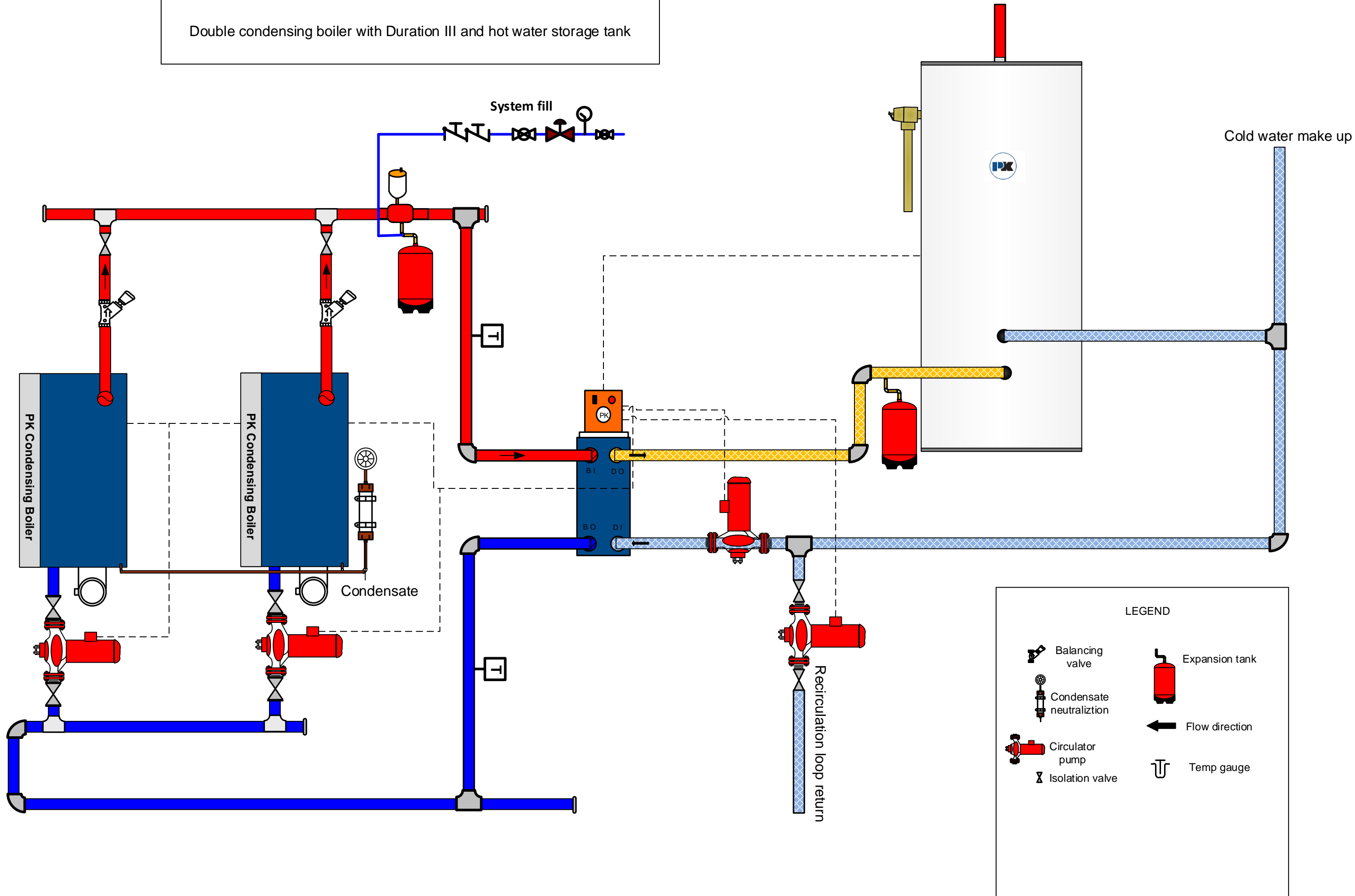
Double condensing boiler with Duration III and hot water storage tank

- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
 - 2. Distance between 1st and 2nd tee should be no more than 4 pipe diameters
 - 3. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 4. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 5. Building recirculation (if utilized) should be tied into cold water make up
 - 6. 12k OHM tank sensor to be installed in tank



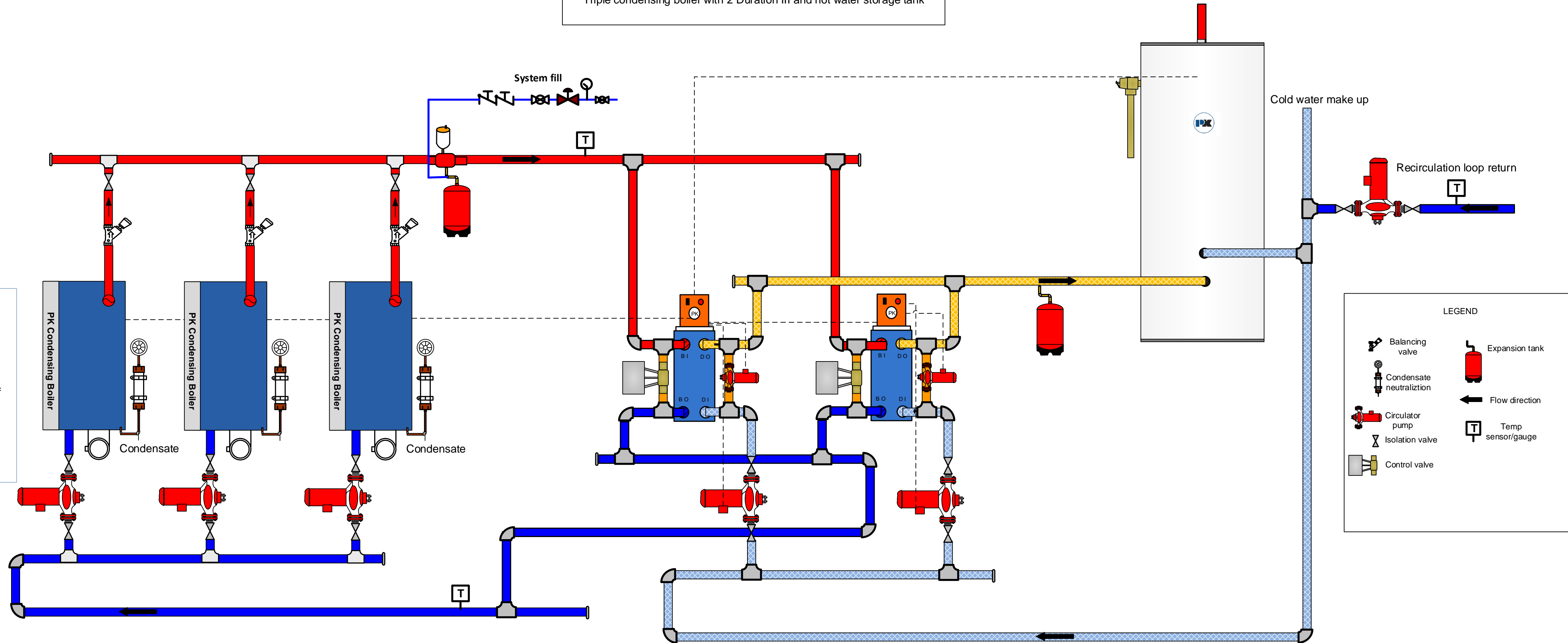
Double condensing boiler with Duration III and hot water storage tank

- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
 - 2. Distance between 1st and 2nd tee should be no more than 4 pipe diameters
 - 3. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 4. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 5. Building recirculation (if utilized) should be tied into cold water make up
 - 6. 12k OHM tank sensor to be installed in tank

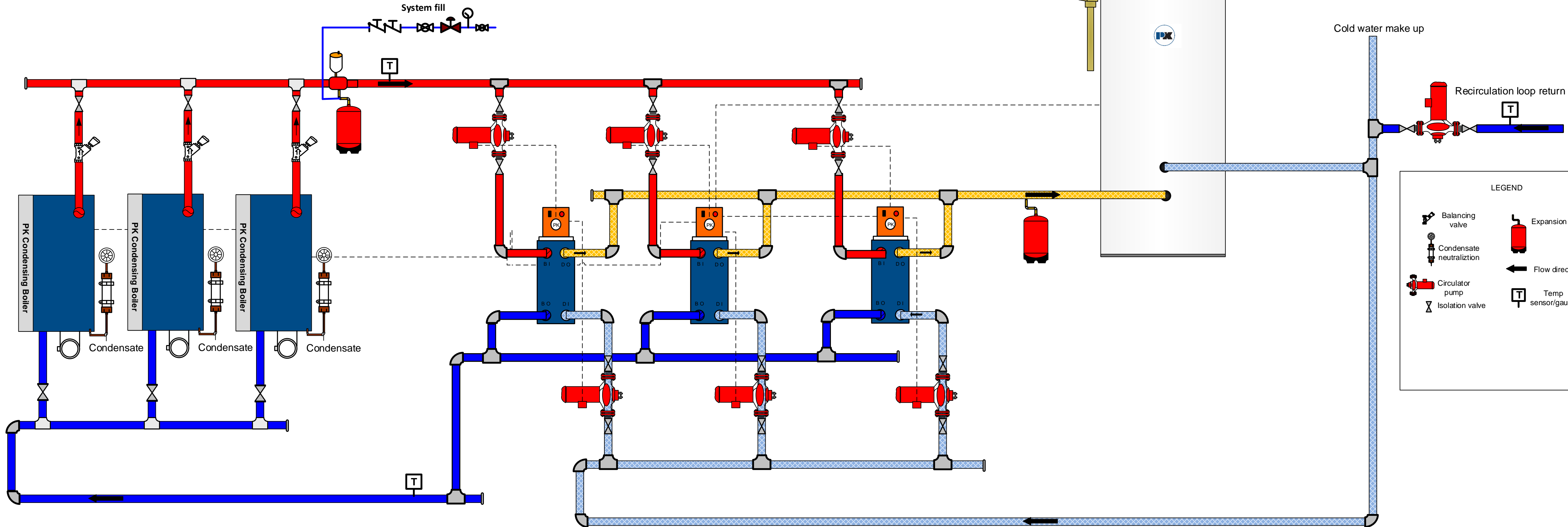


Triple condensing boiler with 2 Duration III and hot water storage tank

- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 3. Building recirculation (if utilized) should be tied into cold water make up
 - 4. 12k ohm tank sensor must be used.



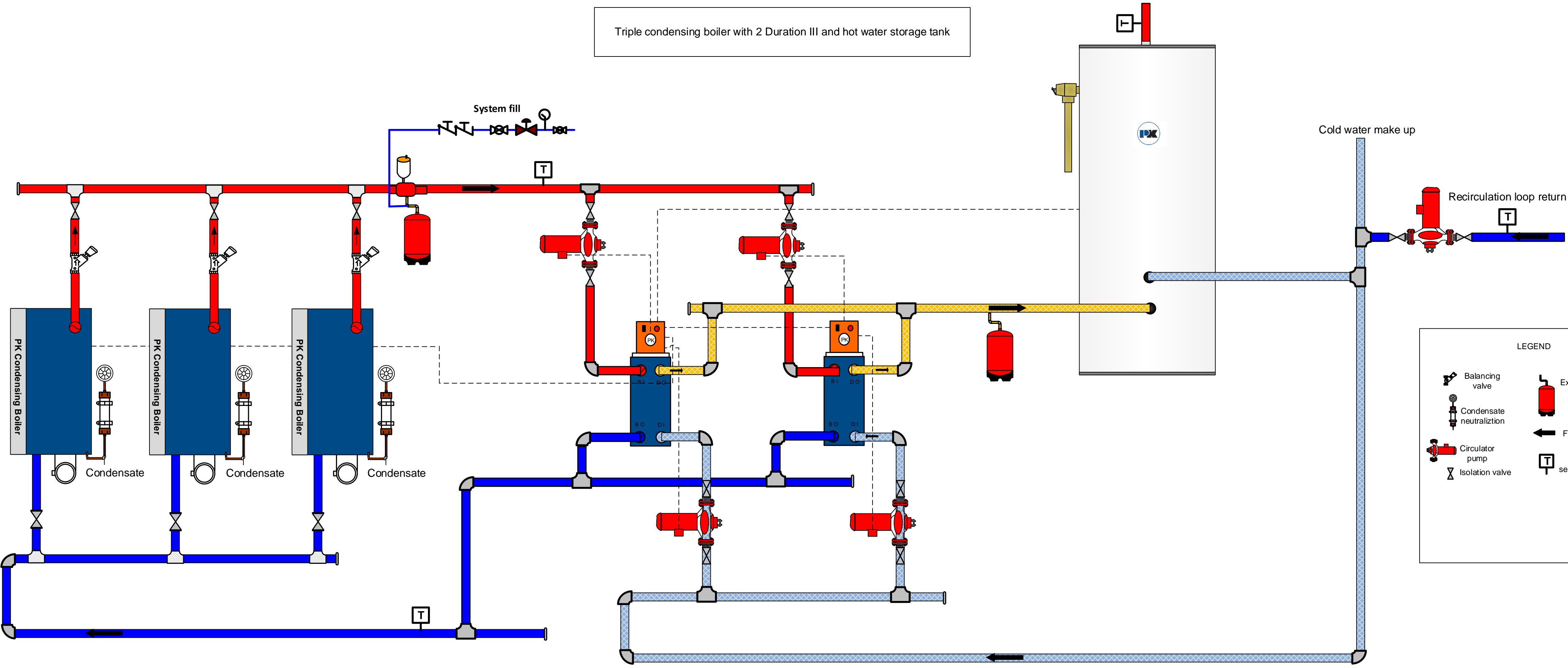
Triple condensing boiler with 2 Duration III and hot water storage tank



Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.

Triple condensing boiler with 2 Duration III and hot water storage tank

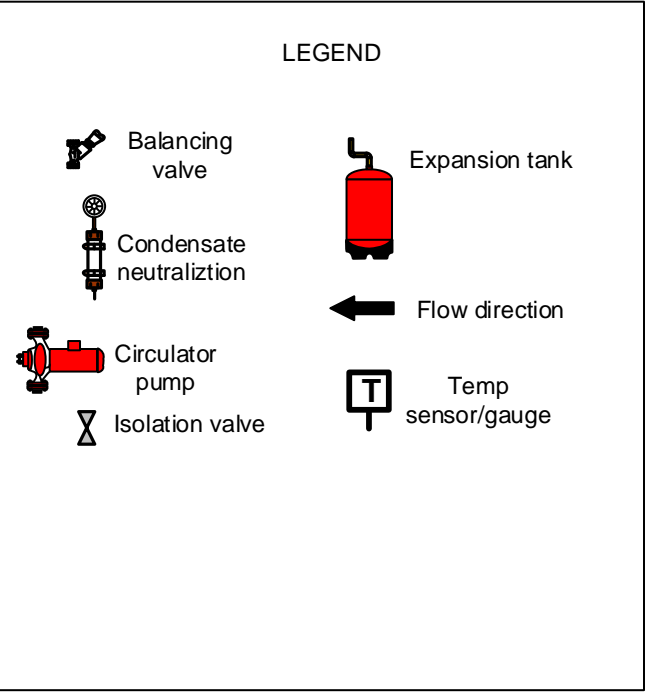
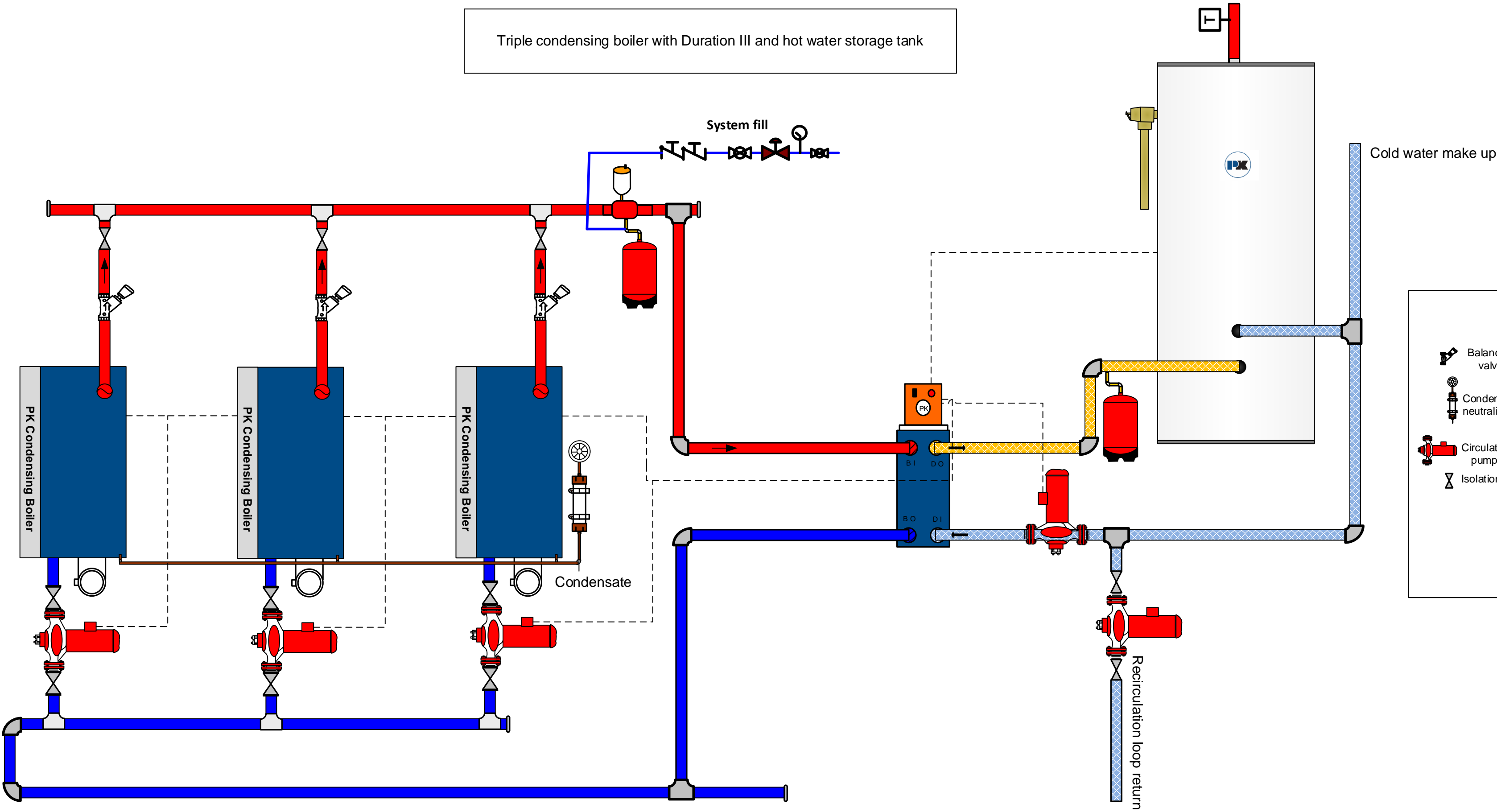


- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 3. Building recirculation (if utilized) should be tied into cold water make up
 - 4. 12k ohm tank sensor must be used.

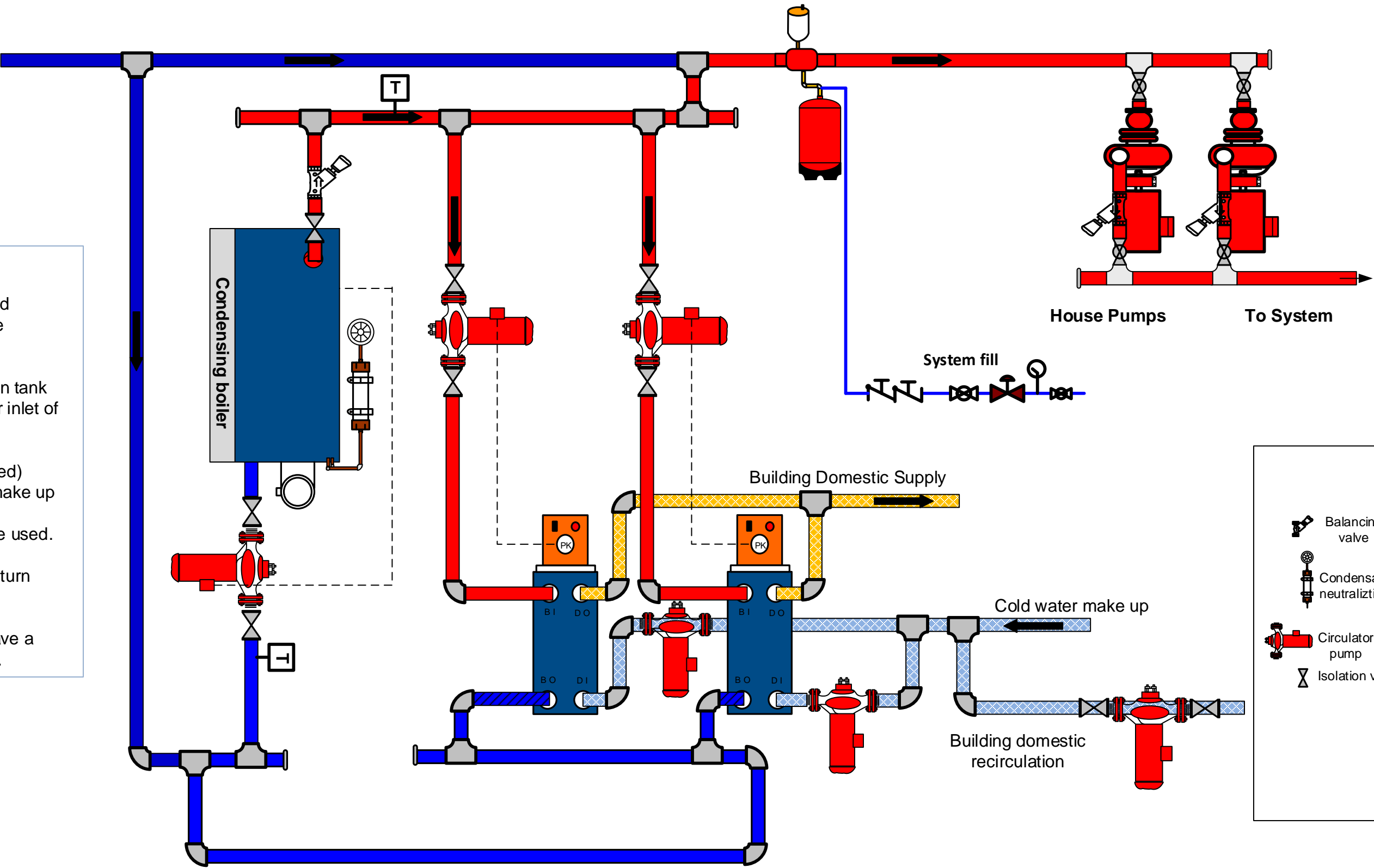
LEGEND

	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
 - 2. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 3. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 4. Building recirculation (if utilized) should be tied into cold water make up
 - 5. 12k OHM tank sensor to be installed in tank

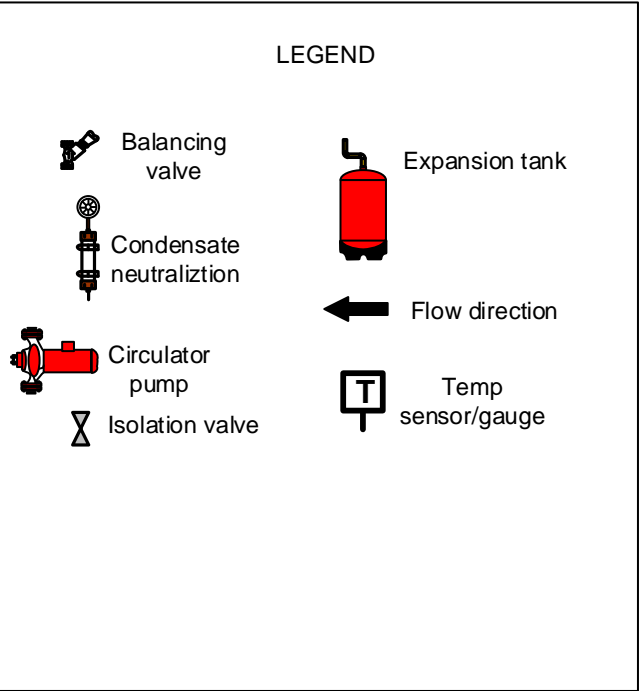


1 condensing boiler with 2 Duration III on Primary/Secondary system

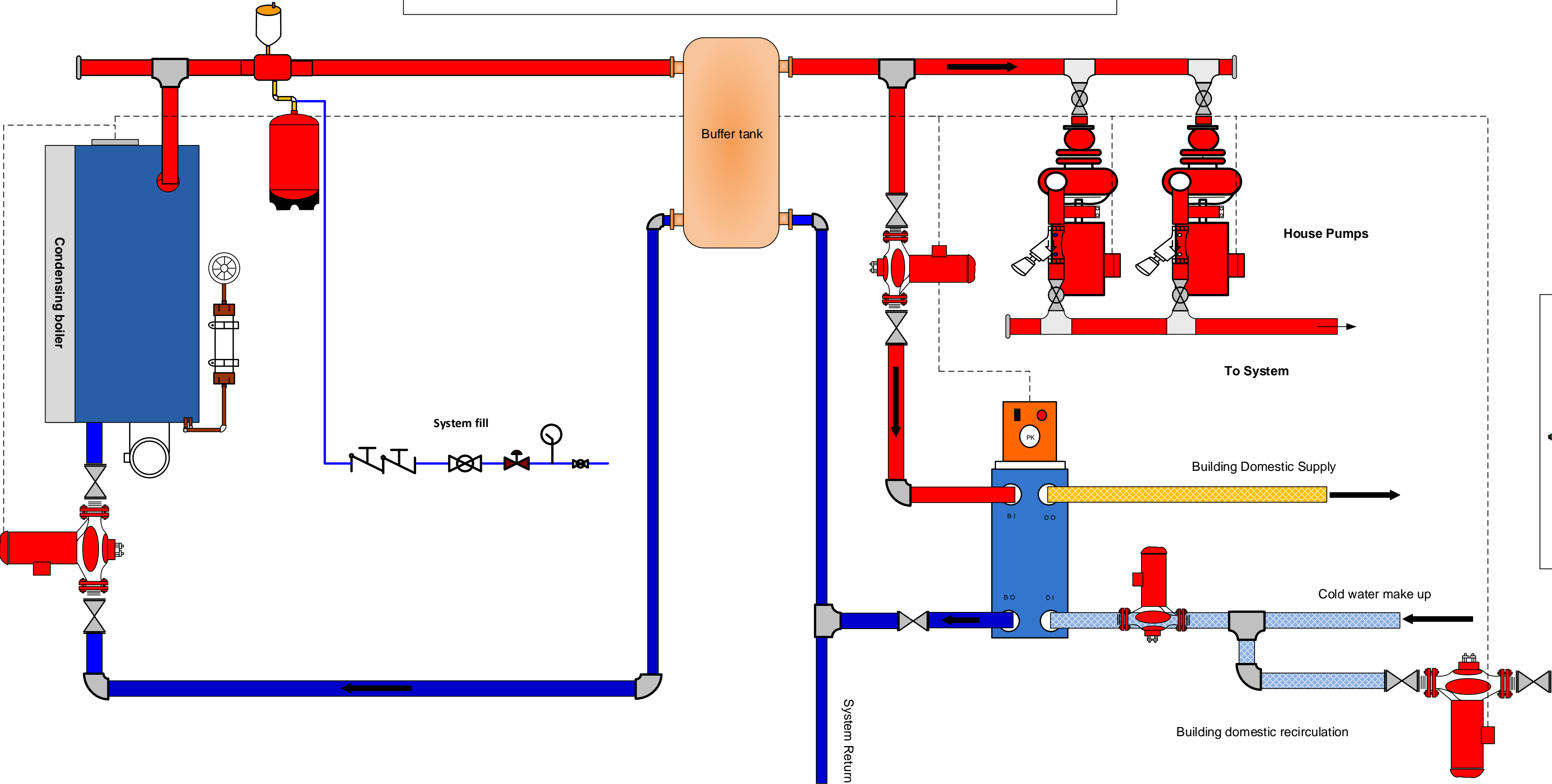


Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.



Single condensing boiler with 1 Duration III and buffer tank

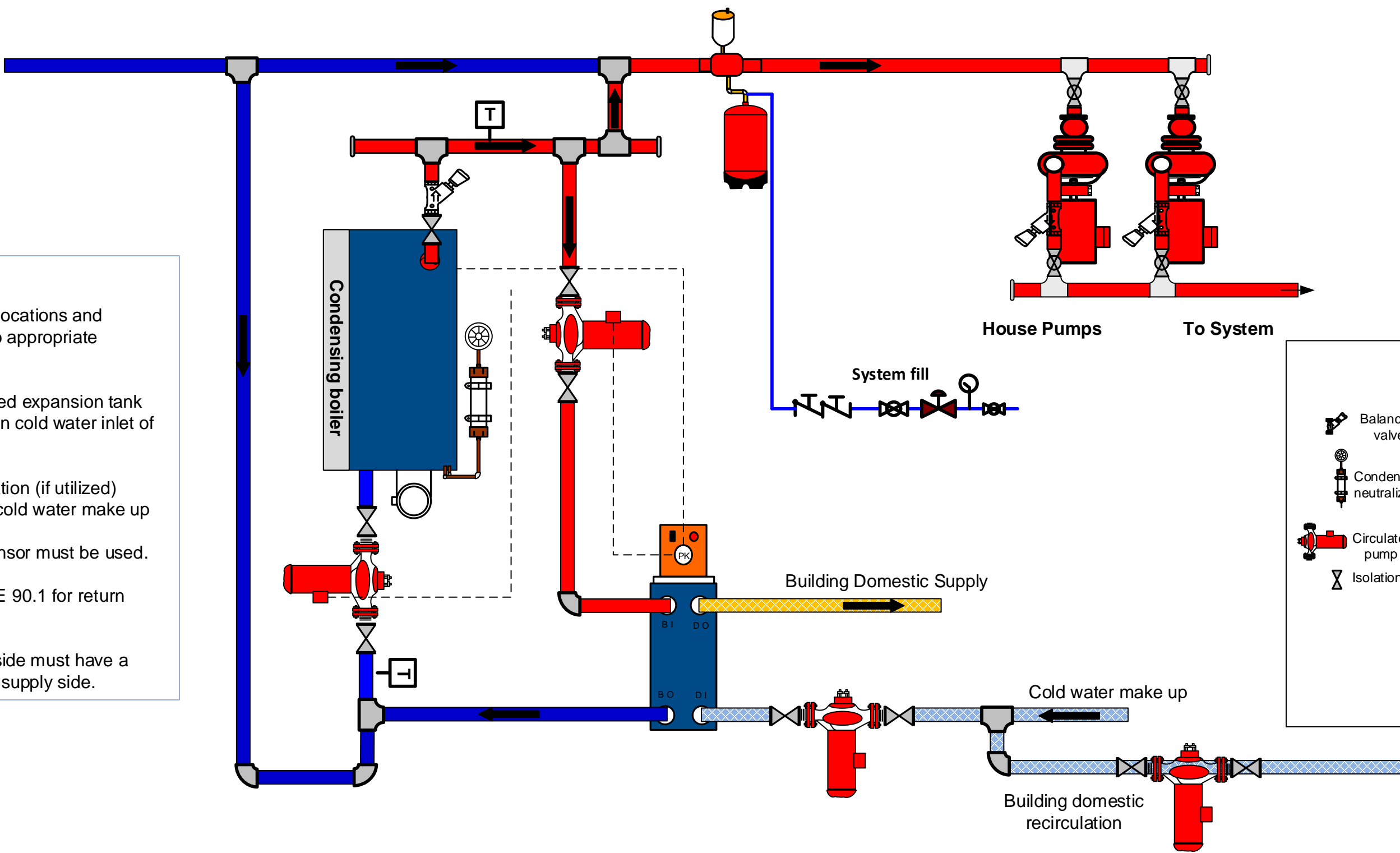


- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
 - 2. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 3. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 4. Building recirculation (if utilized) should be tied into cold water make up

LEGEND

	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

Single condensing boiler with 1 Duration III on Primary/Secondary system



- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 - 3. Building recirculation (if utilized) should be tied into cold water make up
 - 4. 12k ohm tank sensor must be used.
 - 5. Refer to ASHRAE 90.1 for return water %
 - 6. Domestic water side must have a volume of water on supply side.

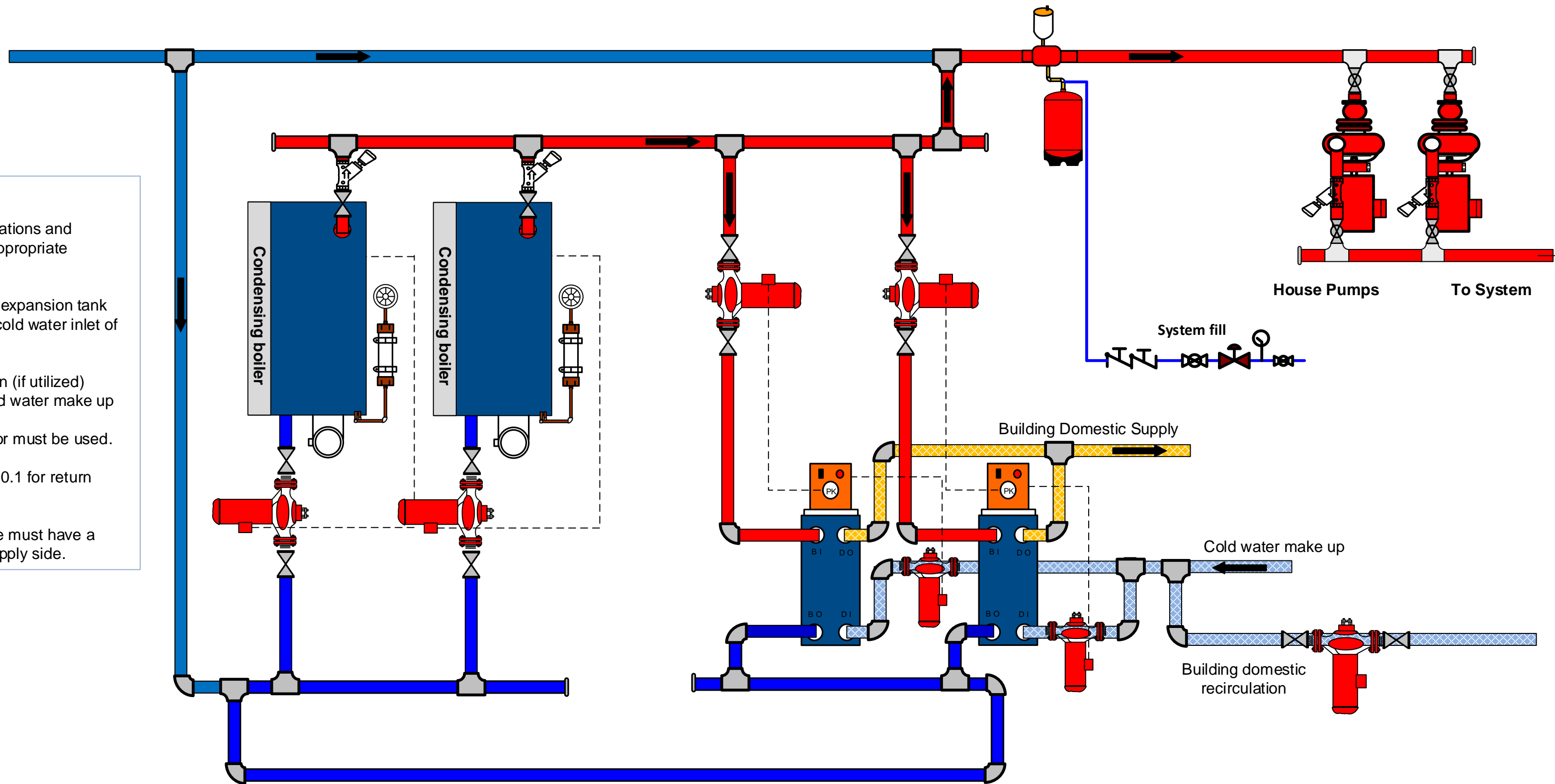
LEGEND

	Balancing valve		Expansion tank
	Condensate neutralization		Flow direction
	Circulator pump		Temp sensor/gauge
	Isolation valve		

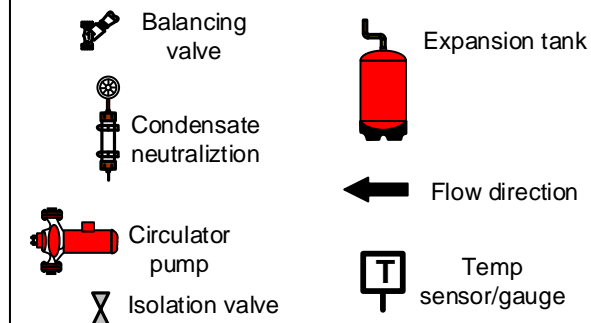
2 condensing boilers with 2 Duration III on Primary/Secondary system

Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.



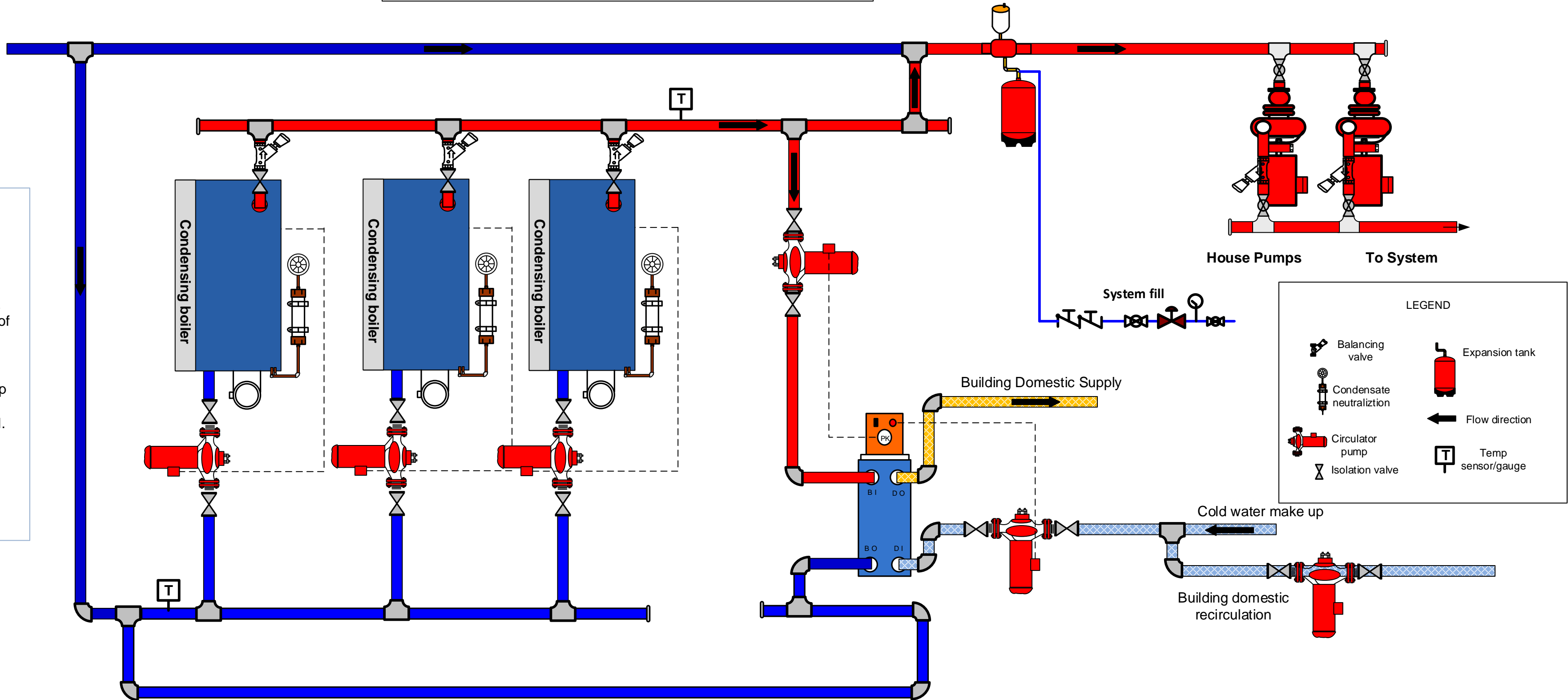
LEGEND



3 condensing boilers with 1 Duration III on Primary/Secondary system

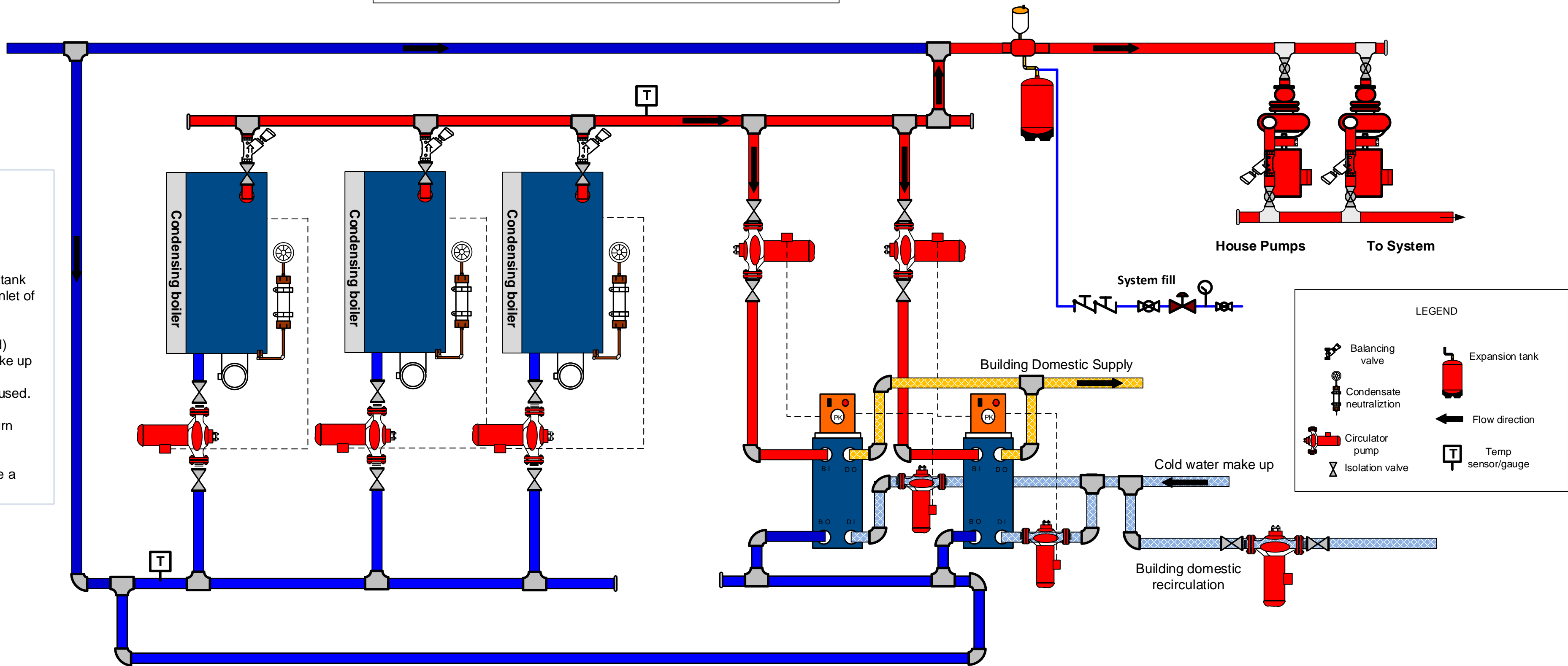
Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.



3 condensing boilers with 2 Duration III on Primary/Secondary system

- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
 3. Building recirculation (if utilized) should be tied into cold water make up
 4. 12k ohm tank sensor must be used.
 5. Refer to ASHRAE 90.1 for return water %
 6. Domestic water side must have a volume of water on supply side.



3 condensing boilers with 3 Duration III on Primary/Secondary system

Notes:

1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5. Refer to ASHRAE 90.1 for return water %
6. Domestic water side must have a volume of water on supply side.

