

## Commercial Piping Diagram

Winter 2020

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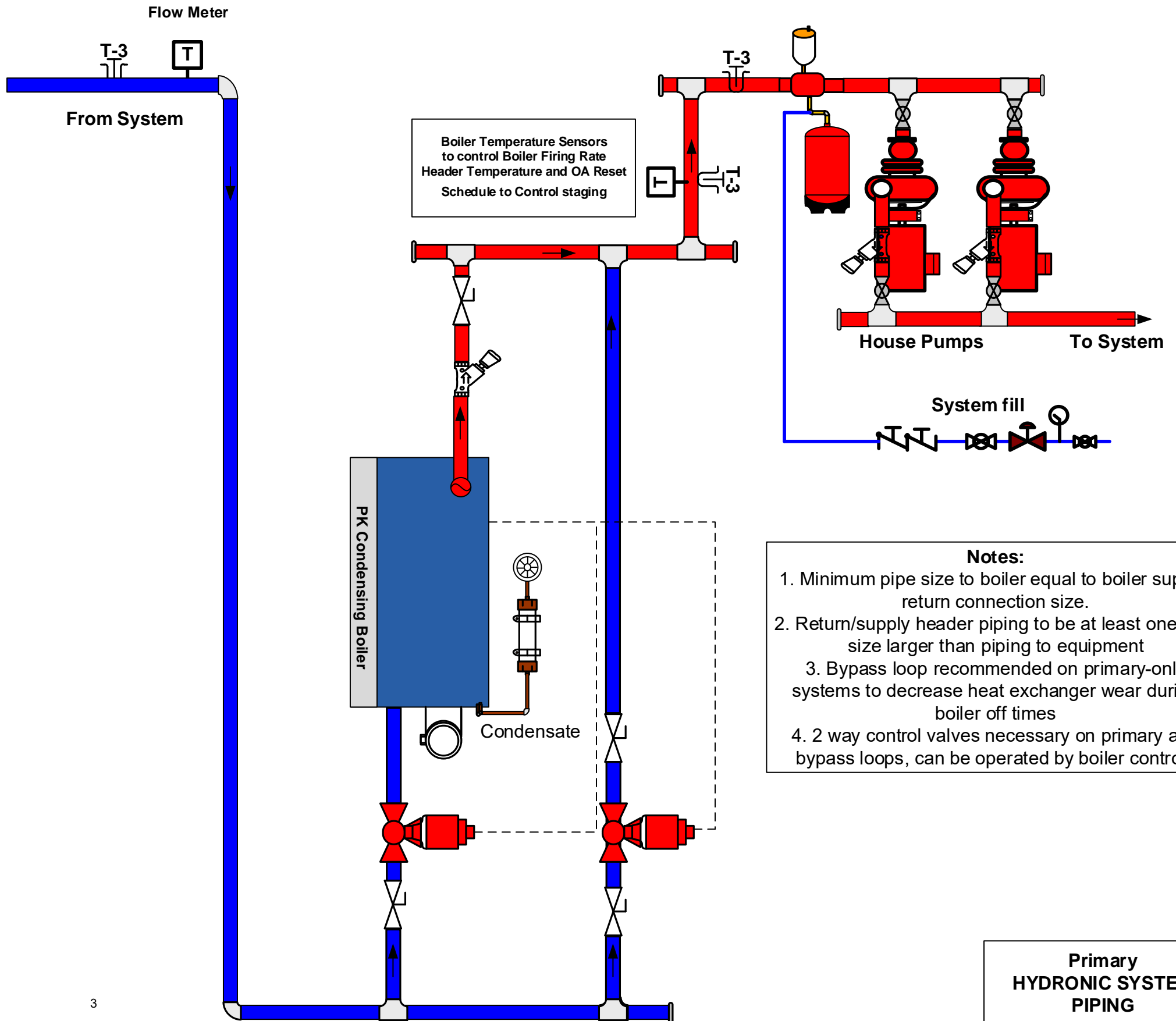
Section 4; Starting on Page 20: Primary Condensing System Water Heater (Direct Fired)

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

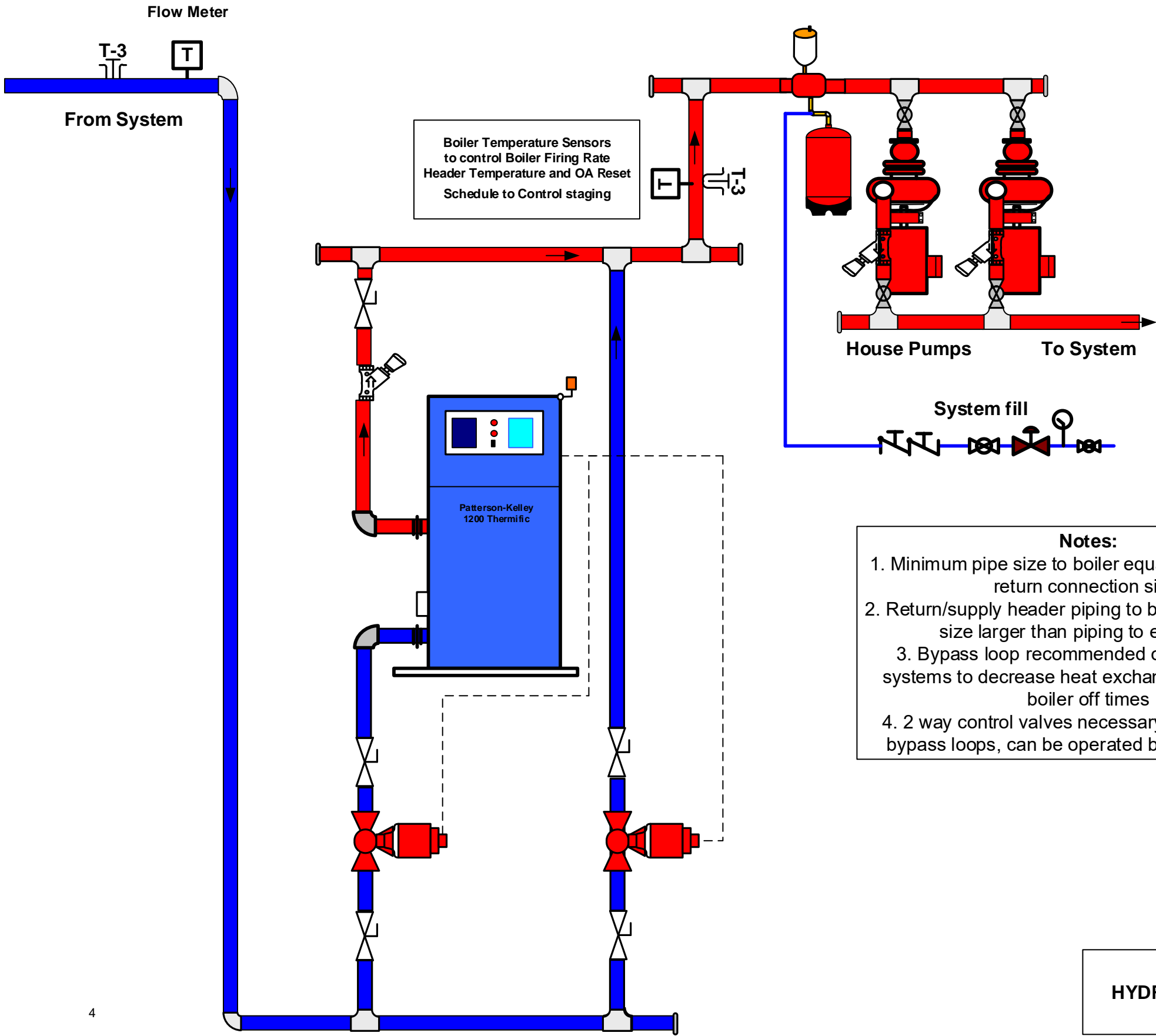
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## Primary loop diagram



Primary loop diagram



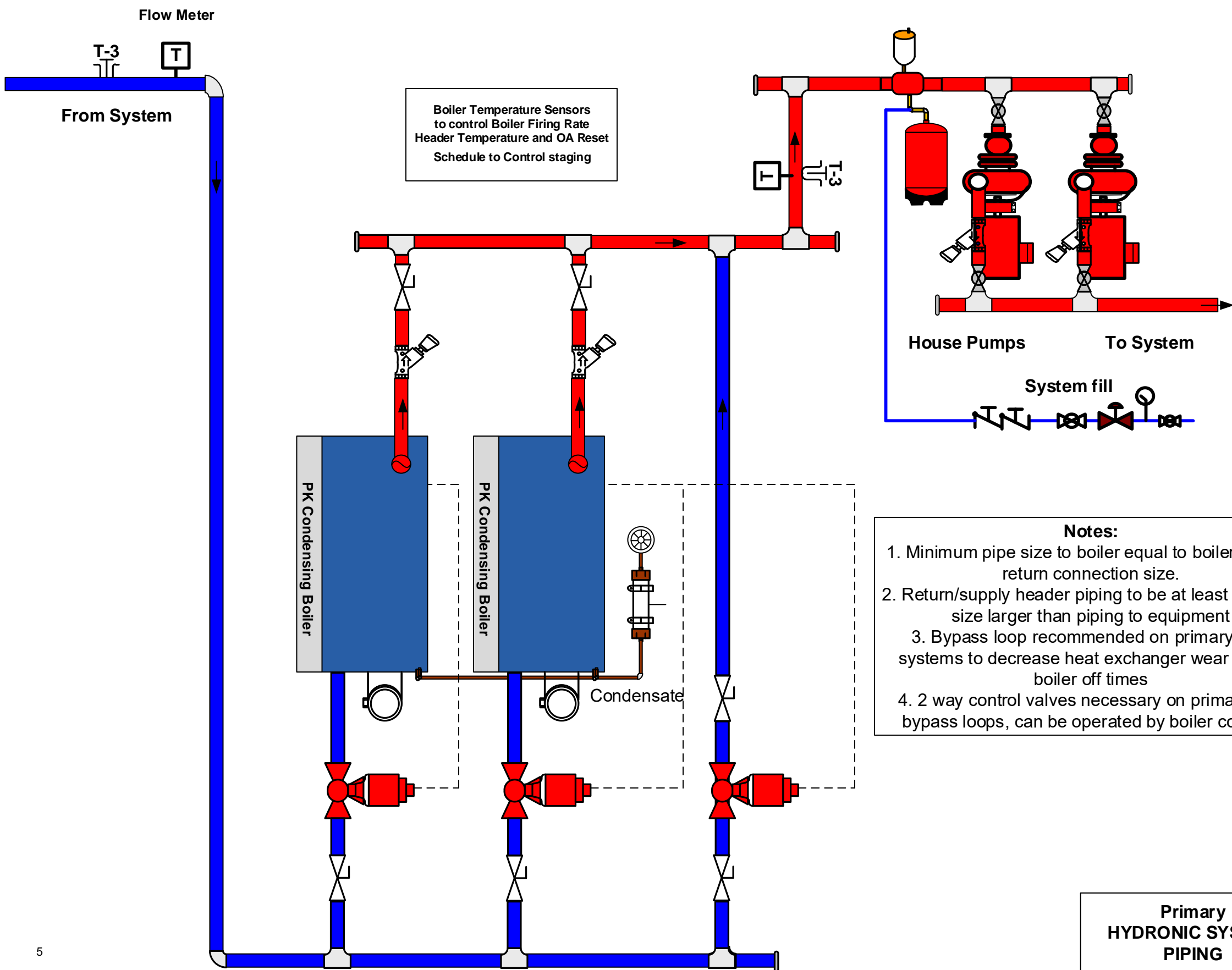
**Notes:**

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**



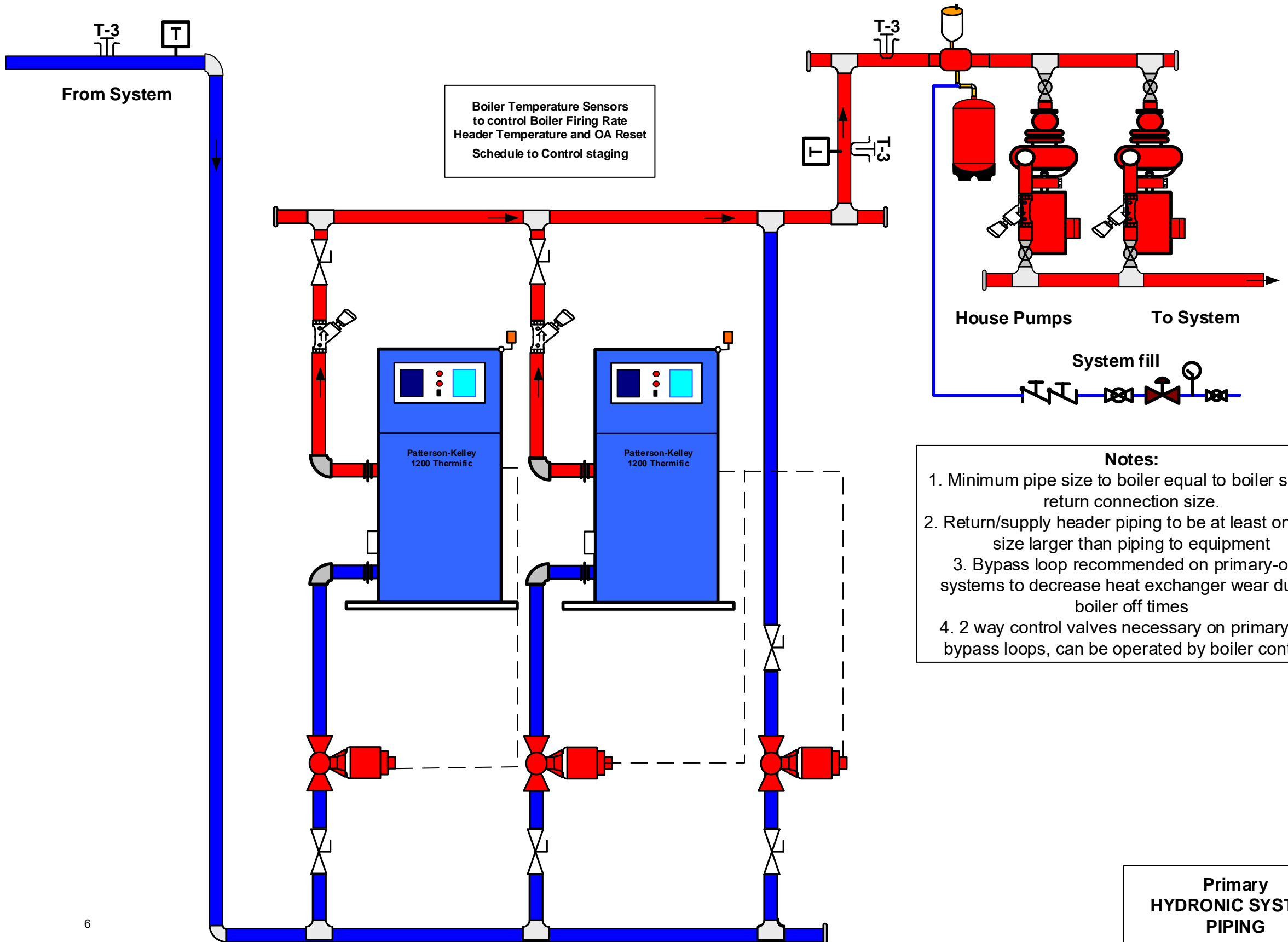
Primary loop diagram



- 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

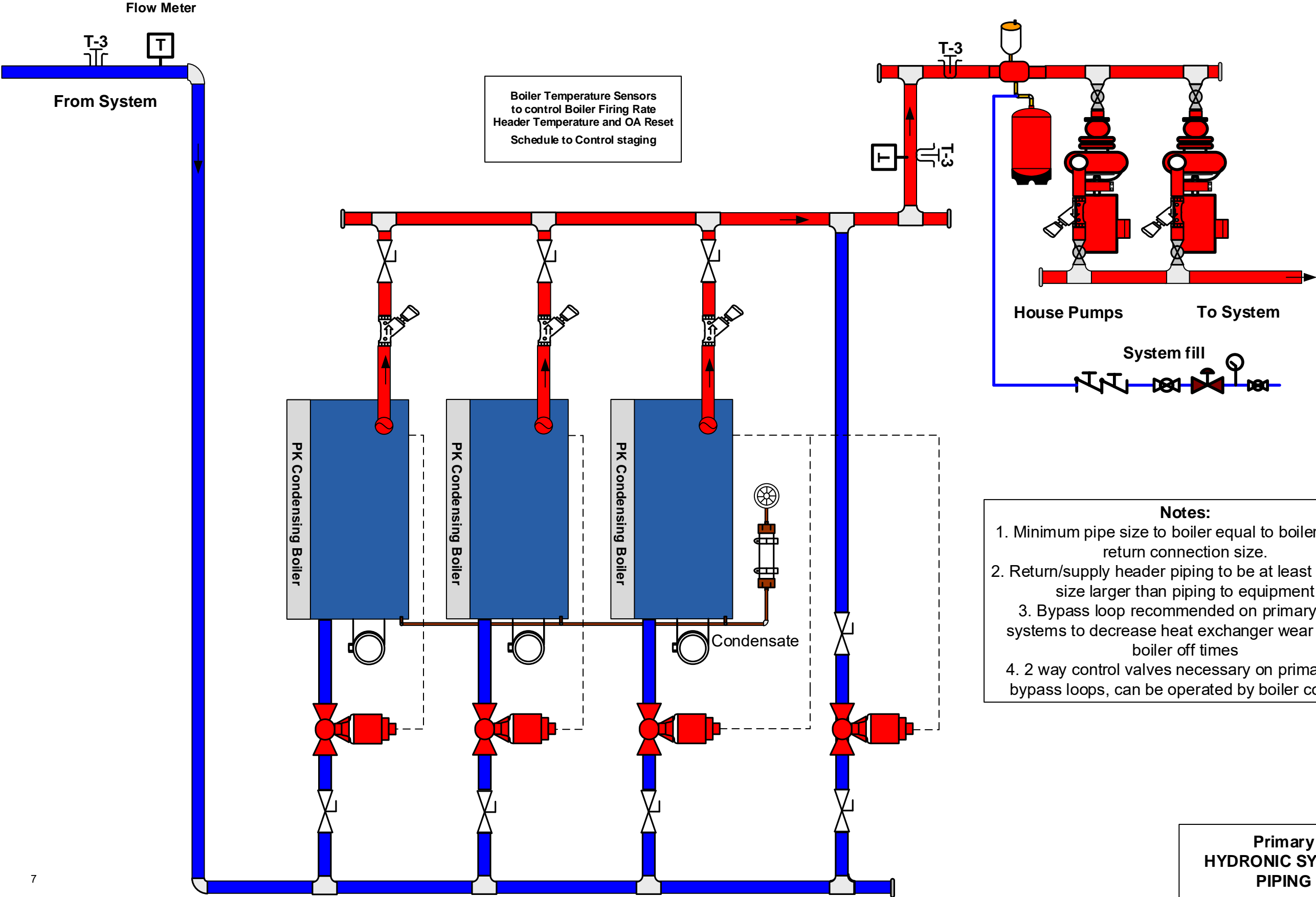
Primary  
HYDRONIC SYSTEM  
PIPING

# Primary loop diagram

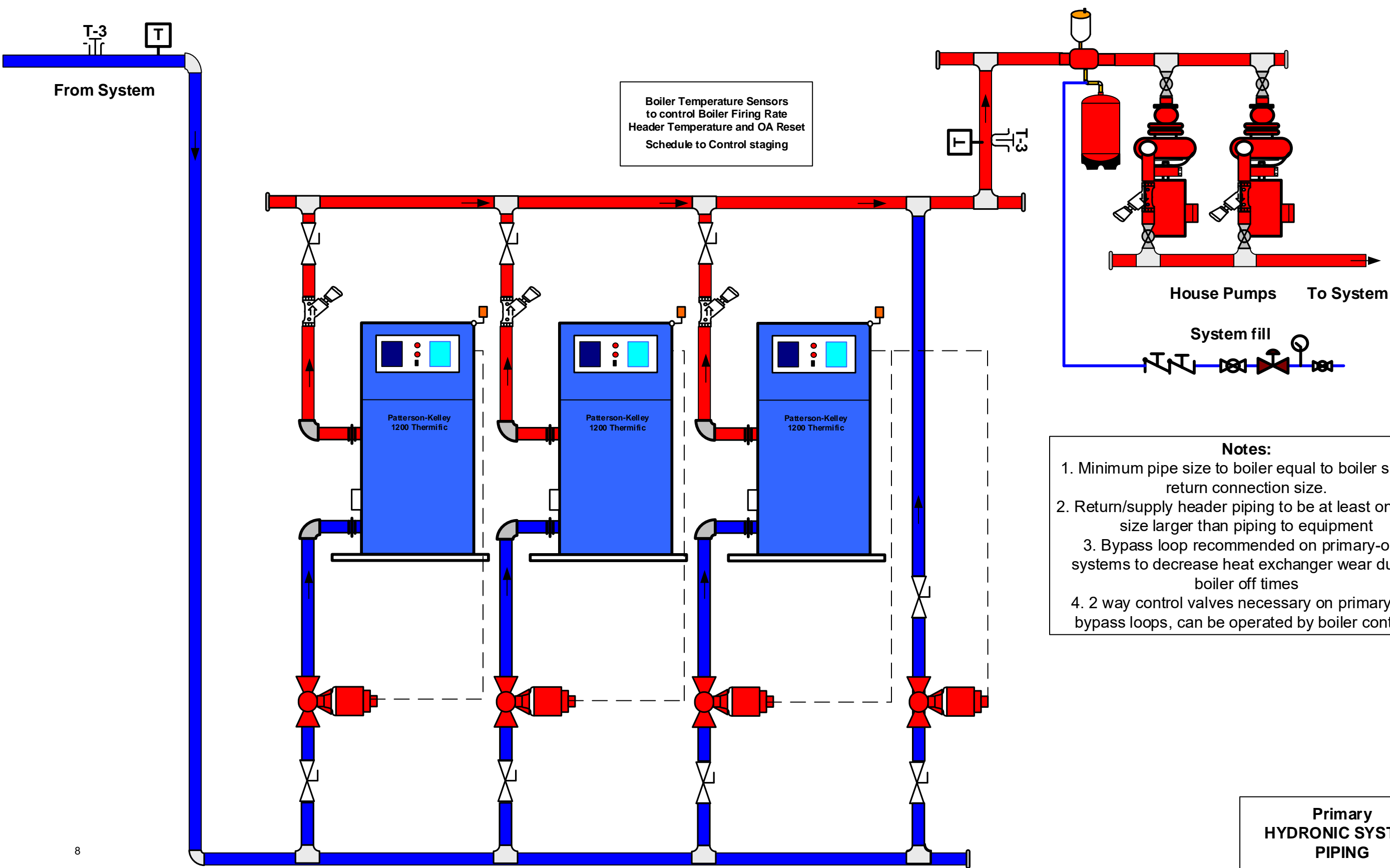




Primary loop diagram



Primary loop diagram

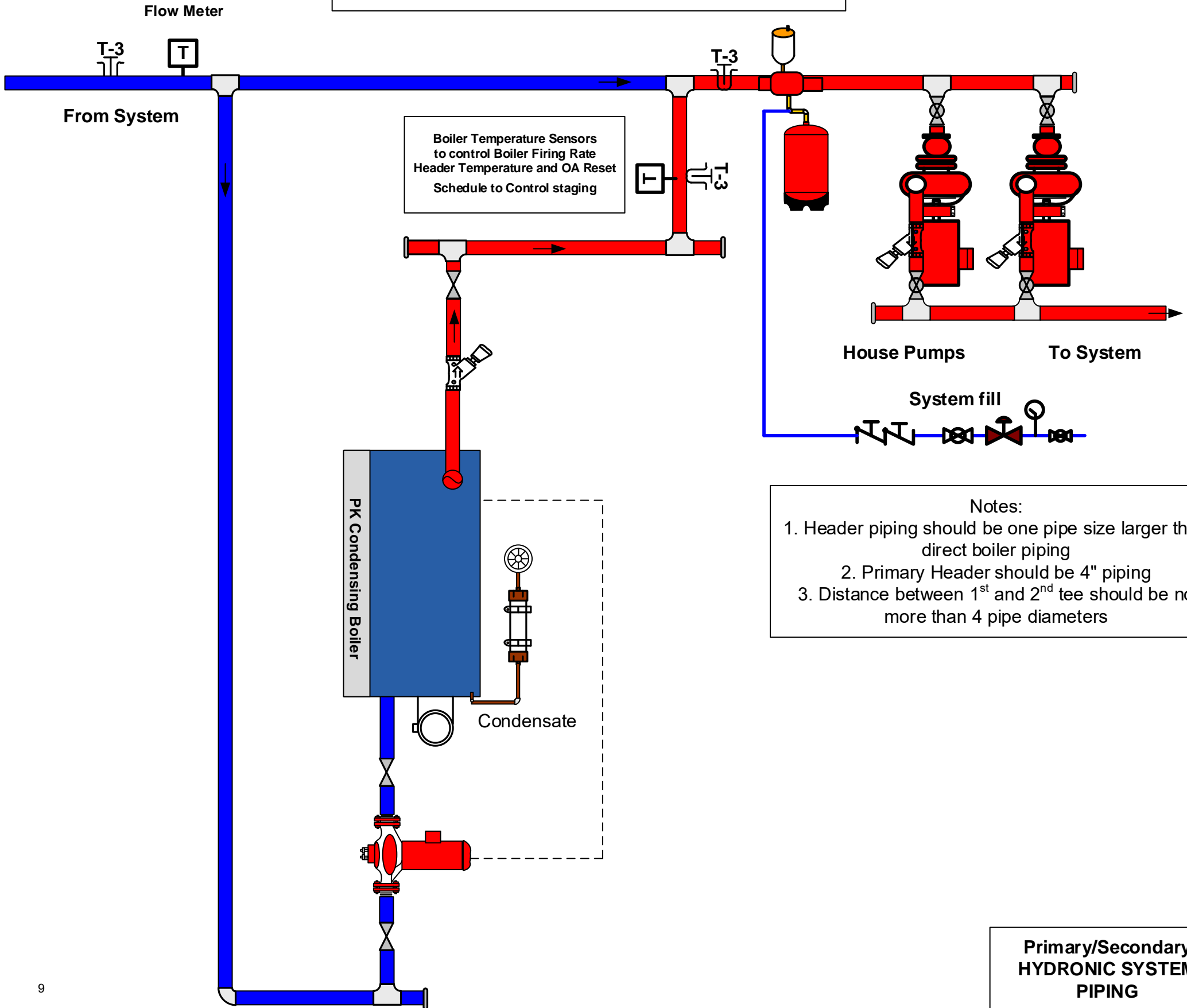


- Notes:**
- 1. Minimum pipe size to boiler equal to boiler supply/ return connection size.
  - 2. Return/supply header piping to be at least one pipe size larger than piping to equipment
  - 3. Bypass loop recommended on primary-only systems to decrease heat exchanger wear during boiler off times
 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

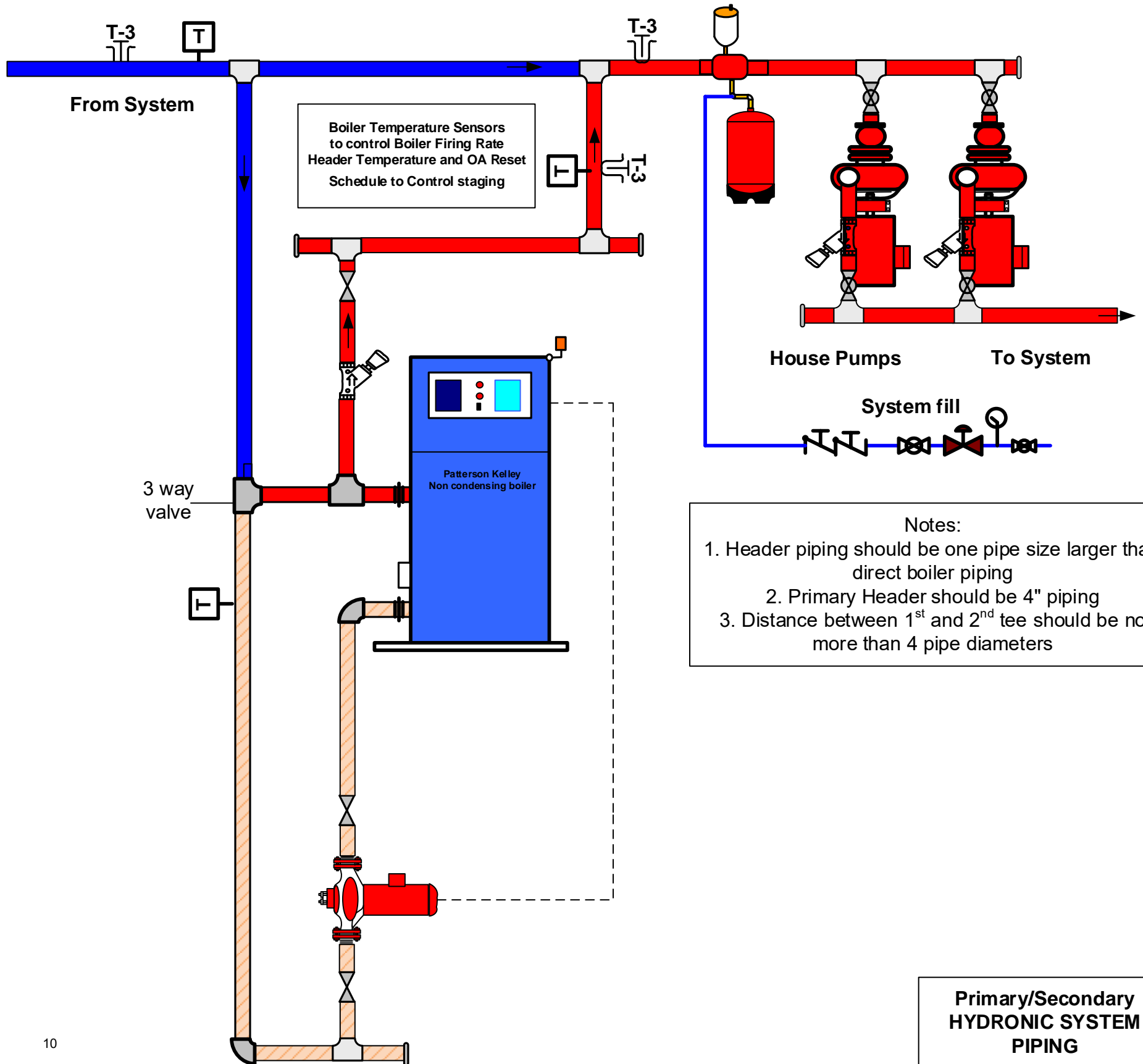
Primary  
HYDRONIC SYSTEM  
PIPING



# Primary/Secondary loop diagram

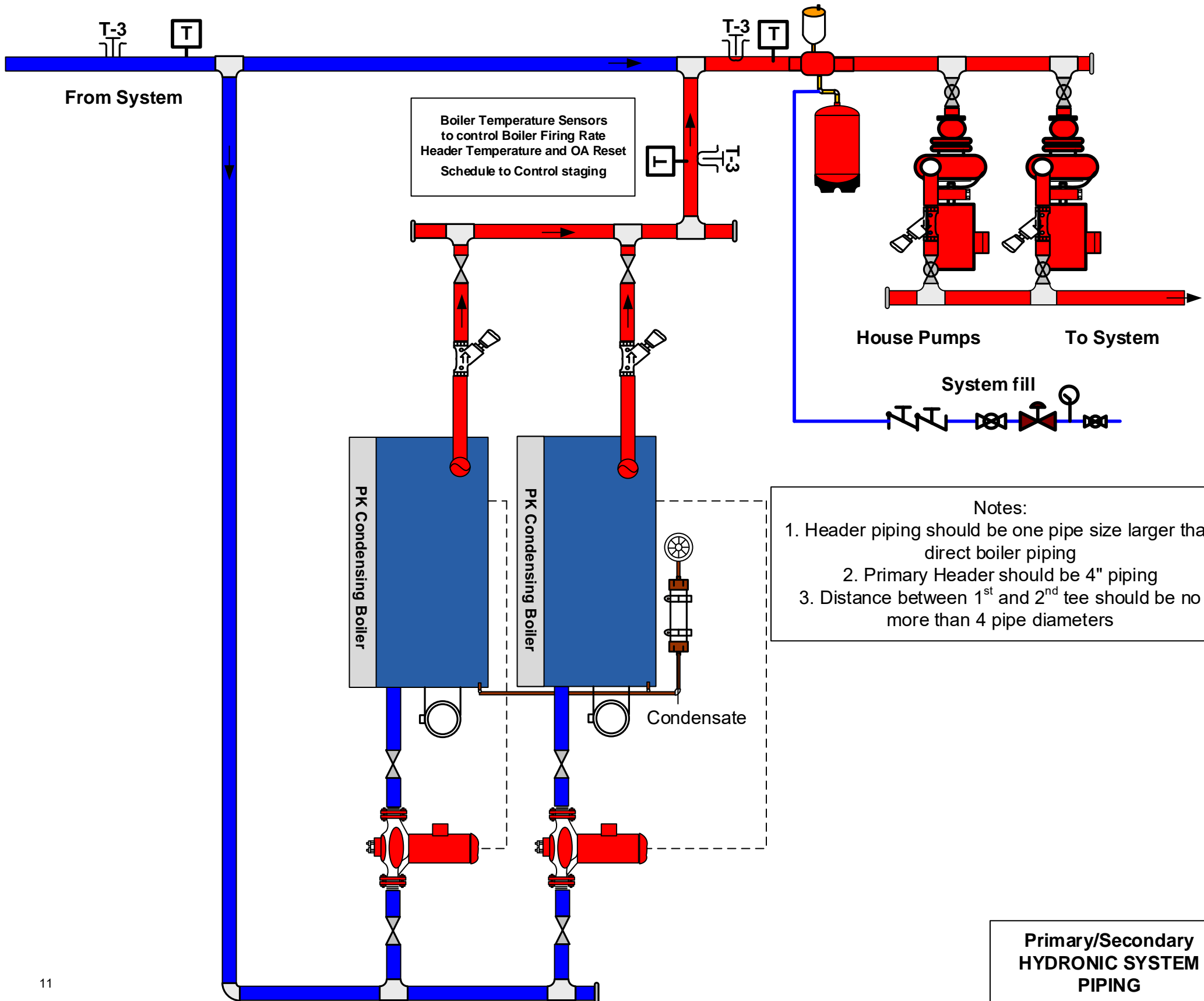


# Primary/Secondary loop diagram

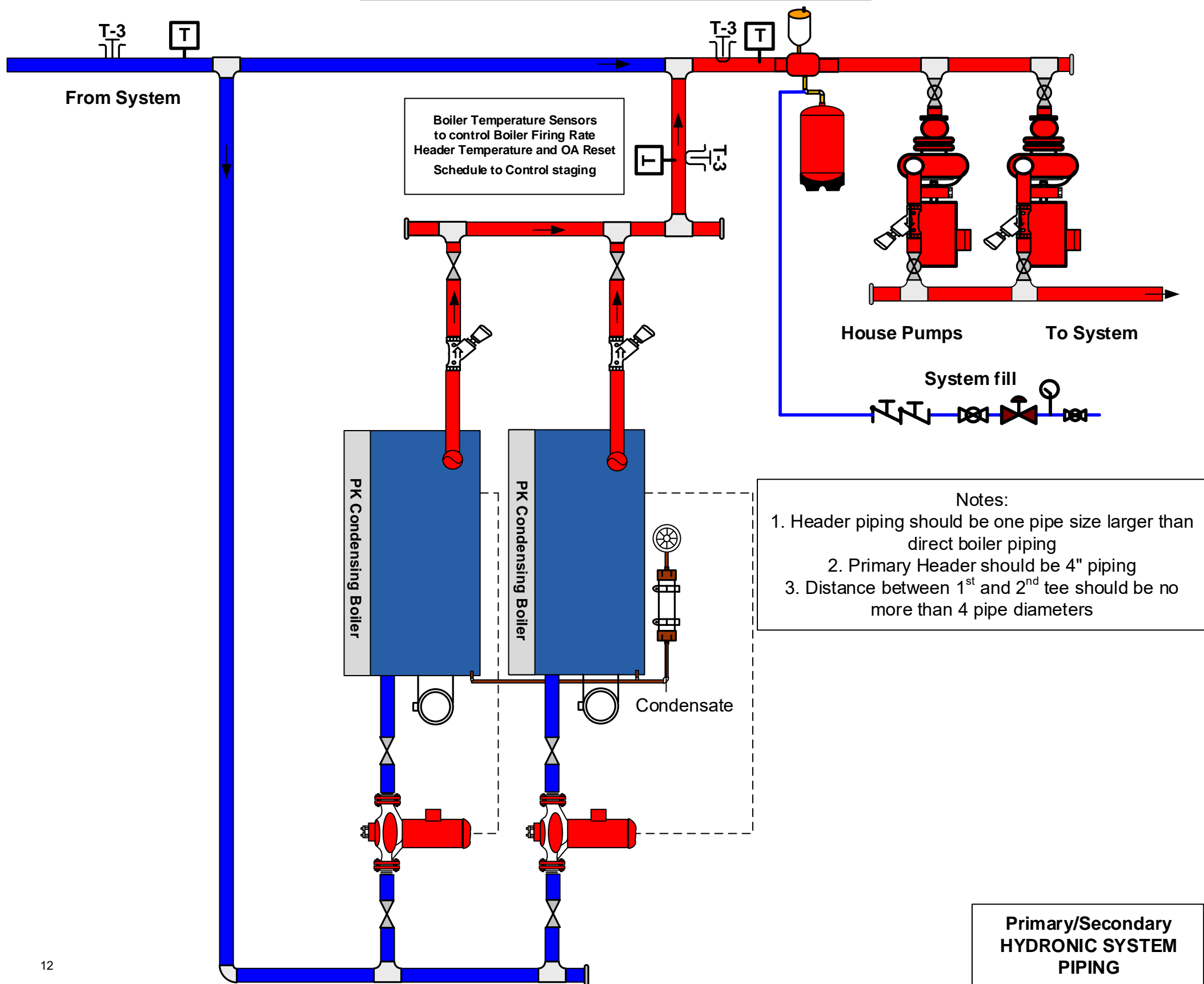




# Primary/Secondary loop diagram

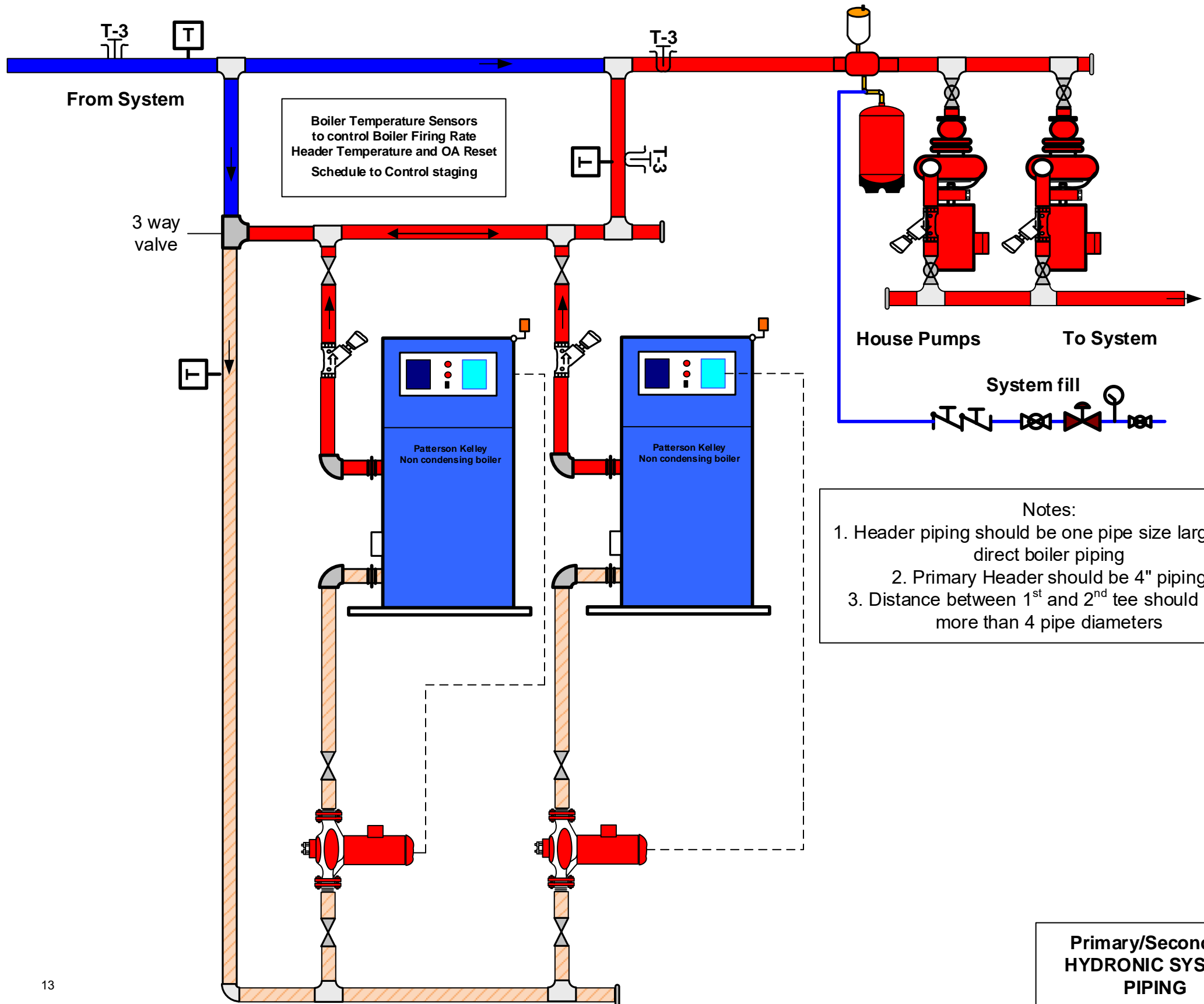


# Primary/Secondary loop diagram





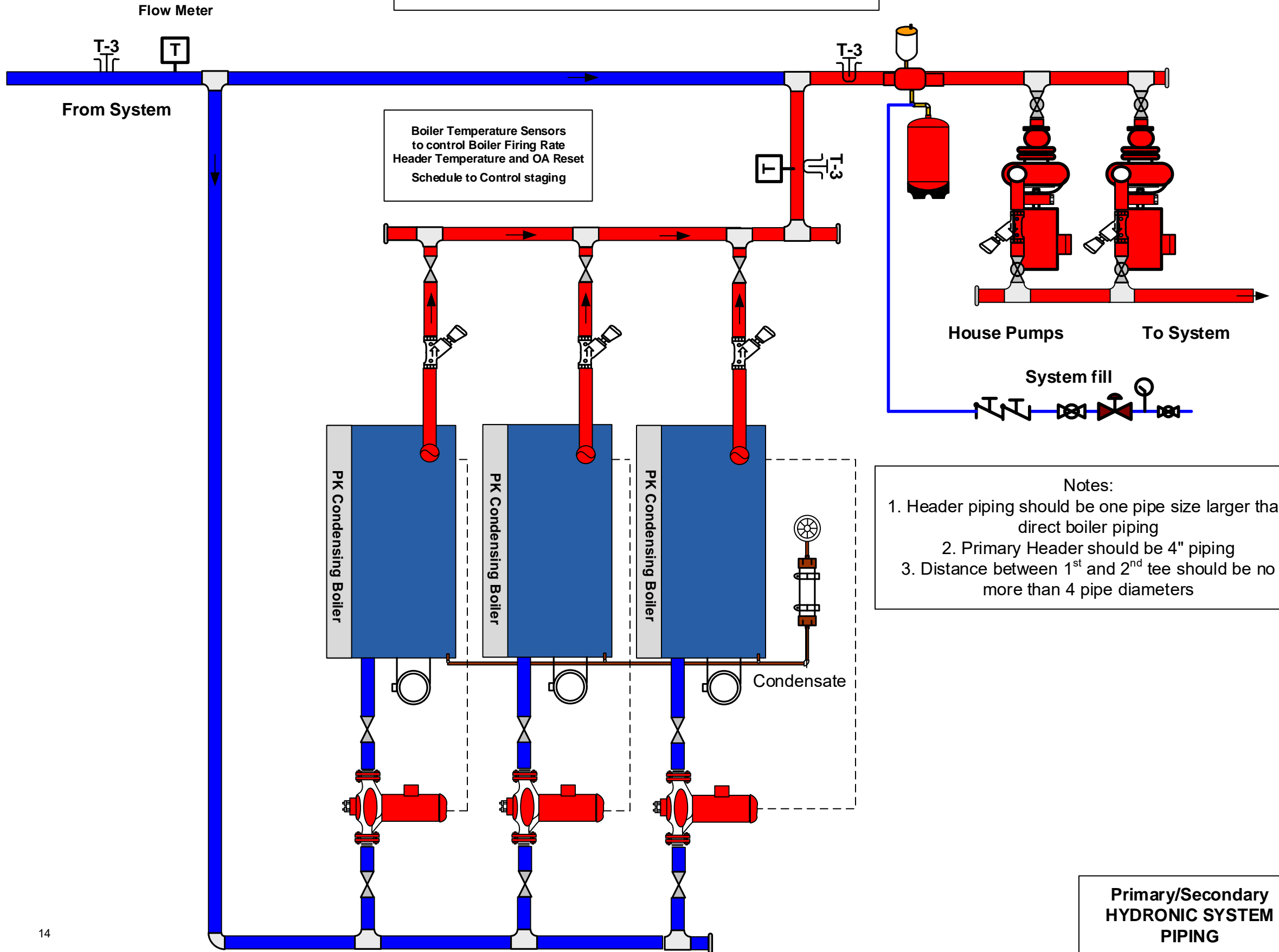
# Primary/Secondary loop diagram



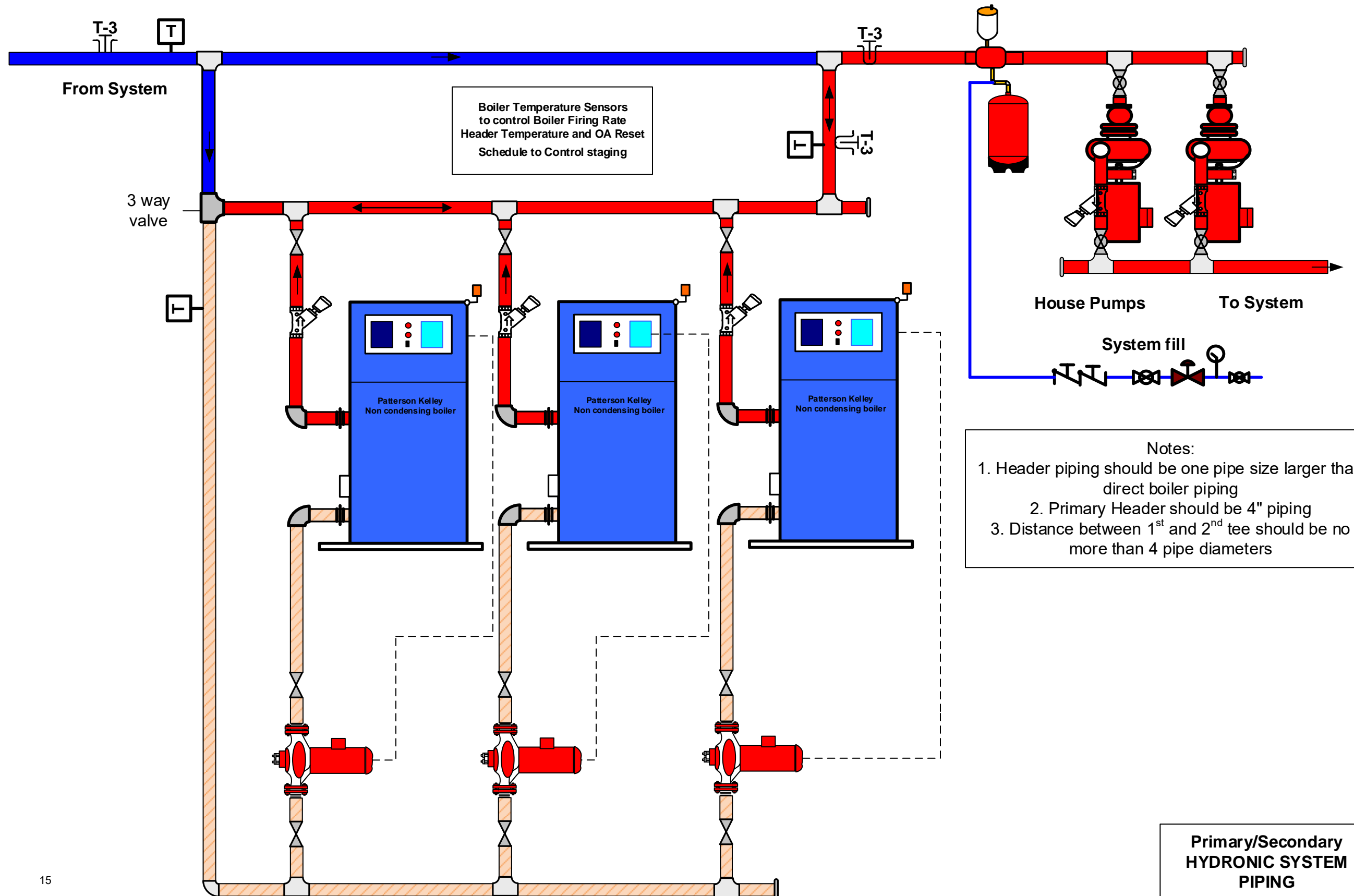
- Notes:
1. Header piping should be one pipe size larger than direct boiler piping
  2. Primary Header should be 4" piping
  3. Distance between 1<sup>st</sup> and 2<sup>nd</sup> tee should be no more than 4 pipe diameters

**Primary/Secondary  
HYDRONIC SYSTEM  
PIPING**

# Primary/Secondary loop diagram

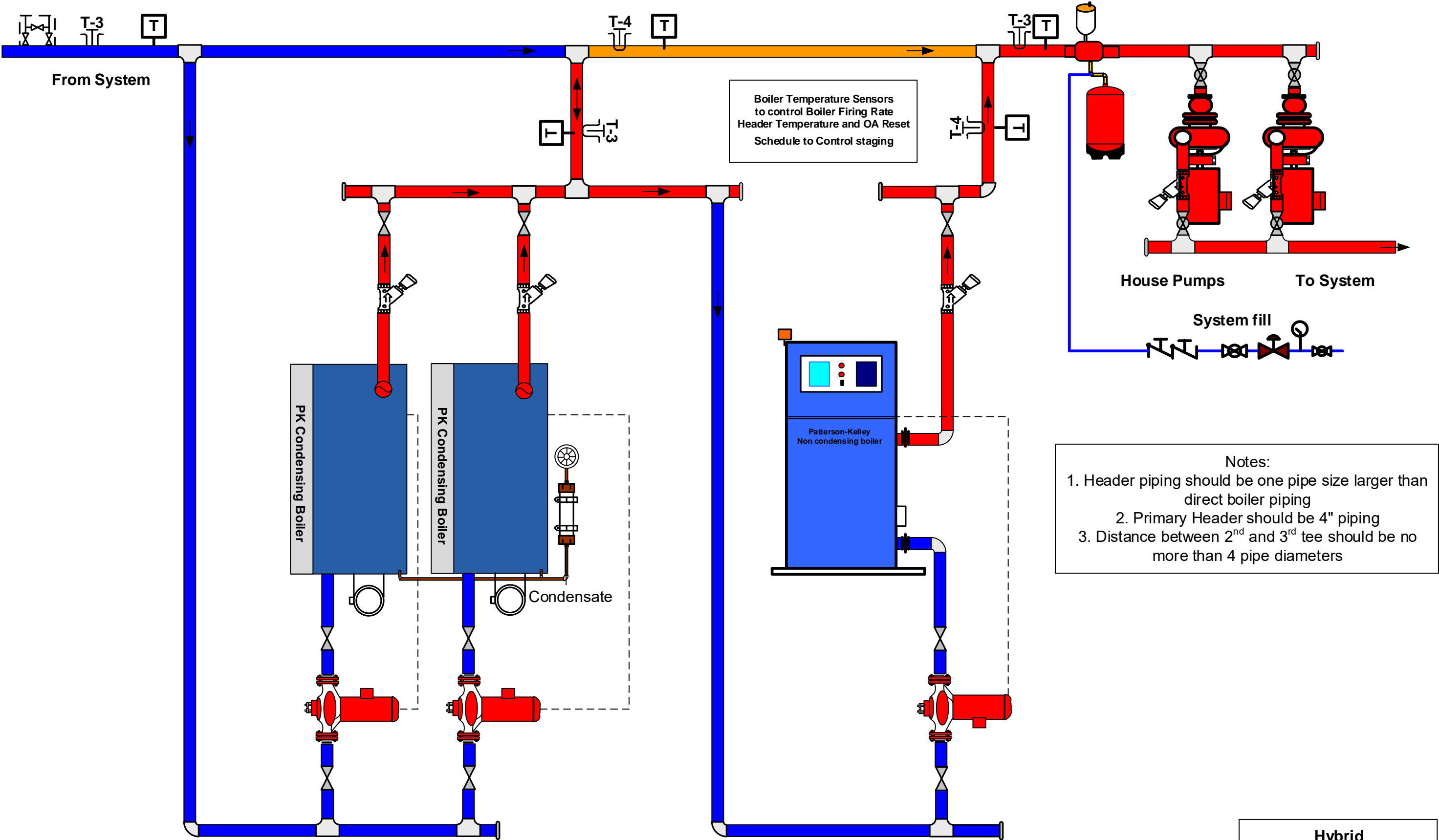


# Primary/Secondary loop diagram





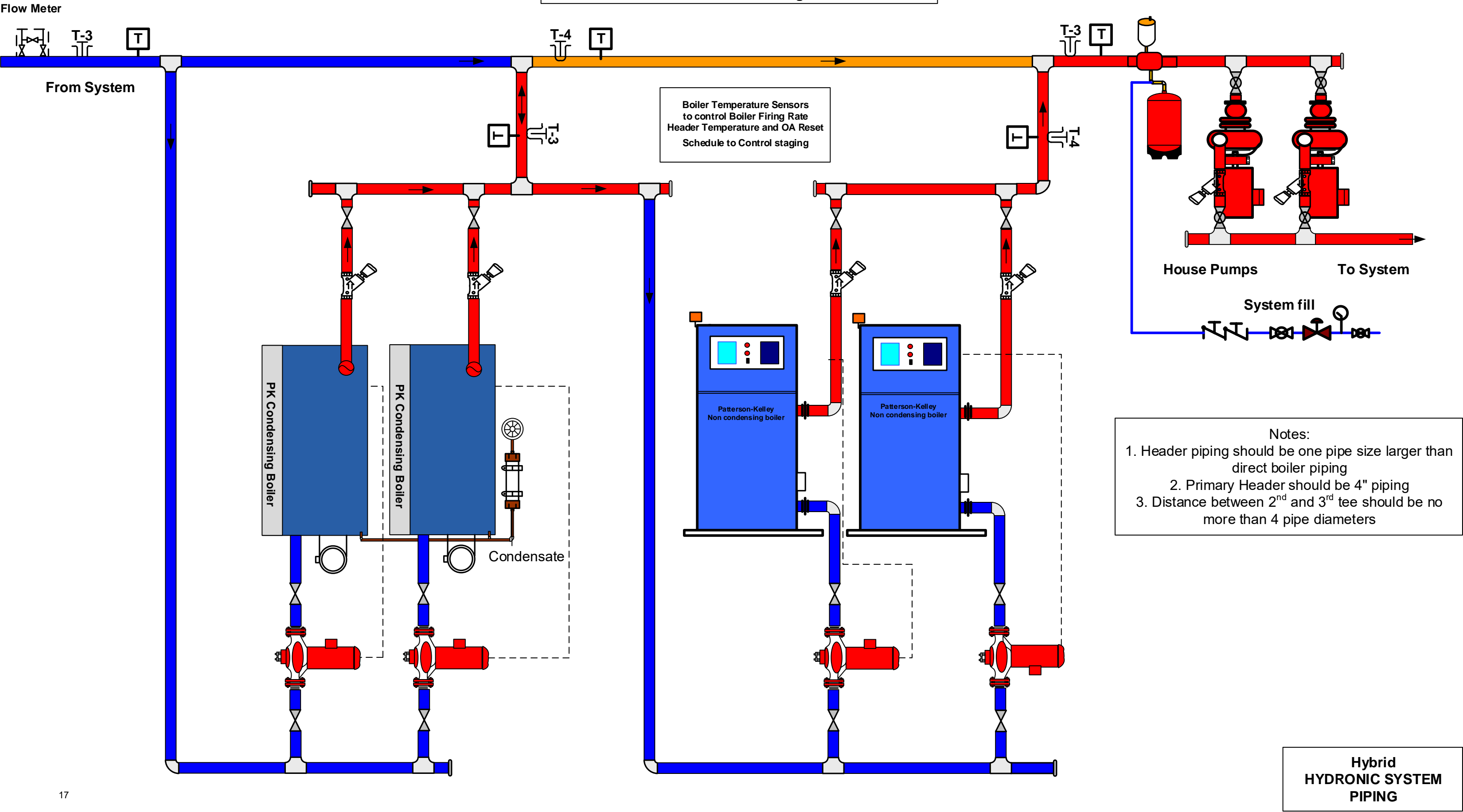
Three Tee Piping allows for pre-heating from Condensing Boilers to Non-condensing Boilers

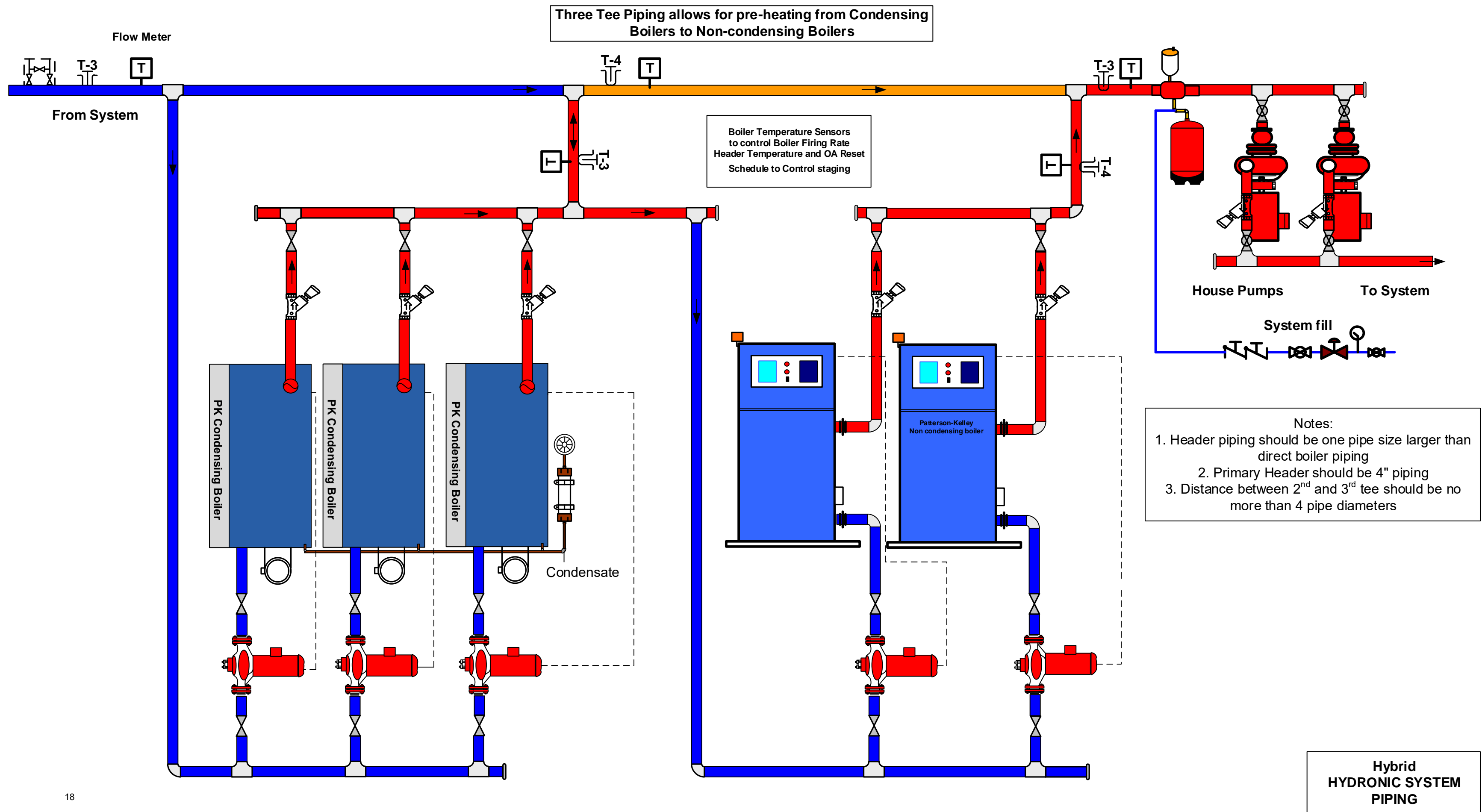


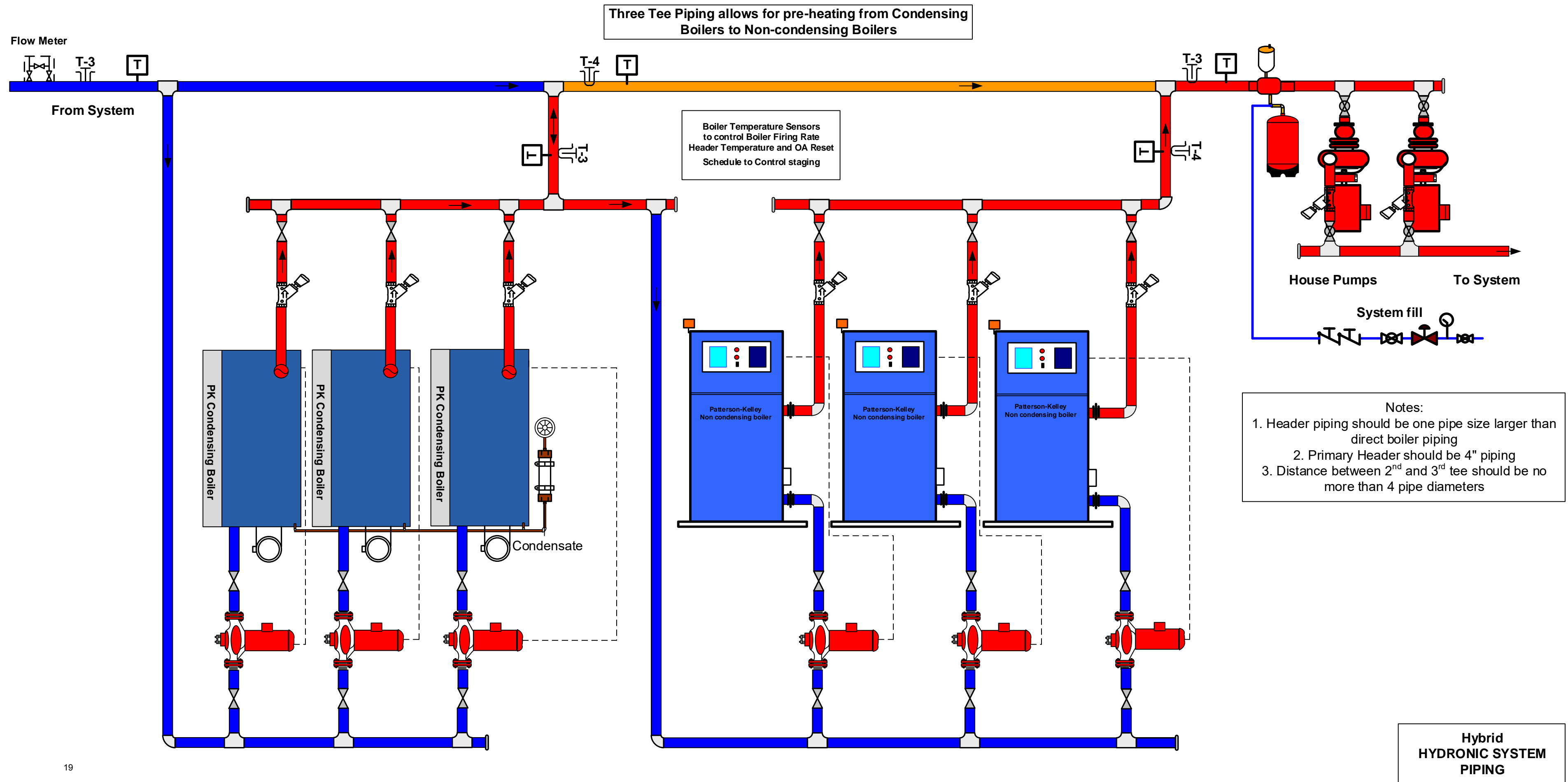
- Notes:
1. Header piping should be one pipe size larger than direct boiler piping
  2. Primary Header should be 4" piping
  3. Distance between 2<sup>nd</sup> and 3<sup>rd</sup> tee should be no more than 4 pipe diameters

Hybrid  
HYDRONIC SYSTEM  
PIPING

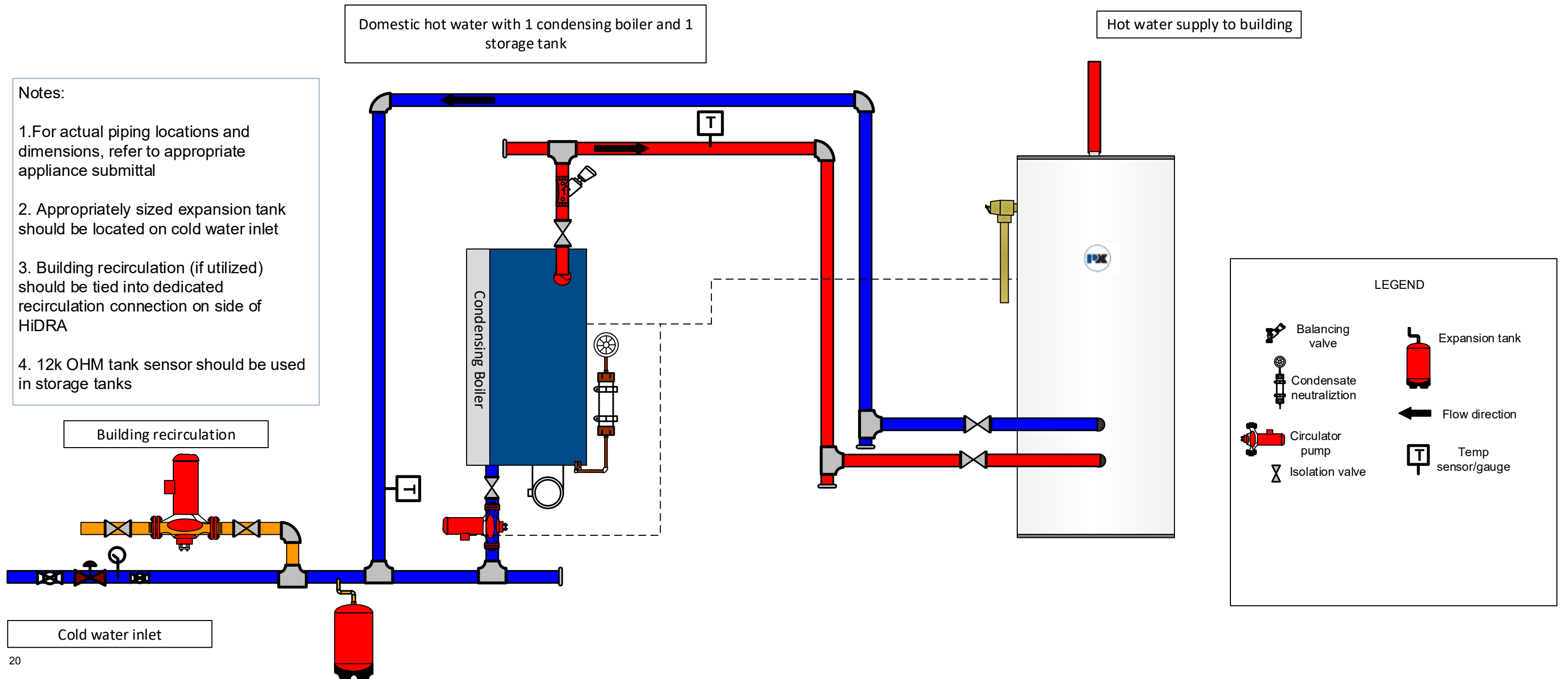
Three Tee Piping allows for pre-heating from Condensing Boilers to Non-condensing Boilers

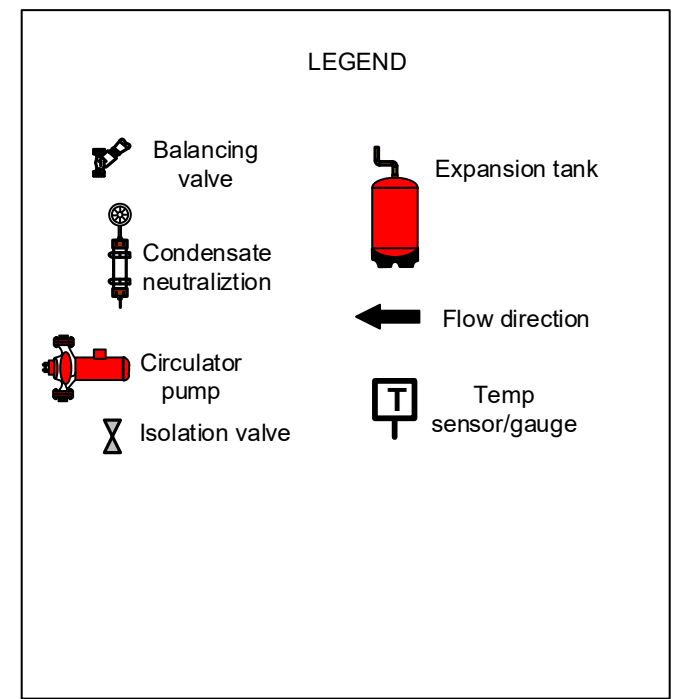
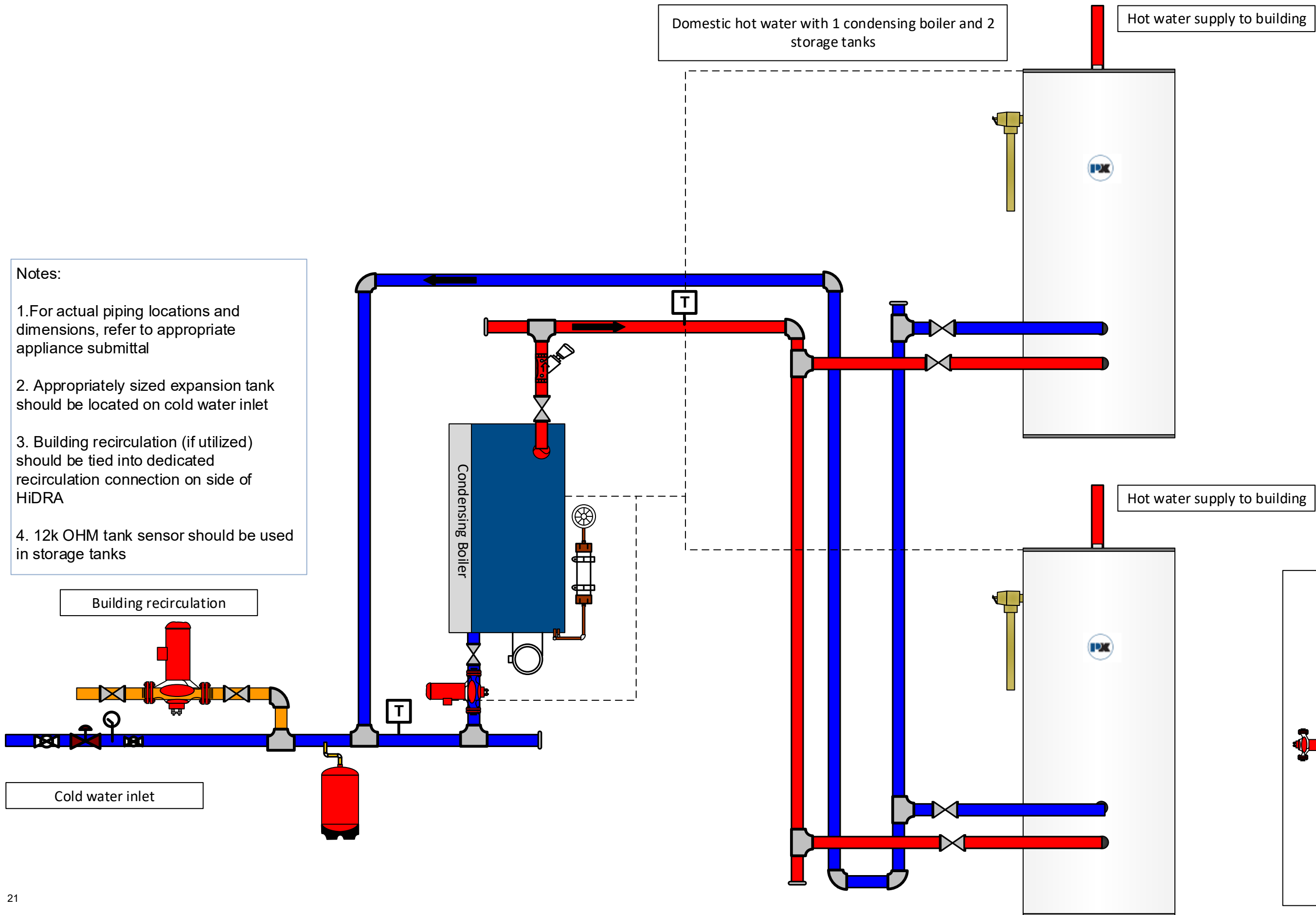




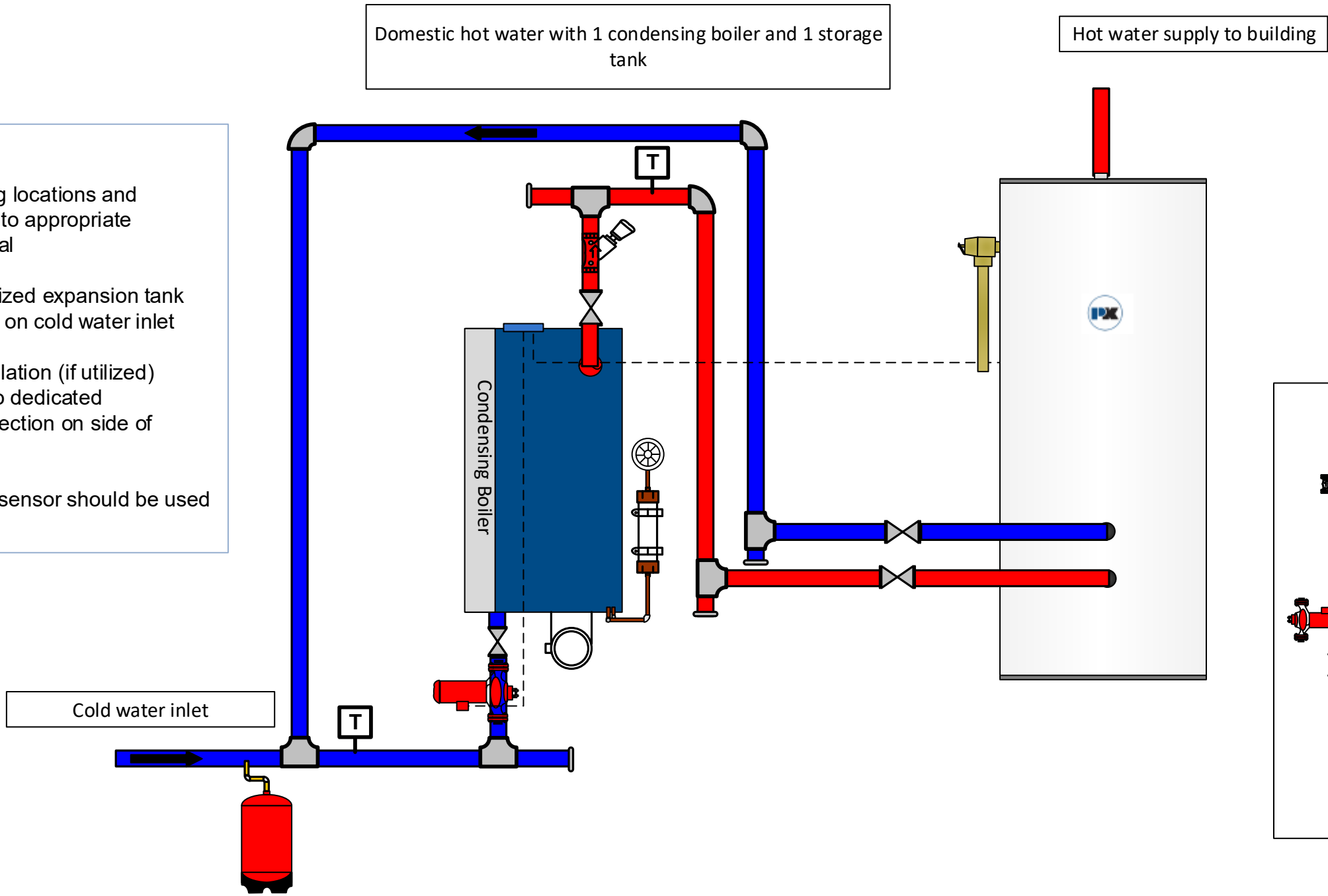






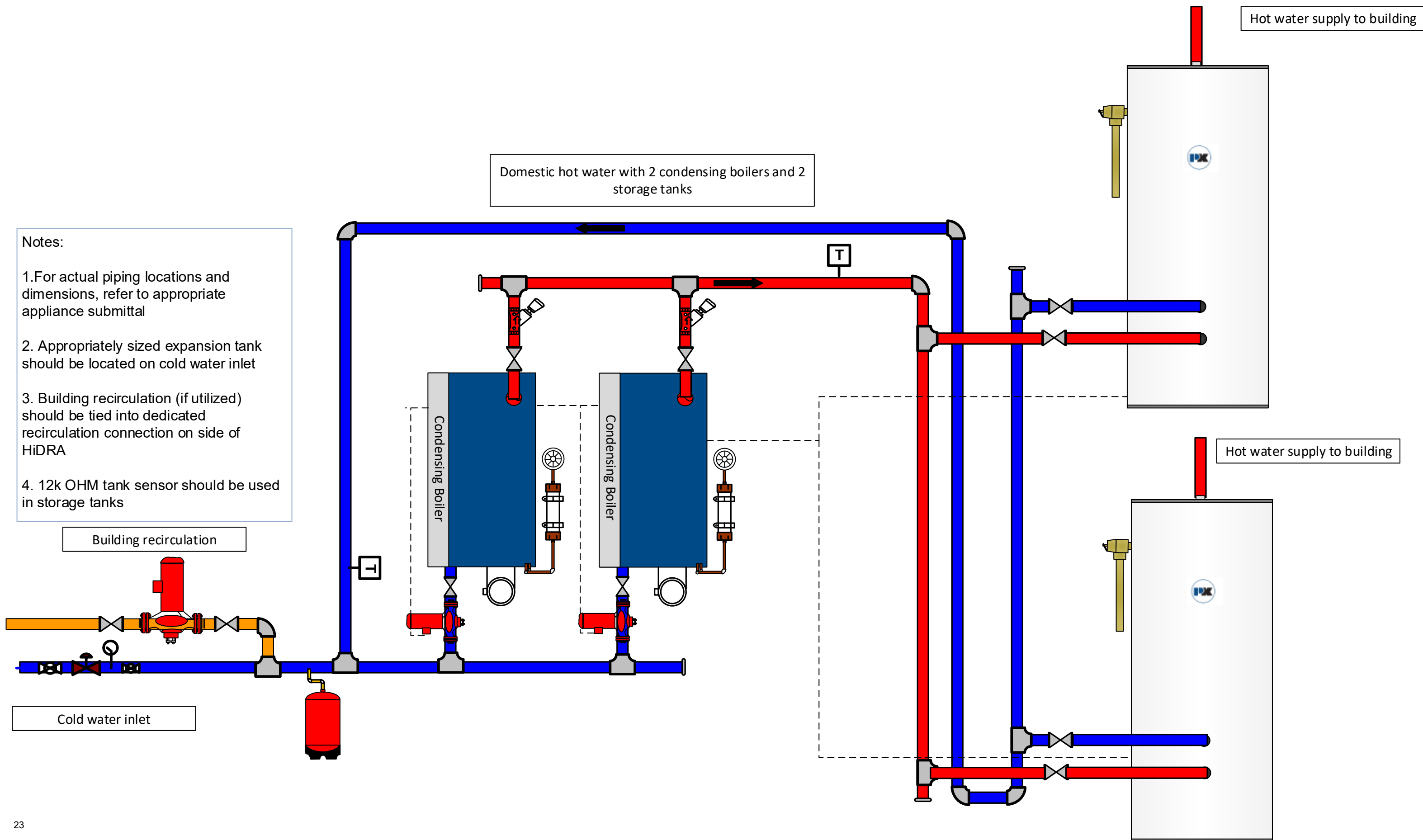


- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet
  3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
  4. 12k OHM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

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

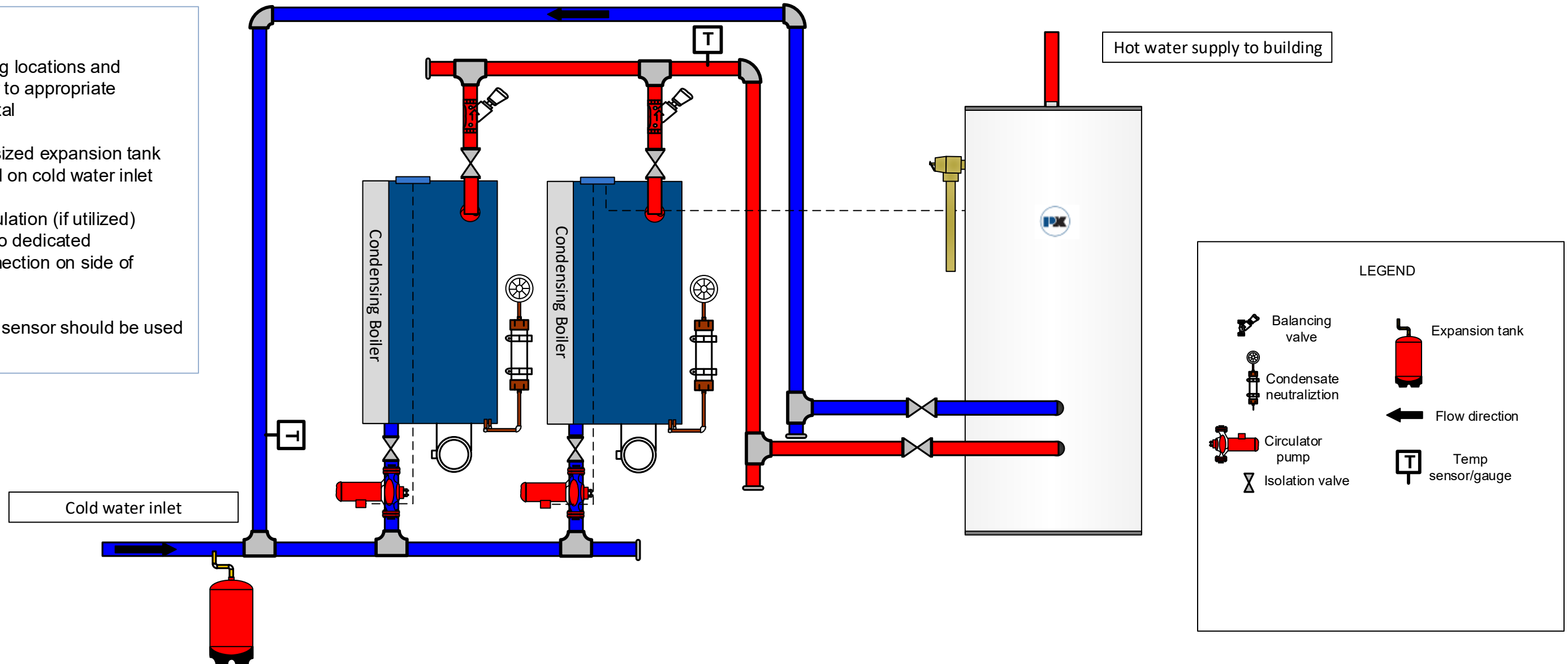
- |  |                           |  |                   |
|--|---------------------------|--|-------------------|
|  | Balancing valve           |  | Expansion tank    |
|  | Condensate neutralization |  | Flow direction    |
|  | Circulator pump           |  | Temp sensor/gauge |
|  | Isolation valve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



# Domestic hot water with 2 condensing boiler and 1 storage tank

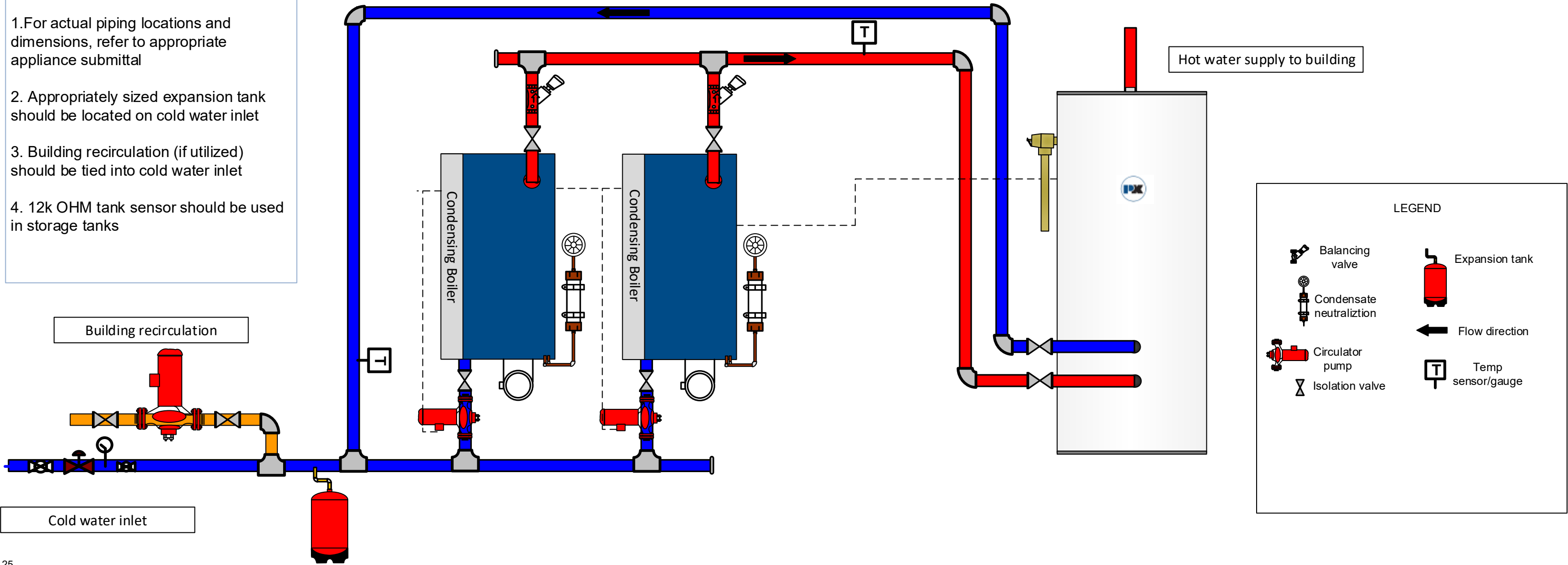
## Notes:

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
4. 12k OHM tank sensor should be used in storage tanks



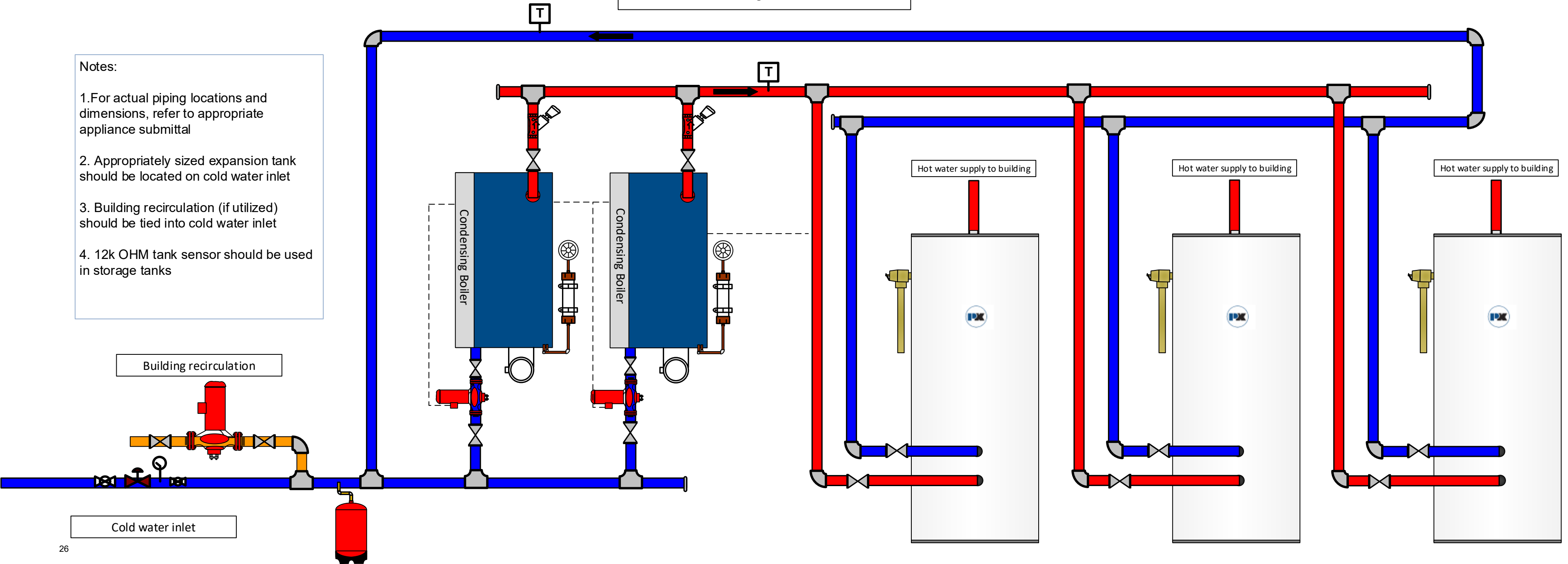
Domestic hot water with 2 condensing boilers and 1 storage tank

- 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



Domestic hot water with 2 condensing boilers and 3 storage tanks

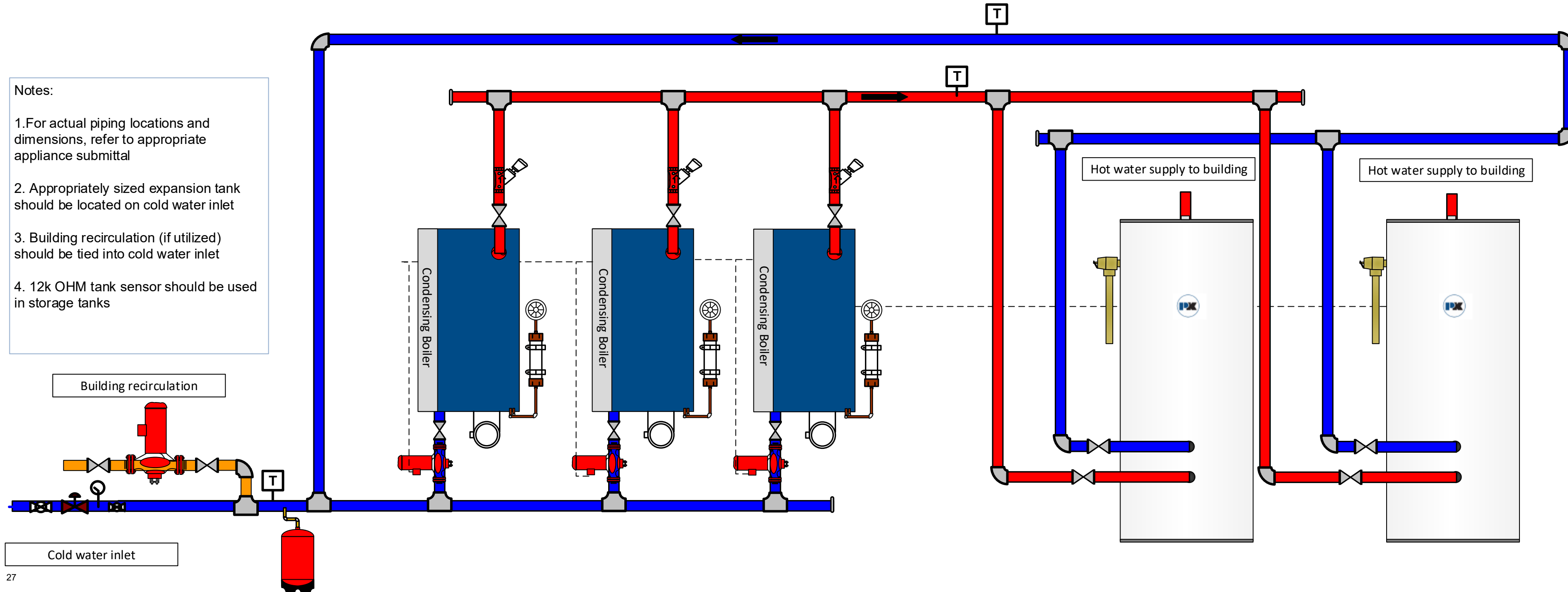
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet
  - 3. Building recirculation (if utilized) should be tied into cold water inlet
  - 4. 12k OHM tank sensor should be used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



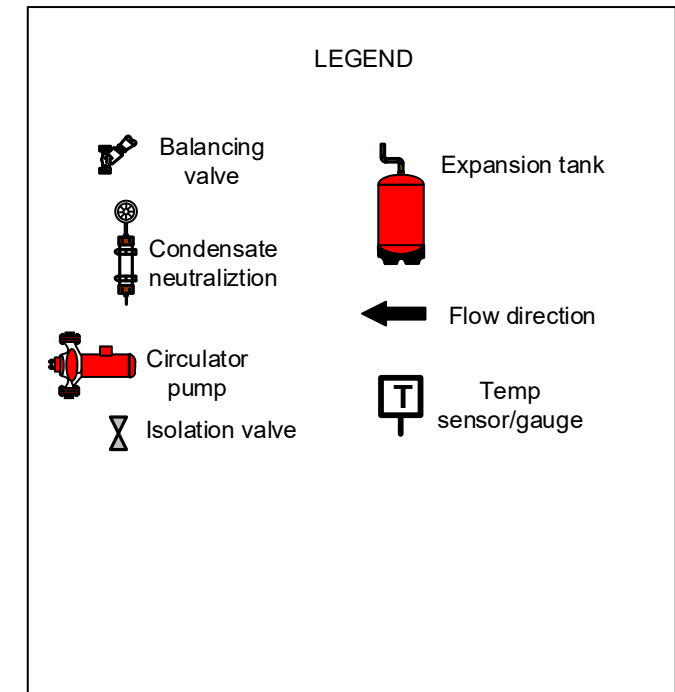
LEGEND

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

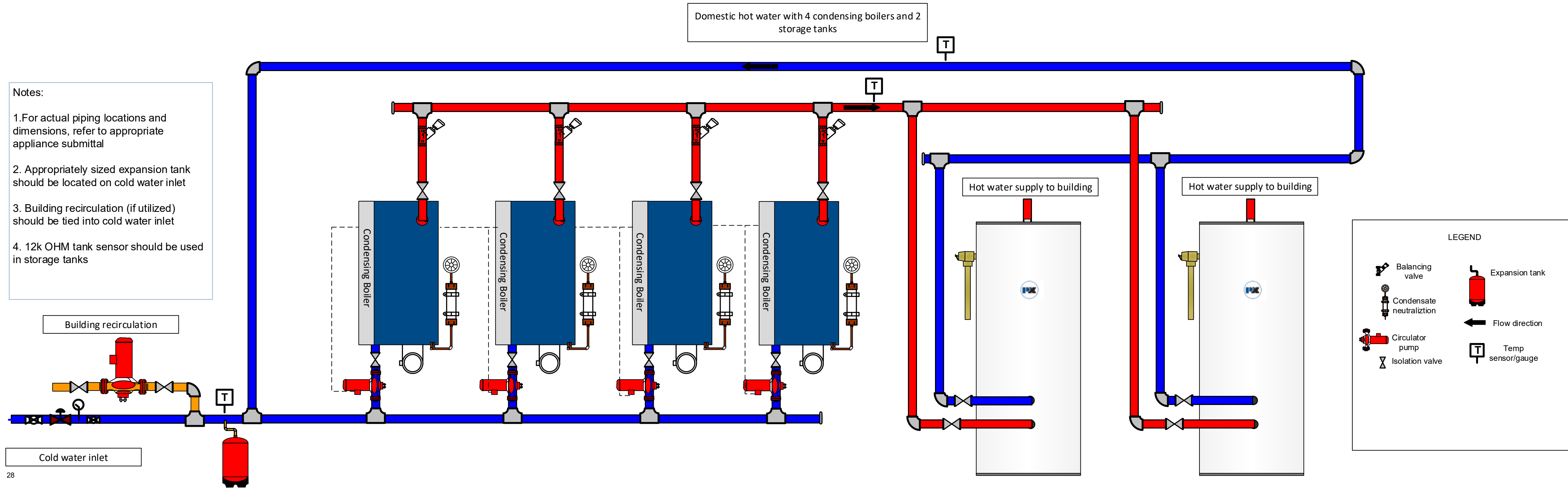
Domestic hot water with 3 condensing boilers and 2 storage tanks



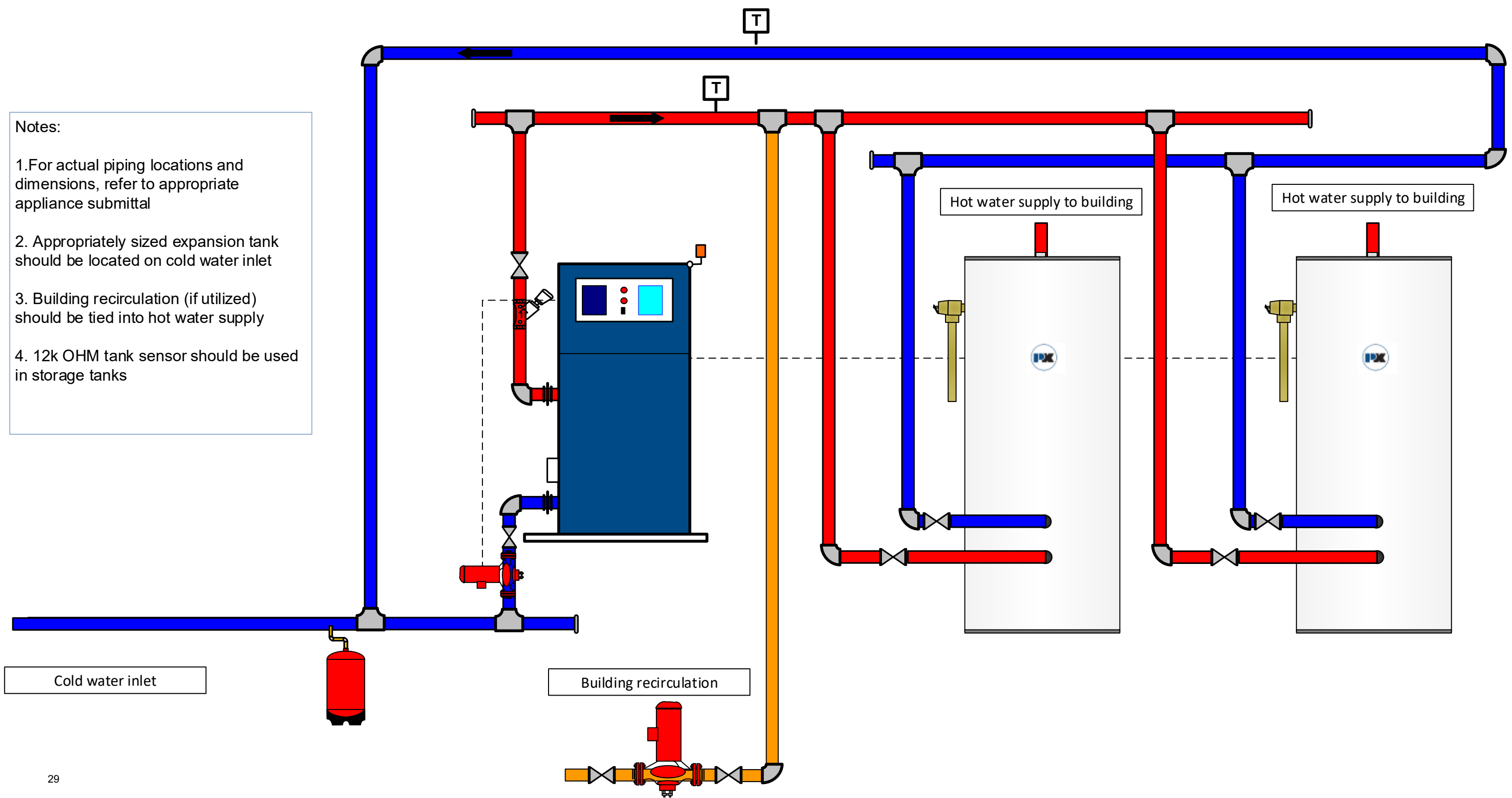
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet
  3. Building recirculation (if utilized) should be tied into cold water inlet
  4. 12k OHM tank sensor should be used in storage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







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

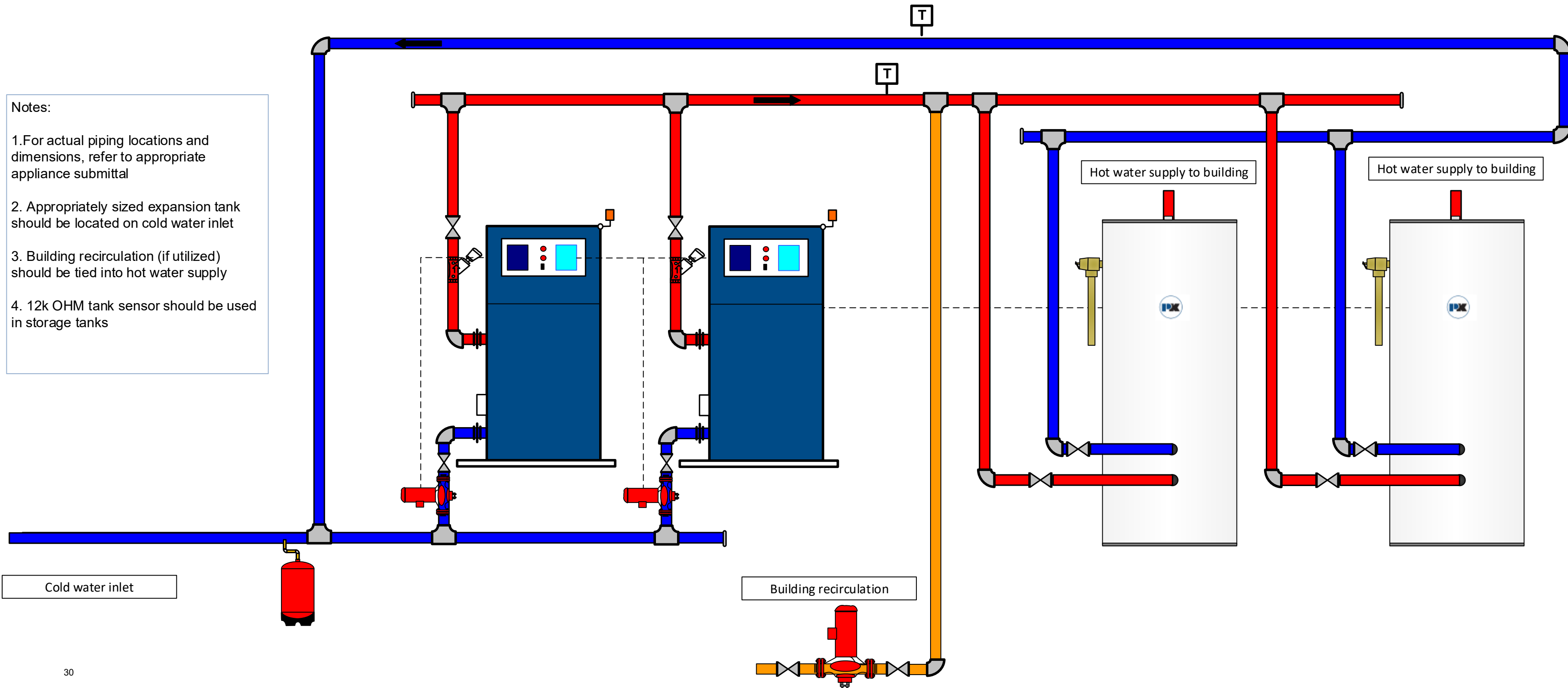


- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet
  3. Building recirculation (if utilized) should be tied into hot water supply
  4. 12k OHM tank sensor should be used in storage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

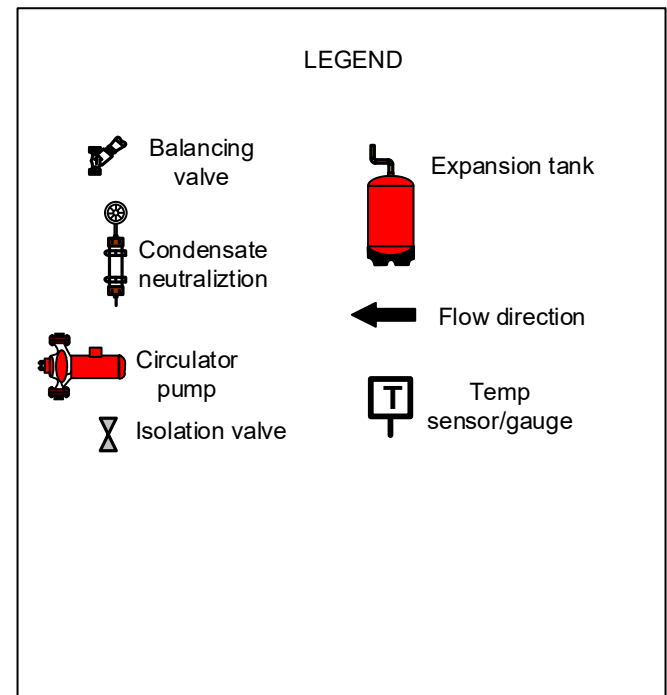
LEGEND

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

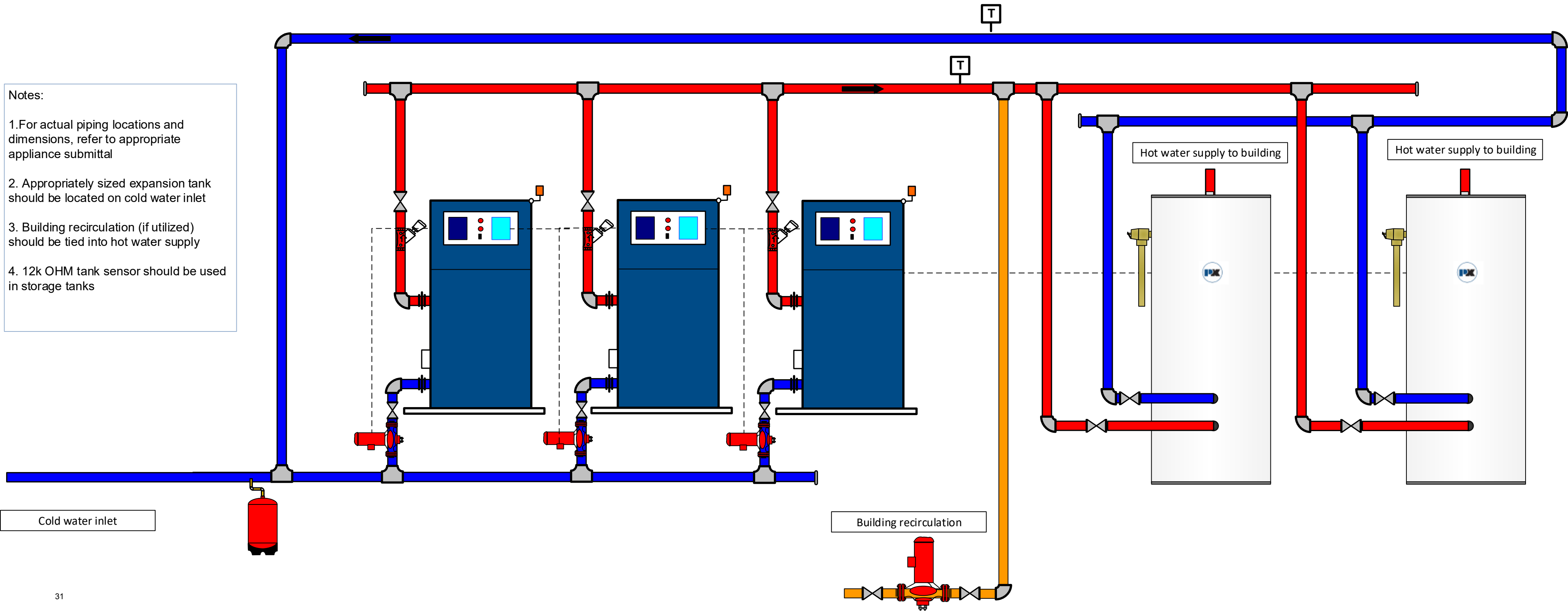
Domestic hot water with 1 non-condensing boiler  
and 2 storage tanks



- 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



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



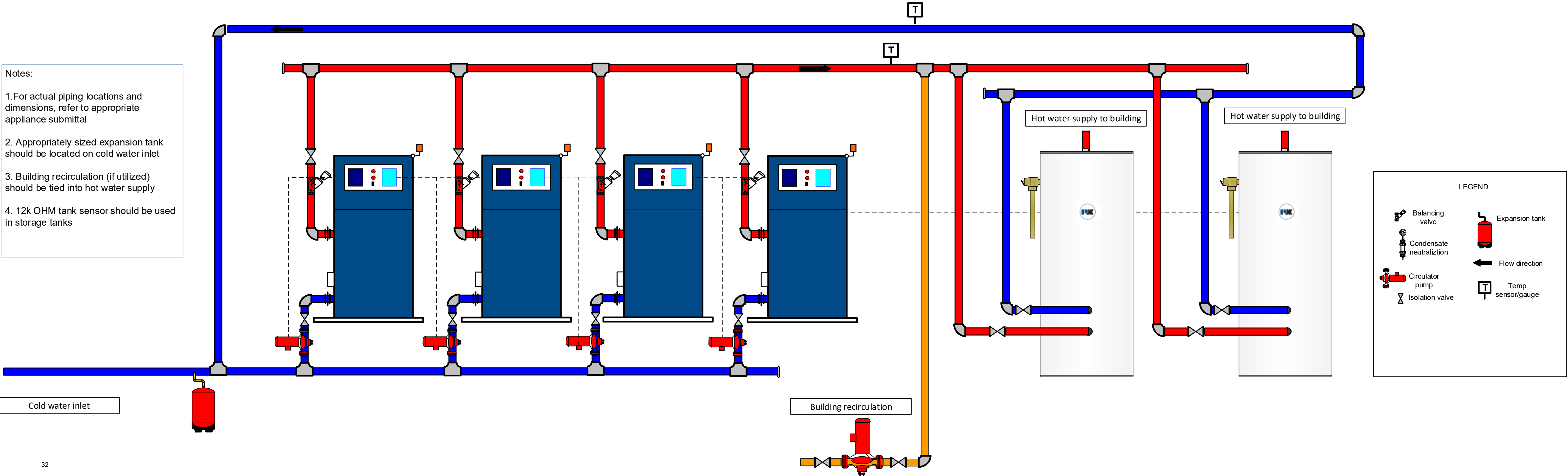
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet
  3. Building recirculation (if utilized) should be tied into hot water supply
  4. 12k OHM tank sensor should be used in storage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

- 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

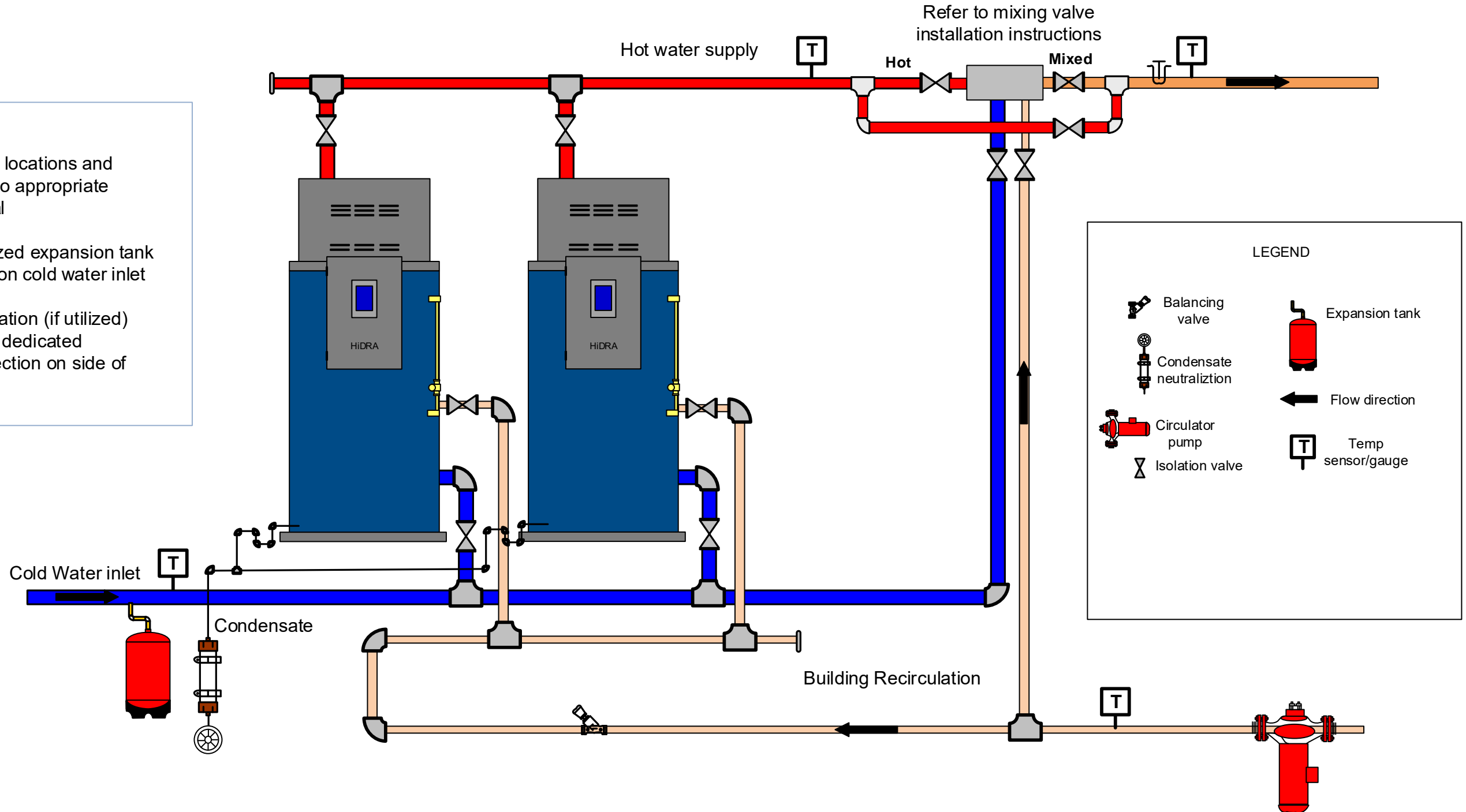




## Double HiDRA piping diagram

### Notes:

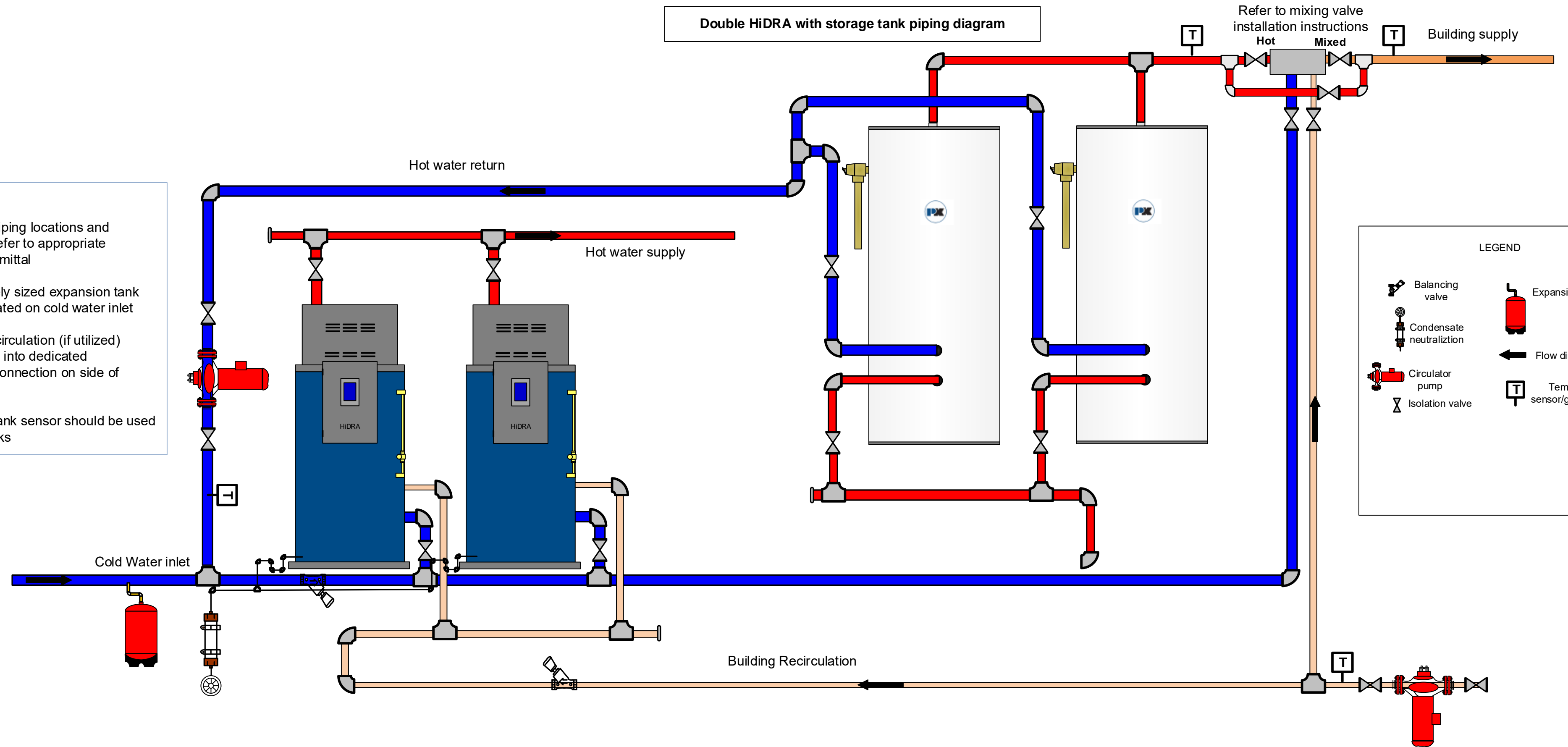
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA



# Double HiDRA with storage tank piping diagram

## Notes:

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



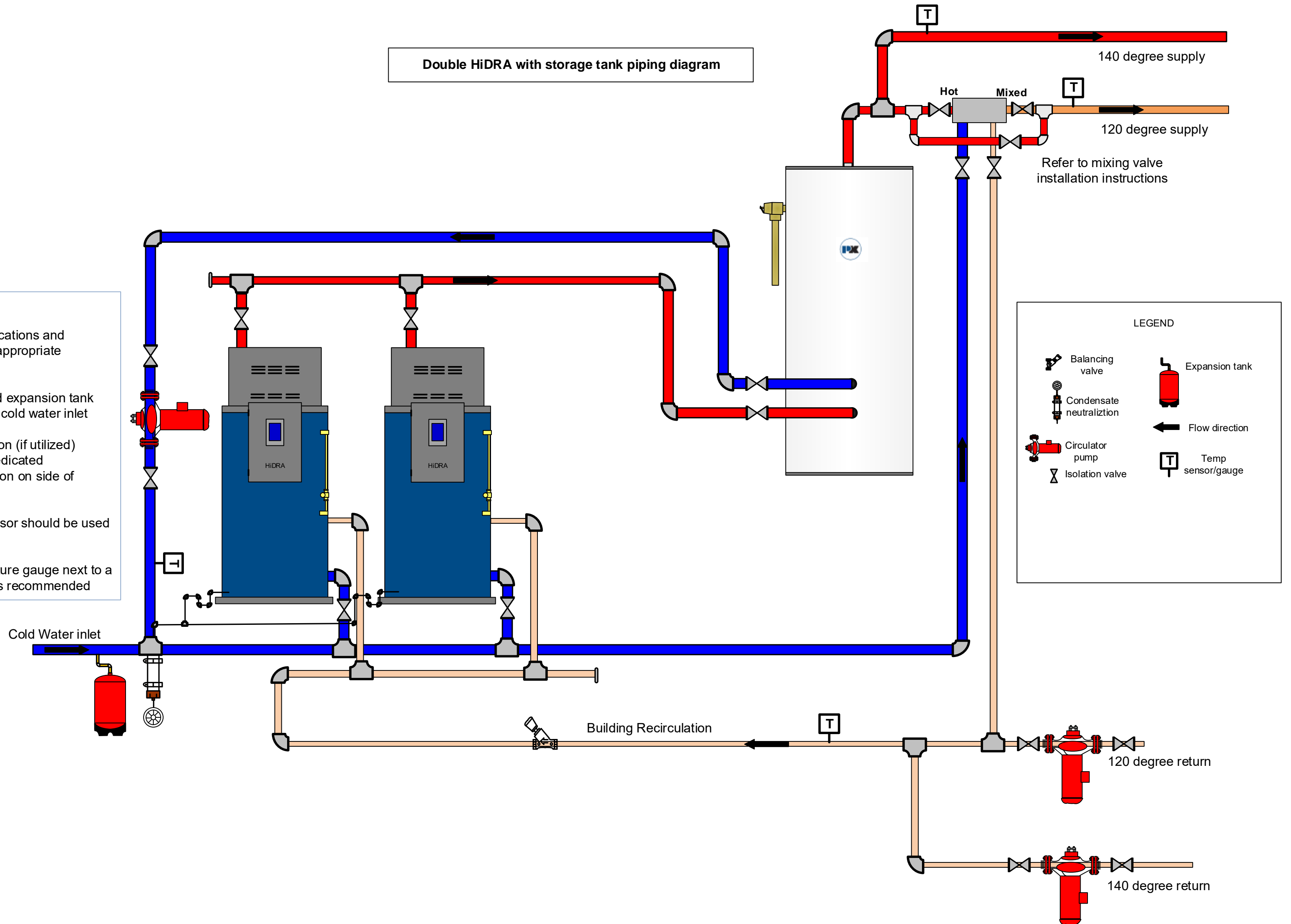
## LEGEND

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

Double HiDRA with storage tank piping diagram

Notes:

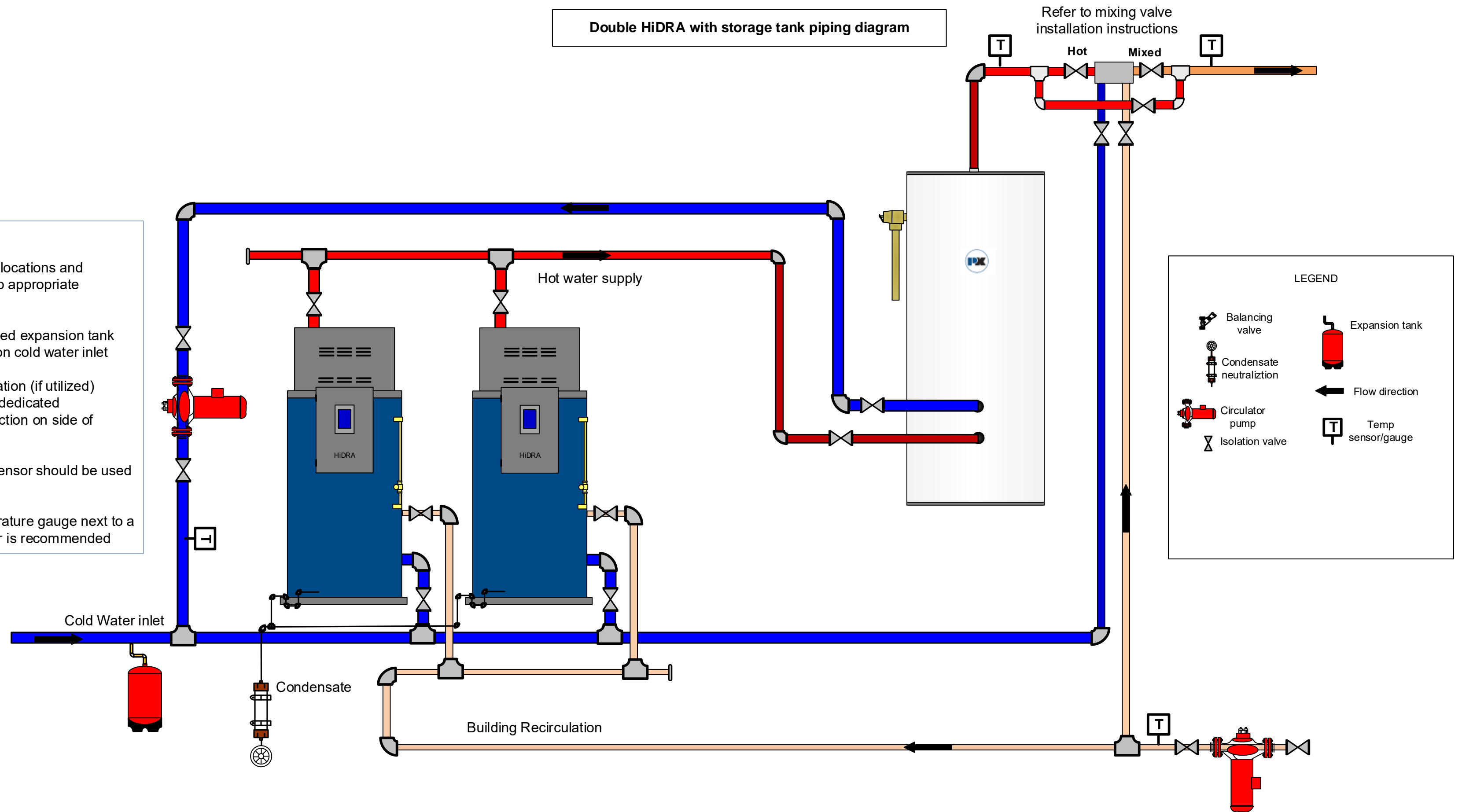
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should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

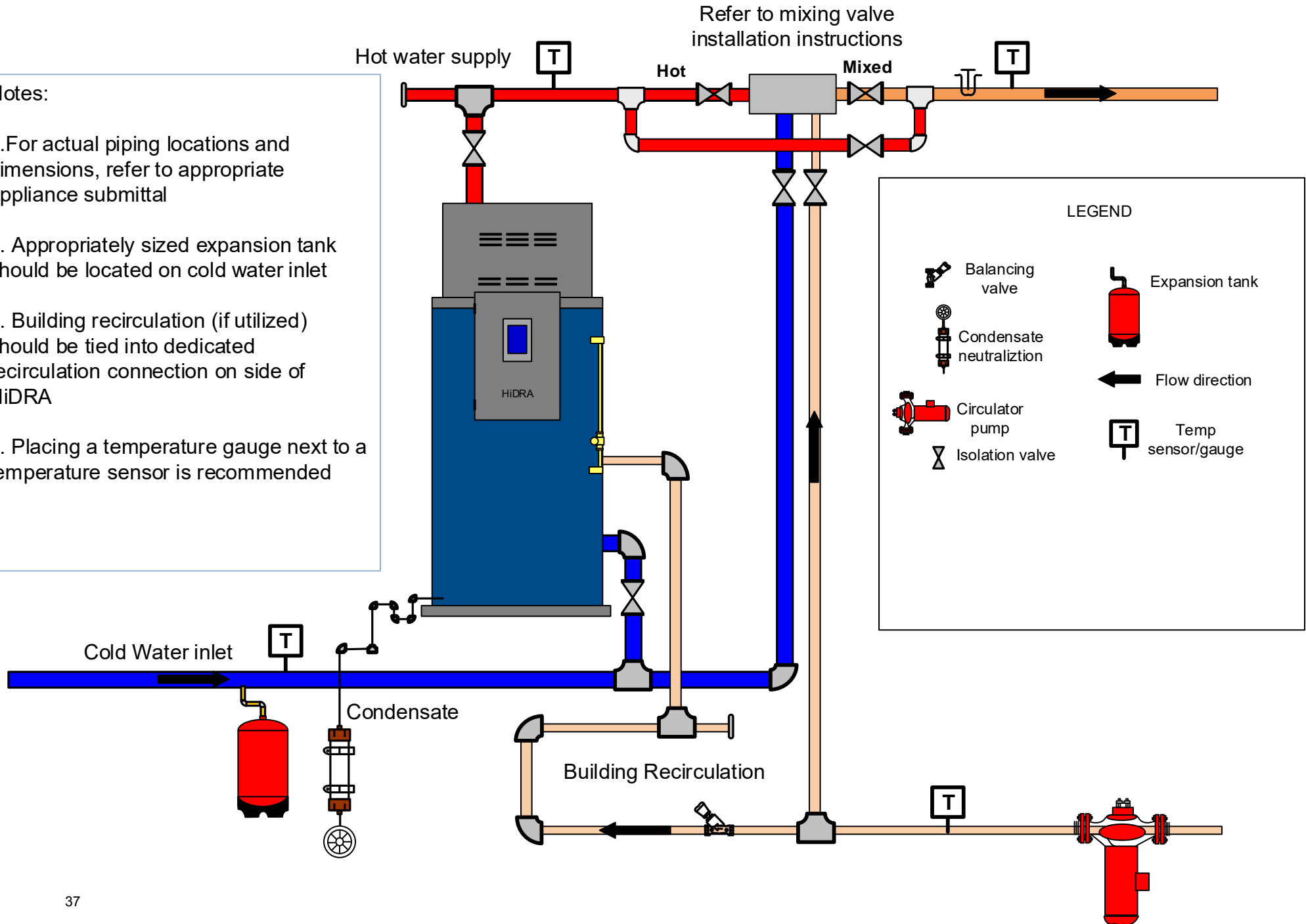
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. 12k OHM tank sensor should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



## Single HiDRA piping diagram

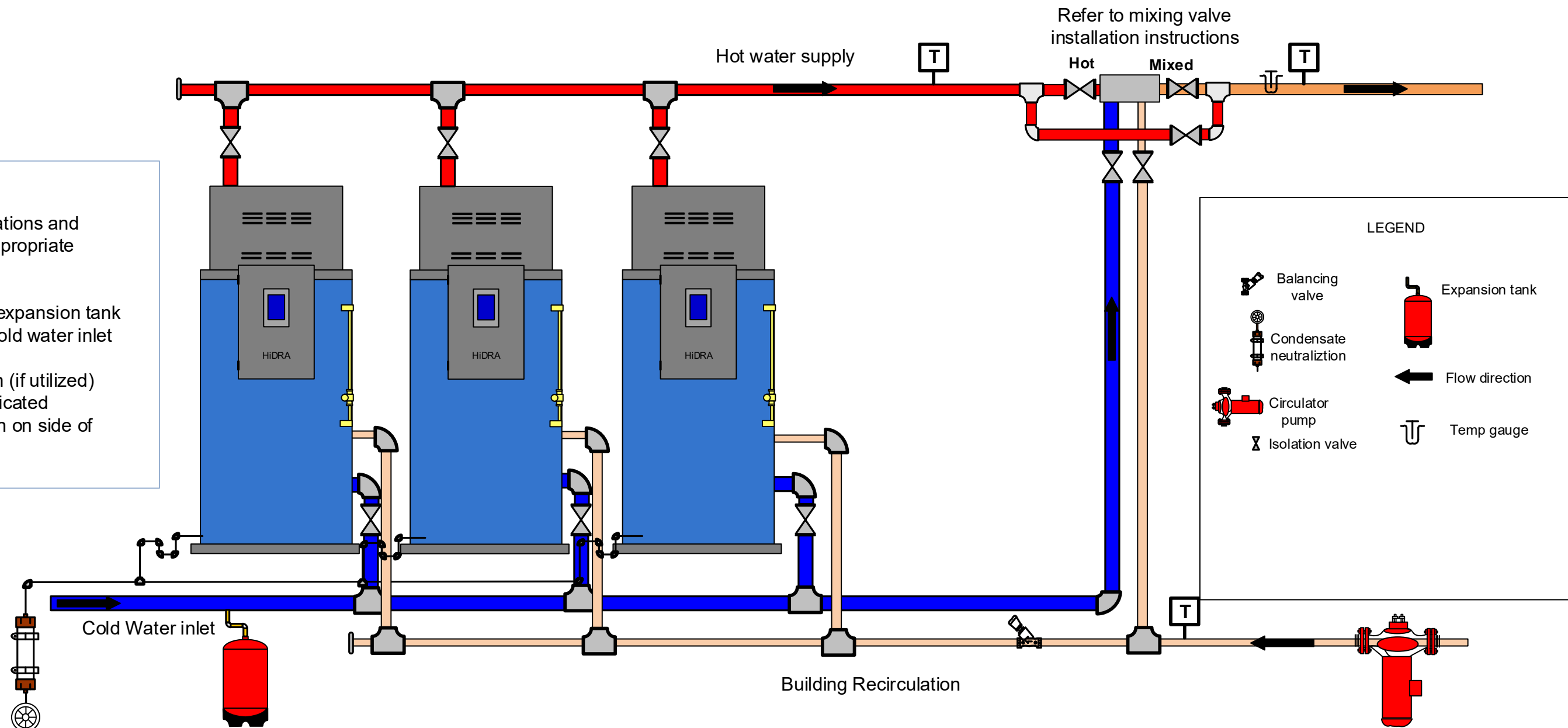
### Notes:

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

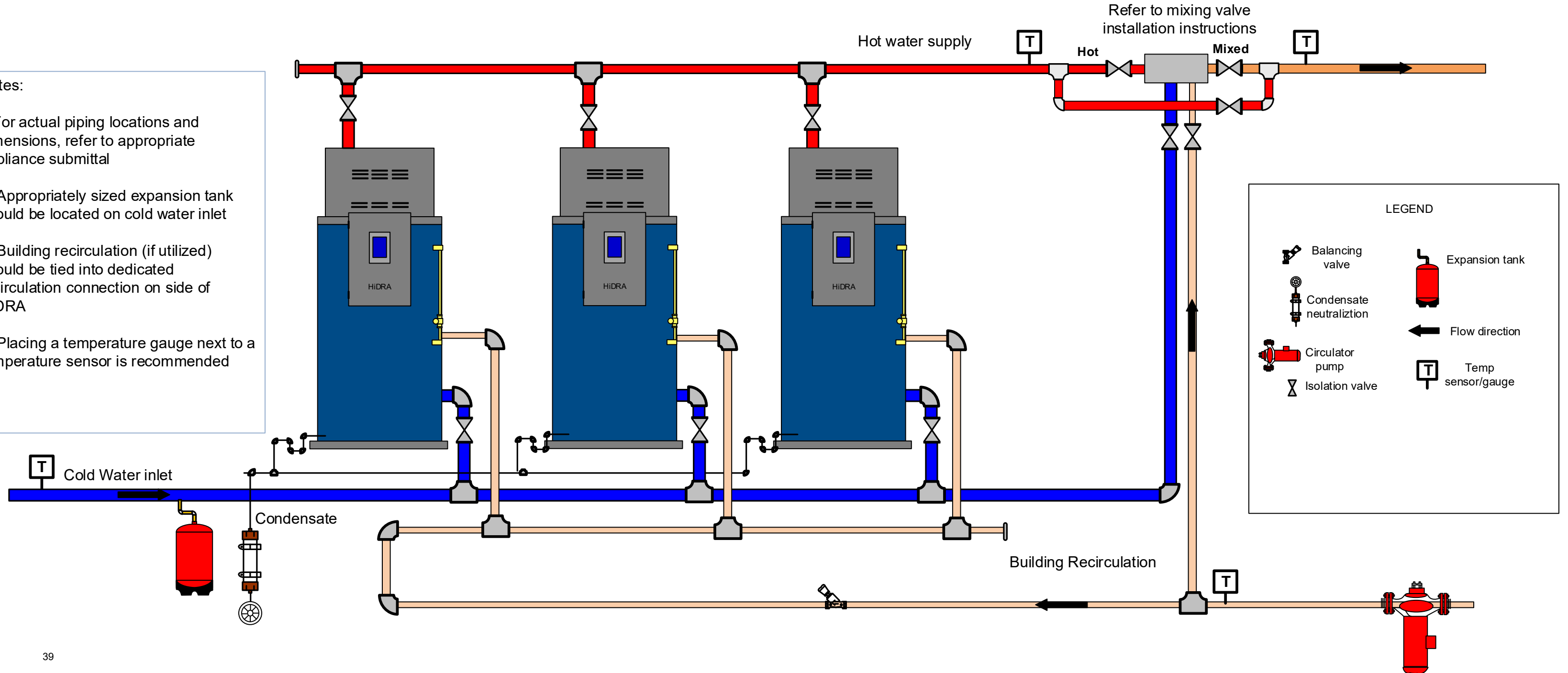




# Triple HiDRA piping diagram

## Notes:

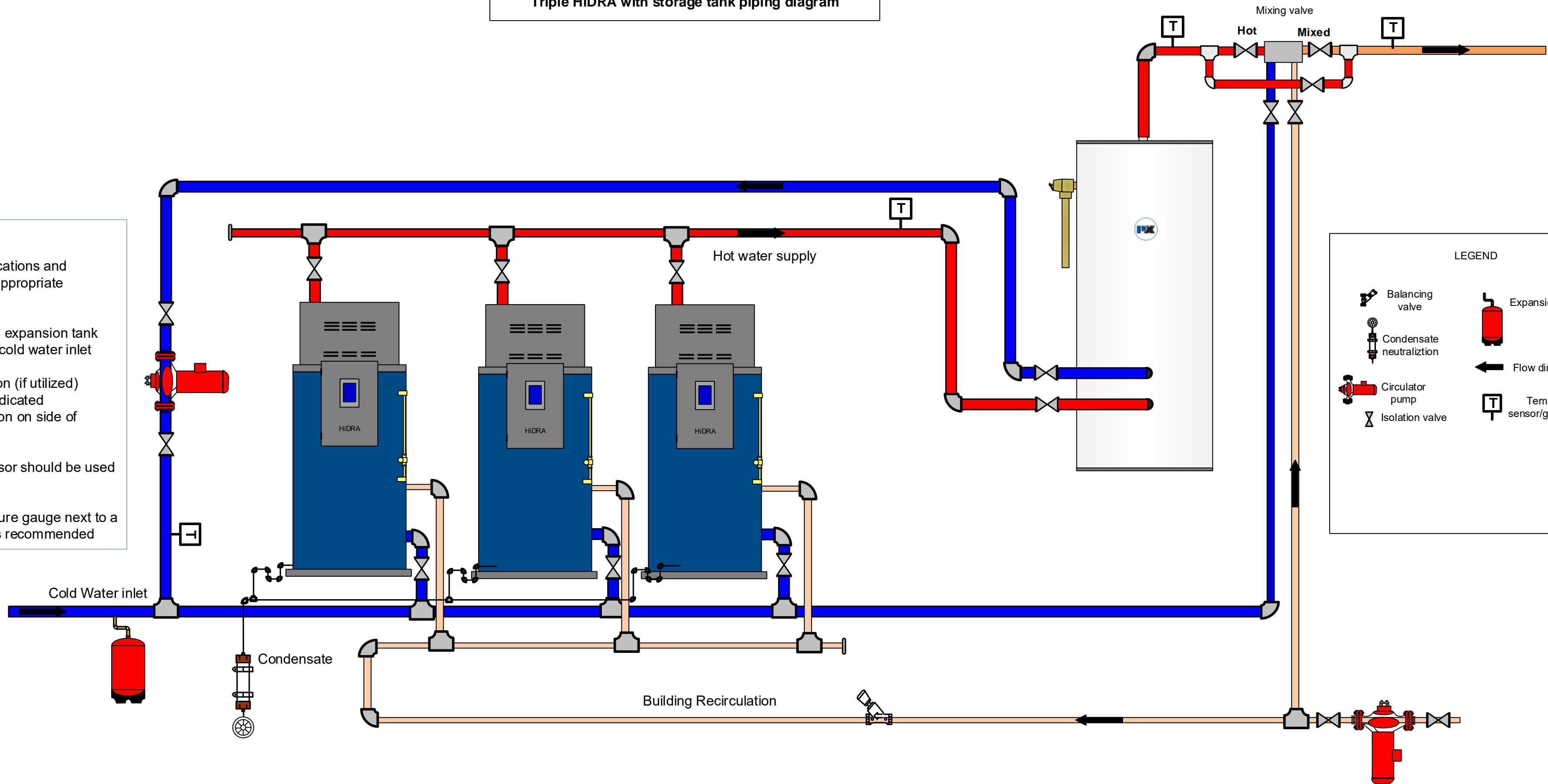
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet
3. Building recirculation (if utilized) should be tied into dedicated recirculation connection on side of HiDRA
4. Placing a temperature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



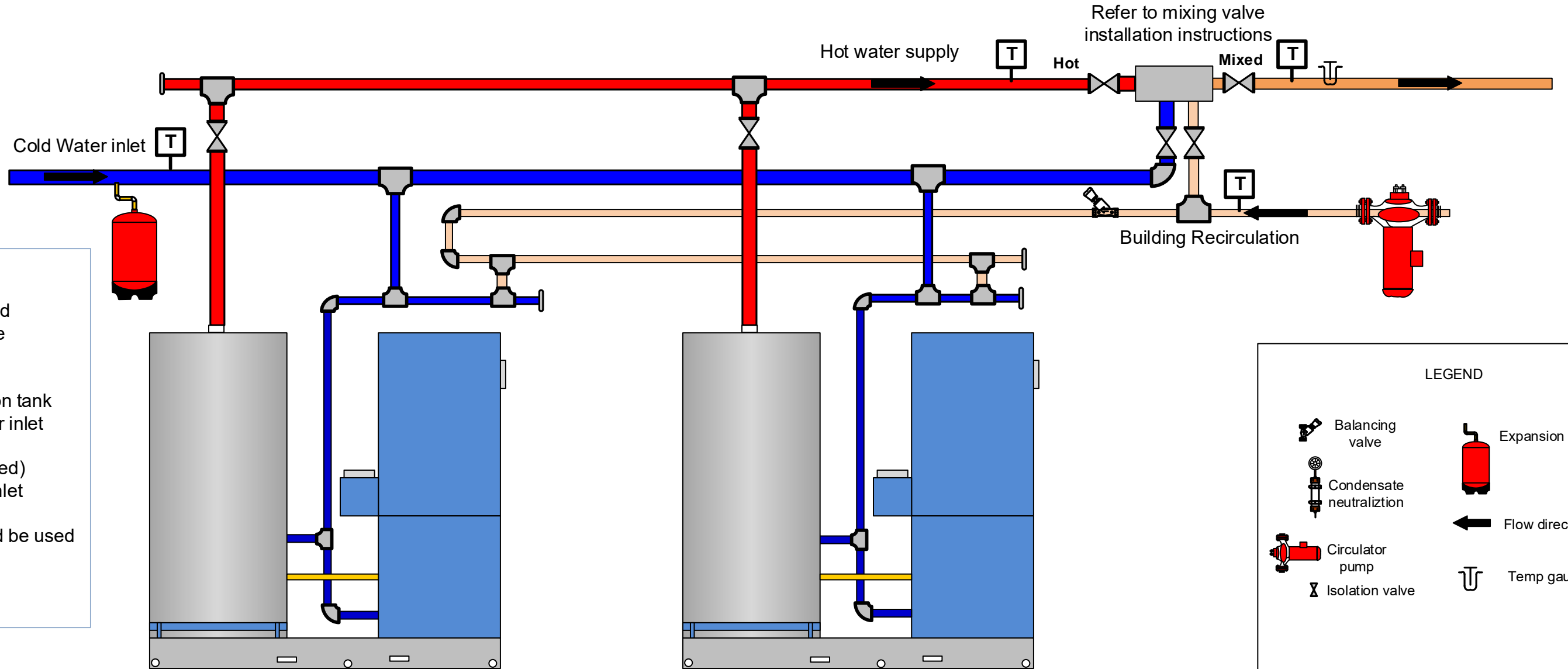
Triple HiDRA with storage tank piping diagram

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



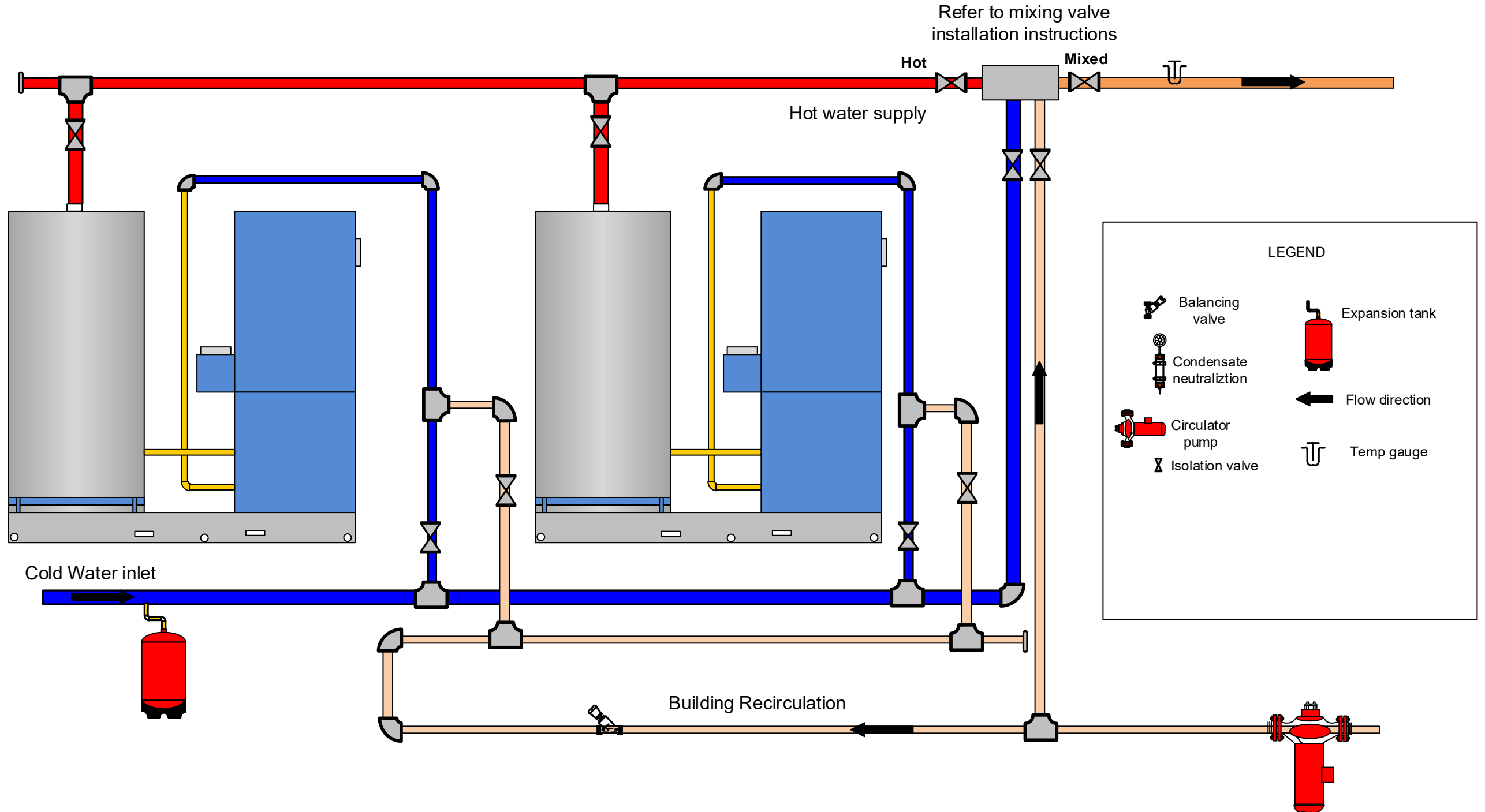
# Double Mach N Roll with 200 gallon tank piping diagram



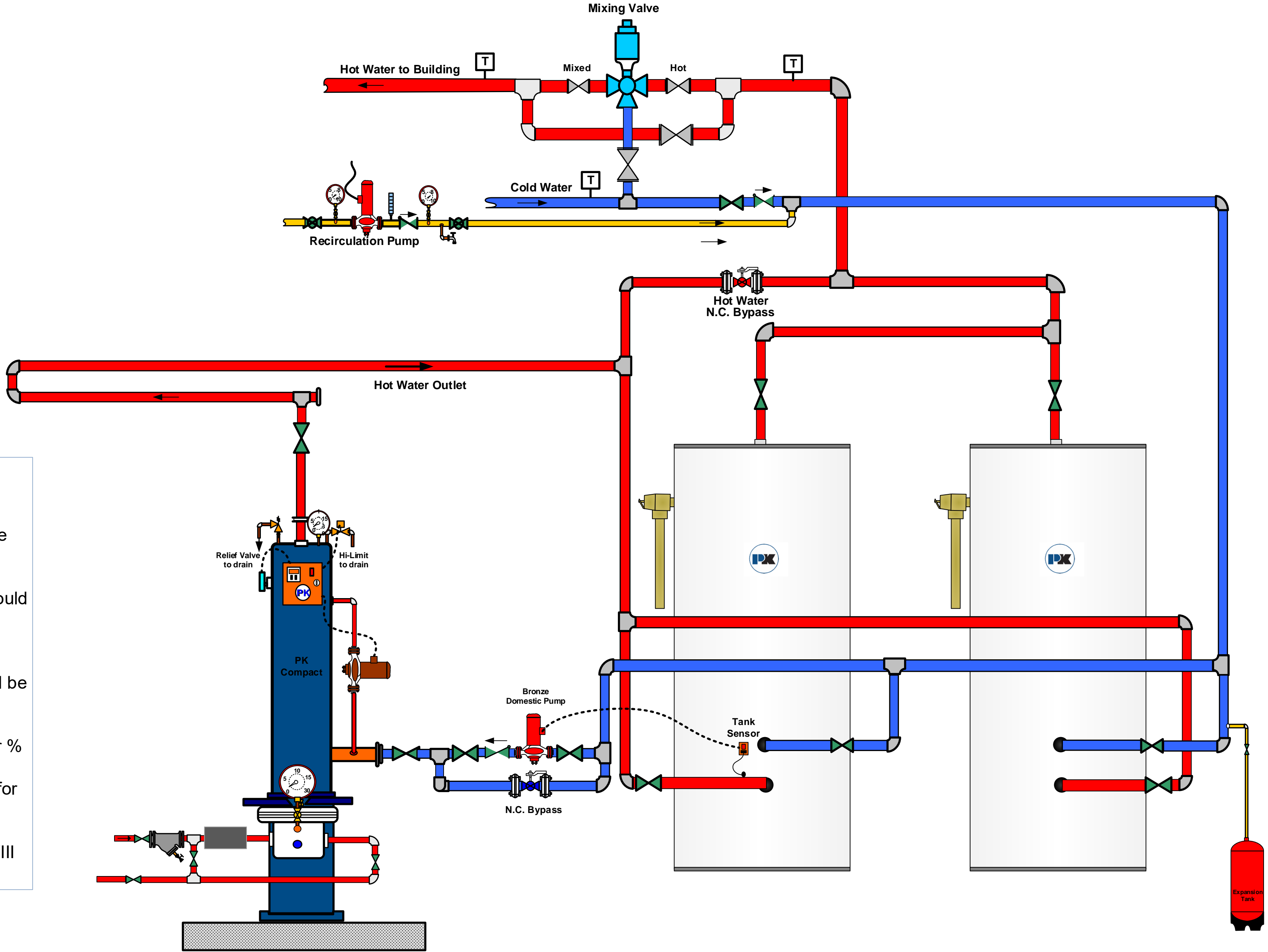
## Notes:

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



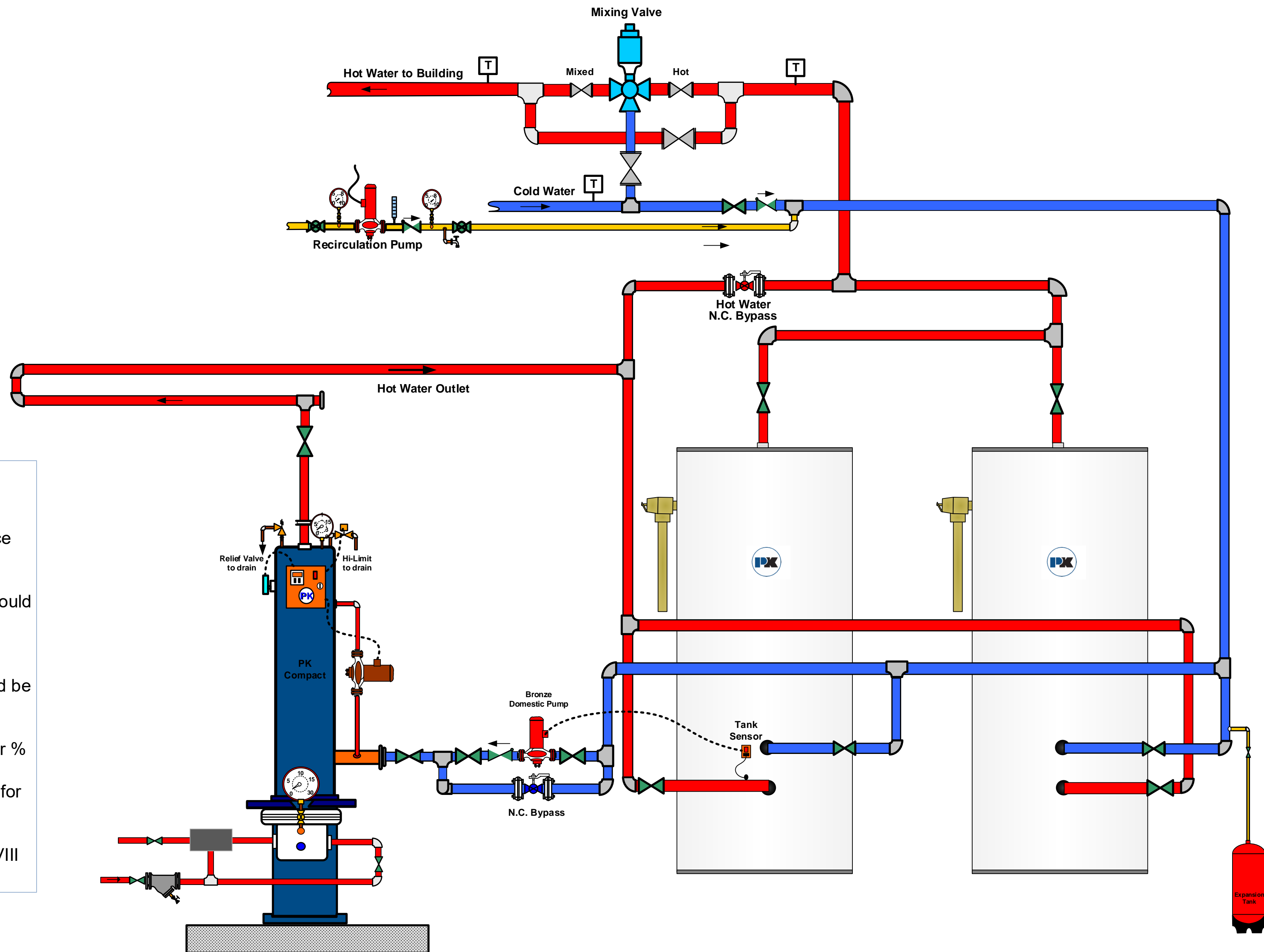
Single water to water 2 way valve Compact with 2 storage tanks



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

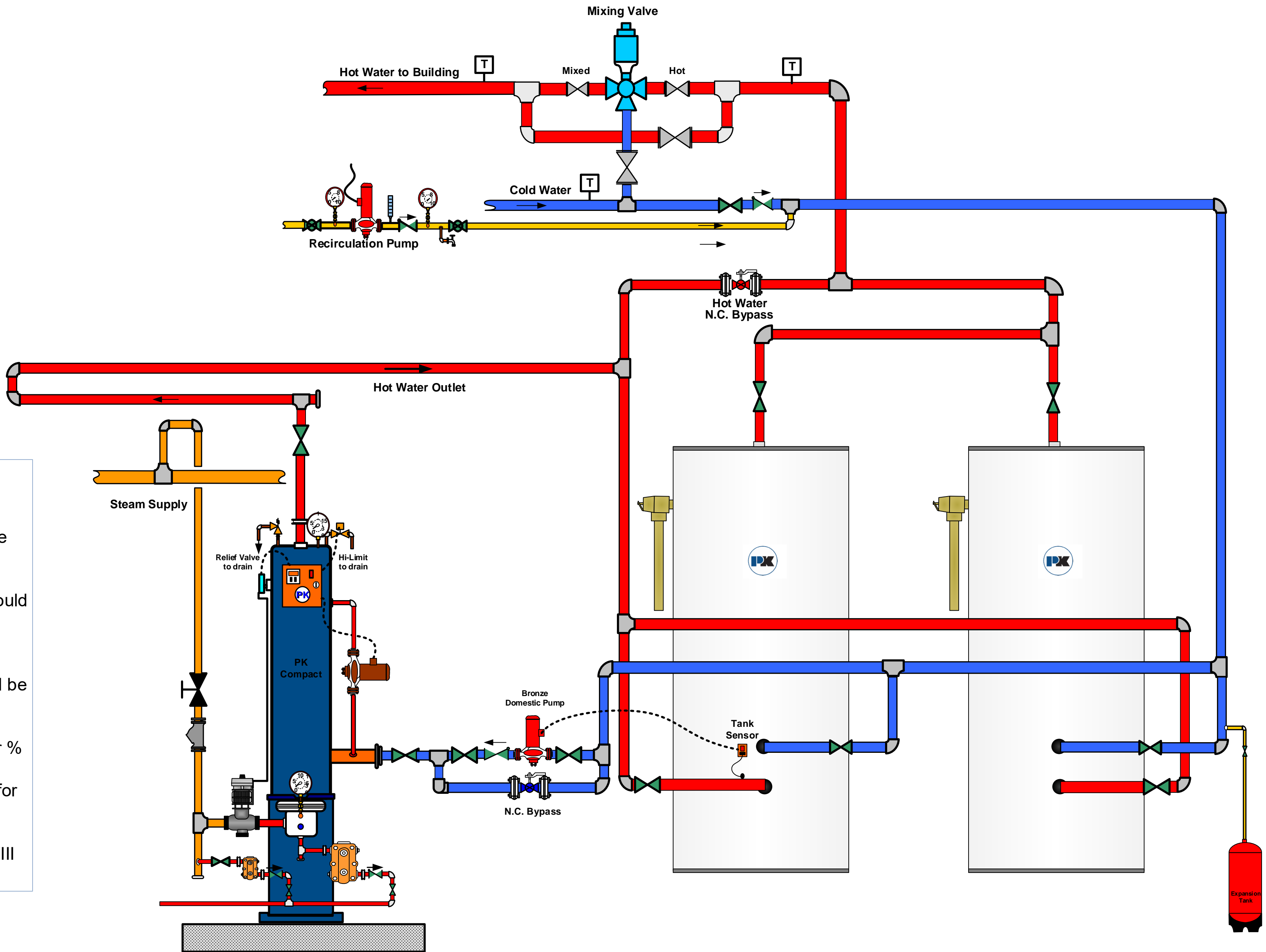
Single water to water 3 way valve Compact with 2 storage tanks



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
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

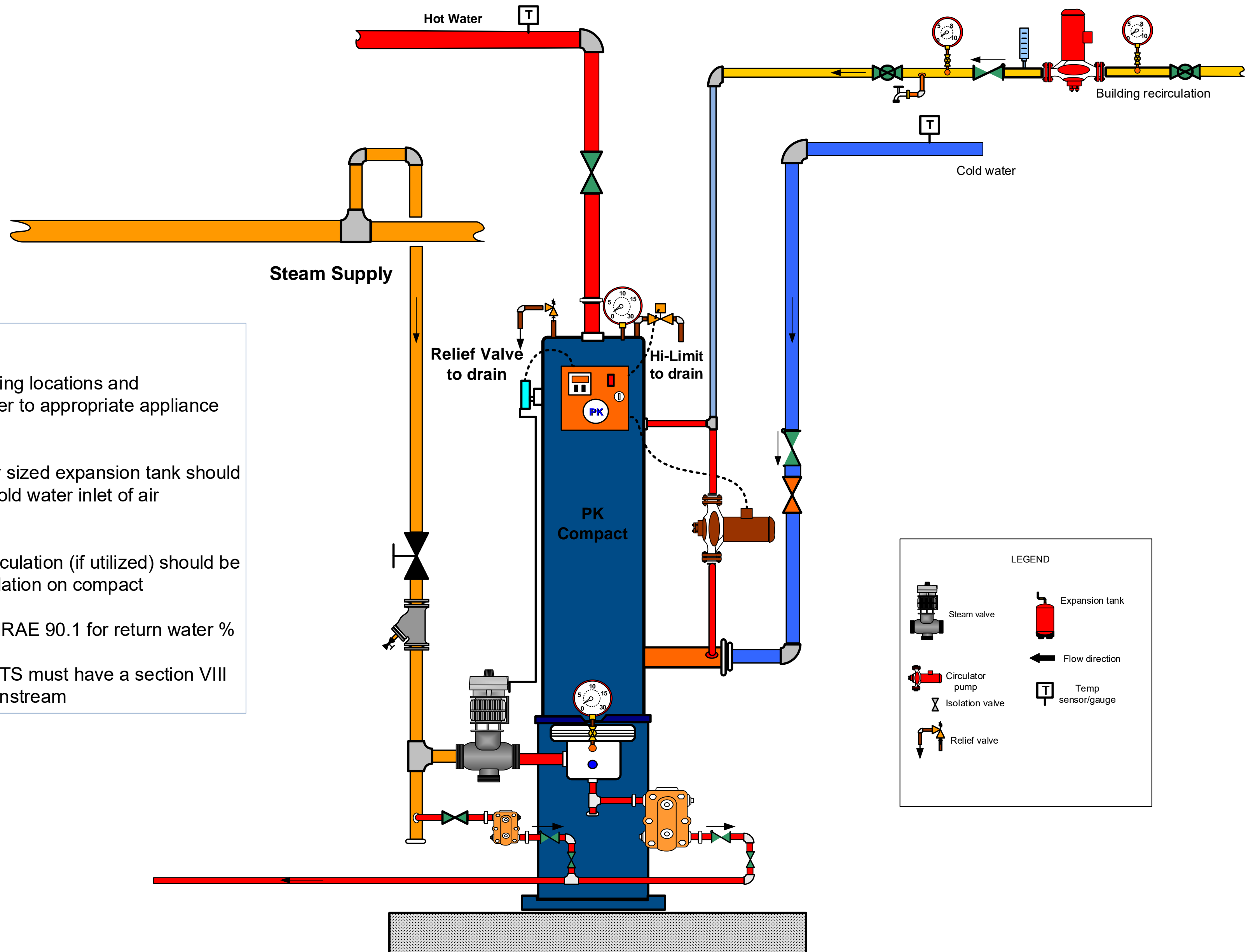
Single Compact with 2 storage tanks



Notes:

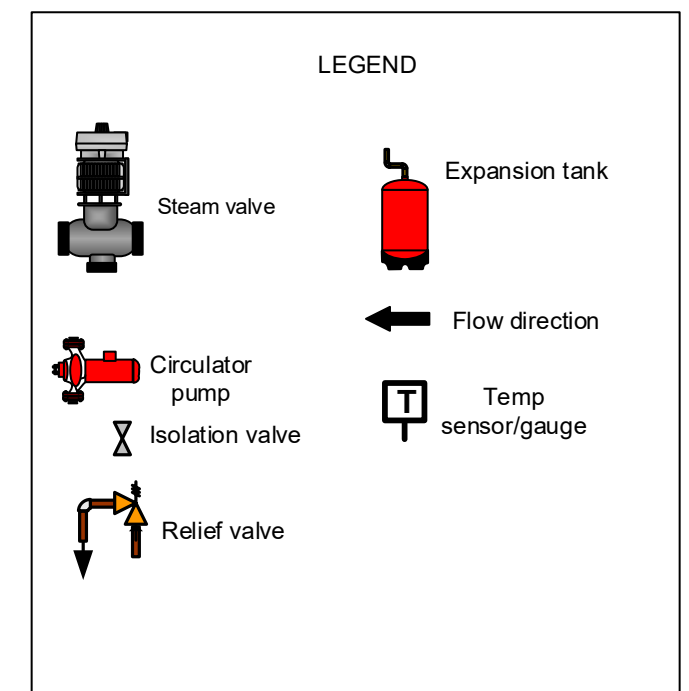
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
- 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
- 3. Building recirculation (if utilized) should be tied into cold water make up
- 4. Refer to ASHRAE 90.1 for return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



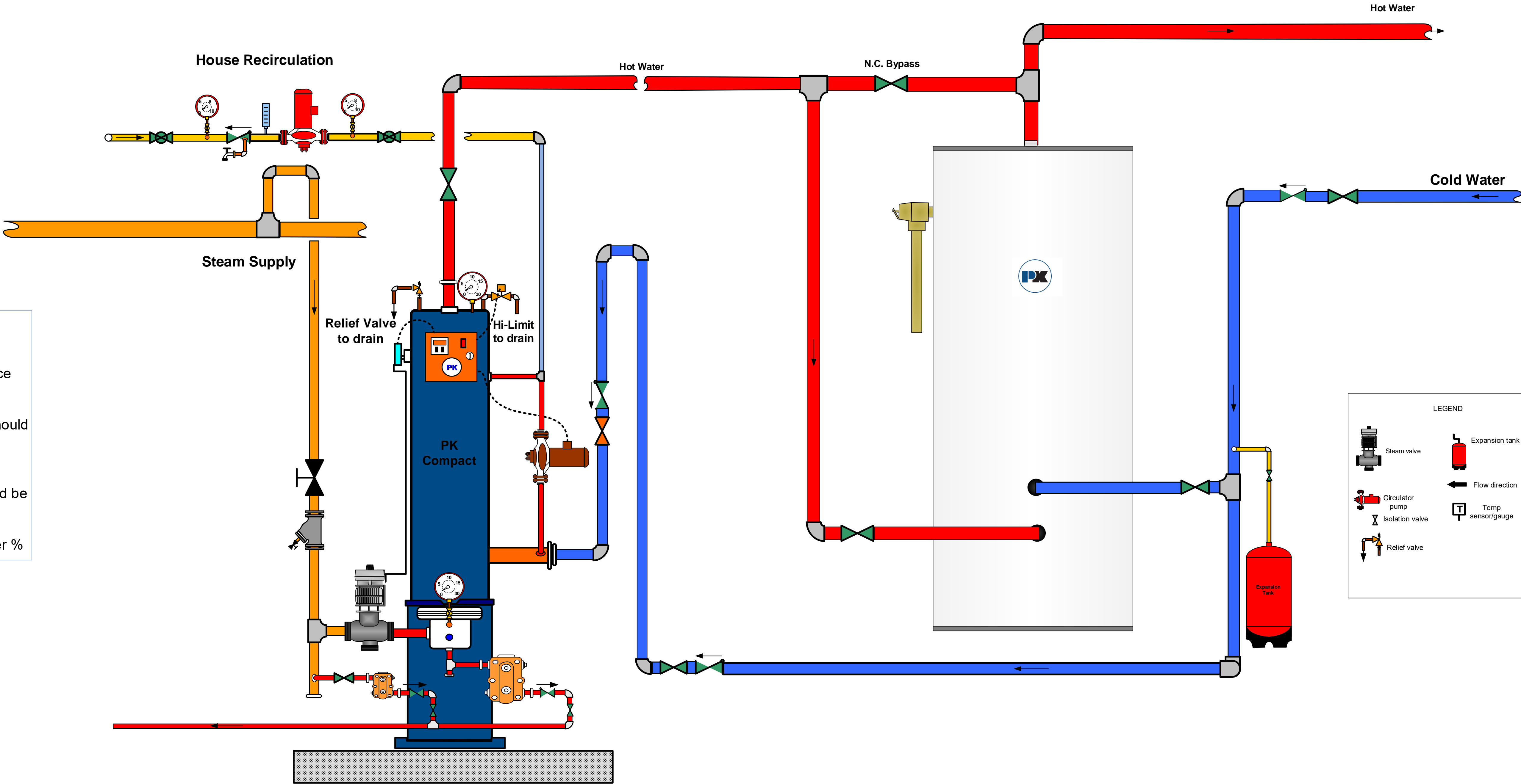


Notes:

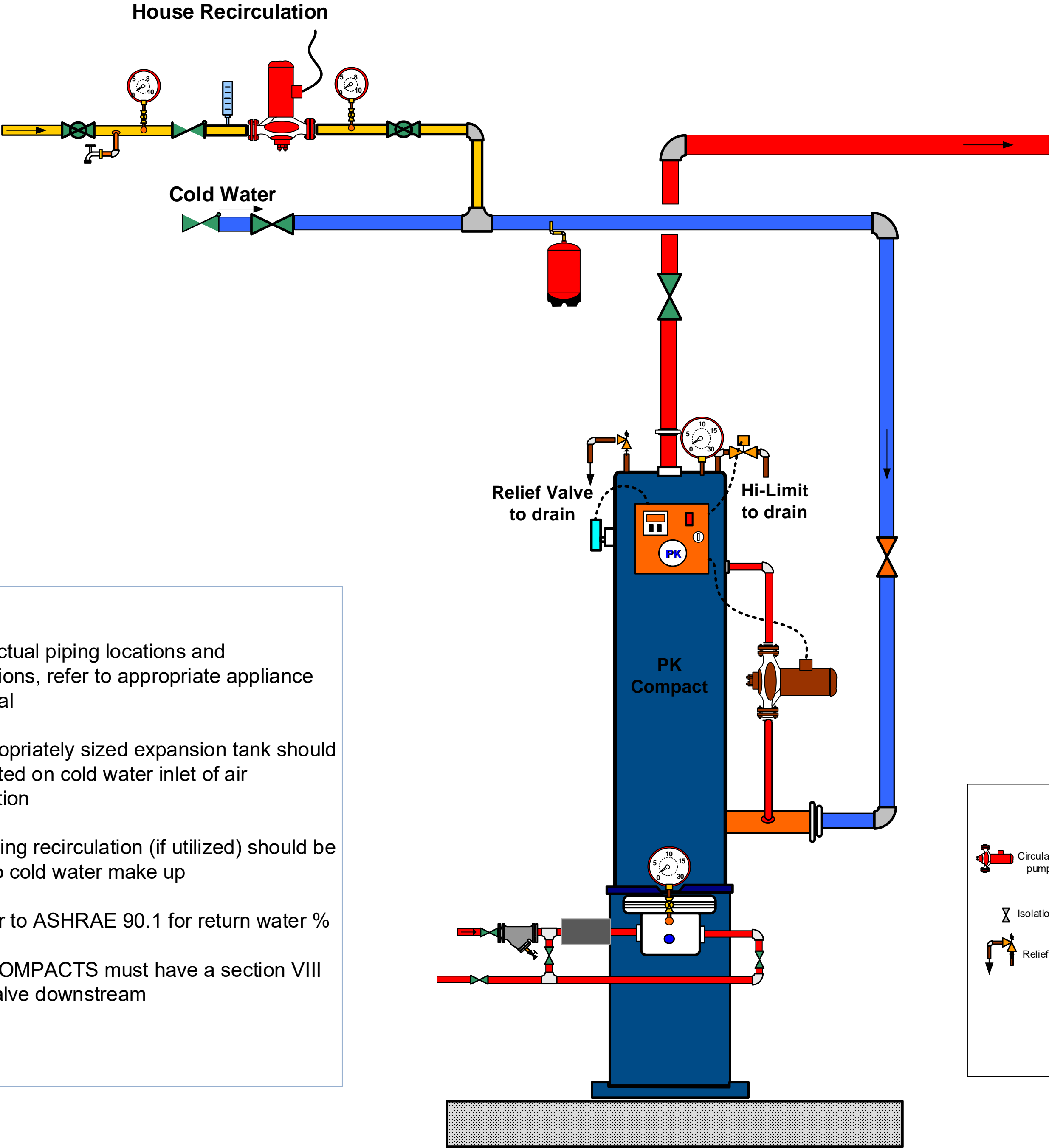
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into recirculation on compact
4. Refer to ASHRAE 90.1 for return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



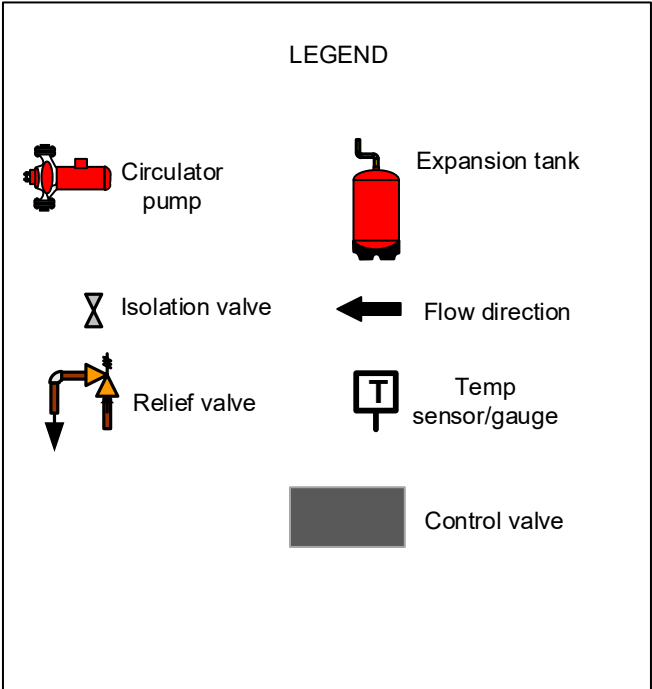
Single Compact with NY TRIM and Hot water storage tank



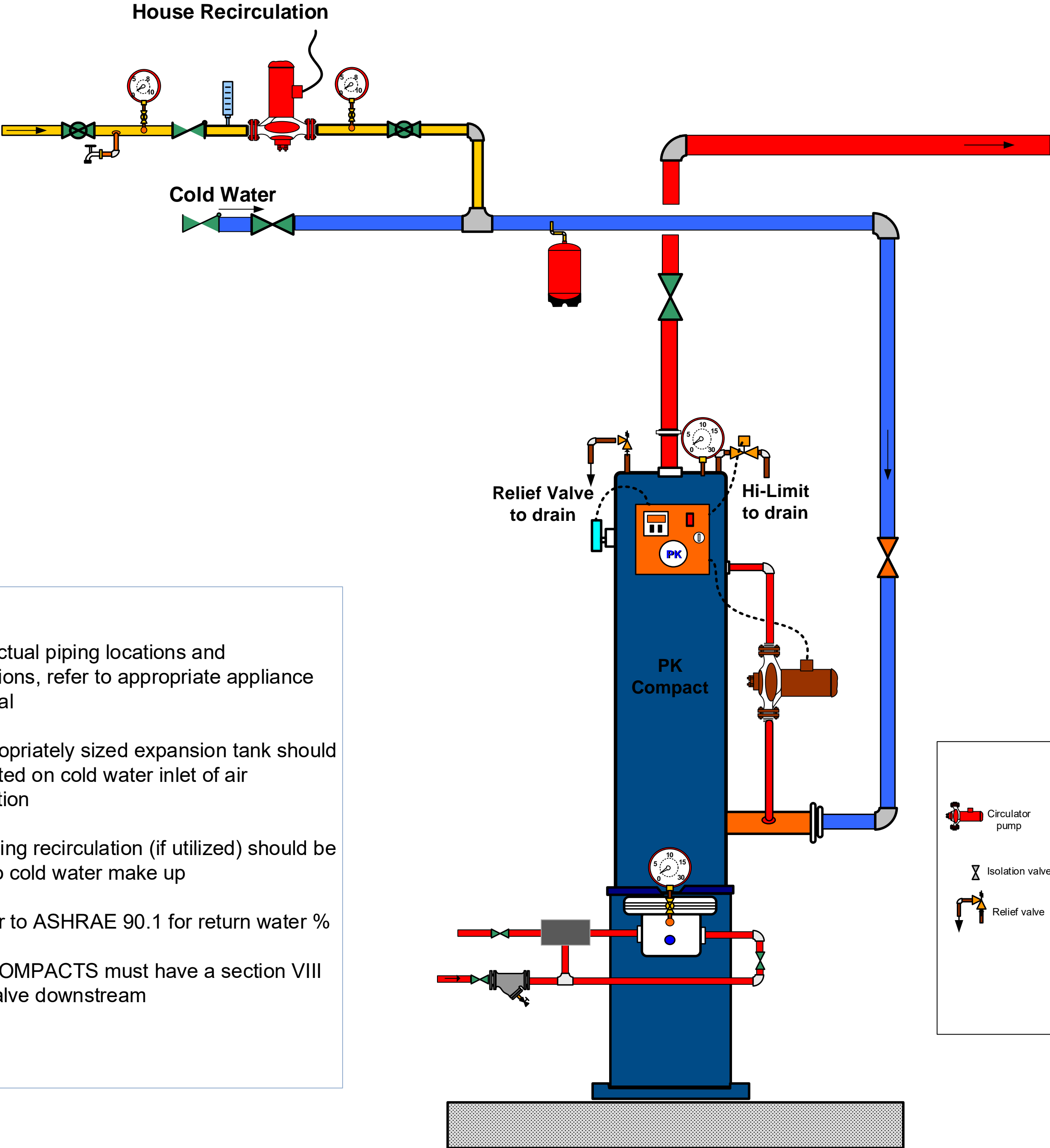
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 3. Building recirculation (if utilized) should be tied into compact recirculation
  - 4. Refer to ASHRAE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



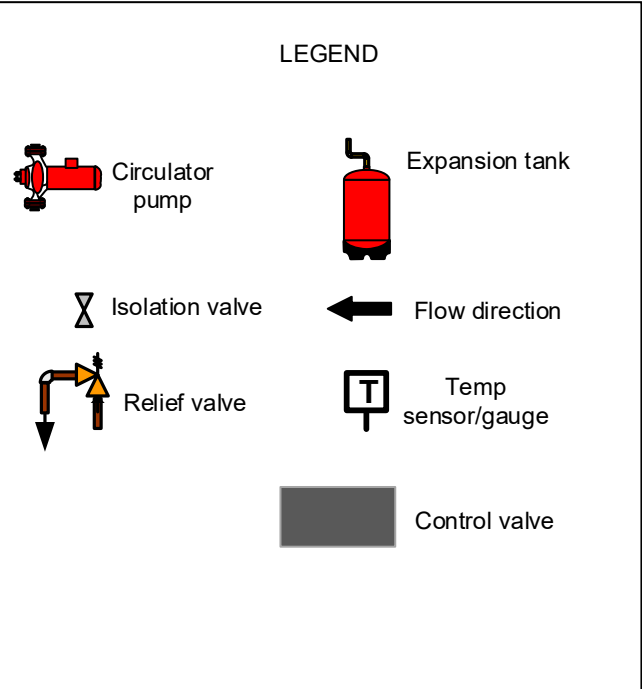
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 3. Building recirculation (if utilized) should be tied into cold water make up
  - 4. Refer to ASHRAE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



Single Water to Water with 3 way valve Compact installation

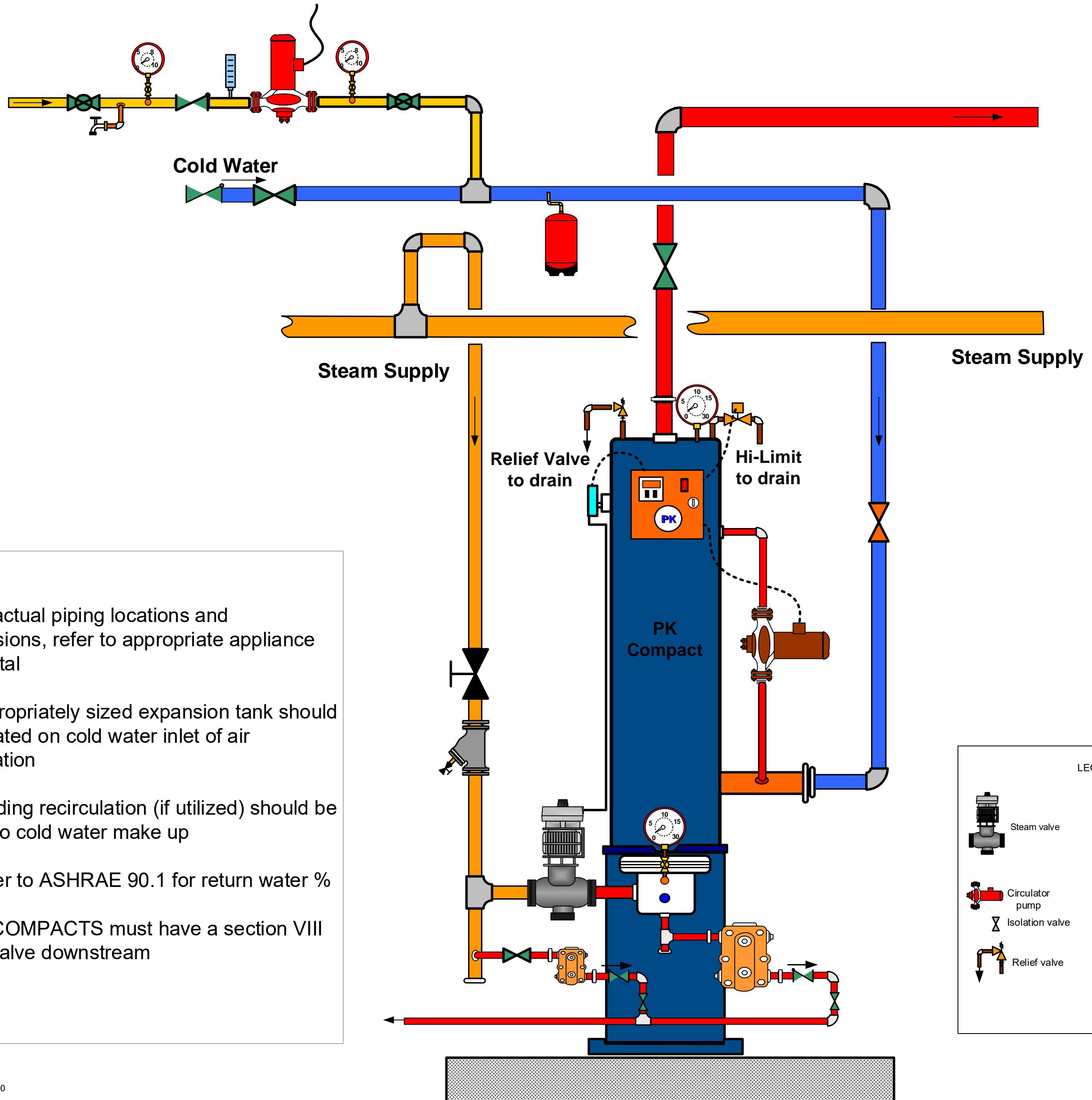


- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 3. Building recirculation (if utilized) should be tied into cold water make up
  - 4. Refer to ASHRAE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



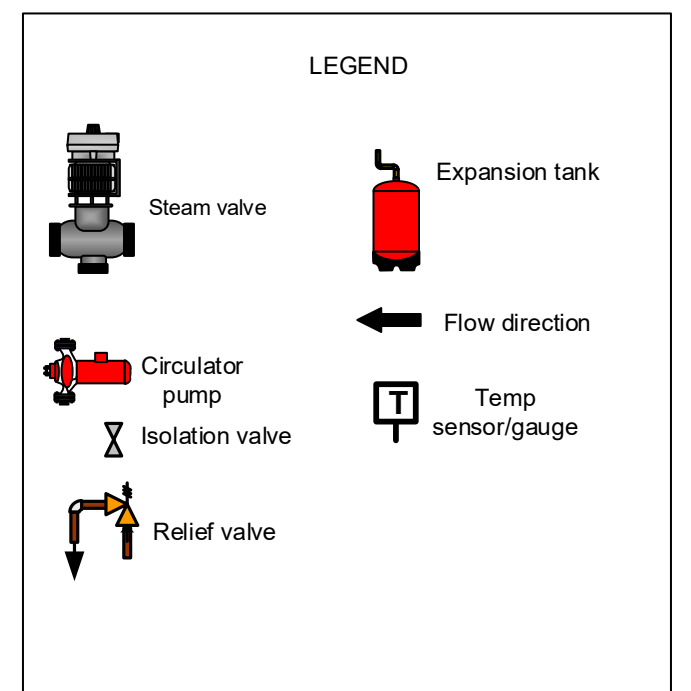
# Single Compact installation

## House Recirculation



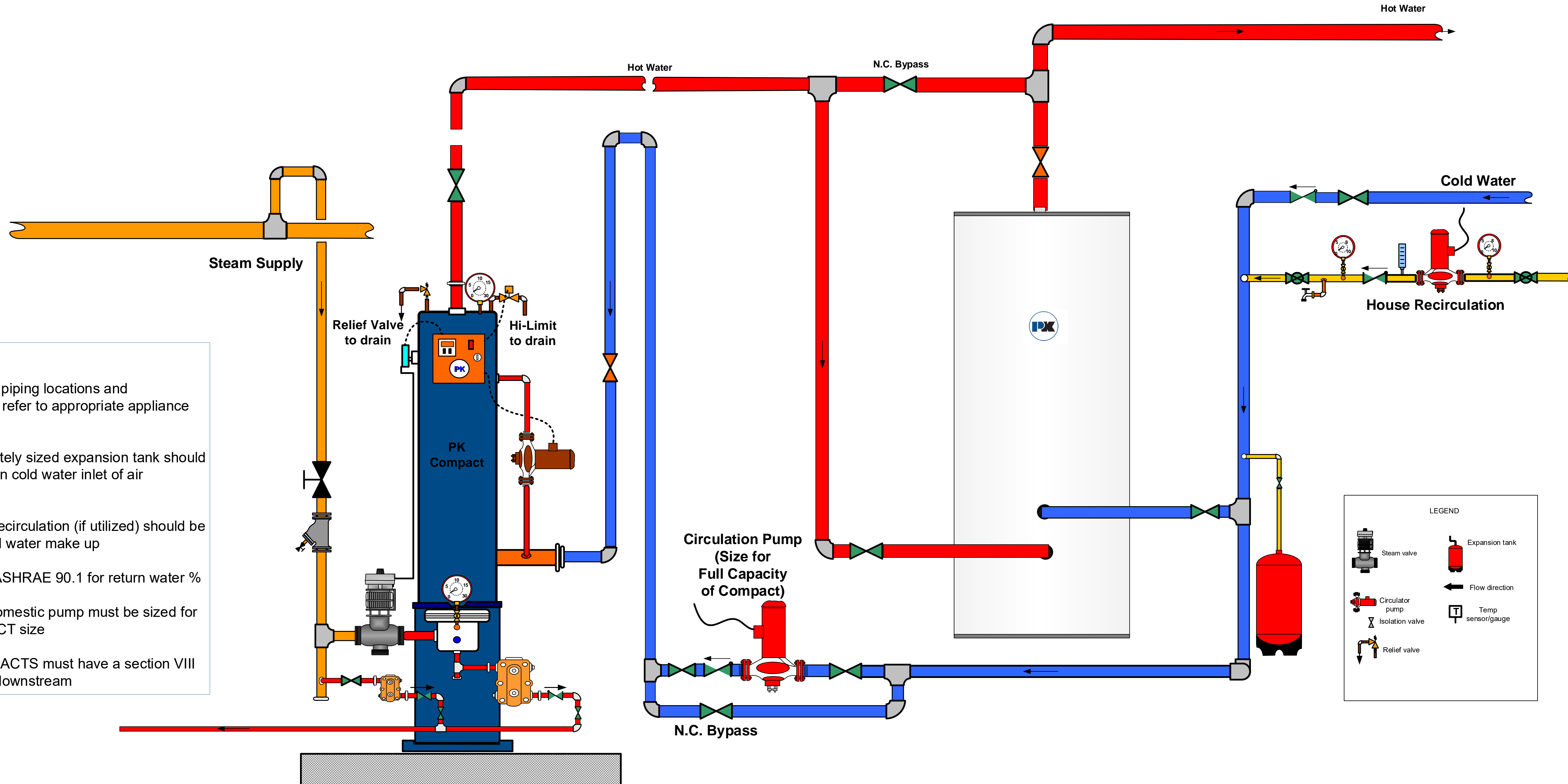
### Notes:

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

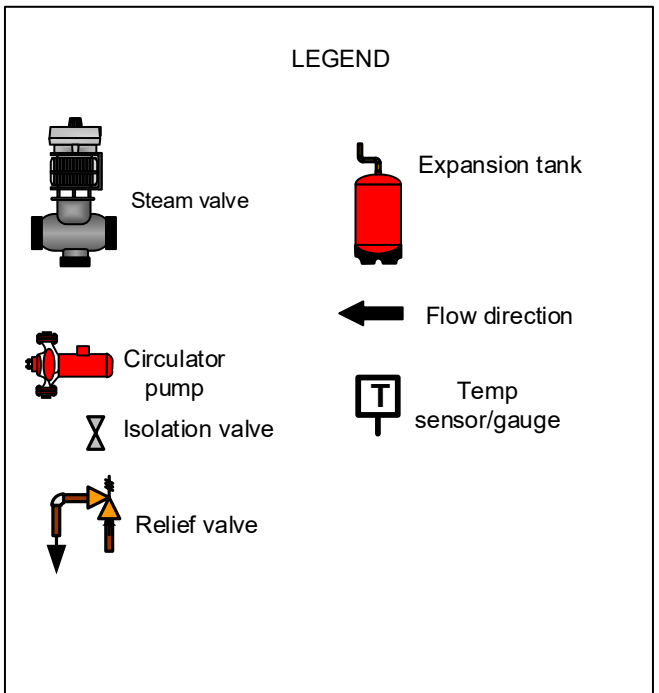
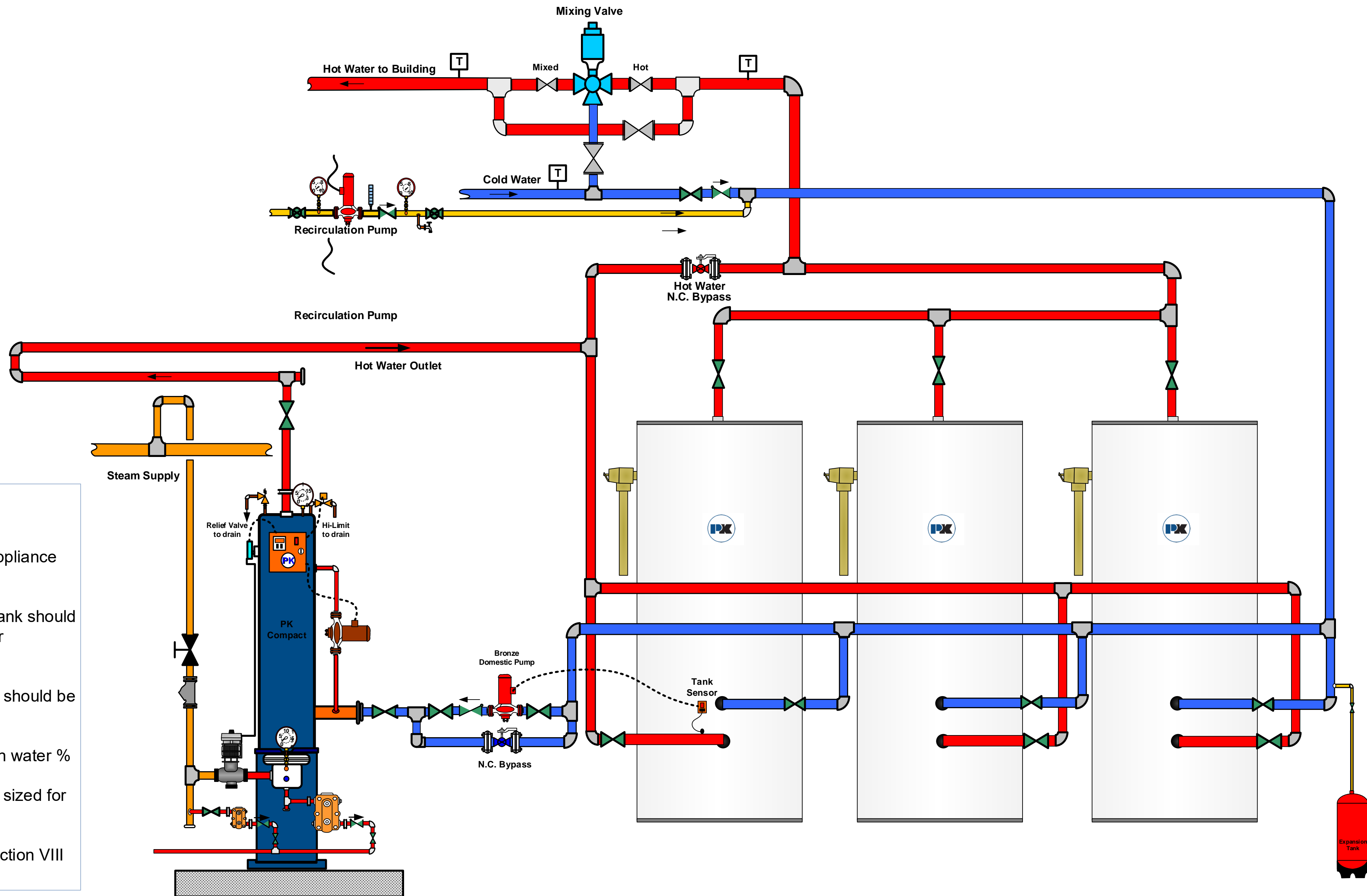


Notes:

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



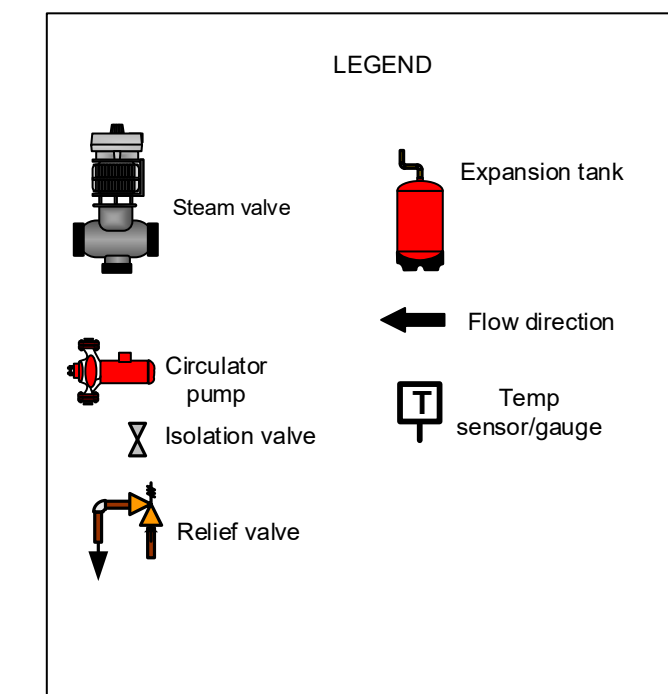
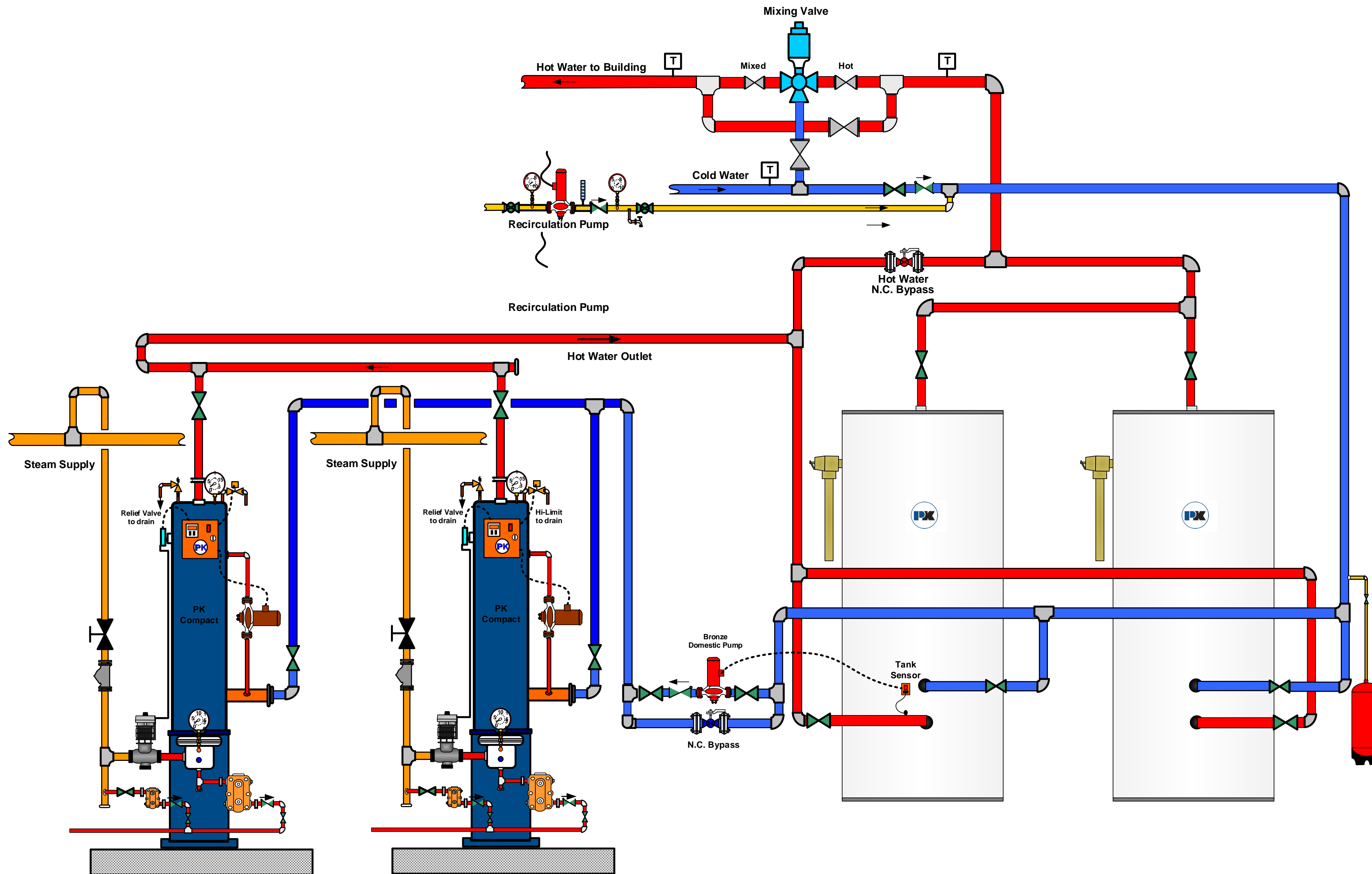
# Single Compact with 3 storage tanks



- 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

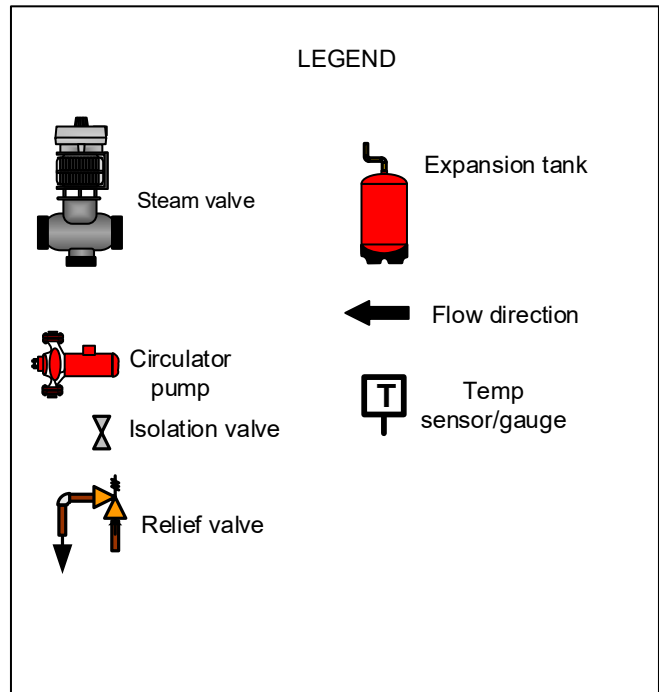
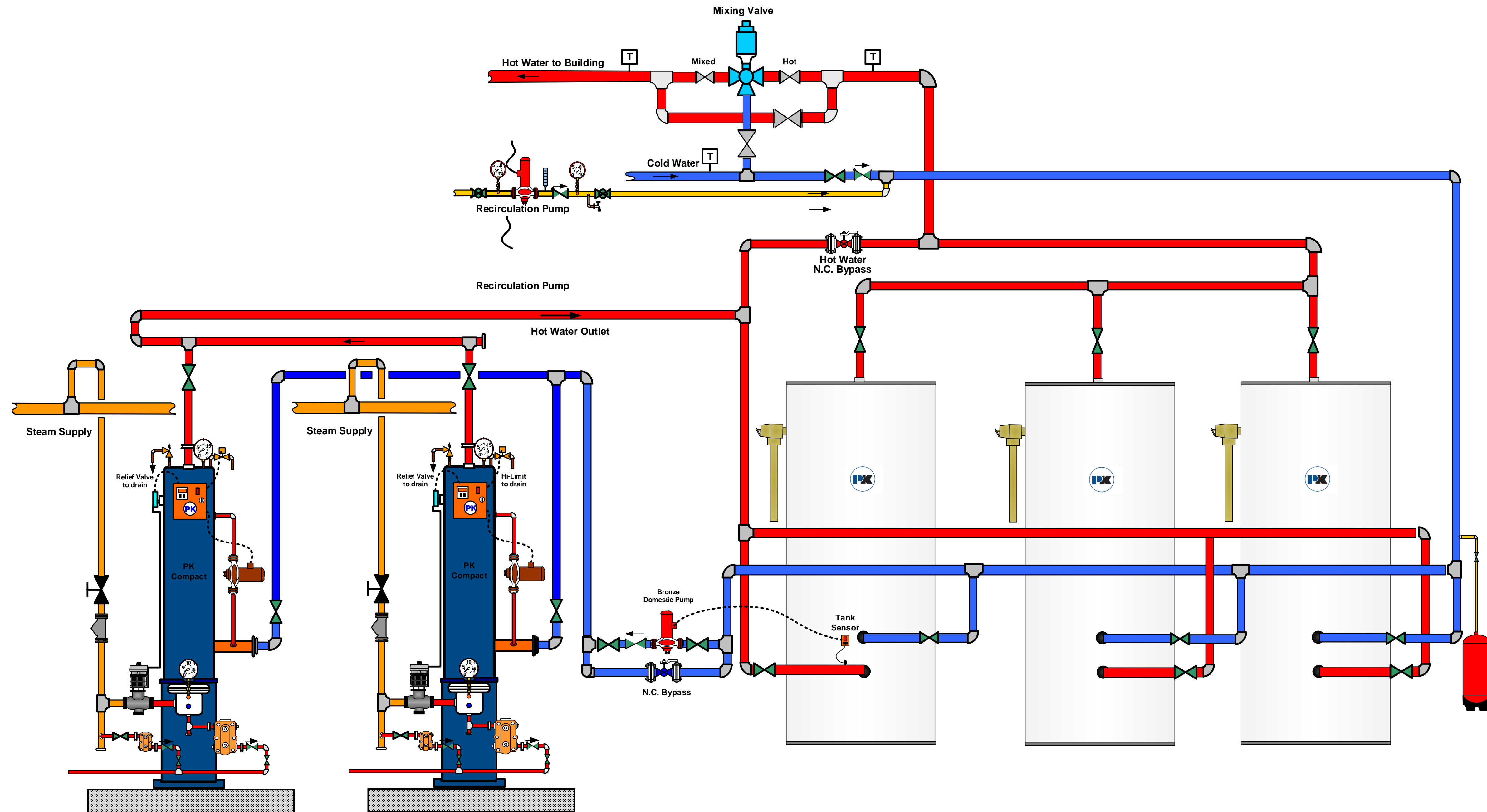


# 2 Compacts with 2 storage tanks



## Notes:

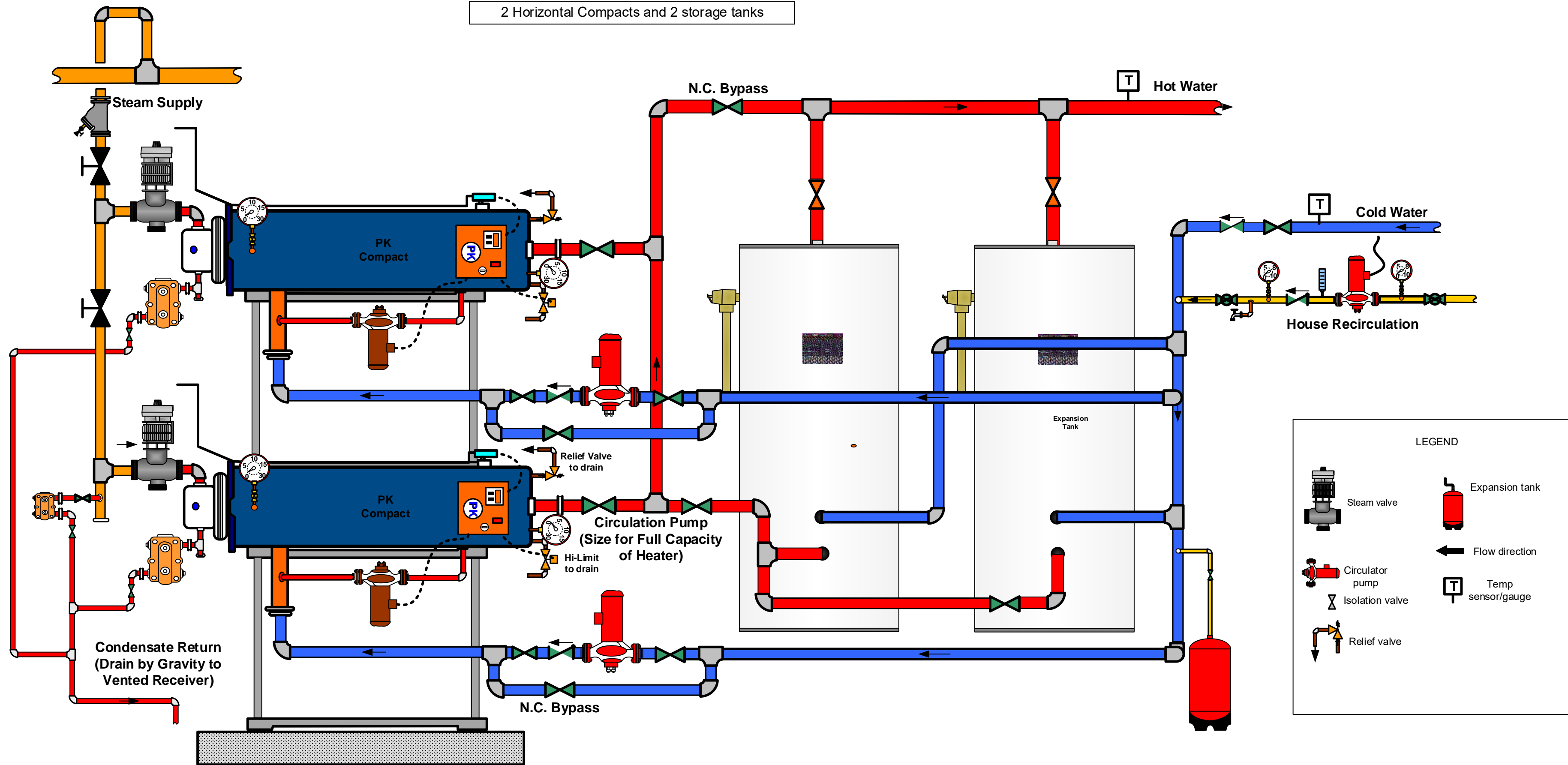
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water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



- 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

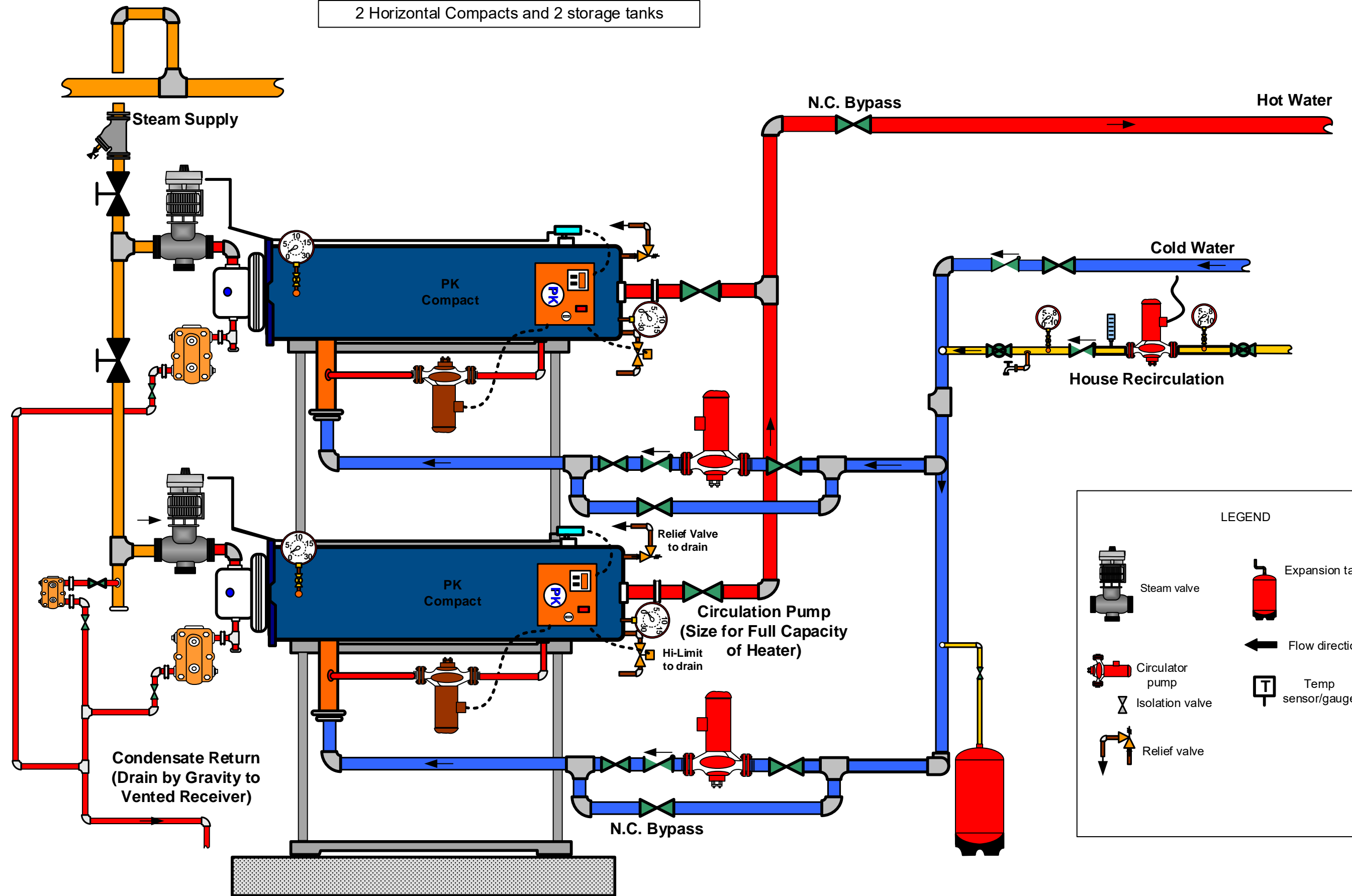
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  3. Building recirculation (if utilized) should be tied into cold water make up
  4. Refer to ASHRAE 90.1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

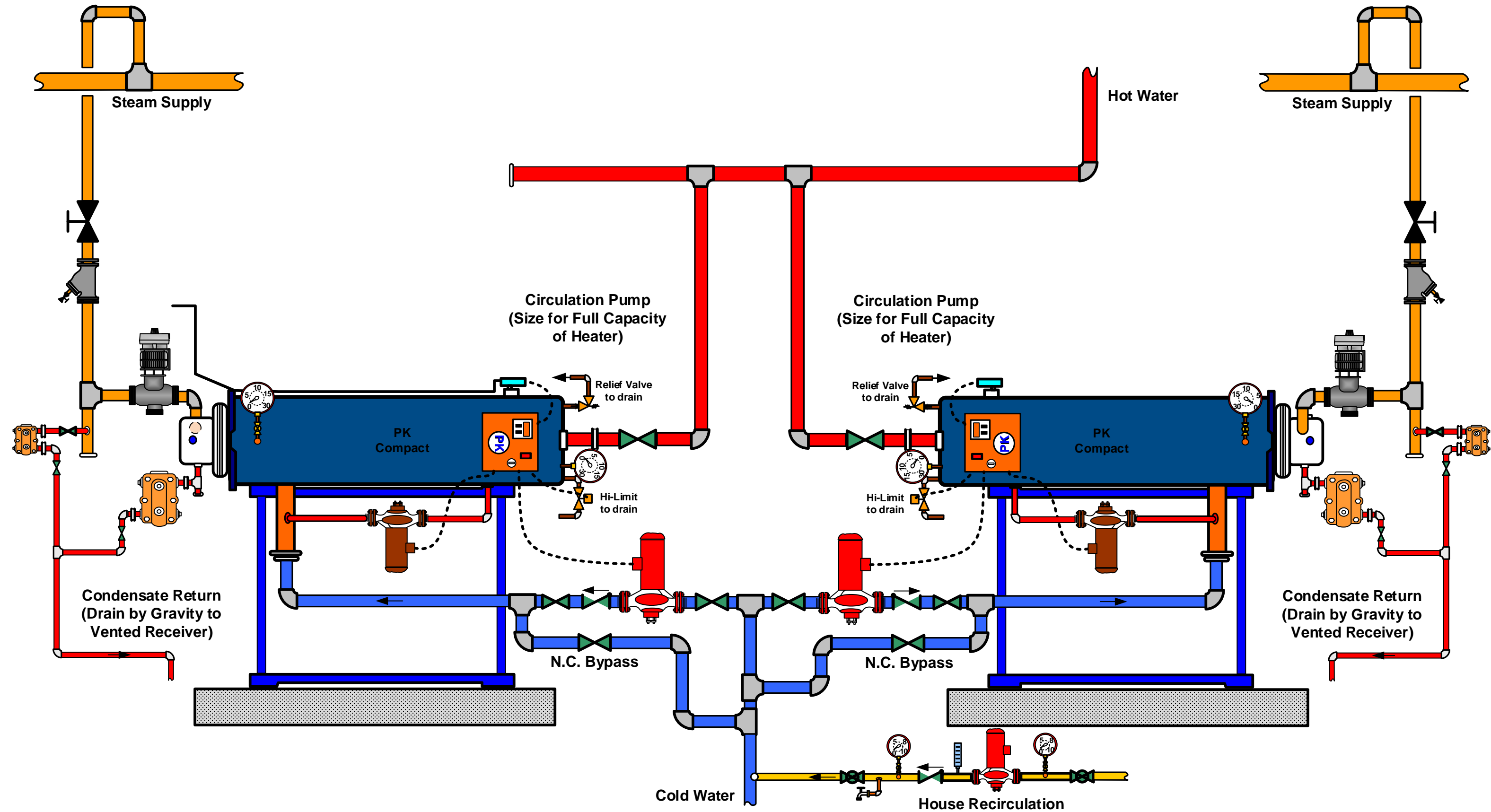


2 Horizontal Compacts and 2 storage tanks

#### 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





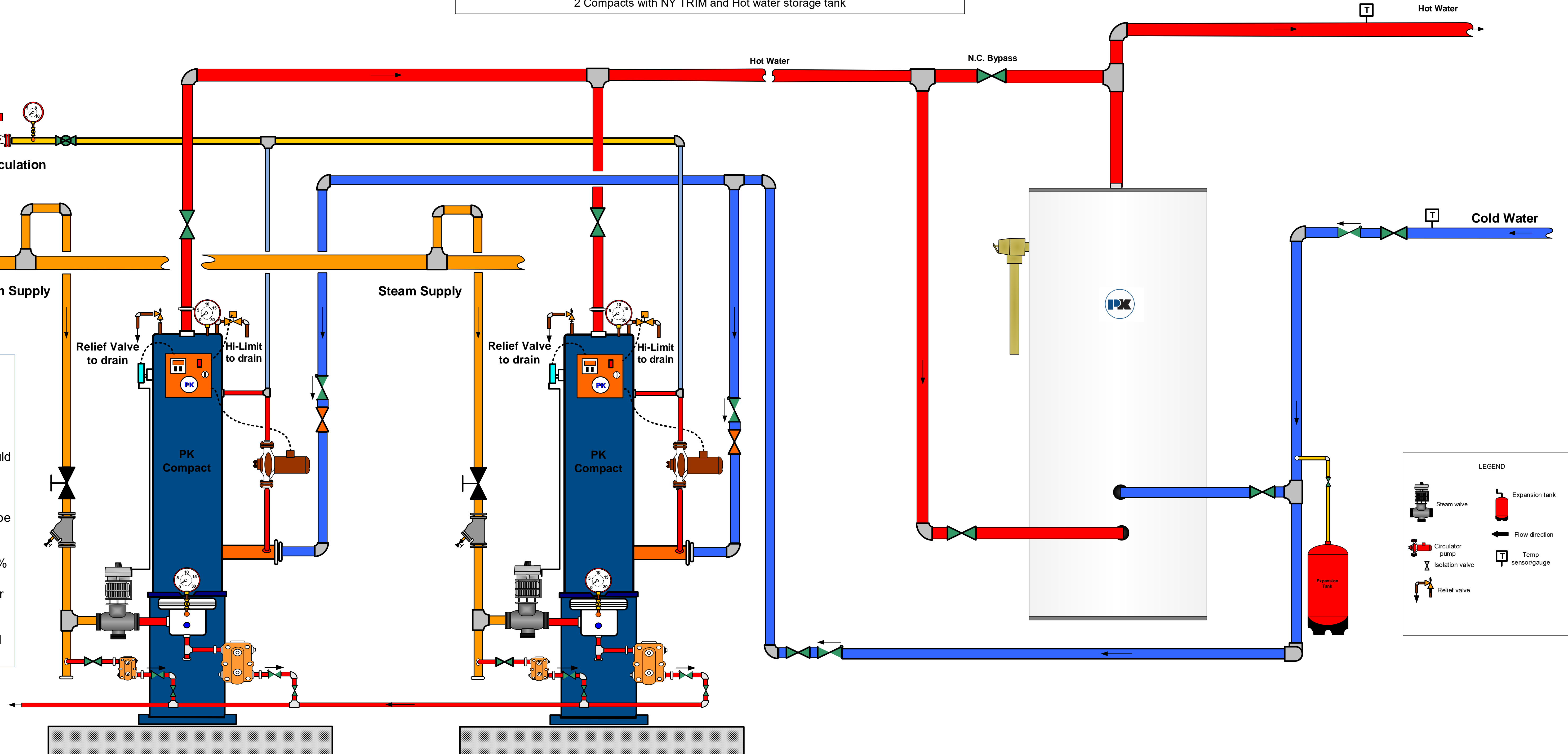
Notes:

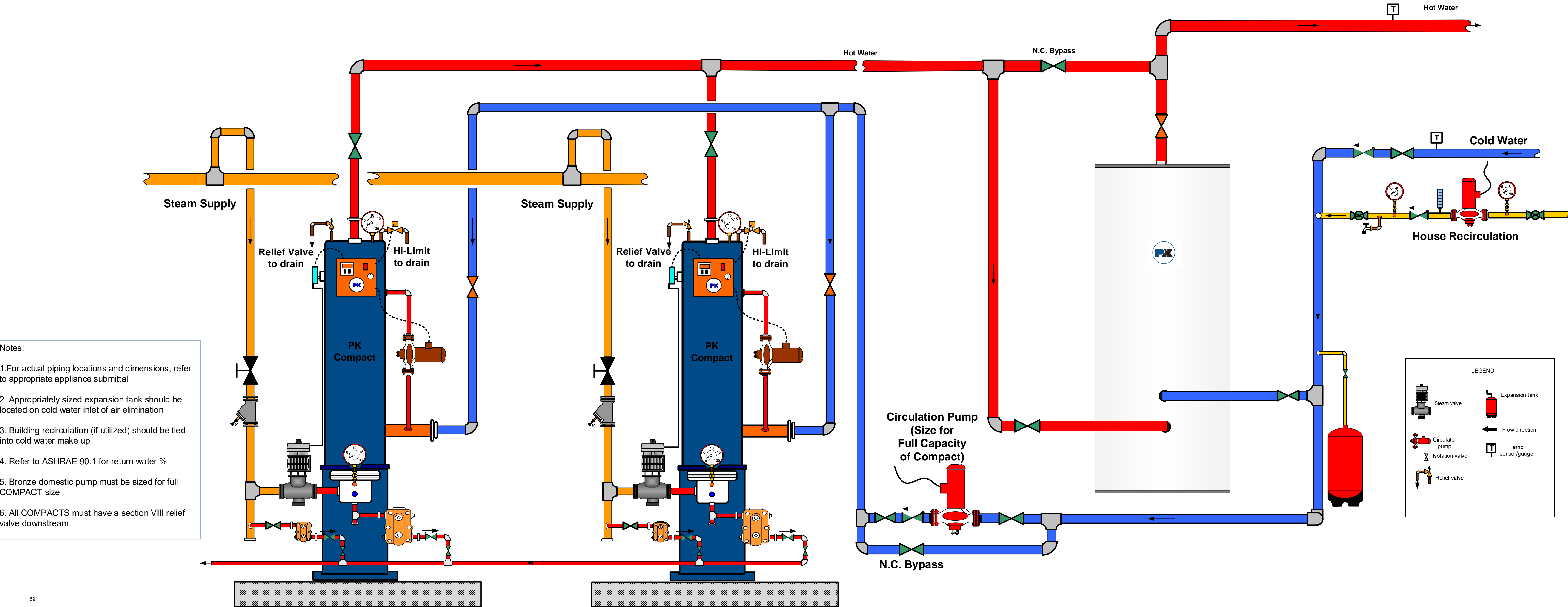
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5.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



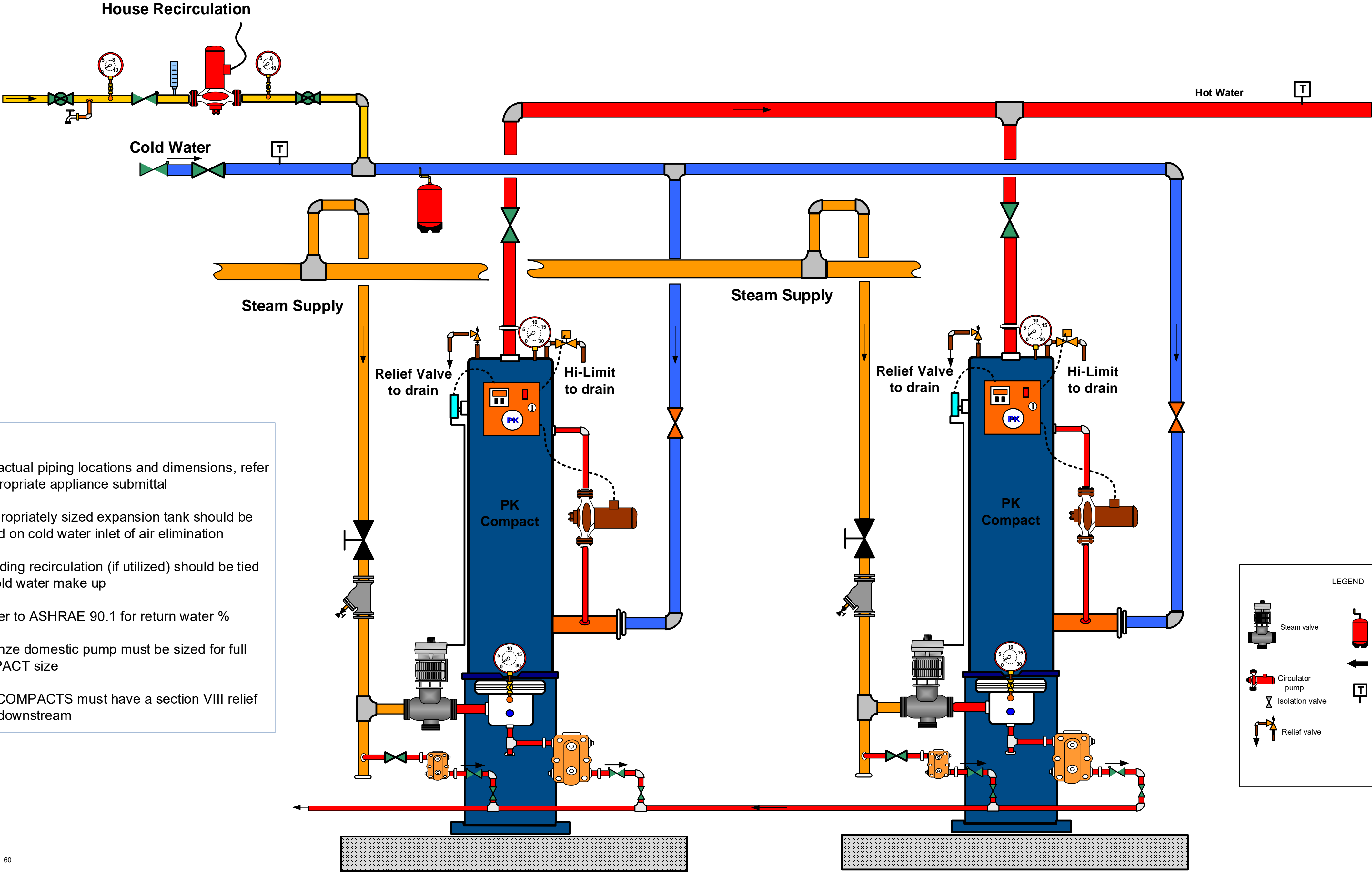
Notes:

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 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





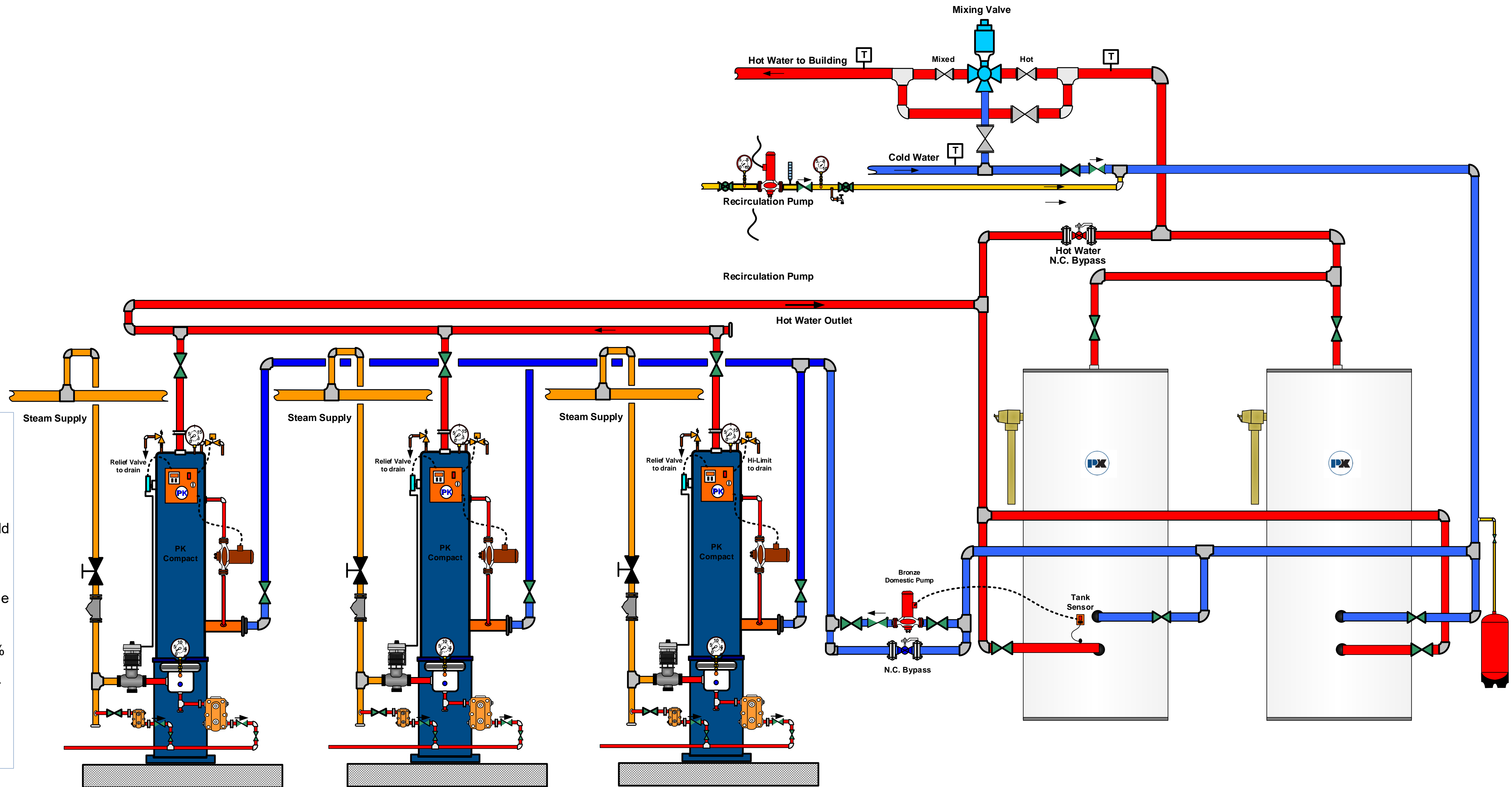




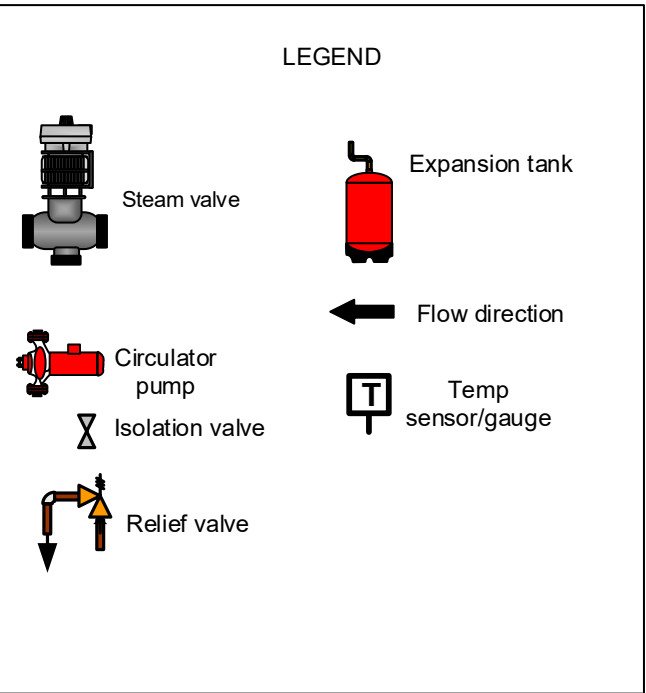
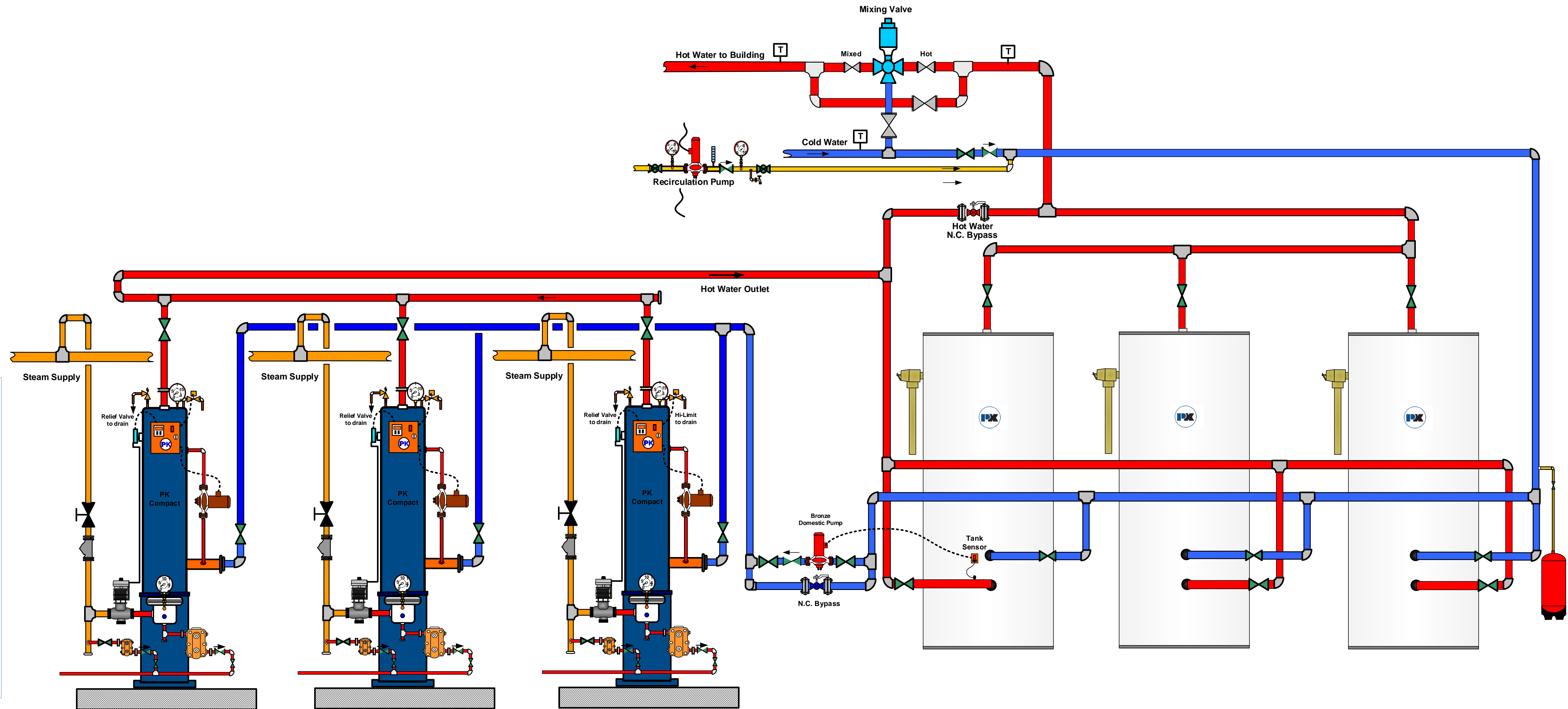
- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 3. Building recirculation (if utilized) should be tied into cold water make up
  - 4. Refer to ASHRAE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

	Expansion tank
	Flow direction
	Temp sensor/gauge



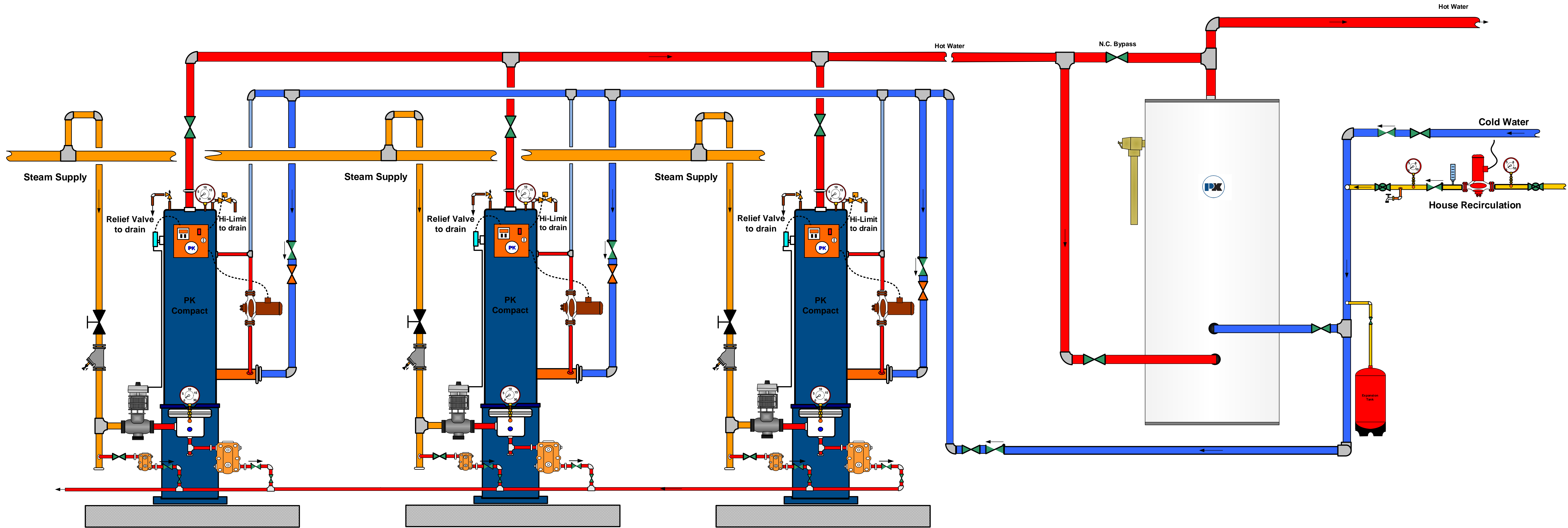
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  3. Building recirculation (if utilized) should be tied into cold water make up
  4. Refer to ASHRAE 90.1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

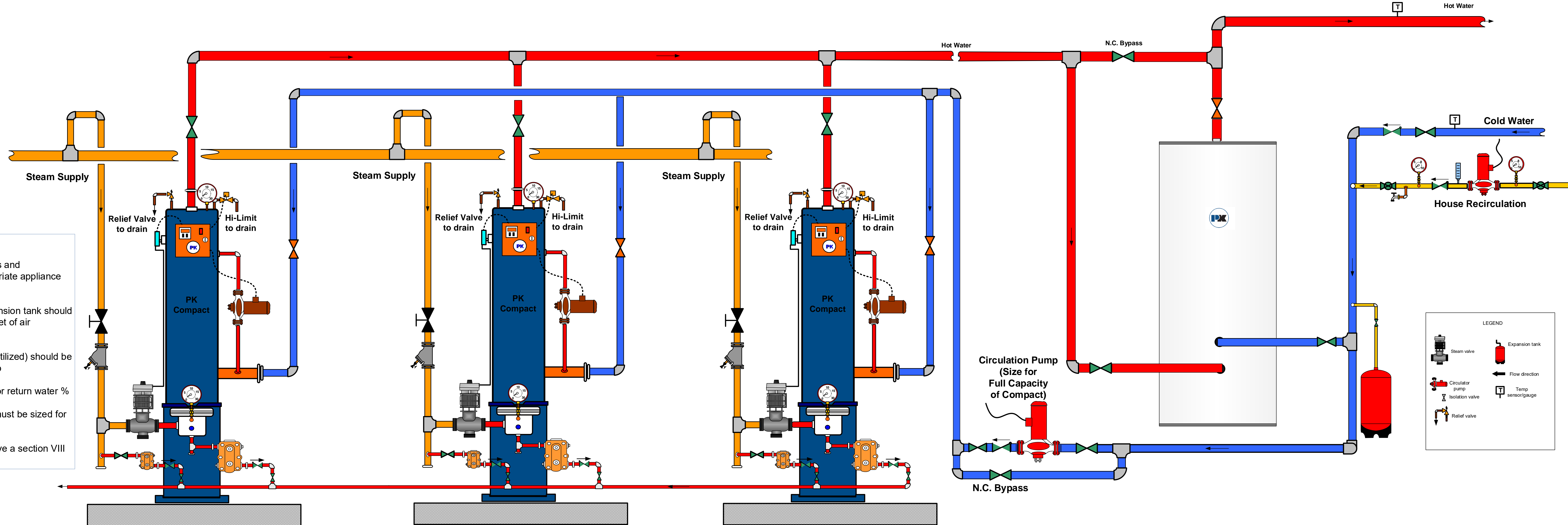
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. Refer to ASHRAE 90.1 for return water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

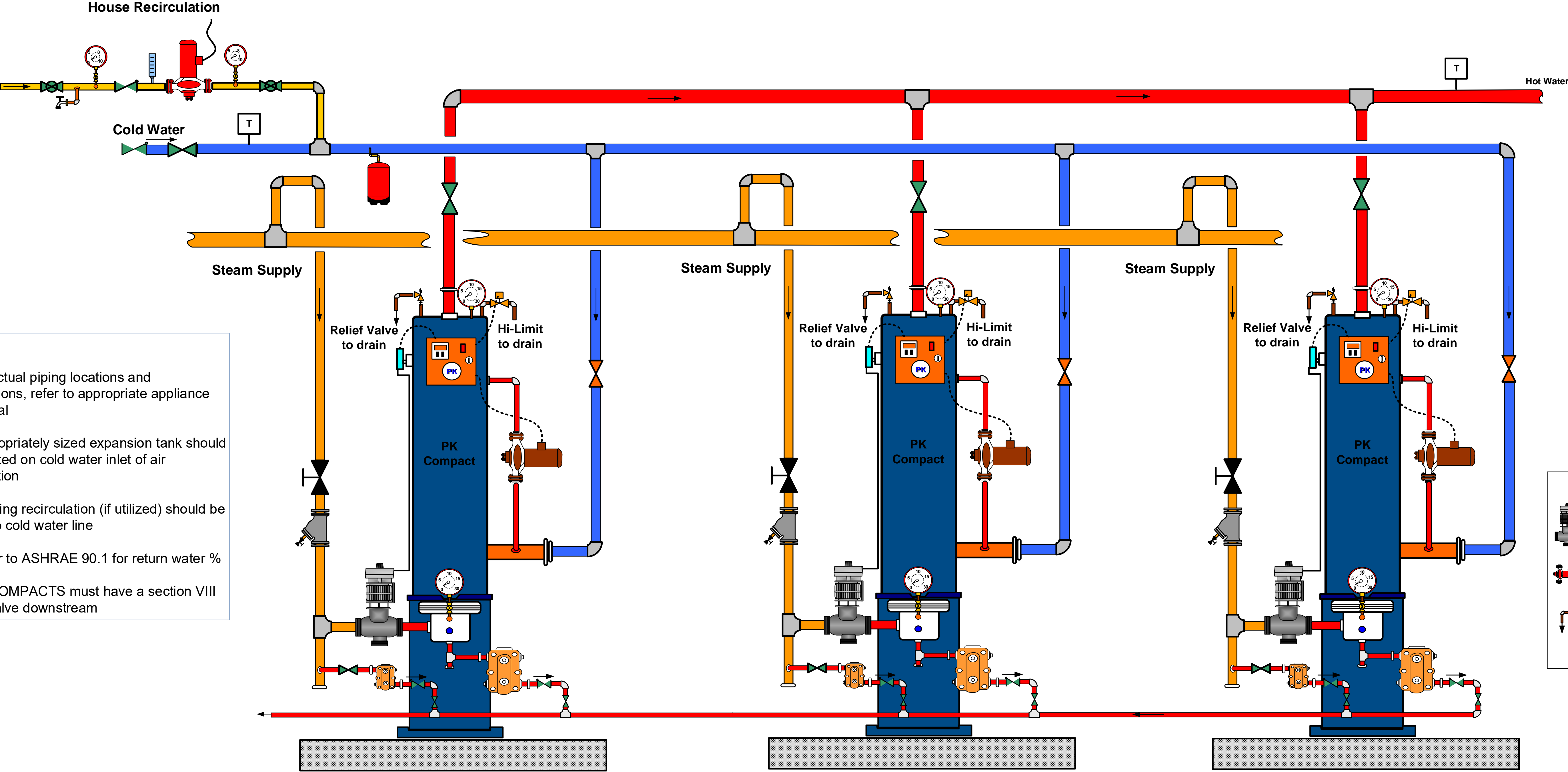
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  3. Building recirculation (if utilized) should be tied into cold water make up
  4. 12k ohm tank sensor must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



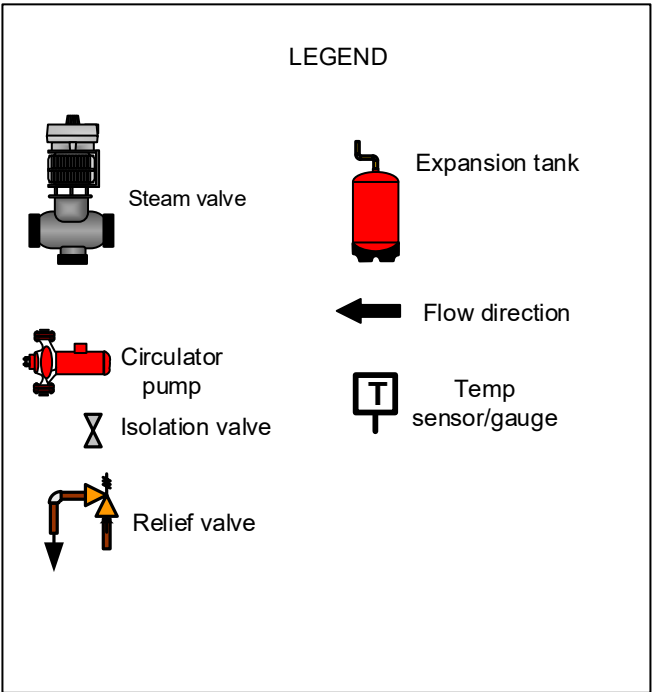
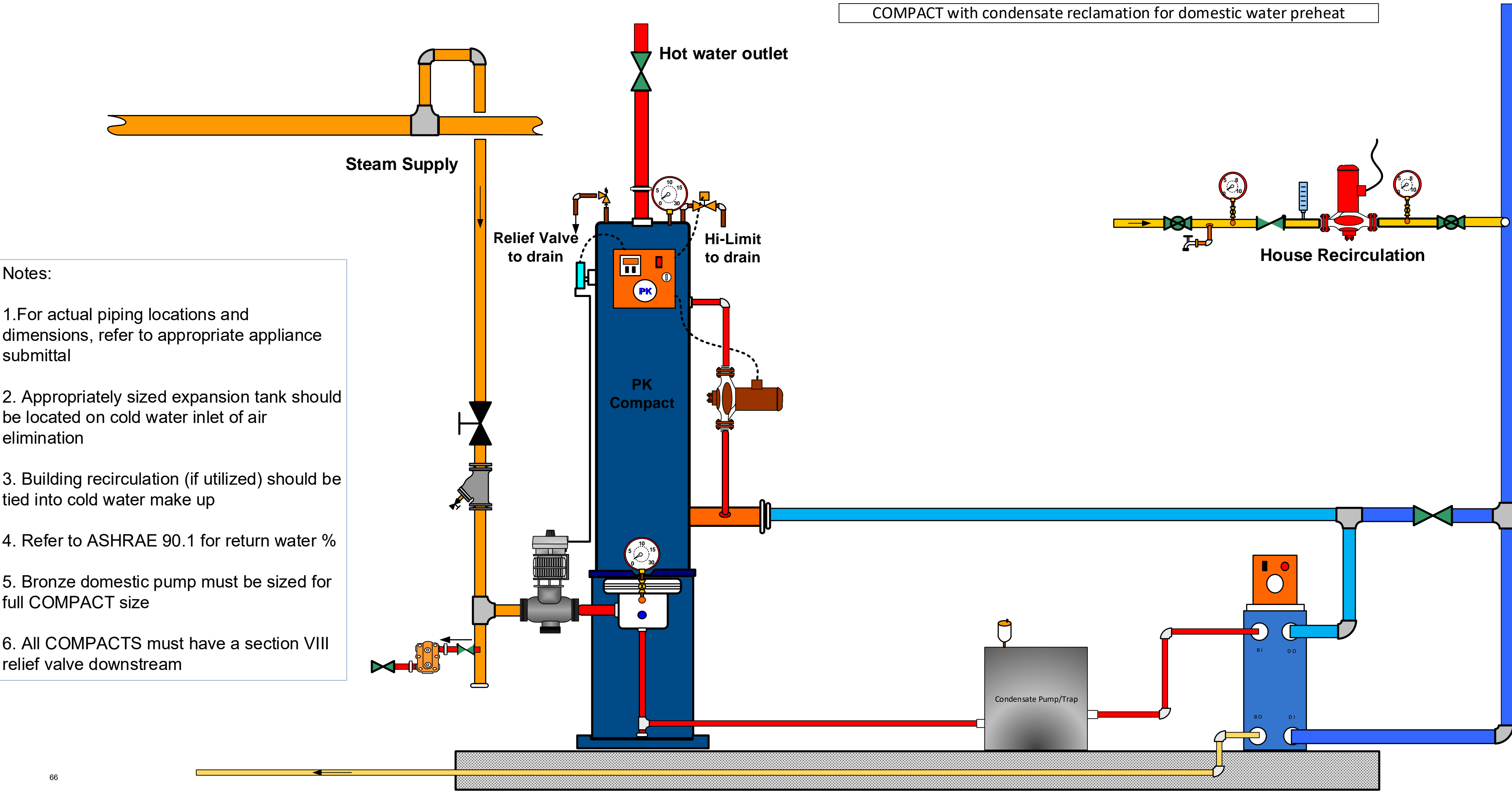


- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 3. Building recirculation (if utilized) should be tied into cold water line
  - 4. Refer to ASHRAE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

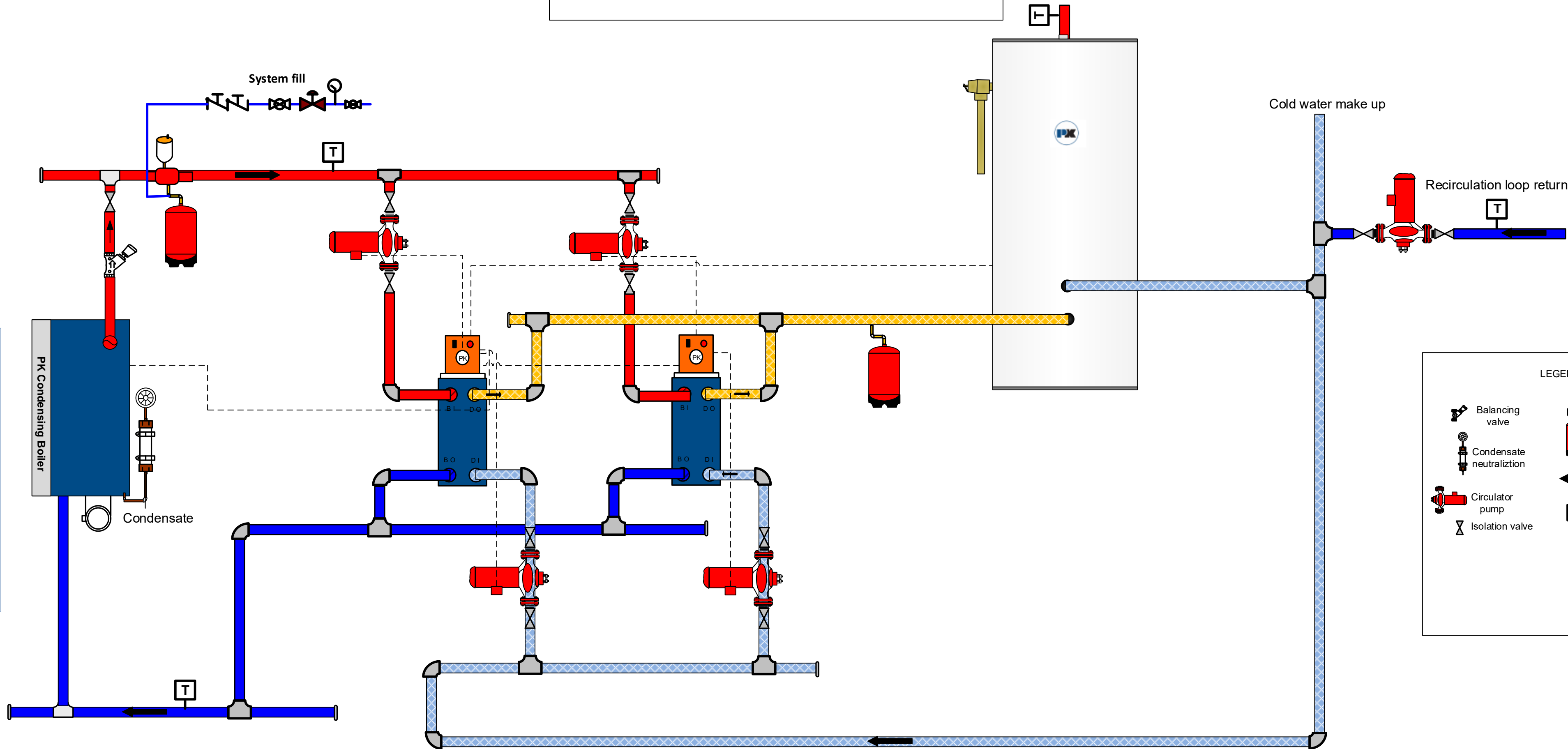
LEGEND

	Expansion tank
	Flow direction
	Temp sensor/gauge

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

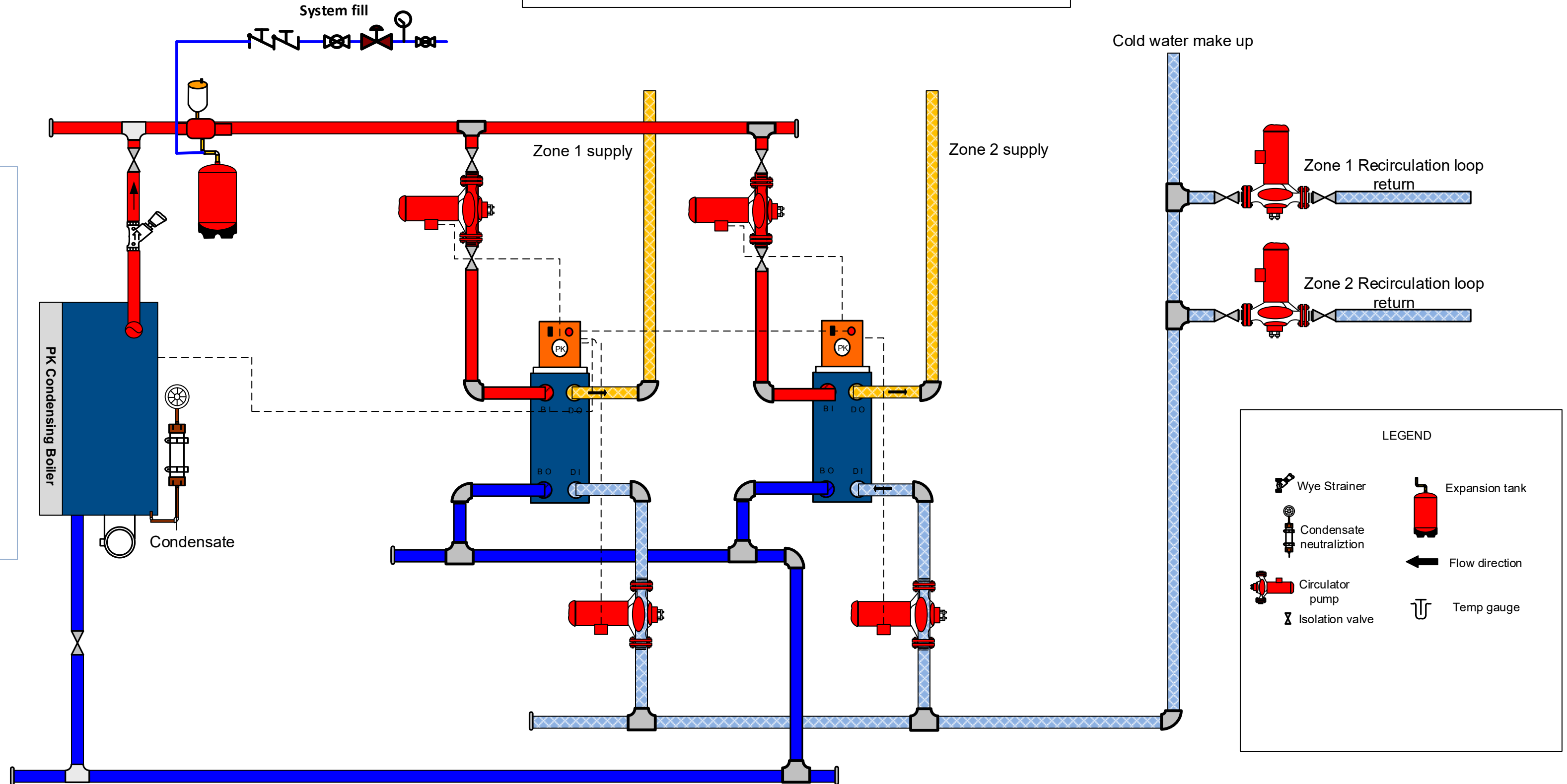




Single condensing boiler with 2 Duration III independent zones

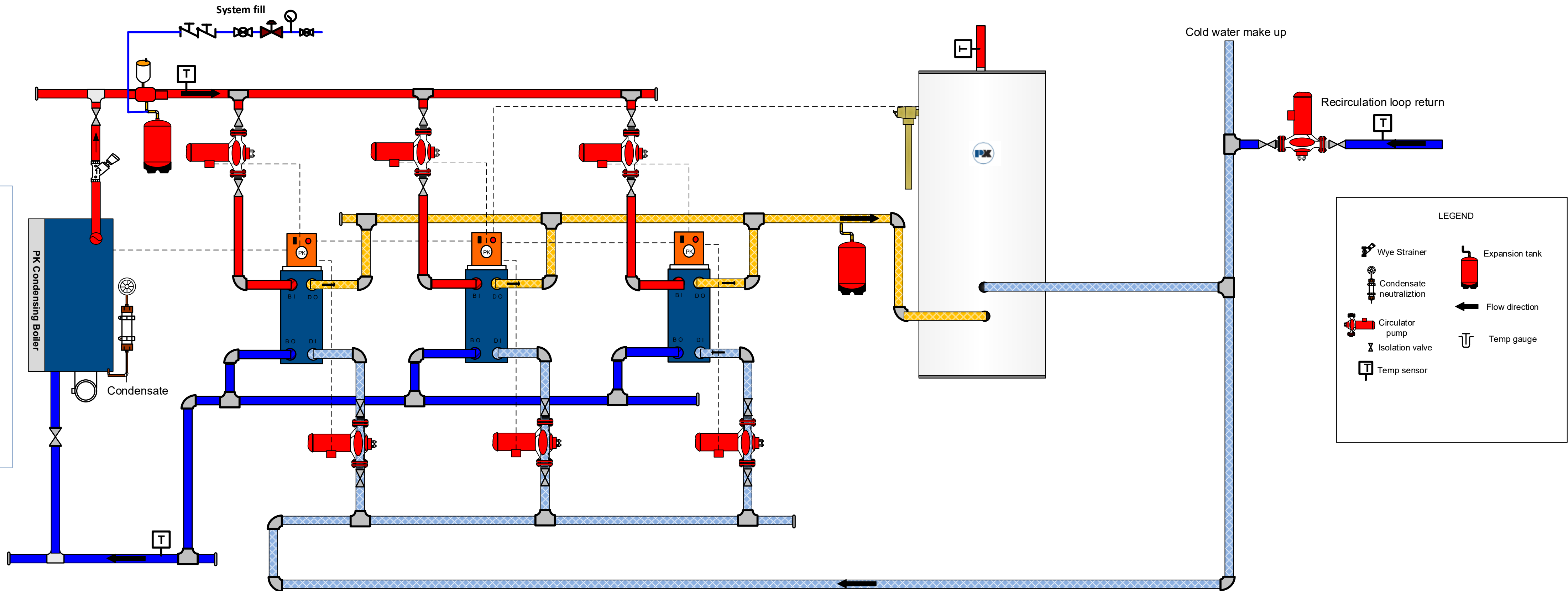
Notes:

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

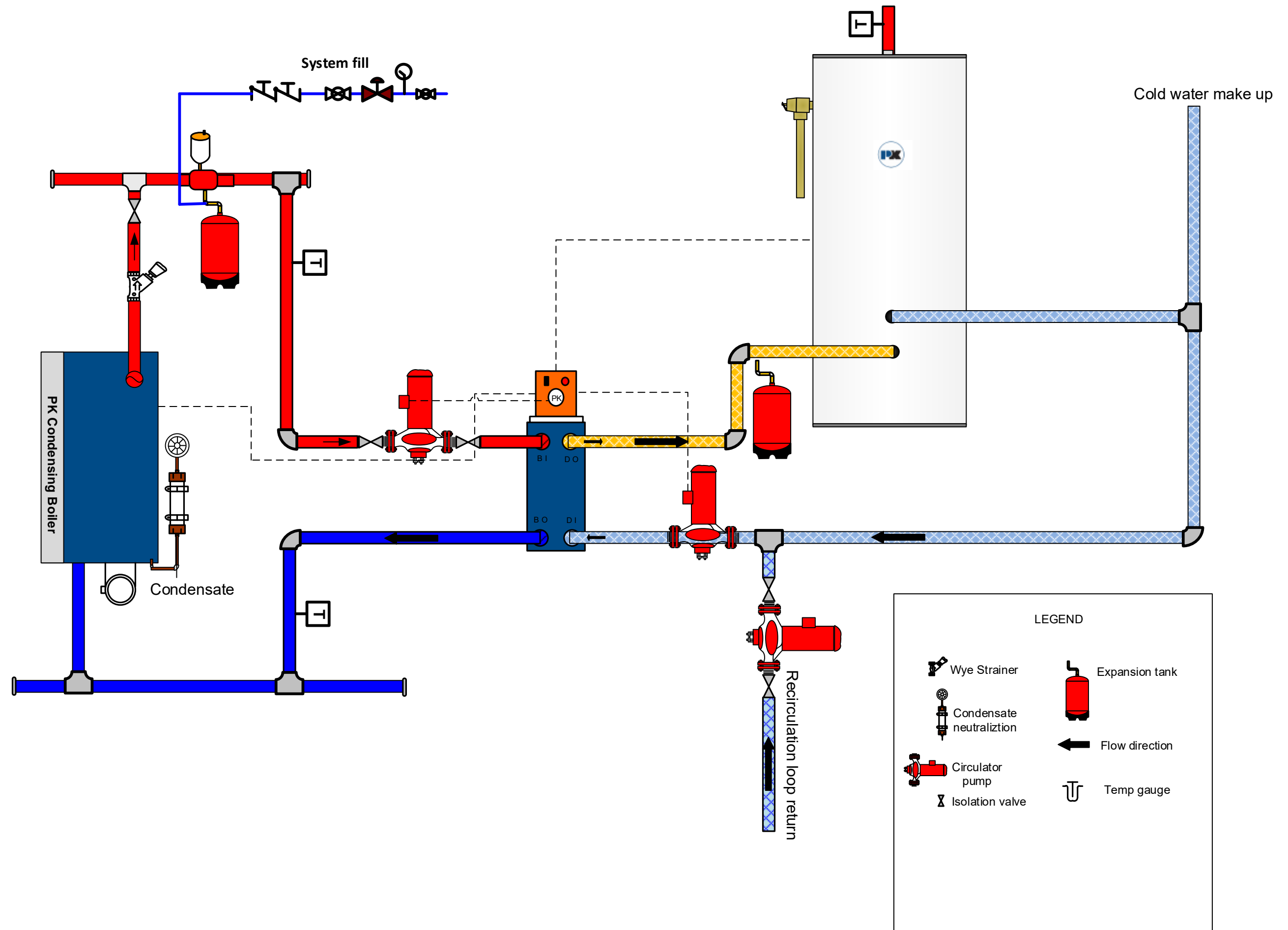
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  3. Building recirculation (if utilized) should be tied into cold water make up
  4. 12k ohm tank sensor must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



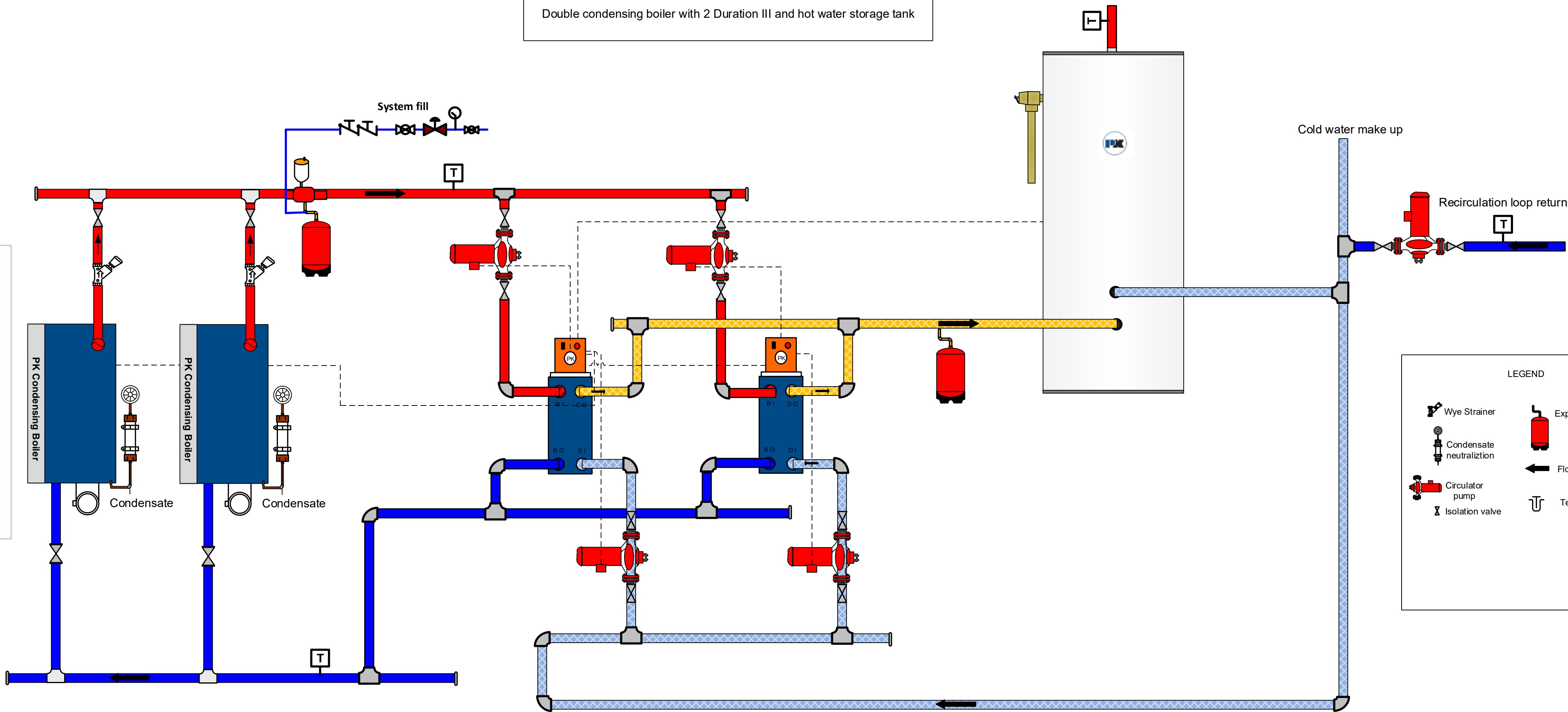
# Single condensing boiler with Duration III and hot water storage tank

## 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



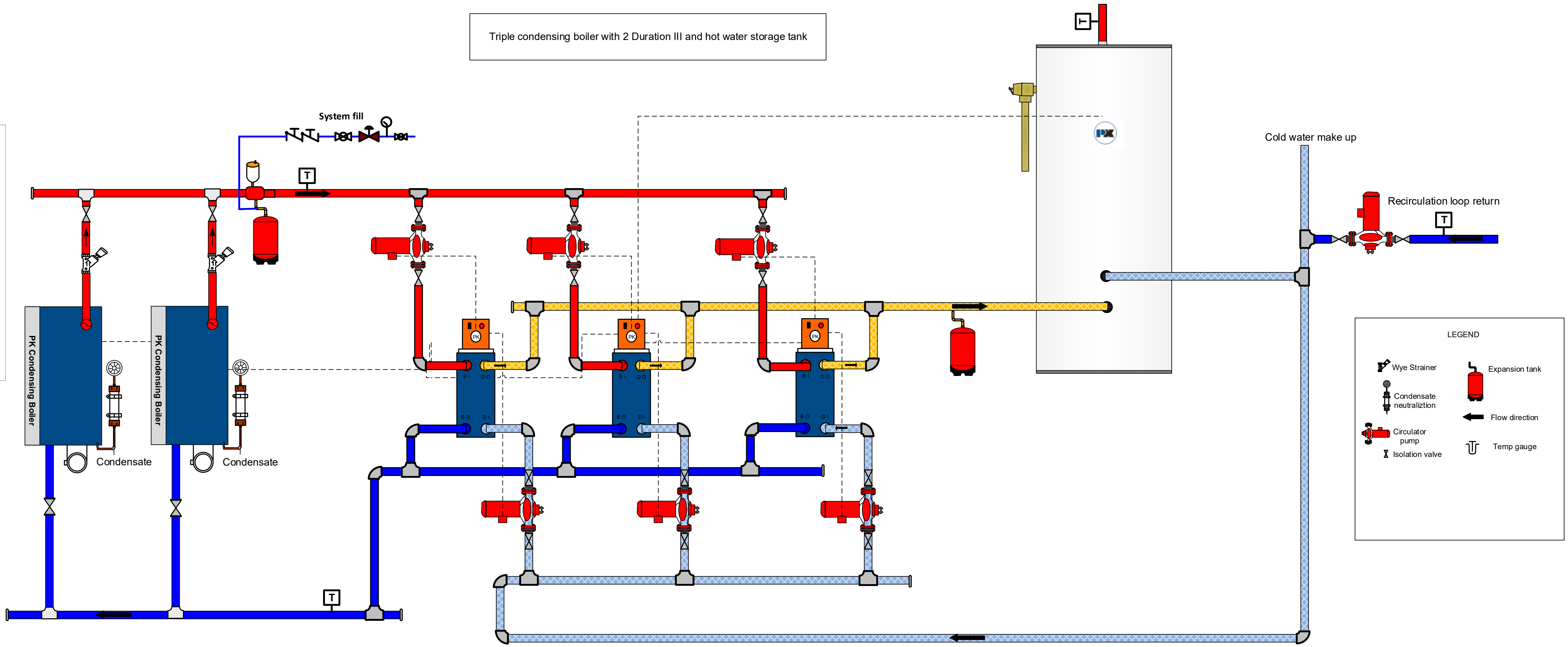
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  3. Building recirculation (if utilized) should be tied into cold water make up
  4. 12k ohm tank sensor must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

LEGEND


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

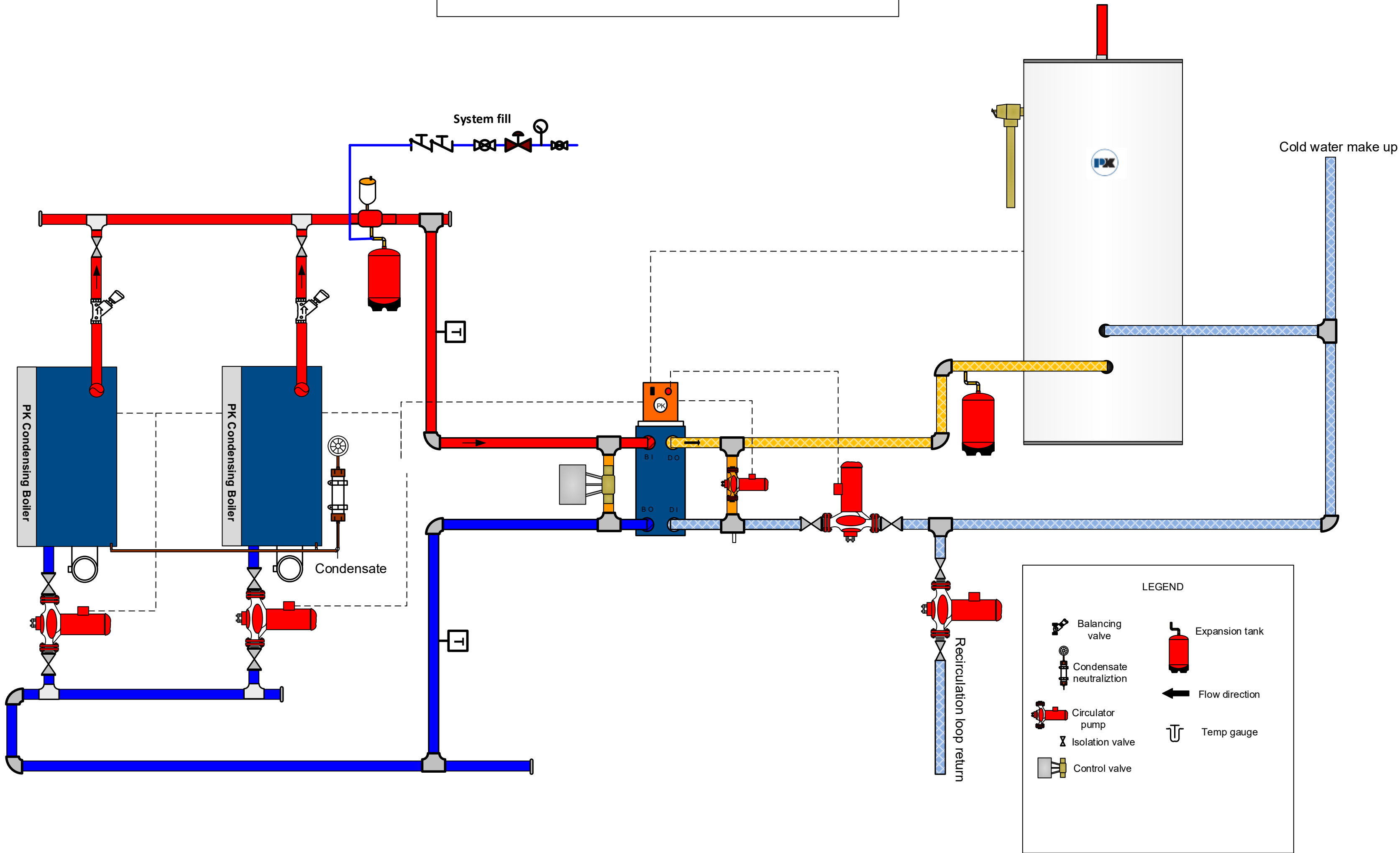
Notes:

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.



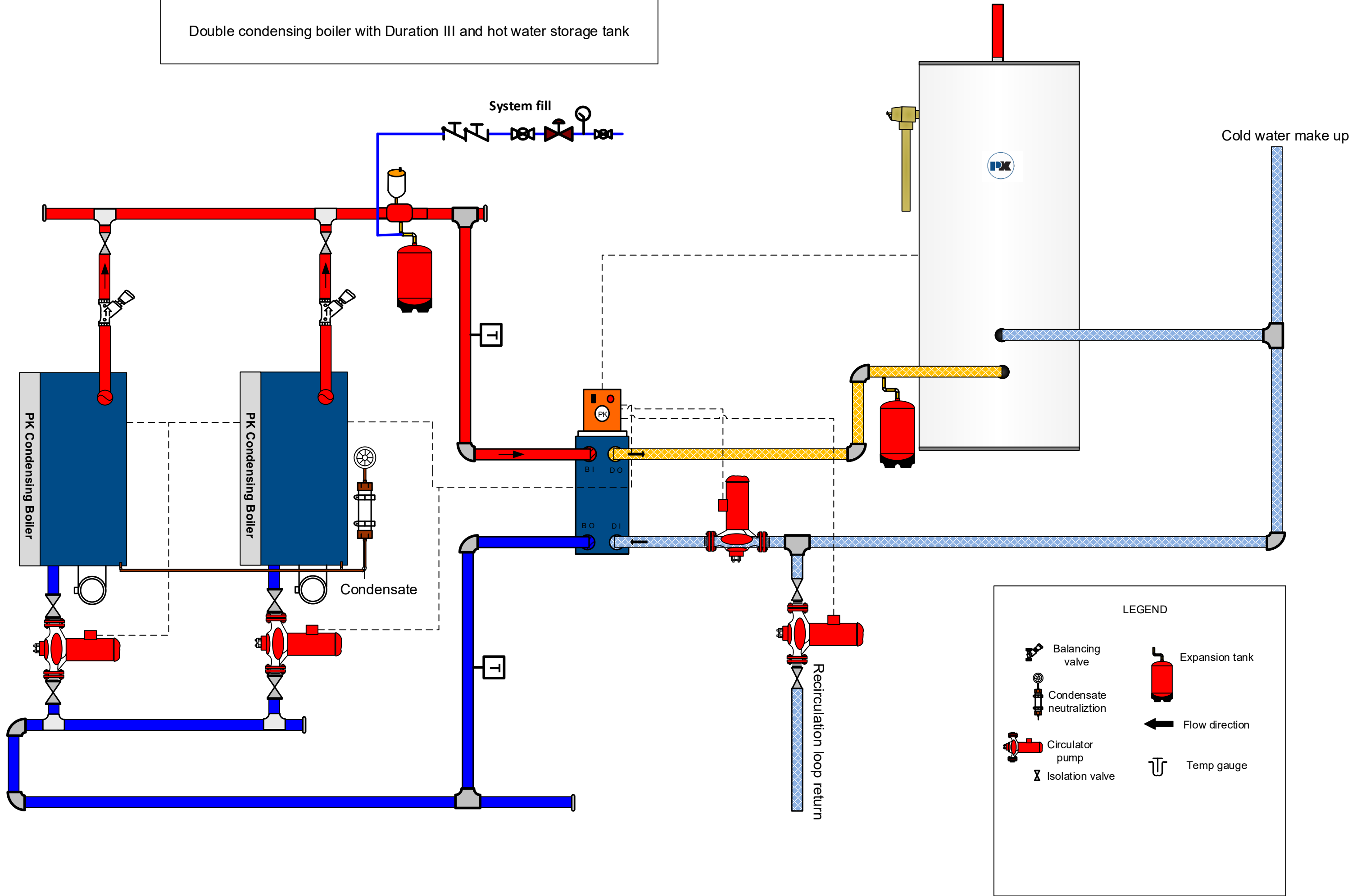
Double condensing boiler with Duration III and hot water storage tank

- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
  - 2. Distance between 1<sup>st</sup> and 2<sup>nd</sup> 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

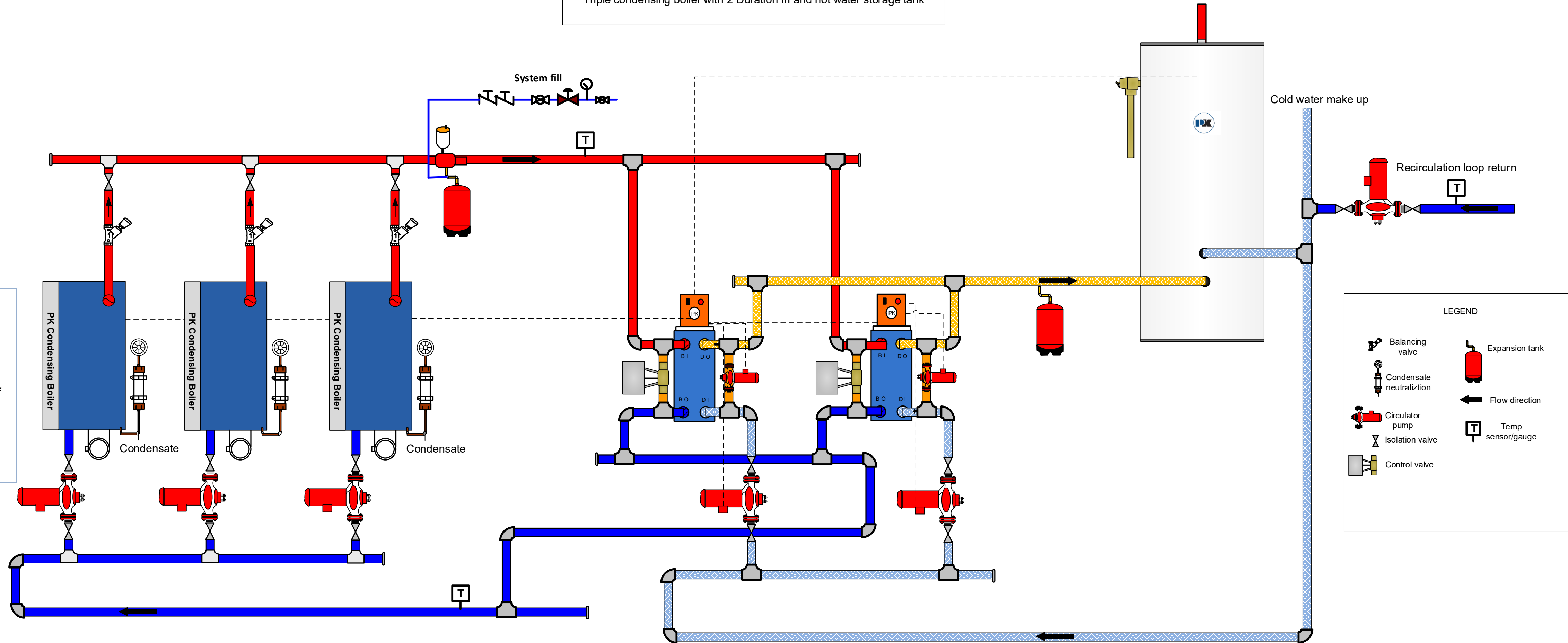
- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
  - 2. Distance between 1<sup>st</sup> and 2<sup>nd</sup> tee should be no more than 4 pipe diameters
  - 3. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 4. Appropriately sized 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





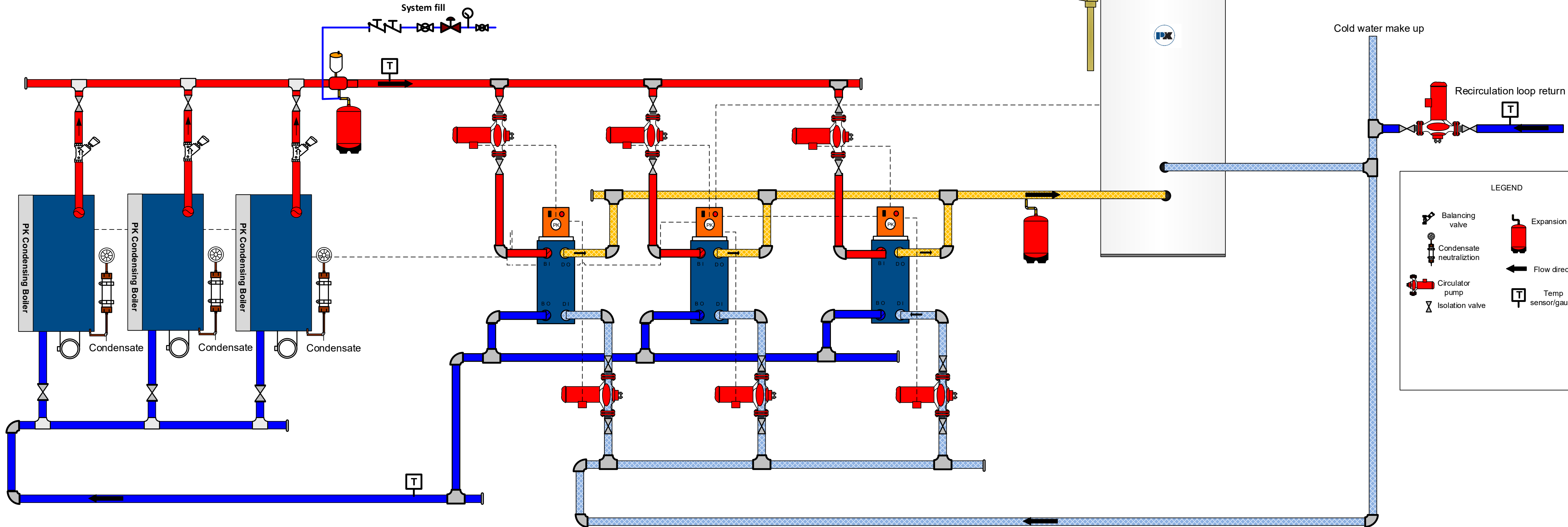
Triple condensing boiler with 2 Duration III and hot water storage tank

- 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.



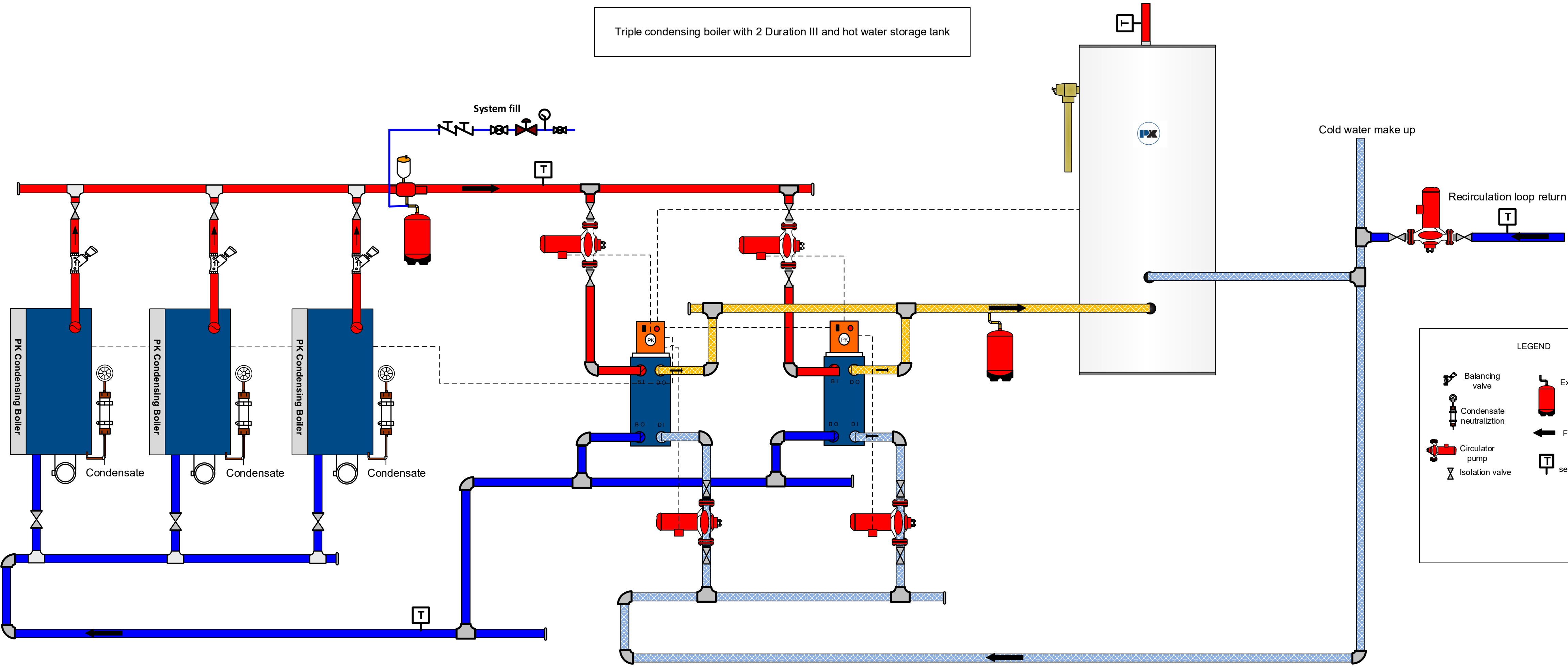


Triple condensing boiler with 2 Duration III and hot water storage tank



- 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

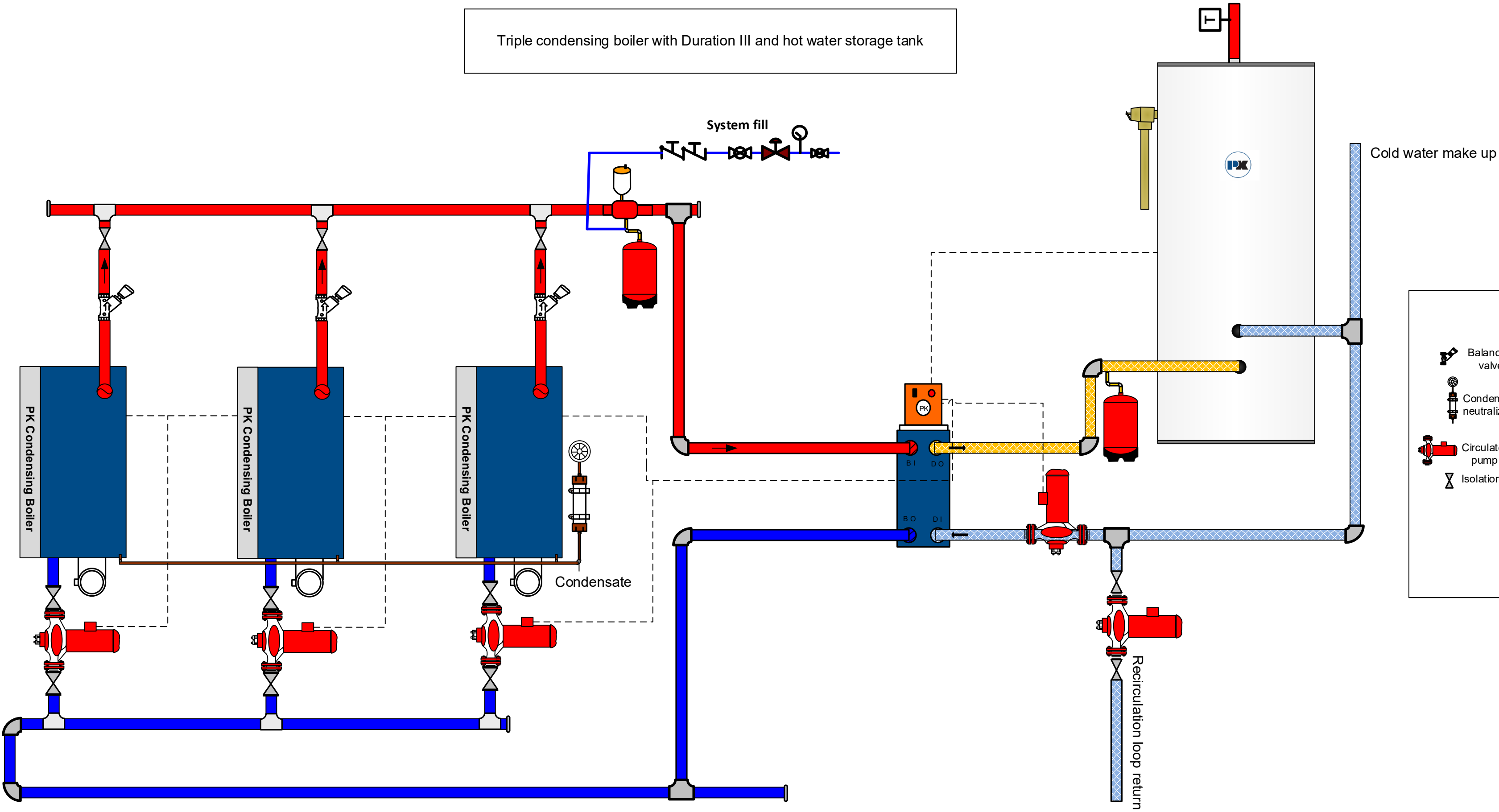


- Notes:
- 1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 3. Building recirculation (if utilized) should be tied into cold water make up
  - 4. 12k ohm tank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

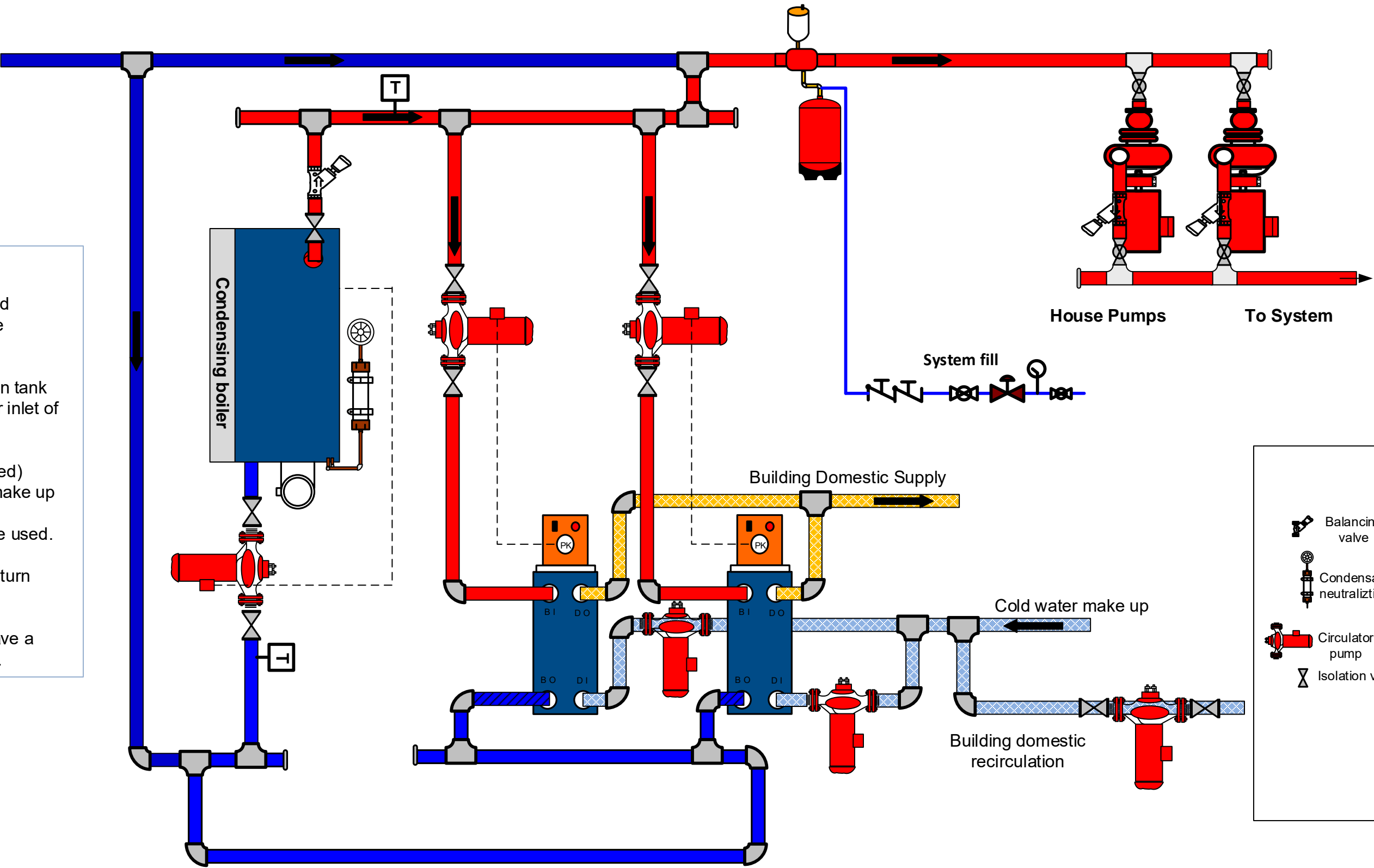
LEGEND

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

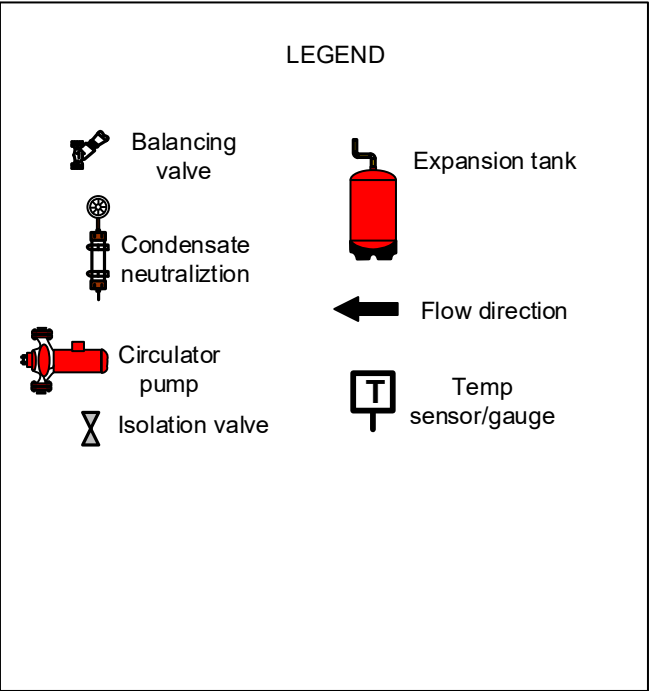
- Notes:
- 1. Header piping should be one pipe size larger than direct boiler piping
  - 2. For actual piping locations and dimensions, refer to appropriate appliance submittal
  - 3. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  - 4. Building recirculation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



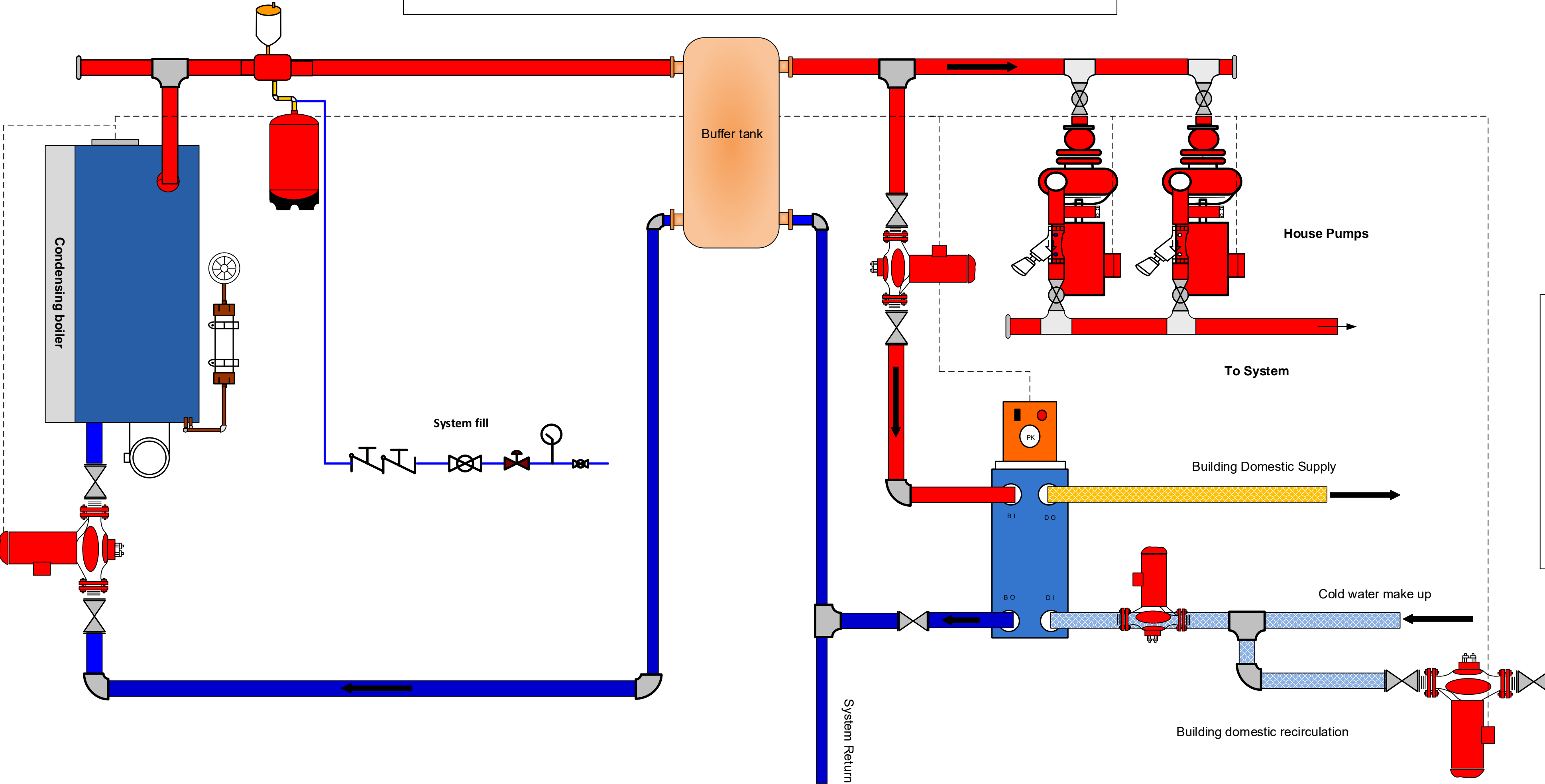
1 condensing boiler with 2 Duration III on Primary/Secondary system



- 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

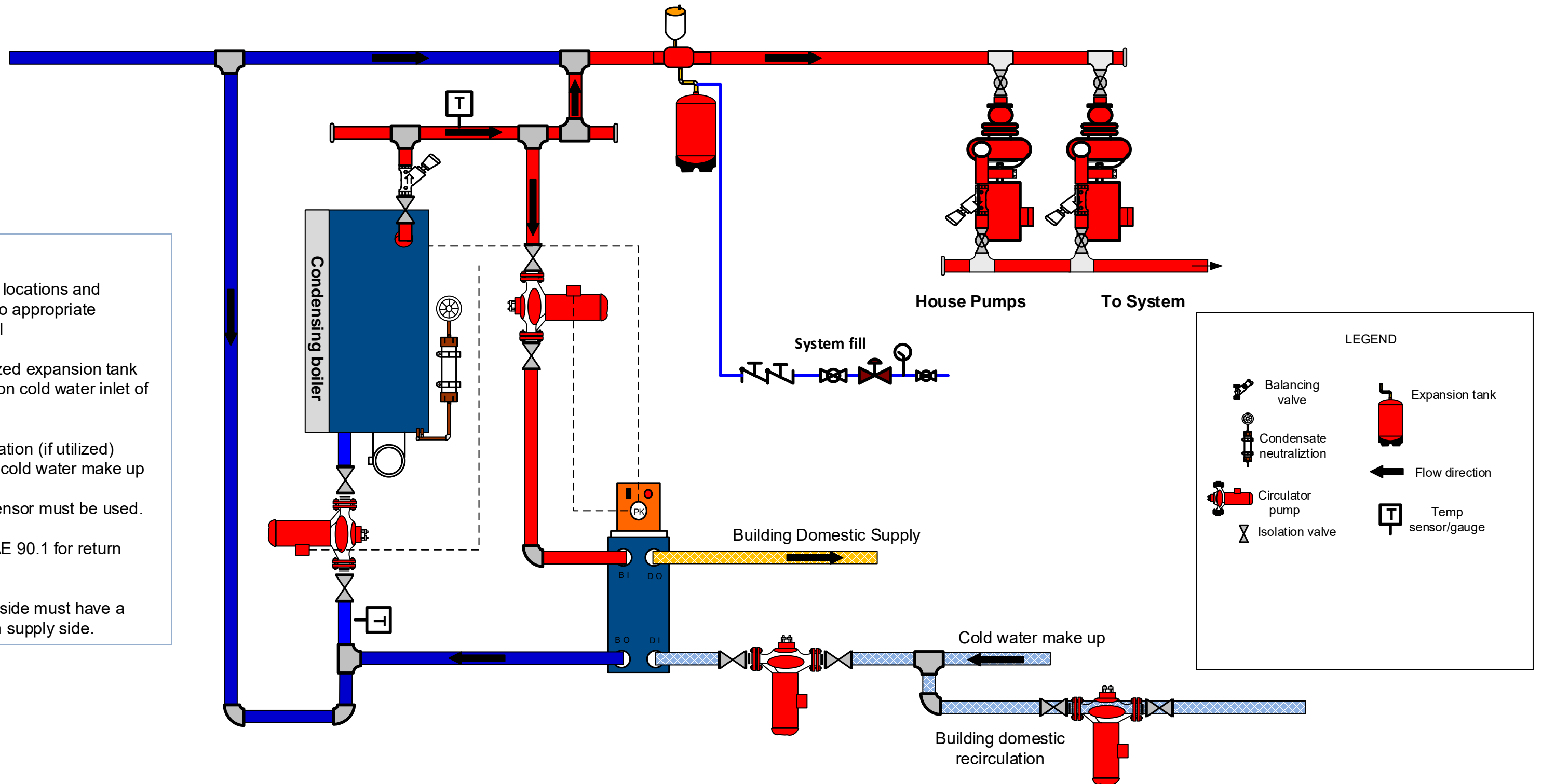
LEGEND

	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:

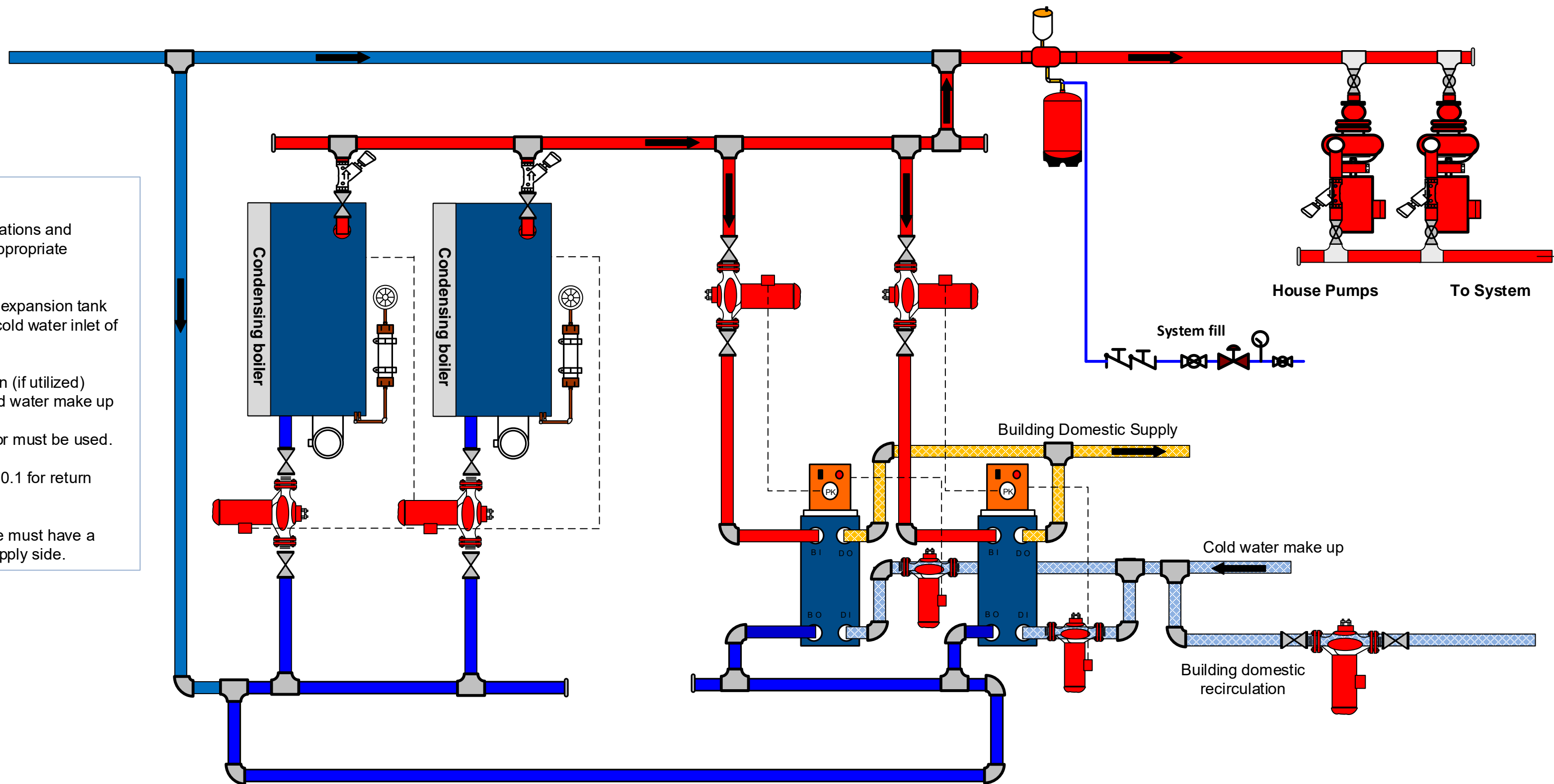
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
3. Building recirculation (if utilized) should be tied into cold water make up
4. 12k ohm tank sensor must be used.
5.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



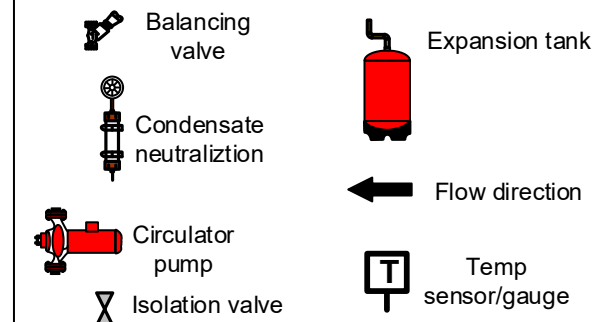
2 condensing boilers with 2 Duration III on Primary/Secondary system

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.

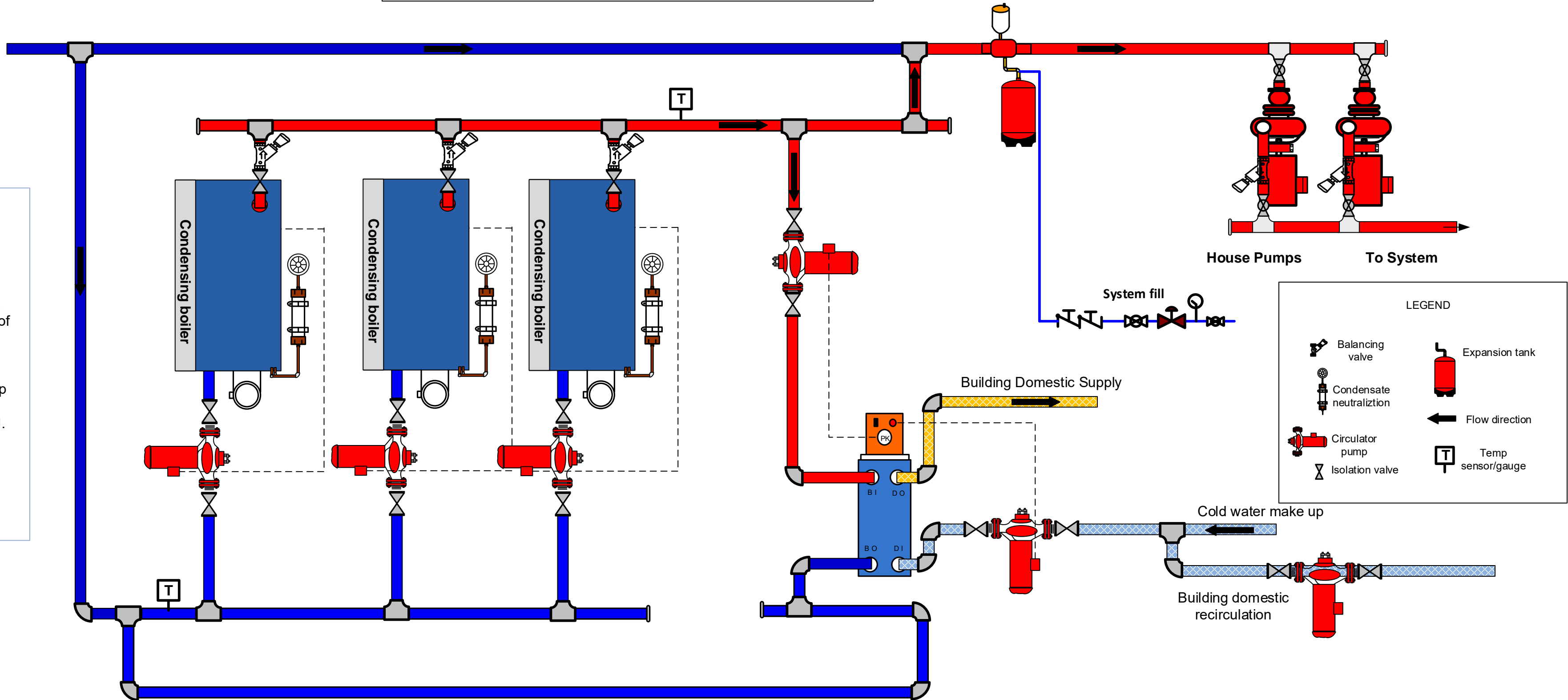


LEGEND



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

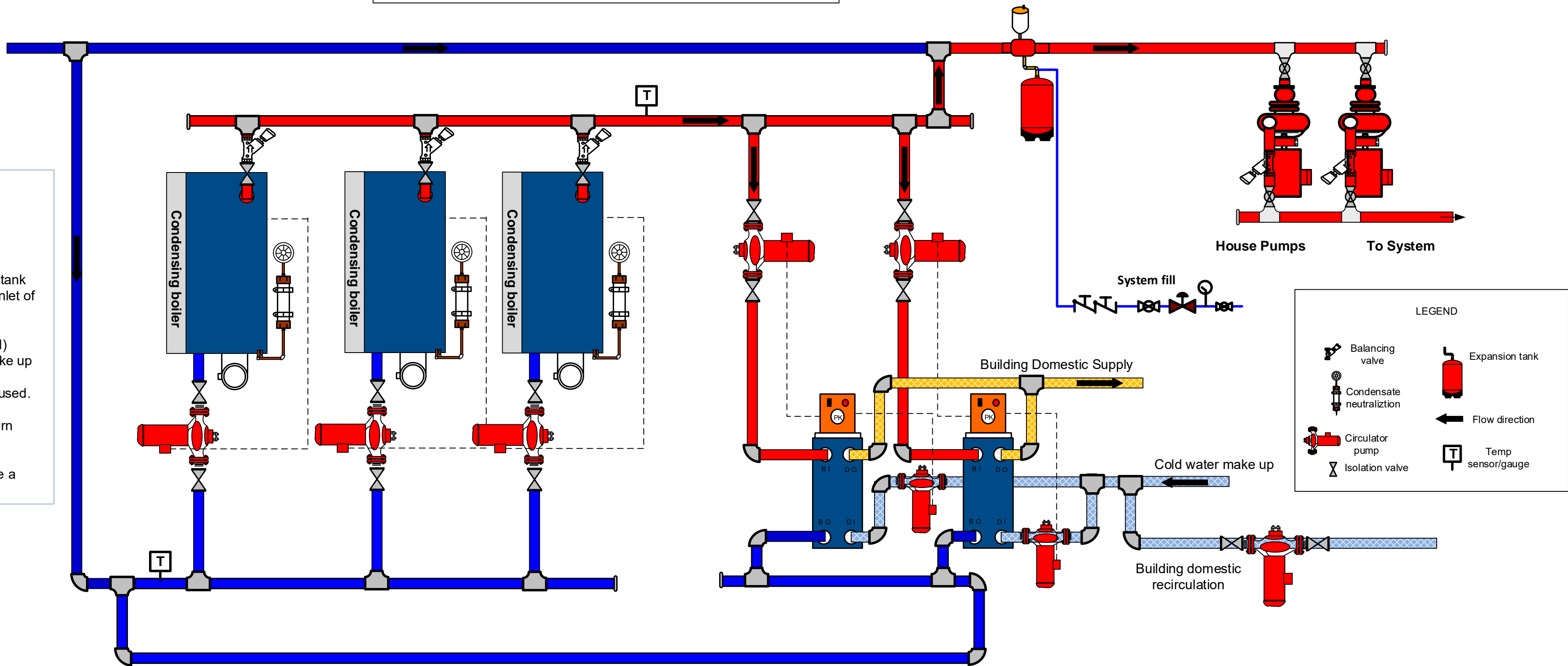
- Notes:
1. For actual piping locations and dimensions, refer to appropriate appliance submittal
  2. Appropriately sized expansion tank should be located on cold water inlet of air elimination
  3. Building recirculation (if utilized) should be tied into cold water make up
  4. 12k ohm tank sensor must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

