

Welcome to the YPG Lunch & Learn
“District Energy 101”
Wednesday, May 29, 2024
12:00pm EDT

Housekeeping

Webinar and Q&A Format

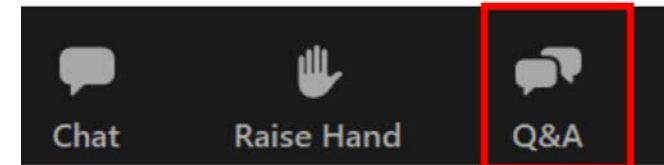
This webinar is scheduled for 60 minutes, including the presentation and time for Q&A, which will take place following the panel discussion. Please submit any questions in the Q&A box. If needed, the webinar will extend past the hour to answer as many audience questions as we can.

This webinar will be recorded

and streamed on the IDEA website within 24 hours of the conclusion of this webinar. Registrants will also be sent a follow-up email with links to the recording and presentation slides. A link to the presentation slides is also provided in the chat box if you want to print out and follow along.

How to Submit Questions

Please submit questions via the “Q&A” box during the presentation portion of the webinar. The Q&A icon can be found in the menu bar at the bottom of your screen. Questions will be reviewed by IDEA and posed to the presenters by the host at the conclusion of their presentation.



If you are having any technical issues, please send a note via the Chat Box to our host, Jason Beal.

CHILLED-WATER SYSTEMS

June 2020

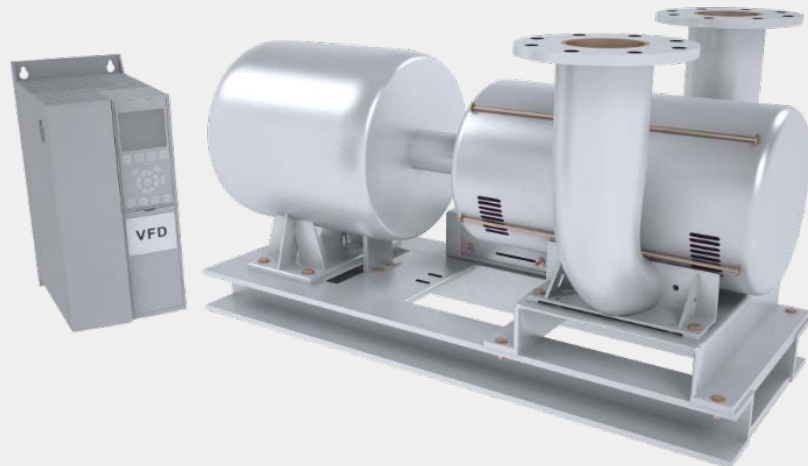
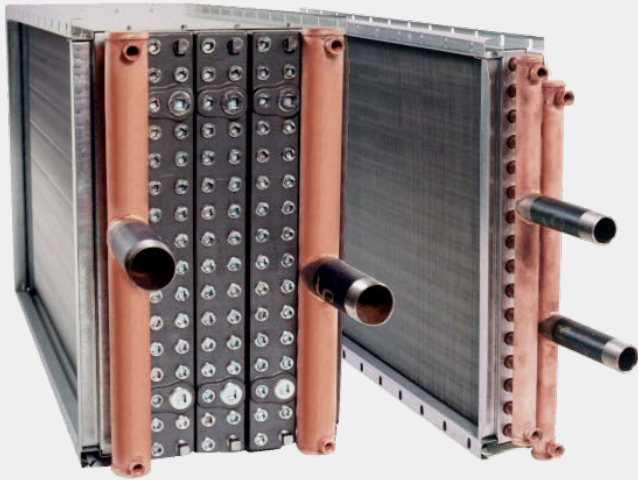
An Air
Conditioning Clinic
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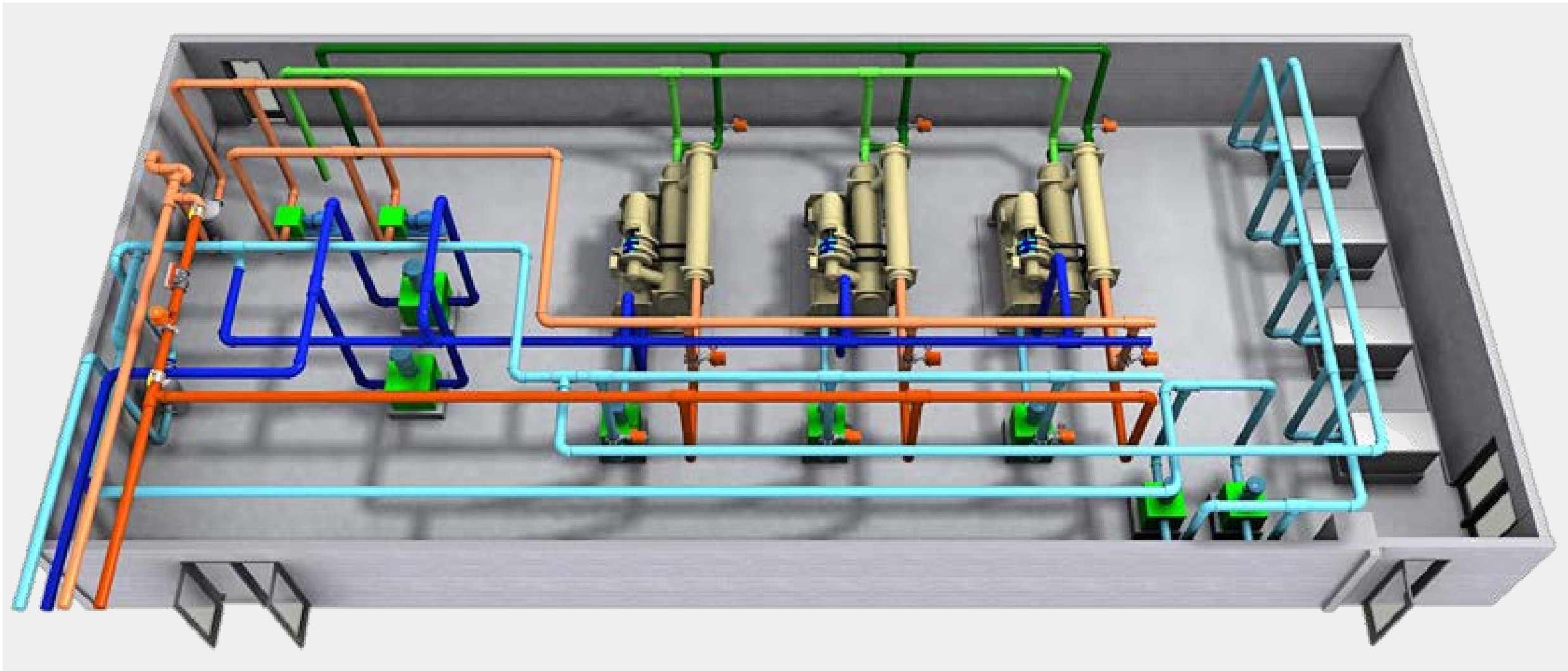
period

CHILLED-WATER SYSTEM DESIGN

CHILLED-WATER SYSTEM COMPONENTS

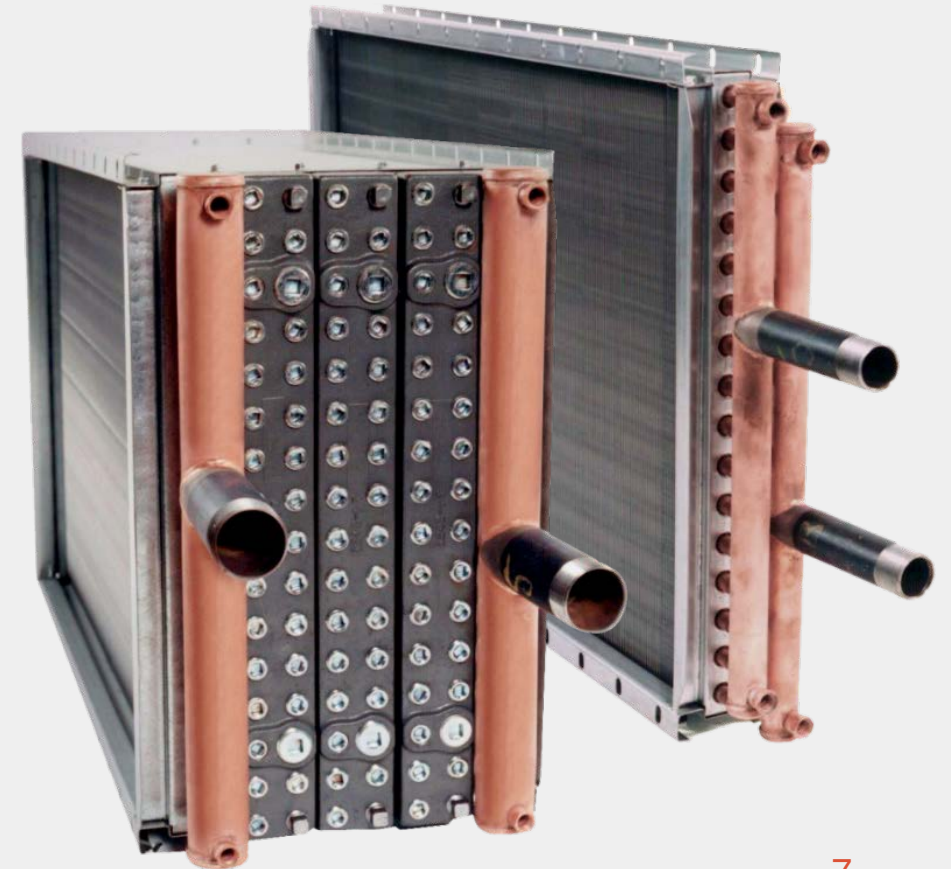


CHILLED-WATER SYSTEM

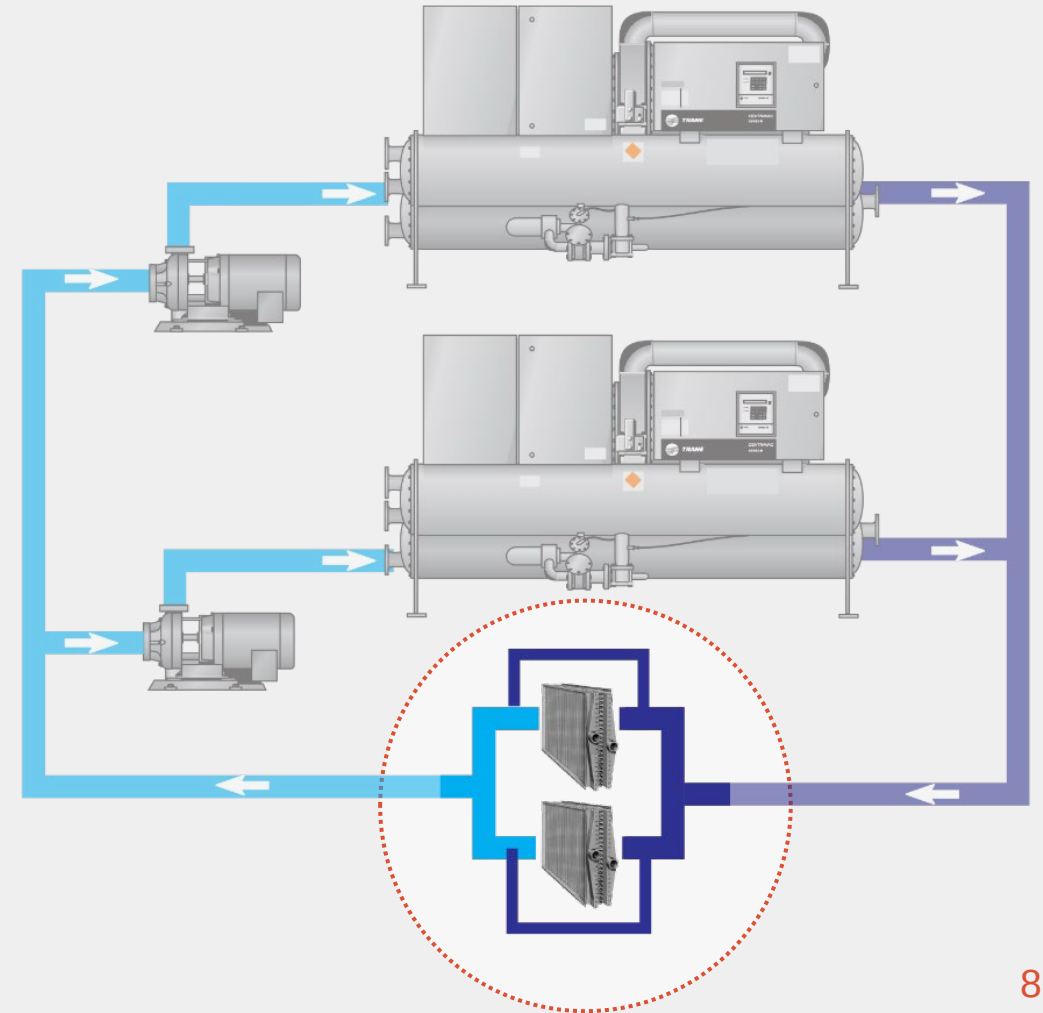
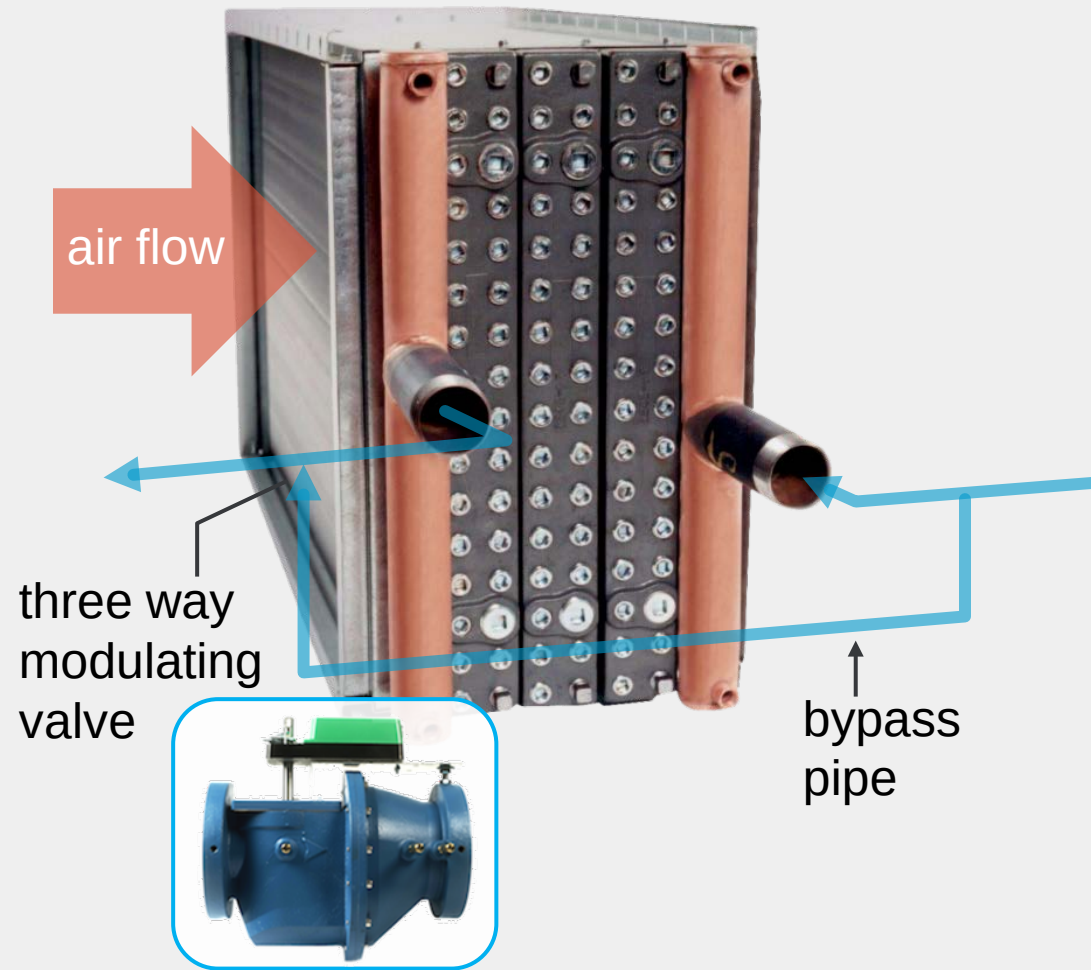


LOAD-TERMINAL CONTROL OPTIONS

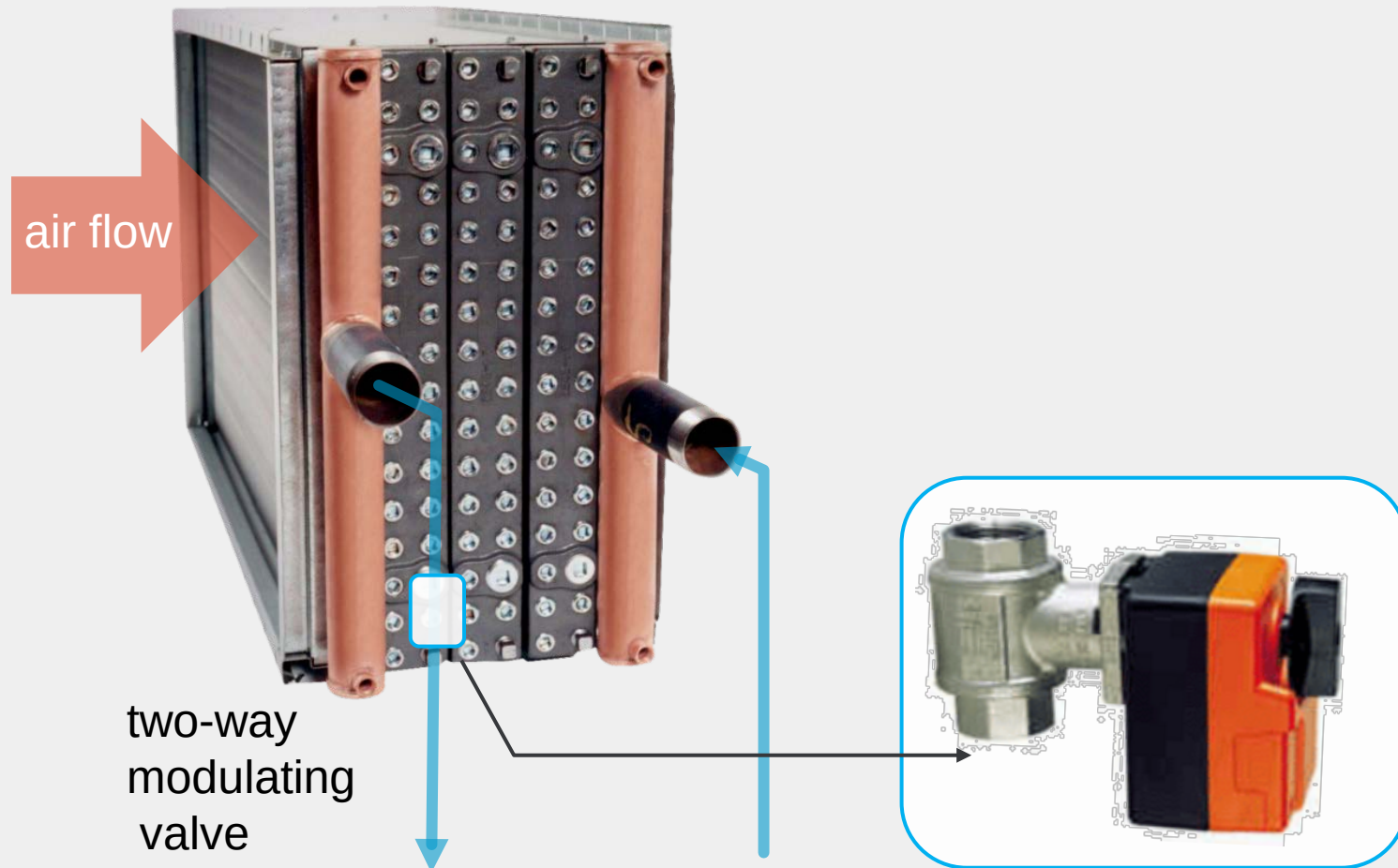
- Three-way modulating valve
- Two-way modulating valve
- Face-and-bypass dampers



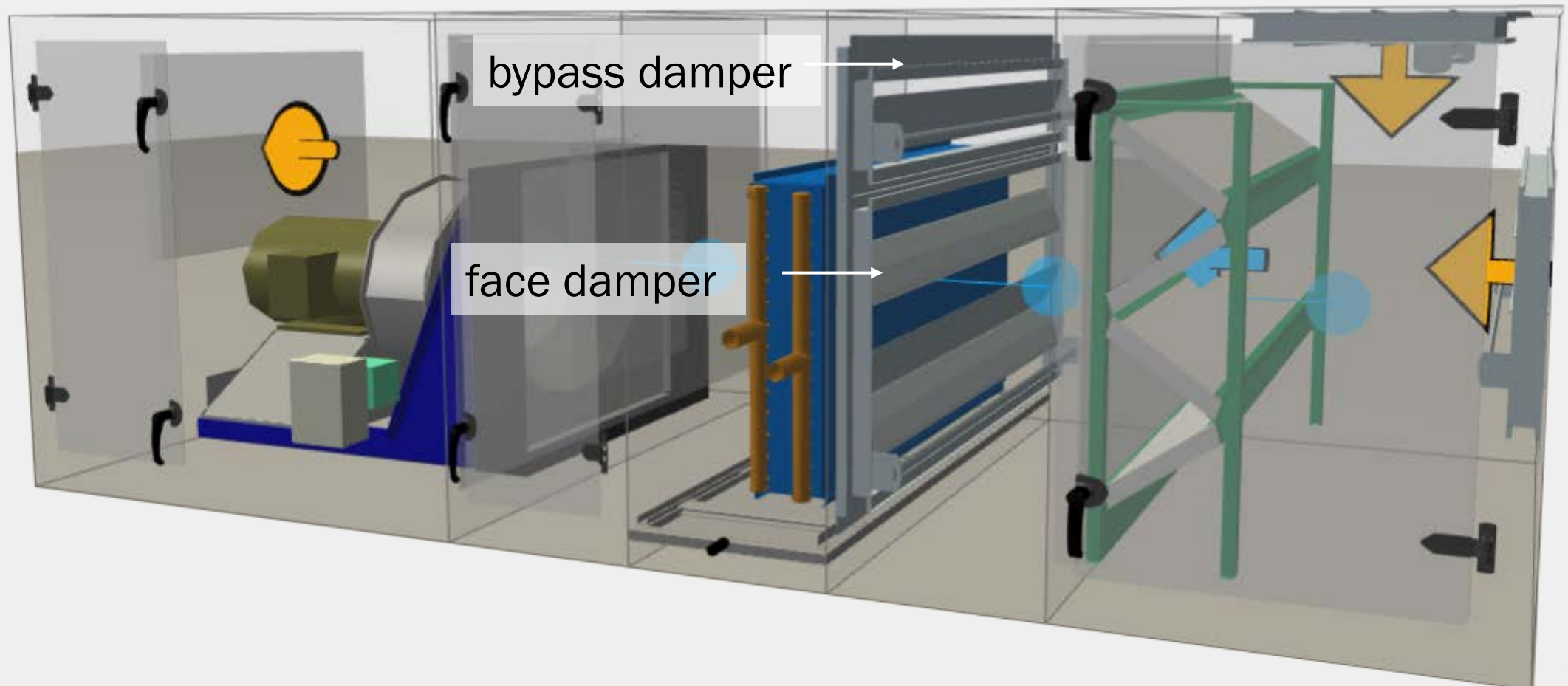
THREE-WAY VALVE CONTROL



TWO-WAY VALVE CONTROL



FACE AND BYPASS DAMPER CONTROL



COIL CONTROL SUMMARY

Three-way modulating valve

- Constant water flow
- Variable return-water temperature

Two-way modulating valve

- Variable water flow (pump energy savings)
- Constant return-water temperature

Face-and-bypass dampers

- Constant water flow
- Variable return-water temperature
- Enhanced dehumidification capability with “wild” coils

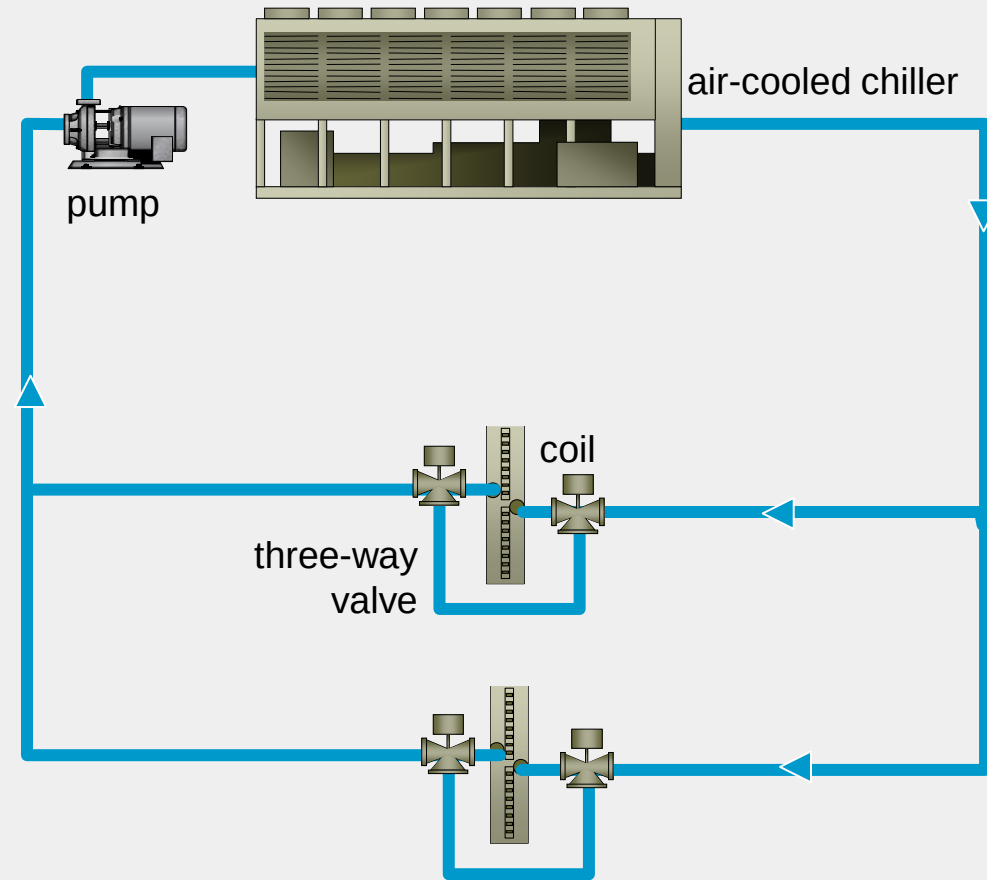


CHILLER EVAPORATOR FLOW

- Constant flow is most common
- Variable flow is very common
 - Reduce energy consumption
 - Only use with advanced unit and system controls



SINGLE-CHILLER SYSTEM

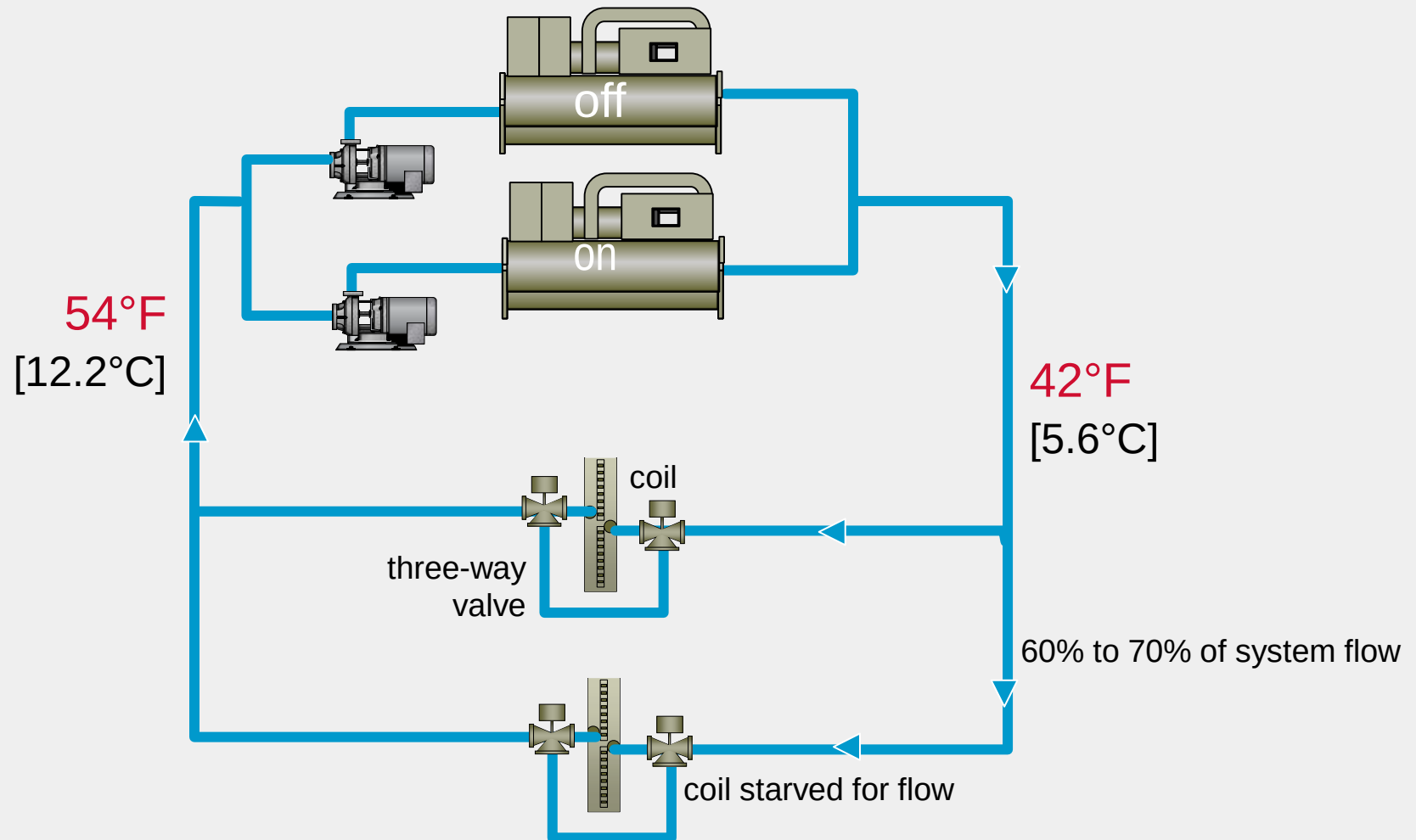


MULTIPLE-CHILLER SYSTEMS

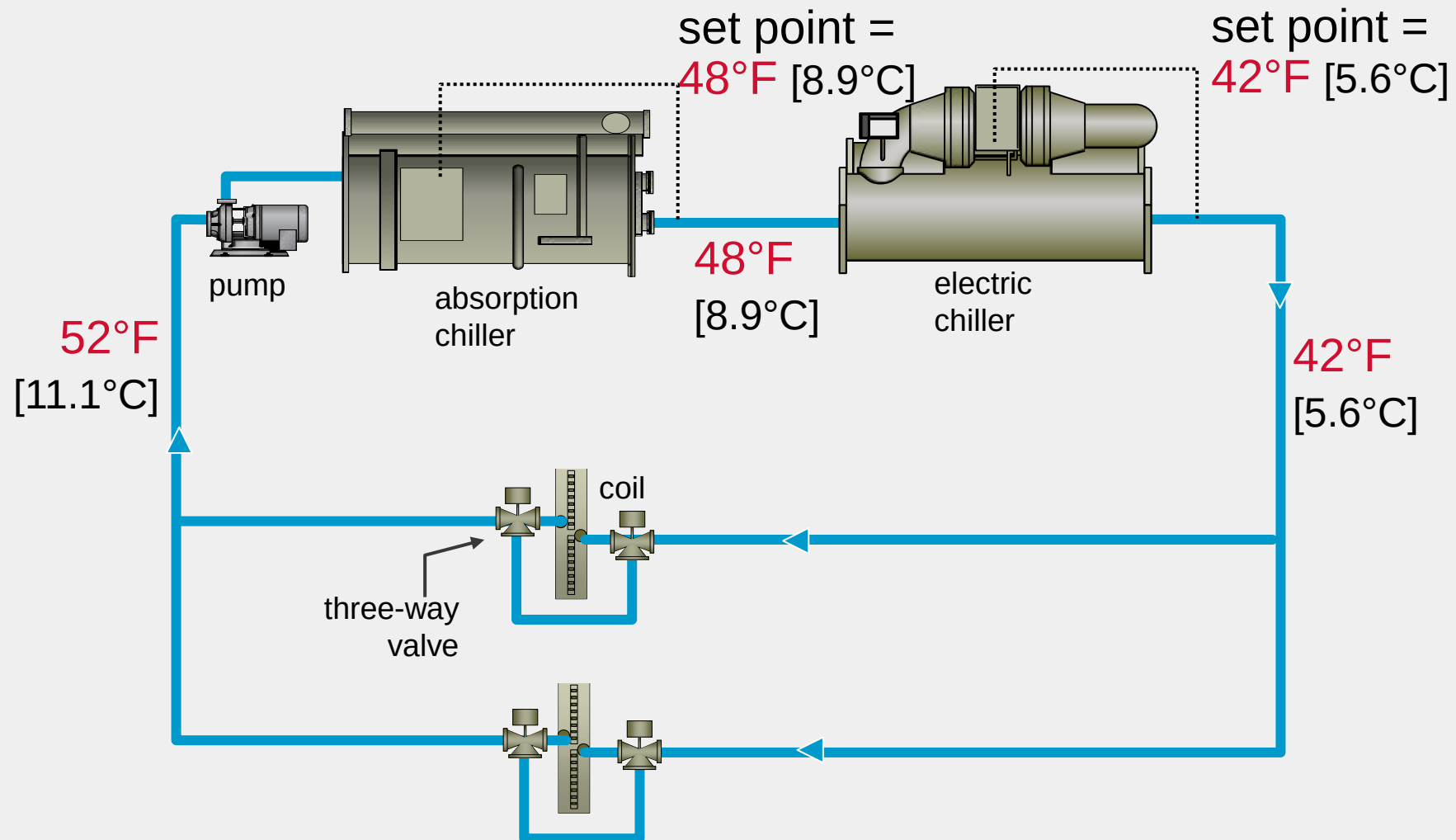
- Redundancy
- Part-load efficiency



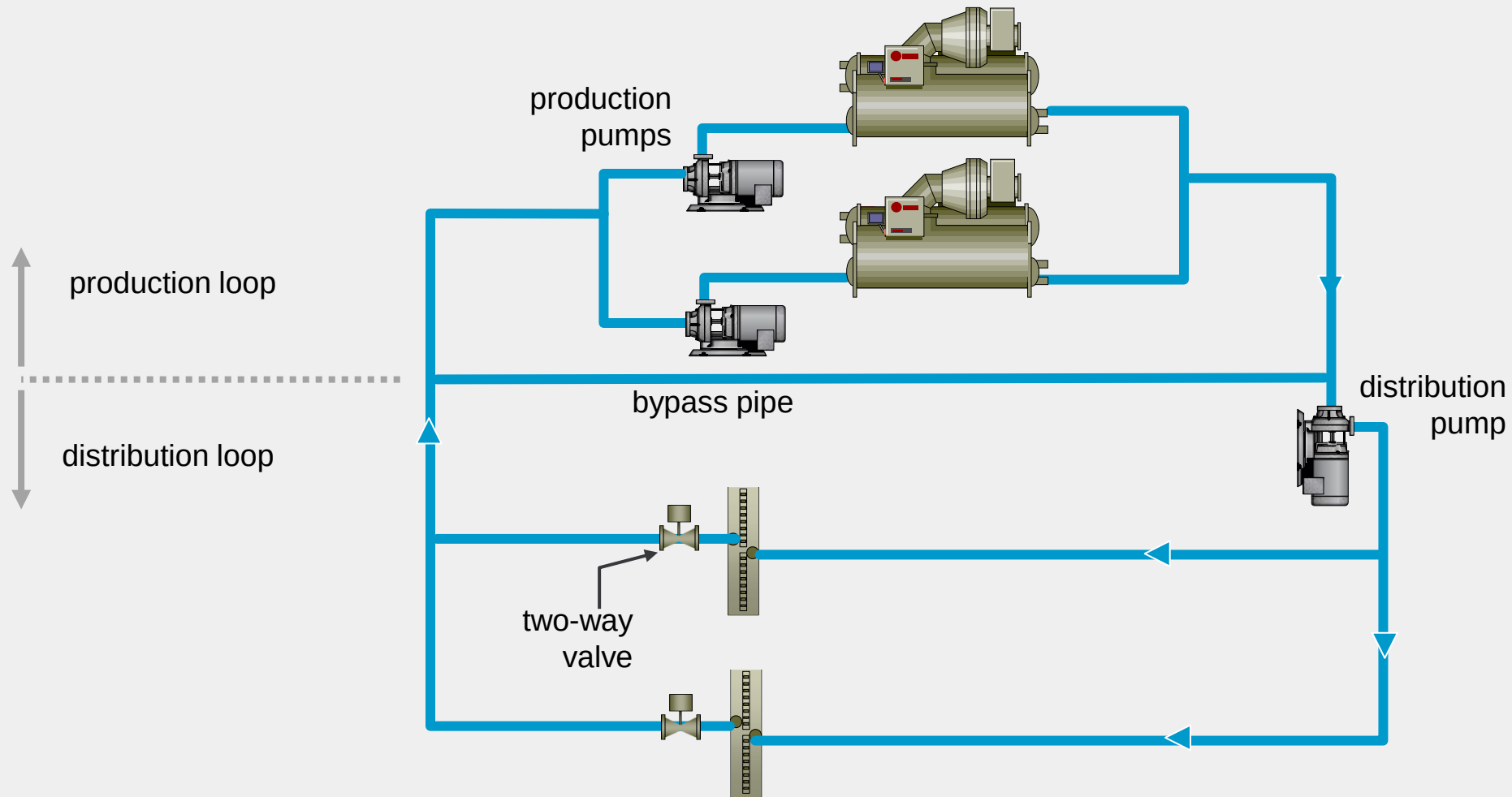
CHILLERS PIPED IN PARALLEL DEDICATED PUMPS



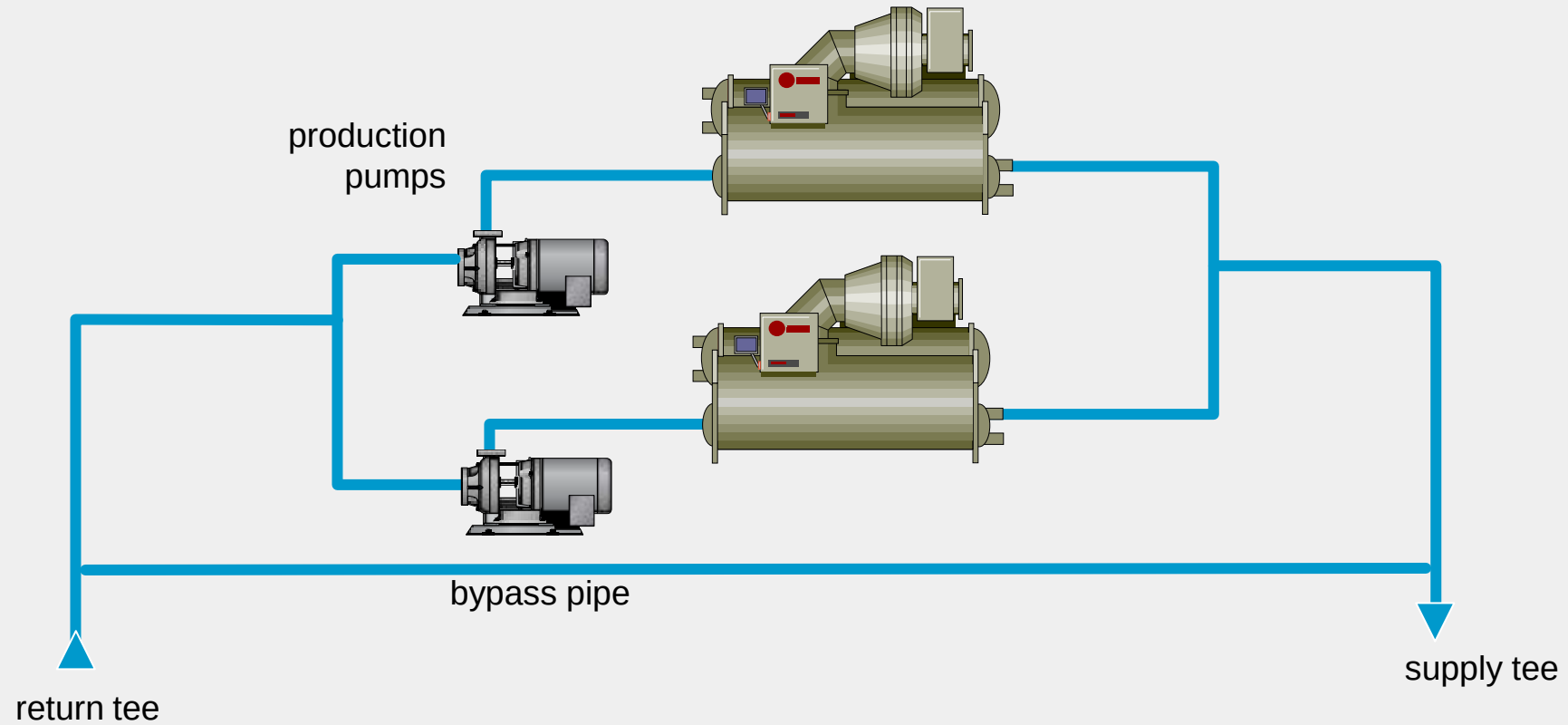
CHILLERS PIPED IN SERIES STAGGERED SET POINTS



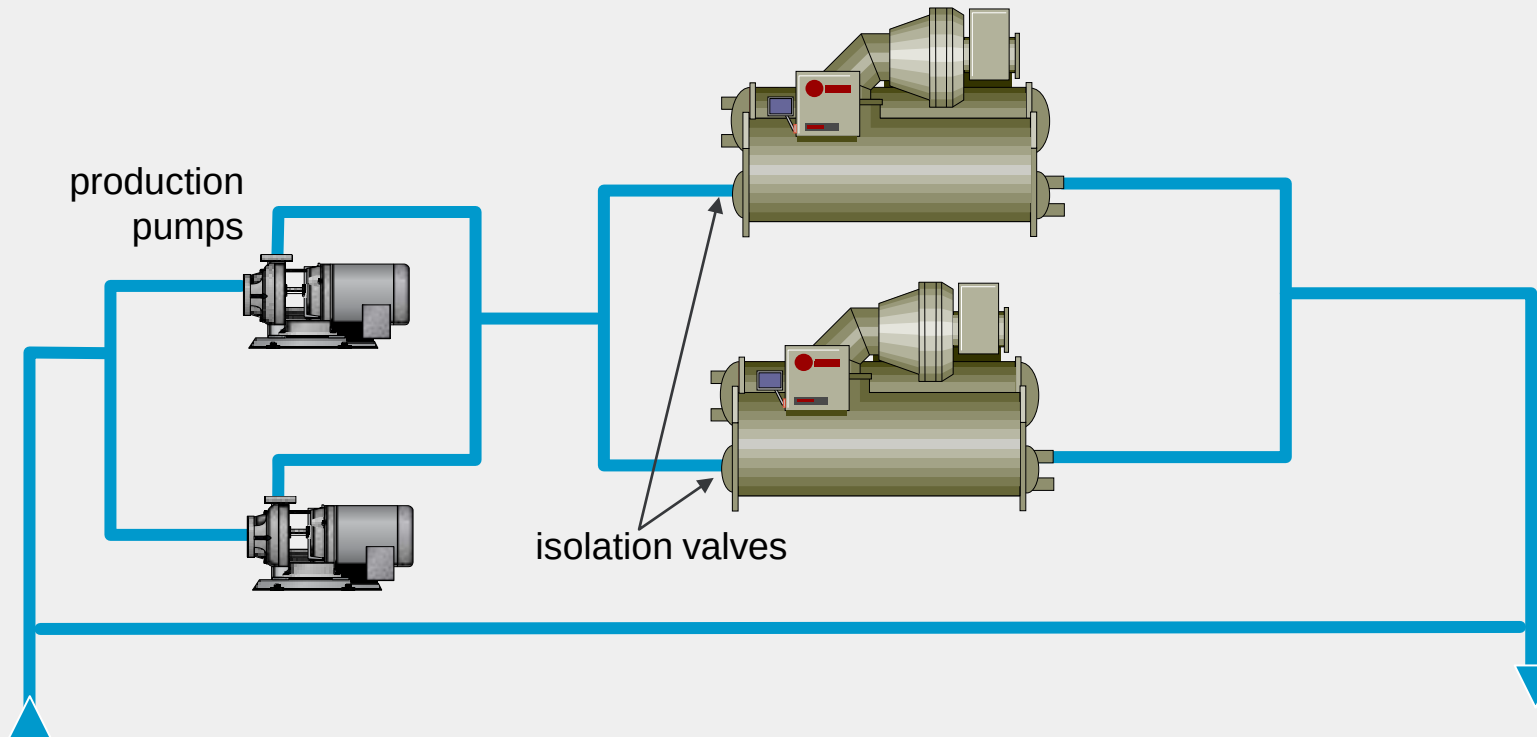
PRIMARY-SECONDARY CONFIGURATION



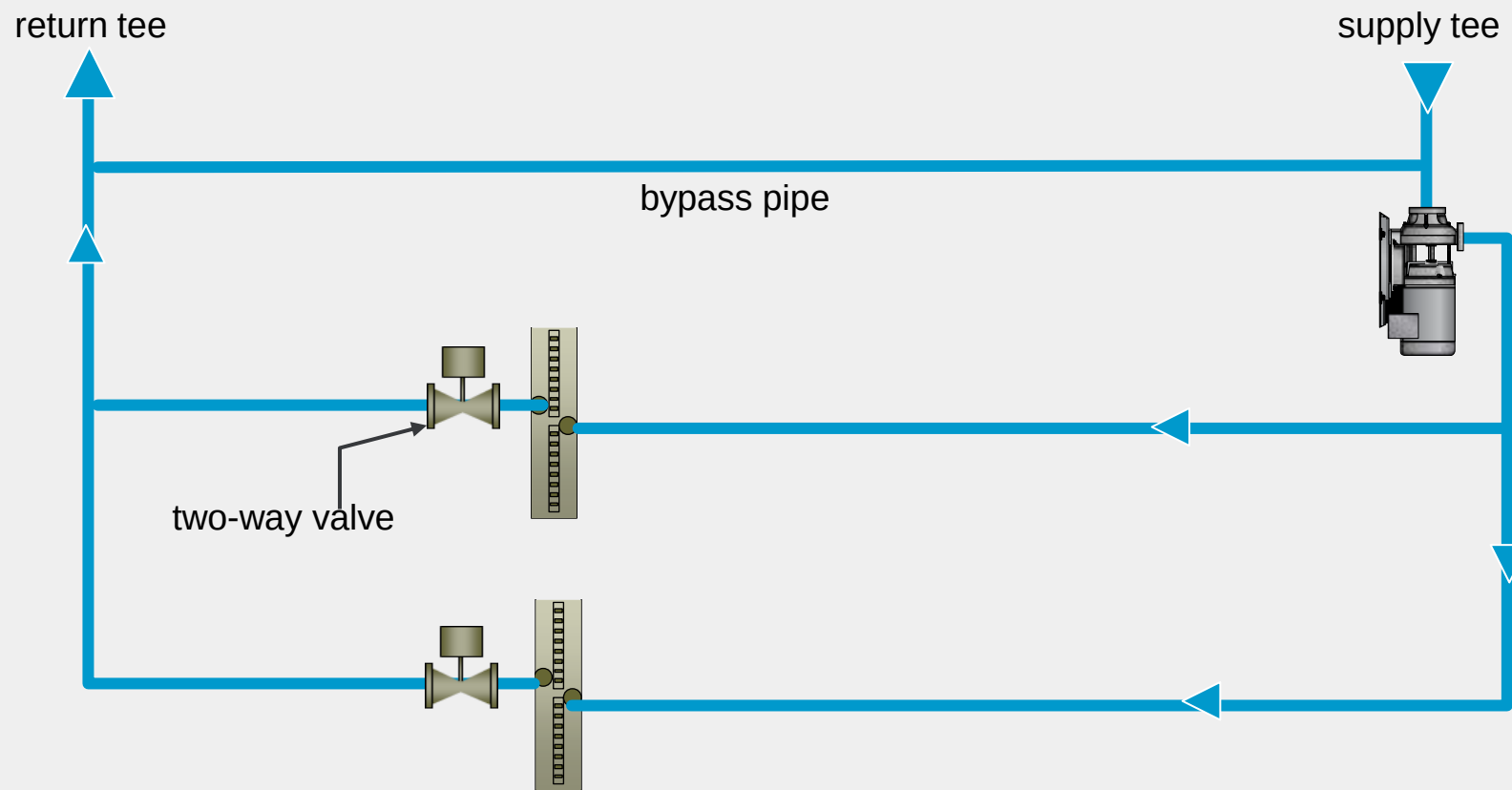
PRODUCTION LOOP



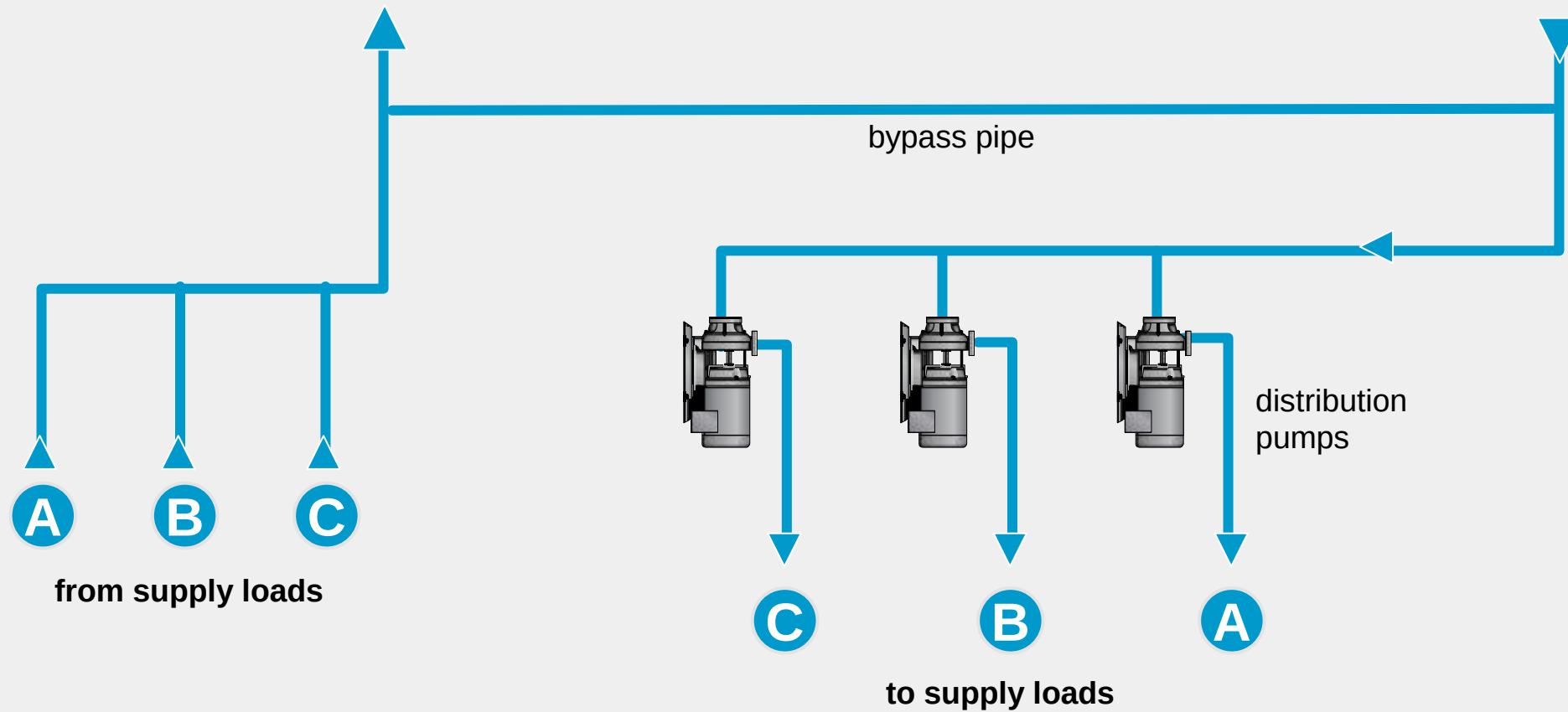
MANIFOLDED PRODUCTION PUMPS



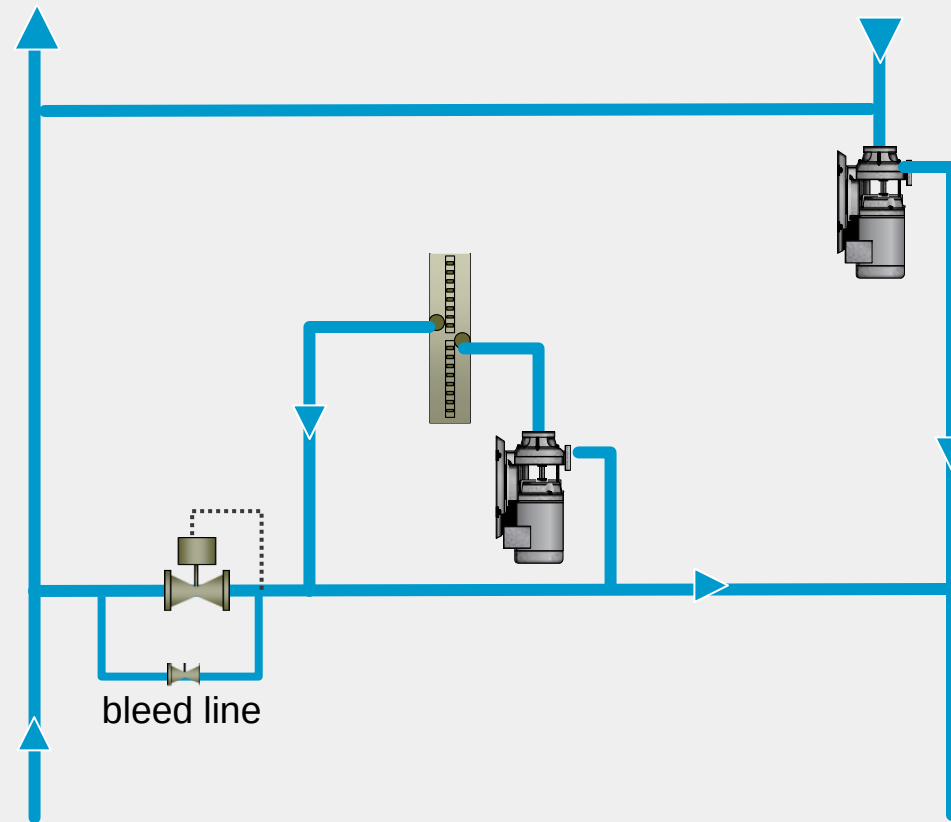
DISTRIBUTION LOOP



MULTIPLE DISTRIBUTION PUMPS

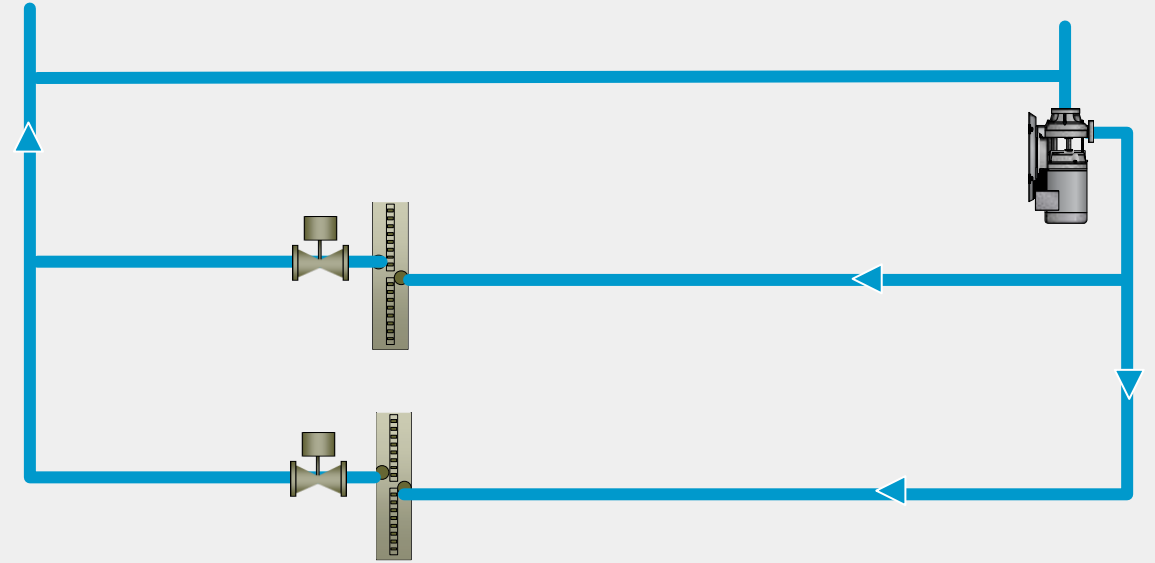


TERTIARY PUMPING

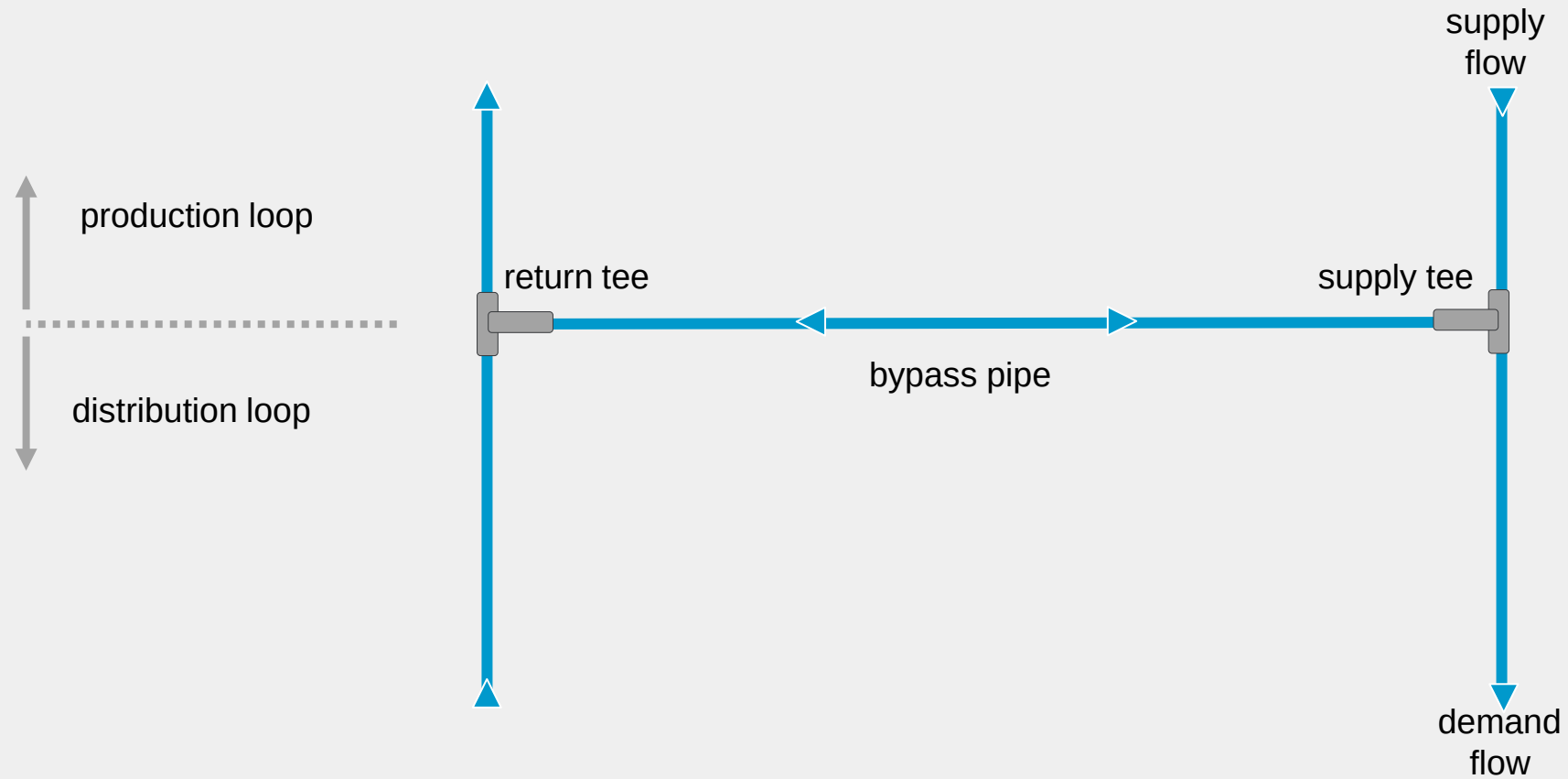


DISTRIBUTION LOOP CHARACTERISTICS

- Reduced pump energy use
- Distribution loop sized for system diversity
- Higher return-water temperatures



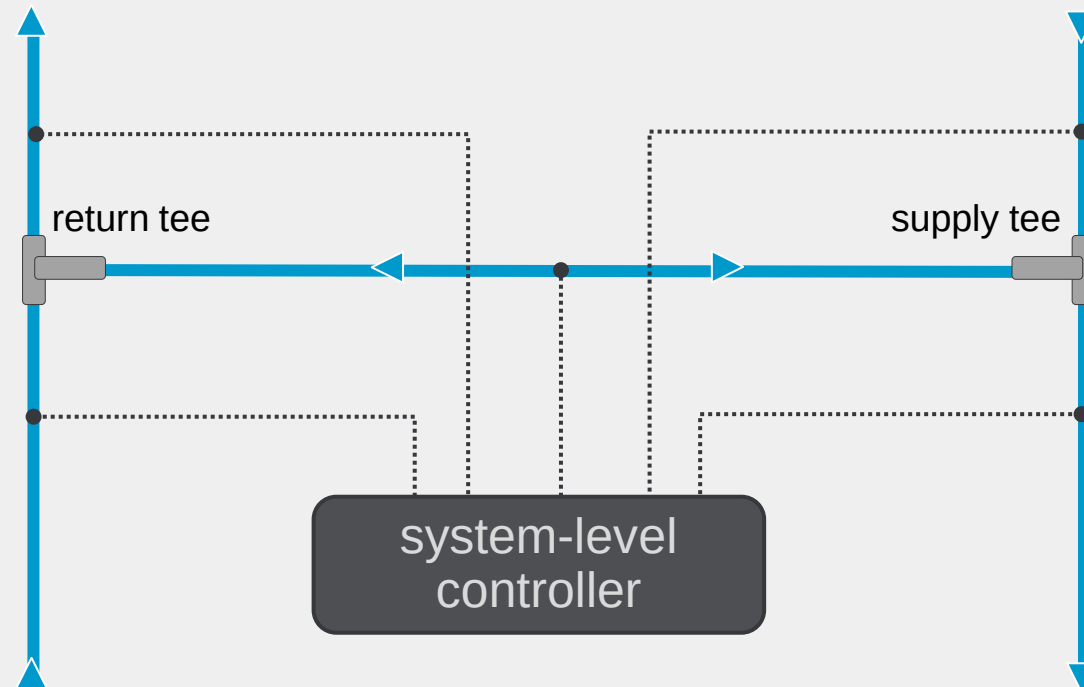
SYSTEM OPERATION



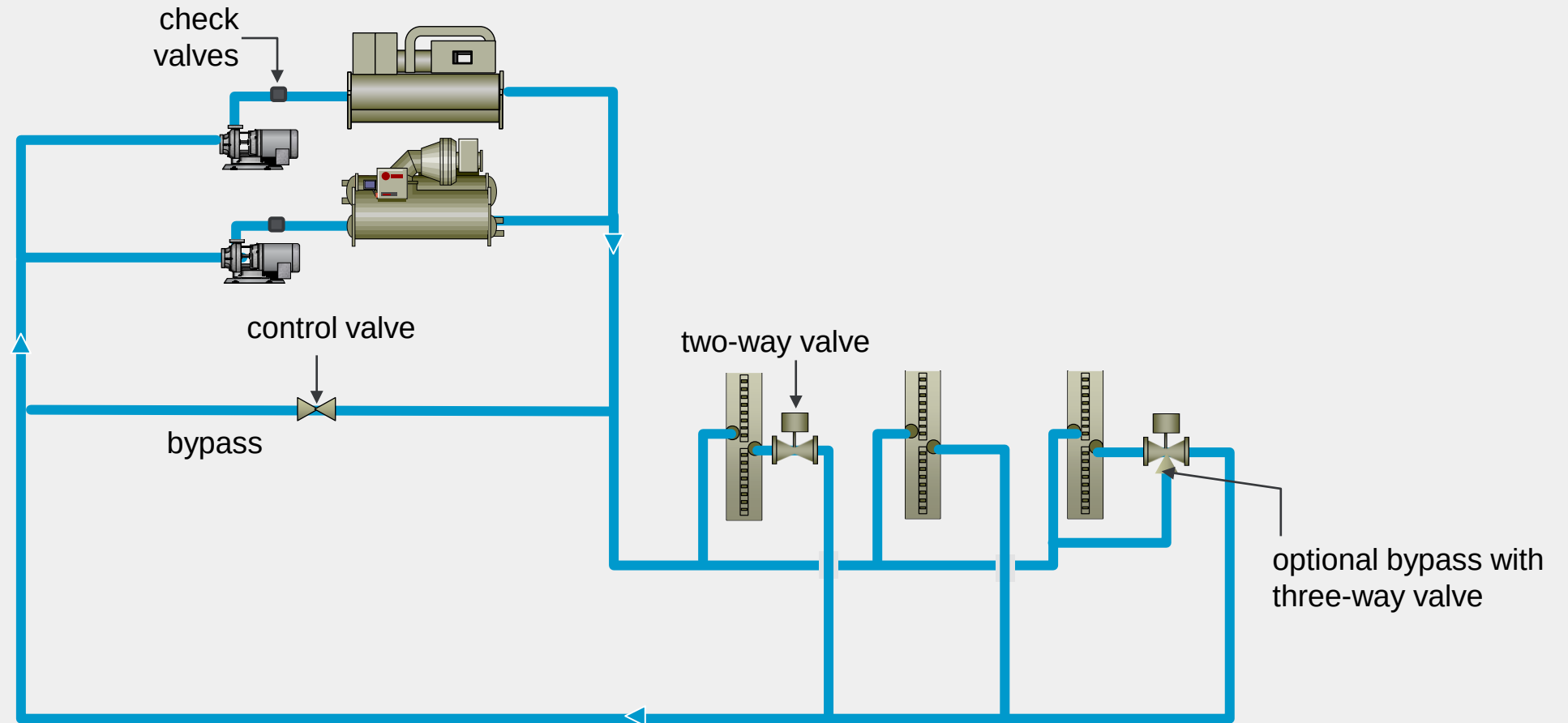
CONTROL OF PRIMARY-SECONDARY SYSTEM

condition	response
deficit flow for specified period of time	start another chiller and pump
excess flow greater than 110% to 115% of next pump to turn off	turn off next chiller and pump
neither	do nothing

TEMPERATURE-BASED CALCULATIONS



VARIABLE-PRIMARY-FLOW SYSTEMS

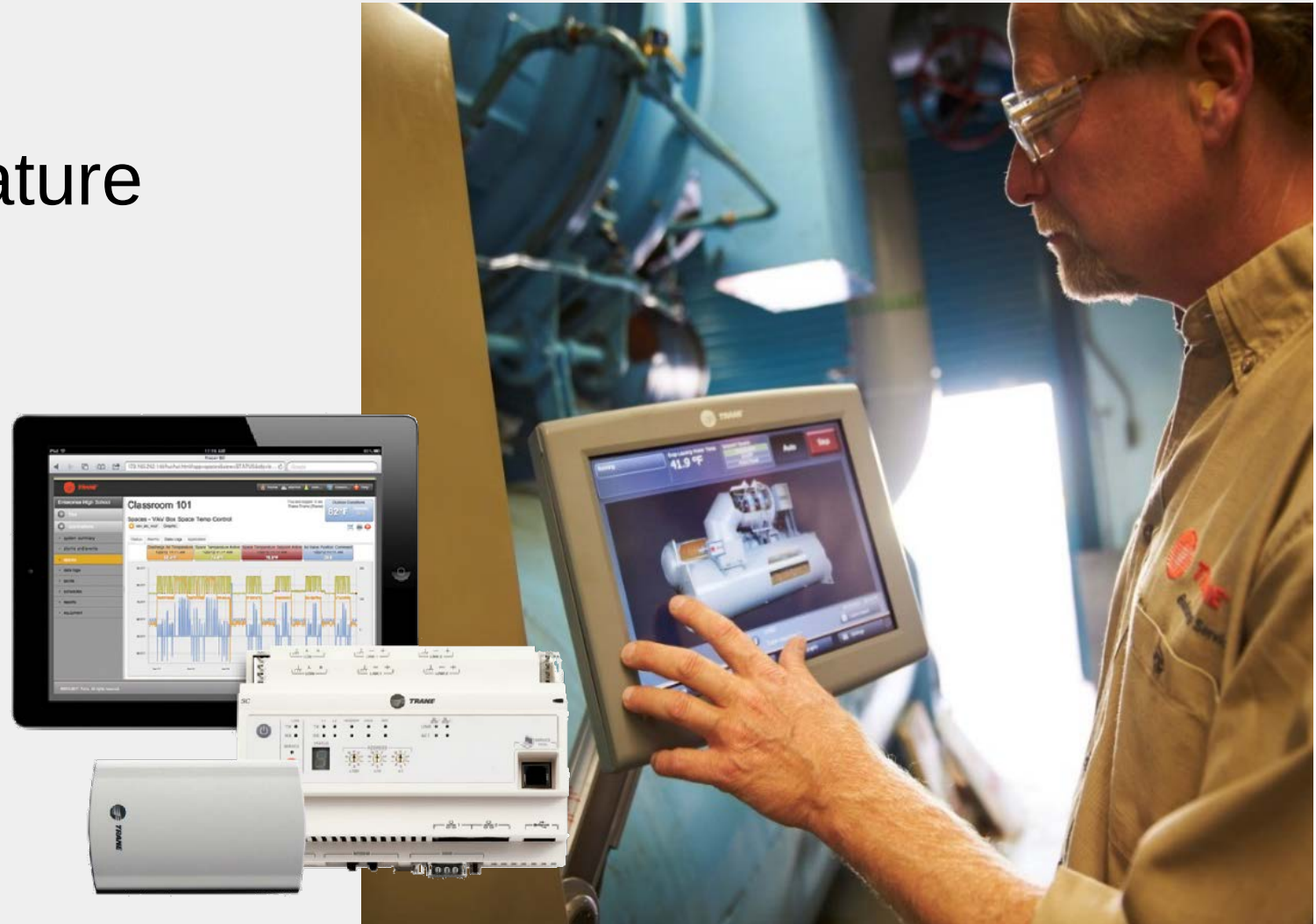


CRITICAL VPF SYSTEM REQUIREMENTS

- Chillers must handle variable evaporator flow
- System must include a bypass
- System-level controls must limit the rate-of-flow change
- Adequate time to design and commission controls
- Operator must understand the system

CHILLER CONTROLS

- Start-stop
- Chilled-water temperature control
- Monitor and protect
- Adapt to unusual conditions



WHAT'S COMING

- Decarb
- Energy Transition
- TES, geo, efficiency



YPG District Energy 101

Patrick Villaume, Patterson-Kelley / SPX



What is Steam?

Patrick Villaume, Patterson-Kelley / SPX

What is Steam?

- Steam is the gaseous state of water, produced at its boiling (or vaporization) point.
- When liquid boils, it creates a vapor.
- As long as the vapor is in contact with the liquid, the temperature is the same.

What is Steam?

- A pot of water when heated will rise to 212°F, but if additional heat was added to the pot, no additional increase in temperature will occur. Rather, a change in the state from liquid to vapor will occur.
- This vapor is called steam with a temperature of 212°F but 1600x the volume of water.



Energy in Steam

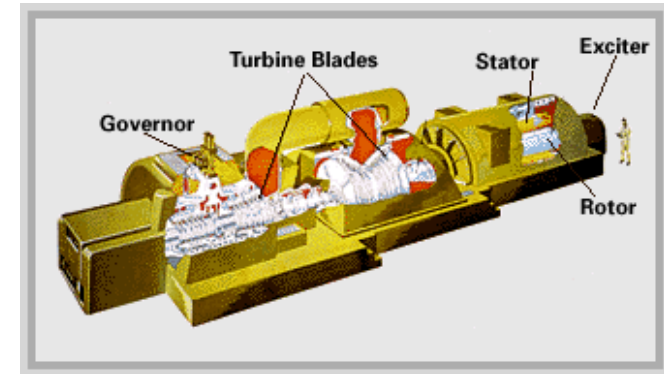
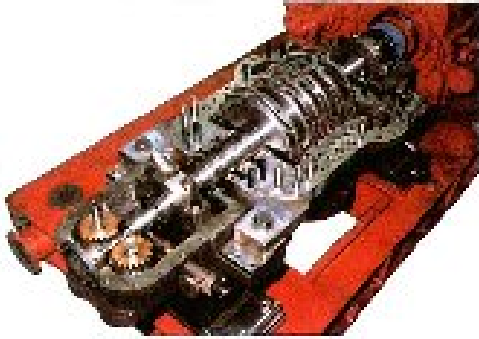
- The heat stored in the water is “Sensible Heat or Energy”.
- The heat applied after water reaches 212°F and vaporizes is called “Latent Heat or Energy”.
- When no change in temp occurs this is the Saturated State of steam.
- The total energy in the steam is “Sensible” and “Latent.” 85% of that energy is “Latent”

Why Steam?

- High usable heat content
- Gives up heat at a constant temperature
- Produced from water
 - A plentiful resource
 - A reusable resource
- Clean (low toxicity), odorless, tasteless
- Ease of transportability
- Low cost and efficient to distribute as compared to other sources of power

Where Do We Use Steam?

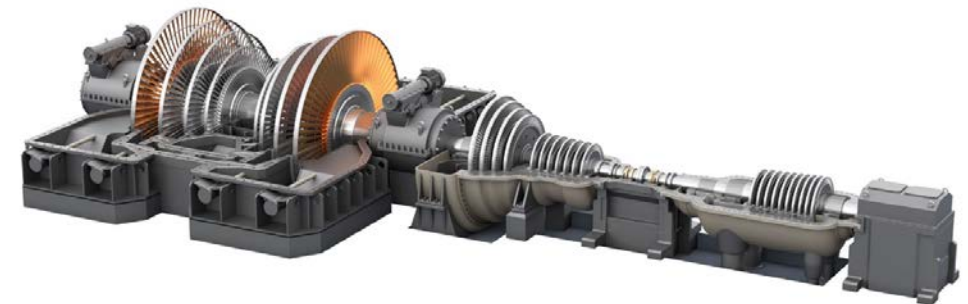
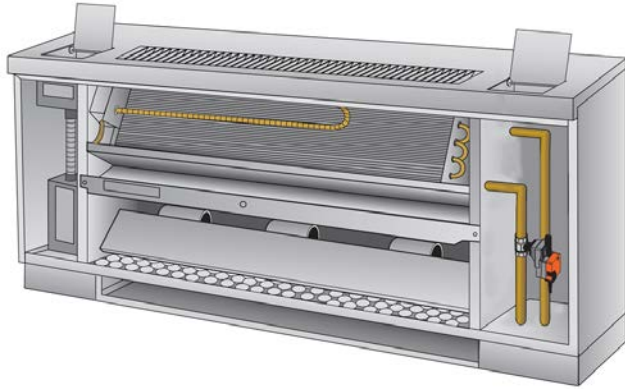
- Mechanical Energy – use velocity of steam to produce an effect



- Thermal Energy – use of heat and heating properties

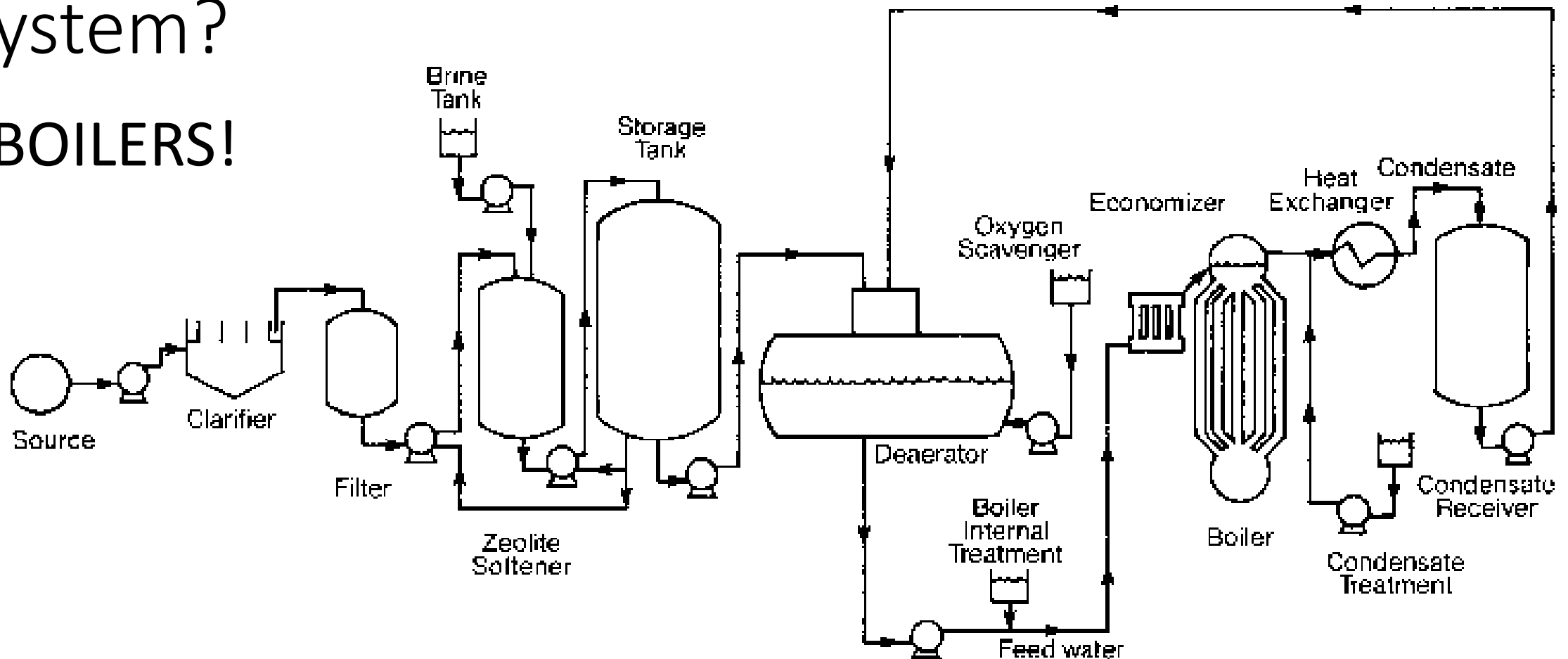


Steam in District Energy Systems



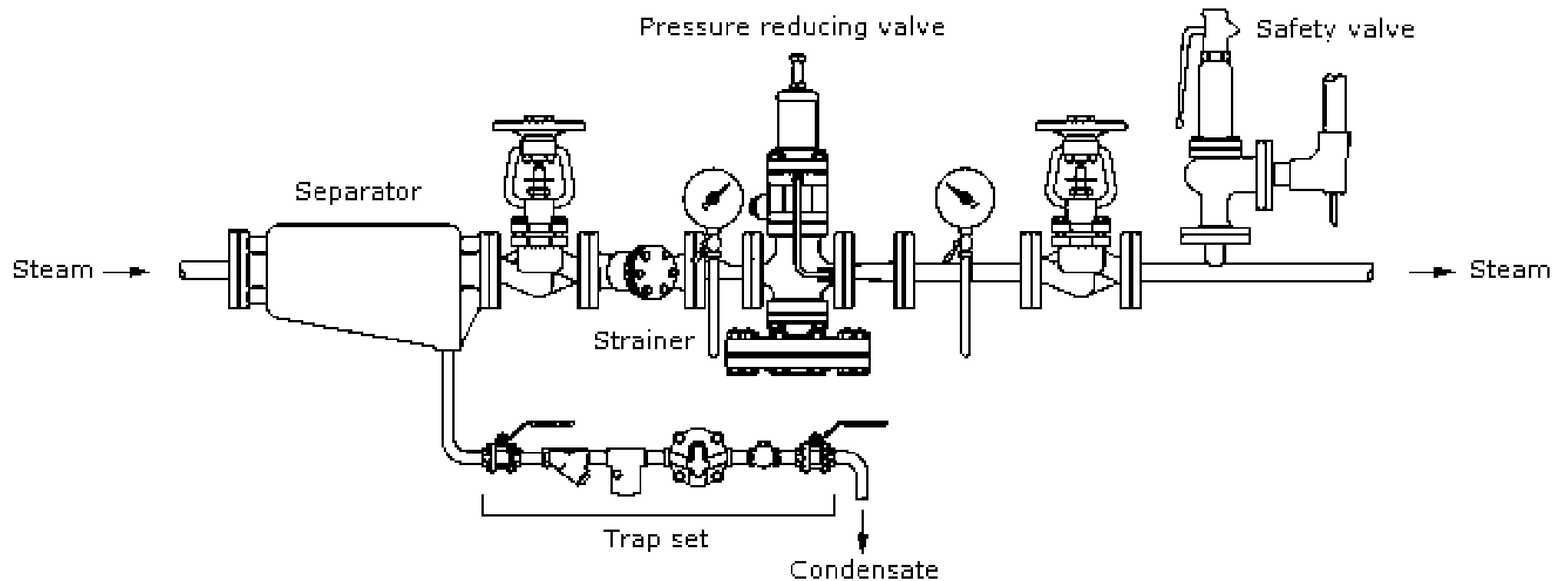
How is Steam Created for a District Energy System?

- **BOILERS!**



How is Steam Distributed in a System?

- The pressure from the boiler is distributed to different zones or buildings throughout the campus with the help of:



What to Look Out for

- A steam system is as efficient as you maintain it to be
- Make sure you are aware of and trained on all the components in your steam system
- Water is the enemy of a good steam system
- Maintain steam traps and condensate systems
- Perform steam trap surveys
- Steam is invisible and pressurized
- Leaks that occur due to water erosion could lead to significant damage with any steam system
- Could be harmful if left unattended





CampusEnergy2024

February 20 – 23, 2024

Hilton San Francisco Union Square | San Francisco, CA



Thank You!

Patrick Villaume, Patterson-Kelley / SPX
patrick.villaume@spx.com



What's Next at IDEA?



Join us at the Renaissance Orlando at SeaWorld® for our 115th Annual Conference, IDEA2024. Join the IDEA YPG for District Energy 102 on Wednesday, June 19!

Register to learn and connect with hundreds of district energy colleagues from around the world.

Register at <https://bit.ly/IDEA2024-Registration>

Preliminary Program at <https://bit.ly/IDEA2024-DailySched>

Keynote Address from **Brian Deese**, Former Director of White House Economic Council at <https://bit.ly/IDEA2024Keynote>

Two Plenary Panels at <https://bit.ly/IDEAPlenary2024>



CampusEnergy2025 Call for Presentations

We are excited that CampusEnergy2025 is coming back to Boston, at the Westin Seaport Hotel, Feb. 3-6, 2025 and the **Call for Presentations** is now open.

If you want to present at this ever-growing event, submit your abstract at <https://bit.ly/Campus24Call4Abs>. The deadline to submit is **Wednesday, July 27**.



Additional Online Education

If you missed any of our previous online educational programming, please visit the IDEA Webinars page and stream them today.

<https://www.districtenergy.org/events/webinars>