We Claim:

1. A controller for controlling a refrigeration unit, the controller configured for:

storing instructions for a first refrigeration setting having a first average power consumption and a first range of temperature variation;

storing instructions for a second refrigeration setting having a second average power consumption and a second range of temperature variation, wherein the first average power consumption is lower than the second average power consumption, and the second range of temperature variation is smaller than the first range of temperature variation;

tracking a cumulative average temperature in a refrigeration element; and

activating either the first refrigeration setting or the second refrigeration setting, wherein the controller activates the first refrigeration setting while the cumulative average temperature is within a selected temperature range having a lower threshold and an upper threshold, and once the cumulative average temperature is less than the lower threshold or greater than the upper threshold of the selected temperature range, the controller activates the second refrigeration setting until the cumulative average temperature is within a target temperature range that has a lower threshold that is greater than the lower threshold of the selected temperature range and an upper threshold that is less than the upper threshold of the selected temperature range.

2. The controller of claim 1, wherein in the first refrigeration setting, the controller alternately activates a first phase and a second phase in the refrigeration unit, wherein the controller activates the first phase when an upper temperature threshold of the refrigeration element is detected, and the controller activates the second phase when a lower temperature threshold of the refrigeration element is detected.

3. The controller of claim 2, wherein the refrigeration unit comprises a compressor and a condenser comprising one or more condenser fans, and in the first phase, the one or more condenser fans are activated and the compressor is operated at at least 80% of a nominal full power, and in the second phase, the one or more condenser fans and the compressor are both inactivated.

4. The controller of claim 3, wherein in the second refrigeration setting, the one or more condenser fans are activated and the compressor is operated at a lower average power than in the first phase of the first refrigeration setting.

5. The controller of claim 2, wherein the refrigeration unit comprises one or more evaporator fans, the one or more evaporator fans are activated during a majority of each of the first phase and the second phase, and the one or more evaporator fans are inactivated an interval of time prior to the end of each of the first phase and the second phase.

6. The controller of claim 5, wherein the one or more evaporator fans are operated at a lower power during the second phase than during either the first phase or the second refrigeration setting.

7. The controller of claim 1, wherein the controller controls the refrigeration unit to operate in the first refrigeration setting and then in the second refrigeration setting for a selected total period of time, and the selected temperature range is defined by a product of a rate at which the second refrigeration setting is capable of bringing the cumulative average temperature in the refrigeration element to the target temperature range, and a correction interval of time, defined as an interval of time required for the second refrigeration setting to bring the cumulative average temperature in the refrigeration element to the target temperature range; and wherein the controller controls the refrigeration unit to operate in the first refrigeration setting for the selected total period of time minus the correction interval of time, and then is operated in the second refrigeration setting for the correction interval of time.

8. The controller of claim 1, wherein the target temperature range is defined using upper and lower margins around a setpoint temperature.

9. The controller of claim 1, wherein the controller comprises at least one processor, at least one data storage component configured for communication with said at least one processor, and at least one algorithm stored on the at least one data storage component to be executed by the at least one processor.

10. The controller of claim 9, wherein the at least one algorithm comprises executable instructions for one or more of the first refrigeration setting, the second refrigeration setting, the cumulative average temperature tracker, and the refrigeration setting controller.

11. The controller of claim 1, wherein the refrigeration element comprises at least one of: a refrigerated supply line provided from the refrigeration unit; a refrigerated environment that is refrigerated by the refrigeration unit; or an air return line for air returning to the refrigeration unit from a refrigerated environment.

12. A method comprising:

providing a first refrigeration control mode and a second refrigeration control mode for operating a refrigeration unit, wherein an average power consumption in the first refrigeration control mode is lower than an average power consumption in the second refrigeration control mode, and the second refrigeration control mode maintains the refrigeration unit within a smaller range of temperature variation than the first refrigeration control mode;

operating the refrigeration unit in the first refrigeration control mode;

monitoring a cumulative average temperature in the refrigeration element since beginning operating the refrigeration unit in the first refrigeration control mode; and

once the cumulative average temperature in the refrigeration element is outside a selected temperature range, switching to operating the refrigeration unit in the second refrigeration control mode, until the cumulative average temperature in the refrigeration element is within a target temperature range around a setpoint temperature, wherein the target temperature range has an upper limit that is lower than an upper limit of the selected temperature range, and a lower limit that is higher than a lower limit of the selected temperature range.

13. The method of claim 12, wherein in the first refrigeration control mode, the refrigeration unit is alternately activated in a first phase and a second phase, wherein the first phase is activated when an upper temperature threshold is detected in the refrigeration element, and the second phase is activated when a lower temperature threshold is detected in the refrigeration element; wherein in the first phase, one or more condenser fans are activated and a compressor is operated at at least 80% of a nominal full power, and in the second phase, the one

or more condenser fans and the compressor are both inactivated; and wherein in the second refrigeration control mode, the one or more condenser fans are activated and the compressor is operated at a lower average power than in the first phase.

14. The method of claim 13, wherein at least one evaporator fan is activated during a majority of each of the first phase, the second phase, and the second refrigeration control mode, with the at least one evaporator fan operated at a lower power during the second phase than during either the first phase or the second refrigeration control mode, wherein the at least one evaporator fan is inactivated an interval of time prior to the end of each of the first phase, the second phase, and the second refrigeration control mode.

15. The method of claim 12, wherein the refrigeration unit is operated in the first refrigeration control mode and then in the second refrigeration control mode for a selected total period of time, and the selected temperature range is defined by a product of a rate at which the second refrigeration control mode is capable of bringing the cumulative average temperature in the refrigeration element to the target temperature range, and a correction interval of time defined as an interval of time required for the second refrigeration control mode to bring the cumulative average temperature in the refrigeration element to the target temperature range; and wherein the refrigeration unit is operated in the first refrigeration control mode for the selected total period of time minus the correction interval of time, and then is operated in the second refrigeration control mode for the correction interval of time.

16 The method of claim 12, wherein the method is executed by at least one processor running executable instructions comprising at least one algorithm.

17. The method of claim 12, wherein the refrigeration element comprises at least one of: a refrigerated supply line provided from the refrigeration unit; a refrigerated environment that is refrigerated by the refrigeration unit; or an air return line for air returning to the refrigeration unit from a refrigerated environment.

18. A refrigeration system comprising:

a refrigeration unit comprising a compressor, a condenser comprising one or more condenser fans, an expansion device, and an evaporator comprising one or more evaporator fans;

a refrigerated air supply leading from the evaporator to a refrigeration chamber; and

a controller with a communicative link to the compressor, the one or more condenser fans, the expansion device, and the one or more evaporator fans, wherein the controller is configured to:

operate the refrigeration unit alternately in a first mode and a second mode, wherein the first mode has a lower average power consumption than the second mode, and the second mode maintains the refrigeration unit within a smaller range of temperature variation than the first mode;

track a cumulative average temperature in the refrigerated air supply; and

once the cumulative average temperature is outside a selected temperature range, switches the refrigeration unit from operating in the first mode to the second mode until the cumulative average temperature is within a target temperature range around a setpoint temperature, wherein the target temperature range has an upper limit that is lower than an upper limit of the selected temperature range, and a lower limit that is higher than a lower limit of the selected temperature range.

19. The refrigeration system of claim 18, wherein in the first mode, the refrigeration unit is alternately activated in a first phase and a second phase, wherein the first phase is activated when an upper temperature threshold is detected in the refrigerated air supply, and the second phase is activated when a lower temperature threshold is detected in the refrigerated air supply; wherein in the first phase, the one or more condenser fans are activated and the compressor is operated at at least 80% of a nominal full power, and in the second phase, the one or more condenser fans and the compressor are both inactivated; and wherein in the second refrigeration control mode, the one or more condenser fans are activated and the compressor is operated at a lower average power than in the first phase.

20. The refrigeration system of claim 19, wherein the one or more evaporator fans are activated during a majority of each of the high-capacity phase, the second phase, and the second

refrigeration control mode, with the one or more evaporator fans operated at a lower power during the second phase than during the high-capacity phase and the second refrigeration control mode, and the one or more evaporator fans are inactivated an interval of time prior to the end of each of the high-capacity phase, the second phase, and the second refrigeration control mode.

21. A controller for controlling a refrigeration unit comprising an evaporator having at least one evaporator fan, the controller configured for alternately activating a first phase and a second phase in the refrigeration unit, wherein the controller activates the first phase when an upper temperature threshold is detected in the refrigeration element, and the controller activates the second phase when a lower temperature threshold is detected in the refrigeration element, wherein the at least one evaporator fan is activated during a majority of each of the first phase and the second phase, and the at least one evaporator fan is inactivated an interval of time prior to the end of each of the first phase and the second phase.

22. The controller of claim 21, wherein the at least one evaporator fan is operated at a lower power during the second phase than during the first phase.

23. The controller of claim 21, wherein the refrigeration unit further comprises a compressor and a condenser comprising one or more condenser fans, and in the first phase, the one or more condenser fans are activated and the compressor is operated at at least 80% of a nominal full power, and in the second phase, the one or more condenser fans and the compressor are both inactivated.

24. The controller of claim 21, in which the first phase and the second phase are comprised in a first refrigeration setting, the first refrigeration setting having a first average power consumption and a first range of temperature variation, and the controller is further configured for alternately activating the first refrigeration setting and a second refrigeration setting having a second average power consumption and a second range of temperature variation, wherein the first average power consumption is lower than the second average power consumption, and the second range of temperature variation is smaller than the first range of temperature variation.

25. The controller of claim 24, wherein the at least one evaporator fan is operated at a lower power during the second phase than during either the first phase or the second refrigeration setting.

26. The controller of claim 24, wherein the controller is further configured for tracking a cumulative average temperature in a refrigeration element, and activating the first refrigeration setting while the cumulative average temperature is within a selected temperature range having a lower threshold and an upper threshold, and once the cumulative average temperature is less than the lower threshold or greater than the upper threshold of the selected temperature range, the controller activates the second refrigeration setting until the cumulative average temperature is within a target temperature range that has a lower threshold that is greater than the lower threshold of the selected temperature range and an upper threshold that is less than the upper threshold of the selected temperature range.

We Claim:

1. A controller for controlling a refrigeration unit, the controller configured for:

storing instructions for a first refrigeration setting having a first average power consumption and a first range of temperature variation;

storing instructions for a second refrigeration setting having a second average power consumption and a second range of temperature variation, wherein the first average power consumption is lower than the second average power consumption, and the second range of temperature variation is smaller than the first range of temperature variation;

tracking a cumulative average temperature in a refrigeration element; and

activating either the first refrigeration setting or the second refrigeration setting, wherein the controller activates the first refrigeration setting while the cumulative average temperature is within a selected temperature range having a lower threshold and an upper threshold, and once the cumulative average temperature is less than the lower threshold or greater than the upper threshold of the selected temperature range, the controller activates the second refrigeration setting until the cumulative average temperature is within a target temperature range that has a lower threshold that is greater than the lower threshold of the selected temperature range and an upper threshold that is less than the upper threshold of the selected temperature range.

2. The controller of claim 1, wherein in the first refrigeration setting, the controller alternately activates a first phase and a second phase in the refrigeration unit, wherein the controller activates the first phase when an upper temperature threshold of the refrigeration element is detected, and the controller activates the second phase when a lower temperature threshold of the refrigeration element is detected.

3. The controller of claim 2, wherein the refrigeration unit comprises a compressor and a condenser comprising one or more condenser fans, and in the first phase, the one or more condenser fans are activated and the compressor is operated at at least 80% of a nominal full power, and in the second phase, the one or more condenser fans and the compressor are both inactivated.

4. The controller of claim 3, wherein in the second refrigeration setting, the one or more condenser fans are activated and the compressor is operated at a lower average power than in the first phase of the first refrigeration setting.

5. The controller of claim 2, wherein the refrigeration unit comprises one or more evaporator fans, the one or more evaporator fans are activated during a majority of each of the first phase and the second phase, and the one or more evaporator fans are inactivated an interval of time prior to the end of each of the first phase and the second phase.

6. The controller of claim 5, wherein the one or more evaporator fans are operated at a lower power during the second phase than during either the first phase or the second refrigeration setting.

7. The controller of claim 1, wherein the controller controls the refrigeration unit to operate in the first refrigeration setting and then in the second refrigeration setting for a selected total period of time, and the selected temperature range is defined by a product of a rate at which the second refrigeration setting is capable of bringing the cumulative average temperature in the refrigeration element to the target temperature range, and a correction interval of time, defined as an interval of time required for the second refrigeration setting to bring the cumulative average temperature in the refrigeration element to the target temperature range; and wherein the controller controls the refrigeration unit to operate in the first refrigeration setting for the selected total period of time minus the correction interval of time, and then is operated in the second refrigeration setting for the correction interval of time.

8. The controller of claim 1, wherein the target temperature range is defined using upper and lower margins around a setpoint temperature.

9. The controller of claim 1, wherein the controller comprises at least one processor, at least one data storage component configured for communication with said at least one processor, and at least one algorithm stored on the at least one data storage component to be executed by the at least one processor.

10. The controller of claim 9, wherein the at least one algorithm comprises executable instructions for one or more of the first refrigeration setting, the second refrigeration setting, the cumulative average temperature tracker, and the refrigeration setting controller.

11. The controller of claim 1, wherein the refrigeration element comprises at least one of: a refrigerated supply line provided from the refrigeration unit; a refrigerated environment that is refrigerated by the refrigeration unit; or an air return line for air returning to the refrigeration unit from a refrigerated environment.

12. A method comprising:

providing a first refrigeration control mode and a second refrigeration control mode for operating a refrigeration unit, wherein an average power consumption in the first refrigeration control mode is lower than an average power consumption in the second refrigeration control mode, and the second refrigeration control mode maintains the refrigeration unit within a smaller range of temperature variation than the first refrigeration control mode;

operating the refrigeration unit in the first refrigeration control mode;

monitoring a cumulative average temperature in the refrigeration element since beginning operating the refrigeration unit in the first refrigeration control mode; and

once the cumulative average temperature in the refrigeration element is outside a selected temperature range, switching to operating the refrigeration unit in the second refrigeration control mode, until the cumulative average temperature in the refrigeration element is within a target temperature range around a setpoint temperature, wherein the target temperature range has an upper limit that is lower than an upper limit of the selected temperature range, and a lower limit that is higher than a lower limit of the selected temperature range.

13. The method of claim 12, wherein in the first refrigeration control mode, the refrigeration unit is alternately activated in a first phase and a second phase, wherein the first phase is activated when an upper temperature threshold is detected in the refrigeration element, and the second phase is activated when a lower temperature threshold is detected in the refrigeration element; wherein in the first phase, one or more condenser fans are activated and a compressor is operated at at least 80% of a nominal full power, and in the second phase, the one

or more condenser fans and the compressor are both inactivated; and wherein in the second refrigeration control mode, the one or more condenser fans are activated and the compressor is operated at a lower average power than in the first phase.

14. The method of claim 13, wherein at least one evaporator fan is activated during a majority of each of the first phase, the second phase, and the second refrigeration control mode, with the at least one evaporator fan operated at a lower power during the second phase than during either the first phase or the second refrigeration control mode, wherein the at least one evaporator fan is inactivated an interval of time prior to the end of each of the first phase, the second phase, and the second refrigeration control mode.

15. The method of claim 12, wherein the refrigeration unit is operated in the first refrigeration control mode and then in the second refrigeration control mode for a selected total period of time, and the selected temperature range is defined by a product of a rate at which the second refrigeration control mode is capable of bringing the cumulative average temperature in the refrigeration element to the target temperature range, and a correction interval of time defined as an interval of time required for the second refrigeration control mode to bring the cumulative average temperature in the refrigeration element to the target temperature range; and wherein the refrigeration unit is operated in the first refrigeration control mode for the selected total period of time minus the correction interval of time, and then is operated in the second refrigeration control mode for the correction interval of time.

16 The method of claim 12, wherein the method is executed by at least one processor running executable instructions comprising at least one algorithm.

17. The method of claim 12, wherein the refrigeration element comprises at least one of: a refrigerated supply line provided from the refrigeration unit; a refrigerated environment that is refrigerated by the refrigeration unit; or an air return line for air returning to the refrigeration unit from a refrigerated environment.

18. A refrigeration system comprising:

a refrigeration unit comprising a compressor, a condenser comprising one or more condenser fans, an expansion device, and an evaporator comprising one or more evaporator fans;

a refrigerated air supply leading from the evaporator to a refrigeration chamber; and

a controller with a communicative link to the compressor, the one or more condenser fans, the expansion device, and the one or more evaporator fans, wherein the controller is configured to:

operate the refrigeration unit alternately in a first mode and a second mode, wherein the first mode has a lower average power consumption than the second mode, and the second mode maintains the refrigeration unit within a smaller range of temperature variation than the first mode;

track a cumulative average temperature in the refrigerated air supply; and

once the cumulative average temperature is outside a selected temperature range, switches the refrigeration unit from operating in the first mode to the second mode until the cumulative average temperature is within a target temperature range around a setpoint temperature, wherein the target temperature range has an upper limit that is lower than an upper limit of the selected temperature range, and a lower limit that is higher than a lower limit of the selected temperature range.

19. The refrigeration system of claim 18, wherein in the first mode, the refrigeration unit is alternately activated in a first phase and a second phase, wherein the first phase is activated when an upper temperature threshold is detected in the refrigerated air supply, and the second phase is activated when a lower temperature threshold is detected in the refrigerated air supply; wherein in the first phase, the one or more condenser fans are activated and the compressor is operated at at least 80% of a nominal full power, and in the second phase, the one or more condenser fans and the compressor are both inactivated; and wherein in the second refrigeration control mode, the one or more condenser fans are activated and the compressor is operated at a lower average power than in the first phase.

20. The refrigeration system of claim 19, wherein the one or more evaporator fans are activated during a majority of each of the high-capacity phase, the second phase, and the second

refrigeration control mode, with the one or more evaporator fans operated at a lower power during the second phase than during the high-capacity phase and the second refrigeration control mode, and the one or more evaporator fans are inactivated an interval of time prior to the end of each of the high-capacity phase, the second phase, and the second refrigeration control mode.