CLAIMS:

Claim 1. A method of monitoring and controlling an operation of a meter electrically connected between a power source and a load through a meter socket, comprising:

detecting at least one potential failure condition of an electrical connection between the meter and the meter socket;

determining, based on the detected at least one potential failure condition, a correction time indicating an amount of time before a predicted failure of the electrical connection;

determining whether the meter is in an imminent failure condition based on at least one of the correction time and the detected at least one potential failure condition; and

disconnecting power to the load with the meter when it is determined the meter is in the imminent failure condition.

Claim 2. The method according to Claim 1, wherein disconnecting power includes transmitting a notification of the meter being in the imminent failure condition to a location.

Claim 3. The method according to Claim 1, wherein detecting the at least one potential failure condition comprises detecting a current through the electrical connection and a temperature in the vicinity of the electrical connection.

Claim 4. The method according to Claim 3, wherein determining the correction time comprises relating the temperature in the vicinity of the electrical connection and the current through the electrical connection to a time value in a lookup table that relates temperature and current to time.

Claim 5. The method according to Claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

determining a rate of change in temperature based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical connection;

determining a rate of change in current based on the current through the electrical connection and at least one previously detected current through the electrical connection;

determining a reference rate of change in temperature based on the rate of change in current;

comparing the rate of change in temperature to the reference rate of change in temperature; and

determining the meter is in the imminent failure condition when rate of change in temperature is equal to or greater than the reference rate of temperature.

Claim 6. The method according to Claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

determining a rate of change in temperature based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical connection;

comparing the rate of change in temperature to a threshold rate of change in temperature; and

determining the meter is in the imminent failure condition when the rate of change in temperature is equal to or greater than the threshold rate of change in temperature.

Claim 7. The method according to Claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

detecting at least one additional temperature with at least one of a plurality of additional temperature sensors and determining at least one temperature differential based on the at least one additional temperature and the temperature in the vicinity of the electrical connection;

comparing the at least one temperature differential to a threshold temperature differential; and

determining the meter is in the imminent failure condition when the at least one temperature differential is equal to or greater than the threshold temperature differential.

Claim 8. The method according to claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

comparing the current through the electrical connection to a maximum current; and

determining the meter is in the imminent failure condition when the current through the electrical connection is greater than the maximum current.

Claim 9. The method according to claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

comparing the temperature in the vicinity of the electrical connection to a maximum temperature; and

determining the meter is in the imminent failure condition when the temperature in the vicinity of the electrical connection is equal to or greater than the maximum temperature.

Claim 10. The method according to Claim 1, further comprising:

determining the detected at least one failure condition is abnormal based on the correction time when the correction time is less than a threshold correction time; and

transmitting the correction time to a location when the detected at least one potential failure condition is abnormal.

Claim 11. The method according to Claim 10, wherein determining whether the meter is in the imminent failure condition based on the correction time comprises:

determining the detected at least one potential failure condition is abnormal;

comparing the correction time to a minimum correction failure time; and

determining the meter is in the imminent failure condition when the correction time is less than the minimum correction failure time.

Claim 12. The method according to Claim 1, wherein disconnecting power to the load with the meter when it is determined the meter is in the imminent failure condition comprises operating a disconnect switch to be set to an open state, wherein the disconnect switch is in a line within the meter that provides power to the load.

Claim 13. The method according to Claim 12 further comprising:

monitoring a temperature in the vicinity of the electrical connection after the disconnect switch is set to the open state;

operating the disconnect switch to be set in a closed state and connecting power to the load with the meter when the temperature in the vicinity of the electrical connection is less than a threshold safe temperature.

Claim 14. The method according to Claim 12, further comprising:

monitoring a temperature in the vicinity of the electrical connection after the disconnect switch is set to the open state;

transmitting a safe temperature alert to an external control when the temperature in the vicinity of the electrical connection is less than a threshold safe temperature; and

operating the disconnect switch to be set in a closed state and connecting power to the load with the meter when a closed command is received from the external control.

Claim 15. An apparatus that monitors and controls the operation of a meter electrically connected between a power source and a load through a meter socket, comprising:

a detection unit configured to monitor an electrical connection between the meter and the meter socket, and detect at least one potential failure condition of the electrical connection; and

a controller configured to:

determine a correction time, based on the detected at least one potential failure condition of the electrical connection, that indicates an amount of time before a predicted failure of the electrical connection,

determine whether the meter is in an imminent failure condition based on at least one of the correction time and the at least one potential failure condition, and

disconnect power to the load with the meter when it is determined the meter is in the imminent failure condition.

Claim 16. The apparatus according to Claim 15, the controller is configured to transmits a notification of the imminent failure condition to a location.

Claim 17. The apparatus according to Claim 15, wherein the detection unit comprises:

at least one temperature sensor that detects a temperature in the vicinity of the electrical connection; and

at least one current sensor that detects a current through the electrical connection, wherein

the detection unit is configured to detect the detected at least one potential failure condition by reading the temperature in the vicinity of electrical connection and the current through the electrical connection.

Claim 18. The apparatus according to Claim 17, wherein the controller is configured to determine the correction time by relating the temperature in the vicinity of the electrical connection and the current through the electrical connection to a time value in a lookup table that relates temperature and current to time.

Claim 19. The apparatus according to Claim 17, wherein

the controller is configured to determine the meter is in the imminent failure condition based on the detected at least one potential failure condition by determining a rate of change in temperature is greater than a reference rate of change in temperature; and

the controller is configured to determine the reference rate of change of temperature based on a rate of change of current through the electrical connection, wherein

the rate of change in temperature is based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical, and the rate of change in current is based on the current through the electrical connection and at least one previously detected current through the electrical connection.

Claim 20. The apparatus according to Claim 17, wherein

the controller is configured to determine the meter is in the imminent failure condition based on the detected at least one potential failure condition by determining when one of the temperature in the vicinity of the electrical connection is higher than a maximum temperature and the current through the electrical connection is higher than a maximum current.

Claim 21. The apparatus according to Claim 17, further comprising:

at least one additional temperature sensor that detects at least one additional temperature, wherein

the controller is further configured to determine the meter is in the imminent failure condition when a difference between the temperature in the vicinity of the electrical connection and the at least one additional temperature is greater than at least one temperature differential threshold.

Claim 22. The apparatus according to Claim 15, further comprising:

a disconnect switch provided within the meter and set by the controller, wherein

the disconnect switch connects power to the load when set to a closed state and disconnects power to the load when set to an open state, wherein

the detection unit is configured to detect a temperature in the vicinity of the electrical connection, and

the controller is configured to set the disconnect switch to the open state when the controller determines the meter is in the imminent failure condition, and the controller is configured to set the disconnect switch to the closed state when the controller determines the temperature in the vicinity of the electrical connection is less than a threshold safe operating temperature.

CLAIMS:

Claim 1: A method of monitoring and controlling an operation of a meter electrically connected between a power source and a load through a meter socket, comprising:

detecting at least one potential failure condition of an electrical connection between the meter and the meter socket;

determining, based on the detected at least one potential failure condition, a correction time indicating an amount of time before a predicted failure of the electrical connection;

determining whether the meter is in an imminent failure condition based on the correction time by comparing the correction time to a minimum correction time;

determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition; and

disconnecting power to the load with the meter when it is determined the meter is in the imminent failure condition.

Claim 2: The method according to Claim 1, wherein disconnecting power includes transmitting a notification of the meter being in the imminent failure condition to a location.

Claim 3: The method according to Claim 1, wherein detecting the at least one potential failure condition comprises detecting a current through the electrical connection and a temperature in the vicinity of the electrical connection.

Claim 4: The method according to Claim 3, wherein determining the correction time comprises relating the temperature in the vicinity of the electrical connection and the current through the electrical connection to a time value in a lookup table that relates temperature and current to time.

Claim 5: The method according to Claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

determining a rate of change in temperature based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical connection;

determining a rate of change in current based on the current through the electrical connection and at least one previously detected current through the electrical connection;

determining a reference rate of change in temperature based on the rate of change in current;

comparing the rate of change in temperature to the reference rate of change in temperature; and

determining the meter is in the imminent failure condition when rate of change in temperature is equal to or greater than the reference rate of temperature.

Claim 6: The method according to Claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

determining a rate of change in temperature based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical connection;

comparing the rate of change in temperature to a threshold rate of change in temperature; and

determining the meter is in the imminent failure condition when the rate of change in temperature is equal to or greater than the threshold rate of change in temperature.

Claim 7: The method according to Claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

detecting at least one additional temperature with at least one of a plurality of additional temperature sensors and determining at least one temperature differential based on the at least one additional temperature and the temperature in the vicinity of the electrical connection;

comparing the at least one temperature differential to a threshold temperature differential; and

determining the meter is in the imminent failure condition when the at least one temperature differential is equal to or greater than the threshold temperature differential.

Claim 8: The method according to claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

comparing the current through the electrical connection to a maximum current; and

determining the meter is in the imminent failure condition when the current through the electrical connection is greater than the maximum current.

Claim 9: The method according to claim 3, wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition comprises:

comparing the temperature in the vicinity of the electrical connection to a maximum temperature; and

determining the meter is in the imminent failure condition when the temperature in the vicinity of the electrical connection is equal to or greater than the maximum temperature.

Claim 10: The method according to Claim 1, further comprising:

determining the detected at least one failure condition is abnormal based on the correction time when the correction time is less than a threshold correction time; and

transmitting the correction time to a location when the detected at least one potential failure condition is abnormal.

Claim 11: The method according to Claim 10, wherein determining whether the meter is in the imminent failure condition based on the correction time comprises:

determining the detected at least one potential failure condition is abnormal;

comparing the correction time to the minimum correction time; and

determining the meter is in the imminent failure condition when the correction time is less than the minimum correction time.

Claim 12: The method according to Claim 1, wherein disconnecting power to the load with the meter when it is determined the meter is in the imminent failure condition comprises operating a disconnect switch to be set to an open state, wherein the disconnect switch is in a line within the meter that provides power to the load.

Claim 13: The method according to Claim 12 further comprising:

monitoring a temperature in the vicinity of the electrical connection after the disconnect switch is set to the open state;

operating the disconnect switch to be set in a closed state and connecting power to the load with the meter when the temperature in the vicinity of the electrical connection is less than a threshold safe temperature.

Claim 14: The method according to Claim 12, further comprising:

monitoring a temperature in the vicinity of the electrical connection after the disconnect switch is set to the open state;

transmitting a safe temperature alert to an external control when the temperature in the vicinity of the electrical connection is less than a threshold safe temperature; and

operating the disconnect switch to be set in a closed state and connecting power to the load with the meter when a closed command is received from the external control.

Claim 15: An apparatus that monitors and controls the operation of a meter electrically connected between a power source and a load through a meter socket, comprising:

a detection unit configured to monitor an electrical connection between the meter and the meter socket, and detect at least one potential failure condition of the electrical connection; and

a controller configured to:

determine a correction time, based on the detected at least one potential failure condition of the electrical connection, that indicates an amount of time before a predicted failure of the electrical connection,

determine whether the meter is in an imminent failure condition based on the correction time by comparing the correction time to a minimum correction time,

determine whether the meter is in the imminent failure condition based on the detected at least one potential failure condition, and

disconnect power to the load with the meter when it is determined the meter is in the imminent failure condition.

Claim 16: The apparatus according to Claim 15, the controller is configured to transmits a notification of the imminent failure condition to a location.

Claim 17: The apparatus according to Claim 15, wherein the detection unit comprises:

at least one temperature sensor that detects a temperature in the vicinity of the electrical connection; and

at least one current sensor that detects a current through the electrical connection, wherein

the detection unit is configured to detect the detected at least one potential failure condition by reading the temperature in the vicinity of electrical connection and the current through the electrical connection.

Claim 18: The apparatus according to Claim 17, wherein the controller is configured to determine the correction time by relating the temperature in the vicinity of the electrical connection and the current through the electrical connection to a time value in a lookup table that relates temperature and current to time.

Claim 19: The apparatus according to Claim 17, wherein

the controller is configured to determine the meter is in the imminent failure condition based on the detected at least one potential failure condition by determining a rate of change in temperature is greater than a reference rate of change in temperature; and

the controller is configured to determine the reference rate of change of temperature based on a rate of change of current through the electrical connection, wherein

the rate of change in temperature is based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical, and the rate of change in current is based on the current through the electrical connection and at least one previously detected current through the electrical connection.

Claim 20: The apparatus according to Claim 17, wherein

the controller is configured to determine the meter is in the imminent failure condition based on the detected at least one potential failure condition by determining when one of the

temperature in the vicinity of the electrical connection is higher than a maximum temperature and the current through the electrical connection is higher than a maximum current.

Claim 21: The apparatus according to Claim 17, further comprising:

at least one additional temperature sensor that detects at least one additional temperature, wherein

the controller is further configured to determine the meter is in the imminent failure condition when a difference between the temperature in the vicinity of the electrical connection and the at least one additional temperature is greater than at least one temperature differential threshold.

Claim 22: The apparatus according to Claim 15, further comprising:

a disconnect switch provided within the meter and set by the controller, wherein

the disconnect switch connects power to the load when set to a closed state and disconnects power to the load when set to an open state, wherein

the detection unit is configured to detect a temperature in the vicinity of the electrical connection, and

the controller is configured to set the disconnect switch to the open state when the controller determines the meter is in the imminent failure condition, and the controller is configured to set the disconnect switch to the closed state when the controller determines the temperature in the vicinity of the electrical connection is less than a threshold safe operating temperature.

Claim 23: A method of monitoring and controlling an operation of a meter electrically connected between a power source and a load through a meter socket, comprising:

detecting at least one potential failure condition of an electrical connection between the meter and the meter socket;

determining, based on the detected at least one potential failure condition, a correction time indicating an amount of time before a predicted failure of the electrical connection;

determining whether the meter is in an imminent failure condition based on at least one of the correction time and the detected at least one potential failure condition; and

disconnecting power to the load with the meter when it is determined the meter is in the imminent failure condition,

wherein detecting the at least one potential failure condition comprises detecting a current through the electrical connection and a temperature in the vicinity of the electrical connection,

wherein determining whether the meter is in the imminent failure condition based on the detected at least one potential failure condition includes:

determining a rate of change in temperature based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical connection;

determining a rate of change in current based on the current through the electrical connection and at least one previously detected current through the electrical connection;

determining a reference rate of change in temperature based on the rate of change in current;

comparing the rate of change in temperature to the reference rate of change in temperature; and

determining the meter is in the imminent failure condition when rate of change in temperature is equal to or greater than the reference rate of temperature.

Claim 24: An apparatus that monitors and controls the operation of a meter electrically connected between a power source and a load through a meter socket, comprising:

a detection unit including at least one temperature sensor that detects a temperature in the vicinity of the electrical connection, and at least one current sensor that detects a current through the electrical connection; and

a controller configured to:

determine a correction time, based on the detected at least one potential failure condition of the electrical connection, that indicates an amount of time before a predicted failure of the electrical connection,

determine whether the meter is in an imminent failure condition based on at least one of the correction time and the at least one potential failure condition, and

disconnect power to the load with the meter when it is determined the meter is in the imminent failure condition,

wherein the detection unit is configured to monitor an electrical connection between the meter and the meter socket, and detect at least one potential failure condition of the electrical connection by reading the temperature in the vicinity of electrical connection and the current through the electrical connection,

wherein the controller is configured to determine the meter is in the imminent failure condition based on the detected at least one potential failure condition by determining a rate of change in temperature is greater than a reference rate of change in temperature,

wherein the controller is configured to determine the reference rate of change of temperature based on a rate of change of current through the electrical connection, and

wherein the rate of change in temperature is based on the temperature in the vicinity of the electrical connection and at least one previously detected temperature in the vicinity of the electrical, and the rate of change in current is based on the current through the electrical connection and at least one previously detected current through the electrical connection.