CLAIMS

1. A heat sensor assembly for a power distribution system, comprising:

a cable, containing a plurality of at least three heat sensors arranged along the length of the cable, each of the heat sensors being spaced from the next by an interval;

an end module at a first end of the cable, the end module having a corresponding plurality of terminal pairs, each terminal pair being dedicated to one of the heat sensors;

circuitry inside the cable, connecting each of the heat sensors across a corresponding one of the terminal pairs such that each terminal pair outputs a temperature signal indicative of the temperature sensed by the corresponding heat sensor; and

a controller configured to receive the temperature signal from each terminal pair and to compare the temperature signals against one another to determine whether the temperature sensed by any one of the heat sensors differs from that sensed by the other heat sensors by more than a predetermined threshold (ΔT_{ALARM}), and if so to generate an alarm signal.

2. A heat sensor assembly according to claim 1, wherein the circuitry comprises a corresponding plurality of measurement lines and a common return line, each of the measurement lines connecting one of the heat sensors to a first terminal of the respective terminal pair in the end module, and the common return line connecting each of the heat sensors to a second terminal of the respective terminal pair in the end module.

3. A heat sensor assembly according to claim 1 or 2, wherein the controller is configured to compare the temperature signals by:

for each of the temperature signals, calculating the difference between that temperature signal and each other temperature signal; and

comparing each of the calculated differences against the predetermined threshold (ΔT_{ALARM}).

4. A heat sensor assembly according to claim 1 or 2, wherein the controller is configured to compare the temperature signals by:

calculating an average of all of the temperature signals;

for each of the temperature signals, calculating the difference between that temperature signal and the calculated average; and

comparing each of the calculated differences against the predetermined threshold (ΔT_{ALARM}).

5. A heat sensor assembly according to claim 1 or 2, wherein the controller is configured to compare the temperature signals by:

for each of the temperature signals, calculating an average of all of the other temperature signals and then calculating the difference between the temperature signal and the calculated average; and

comparing each of the calculated differences against the predetermined threshold (ΔT_{ALARM}).

6. A heat sensor assembly according to any of the preceding claims, wherein the alarm signal includes identification of which heat sensor has triggered the alarm signal.

7. A heat sensor assembly according to any of the preceding claims, wherein the cable comprises two or more cable segments, the cable segments being detachably joined to one another by connectors, the connectors preferably including keying features such that they couple in a single relative orientation.

8. A heat sensor assembly according to claim 7, wherein each cable segment comprises a heat sensor cable sub-section and a linking cable sub-section, optionally detachably joined to one another by a connector, the heat sensor cable sub-section comprising at least one of the heat sensors.

9. A heat sensor assembly according to any of the preceding claims, wherein the plurality of heat sensors includes at least six heat sensors.

10. A heat sensor assembly according to any of the preceding claims, wherein the interval between the heat sensors is between 2 and 4 metres, preferably approximately 3 metres.

11. A heat sensor assembly according to any of the preceding claims, wherein each of the plurality of heat sensors comprises a thermistor, a thermocouple, a resistance temperature detector (RTD) or a semiconductor based sensor.

12. A heat sensor assembly according to any of the preceding claims, wherein the controller is further configured to compare each temperature signal against a pre-set critical temperature threshold (T_{CRIT}) and to generate an alarm signal if any of the temperature signals is greater than the pre-set critical temperature threshold (T_{CRIT})

13. A heat sensor assembly according to any of the preceding claims, further comprising an ambient temperature sensor and wherein the controller is further configured to, for each temperature signal, calculate the difference between the temperature signal and the ambient temperature, to compare the difference against a pre-set critical temperature difference threshold (ΔT_{CRIT}) and to generate an alarm signal if the difference is greater than the pre-set critical temperature difference threshold (ΔT_{CRIT}).

14. A heat sensor assembly according to any of the preceding claims further comprising a communications module for outputting the temperature signals and/or any alarm signal from the controller to an external device.

15. A heat sensor assembly according to any of the preceding claims further comprising a power module for supplying power to the controller from a local or external power source.

16. A heat sensor system comprising a plurality of heat sensor assemblies each in accordance with any of claims 1 to 15, wherein the respective controllers are each supplied with power from a common power source.

17. A heat sensor system according to claim 16 wherein the controllers are grouped into two or more sets, each set comprising at least two of the controllers, each set of controllers being provided with an input power connection for receiving power from the common power source and an output power connector for supplying power to another of the sets.

18. A heat sensor system according to claim 15 or 16, further comprising a central controller, the respective controllers being configured to communicate with the central controller, wherein the controllers are preferably grouped into two or more sets, each set comprising at least two of the controllers, each set of controllers being provided with data connections for exchanging data with the central controller and/or with another of the sets.

19. A heat sensor system according to claims 17 and 18 wherein the input power connection, output power connection and data connections are provided by a RJ45 socket input and a RJ45 socket output at each set of controllers.

20. A kit of parts, wherein when connected together the parts form a heat sensor assembly in accordance with claim 8 or any of claims 9 to 15 when dependent on claim 8, comprising: a plurality of heat sensor cable sub-sections and a plurality of linking cable sub-sections, the heat sensor cable sub-sections and the linking cable sub-sections being detachably connectable, and one of the linking cable sub-sections being provided with the end module.

21. A set of busbar segments for a power distribution system, each busbar segment comprising an elongate housing containing conductors for distributing power in use, the conductors extending along the elongate length of the housing between connection points at each end for joining to another one of the busbar segments, and each busbar segment further comprising a heat sensor assembly

segment comprising a cable segment including at least one heat sensor and connectors at each end of the cable segment, configured such that when the set of busbar segments is connected, the joined cable segments form a cable containing a plurality of at least three heat sensors arranged along the length of the cable, each of the heat sensors being spaced from the next by an interval, and circuitry inside the cable, connecting each of the heat sensors across one of a corresponding plurality of terminal pairs such that each terminal pair outputs a temperature signal indicative of the temperature sensed by the corresponding heat sensor.

22. A set of busbar segments according to claim 21, wherein each cable segment comprises a heat sensor cable sub-section and a linking cable sub-section, optionally detachably joined to one another by a connector, the heat sensor cable sub-section comprising at least one of the heat sensors.

23. A power distribution system comprising one or more busbar segments containing conductors for distributing power in use, and a heat sensor assembly according to any of claims 1 to 15 or a heat sensor system according to any of claims 16 to 19, arranged such that each heat sensor is positioned adjacent a joint in the power distribution system, preferably a joint between busbar segments or a joint between a busbar segment and a power outlet optionally affixed thereto.

24. A method of monitoring for faulty connections in a power distribution system comprising one or more busbar segments containing conductors for distributing power in use, comprising:

providing a plurality of at least three heat sensors, each heat sensor being positioned adjacent a joint in the power distribution system, preferably a joint between busbar segments or a joint between a busbar segment and a power outlet optionally affixed thereto;

monitoring a temperature signal output by each of the plurality of heat sensors;

comparing the temperature signals against one another to determine whether the temperature sensed by any one of the heat sensors differs from that sensed by the other heat sensors by more than a predetermined threshold (ΔT_{ALARM}), and if so generating an alarm signal.

25. A method according to claim 24, wherein comparing the temperature signals comprises:

for each of the temperature signals, calculating the difference between that temperature signal and each other temperature signal; and

comparing each of the calculated differences against the predetermined threshold (ΔT_{ALARM}).

26. A method according to claim 24, wherein comparing the temperature signals comprises:

calculating an average of all of the temperature signals;

for each of the temperature signals, calculating the difference between that temperature signal and the calculated average; and

comparing each of the calculated differences against the predetermined threshold (ΔT_{ALARM}).

27. A method according to claim 24, wherein comparing the temperature signals comprises:

for each of the temperature signals, calculating an average of all of the other temperature signals and then calculating the difference between the temperature signal and the calculated average; and

comparing each of the calculated differences against the predetermined threshold (ΔT_{ALARM}).

28. A method according to any of claims 24 to 27, further comprising:

comparing each temperature signal against a pre-set critical temperature threshold (T_{CRIT}) and generating an alarm signal if any of the temperature signals is greater than the pre-set critical temperature threshold (T_{CRIT})

29. A method according to any of claims 24 to 28, further comprising:

providing an ambient temperature sensor; and

for each temperature signal, calculating the difference between the temperature signal and the ambient temperatur e, comparing the difference against a pre-set critical temperature difference threshold (ΔT_{CRIT}) and generating an alarm signal if the difference is greater than the pre-set critical temperature difference threshold (ΔT_{CRIT}).