Claims

1. Method of monitoring a functional state of an electricity meter (2), comprising the steps of:

generating at least one temperature signal from which an actual temperature value (T) of the electricity meter (2) can be derived;

determining whether the actual temperature value (T) and/or a gradient (Gm) thereof exceeds at least one threshold value (L),

characterised in that

the at least one threshold value (L) is being derived from at least one predefined temperature curve (T300) representing predefined temperature values (T) of the electricity meter (2) over time according to a modelled thermal behaviour of the electricity meter (2), wherein the at least one predefined temperature curve (T300) is readjusted over time, thereby providing moving or rolling thresholds or limits for respective temperature values and/or gradients.

2. Method according to claim 1, **characterised in that** the method further comprises the step of generating a triggering signal (S) if the actual temperature value (T) and/or a gradient (Gm) thereof exceeds the at least one threshold value (L).

3. Method according to claim 1 or 2, **characterised in that** the method further comprises the step of adjusting the at least one temperature curve (T300) and/or to select the temperature curve (T300) from a set of predefined temperature curves (T300) according to a certain operational state and/or according to a certain operational condition of the electricity meter (2).

4. Method according to one of the preceding claims, **characterised in that** the method further comprises the step of identifying at least one point of interest in the at least one temperature curve (T300), the at least one point of interest relating to certain operational conditions of the electricity meter (2).

5. Method according to one of the preceding claims, **characterised in that** an electrical resistance (R) in a primary current path within the meter is associated to the at least one predefined temperature curve (T300) and/or derived from the actual temperature value (T) and/or gradient (Gm) thereof.

6. Method according to one of the preceding claims **characterised in that** the method further comprises the step of establishing at least one thermal model for modelling the thermal behaviour of the electricity meter (2), the at least one thermal model comprising the at least one predefined temperature curve (T300).

7. Method according to claim 6, **characterised in that** upon identification of certain errors, trends, patterns or correlations between the actual temperature value (T) and/or the gradient (Gm) thereof, and the at least one predefined temperature curve (T300), at least one parameter of the thermal model is automatically adjusted by machine learning.

8. Method according to claim 6 or 7, **characterised in that** the step of establishing the at least one thermal model includes the step of defining at least one equilibrium state (Q302, Q303) which the electricity meter (2) assumes during operation, the at least one equilibrium state (Q302, Q303) representing a thermal equilibrium of the electricity meter (2) in dependence of at least one electrical load (A) running through the electricity meter (2), and of environmental conditions existing in an environment (100) of the electricity meter (2).

9. Method according to claims 6 to 8, **characterised in that** the step of establishing the at least one thermal model includes the step of defining at least one heating behaviour and/or at least one cooling behaviour of the electricity meter (2) based on at least one functional step response (C) of the electricity meter (2) to a change in a functional state and/or operational state of the electricity meter (2).

10. Method according to one of claims 6 to 9, **characterised in that** the step of establishing the thermal model involves the step of determining at least one thermal resistance value (Rth) and/or the step of determining at least one thermal capacitance value (Cth) of the electricity meter (2).

11. Method according to one claims 6 to 10, **characterised in that** the step of establishing at least one thermal model is carried out for at least two different types of operating conditions of the electricity meter (2) and/or at least two different types of electricity meters (2).

12. A computer program (4) for monitoring a functional state of an electricity meter, comprising instructions which, when the computer program (4) is executed by an electricity meter (2) and/or an administration device (3) in an electricity metering system (1), cause the electricity meter (2) and/or the administration device (3) to carry out the steps of a method according to one of claims 1 to 11.

13. A computer-readable data carrier (7) having stored thereon the computer program (4) of claim 12.

14. A data carrier signal (5) carrying the computer program of claim 12.

15. An electricity meter (2) comprising a processing unit (18) and a temperature sensor (21), the electricity meter (2) configured to carry out the method of one of claims 1 to 11.

16. An electricity metering system (1), in particular an Advanced Metering Infrastructure (AMI), comprising at least one electricity meter (2) according to claim 15 and/or at least one administration device (3) configured to carry out the method of one of claims 1 to 11.