

**TECHNISCHER**

**LÖSUNGSVORSCHLAG Aktenze**

**ichen:H2015-011**

**Title:"Thermalanalysis of environmental conditions**

**Unternehmenseinheit:DiehlMetering S.A.S.**

**The Description:**

Environmental detection by thermal analysis

The present invention relates to the field of devices and apparatus which are installed and must function correctly in very high temperature environments. These may be, in particular, devices for measuring energy or quantities of liquid or gaseous fluids flowing in a pipe, and especially water meters. However, the measurement accuracy, or even the reliability of operation of such devices, can be influenced by significant variations or extreme values of certain physical parameters in their environment.

In this context, the invention is concerned with a method for setting at least some of the parameters for the operation of such a device, as well as a corresponding device.

In general, the above-mentioned devices, which often operate automatically and independently, currently undergo a parameterisation process before leaving the factory, which may include a calibration or a loading of a grid or a compensation table.

This initial systematic setting is in most cases sufficient and tolerable, even if it does not allow optimal operation over the entire range of the physical quantity(s) under consideration, nor over the entire life of the device.

However, especially for precision devices and/or devices with one or more functions whose settings must be specifically adapted to the installation environment, such a standardised initial setting is not sufficient.

In such a case, the current state of the art requires an operator or installer to be present on site, at least initially and possibly at a later date. This results in high labour costs, as well as the need to provide suitable configuration equipment.

The main purpose of the invention is to overcome the above limitations.

There is a wide range of devices available for installation in many different environments. Often a factory setting is sufficient, but some features may require specific settings for the environment in which the unit is installed. If this is the case, either the installer must have a means of configuring the unit on site, or the unit is capable of detecting the environment in which it is installed and can then be set up by itself. The latter option is the subject of the invention.

Until now, either a device has operated with a sufficiently tolerant but not necessarily optimal factory setting, or it has had to be set up on site during installation.

Most commercial documentation or instructions for use mention this ~~situ~~

The invention enables a device to determine the environment in which it is inserted by analysing the temperature profile it measures.

This allows the device to operate optimally without the need for in situ parameterisation.

This invention allows a device to optimise some of its functionality throughout its life depending on its location.

For example, an appliance installed in a cellar will see a temperature profile with rapid variations, whereas the same appliance installed in an insulated cistern will see slow variations. In this example, the unit will be able to know where it is and set itself up in an optimal way.

This invention will be integrated into a radio module in order to optimise its parameterisation according to the place of installation, as one of its functions will be to be able to calculate the risk of freezing of the water contained in the meter on which it is mounted.

1. A method of setting the parameters of an apparatus, in particular a water meter, installed in a substantially closed environment or a receiving dwelling which has, in particular, specific and distinctive local thermal conditions, said apparatus comprising or being connected to at least one sensor suitable and intended for detecting the local temperature of said environment or dwelling, a processing and management means and advantageously a radio communication module, preferably bidirectional,

A method characterised in that it consists of measuring the local temperature for a given period of time, analysing the measured values, using the results of this analysis to deduce initial or updated information relating to the type of environment or installation dwelling, or to any modifications affecting the thermal conditions prevailing in the latter, and initially carrying out an initial parameterisation or a possible re-parameterisation of at least certain functions and/or at least part of the operating mode of the said appliance, after evaluating the above-mentioned information.

2. Method according to claim 1, characterised in that it consists in storing the temperature values measured over a predefined time interval and in analysing the profile of variation of the temperature over this interval, if necessary by comparing it with communicated or preprogrammed reference profiles, or by subjecting it to specific mathematical calculations or processing.

3. A method according to any one of claims 1 and 2, characterised in that the analysis of the temperature profile comprises at least an analysis in terms of richness and weighting of the harmonics constituting the signal or the re-curve presenting said profile.

4. Method according to any one of claims 1 to 3, characterised in that it consists in communicating to the processing and management means, for example by means of the radio communication module, advantageously at regular intervals and preferably substantially at each occurrence of measurement of the local temperature of the environment or of the dwelling in which the appliance in question is installed, information on the outside temperature of the geographical location in which the appliance is installed.

5. The method according to claim 4, characterised in that it consists, in addition to the analysis of the local temperature profile, in concomitantly also analysing the profile of the temperature differential between the outside temperature and the local temperature.

6. Method according to any one of claims 1 to 5, characterised in that it consists, for an apparatus of the water meter type, in exploiting the information resulting from the temperature(s) measurements in order to parameterise a function for predicting the time of freezing of the said apparatus.

7. Method according to any one of claims 1 to 6, characterised in that it consists in carrying out an overall statistical analysis of a fleet of appliances installed at a plurality of different users, according to their mode and environment of installation, and in possibly exploiting the results of this analysis in the event of an excess of extreme or exceptional climatic conditions, particularly in terms of temperature, in order, for example, to optimise the geographical distribution of resources and means of maintenance and repair.

8. Method according to any one of claims 1 to 7, characterised in that it consists in using the results of the analysis of the measured temperature values to detect an event which has occurred in the environment, in the dwelling and/or in the appliance, and possibly in carrying out an at least partial reprogramming of the operating mode of said appliance.

9. Method according to any one of claims 1 to 8, characterised in that it consists, by means of a suitable sensor or detector, in measuring at least one other physical quantity characteristic of the environment or of the dwelling, and/or affecting the operation of the appliance, and in evaluating the measured values in order possibly to determine or modify a parameterisation or calibration, or even at least partially an operating mode, of the said appliance.

10. Measuring apparatus, in particular a water meter, suitable and intended for installation in a receiving environment or dwelling having, in particular, specific and distinctive thermal conditions, said apparatus comprising processing and management means and a radio communication module, preferably bidirectional, in addition to the means suitable for performing the basic function of the apparatus,

A device characterised in that it also comprises at least one temperature sensor for measuring the local temperature of the environment or of the housing in which said device is installed, and in that the processing and management means is adapted and intended to carry out the steps of the method according to any one of claims 1 to 9, by executing control software installed before said device is put into service.