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(54) **A SENSOR**

(57) The invention relates to a sensor (110) for lighting technology, the sensor (110) comprising a power supply (110a), the power supply (110a) being provided with a module (112) configured to mechanically engage a wire

of a mains supplying wiring and designed for inductively tapping off electric power out of said main supplying wiring.

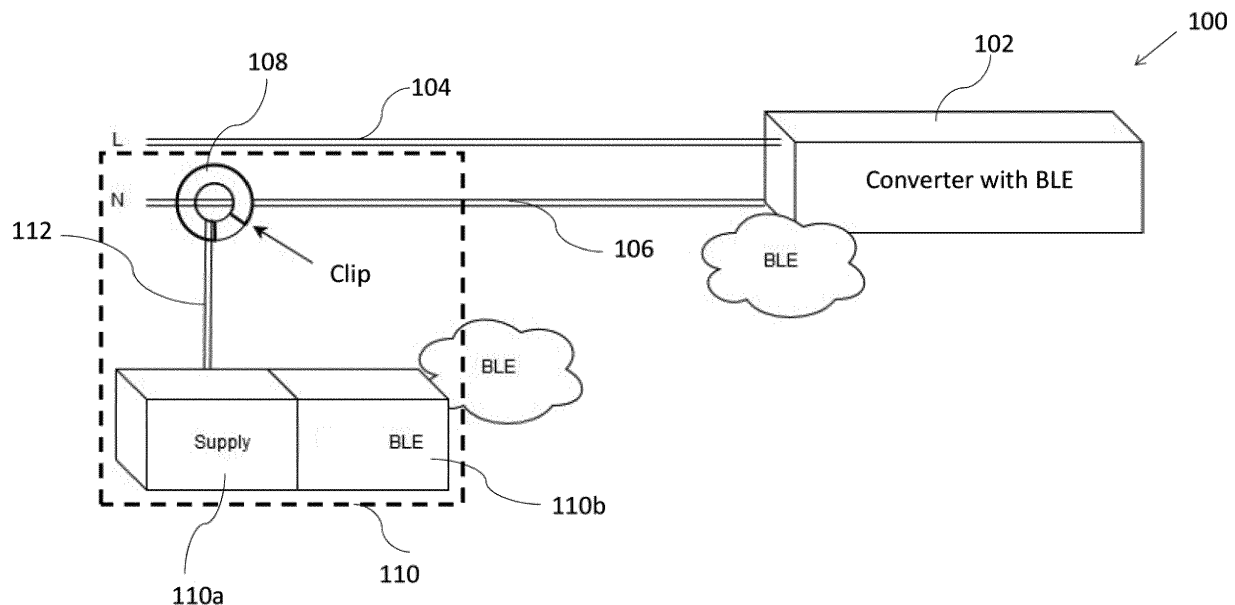


Fig. 1

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The invention relates to a sensor for lighting technologies.

BACKGROUND OF THE INVENTION

[0002] Nowadays, detectors, such as smoke detectors, are found in almost all homes.

[0003] Moreover, local building codes and insurance companies often require detectors such as movement detectors or smoke detectors to be installed in newly constructed buildings.

[0004] For example, public awareness of the benefits of smoke detectors and their low cost have made them very popular. Most of the household smoke detectors are powered by battery in order to simplify their installation by the owner of the home.

[0005] However, while the battery powered smoke detectors are easy to install, it is difficult to maintain them. In fact, the battery should be checked at least once a month and usually needs to be replaced once or twice a year.

[0006] In general, testing and replacing the battery often requires the use of a ladder, since smoke detectors are advantageously installed on ceilings in order to detect smoke which rises to the ceiling. Since most homes now contain at least one smoke detector in each room of the house, a monthly control by carrying a ladder to each smoke detector and climbing up and down the ladder several times is bothersome and can also be dangerous. As a consequence, most homeowners simply do not test the batteries of the smoke detectors.

[0007] This, of course, creates an even greater danger that the smoke detector will fail due to a dead or weak battery.

[0008] Commercial smoke detectors, on the other hand, are almost always AC powered with a battery back-up. However, these smoke detectors are complicated to install.

[0009] Thus, it is an objective to provide for an improved sensor for lighting technology, such as a smoke sensor, which can easily be supplied with power.

SUMMARY OF THE INVENTION

[0010] The object of the present invention is achieved by the solution provided in the enclosed independent claims. Advantageous implementations of the present invention are further defined in the dependent claims.

[0011] According to a first aspect the invention relates to a sensor for lighting technology, the sensor comprising a power supply, the power supply being provided with a module configured to mechanically engage a wire of a mains supplying wiring (of another device) and designed for inductively tapping off electric power out of said main

supplying wiring.

[0012] Preferably the sensor is bus-enabled, e.g. via a DALI bus interface.

[0013] Preferably, the sensor is a day-light sensor.

[0014] In an implementation form of the first aspect, the sensor is a presence detector.

[0015] In an implementation form of the first aspect, the sensor is a movement detector.

[0016] In an implementation form of the first aspect, the sensor is a smoke detector.

[0017] In an implementation form of the first aspect, the power supply comprises a ferrite core and a secondary winding.

[0018] In an implementation form of the first aspect, the sensor is configured to communicate in a wireless manner with a converter supplied via said mains wire.

[0019] In an implementation form of the first aspect, the sensor is configured to instruct the converter to draw a higher power.

[0020] In an implementation form of the first aspect, the power supply is configured to supply the sensor (also or only) when the converter is in a standby mode.

[0021] In an implementation form of the first aspect, the sensor comprises a clip, wherein the clip has a circular shape and wherein the clip surrounds a L wire.

[0022] In an implementation form of the first aspect, the sensor comprises a clip, wherein the clip has a circular shape and wherein the clip surrounds a N wire.

[0023] In an implementation form of the first aspect, the clip is configured to provide isolation.

[0024] According to a second aspect, the invention relates to a kit comprising a sensor according to the first aspect or any one of the implementation forms thereof and a converter for lighting means, the converter being provided with a L or N mains supply wire designed for being coupled to the module of the power supply.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The invention will be explained in the followings together with the figure:

Fig. 1 shows an embodiment of a kit comprising a sensor for lighting technology according to an embodiment;

Fig. 2 shows a schematic representation of a supply of a sensor for lighting technology according to an embodiment; and

Fig. 3 shows a schematic representation of a supply of a sensor for lighting technology according to an embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Aspects of the present invention are described

herein in the context of a sensor for lighting technologies.

[0027] The present invention is described more fully hereinafter with reference to the accompanying drawings, in which various aspects of the present invention are shown. This invention however may be embodied in many different forms and should not be construed as limited to the various aspects of the present invention presented through this disclosure. Rather, these aspects are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the present invention to those skilled in the art. The various aspects of the present invention illustrated in the drawings may not be drawn to scale. Rather, the dimensions of the various features may be expanded or reduced for clarity. In addition, some of the drawings may be simplified for clarity. Thus, the drawings may not depict all of the components of a given apparatus.

[0028] Various aspects of a sensor for lighting technology will be presented. However, as those skilled in the art will readily appreciate, these aspects may be extended to aspects of sensors for lighting technologies without departing from the invention.

[0029] It is further understood that the aspect of the present invention might contain integrated circuits that are readily manufacturable using conventional semiconductor technologies, such as complementary metal-oxide semiconductor technology, short "CMOS". In addition, the aspects of the present invention may be implemented with other manufacturing processes for making optical as well as electrical devices. Reference will now be made in detail to implementations of the exemplary aspects as illustrated in the accompanying drawings. The same reference signs will be used throughout the drawings and the following detailed descriptions to refer to the same or like parts.

[0030] Now referring to Fig. 1, a kit 100 comprising a sensor 110 for lighting technologies according to an embodiment is shown.

[0031] Moreover, the kit 100 comprises a converter 102 for lighting means, the converter 102 being provided with a L or N mains supply wire designed for being coupled to a module 112 of the sensor 110.

[0032] Furthermore, the sensor 110 comprises a power supply 110a, wherein the power supply 110a is provided with the module 112 configured to mechanically engage a wire 104, 106 of a mains supplying wiring and designed for inductively tapping off electric power out of said main supplying wiring.

[0033] The sensor 110 can be a presence detector, movement detector or a smoke detector.

[0034] Furthermore, the sensor 110 can be configured to communicate in a wireless manner with the converter 102, for example via Bluetooth Low Energy (BLE) technology module 110b.

[0035] Thus, the sensor may have logics communicating with the consumer. If the sensor notices, e.g. a low supply voltage, it can communicate with the consumer on the grid and request a higher consumption to get more

energy.

[0036] Consumption can be increased when the consumer e.g. goes out of standby. It is also conceivable that the sensor signals an imminent higher consumption. This can prevent the supply 110a from collapsing.

[0037] Moreover, the converter 102 can be configured to supply the sensor 110 with power and the sensor 110 can be configured to instruct the converter 102 to draw a higher power in order to guarantee a sufficient secondary power supply for the sensor 110.

[0038] In an embodiment, the power supply 110a is configured to supply the sensor 110 even when the converter 102 is in a standby mode in which, for example, only the DALI interface is powered and awaiting incoming signals. This low current flowing in the standby mode has to be sufficient for the secondary power supply of the sensor 110.

[0039] As it can be taken from Fig. 1, the sensor 110 can comprise a clip 108, wherein the clip 108 can have a circular shape and wherein the clip 108 can surround either a L wire 104 or a N wire 106. Moreover, the clip 108 can be configured to provide isolation.

[0040] Fig. 2 shows a schematic representation of the power supply 110a of the sensor 110 for lighting technology according to an embodiment.

[0041] The power supply 110a is connected to the mains 201. Moreover, the power supply 110a can comprise a ferrite core Lp and a secondary winding L1 and L2 for adaptively coupling in electric power as power supply for the sensor 110.

[0042] On the secondary side of the supply power circuit 110, there are two diodes D1 and D2 as well as a capacitor C4.

[0043] The output of the diode D2 is fed to a module 202 which is connected to ground GND. Moreover, the output voltage of the module 202 are fed into the module 203 which comprises the sensor 110, a microcontroller and a RF module.

[0044] Fig. 3 shows a schematic representation of the power supply 110a of the sensor 110 for lighting technology according to an embodiment.

[0045] The power supply 110a is connected to the mains 201. Moreover, the power supply 110a can comprise a ferrite core Lp and a secondary winding L3 for adaptively coupling in electric power as power supply for the sensor 110.

[0046] On the secondary side of the supply power circuit 110a, there is one diode D1 as well as a capacitor C4.

[0047] The output of the diode D1 is fed to a module 202 which is connected to ground GND. Moreover, the output voltage of the module 202 are fed into the module 203 which comprised the sensor 110, a microcontroller and an RF module.

[0048] All features of all embodiments described, shown and/or claimed herein can be combined with each other.

[0049] While various embodiments of the present invention have been described above, it should be under-

stood that they have been presented by way of example only and not limitation. Numerous changes to the disclosed embodiments can be made in accordance with the disclosure herein without departing from the spirit of scope of the invention. Thus, the breadth and scope of the present invention should not be limited by any of the above-described embodiments. Rather, the scope of the invention should be defined in accordance with the following claims and their equivalence.

[0050] Although the invention has been illustrated and described with respect to one or more implementations, equivalent alternations and modifications will occur to those skilled in the art upon the reading of the understanding of the specification and the annexed drawings. In addition, while a particular feature of the invention may have been disclosed with respect to only of the several implementations, such features may be combined with one or more other features of the other implementations as may be desired and advantage for any given or particular application.

Claims

1. A sensor (110) for lighting technology,
 - the sensor (110) comprising a power supply (110a),
 - the power supply (110a) being provided with a module (112) configured to mechanically engage a wire of a mains supplying wiring, which is not directly connected to the sensor, and designed for inductively tapping off electric power out of said main supplying wiring.
2. The sensor (110) of claim 1, wherein the sensor (110) is a presence detector.
3. The sensor (110) of claim 1, wherein the sensor (110) is a movement detector.
4. The sensor (110) of claim 1, wherein the sensor is a smoke detector.
5. The sensor (110) of any one of the preceding claims, wherein the power supply (110a) comprises a ferrite core (Lp) and a secondary winding (L1, L2, L3).
6. The sensor (110) of any one of the preceding claims, wherein the sensor (110) is configured to communicate in a wireless manner with a converter (102).
7. The sensor (110) of claim 6, wherein the converter (102) is configured to supply the sensor (110) with power.
8. The sensor (110) of claim 6 or 7, wherein the sensor (110) is configured to instruct the converter (102) to

draw a higher power.

9. The sensor (110) of claim 6 to 8, wherein the power supply (110a) is configured to supply the sensor (110) when the converter (102) is in a standby mode.
10. The sensor (110) of any one of the preceding claims, wherein the sensor (110) comprises a clip (108), wherein the clip (108) has a circular shape and wherein the clip (108) surrounds a L wire (104).
11. The sensor (110) of any one of the preceding claims 1 to 9, wherein the sensor (110) comprises a clip (108), wherein the clip (108) has a circular shape and wherein the clip surrounds a N wire (106).
12. The sensor (110) of claim 10 or 11, wherein the clip (108) is configured to provide isolation.
13. A kit (100) comprising a sensor (110) according to any of the preceding claims and a converter (102) for lighting means, the converter (102) being provided with a L (104) or N (106) mains supply wire designed for being coupled to the module of the power supply (112).

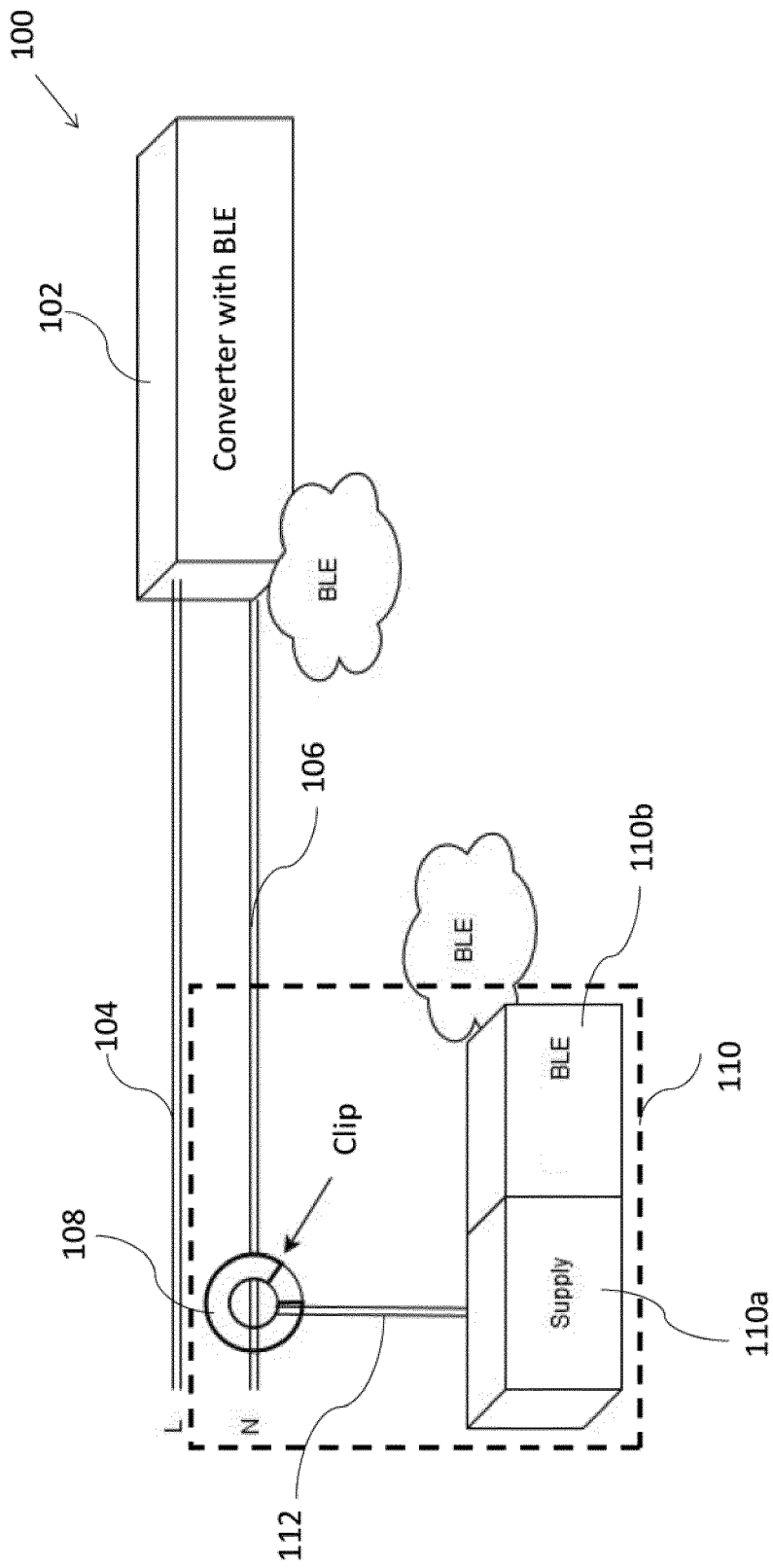


Fig. 1

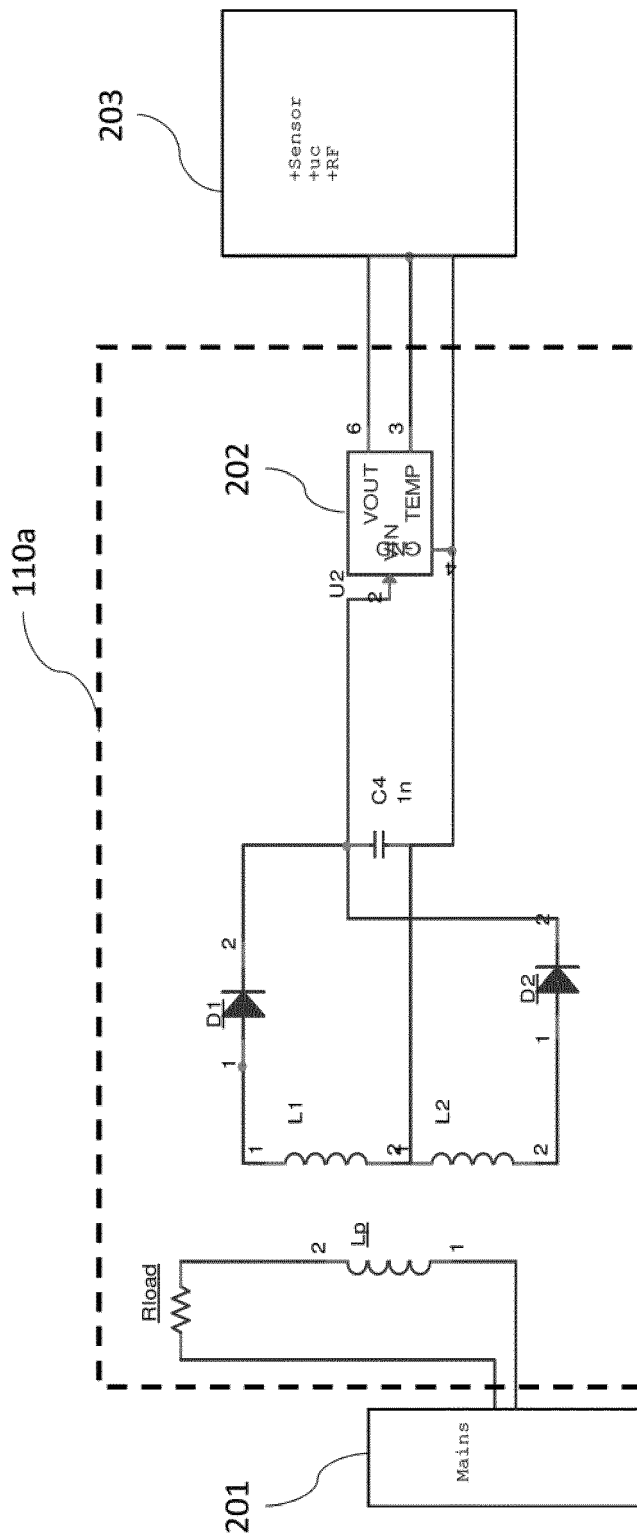
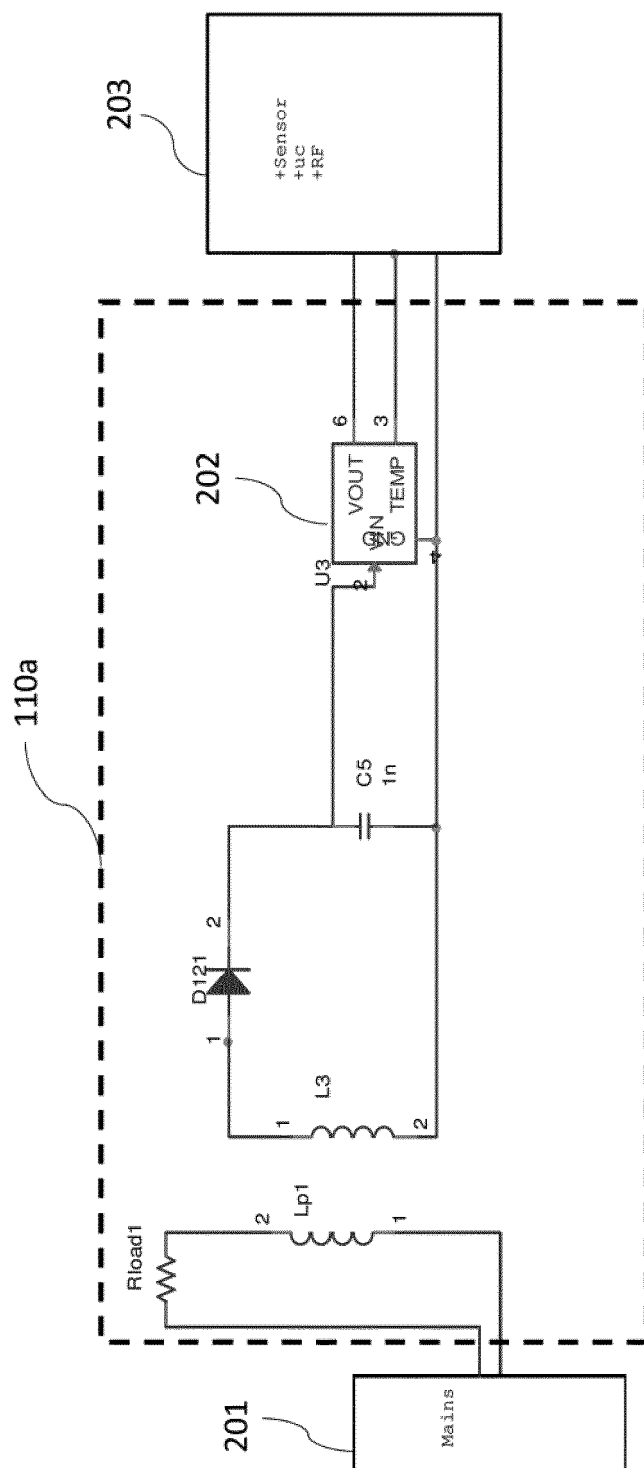


Fig. 2

3. bio



EUROPEAN SEARCH REPORT

Application Number
EP 19 18 9285

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 2016/063329 A1 (KOO JA-LL [KR] ET AL) 3 March 2016 (2016-03-03) * the whole document *	1-4,6, 9-11,13	
X	US 8 767 071 B1 (MARSHALL PATRICK [US]) 1 July 2014 (2014-07-01) * the whole document *	1-4,6, 10,11,13	
X	KR 2017 0123295 A (MMPC INC [KR]) 7 November 2017 (2017-11-07) * paragraph [0026] - paragraph [0031]; figures 1,3 *	1-4, 10-12	
X	US 2010/084920 A1 (BANTING JOHN FREDRICK [US] ET AL) 8 April 2010 (2010-04-08) * paragraph [0133] - paragraph [0134]; figures 12-14 *	1,10,11	
A	AMARO JOSE PEDRO ET AL: "Harvested Power Wireless Sensor Network Solution for Disaggregated Current Estimation in Large Buildings", IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 64, no. 7, 1 July 2015 (2015-07-01), pages 1847-1857, XP011583547, ISSN: 0018-9456, DOI: 10.1109/TIM.2014.2383052 [retrieved on 2015-06-05] * page 8, right-hand column; figure 5 *	1-4,6-13	G08B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 February 2020	Examiner Kurzbauer, Werner
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)



Application Number

EP 19 18 9285

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☒ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

2-4, 6-13(completely); 1(partially)

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION
SHEET B

Application Number

EP 19 18 9285

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 2-4, 13(completely); 1(partially)

A sensor comprising a power supply, the power supply being provided with a module configured to mechanically engage a wire of a mains supplying wiring, which is not directly connected to the sensor, and designed for inductively tapping off electric power out of said main supplying wiring, wherein the sensor is either a presence detector, a movement detector or a smoke detector.

2. claims: 5(completely); 1(partially)

A sensor comprising a power supply, the power supply being provided with a module configured to mechanically engage a wire of a mains supplying wiring, which is not directly connected to the sensor, and designed for inductively tapping off electric power out of said main supplying wiring, wherein the power supply comprises a ferrite core and a secondary winding.

3. claims: 6-9(completely); 1(partially)

A sensor comprising a power supply, the power supply being provided with a module configured to mechanically engage a wire of a mains supplying wiring, which is not directly connected to the sensor, and designed for inductively tapping off electric power out of said main supplying wiring, wherein the sensor is configured to communicate in a wireless manner with a converter.

4. claims: 10-12(completely); 1(partially)

A sensor comprising a power supply, the power supply being provided with a module configured to mechanically engage a wire of a mains supplying wiring, which is not directly connected to the sensor, and designed for inductively tapping off electric power out of said main supplying wiring, wherein the sensor comprises a clip, wherein the clip has a circular shape and wherein the clip surrounds a wire.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 19 18 9285

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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