

19



Octrooi­centrum
Nederland

11

2025216

12 B1 OCTROOI

21 Aanvraagnummer: **2025216**

51 Int. Cl.:
H05B 47/21 (2020.01)

22 Aanvraag ingediend: **26 maart 2020**

30 Voorrang:

-

41 Aanvraag ingeschreven:
20 oktober 2021

43 Aanvraag gepubliceerd:

-

47 Octrooi verleend:
20 oktober 2021

45 Octrooischrift uitgegeven:
7 december 2021

73 Octrooihouder(s):

SCHREDER S.A. te BRUSSELS, België, BE

72 Uitvinder(s):

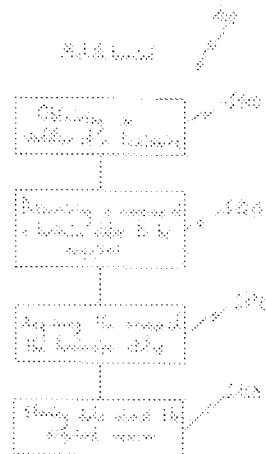
Vincent Lang te GRÂCE-HOLLOGNE (BE)

74 Gemachtigde:

dr. ir. G.J.C. Verdijck c.s. te Den Haag

54 **SYSTEM FOR CHECKING A LUMINAIRE STATUS AND METHOD THEREOF**

57 A method for checking a status of a luminaire using a mobile terminal in a vicinity of the luminaire, wherein the mobile terminal includes a sensing means, a memory, and a communication means, comprising: obtaining, by the mobile terminal, an identifier of the luminaire; determining, based on the obtained identifier of the luminaire, a measure of the status of the luminaire to be acquired; acquiring, by the sensing means of the mobile terminal, the measure of the luminaire status; storing, in the memory of the mobile terminal, data about the acquired measure of the luminaire status, said data being associated to the identifier of the luminaire.



SYSTEM FOR CHECKING A LUMINAIRE STATUS AND METHOD THEREOF

FIELD OF INVENTION

5

The present invention relates to methods and systems for checking a luminaire status, in particular using a mobile terminal.

BACKGROUND

10

It is known to provide a luminaire with a control and communication circuit with at least one sensor adapted to measure a quantity related to, for example, a status of the luminaire corresponding to the angular positioning of the luminaire. The at least one sensor allows the control and communication device to send to a remote server a datum relative to the angular positioning, or an angular positioning change, of the luminaire. For example, the at least one sensor is an acceleration sensor. The measurements provided by the at least one sensor can for example be processed locally but, alternatively or in addition, can also be processed in the remote server.

15

Thanks to the provision of the at least one sensor, the control and communication circuit can remotely communicate data related to the angular positioning of the luminaire, associate this data to the related luminaire, and detect an accidental change of angular positioning due for example to the action of the weather or environmental conditions, such as, for example, the wind or vegetation, that vary the angular positioning with respect to the angular positioning conditions set in the installation step or a change of angular positioning due for example to the support being knocked down by a traffic accident or an change of angular positioning due to the subsidence of the foundation base. The control and communication device may store a datum related to the angular positioning set during the installation step, for example, acquired via the at least one sensor, to estimate variations of angular positioning (via the at least one sensor) and to send to the remote server messages and/or alarms related to variations of inclination that, exceeding a predetermined threshold, require maintenance of the lighting apparatus and/or the support pole.

20

25

30

The angular positioning may be defined by one or more tilt angle of the luminaire, said tilt angle corresponding to a yaw angle, a pitch angle, or a roll angle.

35

The above example is directed to the angular positioning of the luminaire but can be applied similarly to other sensors provided to the luminaire. By providing the luminaire with the control and communication circuit and the at least one sensor, a given luminaire status may be readily obtained. Nonetheless, it is to be noted that providing sensors and/or communication means to

every luminaire may prove to be costly for a customer. Also, the required sensor to perform a predetermined measure may be absent from the luminaire and/or the required sensor of the luminaire may be malfunctioning. Hence, there is a need for a system and method capable of checking a luminaire status solving these issues.

5

SUMMARY

The object of embodiments of the invention is to provide an improved system and method for checking a status of a luminaire, more in particular using a mobile terminal. More specifically, 10 embodiments of the invention aim to provide a system and method which allow a field operator for checking the luminaire status in a flexible and user-friendly manner, and keep a trace of the measure performed such that it can be directly linked to the related luminaire.

According to a first aspect of the invention, there is provided a method for checking a status of a 15 luminaire. The method uses a mobile terminal in a vicinity of the luminaire. The mobile terminal includes a sensing means, a memory, and a communication means. The method comprises the steps of:

- obtaining, by the mobile terminal, an identifier of the luminaire;
- determining, based on the obtained identifier of the luminaire, a measure of the status 20 of the luminaire to be acquired;
- acquiring, by the sensing means of the mobile terminal, the measure of the luminaire status;
- storing, in the memory of the mobile terminal, data about the acquired measure of the luminaire status, said data being associated to the identifier of the luminaire.

25

Embodiments of the invention are based *inter alia* on the insight that with the accelerated emergence of multifunctional luminaires and increase in the customization of the luminaires, requirements in the compliance of the luminaire relative to various parameters, as well as the variety of said various parameters, have increased. However, despite the usefulness of being able 30 to monitor precisely the status of a given luminaire with respect to various parameters, providing sensors to every luminaires for monitoring all luminaires statuses can be costly, malfunctioning of sensors can occur, and retrofitting of luminaires to make them “smarter” can be cumbersome. This problem is overcome by a method as defined above.

During maintenance or installation of the luminaire, a field operator may need to check the 35 status of the luminaire. The status of the luminaire may correspond to a measurable characteristic characterizing the luminaire, an environment of the luminaire, or a subpart of the luminaire. For

example, the measurable characteristic of the luminaire may be any one of, but not limited to: angular positioning of a luminaire head of the luminaire, geo-localization of the luminaire, arrangement of the components in the luminaire head of the luminaire, connectivity of a communication unit of the luminaire, sound level in the surrounding environment of the luminaire, amount of light at a time of the day in proximity of the luminaire, light distribution of the luminaire head of the luminaire, status of a component being part of the luminaire, etc.

The luminaire is associated to an identifier. The identifier may be a unique identifier. Due to the association of the identifier and the luminaire, any measure obtained via the mobile terminal may be easily linked to the corresponding luminaire using the identifier. Also, thanks to the identifier, the field operator may establish which luminaire status is to be determined, and thus which measure is to be performed.

In embodiments of the invention, the method uses a mobile terminal in a vicinity of the luminaire to be able to rely on a sensing means included in the mobile terminal. The mobile terminal may be, *e.g.* a laptop, a smartphone, a tablet, wearable device, or a dedicated mobile terminal. The measure of the luminaire status is acquired using the sensing means of the mobile terminal. Depending on the sensing means, the field operator may measure parameters not otherwise available to sensors of the luminaire, thereby increasing the flexibility of the process of luminaire status determination. Additionally, even if a sensor of the luminaire may acquire a measure of the same kind as the measure performed by the sensing means of the mobile terminal, the measure performed by the sensing means may allow improvement in the measure precision and/or in the measure reliability.

After acquisition of the measure, data related to said measure is linked to the unique identifier of the luminaire when stored, allowing for easy post-processing and sorting. Additional data may be joined when storing data about the acquired measure associated to the identifier, *e.g.* a time stamp of the checking of the luminaire status, and/or a location stamp of the checking of the luminaire status, and/or an identification of the field operator having performing the checking of the luminaire status using the mobile terminal. When carrying out maintenance or installation of a plurality of luminaires, the inherent portability of the mobile terminal gives user-friendliness in repeating the method across the plurality of luminaires.

It is to be noted that, in the context of the present invention, the vicinity of the luminaire may be defined as a distance from the luminaire allowing to acquire a representative measure of the desired luminaire status.

In an embodiment, the identifier of the luminaire is unique to the luminaire and data related to the luminaire is associated to the identifier. Additionally, there may be one or more additional

identifier, said additional identifiers being associated to different parts of the luminaire, *e.g.* one identifier per luminaire head of a luminaire including a plurality of luminaire heads, one identifier per component of the luminaire. The data about the acquired measure may be associated to the relevant identifier of the luminaire part in addition to the identifier of the luminaire. The identifier may be provided directly to a surface of the luminaire head or of the luminaire support in case of a visually readable identifier, or may be obtained within a certain range of RF communication centered on the luminaire. The skilled person will understand that there are various ways to assign a unique identifier to a specific object such as a luminaire, *e.g.* geo-localization coordinates, bar code, QR code, serial number, unique symbol or image, NFC-transmitted code such as a RFID tag.

According to a preferred embodiment, the determining of the measure of the luminaire status to be acquired includes:

- transmitting to a remote terminal, by the communication means of the mobile terminal, the obtained identifier of the luminaire; and
- receiving from the remote terminal, by the communication means of the mobile terminal, an instruction about the measure of the luminaire status to be acquired based on the obtained identifier of the luminaire.

In this manner, the mobile terminal may be communicating with a remote terminal to obtain directly what is inquired regarding the luminaire status. The remote terminal may be a terminal, said terminal including a communication means, a processing means, and a memory, located at a distance from the luminaire and being apt for communicating with the luminaire, *e.g.* another luminaire, another mobile terminal, a remote server. Preferably the remote terminal is a remote server for centrally handling a plurality of luminaires, preferably in a luminaire network.

Communication with the remote terminal may be established wirelessly or in a wired manner. Data may be sent via a wireless network operating over short-range or long-range communication, *e.g.* Bluetooth, Wi-Fi, Zigbee, LORA (IoT), IR, cellular, or via a wired network, *e.g.* Ethernet, DALI, DMX, RS485, USB.

The instruction about the measure received from the remote terminal may comprise an indication about one or more measurement required in order to obtain the measure, *e.g.* a specific tilt angle of the luminaire head, a sound level, a light amplitude, a photo of wirings within the luminaire head, and/or may comprise one or more guideline on how to accomplish the one or more measurement required to obtain the measure.

According to an exemplary embodiment, the determining of the measure of the luminaire status to be acquired includes:

- retrieving, from the memory of the mobile terminal, an instruction about the measure of the luminaire status to be acquired based on the obtained identifier of the luminaire.

In this way, the mobile terminal can operate in a standalone manner in order to determine the measure of the luminaire status to be acquired.

Note that the retrieving of the instruction from the memory of the mobile terminal is not exclusive of the receiving of the instruction from the remote terminal. For example, part of the instruction about the measure to be acquired may be available from the memory of the mobile terminal and another part of the instruction about the measure to be acquired may be available from the memory of the remote terminal; both the part and the another part of the instruction may be gathered such that the measure of the luminaire status to be acquired is determined.

According to a preferred embodiment, the method further comprises:

- transmitting, preferably to a remote terminal, by the communication means of the mobile terminal, the data about the acquired measure of the luminaire status associated to the identifier of the luminaire.

In this manner, most of the data related to luminaire statuses of a plurality of luminaires in a luminaire network can be centralized in the remote terminal for further processing and/or sorting.

According to an exemplary embodiment, the method further comprises:

- determining, based on the acquired measure of the luminaire status, the luminaire status.

In this way, the luminaire status is established. The determination of the luminaire status based on the acquired measure may be achieved with or without processing the acquired measure in the mobile terminal and/or at the remote terminal.

In an embodiment, a certain amount of light may be measured by a light sensing means of the mobile terminal on the premises of the luminaire. This amount of light may be processed to remove white noise from the measured amount of light, said white noise originating from a sensor of the light sensing means, in order to obtain the luminaire status corresponding to the luminaire environmental light.

In embodiments of the luminaire comprising a photocell to control the switching of the main lighting unit, the photocell of the luminaire may have aged and there may be a need to check whether the measurement from the photocell is still accurate. To check the status of the photocell, the amount of light measured by the sensing means of the mobile terminal may be compared to the

amount of light measured by the photocell. In another embodiment, the light sensing means of the mobile terminal may measure the amount of light on the premises of the luminaire to determine the background light level status of the luminaire; and the determined background light level status of the luminaire may be used to adapt the switching threshold controlled by the photocell of the luminaire.

In yet another embodiment, the field operator may capture with the mobile terminal an image of a light distribution of the luminaire on a surface to be illuminated to check the light distribution status of the main lighting unit. In still another embodiment, the field operator may capture with the mobile terminal an image of the luminaire with the main lighting unit switched on to check the mains connection status of the luminaire.

The skilled person will understand that various kinds of acquired measures may be processed accordingly to determine the luminaire status. As part of the overall monitoring and supervising of a luminaire network, the determined luminaire status may serve as a basis for future actions.

According to a typical embodiment, the method further comprises:

- obtaining information indicating whether the luminaire status is correct based on the determined luminaire status and a reference status, said information optionally comprising a required correction.

By this approach, comparison of the determined luminaire status is executed, the result of which may be the basis for future actions on the luminaire. More specifically, the luminaire status may be compared with the reference status, said reference status corresponding, for example, to an expected value or state of the luminaire status. Depending on the difference between the luminaire status and the reference status, the luminaire status may be estimated as correct or incorrect depending whether the luminaire status deviates out of a predetermined range away from the reference status. An indication of the luminaire status being incorrect may lead to, *e.g.* a maintenance operation by the field operator, the checking of another luminaire status, and/or a further action by the remote terminal.

According to a preferred embodiment, the luminaire includes a luminaire head. The sensing means of the mobile terminal comprises an accelerometer. The acquiring of the measure of the luminaire status comprises:

- providing the mobile terminal to a predetermined surface of the luminaire head; and
- acquiring, via the accelerometer of the mobile terminal, a measure for at least one tilt angle representative for an angular positioning of the luminaire head.

In this manner, the field operator may conveniently check the luminaire status corresponding to the angular positioning of the luminaire head of the luminaire using the mobile terminal only, or may complement available data about the luminaire head angular positioning. The angular positioning may be defined by one or more tilt angle, said tilt angle corresponding to a yaw angle, a pitch angle, or a roll angle of the luminaire head. The predetermined surface of the luminaire head may be a substantially flat surface configured for cooperating with a corresponding external surface of the mobile terminal, optionally with a holder configured for holding in place the mobile terminal. The predetermined surface of the luminaire head may be an external surface of the housing of the luminaire head or a surface inside the housing of the luminaire head. The predetermined surface of the luminaire head may be defined with a predetermined inclination with respect to a horizontal plane, said predetermined inclination being defined by a yaw, pitch, and/or roll angle, allowing to determine the luminaire status corresponding to the luminaire head angular positioning based on the acquired measure and taking into account the predetermined inclination of the predetermined surface.

According to an exemplary embodiment, the mobile terminal comprises an output means. The obtaining of information indicating whether the luminaire status is correct comprises:

- obtaining information comprising the required correction; and
- outputting, by the output means of the mobile terminal, an information correlated with the required correction.

In this way, the field operator may be assisted when performing different manipulations of the mobile terminal and/or of the luminaire during the implementation of the method in order to facilitate some of these manipulations. The output means may be at least one of: a display, a speaker, a vibration unit, and/or a light source of the mobile terminal. In an embodiment, the field operator may be performing correction and the correlation in signal outputted by the output means may vary as the luminaire status improves or worsens. The variations in the outputted signal correlated with the required correction may be a variation in intensity of the signal, frequency of the signal, in an image-based signal such as variation in color, and/or spoken or written language outputted.

According to a preferred embodiment, the sensing means of the mobile terminal comprises an image capturing means. The obtaining of the identifier comprises:

- acquiring, via the image capturing means of the mobile terminal, a visual representation, preferably a QR code or a barcode, of the identifier, said visual representation being provided to a surface in proximity to the luminaire; and
- obtaining, by the mobile terminal, the identifier of the luminaire based on the acquired visual representation.

5

In this manner, the identifier can be provided to any existing or new luminaire easily, for example by sticking a label with the visual representation on the surface in proximity to the luminaire. The visual representation may be generated quickly. The visual representation may be arranged on the luminaire support, *e.g.* a pole of the luminaire, on an internal surface of the luminaire accessible to the field operator, on a surface of the luminaire head, on any component inside the luminaire head, or on any module of the luminaire.

10

The skilled person will understand that the hereinabove described technical considerations and advantages for method embodiments also apply to the below described corresponding system embodiments, *mutatis mutandis*.

15

According to a second aspect of the invention, there is provided a system including a mobile terminal and a luminaire. The system is for checking a status of the luminaire using the mobile terminal in a vicinity of the luminaire. The mobile terminal comprises:

20

- a sensing means;
- a memory;
- a communication means; and
- a controlling means, said controlling means being configured for controlling the steps of the method of any one of the method embodiments above mentioned.

25

According to an exemplary embodiment, the luminaire comprises a luminaire head with a predetermined surface. The predetermined surface of the luminaire head may be an external surface of the housing of the luminaire head or a surface inside the housing of the luminaire head.

30

The sensing means of the mobile terminal comprises an accelerometer. The predetermined surface is configured for receiving the mobile terminal. After providing the mobile terminal to the predetermined surface of the luminaire head, the controlling means, to acquire the measure of the luminaire status, controls the mobile terminal to acquire, via the accelerometer, a measure of at least one tilt angle representative for an angular positioning of the luminaire head. Additionally, the mobile terminal may comprise an output means, and the controlling means may control the mobile terminal to:

35

- obtain information comprising a required correction of the luminaire status; and
- output, by the outputs means of the mobile terminal, an information correlated with the required correction.

- 5 According to a preferred embodiment, the mobile terminal comprises an output means. The controlling means is further configured for controlling the output means such that controlling the steps of the method of any one of the method embodiments above mentioned is at least partially assisted by information outputted by the output means.
- 10 In this way, performing the steps of the method and manipulating the mobile terminal during the implementation of the method may be made easier by the at least partial output of information through the output means. The output means of the mobile terminal may comprise a display, a speaker, a vibration unit, an augmented-reality device, and/or a light source. In an embodiment, the outputted information may be information correlated to the required correction to the luminaire
- 15 status. In another embodiment, the outputted information may be a video assistance on the display of the mobile terminal showing to the field operator how to manipulate the mobile terminal during the implementation of the method. The skilled person will understand that assistance may be provided through numerous ways to the field operator depending on the output means available.
- 20 According to an exemplary embodiment, the mobile terminal comprises an input means. The controlling means is further configured for controlling the input means such that controlling the steps of the method of any one of the method embodiments above mentioned is at least partially assisted by command inputted via the input means.
- 25 In this manner, performing the steps of the method and manipulating the mobile terminal during the implementation of the method may be made easier by the at least partial input of commands through the input means. The input means of the mobile terminal may comprise at least one of: a touch-enabled input panel, a touchscreen, a keyboard, a switch or button, an image capturing means, and/or a sound capturing means. In addition, the mobile terminal may also comprise the
- 30 output means and performing the steps of the method by the controlling means is such that it is also at least partially assisted by information outputted by the output means. In an embodiment, the mobile terminal may comprise a speaker and a sound-capturing means allowing for an at least partially speech controlled implementation of the method. In another embodiment, the field operator may complete any of the steps of the method by a manual entry of information on the
- 35 mobile terminal via the keyboard or the touch-enabled input panel of the mobile terminal.

According to a preferred embodiment, the mobile terminal further comprises a display. The controlling means is further configured for controlling the display to display information about the controlling performed by the controlling means.

- 5 In this way, the user-friendliness in implementing the method for checking the luminaire status is improved by visual assistance. The information displayed may be, *e.g.* one or more guideline to assist the field operator in conducting the steps of the method using the mobile terminal, informing the field operator about the progress of the checking of the luminaire status, an input demand from the mobile terminal to be inputted by the field operator via the input means of the mobile terminal.

10

According to an exemplary embodiment, the controlling means is configured to display a geographical map indicating the luminaire for which checking of the luminaire status is required, prior to performing the step of obtaining the identifier.

- 15 In this manner, there is a clear map overview of the geographical positioning of the luminaires needing attention, and the field operator can plan accordingly.

According to a preferred embodiment, the controlling means is configured to display an overview of the measure of the luminaire status to be acquired and the associated identifier of the luminaire, prior to performing the step of obtaining the identifier.

20

In this way, there is a clear overview for the field operator of the tasks at hand for planning.

According to an exemplary embodiment, the sensing means of the mobile terminal includes at least one of: an accelerometer, an image capturing means, a light sensing means, a sound capturing means, a geo-localization means, a temperature sensing means, an antenna.

25

In this manner, the mobile terminal may be able to be used for a broad range of measurements relative to the luminaire status.

30

The skilled person will understand that the hereinabove described technical considerations and advantages for method and system embodiments also apply to the below described corresponding embodiments of a method for installing a luminaire, *mutatis mutandis*.

- 35 According to a third aspect of the invention, there is provided a method for installing a luminaire. The method uses a mobile terminal in a vicinity of the luminaire. The method comprises:

- mounting a luminaire head of the luminaire;
- performing, using the mobile terminal, the steps of the method of any one of the method embodiments above mentioned;
- optionally, performing a required correction; wherein the required information is
5 obtained when obtaining information indicating whether the luminaire status is correct based on the determined luminaire status, said information comprising the required correction.

BRIEF DESCRIPTION OF THE FIGURES

10

This and other aspects of the present invention will now be described in more detail, with reference to the appended drawings showing a currently preferred embodiment of the invention. Like numbers refer to like features throughout the drawings.

15 Figure 1 schematically illustrates an exemplary embodiment of a method for checking a status of a luminaire according to the invention;

Figures 2A-2B schematically illustrate two alternative embodiments, respectively, of sub-steps of a method for checking a status of a luminaire according to the invention;

Figure 3 schematically illustrates another exemplary embodiment of a method for checking a status
20 of a luminaire according to the invention;

Figure 4 shows an illustrative view of a system for checking a status of a luminaire according to the invention.

DESCRIPTION OF EMBODIMENTS

25

Figure 1 schematically illustrates an exemplary embodiment of a method for checking a status of a luminaire according to the present invention. The method is to be applied in a mobile terminal. The mobile terminal is used in a vicinity of the luminaire.

The luminaire may comprise a main lighting unit and optionally a functional module. In an
30 embodiment, the main lighting unit and optionally the functional module may be incorporated in a luminaire head of the luminaire. In another embodiment, the functional module may be separated from the luminaire head of the luminaire. The luminaire may comprise one or more luminaire heads. The functional module may comprise functional circuitry. Examples of functional circuitry which may be included in the functional module may be any one or more of the following:

35 - base station circuitry;

- power management circuitry comprising, *e.g.* one or more of: a power meter, a fuse, a line protection, a circuit breaker, an electrical connection for multiple power lines, a clock, an astroclock, a power supply module, an PLC, a computer, a communication module, display circuitry, etc.; preferably the power management circuitry is configured to manage the provision of power to multiple luminaires, preferably at least three luminaires, *e.g.* more than ten luminaires. In such embodiments power connection cables pass from the functional module through a support of the luminaire to other luminaires, *e.g.* underground;
- telecommunication circuitry which can comprise at least one of: an optical fiber connection, a fiber to copper interface, a fiber patch panel, a modem, a router, a switch, a patch panel, a network video recorder (NVR), a computer;
- audio system management circuitry which can comprise at least one of: an amplifier, a transformer, a media player (connected to network or not), electrical connections for multiple loudspeaker lines, a computer;
- WiFi circuitry, wherein an antenna for receiving WiFi signals may be integrated either in the functional module or in a separate antenna module as in the exemplary embodiment of the luminaire with a base station module;
- charger circuitry, *e.g.* phone charger circuitry or vehicle charger circuitry;
- an environmental sensor such as a microphone, or a detector of CO₂, NO_x, smoke, etc., and the associated circuitry;
- a human interface device (HID) and the associated circuitry, *e.g.* a camera, a loudspeaker, a button, etc.

The mobile terminal comprises a sensing means, a communication means, a controlling means, and a memory. Detailed embodiments of a system including the mobile terminal and the luminaire will be described with respect to Figure 4. Additionally the system may further comprise a remote terminal. The remote terminal may be a terminal, said terminal including a communication means, a processing means, and a memory, located at a distance from the luminaire and being apt for communicating with the luminaire, *e.g.* another luminaire, another mobile terminal, a remote server. Preferably the remote terminal is a remote server for centrally handling a plurality of luminaires, preferably in a luminaire network.

In a first step S110 there is an obtaining, by the mobile terminal, of an identifier of the luminaire. The identifier may be a unique attribute of the luminaire. The identifier may be of different kinds and represented in a physical form, *e.g.* serial number, barcode, symbol, or obtainable electronically, *e.g.* RFID tag, geo-localization position. Depending on the kind of the identifier, step S110 may be divided in a plurality of sub-steps.

In an embodiment, the identifier is a visual representation, *e.g.* a QR code, on a surface in proximity of the luminaire and step S110 may comprise: acquiring, via an image capturing means

of the mobile terminal, the visual representation of the identifier; and obtaining, by the mobile terminal, the identifier of the luminaire based on the acquired visual representation. The determining of the identifier of the luminaire based on the acquired visual representation may be done by a processing means of the mobile terminal. Alternatively, the mobile terminal may
5 transmit, via the communication means of the mobile terminal, the visual representation of the identifier to the remote terminal, and then receive, from the remote terminal, the identifier based on the visual representation. In another embodiment, the identifier of the luminaire may be a geo-localization position of the luminaire obtained by a geo-localization means of the mobile terminal. The skilled person will understand that numerous means can be implemented to assign a unique
10 identifier to the luminaire and then obtain it using the mobile terminal.

In addition, another identifier of the luminaire may be obtained by the mobile. The another identifier may be of a similar kind or of a different kind than the identifier of the luminaire. The another identifier may correspond to a subpart of the luminaire, *e.g.* the luminaire head, a driving means of the luminaire, one of the functional modules of the luminaire.

15 In a second step S120, there is a determining, based on the obtained identifier of the luminaire, of a measure of the status of the luminaire to be acquired. Detailed embodiments of the determining of the measure of the luminaire status will be described with respect to Figures 2A and 2B. By luminaire status, it is meant a measurable characteristic characterizing the luminaire, an environment of the luminaire, or a subpart of the luminaire. For example, the measurable
20 characteristic of the luminaire may be any one of, but not limited to: angular positioning of a luminaire head of the luminaire, geo-localization of the luminaire, arrangement of the electronic components in the luminaire head of the luminaire, connectivity of a communication unit of the luminaire, sound level in the surrounding environment of the luminaire, amount of light at a time of the day in proximity of the luminaire, light distribution of the luminaire head of the luminaire,
25 status of an electronic component being part of the luminaire, etc. In the context of the present invention, applying the method in the mobile terminal in the vicinity of the luminaire may be understood as providing the mobile terminal at a distance from the luminaire allowing to acquire a representative measure of the desired luminaire status.

In a third step S130, there is an acquiring, by the sensing means of the mobile terminal, of
30 the measure of the luminaire status. The acquiring of the measure may be dependent on the kind of the sensing means of the mobile terminal. The sensing means of the mobile terminal may be at least one of: an accelerometer, an image capturing means, a light sensing means, a sound capturing means, a geo-localization means, a temperature sensing means, an antenna. The acquiring of the measure may include one or more manipulation of the mobile terminal and/or of the luminaire. For
35 example, in an embodiment, the luminaire may include the luminaire head, the sensing means of the mobile terminal may comprise an accelerometer, and the acquiring of the measure of the

luminaire status may comprise the steps of: providing the mobile terminal to a predetermined surface of the luminaire head; and acquiring, via the accelerometer of the mobile terminal, a measure for at least one tilt angle representative for an angular positioning of the luminaire head. In another embodiment, acquiring the measure may require measurements from more than one sensing means to be fully obtained or may require a manual entry on the mobile terminal by a field operator. Additionally or alternatively, a similar measure as the required measure may be available in the memory of the mobile terminal or in the remote terminal and acquiring the measure may allow to complement or detract the available similar measure.

In a fourth step S140, there is a storing, in the memory of the mobile terminal, of data about the acquired measure of the luminaire status, said data being associated to the identifier of the luminaire. Additional data may be joined when storing data about the acquired measure associated to the identifier, *e.g.* a time stamp of the checking of the luminaire status, and/or a location stamp of the checking of the luminaire status, and/or an identification of the field operator having performing the checking of the luminaire status using the mobile terminal. The memory of the mobile terminal may be a temporary memory, *e.g.* a buffer memory, or a long-term memory, *e.g.* a hard disk memory. The association of the data about the acquired measure of the luminaire status and the identifier of the luminaire may allow for a convenient sorting of the data, or in view of a further processing. In an embodiment, the measure of the luminaire status is more specifically related to a subpart of the luminaire and the subpart of the luminaire has an associated identifier which has been obtained by the mobile terminal; the mobile terminal may store the data about the acquired measure and associate it to both the identifier of the luminaire and the identifier of the subpart of the luminaire.

Figures 2A and 2B schematically illustrate two alternative embodiments, respectively, of sub-steps of a method for checking a status of a luminaire according to the present invention. Figures 2A and 2B illustrate sub-steps of step S120 of Figure 1.

In a step S121, as illustrated in Figure 2A, there is a retrieving, from the memory of the mobile terminal, of an instruction about the measure of the luminaire status to be acquired based on the obtained identifier of the luminaire. The instruction about the measure retrieved from the memory of the mobile terminal may comprise an indication about one or more measurement required in order to obtain the measure, *e.g.* a specific tilt angle of the luminaire head, a sound level, a light amplitude, a photo of wirings within the luminaire head, and/or may comprise one or more guideline on how to accomplish the one or more measurement required to obtain the measure.

In an embodiment, the mobile terminal may comprise a display and the retrieved instruction may correspond to a written instruction or an image-based instruction indicating how to

obtain the required measure. In another embodiment, the retrieved instruction may, upon obtaining the identifier, correspond to the launch of a program on the mobile terminal allowing to perform the acquisition of the measure. In yet another embodiment, the retrieved instruction may comprise one or more guideline such as preparatory steps to be conducted with respect to the luminaire and/or the mobile terminal prior to the acquiring of the measure.

Alternatively or additionally, as illustrated in Figure 2B, in a step S121', there is a transmitting to a remote terminal, by the communication means of the mobile terminal, of the obtained identifier of the luminaire. The mobile terminal may be communicating with the remote terminal to obtain directly what is inquired regarding the luminaire status. Communication with the remote terminal may be established wirelessly or in a wired manner. Data may be sent via a wireless network operating over short-range or long-range communication, *e.g.* Bluetooth, Wi-Fi, Zigbee, LORA (IoT), IR, cellular, or via a wired network, *e.g.* Ethernet, DALI, DMX, RS485, USB.

In a step S122', there is a receiving, by a communication means of the remote terminal, of the obtained identifier. In a step S123', there is a retrieving, from a memory of the remote terminal, of an instruction about the measure of the luminaire status to be acquired based on the obtained identifier of the luminaire. In a step S124', there is a transmitting to the mobile terminal, by the communication means of the remote terminal, of the retrieved instruction. In a step S125', there is a receiving, by the communication means of the mobile terminal, of the retrieved instruction about the measure of the luminaire status to be acquired.

The steps described with respect to Figure 2A and Figure 2B may be executed as alternatives to one another or in complement to one another. For example, part of the instruction about the measure to be acquired may be available from the memory of the mobile terminal and another part of the instruction about the measure to be acquired may be available from the memory of the remote terminal; both the part and the another part of the instruction may be gathered such that the measure of the luminaire status to be acquired is determined.

Figure 3 schematically illustrates another exemplary embodiment of a method for checking a status of a luminaire according to the present invention. In the embodiment of Figure 3, steps S210, S220, S230, and S240 may be similar to steps S110, S120, S130, and S140 of Figure 1.

In a step S245, there is a transmitting, preferably to a remote terminal, by the communication means of the mobile terminal, of the data about the acquired measure of the luminaire status associated to the identifier of the luminaire. The transmitting of the data may be to the same remote terminal as for step S121' of Figure 2B or to another remote terminal. In the embodiment of Figure 3, the step S245 may be executed in parallel with the step S240. In another

embodiment, the step S245 may be executed prior to the step S240. In yet another embodiment, the step S240 may be executed prior to the step S245.

In a step S250, there is a determining, based on the acquired measure of the luminaire status, of the luminaire status. The determining of the luminaire status based on the acquired
5 measure may be achieved with or without processing the acquired measure in the mobile terminal and/or the remote terminal. For example, the acquired measure may serve to complement or detract an available measure and the acquired measure may be processed while taking into account the available measure.

In an embodiment, a certain amount of light may be measured by a light sensing means of
10 the mobile terminal on the premises of the luminaire. This amount of light may be processed to remove white noise from the measured amount of light, said white noise originating from a sensor of the light sensing means, in order to obtain the luminaire status corresponding to the luminaire environmental light.

In embodiments of the luminaire comprising a photocell to control the switching of the
15 main lighting unit, the photocell of the luminaire may have aged and there may be a need to check whether the measurement from the photocell is still accurate. To check the status of the photocell, the amount of light measured by the sensing means of the mobile terminal may be compared to the amount of light measured by the photocell. In another embodiment, the light sensing means of the mobile terminal may measure the amount of light on the premises of the luminaire to determine the
20 background light level status of the luminaire; and the determined background light level status of the luminaire may be used to adapt the switching threshold controlled by the photocell of the luminaire.

In yet another embodiment, the field operator may capture with the mobile terminal an
25 image of a light distribution of the luminaire on a surface to be illuminated to check the light distribution status of the main lighting unit. In still another embodiment, the field operator may capture with the mobile terminal an image of the luminaire with the main lighting unit switched on to check the mains connection status of the luminaire.

The skilled person will understand that various kinds of acquired measures may be
30 processed accordingly to determine the luminaire status. As part of the overall monitoring and supervising of a luminaire network, for example by the remote terminal, the determined luminaire status may serve as a basis for future actions.

In another embodiment, a measure for at least one tilt angle representative for an angular
35 positioning of a luminaire head of the luminaire may be measured by an accelerometer of the mobile terminal, said mobile terminal being provided to a predetermined surface of the luminaire head. The angular positioning may be defined by one or more tilt angle, said tilt angle corresponding to a yaw angle, a pitch angle, or a roll angle of the luminaire head. The

predetermined surface of the luminaire head may be a substantially flat surface configured for cooperating with a corresponding external surface of the mobile terminal, optionally with a holder configured for holding in place the mobile terminal. The predetermined surface of the luminaire head may be an external surface of the housing of the luminaire head or a surface inside the housing of the luminaire head. The predetermined surface of the luminaire head may be defined with a predetermined inclination with respect to a horizontal plane, said predetermined inclination being defined by a yaw, pitch, and/or roll angle, allowing to determine the luminaire status corresponding to the luminaire head angular positioning based on the acquired measure and taking into account the predetermined inclination of the predetermined surface.

In a step S260, there is an obtaining of information indicating whether the luminaire status is correct based on the determined luminaire status and a reference status, said information optionally comprising a required correction. To conclude whether the luminaire status is correct the determined luminaire status in step S250 may be compared to the reference status; the result of said comparison may be the basis for future actions on the luminaire. More specifically, the luminaire status may be compared with the reference status, said reference status corresponding, for example, to an expected value or state of the luminaire status. Depending on the difference between the luminaire status and the reference status, the luminaire status may be estimated as correct or incorrect depending whether the luminaire status deviates out of a predetermined range away from the reference status. An indication of the luminaire status being incorrect may lead to, *e.g.* a maintenance operation by the field operator, the checking of another luminaire status, and/or a further action by the remote terminal.

Similarly as the determining of the measure to be acquired in step S220, the obtaining of information in step S260 may rely on a retrieving of the information from the memory of the mobile terminal, or may involve a transmitting of the luminaire status to the remote terminal followed by a receiving from the remote terminal of information indicating whether the luminaire status is correct. Alternatively, the remote terminal may, upon receiving the data of the acquired measure of the luminaire status following the execution of step S245, directly transmit to the mobile terminal the information indicating whether the luminaire status is correct based on the determined luminaire status. In this case, applying the step S250 in the mobile terminal may be avoided and take place instead in the remote terminal.

In an embodiment, the mobile terminal may comprises an output means. Applying the step S260 in the mobile terminal may comprise: obtaining information comprising the required correction; and outputting, by the output means of the mobile terminal, an information correlated with the required correction. In this way, performing the steps of the method and manipulating the mobile terminal during the implementation of the method may be made easier by the assistance provided when outputting the information correlated with the required correction through the

output means. The output means of the mobile terminal may comprise a display, a speaker, a vibration unit, an augmented-reality device, and/or a light source. The correlation in signal outputted by the output means with the required correction may be correlation in intensity of the signal, frequency of the signal, color of the signal, and/or spoken or written language outputted.

5 The skilled person will understand that assistance may be provided through numerous ways to the field operator depending on the output means available.

Figure 4 shows an illustrative view of a system for checking a status of a luminaire according to the present invention. The system includes a mobile terminal 10 and a luminaire 20. The system is
10 for checking a status of the luminaire using the mobile terminal 10 in a vicinity of the luminaire 20. The mobile terminal 10 may be used by a field operator performing installation or maintenance of the luminaire 20.

The mobile terminal 10 comprises: a sensing means, a memory (not shown), a communication means (not shown), and a controlling means (not shown). The sensing means may
15 be at least one of: an accelerometer, an image capturing means, a light sensing means, a sound capturing means, a geo-localization means, a temperature sensing means, an antenna. The sensing means of Figure 4 comprises at least a sound capturing means 13, an image capturing means 16, and an accelerometer (not shown). The controlling means is configured for controlling the steps of the method as described in Figures 1-3. The mobile terminal 10 may be, *e.g.* a laptop, a
20 smartphone, a tablet, wearable device, or a dedicated mobile terminal.

The luminaire 20 may comprise one or more luminaire head 21a, 21b, 21c, said one or more luminaire head 21a, 21b, 21c being affixed to a support 23. The support 23 may be a pole, a wall, or an external surface of a tunnel. The one or more luminaire head 21a, 21b, 21c may
25 comprise a main lighting unit. Optionally the luminaire 20 may further comprise a functional module as detailed in Figure 1.

The luminaire 20 may be an outdoor luminaire. By outdoor luminaire, it is meant luminaires which are installed on roads, tunnels, industrial plants, stadiums, airports, harbors, rail stations, campuses, parks, cycle paths, pedestrian paths, or in pedestrian zones for example, and which can be used notably for the lighting of an outdoor area, such as roads and residential areas in
30 the public domain, private parking areas and access roads to private building infrastructures, etc. In the embodiment of Figure 4, there is a plurality of luminaires 20 positioned between a road 31 and a cycle path 32. The luminaire 20 in the foreground of Figure 4 comprises a first luminaire head 21a configured for illuminating the cycle path 32, and a second luminaire head 21b configured for illuminating the road 31, said first and second luminaire heads 21a, 21b being mounted on a first
35 pole 23. The luminaire 20 in the background of Figure 4 comprises a single third luminaire head

21c configured for illuminating the road 31, said single third luminaire head 21c being mounted on a second pole 23.

The first pole 23 of the foreground luminaire 20 of Figure 4 may be provided with a first identifier 24 of the luminaire, said first identifier 24 uniquely identifying the foreground luminaire 20. In the context of the present invention, luminaire identifiers 24, 24', 24'' may be considered as a unique attribute of the luminaire. The identifiers 24, 24', 24'' may be of different kinds and represented in a physical form, *e.g.* serial number, barcode, symbol, or obtainable electronically, *e.g.* RFID tag, geo-localization position.

The first identifier 24 of Figure 4 is a barcode arranged on an external surface of the first pole 23. In another embodiment, the first identifier 24 may be arranged on an internal surface of the first pole 23 accessible by a service door or may be located on a surface of a cabinet in proximity of the foreground luminaire 20. In yet another embodiment, a luminaire head of the luminaire is provided to a support other than a pole and the identifier of the luminaire is located in proximity of the luminaire head.

The first luminaire head 21a of the foreground luminaire 20 may be provided with a second identifier 24'. The second identifier 24' may be a QR code arranged on an external surface of the first luminaire head 21a. The second identifier 24' may be an identifier uniquely identifying the first luminaire head 21a. Additionally or alternatively, the second identifier 24' may be arranged on an internal surface of the first luminaire head 21a.

The second pole 23 of the background luminaire 20 of Figure 4 may be provided with a third identifier 24''. The third identifier 24'' may be a RFID tag readable by a reading means (not shown) of the mobile terminal 10.

The mobile terminal 10 may comprise an output means. The output means may be at least one of: a display, a speaker, a vibration unit, and/or a light source. The output means of Figure 4 comprises at least a display 11 and a speaker 12. The mobile terminal 10 may further comprise an input means. The input means may be at least one of: a touch-enabled input panel, a touchscreen, a keyboard, a switch or button, and image capturing means, and/or a sound capturing means. The input means of Figure 4 comprises at least a touchscreen 11 also acting as the display 11 and a sound capturing means 13 also acting as the sound capturing means 13 of the sensing means.

The controlling means of the mobile terminal 10 may be configured for controlling the output means such that controlling the steps of the method according to any of the embodiments of Figures 1-3 may be at least partially assisted by information outputted by the output means. In an embodiment, the outputted information may be information correlated to a required correction to the luminaire status, and the field operator may proceed with the correction assisted by information outputted by the output means.

In another embodiment, the mobile terminal 10 comprises the display 11 and the controlling means may be configured for controlling the display 11 to display information about the controlling performed by the controlling means. The information displayed by the display 11 may be, *e.g.* one or more guideline to assist the field operator in conducting the steps of the method using the mobile terminal 10, informing the field operator about the progress of the checking of the luminaire status, an input demand from the mobile terminal 10 to be inputted by the field operator via the input means of the mobile terminal 10. For example, the outputted information may be an image-based or a written assistance on the display 11 of the mobile terminal showing to the field operator how to manipulate the mobile terminal 10 during the implementation of the method. The assistance provided on the display 11 may be replaced or complemented by a vocal assistance provided through the speaker 12 of the mobile terminal. The skilled person will understand that assistance may be provided through numerous ways to the field operator depending on the output means available.

In the embodiment of Figure 4, the controlling means is configured to display a geographical map 14 on the display 11 indicating the luminaire 20 for which checking of the luminaire status is required, prior to performing the step of obtaining the identifier 24, 24', 24". The indication of the luminaire 20 for which checking of the luminaire status is required may be at the luminaire level or at a sub-level corresponding to a subpart of the luminaire 20, at the luminaire head-level in Figure 4. The indication may take the form of a dark spot on the geographical map 14 when checking is required, and a clear spot when it is not. The skilled person will understand that the present invention is not restricted to this specific type of indication.

In the embodiment of Figure 4, the controlling means is configured to display an overview 15 on the display 11 of the measure of the luminaire status to be acquired and the associated identifier 24, 24', 24" of the luminaire, prior to performing the step of obtaining the identifier 24, 24', 24". The identifiers 24, 24', 24" may correspond to identifications ID2, ID1, and ID3, respectively, on the overview 15 displayed on the display 11 of the mobile terminal. The overview 15 may, in correspondence with the identifications ID1, ID2, and ID3, indicates which measures are required to be acquired. For example, the measure of at least one tilt angle may be required for the second luminaire head 21b associated to the identifier 24' and corresponding to identification ID1. The acquiring of the at least one tilt angle may be executed by first providing the mobile terminal 10 to a predetermined surface 22 of the second luminaire head 21b, a predetermined external surface 22 in the embodiment of Figure 4. Additionally, in the embodiment of Figure 4, the overview 15 may indicate that the measure of an environmental condition of the luminaire 20, a sound level, may be required for the third luminaire head 21c associated to the identifier 24" and corresponding to identification ID3. The measure of the sound level may be used, for example, to correlate with a sound level captured by a sound capturing sensor of the background luminaire 20

and thereafter determining a status of the sound capturing sensor part of the background luminaire 20, *i.e.* working or out of order.

The controlling means of the mobile terminal 10 may be configured for controlling the input means such that controlling the steps of the method according to any of the embodiments of Figures 1-3 may be at least partially assisted by command inputted via the input means. In an embodiment, the mobile terminal 10 may comprise the speaker 13 and a command may be vocally inputted via the speaker to assist one of the steps of the method. In another embodiment, the mobile terminal 10 may comprise the speaker 12 and the sound-capturing means 13 allowing for an at least partially speech controlled implementation of the method including both vocal commands and vocal assistance. In yet another embodiment, the field operator may complete any of the steps of the method by a manual entry of information on the mobile terminal 10 via the touchscreen 11 of the mobile terminal. The skilled person will understand that commands may be provided through numerous ways by the field operator depending on the input means available.

The mobile terminal 10 of Figure 4 may be communicating, via the communication means of the mobile terminal 10, with a remote terminal. Communication with the remote terminal may be established wirelessly or in a wired manner. Data may be sent via a wireless network operating over short-range or long-range communication, *e.g.* Bluetooth, Wi-Fi, Zigbee, LORA (IoT), IR, cellular, or via a wired network, *e.g.* Ethernet, DALI, DMX, RS485, USB. The memory of the mobile terminal 10 may be a temporary memory, *e.g.* a buffer memory, or a long-term memory, *e.g.* a hard disk memory. Use of the memory of the mobile terminal 10 and the communication with the remote terminal may be similar to the description of embodiments of the method with respect to any one of Figures 1-3.

Whilst the principles of the invention have been set out above in connection with specific embodiments, it is to be understood that this description is merely made by way of example and not as a limitation of the scope of protection which is determined by the appended claims.

Conclusies

1. Een werkwijze voor het checken van een status van een verlichtingsarmatuur gebruik makend van een mobiele terminal in een nabijheid van de verlichtingsarmatuur, waarbij de mobiele terminal een detectiemiddel, een geheugen, en een communicatiemiddel bevat, de methode
- 5 omvattende:
- het door middel van de mobiele terminal verkrijgen van een kenteken van de verlichtingsarmatuur (S110, S210);
 - het op basis van het verkregen kenteken van de verlichtingsarmatuur bepalen van een te

10 verwerven waarde van de status van de verlichtingsarmatuur (S120, S220);

 - het door middel van het detectiemiddel van de mobiele terminal verwerven van een waarde van de verlichtingsarmatuurstatus (S130, S230);
 - het in het geheugen van de mobiele terminal opslaan van data over de verworven waarde van de verlichtingsarmatuurstatus, waarbij de data met het kenteken van de verlichtingsarmatuur

15 wordt geassocieerd (S140, S240).
2. De werkwijze volgens conclusie 1, waarbij het bepalen van de te verwerven waarde van de verlichtingsarmatuurstatus bevat:
- het door het communicatiemiddel van de mobiele terminal uitsturen van het verkregen

20 kenteken van de verlichtingsarmatuur (S121') naar een terminal op afstand; en - het door het communicatiemiddel van de mobiele terminal ontvangen van een instructie over de waarde van de te verwerven verlichtingsarmatuurstatus op basis van het verkregen kenteken van de verlichtingsarmatuur (S125'), van de terminal op afstand.
- 25 3. De werkwijze van conclusie 1 of 2, waarbij het bepalen van de te verwerven waarde van de verlichtingsarmatuurstatus bevat:
- het uit het geheugen van de mobiele terminal ophalen van een instructie over de waarde van de te verwerven verlichtingsarmatuurstatus op basis van het verkregen kenteken van de verlichtingsarmatuur (S121).
- 30
4. De werkwijze volgens één der conclusies 1-3, waarbij de werkwijze verder omvat:
- het door het communicatiemiddel van de mobiele terminal uitsturen, bij voorkeur naar een terminal op afstand, van de data over de verworven waarde van de verlichtingsarmatuurstatus welke met het kenteken van de verlichtingsarmatuur is geassocieerd (S245).
- 35
5. De werkwijze volgens één der voorgaande conclusies, waarbij de methode verder omvat:

- het op basis van de verworven waarde van de verlichtingsarmatuurstatus bepalen van de verlichtingsarmatuurstatus (S250).

6. De werkwijze volgens conclusie 5, waarbij de werkwijze verder omvat:

- 5 - het verkrijgen van informatie die aangeeft of de verlichtingsarmatuurstatus correct is op basis van de bepaalde verlichtingsarmatuurstatus en een referentiestatus, waarbij de informatie optioneel een nodige correctie omvat (S260).

7. De werkwijze volgens één der voorgaande conclusies, waarbij de verlichtingsarmatuur een verlichtingsarmatuurkop omvat, waarbij het detectiemiddel van de mobiele terminal een accelerometervat; en waarbij de verwerving van de waarde van de verlichtingsarmatuurstatus (S130, S230) omvat:

- 10 - het voorzien van de mobiele terminal op een vooraf bepaald oppervlak van de verlichtingsarmatuurkop; en
- 15 - het via de accelerometer van de mobiele terminal verwerven van een waarde voor ten minste één kantelhoek die representatief is voor een hoekpositionering van de verlichtingsarmatuurkop.

8. De werkwijze volgens conclusie 6, optioneel in combinatie met conclusie 7, waarbij de mobiele terminal een uitvoermiddel omvat, en waarbij het verkrijgen van informatie die aangeeft of de verlichtingsarmatuurstatus correct is (S260) omvat:

- het verkrijgen van informatie die de nodige correctie omvat; en
- het door het uitvoermiddel van de mobiele terminal uitvoeren van een informatie die met de nodige correctie is gecorreleerd.

25

9. De werkwijze volgens één der voorgaande conclusies, waarbij het detectiemiddel van de mobiele terminal een beeldopnamemiddel omvat; en waarbij het verkrijgen van het kenteken (S110, S210) omvat:

- 30 - het via het beeldopnamemiddel van de mobiele terminal verwerven van een visuele weergave van het kenteken, bij voorkeur een QR code of een barcode, waarbij de visuele weergave aan een oppervlak in de nabijheid van de verlichtingsarmatuur is voorzien; en
- het door de mobiele terminal verkrijgen van het kenteken van de verlichtingsarmatuur op basis van de verworven visuele weergave.

10. Een systeem omvattende een mobiele terminal (10) en een verlichtingsarmatuur (20), voor het checken van een status van de verlichtingsarmatuur gebruik makend van de mobiele terminal in een nabijheid van de verlichtingsarmatuur, waarbij de mobiele terminal (10) omvat:

- een detectiemiddel;
- 5 - een geheugen;
- een communicatiemiddel; en
- een controlemiddel, waarbij het controlemiddel is ingericht om de stappen van de methode volgens één der conclusies 1-9 te controleren.

10 11. Het systeem volgens conclusie 10, waarbij de verlichtingsarmatuur (20) een verlichtingsarmatuurkop (21a, 21b, 21c) met een vooraf bepaald oppervlak (22) omvat; waarbij het detectiemiddel van de mobiele terminal een accelerometer omvat; en waarbij het vooraf bepaald oppervlak (22) is ingericht voor het ontvangen van de mobiele terminal (10) wanneer het controlemiddel de stappen van de werkwijze van conclusie 7 uitvoert, optioneel in combinatie met
15 conclusie 8.

12. Het systeem volgens conclusie 10 of 11, waarbij de mobiele terminal (10) een uitvoermiddel omvat; en waarbij het controlemiddel verder is ingericht om het uitvoermiddel te controleren zodanig dat het controleren van de stappen van de werkwijze volgens één der conclusies 1-9 voor
20 tenminste een deel gebruik maakt van informatie welke door het uitvoermiddel is uitgestuurd.

13. Het systeem volgens één der conclusies 10-12, waarbij de mobiele terminal (10) een invoermiddel omvat; en waarbij het controlemiddel verder is ingericht om het invoermiddel te controleren zodanig dat het controleren van de stappen van de werkwijze volgens één der
25 conclusies 1-9 voor tenminste een deel gebruik maakt van een commando welke door het invoermiddel is ingevoerd.

14. Het systeem volgens één der conclusies 10-13, waarbij de mobiele terminal (10) verder een scherm (11) omvat; en waarbij het controlemiddel verder is ingericht om het scherm te controleren
30 om informatie weer te geven over het controleren welke door het controlemiddel is uitgevoerd.

15. Het systeem volgens de voorgaande conclusie, waarbij het controlemiddel is ingericht om een geografische map (14) weer te geven welke de verlichtingsarmatuur aangeeft voor welke het checken van de verlichtingsarmatuurstatus nodig is, vóór het uitvoeren van de stap van het
35 verkrijgen van het kenteken.

16. Het systeem volgens conclusie 14 of 15, waarbij het controlemiddel is ingericht om een overzicht weer te geven (15) van de waarde van de te verwerven verlichtingsarmatuurstatus en het geassocieerde kenteken van de verlichtingsarmatuur, vóór het uitvoeren van de stap van het verkrijgen van het kenteken.

5

17. Het systeem volgens conclusie 10-16, waarbij het detectiemiddel van de mobiele terminal ten minste één van het volgende bevat: een accelerometer, een beeldopnamemiddel (16), een lichtdetectiemiddel, een geluidopnamemiddel (13), een geo-lokalisatiemiddel, een temperatuurdetectiemiddel, een antenne.

10

18. Een werkwijze voor het installeren van een verlichtingsarmatuur (20) gebruik makend van een mobiele terminal (10) in een nabijheid van de verlichtingsarmatuur, waarbij de werkwijze omvat:

- het monteren van een verlichtingsarmatuurkop (21a, 21b, 21c) van de verlichtingsarmatuur;

15

- het uitvoeren van de stappen van de werkwijze volgens één der conclusies 1-9, gebruik makend van de mobiele terminal (10);

- het optioneel, uitvoeren van de nodige correctie verkregen in de stappen van de werkwijze van conclusie 6.

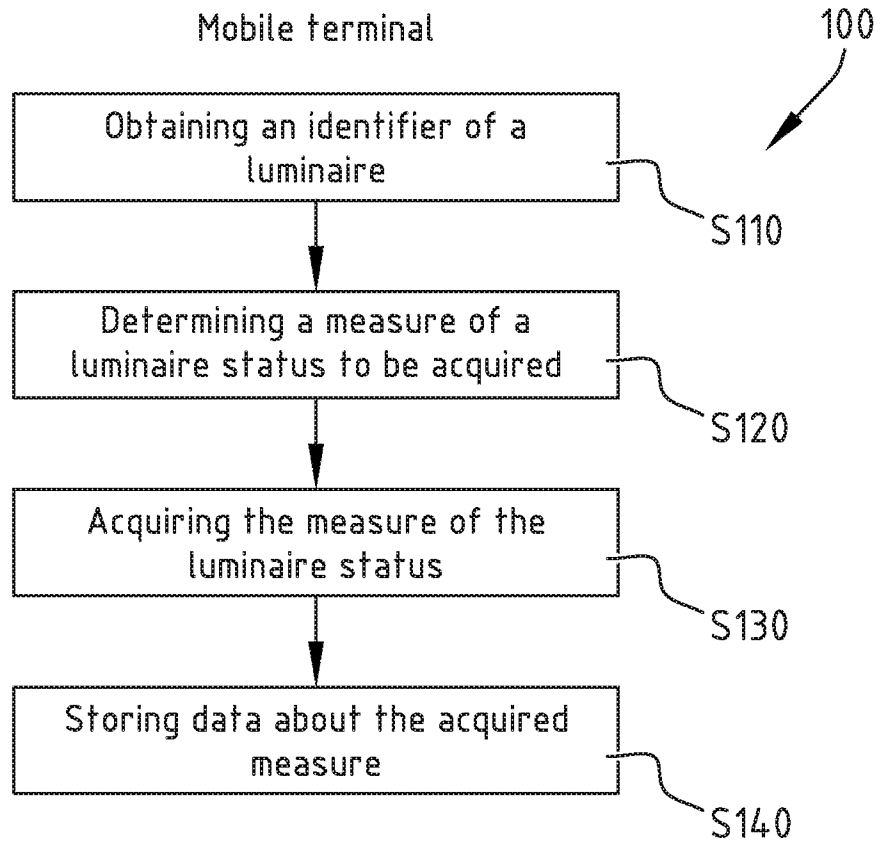


FIG. 1

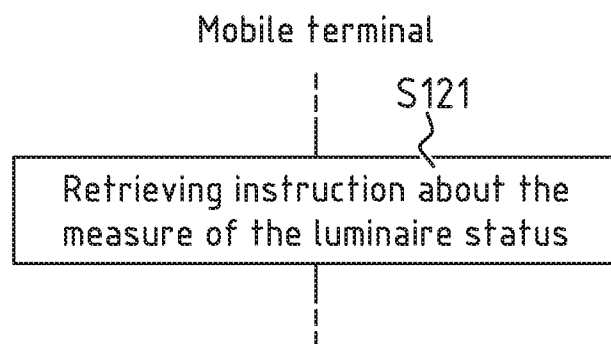
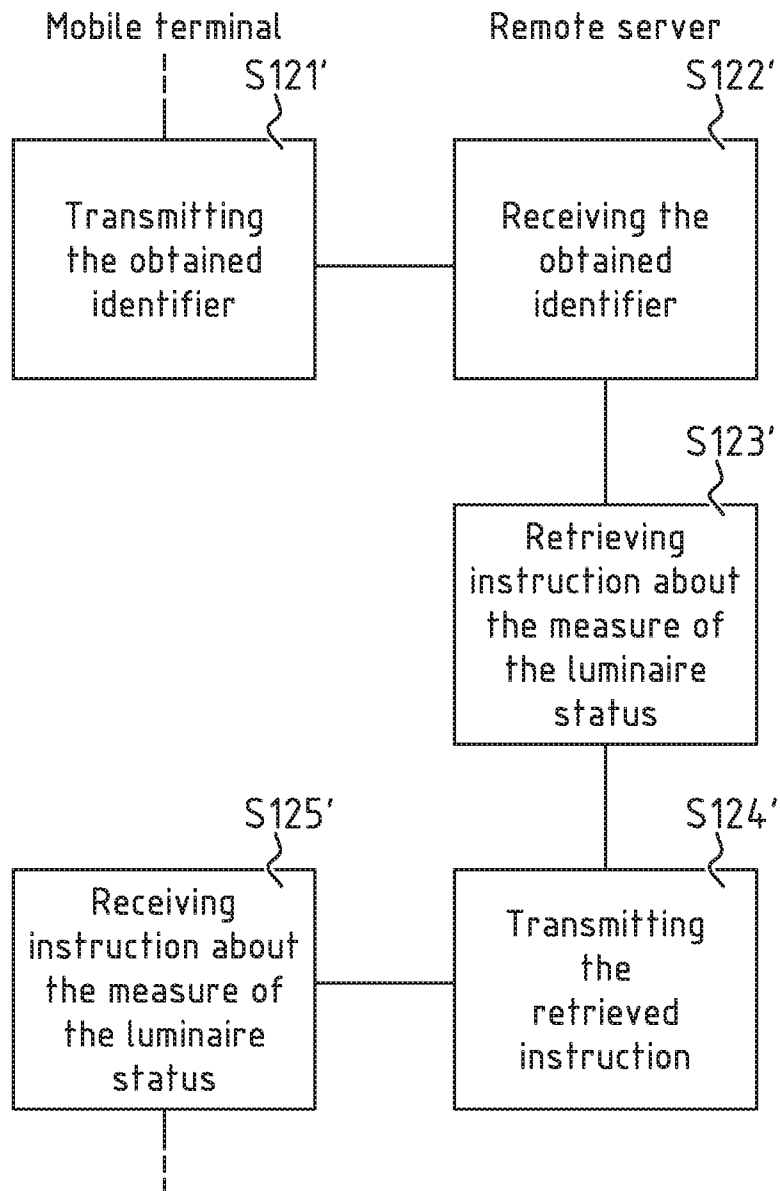
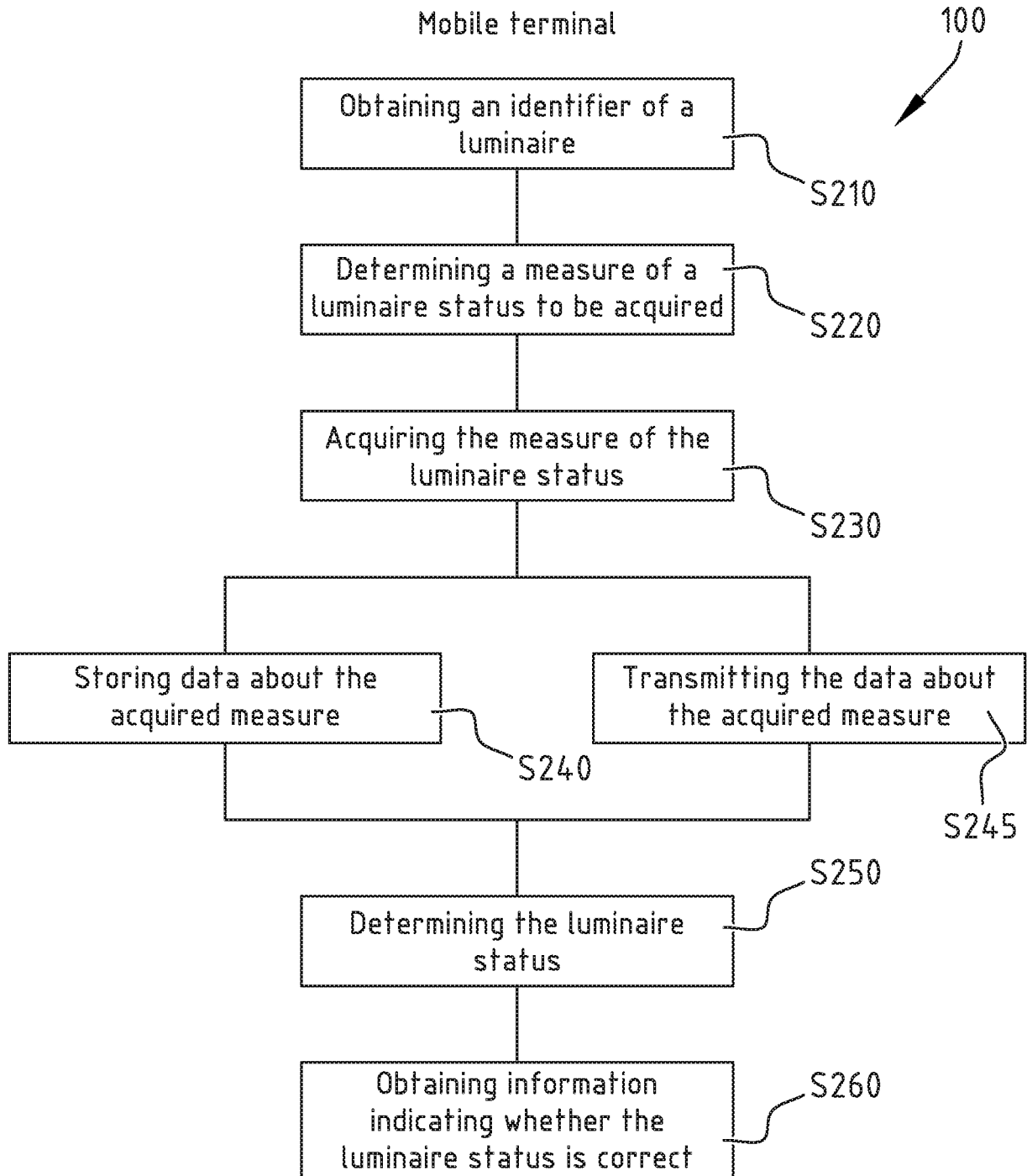


FIG. 2A

FIG. 2B

FIG. 3

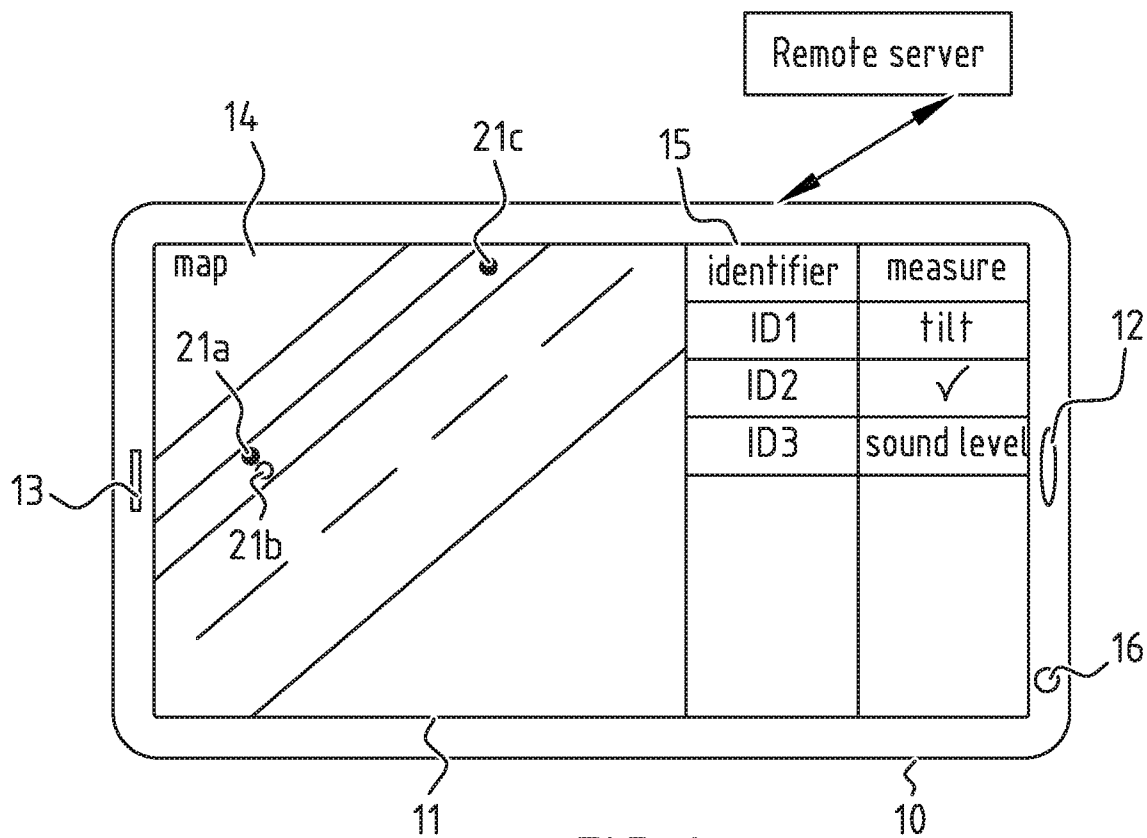
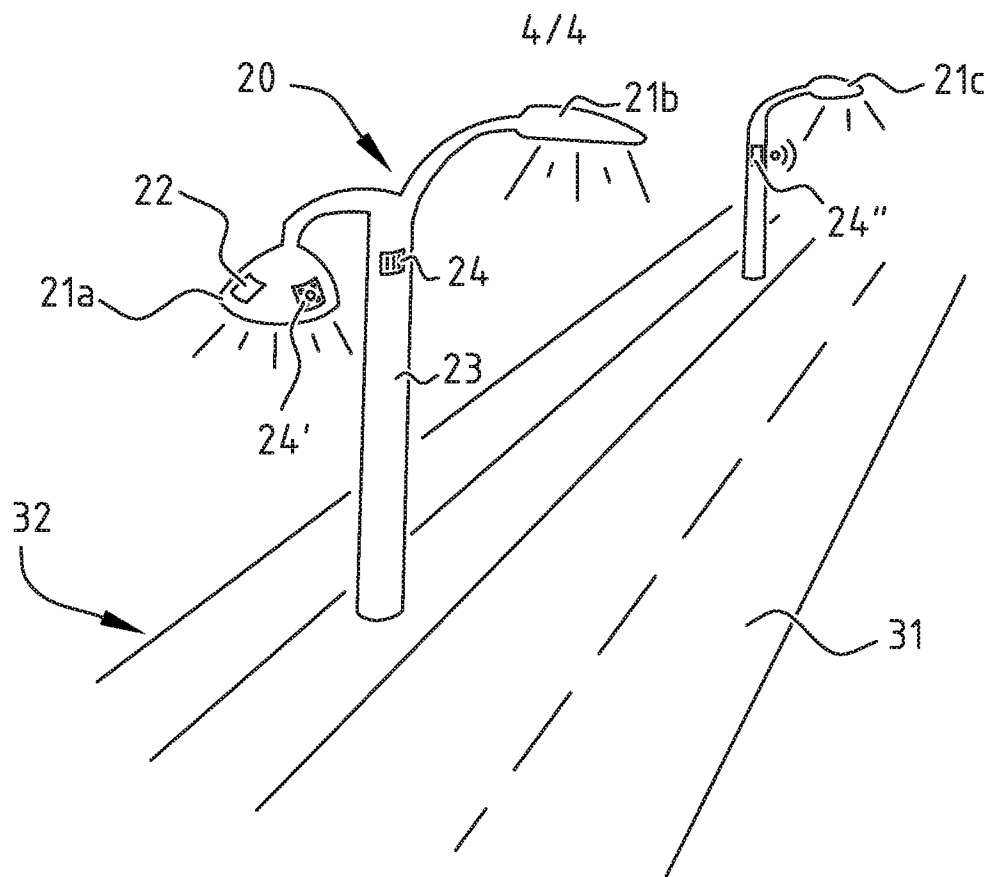


FIG. 4

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE 2H-P169751NL00
Nederlands aanvraag nr. 2025216	Indieningsdatum 26-03-2020
	Ingeroepen voorrangsdatum
Aanvrager (Naam) SCHREDER S.A.	
Datum van het verzoek voor een onderzoek van internationaal type 08-08-2020	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN76715
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC) Zie onderzoeksrapport	
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
IPC	Zie onderzoeksrapport
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III. <input type="checkbox"/>	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV. <input type="checkbox"/>	GEBREK AAN EENHEID VAN UITVINDING (opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2025216

<p>A. CLASSIFICATIE VAN HET ONDERWERP INV. H05B47/21 ADD.</p>		
<p>Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.</p>		
<p>B. ONDERZOCHETE GEBIEDEN VAN DE TECHNIEK</p>		
<p>Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen) H05B F21S F21V H04Q</p>		
<p>Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen</p>		
<p>Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden) EPO-Internal, WPI Data, INSPEC, COMPENDEX, IBM-TDB</p>		
<p>C. VAN BELANG GEACHTE DOCUMENTEN</p>		
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	WO 2012/143814 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; WANG JIANFENG [US] ET AL.) 26 oktober 2012 (2012-10-26)	1-6,10, 12-14, 16-18
Y	* bladzijde 1, alinea 1; figuren 1-9 * * bladzijde 2, alinea 7 - bladzijde 4, alinea 12 * * bladzijde 7, alinea 28 - bladzijde 38, alinea 108 *	7-9,11, 15
Y	WO 2019/134899 A1 (SCHREDER SA [BE]) 11 juli 2019 (2019-07-11) * bladzijde 1, regels 6-7; figuren 1-8 * * bladzijde 1, regel 31 - bladzijde 9, regel 2 * * bladzijde 9, regel 30 - bladzijde 17, regel 16 *	7,8,11, 15
	----- -/--	
<p><input checked="" type="checkbox"/> Verdere documenten worden vermeld in het vervolg van vak C. <input checked="" type="checkbox"/> Leden van dezelfde octrooifamilie zijn vermeld in een bijlage</p>		
<p>° Speciale categorieën van aangehaalde documenten</p>		
<p>"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft</p>		<p>"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding</p>
<p>"D" in de octrooiaanvraag vermeld</p>		<p>"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur</p>
<p>"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven</p>		<p>"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht</p>
<p>"L" om andere redenen vermelde literatuur</p>		<p>"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie</p>
<p>"O" niet-schriftelijke stand van de techniek</p>		
<p>"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur</p>		
<p>Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid 17 november 2020</p>		<p>Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type</p>
<p>Naam en adres van de instantie European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016</p>		<p>De bevoegde ambtenaar Brosa, Anna-Maria</p>

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek
NL 2025216

C.(Vervolg). VAN BELANG GEACHTE DOCUMENTEN		
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
Y	WO 2019/175439 A1 (SCHREDER SA [BE]) 19 september 2019 (2019-09-19) * bladzijde 1, regels 5-6; figuren 1-5 * * bladzijde 1, regel 20 - bladzijde 8, regel 33 * * bladzijde 9, regel 20 - bladzijde 13, regel 18 * -----	9

**ONDERZOEKSRAPPORT BETREFFENDE HET
 RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
 VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
 de stand van de techniek

NL 2025216

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
WO 2012143814	A1	26-10-2012	CN 103548417 A 29-01-2014
			EP 2700283 A1 26-02-2014
			JP 6110844 B2 05-04-2017
			JP 2014517981 A 24-07-2014
			US 2014028216 A1 30-01-2014
			WO 2012143814 A1 26-10-2012

WO 2019134899	A1	11-07-2019	BE 1025876 A1 30-07-2019
			EP 3735554 A1 11-11-2020
			US 2020344863 A1 29-10-2020
			WO 2019134899 A1 11-07-2019

WO 2019175439	A1	19-09-2019	AU 2019233735 A1 01-10-2020
			BE 1026103 A1 09-10-2019
			WO 2019175439 A1 19-09-2019

WRITTEN OPINION

File No. SN76715	Filing date (<i>day/month/year</i>) 26.03.2020	Priority date (<i>day/month/year</i>)	Application No. NL2025216
International Patent Classification (IPC) INV. H05B47/21			
Applicant SCHREDER S.A.			

This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the application
- Box No. VIII Certain observations on the application

	Examiner Brosa, Anna-Maria
--	-------------------------------

WRITTEN OPINION**Box No. I Basis of this opinion**

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - on paper
 - in electronic form
 - c. time of filing/furnishing:
 - contained in the application as filed.
 - filed together with the application in electronic form.
 - furnished subsequently for the purposes of search.
3. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	7-9, 11, 15
	No: Claims	1-6, 10, 12-14, 16-18
Inventive step	Yes: Claims	
	No: Claims	1-18
Industrial applicability	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number
NL2025216

Box No. VII Certain defects in the application

see separate sheet

Box No. VIII Certain observations on the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Reference is made to the following documents:
 - D1** WO 2012/143814 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; WANG JIANFENG [US] ET AL.) 26 oktober 2012 (2012-10-26)
 - D2** WO 2019/134899 A1 (SCHREDER SA [BE]) 11 juli 2019 (2019-07-11)
 - D3** WO 2019/175439 A1 (SCHREDER SA [BE]) 19 september 2019 (2019-09-19)
- 2 Insofar as the subject-matter of claim **1** can be understood (see objections under section **VIII** below), the present application does not meet the criteria of patentability, because the subject-matter of claims **1** and **10** is not new.
 - 2.1 Document **D1** discloses (the references between parentheses applying to this document) een werkwijze voor het checken van een status van een verlichtingsarmatuur (Fig. 1, measurement devices 86 in the vicinity of lighting units 82 within OLN 80) gebruik makend van een mobiele terminal (pars. [0029], [0051]; Fig. 1, measurement devices 86; Fig. 2, user control apparatus 200) in een nabijheid van de verlichtingsarmatuur (Fig. 1, lighting units 82 within OLN 80; Fig. 3, OLN 204), waarbij de mobiele terminal een detectiemiddel (par. [0057]; Fig. 3, sensor 270), een geheugen (par. [0054]; Fig. 3, memory 220), en een communicatiemiddel (pars. [0054], [0055]; Fig. 3, communication module 230) bevat, de methode omvattende (see the whole document, especially, page 1, par. [0001]; from page 2, par. [0007] to page 4, par. [0012]; from page 7, par. [0028] to page 38, par. [0108]; Figs. - in particular, pars. [0007], [0029], [0045], [0051], [0054], [0057], [0072], [0073], [0074], [0075], [0080]-[0087], [0089], [0094], [0095]; Figs. 1-3, 7):
 - het door middel van de mobiele terminal verkrijgen van een kenteken van de verlichtingsarmatuur (pars. [0080], [0089]; Fig. 2, block 104);
 - het op basis van het verkregen kenteken van de verlichtingsarmatuur bepalen van een te verwerven waarde van de status van de verlichtingsarmatuur (pars. [0072], [0075], [0083], [0084]; Fig. 7, step 1002);

- het door middel van het detectiemiddel van de mobiele terminal verwerven van een waarde van de verlichtingsarmatuurstatus (pars. [0072], [0075]-[0082], [0085], [0087]; Fig. 7, step 1008);
- het in het geheugen van de mobiele terminal opslaan van data over de verworven waarde van de verlichtingsarmatuurstatus, waarbij de data met het kenteken van de verlichtingsarmatuur wordt geassocieerd (par. [0094]; Fig. 7, step 1010).

Consequently, claim **1** is not allowable for lack of novelty of its subject-matter .

2.2 Document **D1** discloses (the references between parentheses applying to this document) een systeem omvattende een mobiele terminal (pars. [0029], [0051]; Fig. 1, measurement devices 86; Fig. 2, user control apparatus 200) en een verlichtingsarmatuur (Fig. 1, lighting units 82 within OLN 80; Fig. 3, OLN 204), voor het checken van een status van de verlichtingsarmatuur gebruik makend van de mobiele terminal in een nabijheid van de verlichtingsarmatuur (Fig. 1, measurement devices 86 in the vicinity of lighting units 82 within OLN 80), waarbij de mobiele terminal omvat (see the whole document, especially, page 1, par. [0001]; from page 2, par. [0007] to page 4, par. [0012]; from page 7, par. [0028] to page 38, par. [0108]; Figs. - in particular, pars. [0007], [0029], [0045], [0051], [0054], [0057], [0072], [0073], [0074], [0075], [0080]-[0087], [0089], [0094], [0095]; Figs. 1-3, 7):

- een detectiemiddel (par. [0057]; Fig. 3, sensor 270);
- een geheugen (par. [0054]; Fig. 3, memory 220);
- een communicatiemiddel (pars. [0054], [0055]; Fig. 3, communication module 230); en
- een controlemiddel, waarbij het controlemiddel is ingericht om de stappen van de methode volgens één der conclusies 1-9 te controleren (see passages cited in section **V.2.1** above).

Consequently, claim **10** is not allowable for lack of novelty of its subject-matter .

3 Dependent claims **2-9** and **11-18** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements in respect of novelty and/or inventive step, the reasons being as following:

- the additional features defined in claims **2-5**, **12-14**, **16** are disclosed in **D1** (see passages cited in section **V.2.1** above);
- the additional features defined in claim **6** are disclosed in **D1** (par. [0045]);

- the additional features defined in claims **7**, **8** and **11** are disclosed in the combination of document **D1** (see passages cited in section **V.2.1** above) with document **D2** (from page 4, line 29 to page 5, line 7);
- the additional features defined in claim **9** are disclosed in the combination of document **D1** (see passages cited in section **V.2.1** above) with document **D3** (page 2, lines 15-25);
- the additional features defined in claim **15** are disclosed in the combination of document **D1** (see passages cited in section **V.2.1** above) with document **D2** (from page 11, line 33 to page 12, line 16);
- the additional features defined in claim **17** are disclosed in **D1** (par. [0095]);
- the additional features defined in claim **18** are disclosed in **D1** (pars. [0031], [0061], [0067]).

Re Item VII

Certain defects in the international application (form or content).

- 1 The independent claims are not properly cast in the **two part form**, with those features which in combination are disclosed by **D1** being placed in the preamble.
- 2 The documents **D1-D3** and their relevant background disclosed therein are not identified in the description.

Re Item VIII

Certain observations on the international application (clarity).

- 1 Claims **1**, **3-5**, **8**, **9**, **11-13** and **15-18** are not clear.
 - 1.1 The wording of claim **1** does not allow the reader to infer which the difference between the step of "determining [...] a measure of the status of the luminaire to be acquired" and the step of "acquiring [...] the measure of the luminaire status" is, thereby rendering the definition of the subject-matter of claim **1** unclear.

The attention of the applicant is drawn to the fact that "determining a measure" suggests performing said measure, which results in the step of "acquiring the measure" being redundant. In contrast, page 13, lines 18-19 of the description suggests that the step of "*determining [...] a measure of the status of the luminaire to be acquired*" actually refers to determining the type of measurable characteristic to be measured; e.g. "*a measurable characteristic characterizing the luminaire, an environment of the luminaire, or a sub part of the luminaire*".

1.2 Claim **2** specifies that the step of *"determining [...] a measure of the status of the luminaire to be acquired"* is carried out by the remote terminal providing said information.

Claim **3** specifies that the step of *"determining [...] a measure of the status of the luminaire to be acquired"* is carried out by the mobile terminal itself obtaining said information.

As disclosed on page 5, lines 4-5 of the description, in this way (according to claim **3**), *"the mobile terminal can operate in a stand alone manner in order to determine the measure of the luminaire status to be acquired"*.

Claim **3** depends on claim **2**. However, claim **3** defines an alternative to claim **2**, which results in claim **3** being a pseudo-dependent claim, thereby rendering the definition of the subject-matter of claim **3** and its dependency unclear.

1.3 The wording of claim **4**, when depending on claim **2**, does not allow the reader to infer whether the reference to *"a remote terminal"* corresponds to the *"remote terminal"* already defined in claim **2** or not, thereby rendering the definition of the subject-matter of claim **4** unclear.

1.4 The wording *"bij voorkeur"* and *"optioneel"*, used in claims **4**, **8**, **9**, **11** and **18** results in the features following that wording having no limiting effect on the scope of protection, thereby rendering the definition of the subject-matter of claims **4**, **8**, **9**, **11** and **18** unclear.

1.5 It is not clear which the difference between the subject-matter of claim **5** and the step of *"acquiring [...] the measure of the luminaire status"* defined in claim **1** is, thereby rendering the definition of the subject-matter of claim **5** unclear.

1.6 It is not clear whether claims **12** and **13** are directed to a "system" or to a "use", which renders the category and the definition of the subject-matter of claims **12** and **13** unclear.

1.7 The wording of claim **12** does not allow the reader to infer which information is actually provided by the output means so that use of said information can be used by the steps of the method of claims **1-9**, thereby rendering the definition of the subject-matter of claim **12** unclear.

1.8 The wording of claim **13** does not allow the reader to infer which kind of command is actually provided by the input means so that use of said command can be used by the steps of the method of claims **1-9**, thereby rendering the definition of the subject-matter of claim **13** unclear.

- 1.9 It is not clear whether claims **15** and **16** are directed to a "system" or to a "method", which renders the category and the definition of the subject-matter of claims **15** and **16** unclear.
- 1.10 The "*accelerometer*" defined in claim **17** is already defined in claim **11**. Hence, said feature is redundant when claim **17** depends on claim **11**, thereby rendering the definition of the subject-matter of claim **17** unclear.
- 1.11 Claim **18** is directed to a method of installing a lighting fixture. However, the method defined in claims **1-9** is directed to checking the status of the lighting fixture, not to an installation thereof, thereby rendering the definition of the subject-matter of claim **18** unclear.