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(54) Bus coupled alarm device

Busgekoppelte Alarmvorrichtung

Dispositif d'alarme à bus couplé

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Description

[0001] The present invention relates to a bus coupled alarm device and especially to a visual alarm device (VAD) coupled to a bus, e.g. a two wired bus, for informing people within a building about hazardous situations or events.

[0002] The European Standard EN54-23, which is intended to be binding in near future, specifies the requirements, test methods and performance criteria for visual alarm devices in a fixed installation intended to signal a visual warning of a fire between the fire detection and fire alarm system and the occupants of a building. It covers those devices which derive their operating power by means of a physical electrical connection to an external source such as a fire alarm system. The visual alarm devices can be pulsing or flashing visual alarm devices.

[0003] According to this standard VADs can be classified into three categories, namely ceiling mounted devices, wall mounted devices and an open class category. Each of these categories has specific targets for light distribution patterns. The devices will have to guarantee a coverage volume where a required illumination of 0.4 lux or 0.4 lm/m^2 is met.

[0004] The flash rate of a VAD should be between 0.5 Hz and 2 Hz and should emit either a red or white flash.

[0005] Different light dispersion characteristics are required according to the VADs intended mounting position. Wall mounted VAD will be effective in a wide range of applications, but the manufacturer will be required to state a mounting height, which is a minimum 2.4 m, followed by the width of a square room over which the VAD will provide coverage. Therefore, the specification code with a VAD suitable for a wall application could read W-2.4-6, i.e. mounted at a height of 2.4 m the VAD will cover a room 36 m^2.

[0006] The VAD will therefore be required to cover the volume below its mounting height.

[0007] Ceiling mounted VADs are suitable for broad coverage in regular shaped rooms. Ceiling VADs must state the height of the ceiling at which it is designed to operate. This can be 3 m, 6 m or 9 m. The VAD in this case needs to radiate light in a cylinder below the mounting point. Therefore the specification code could read C-6-6 i.e. mounted at a ceiling height of 6 m, the VAD will cover a cylinder 6 m in diameter.

[0008] To meet the requirements of BS EN54-23 and cover a practical room size encountered in most situations, VADs need to have higher light output levels than those generally used in the market today, leading to a significant increase in current consumption due to the use of higher output devices or to a greater number of less powerful units.

[0009] On the other hand the present bus systems used to connect the VADs with a control panel and to supply power to the VADs have a limited cross section of the wires and allow only a limited amount of electrical current. Especially in large bus systems having a length up to 1000 m, the number of VADs, which can be connected to the bus, is therefore limited.

[0010] Beside the visual alarm often an acoustic alarm is issued at the same time. The acoustic alarm devices (AAD) will have to be powered through the same bus, as well, and the output level of the sound should not be affected by the flashing of the VADs. Often combined alarm devices, emitting flash light and sound, are used.

[0011] As one measure to cope with this conflicting demands it might be considered to provide a plurality of different VADs, within each of the above three categories but adapted to the size of the coverage area. This increases the manufacturing costs of the system and is susceptible to errors when assembling the system in the building. It would be difficult to guarantee that the right VAD is mounted at a particular place. This involves the risk that either the coverage area of the VAD is too small, or even worse the power demand of the whole system in case on an alarm or in case of initializing the system would be too large, leading to break down of the bus system.

[0012] Specially, if a device intended for a relatively high mounting position, e.g. 9 m, for illuminating a cylinder of e.g. 6 m diameter should be used in a place where the mounting height is only 3 m meters but still for a cylinder of 6 m diameter, a lot of light is wasted by the LEDs emitting in the vertical direction. If the total power supplied to the VAD is reduced, so as to fit to the reduced mounting height, the required illumination of the cylinder could not be maintained for a diameter of 6 m. For example, for a wall mounted VAD a coverage volume of e.g. W-2.4-6 which is scaled up a square area of 15 m * 15 m conforms to a coverage volume of W-6-15, and not to W-24.15. In a similar way, a down scale to an area of 3 m * 3 m would not result in a W-2.4-3 configuration, but would conform to W-1.2-3. Therefore, a special VAD has to be provided with either a dedicated optic or other means for the two different mounting situations.

[0013] The document US 2011/012746 A1 discloses a visual alarm device comprising: a plurality of light emitting devices for emitting light into a plurality of directions; a controller for controlling the operation of the plurality of light emitting devices; wherein the controller is configured to control at least one of a plurality of operation parameters of at least two of the plurality of light emitting devices so as to have different values and so that the respective light emitting devices emit different amounts of light.

[0014] It is an object of the invention to overcome these problems and to provide an improved bus device for a bus coupled alarm system.

[0015] According to the invention a visual alarm device comprises a plurality of light emitting devices, e.g. LEDs, for emitting light into a plurality of directions, a controller for controlling the operation of the plurality of LEDs, wherein the controller is configured to store setting parameters depending on the actual mounting position on a ceiling or on a wall of the visual alarm device to control at least one of a plurality of operation parameters of at least two of the plurality of LEDs so as to have different values and so that the respective LEDs emit different amounts of light 2. in order to avoid an excessive illumination of an area immediately below the visual alarm device while at the same time maintain a minimum luminous flux level within one of a plurality of predetermined surrounding alarm regions of a given dimension.

[0016] The advantage is that the illuminance requirements of the standard can be achieved, without wasting power.

[0017] According to a preferred embodiment the at least one of the plurality of operation parameters is one of a duty cycle and a maximum electric power of the LED.

[0018] The visual alarm device may further comprise an optical guiding element associated with at least one of the plurality of LEDs for guiding the emitted light into a predetermined area.

[0019] The visual alarm device may further comprise a storage unit for storing data representative of the operation parameters. According to a preferred embodiments the storage unit is configured to be overwritten by a bus command received through a bus supplying power and data to the visual alarm device.

[0020] According to another embodiment the storage unit is a write protected memory (EEPROM) storing predefined data. Furthermore, in another embodiment the visual alarm device is configured to be mounted at a ceiling for emitting a flashing optical signal, said flashing optical signal having a luminous flux level higher than a first threshold value within a cylindrical area adjacent to the visual alarm device.

[0021] The visual alarm device of the invention can be configured thus that the respective LEDs of the plurality of LEDs are controlled, so that less energy is supplied to those LEDs illuminating the area immediately below the visual alarm device, compared to those LEDs illuminating the surrounding. According to a preferred embodiment the visual alarm device is configured to be mounted at a wall for emitting a flashing optical signal, said flashing optical signal having a luminous flux level higher than a first threshold value with in a square area adjacent to the visual alarm device.

[0022] For this wall mounted visual alarm device the LEDs are controlled, so that less energy is supplied to those LEDs illuminating the area immediately below the visual alarm device, compared to those LEDs illuminating the surrounding. Details of some embodiments of the invention will be described in connection with the accompanying drawings, wherein:

- Fig. 1 shows an exploded view of a wall mounted VAD;
- Fig. 2 shows in more detail the optical elements of the VAD of Fig. 1;
- Fig. 3 shows the ideal coverage area of a ceiling mounted VAD;
- Fig. 4 shows a block diagram of a visual alarm device according to the invention; and
- Fig. 5 shows a block diagram similar to Fig. 4 for another VAD.

[0023] Preferred embodiments of the invention will be described based on the above figures.

[0024] Fig. 1 shows an exploded view of a combined audio and visual alarm device configured to be mounted at a wall.

[0025] This VAD comprises mounting box 1, an outer horn 3 and a horn cup 5, forming together a housing.

[0026] As can be seen in Fig. 3 within the housing there is provided a main printed circuit board (pcb) 7 and a strobe printed circuit board 9.

[0027] A piezoelectric sound element 11 and a LED based optic 13 is connected with the main pcb 7 and the strobe pcb 9, respectively.

[0028] Although not shown in Fig. 1 the alarm device is configured so as to be connected to a two wired bus for supplying power and commands to the alarm device. Different bus configurations, e.g. those having dedicated lines for power supply and for commands, can be used instead.

[0029] Fig. 2 shows in more detail the optical components of the VAD of Fig. 1.

[0030] The VAD of this example comprises five LEDs 13 in total. Two of them are fixed on raised tabs. A lens 15 is located near the three central LEDs. Furthermore, a reflector 17 cooperates with the LEDs 13 so as to guide the light emitted from the LEDs 13 in the desired directions.

[0031] Although in this example the VAD is equipped with five LEDs 13 and the corresponding optics, this is not essential for the present invention, and any number of LEDs or other light emitting elements might be used. Instead of a reflector 17 and a lens 15 it will be possible to provide other light guide members, like fiber optics.

[0032] As mentioned before, the VAD of Fig. 1 and Fig. 2 is intended as a wall mounted VAD. It is obvious for a skilled person that a VAD to be mounted at a ceiling will have a different configuration of the optic and/or a different number of LEDs.

[0033] The LEDs 13 in the VAD will be operated in case of an alarm or for testing purposes so as to emit light in form of pulses or flashes.

[0034] The luminous intensity of pulsed light is different compared to the intensity of non-pulsed light due to the behavior of the human eye. The so called effective intensity Ieff of pulsed light, expressed in candela can be determined with the following equation, the Blondel-Rey equation

$$I_{eff} = \frac{\int_{t1}^{t2} I\,(t)dt}{\alpha + (t_2 - t_1)}$$

where "I(t)" is the instantaneous intensity in candela as a function of time, "a" is the Blondel-Rey constant and "t2-tl" is the pulse duration (seconds).

[0035] Normally, the maximum value of effective intensity is obtained when t2 and t1 are chosen so that the effective intensity is equal to the instantaneous intensity at t2 and t1.

[0036] From the Blondel-Rey equation it is clear that the effective intensity depends on the pulse duration. The average power also depends on the flash rate, which is not considered in the Blondel-Rey equation.

[0037] For rectangular or square pulses the above equation reduces to

$$I_{eff} = I_0 \frac{\Delta t}{\alpha + \Delta t}$$

with the steady state intensity I_0 and the pulse duration Δt.

[0038] An increase in pulse duration leads to an increase in effective intensity. The behavior is non-linear.

[0039] The Blondel-Rey factor is the reciprocal of the ratio between effective intensity to steady state intensity. It describes how much more luminous intensity in a pulse is needed to reach the steady state intensity of non-pulsed light.

[0040] As example, for a pulse duration of 50ms the effective intensity is only about 20% of the steady state intensity. The luminous intensity of the pulse needs to be five times higher to reach the steady state intensity. As consequence, five times more pulse power is needed.

[0041] The average power will always increase with increasing pulse duration because to double the pulse duration means not to double the effective intensity or to halve the pulse power.

[0042] Fig. 3 shows the ideal coverage area for a ceiling mounted VAD. The lens 15 and any reflector 17 shall be optimized for the ceiling-mounted device. In the example of Fig. 3 the coverage area is indicated for a VAD fulfilling the standard for a C-3-7., this means for a signaling range in form of a cylinder with a height of 3 m and a diameter of 7.2 m. The minimum light emission of the cylinder base and the shell surface should be 0.4 lx, as mentioned in the introductory part.

[0043] In case of mounting the VAD in a larger room, e.g. with a height of 6 m the light emission has to be adapted accordingly, so as to achieve the required minimum light emission of the cylinder base of 0.4 lx. The VAD would therefore require a larger electrical current for the operation.

[0044] Fig. 4 shows an example of a circuit configuration for a VAD according to the invention.

[0045] As shown in this figure a plurality of LEDs 13 with red or white color can be used. The LEDs 13 are divided into at least two groups, and each group is driven by a LED driver 19, e.g. a current controlled switch mode power supply.

[0046] The LED drivers 19 are configured so that the LEDs are driven preferably by pulse width modulation with a pulse duration between 50ms to 200ms (0 to 200ms are allowed according to EN54-23). The energy for the pulse is taken from a common energy storage 21 (e.g. capacitor or accumulator). The energy storage 21 is recharged by the bus 23 via a charging unit 25 controlled by a controller 27 (MCU).

[0047] Of course it is possible to use various capacitors for the two groups of LEDs

[0048] The flash rate, i.e. the time between two consecutive pulses, can be 0.5s to 2s (according to EN54-23, but may vary in different countries according to local regulations, which need to be considered). The VDA can be equipped with a current limiter 29, as shown in the drawings.

[0049] Depending on the available space and on the available charging current and charging method/final cap voltage, electrolytic capacitors, electrical double layer capacitors (e.g. gold cap, super cap) or accumulators can be used for the energy storage 21.

[0050] There are mainly two possibilities how the energy storage or storages 21 can be used. As supply of energy only for the above mentioned pulse duration, or as supply of energy for the whole time of alerting of several minutes.

[0051] According to the invention, in order to adapt the output of the LEDs a PWM control can be used. Alternatively the peak current through or the peak voltage to the respective strings of LEDs 13 can be adjusted. Additionally the pulse form, e.g. square pulse or saw tooth pulse. Of course, it will be possible to make any combination of these settings, for example by adjusting the pulse duration and the peak current simultaneously, or by adjusting the pulse form and the peak voltage.

[0052] As a preferred embodiment a PWM control is implemented, which allows good flexibility and a simple setting, although it adds complexity to the circuit.

[0053] As another approach it is possible to use a hardware adjustable peak current limit controlled by controller 27.

[0054] The setting parameters for controlling the LED drivers are preferably stored in a storage unit. Of course, in a preferred embodiment the LED drivers 19 are controlled by the controller 27, which in turn obtains the control parameters from the storage unit, like e.g. an EEPROM (not shown).

[0055] With this configuration it is possible to allocate different power levels to the respective LEDs.

[0056] For all cases, once the desired light output is set, the LED drivers 19 have to ensure constant power outputs. Mainly variations in input voltage and LED current dependency have to be compensated.

[0057] Temperature compensation can be achieved with the help of a NTC, if desired.

[0058] A load factor i.e. the share of the load on the bus attributed to the VAD, can be calculated taking calibration and configuration values into consideration. Different aging effects of the individual LEDs or LED groups can be accommodated.

[0059] The pulse period, i.e. the time between two lighting events of the LEDs, can be based on a 0.5 s watch timer period with the help of a coded counter handling.

[0060] Since it is desired that all VADs connected to the bus should operate in a synchronized manner a corresponding command will be issued over the bus 23. Subsequently, the first pulse can be done e.g. 0.5 s delayed with respect to the synchronization. All further pulses will follow with a period of a multiple of 0.5 s (1 s, 1.5 s, 2 s).

[0061] To ensure constant illumination without wasting bus energy there is a calibration value saved in a storage unit or memory element (EEPROM, not shown) reflecting the efficiency of the hardware (e.g. this might be used to cope with LEDs with increased efficiency, which can be used with the same circuit configuration in future). This value is set / calculated and saved in the memory or storage unit during manufacturing and can be rewritten at need, either through a dedicated bus command or by a special calibration apparatus to be connected with the VAD.

[0062] When manufacturing the VAD, the device will be configured by corresponding values given in the device class, as discussed at the beginning of the description. These values will be stored in the storage unit in a customer data block and will be re-written by a dedicated bus command or during installation by a special setting apparatus, which can be connected with the VAD or the bus.

[0063] For example, in case a VAD of class C-9-6, i.e. a ceiling mounted VAD for a ceiling height of 9 m and a cylinder diameter of 6 m, which should be used in a room having a ceiling height of 3 m, according to the invention it is possible to reduce the output of those LEDs illuminating the area exactly below the VAD, while keeping the output of the other LEDs, illuminating the surrounding, at a higher level. So it will be possible to avoid wasting power for an excessive illumination of the floor below the VAD while at the same time the appropriate illumination of the cylinder can be maintain.

[0064] Furthermore, it is possible to set the output of the VAD to actually fit to the mounting situation, e.g. so as to match an intermediate ceiling height (4 m or 5m) or an un-regular shaped room.

[0065] The advantage is that the luminance requirements of the standard can be achieved, without wasting power.

[0066] In order to allow an optimization of the entire alarm system comprising the bus 23 and a plurality of VAD a dedicated bus command is implemented for investigating the parameters set for each group of LEDs in each VAD of the bus system. Together with the command to re-write the setting parameters of each VAD this configuration allows to distribute the entire available power of the bus system in an efficient and reliable manner.

[0067] As shown in Fig. 4 the VAD is connected between the two wires of a bus 23. At one side a bus line can be connected with the input of a main current limiter 29. The main current limiter 29 is connected with a charging unit 31 which in turn is connected with an energy storage 21 respectively a capacitor. The other side of the capacitor 21 is connected with the other bus line.

[0068] The VAD comprises the LED drivers 19 and two groups of LEDs 13. The LEDs of each group are connected in series between the one side of the capacitor 21 and the second bus line. The at least two groups of LEDs are connected in parallel.

[0069] The VAD of Fig. 4 furthermore comprises the main controller unit 27 for controlling the current limiter 29, the charging unit 25 and the LED drivers 19. Additionally, if the VAD is intended to be used as an acoustic alarm device as well, a piezoelectric sound element 11 and a corresponding second capacitor 33 can be provided.

[0070] During an alarm the LEDs 13 will be powered by the energy stored in the energy storages 21 respectively the capacitors. In idle times the energy storage 21 is charged through the charging unit 25, receiving the current from the main current limiter 29, which in turn receives the respective current through the bus 23.

[0071] Controller 27 controls the charging unit and the LED drivers 19 depending on the actual values indicating the configuration of this particular VAD, stored in the storage unit or memory therein. That is, if the VAD is intended to cover a large area, the energy stored in the capacitor 21 might be used completely during one pulse of the LEDs 13. In this case, the charging unit 25 and the main current limiter 29 will be controlled by the controller 27 so as to draw a large amount of current from the bus 23 in order to charge the capacitor 21 in the time between two pulses of the alarm.

[0072] On the other hand, if the VAD needs to cover only a small area, the capacitors 21 will not be depleted completely during a flash, and therefore, a smaller current will be enough to recharge the capacitors 21.

[0073] The same considerations hold true if the capacitors 21 are intended to cover not only one flash but the entire alarm time of several minutes.

[0074] The configuration shown in the figure has different capacitors for powering the sound alarm and the light alarm. This helps to avoid the problem that the intensive light alarm will influence the sound emission, since during the light alarm a lot of power might be needed to power the LEDs 13.

[0075] Another aspect of the invention is that at the beginning, when powering up the bus 23 the first time, all capacitors 21 of all VAD devices connected with the bus 23 will be empty. This means that simultaneously all capacitors 21 will try to charge. Due to the current limiter 29 provided with the VADs it can be ensured that even in this case the maximum allowed current of the bus 23 is not exceeded.

[0076] As is shown in Fig. 4 a DC/DC-converter 35 is provided in the VAD so as to allow the controller 27 to be operated at a low voltage 3.3 V for example.

[0077] Fig. 5 shows a slightly different configuration of the VAD of the invention.

[0078] The main differences are that the respective components of the VAD electronic is split up into the main circuit board 7 and the spotlight or strobe circuit board 9, which can be physically separated. Additionally, in Fig. 5 a fault defect indication system can be implemented by the last LED 13 of the LED chain and the controller 27..

[0079] In this regard, the controller 27 is provided with a sensing input monitoring the voltage on the line connecting the current limiter 29 and the charging unit 25. This sensing input of the controller 27 is connected with the line connecting the charging unit 25 and the LED drivers 19. Depending on the respective values detected by the sensing input, the LED will be powered or not.

[0080] Furthermore, in a further preferred configuration of a visual alarm device the controller 27 controls the visual alarm element so as to emit the visual alarm signal in response to an electric alarm signal supplied through a bus.

[0081] The visual alarm signal should have a minimum luminous flux level within one of a plurality of predetermined alarm regions of a given dimension. The storage unit stores at least one set of operation setting values for the controller 27 to control the visual alarm element. Each set of operation setting values can be predefined depending on the dimensions of the predetermined alarm region.

[0082] Each set of operation setting values may comprise at least one of a value for the duty ratio of the visual alarm element, an electrical power level of the visual alarm element, time value for a flash of the visual alarm element, a pulse form.

[0083] The visual alarm element can include a selecting unit, e.g. a manually operated switch, for selecting one set of operation setting values.

[0084] The storage unit can be configured as a write protected storage unit (EEPROM) storing only one set of operation setting values. This VAD can be configured so as to allow an easy exchange of the storage unit.

[0085] The controller 27 can be configured to transmit data via the bus, the data can be representative for the selected set of operation setting values, so as to allow the central control panel of the system to operate the system depending on all received sets of operation setting values.

[0086] Although the present invention has been described in connection with detailed embodiments, it is obvious for a person skilled in the art that the invention is not limited to these embodiments. Various modifications can be implemented by a person skilled in the art. For example, instead of using capacitors, it will be possible to provide the VADs with secondary cells. As an alternative, secondary cells might be provided in addition to capacitors. Instead of LEDs other kind of light emitting devices might be used, like e.g. laser diodes in combination with a fluorescent medium.

Claims

1. A visual alarm device comprising:

   a plurality of light emitting devices (13) for emitting light into a plurality of directions;
   a controller (27) for controlling the operation of the plurality of light emitting devices (13);
   wherein the controller (27) is configured to store setting parameters depending on the actual mounting position on a ceiling or on a wall of the visual alarm device to control at least one of a plurality of operation parameters of at least two of the plurality of light emitting devices (13) so as to have different values and so that the respective light emitting devices (13) emit different amounts of light in order to avoid an excessive illumination of an area immediately below the visual alarm device while at the same time maintain a minimum luminous flux level within one of a plurality of predetermined surrounding alarm regions of a given dimension.

2. The visual alarm device of claim 1, wherein
   the at least one of the plurality of operation parameters is one of a duty cycle and a maximum electric power of the respective light emitting device (13).

3. The visual alarm device of any of claims 1 or 2, further comprising
   an optical guiding element (15, 17) associated with at least one of the plurality of light emitting devices (13) for guiding the emitted light into a predetermined area.

4. The visual alarm device of any of claims 1 to 3, further comprising
   a storage unit for storing data representative of the operation parameters.

5. The visual alarm device of claim 4, wherein
   the storage unit is configured to be overwritten by a bus command received through a bus (23) supplying power and data to the visual alarm device.

6. The visual alarm device of claim 4, wherein
   the storage unit is a write protected memory (EEPROM) storing predefined data.

7. The visual alarm device of any of clams 1 to 6, wherein
   the visual alarm device is configured to be mounted at a ceiling for emitting a flashing optical signal, said flashing optical signal having a luminous flux level higher than a first threshold value within a cylindrical area adjacent to the visual alarm device.

8. The visual alarm device of claim 7, wherein

the light emitting devices (13) of the plurality of light emitting devices (13) are controlled, so that less energy is supplied to those light emitting devices (13) illuminating the area immediately below the visual alarm device, compared to those light emitting devices (13) illuminating the surrounding.

9. The visual alarm device of any of clams 1 to 6, wherein
the visual alarm device is configured to be mounted at a wall for emitting a flashing optical signal, said flashing optical signal having a luminous flux level higher than a first threshold value with in a square area adjacent to the visual alarm device.

10. The visual alarm device of claim 9, wherein
the light emitting devices (13) of the plurality of light emitting devices (13) are controlled, so that less energy is supplied to those light emitting devices (13) illuminating the area immediately below the visual alarm device, compared to those light emitting devices (13) illuminating the surrounding.

Patentansprüche

1. Optische Alarmvorrichtung mit:

einer Mehrzahl von lichtemittierenden Vorrichtungen (13) zum Emittieren von Licht in einer Mehrzahl von Richtungen;
einer Steuerung (27) zum Steuern des Betriebs der Mehrzahl lichtemittierender Vorrichtungen (13);
wobei die Steuerung (27) ausgestaltet ist, um Einstellparameter zu speichern, die von der tatsächlichen Anbringungsposition an einer Decke oder an einer Wand der optischen Alarmvorrichtung abhängen, um zumindest einen der Mehrzahl von Betriebsparameter von zumindest zwei der Mehrzahl lichtemittierender Vorrichtungen (13) zu steuern, um so unterschiedliche Werte zu haben, und so dass die jeweiligen lichtemittierenden Vorrichtungen (13) unterschiedliche Lichtmengen aussenden, um eine übermäßige Beleuchtung eines Gebiets unmittelbar unterhalb der optischen Alarmvorrichtung zu vermeiden, während gleichzeitig ein minimaler Lichtflusspegel innerhalb eines einer Mehrzahl von vorgegebenen Umgebungsalarmbereichen gegebener Größe beibehalten wird.

2. Eine optische Alarmvorrichtung nach Anspruch 1, bei der zumindest einer der Mehrzahl von Betriebsparametern einer ist, der aus einem Lastzyklus und einer maximalen elektrischen Leistung der jeweiligen lichtemittierenden Vorrichtung (13) ausgewählt ist.

3. Optische Alarmvorrichtung nach einem der Ansprüche 1 oder 2, des Weiteren mit
einem optischen Lenkelement (15, 17), das mit zumindest einer der Mehrzahl der lichtemittierenden Vorrichtungen (13) assoziiert ist, um das emittierte Licht in ein gegebenes Gebiet zu lenken.

4. Optische Alarmvorrichtung nach einem der Ansprüche 1 bis 3, des Weiteren mit:
einer Speichereinheit zum Speichern von Daten, die die Betriebsparameter darstellen.

5. Optische Alarmvorrichtung nach Anspruch 4, bei der die Speichereinheit ausgestaltet ist, um durch einen Busbefehl überschrieben zu werden, der durch einen Bus (23) empfangen wird, welcher Leistung und Daten an die optische Alarmvorrichtung liefert.

6. Optische Alarmvorrichtung nach Anspruch 4, bei der die Speichereinheit ein schreibgeschützter Speicher (EEPROM) ist, der die vorgegebenen Daten speichert.

7. Optische Alarmvorrichtung nach einem der Ansprüche 1 bis 6, bei der die optische Alarmvorrichtung ausgestattet ist, um zum Emittieren von optischen Blitzlichtsignalen an einer Decke angebracht zu werden, wobei die optischen Blitzlichtsignale einen Beleuchtungsflusspegel höher als einen ersten Schwellwert innerhalb eines zylindrischen Gebiets benachbart der optischen Alarmvorrichtung hat.

8. Optische Alarmvorrichtung nach Anspruch 7, bei der die lichtemittierende Vorrichtungen (13) der Mehrzahl von lichtemittierenden Vorrichtungen (13) gesteuert werden, so dass weniger Energie an jene lichtemittierenden Vorrichtungen (13) geliefert wird, die das Gebiet unmittelbar unterhalb der optischen Alarmvorrichtung beleuchten, im Vergleich zu jenen lichtemittierenden Vorrichtungen (13), die die Umgebung beleuchten.

9. Optische Alarmvorrichtung nach Anspruch 1 bis 6, bei der die optische Alarmvorrichtung ausgestaltet ist, um an einer Wand angebracht zu werden, um ein optisches Blitzlichtsignal zu emittieren, wobei das optische Blitzlichtsignal innerhalb eines quadratischen Gebiets benachbart zur optischen Alarmvorrichtung einen Lichtflusspegel höher als einen ersten Schwellwert hat.

10. Optische Alarmvorrichtung nach Anspruch 9, bei der die lichtemittierende Vorrichtungen (13) der Mehrzahl der lichtemittierenden Vorrichtungen 13 gesteuert werden, so dass weniger Energie an jene lichtemittierenden Vorrichtungen (13) geliefert wird, die ein Gebiet unmittelbar unterhalb der optischen Alarmvorrichtung beleuchten, im Vergleich zu jenen lichtemittierenden Vorrichtungen (13), die die Umgebung beleuchten.

Revendications

1. Dispositif d'alarme visuelle comprenant :

   une pluralité de dispositifs électroluminescents (13) pour émettre de la lumière dans une pluralité de directions ;
   un dispositif de commande (27) pour commander le fonctionnement de la pluralité de dispositifs électroluminescents (13) ;
   dans lequel le dispositif de commande (27) est configuré pour stocker des paramètres de réglage en fonction de la position de montage réelle sur un plafond ou sur un mur du dispositif d'alarme visuelle pour commander au moins l'un d'une pluralité de paramètres opérationnels d'au moins deux de la pluralité de dispositifs électroluminescents (13) de sorte à avoir des valeurs différentes et de sorte que les dispositifs électroluminescents respectifs (13) émettent des quantités de lumière différentes afin d'éviter un éclairement excessif d'une zone immédiatement en dessous du dispositif d'alarme visuelle tout en maintenant dans le même temps un niveau de flux lumineux minimum à l'intérieur de l'une d'une pluralité de régions d'alarme alentour prédéterminées d'une dimension donnée.

2. Dispositif d'alarme visuelle selon la revendication 1, dans lequel
   l'au moins un de la pluralité de paramètres opérationnels est l'un d'un cycle de service et d'une puissance électrique maximale du dispositif électroluminescent respectif (13).

3. Dispositif d'alarme visuelle selon l'une quelconque des revendications 1 ou 2, comprenant en outre
   un élément de guidage optique (15, 17) associé avec au moins l'un de la pluralité de dispositifs électroluminescents (13) pour guider la lumière émise à l'intérieur d'une zone prédéterminée.

4. Dispositif d'alarme visuelle selon l'une quelconque des revendications 1 à 3, comprenant en outre
   une unité de stockage pour stocker des données représentatives des paramètres opérationnels.

5. Dispositif d'alarme visuelle selon la revendication 4, dans lequel
   l'unité de stockage est configurée pour être réécrite par une instruction de bus reçue par l'intermédiaire d'un bus (23) fournissant de la puissance et des données au dispositif d'alarme visuelle.

6. Dispositif d'alarme visuelle selon la revendication 4, dans lequel
   l'unité de stockage est une mémoire protégée en écriture (EEPROM) stockant des données prédéfinies.

7. Dispositif d'alarme visuelle selon l'une quelconque des revendications 1 à 6, dans lequel
   le dispositif d'alarme visuelle est configuré pour être monté sur un plafond pour émettre un signal optique clignotant, ledit signal optique clignotant ayant un niveau de flux lumineux supérieur à une première valeur de seuil à l'intérieur d'une zone cylindrique adjacente au dispositif d'alarme visuelle.

8. Dispositif d'alarme visuelle selon la revendication 7, dans lequel
   les dispositifs électroluminescents (13) de la pluralité de dispositifs électroluminescents (13) sont commandés de sorte qu'une quantité d'énergie inférieure soit fournie à ceux des dispositifs électroluminescents (13) qui éclairent la zone immédiatement en dessous du dispositif d'alarme visuelle, par rapport à ceux des dispositifs électroluminescents (13) qui éclairent les alentours.

9. Dispositif d'alarme visuelle selon l'une quelconque des revendications 1 à 6, dans lequel
   le dispositif d'alarme visuelle est configuré pour être monté sur un mur pour émettre un signal optique clignotant, ledit signal optique clignotant ayant un niveau de flux lumineux supérieur à une première valeur de seuil à l'intérieur d'une zone carrée adjacente au dispositif d'alarme visuelle.

10. Dispositif d'alarme visuelle selon la revendication 9, dans lequel
    les dispositifs électroluminescents (13) de la pluralité de dispositifs électroluminescents (13) sont commandés de sorte qu'une quantité d'énergie inférieure soit fournie à ceux des dispositifs électroluminescents (13) qui éclairent la zone immédiatement en dessous du dispositif d'alarme visuelle, par rapport à ceux des dispositifs électroluminescents (13) qui éclairent les alentours.

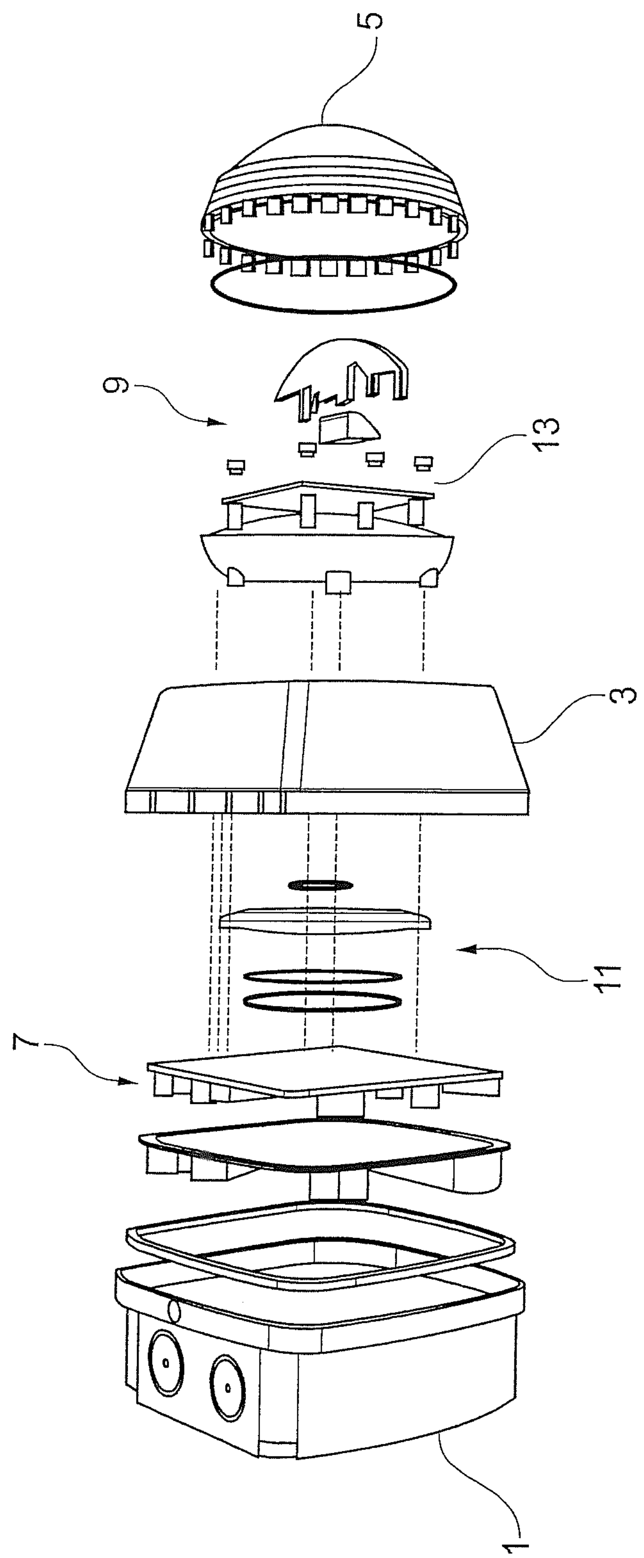

Fig. 1

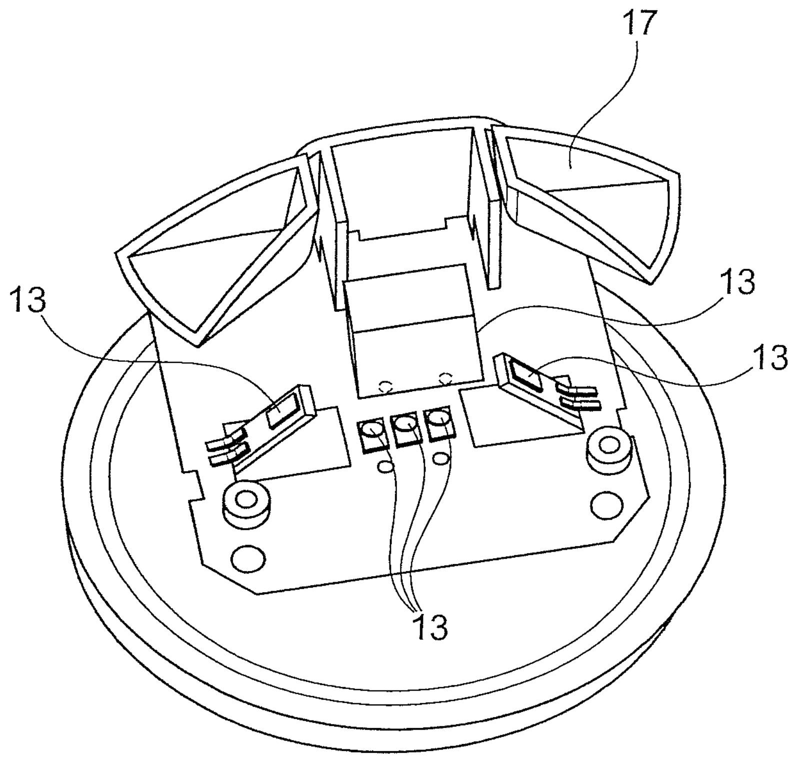

Fig. 2

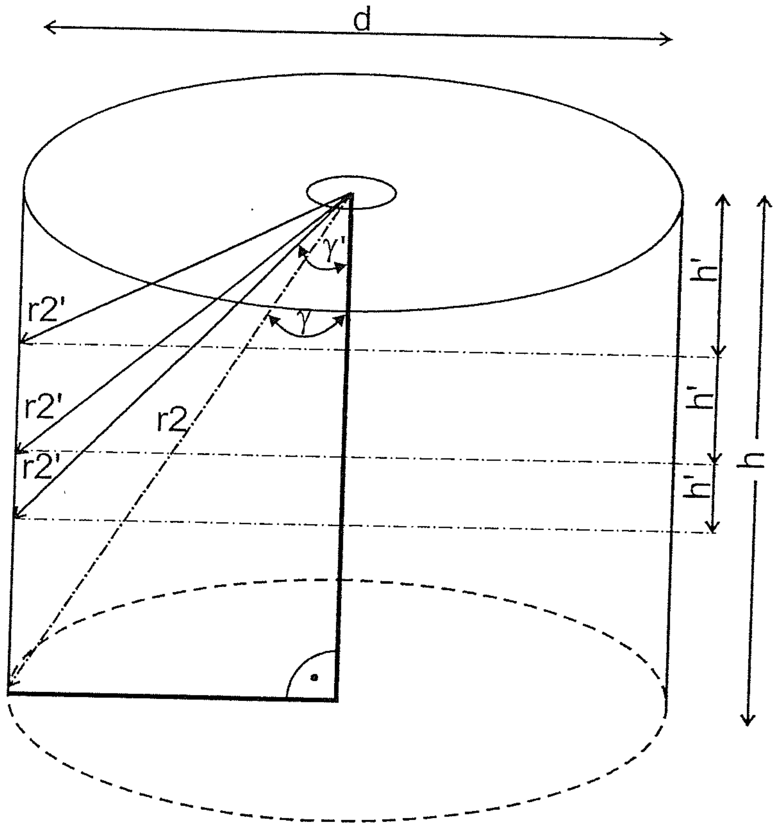

Fig. 3

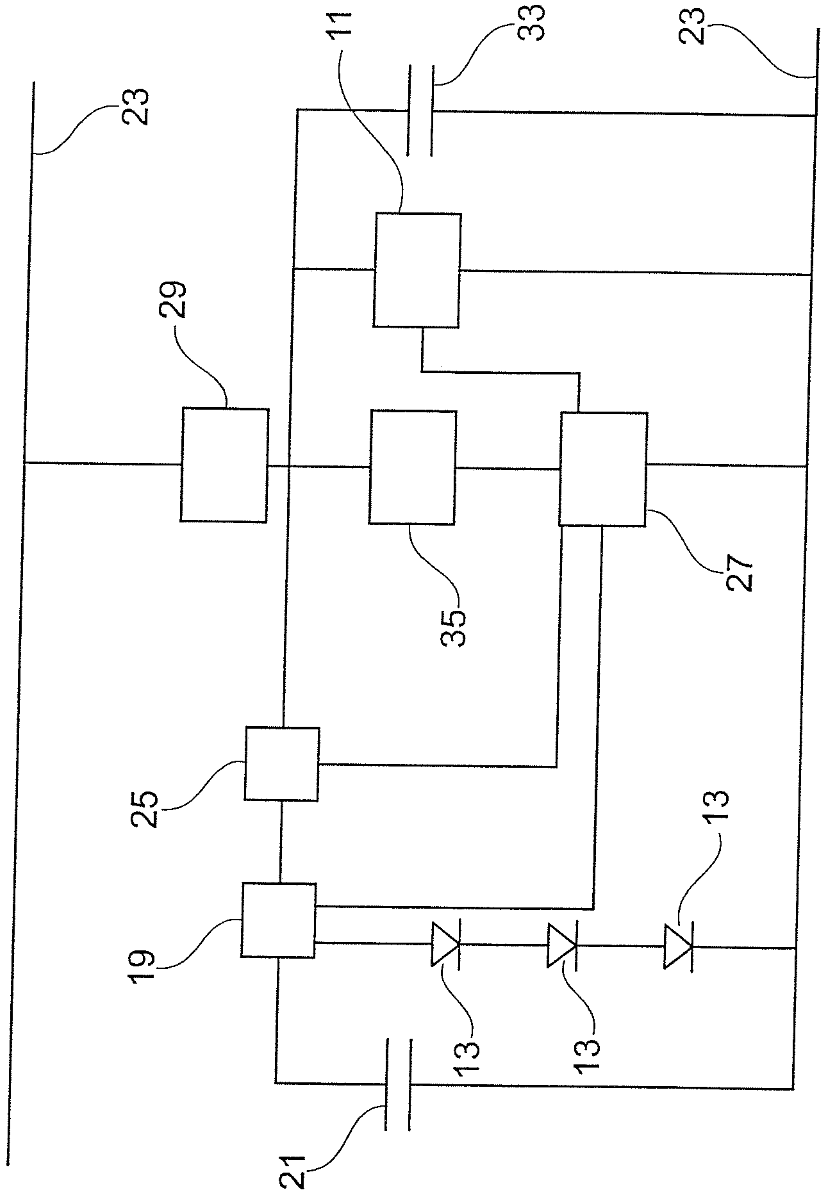

Fig. 4

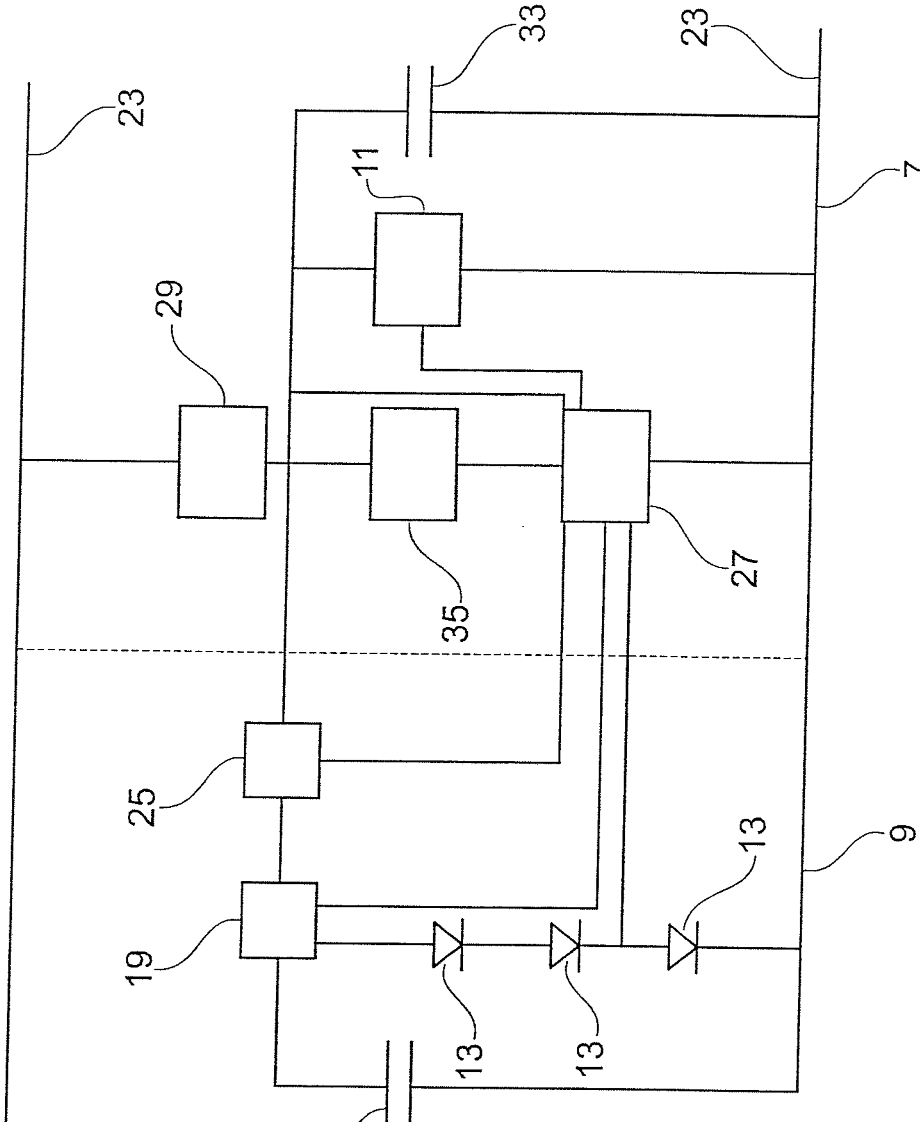

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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