(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 361 461 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.08.2018 Bulletin 2018/33

(51) Int Cl.:
G08B 17/00 *(2006.01)* ***G08B 25/04*** *(2006.01)*
G08B 25/14 *(2006.01)*

(21) Application number: **17425016.7**

(22) Date of filing: **13.02.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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(54) ELECTRONIC UNIT FOR MONITORING AND CONTROLLING OF FIRE SENSORS OPERATING AT DIFFERENT VOLTAGE LEVELS AND FIRE DETECTION SYSTEM

(57) The invention relates to an electronic unit (10) for monitoring and controlling one or more fire sensors (SEN) of a fire detection system (100). Such unit comprising:
- a processing stage (1);
- a managing stage (2) of the sensors which can be connected and activated to generate digital cyclical querying signals (S1, S2) to be sent to the sensors to verify their operative state;
- an electrical power supplying stage (3) to generate direct current electrical potentials to be supplied to the managing stage of the sensors starting from a predetermined reference power supply potential (Vcc).

In such electronic unit, the electrical power supplying stage comprises a first electronic circuit (30, 40, 50) to generate:
- a first potential (V1) higher than the reference potential;
- a second potential (V2) equal to the reference potential;
- a third potential (V3) lower than the reference potential.

The managing stage of the sensors comprises a second electronic circuit (60, 61, 65, 66) to generate: a first digital cyclical querying signal which assumes a high level equal to the second potential and a low level equal to the third potential; a second digital cyclical querying signal adapted to assume a high level equal to the first potential and a low level equal to the second potential. Such first and second digital cyclical querying signals are associated with different communication protocols to be made available to the fire sensors of different type of the fire detection system.

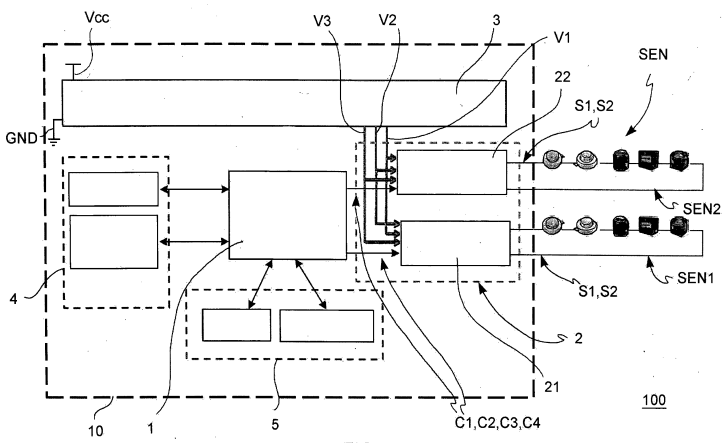

FIG. 1

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Description

TECHNOLOGICAL BACKGROUND OF THE INVENTION

Field of application

[0001] The present invention relates in general to electronic systems for detecting fires which include a plurality of sensors. In particular, the invention relates to an electronic unit for monitoring and controlling the fire sensors of a fire detection system.

Description of the prior art

[0002] In fire detection systems of known type, a plurality of fire sensors are connected to one another by means of a communication network and are monitored by a central control unit. In particular, the monitoring of such sensors envisages transmitting cyclical querying signals of each sensor on the network and receiving corresponding reply signals indicative of the operative state of the queried sensors.

[0003] Each fire sensor currently on the market is configured to receive the cyclical querying signals and to transmit the corresponding reply signals to the central control unit according to one of three different communication protocols.

[0004] A first type of fire sensor, which can be queried according to a first communication protocol or NOTIFIRE protocol developed by the company Honeywell International Inc., is configured to receive and interpret cyclical querying signals which may assume two voltage levels, 24V and 5V, respectively. The NOTIFIRE protocol also envisages a voltage level of 0V, which can be used as reference voltage level. Such digital signals are generated by a respective first central control unit, which is configured to communicate only with such a first type of sensor according to the NOTIFIRE protocol.

[0005] A second type of fire sensor, which can be queried according to a communication protocol developed by the company APOLLO Fire Detectors Ltd. (hereinafter APOLLO protocol) is configured to receive and interpret the digital cyclical querying signals which may assume two voltage levels: 24V and 32V. Such digital signals are generated by a respective second central control unit, which is configured, in turn, to communicate only with such a second type of sensor according to the APOLLO protocol.

[0006] A third type of fire sensor, which can be queried according to a third communication protocol developed by the company HOCHIKI Corporation (hereinafter HOCHIKI protocol), is configured to receive and interpret digital cyclical querying signals which may assume two voltage levels: 24V and 32V. In particular, the transmission of such signals is of serial type and occurs at a predetermined baud rate. Such digital signals are generated by a respective third central control unit, which is configured to communicate only with such a third type of sensor according to the HOCHIKI protocol.

[0007] From the above, it is apparent that in the currently known fire detection systems, the choice of one of the communication protocols indicated above determines in substantially univocal manner both the choice of the type of all fire sensors which can be used in the system and of the corresponding type of central control unit configured to monitor the sensors themselves.

[0008] This represents a limit of the known fire detection systems which, with the aforesaid constraints, are rigid systems which substantially cannot be modified. Indeed, such systems poorly adapt to possible updating/improvement needs during the operating life of the system which may envisage the use of sensors of different type at the same time or even the need to replace the central control unit of one type with one of different type. Indeed, such replacement of the central control unit would not be cost-effective because it would require the replacement of the sensors in the system at the same time.

SUMMARY OF THE INVENTION

[0009] It is the object of the present invention to provide and make available an electronic control unit for monitoring and controlling a fire detection system which ensures more flexibility in the configuration of the fire detection system and allows to overcome, at least partially, the drawbacks and the limits mentioned above, relative to the known fire detection methods.

[0010] In particular, it is the object of the invention to make available an electronic monitoring and controlling unit of a fire detection system which allows to manage and control fire sensors of different type at the same time.

[0011] Such object is achieved by means of an electronic unit for monitoring and controlling fire sensors in a fire detection system according to claim 1.

[0012] Preferred embodiments of such electronic unit are described in dependent claims 2-9.

[0013] It is also the object of the present invention a fire detection system using the aforesaid electronic monitoring and controlling unit of the fire sensors according to claim 10 and a respective method for monitoring and controlling fire sensors according to claim 11.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Further features and advantages of the electronic unit for monitoring and controlling fire sensors of a fire detection system according to the invention will be apparent from the following description which illustrates preferred embodiments, given by way of indicative, non-limiting examples, with reference to the accompanying figures, in which:

- **figure 1** illustrates by means of a block chart an electronic unit for monitoring and controlling fire sensors

in a fire detection system according to the invention;

- **figure 2** diagrammatically illustrates an example of an electrical power supplying stage and of a fire sensor managing stage included in the monitoring and controlling electronic unit of figure 1;
- **figure 3** diagrammatically illustrates a flow chart of a monitoring and controlling method of one or more fire sensors of a fire detection system of the present invention.

[0015] Similar or equivalent elements in the aforesaid figures are indicated with the same reference numerals.

DETAILED DESCRIPTION

[0016] With reference to figures 1-2, an electronic system for detecting fires in an environment is indicated by reference numeral 100 as a whole. Such electronic system 100 comprises a plurality of fire sensors SEN distributed in such environment and an electronic monitoring and controlling unit 10 according to the present invention electrically connected to such plurality of sensors SEN.

[0017] The electronic unit 10 for monitoring and controlling fire sensors SEN is indicated hereinafter as electronic monitoring unit or electronic unit for the sake of simplicity.

[0018] Again which reference to figure 1, such electronic unit 10 comprises a processing stage 1, e.g. consisting of a microprocessor or microcontroller (Central Processing Unit or CPU).

[0019] Furthermore, the electronic unit 10 comprises a managing stage 2 of the aforesaid one or more sensors SEN. In particular, such managing stage 2 is activated by the processing stage 1 to generate digital cyclical querying signals S1, S2 to be sent to the sensors SEN to verify the operative stage thereof.

[0020] In an example of embodiment, the electronic monitoring unit 10 comprises a communication stage 4, operating, e.g. according to an Ethernet TCP/IP or MODBUS TCP/IP protocol, to connect the processing stage 1 to a main processing unit (CPU HOST or PLC) arranged in distal position from the electronic unit 10, e.g. at some tens/hundreds of meters from the electronic control unit 10 up to even several kilometers.

[0021] In another example of embodiment, the electronic monitoring unit 10 may also comprise a further communication stage 5, e.g. operating according to a Controller Area Network or CAN protocol, to connect the processing stage 1 of the monitoring electronic unit 10 to at least another similar unit configured to monitor a same group of sensors in redundant mode.

[0022] Additionally, the electronic unit 10 comprises an electrical power supplying stage 3 configured to generate direct current electrical potentials to be supplied to the managing stage 2 of the sensors starting from a predetermined reference power supply potential Vcc referred to a ground potential GND.

[0023] For example, such reference power potential Vcc is generated by an acid-lead battery configured to provide a nominal voltage Vcc=24V.

[0024] Advantageously, the electrical power supplying stage 3 comprises a first electronic circuit 30, 40, 50 to generate:

- a first potential V1 higher than the reference potential Vcc to be supplied to the managing stage 2 of the sensors;
- a second potential V2 equal to the reference potential Vcc to be supplied to the managing stage 2 of the sensors;
- a third potential V3 lower than the reference potential Vcc to be supplied to the managing stage 2 of the sensors.

[0025] Furthermore, the managing stage 2 of the sensors comprises a second electronic circuit 60, 61, 65, 66 to generate:

- a first digital cyclical querying signal S1 adapted to assume a high level equal to the second potential V2 and a low level equal to the third potential V3,
- a second digital cyclical querying signal S2 adapted to assume a high level equal to the first potential V1 and a low level equal to the second potential V2.

[0026] Such first S1 and second S2 digital cyclical querying signals being associated with different communication protocols to be made available to fire sensors SEN of different type of the fire detection system 100 by the managing stage 2.

[0027] In a preferred example of embodiment of the invention:

- the electrical reference potential Vcc is equal to 24V;
- the first potential V1 is equal to 32V;
- the second potential V2 is equal to 24V;
- the third potential V3 is equal to 5V.

Consequently, the first digital signal S1 has a high level equal to 24V and a low level equal to 5V. In such a manner, the electronic unit 10 is adapted to query one or more sensors SEN according to a first communication protocol, or NOTIFIRE protocol.

The second digital cyclical querying signal S2 is adapted to assume a high level equal to 32V and a low level equal to 24V. In such a manner, the electronic unit 10 is adapted to query one or more sensors SEN according to a second or to a third communication protocol, i.e. according to the APOLLO and HOCHIKI protocol, respectively.

[0028] With reference to the example in figure 2, the first electronic circuit of the electrical power supplying stage 3 comprises a first DC-DC voltage converter circuit 30 configured to receive in input the reference electrical potential Vcc and to generate the first potential V1 higher than such reference potential Vcc. In a particular example, such first DC-DC voltage converter circuit 30 is an

electronic converter of the switching boost converter type.

[0029] The first electronic circuit of the electrical power supplying stage 3 further comprises a second DC-DC voltage converter circuit 40 configured to receive in input the first potential V1 generated by said first DC-DC voltage converter circuit 30 and to generate the second potential V2 equal to the reference potential Vcc.

[0030] The first electronic circuit of the power supplying stage 3 further comprises a third DC-DC voltage converter circuit 50 configured to receive in input the first potential V1 and to generate the third potential V3 lower than such reference potential Vcc.

[0031] In a particular example, such second 40 and third 50 DC-DC voltage converter circuit are electronic converters of the switching buck converter type.

[0032] It is worth noting that the aforesaid first 30, second 40 and third 50 converter circuits are standard circuits known to a person skilled in the art and thus will not be described in further detail hereinafter.

[0033] With reference to figure 1, the aforesaid sensor managing stage 2 of the electronic monitoring and controlling unit 10 comprises a first managing block 21 connected to a first group of sensors SEN1 of the aforesaid one or more groups of sensors SEN and a second managing block 22 connected to a second group of sensors SEN2. In other words, the electronic control unit 10 makes available two mutually similar sensor management channels, which may execute the same operations separately in parallel.

Each of such first 21 and second 22 managing blocks comprises the aforesaid second electronic block, which includes a selector circuit 60 configured to receive in input the first V1, the second V2 and the third V3 electrical potential. In particular, such selector circuit 60 is configured to receive the first electrical potential V1 at a first input IN1, the second electrical potential V2 at a second input IN2 and a third input IN3, the third electrical potential V3 at a fourth input IN4.

[0034] In an example of embodiment, such selector circuit 60 is of the standard type and comprises a relay controlled by a bipolar transistor NPN which can be activated to select one of the three available protocols by selecting the voltage levels (5V-24V or 24V-32V) which can be used for the selected communication. It is worth noting that the bipolar transistor of the selector circuit 60 is controlled by the processing stage 1 by means of a first control signal C1 to generate the high level and the low level of the aforesaid first S1 and second S2 digital cyclical querying signals selected on a first O1 and on a second 02 output of the selector circuit itself, respectively.

[0035] Furthermore, with reference to figure 2, each of such first 21 and second 22 managing blocks of the electronic monitoring and controlling unit 10 comprises a transmitter circuit TX 61 configured to receive in input the high level and the low level of the first S1 and of the second S2 digital cyclical querying signals to be generated. Such transmitter circuit 61 is controlled by the processing stage 1 by means of a control signal C2 to generate an output enabling signal SA.

It is worth noting that such transmitter circuit TX 61 is of standard type and therefore will not be described in further detail hereinafter.

[0036] Additionally, with reference to figure 2, each of such first 21 and second 22 managing blocks of the electronic monitoring and controlling unit 10 comprises a switching circuit 65 controlled by the processing stage 1 by means of a third control signal C3. In particular, such a switching circuit 65 is configured to generate up/down edges of the first S1 and second S2 digital cyclical querying signals starting from said enabling signal SA.

It is worth noting that such switching circuit 65 is of standard type and therefore will not be described in further detail hereinafter.

[0037] Again with reference to figure 2, each of such first 21 and second 22 managing blocks of the electronic monitoring and controlling unit 10 comprises a receiver circuit RX 66 which includes means for discriminating signals sent by the sensors SEN in reply to the first S1 or the second S2 generated digital cyclical querying signal. In particular, such receiver circuit 66 is controlled by the processing stage 1 by means of a fourth control signal C4 to adapt internal levels of discrimination of the reply signals on the basis of the selected communication protocol.

It is worth noting that such receiver circuit RX 66 is of standard type and therefore will not be described in further detail hereinafter.

[0038] In an example of embodiment, the electrical power supplying stage 3 of the electronic monitoring and controlling unit 10 comprises a protection and filtering circuit 70 configured to receive in input the reference power supply potential Vcc. Such protection and filtering circuit 70 includes electronic protection devices of the aforesaid first, second and third DC-DC voltage converter circuits from overvoltages and overcurrents associated with the reference power supply potential Vcc. For example, such protection and filtering circuit 70 may comprise a fuse for protecting from overcurrents in input, a transil used to limit input overvoltage peaks, an LC filter for filtering interferences coming from the input or generated towards the input by the electronic monitoring unit 10.

[0039] With reference to figure 3, the steps of a method 300 for monitoring and controlling one or more fire sensors SEN of a fire detection system 100 of the present invention are described in a flow chart. The method 300 comprises a symbolic step of starting STR.

[0040] The method comprises step 301 of making available an electronic control unit 10 which can be electrically connected to such sensors SEN which includes:

- a processing stage 1;
- a managing stage 2 of the aforesaid one or more fire sensors SEN which can be electrically connected to such sensors;

- an electrical power supplying stage 3 configured to generate direct power supply potentials to be supplied to the managing stage 2 of the sensors starting from a predetermined reference power supply potential Vcc referred to a ground potential GND.

[0041] Furthermore, the method 300 comprises the steps, executed by the electrical power supplying stage 3, of:

generating 302 a first potential V1 higher than the reference potential Vcc to be supplied to the managing stage 2 of the sensors;
generating 303 a second potential V2 equal to the reference potential Vcc to be supplied to the managing stage 2 of the sensors;
generating 304 a third potential V3 lower than such reference potential Vcc to be supplied to the managing stage 2 of the sensors.

[0042] Hereinafter, the method comprises the steps of:

- generating 305 by said managing stage 2, a first digital cyclical querying signal S1 adapted to assume a high level equal to the second potential V2 and a low level equal to the third potential V3,
- generating 306 by said managing stage 2, a second digital cyclical querying signal S2 adapted to assume a high level equal to the first potential V1 and a low level equal to the second potential V2.

[0043] Furthermore, the method 300 comprises a step of sending 307 such first S1 and second S2 digital cyclical querying signals, each of which is associated with different communication protocols to the fire sensors SEN of different type of the fire detection system 100.
[0044] The method 300 comprises a symbolic step of ending ED.
[0045] The electronic unit 10 for monitoring and controlling the fire sensors SEN and the respective fire detection system 100 which employs such unit have advantages.
[0046] In particular, the electronic monitoring and controlling unit 10 allows to make a fire detection system which may use fire sensors of different type, each operating according to one of the known communication protocols: NOTIFIRE, APOLLO and HOCHIKI. In other words, the same electronic monitoring unit 10 may be used in a system 100 for monitoring sensors of different type.
[0047] Such flexibility/adaptability of the electronic unit 10 confers advantages to the electronic fire detection system 100 which uses such unit 10. Indeed, any change made during the working life of the system to deal with possible needs for updating/improving the fire detection system, which are, for example, the addition of one or more new sensors which communicate with the electronic monitoring unit 10 by means of different protocols, is performed simply and effectively by connecting such new sensors to the electronic monitoring system 10 of the invention.
[0048] In equally simple manner, the electronic monitoring unit 10 of the invention may also be used to replace obsolete electronic units in fire detection systems already on the field and operating independently from the communication protocol with the fire sensors used in the aforesaid systems on the field.
[0049] A person skilled in art may make changes and adaptations to the embodiments of the electronic unit for monitoring and controlling one or more fire sensors in a fire detection system according to the invention or can replace elements with others which are functionally equivalent to satisfy contingent needs without departing from the scope of protection of the appended claims. Each of the features described above as belonging to one possible embodiment may be implemented independently from the other described embodiments.

Claims

1. An electronic unit (10) for monitoring and controlling one or more fire sensors (SEN) of a fire detection system (100), comprising:

- a processing stage (1);
- a managing stage (2) of said one or more sensors (SEN) which can be connected to said one or more sensors, said managing stage being activated by the processing stage (1) to generate digital cyclical querying signals (S1, S2) to be sent to said one or more sensors to verify their operative state;
- an electrical power supplying stage (3) configured to generate direct current electrical potentials to be supplied to the managing stage (2) of the sensors starting from a predetermined reference power supply potential (Vcc) referred to a ground potential (GND),

characterized in that
said electrical power supplying stage (3) comprises a first electronic circuit (30, 40, 50) to generate:

- a first potential (V1) higher than the reference potential (Vcc) to be supplied to the managing stage (2) of the sensors;
- a second potential (V2) equal to the reference potential (Vcc) to be supplied to the managing stage (2) of the sensors;
- a third potential (V3) lower than said reference potential (Vcc) to be supplied to the managing stage (2) of the sensors, and

said managing stage (2) of the sensors comprises a second electronic circuit (60, 61, 65, 66) to generate:

- a first digital cyclical querying signal (S1) adapted to assume a high level equal to the second potential (V2) and a low level equal to the third potential (V3),
- a second digital cyclical querying signal (S2) adapted to assume a high level equal to the first potential (V1) and a low level equal to the second potential (V2),

said first (S1) and second (S2) digital cyclical querying signals being associated with different communication protocols to be made available to the fire sensors (SEN) of different type of the fire detection system (100).

2. An electronic monitoring and controlling unit (10) according to claim 1, wherein said first electronic circuit of the electrical power supplying stage (3) comprises:

- a first DC-DC voltage converter circuit (30) configured to receive in input the reference electrical potential (Vcc) and to generate the first potential (V1) higher than said reference potential (Vcc);
- a second DC-DC voltage converter circuit (40) configured to receive in input the first potential (V1) generated by said first DC-DC voltage converter circuit (30) and to generate the second potential (V2) equal to the reference potential (Vcc);
- a third DC-DC voltage converter circuit (50) configured to receive in input said first potential (V1) and to generate the third potential (V3) lower than said reference potential (Vcc).

3. An electronic monitoring and controlling unit (10) according to claim 2, wherein said first DC-DC voltage converter circuit (30) is an electronic converter of the switching boost converter type.

4. An electronic monitoring and controlling unit (10) according to claim 2, wherein said second (40) and third (50) DC-DC voltage converter circuits are electronic converters of the switching buck converter type.

5. An electronic monitoring and controlling unit (10) according to claim 2, wherein said sensor managing stage (2) comprises a first managing block (21) which can be connected to a first group of sensors (SEN1) of said one or more sensors (SEN) and a second managing block (22) which can be connected to a second group of sensors (SEN2) of said one or more sensors (SEN), each of said first and second managing block comprises said second electronic circuit which includes a selector circuit (60) configured to receive in input said first (V1), second (V2) and third (V3) electrical potential, said selector circuit being controlled by the processing stage (1) by means of a first control signal (C1) to generate in output the high level and the low level of the aforesaid first (S1) and second (S2) digital cyclical querying signals.

6. An electronic monitoring and controlling unit (10) according to the preceding claim, wherein each of said first (21) and second (22) managing blocks comprises:

- a transmitter circuit (TX) configured to receive in input the high level and the low level of the first (S1) and second (S2) digital cyclical querying signals to be generated, said transmitter circuit (61) being controlled by the processing stage (1) by means of a control signal (C2) to generate an enabling signal (SA);
- a switching circuit (65) controlled by the processing stage (1) by means of a third control signal (C3) to generate up/down edges of the first (S1) and second (S2) digital cyclical querying signals starting from said enabling signal (SA).

7. An electronic monitoring and controlling unit (10) according to the preceding claim, wherein each of said first (21) and second (22) managing blocks further comprises a receiver circuit (66) comprising means for discriminating sensor signals (SEN) in reply to the generated first (S1) or second (S2) digital cyclical querying signal, said receiver circuit being controlled by the processing stage (1) by means of a fourth control signal (C4) to adapt the internal discrimination levels on the basis of the selected communication protocol.

8. An electronic monitoring and controlling unit (10) according to claim 2, wherein said electrical power supplying stage (3) further comprises a protection and filtering circuit (70) configured to receive in input said reference power supply potential (Vcc), said protection and filtering circuit (70) including electronic protection devices of the aforesaid first, second and third DC-DC voltage converter circuit from overvoltages and overcurrents associated with the reference power supply potential (Vcc).

9. An electronic monitoring and controlling unit (10) according to claim 1, wherein:

- the reference potential (Vcc) is equal to 24V;
- the first potential (V1) is equal to 32V;
- the second potential (V2) is equal to 24V;
- the third potential (V3) is equal to 5V,

said first digital signal (S1) has a high level equal to 24V and a low level equal to 5V for querying said

one or more sensors (SEN) according to a first communication protocol,
said second digital cyclical querying signal (S2) has a high level equal to 32V and a low level equal to 24V for querying said one or more sensors (SEN) according to a second and to a third communication protocol.

10. An electronic system (100) for detecting fires in an environment, comprising:

- a plurality of fire sensors (SEN) distributed in said environment;
- an electronic monitoring and controlling unit (10) according to at least one of the claims 1-9, electrically connected to said plurality of sensors (SEN).

11. A method (300) for monitoring and controlling one or more fire sensors (SEN) of a fire detection system (100), comprising the steps of:

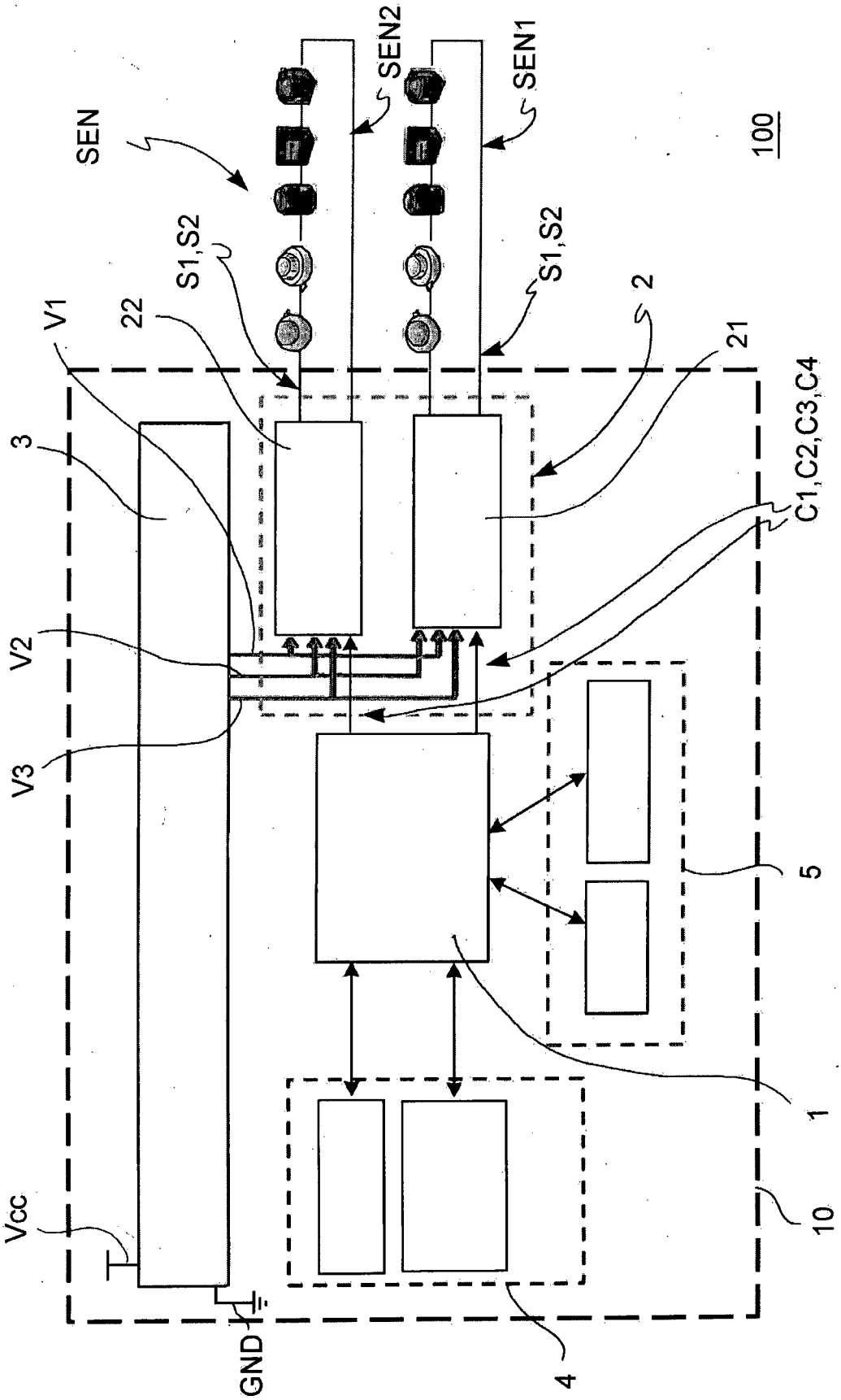
- making available (301) an electronic control unit (10), comprising:

  - a processing stage (1);
  - a managing stage (2) of said one or more fire sensors (SEN), which can be connected electrically to said one or more sensors;
  - an electrical power supplying stage (3) configured to generate direct power supply potentials to be supplied to the managing stage (2) of the sensors starting from a predetermined reference power supply potential (Vcc) referred to a ground potential (GND),

- generating, by said electrical power supplying stage (3):

  a first potential (V1) higher than the reference potential (Vcc) to be supplied to the managing stage (2) of the sensors (302);
  a second potential (V2) equal to the reference potential (Vcc) to be supplied to the managing stage (2) of the sensors (303);
  a third potential (V3) lower than said reference potential (Vcc) to be supplied to the managing stage (2) of the sensors (304),
  said method further comprising the steps of:

  - generating (305) by said managing stage (2), a first digital cyclical querying signal (S1) adapted to assume a high level equal to the second potential (V2) and a low level equal to the third potential (V3),
  - generating (306) by said managing stage (2), a second digital cyclical querying signal (S2) adapted to assume a high level equal to the first potential (V1) and a low level equal to the second potential (V2),
  - sending (307) the first (S1) and second (S2) digital cyclical querying signals, which are associated with different communication protocols to the fire sensors (SEN) of different type of the fire detection system (100).


SEN
SEN2
SEN1
100
S1,S2
S1,S2
V1
22
2
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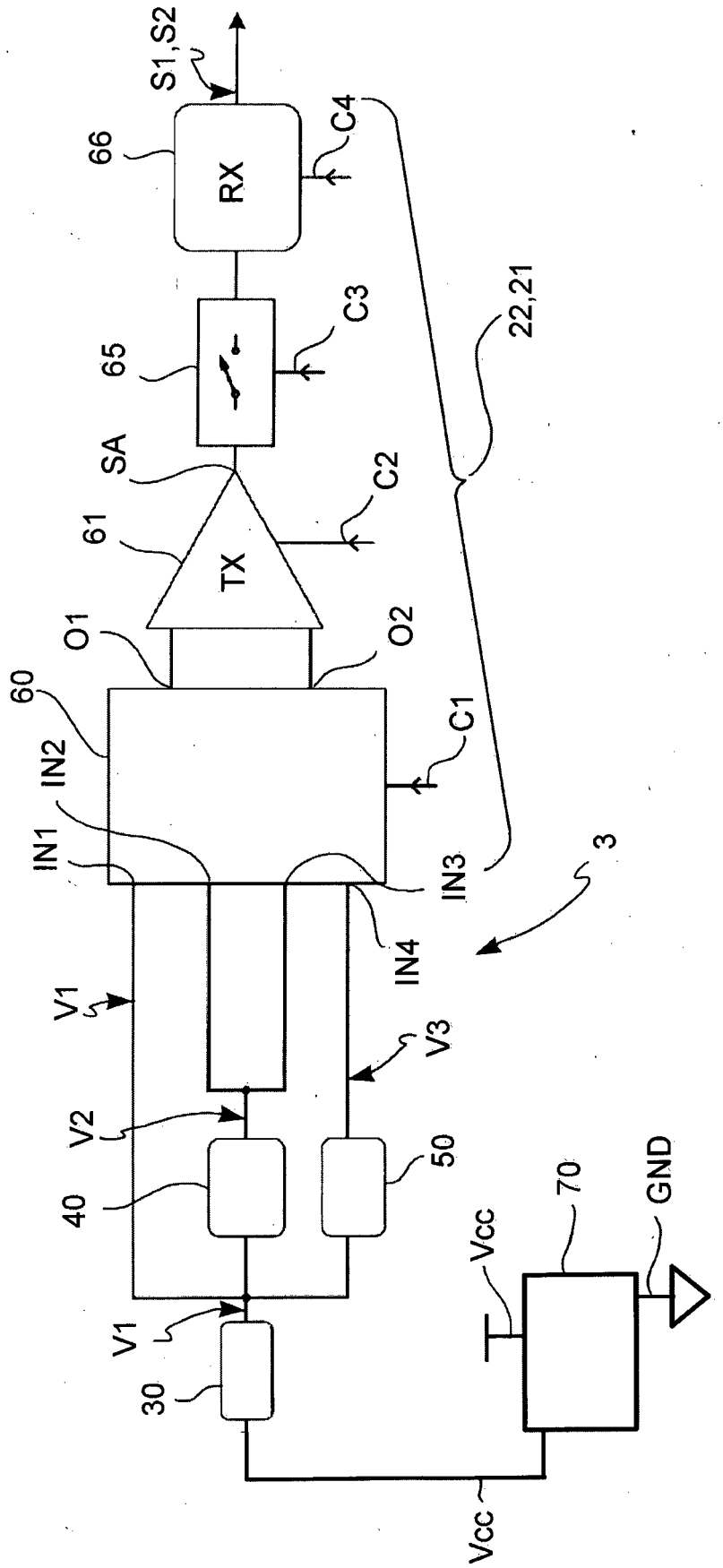
3
C1,C2,C3,C4
V2
V3
5
1
10
Vcc
GND
4

FIG. 1


S1,S2
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C4
65
C3
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SA
C2
61
TX
O1
O2
60
IN2
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IN1
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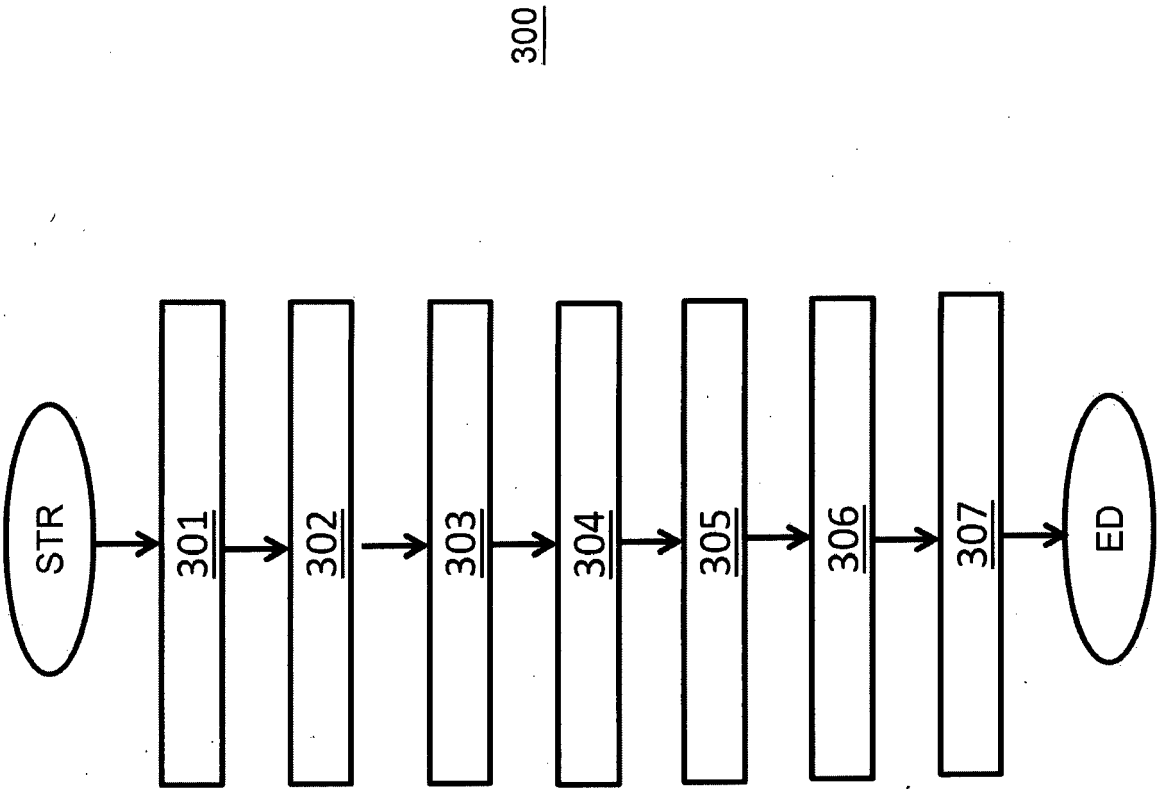
50
70
GND
Vcc
V1
30
Vcc

FIG. 2

FIG. 3



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EUROPEAN SEARCH REPORT

Application Number
EP 17 42 5016

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	Active Repeater: "ZXe INTELLIGENT MULTI PROTOCOL FIRE ALARM CONTROL PANEL PRODUCT Specification FEATURES", , 27 November 2002 (2002-11-27), XP055398394, Retrieved from the Internet: URL:http://www.intertrade.ps/userfiles/file/zxs2ss.pdf [retrieved on 2017-08-11] * Title * * page 1, left-hand column, lines 7-10 * * page 2, last line *	1-11	INV. G08B17/00 G08B25/04 G08B25/14
A	EP 2 996 301 A1 (UTC FIRE & SECURITY EMEA BVBA [BE]) 16 March 2016 (2016-03-16) * sentence 1, paragraph 2 * * paragraph [0003] * * last sentence, paragraph 9 * * last sentence, paragraph 10 * * paragraph [0011] * * sentence 2, paragraph 12 * * sentence 4, paragraph 15 * * sentences 3-6, paragraph 16 * * sentence 1, paragraph 17 *	1-11	TECHNICAL FIELDS SEARCHED (IPC) G08B
A	WO 2015/159511 A1 (PANASONIC INTELLECTUAL PROPERTY MANAGEME) 22 October 2015 (2015-10-22) * paragraph [0022] * * sentence 1, paragraph 26 * * sentences 2,3, paragraph 29 * * sentence 1, paragraph 31 * * sentence 2, paragraph 32 * * paragraph [0073] * * last sentence, paragraph 75 * * figures 1,5 *	1-11	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 August 2017	Plathner, B

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EUROPEAN SEARCH REPORT

Application Number
EP 17 42 5016

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
	& EP 3 133 569 A1 (PANASONIC IP MAN CO LTD [JP]) 22 February 2017 (2017-02-22) * paragraph [0022] * * sentence 1, paragraph 26 * * sentences 2,3, paragraph 29 * * sentence 1, paragraph 31 * * sentence 2, paragraph 32 * * paragraph [0073] * * last sentence, paragraph 75 * * figures 1,5 * -----		

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 August 2017	Plathner, B

CATEGORY OF CITED DOCUMENTS

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