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(54) Monitoring device for actuators

(57) This device is especially intended to monitoring actuators as are used in nursing beds, hoists, wheel-chairs, lifts, lifting motors or the like, for disabled persons. Said device measures the time the actuator is running, the current (Si) it consumes and the voltage (Sv) at the

actuator, in order to calculate the consumption in Wh. A build-in-memory records the data and compares it to a build-in-profile of the actuator monitored. This can be displayed numerically, at a figure or as a limit indicator by means of LEDs or alike.

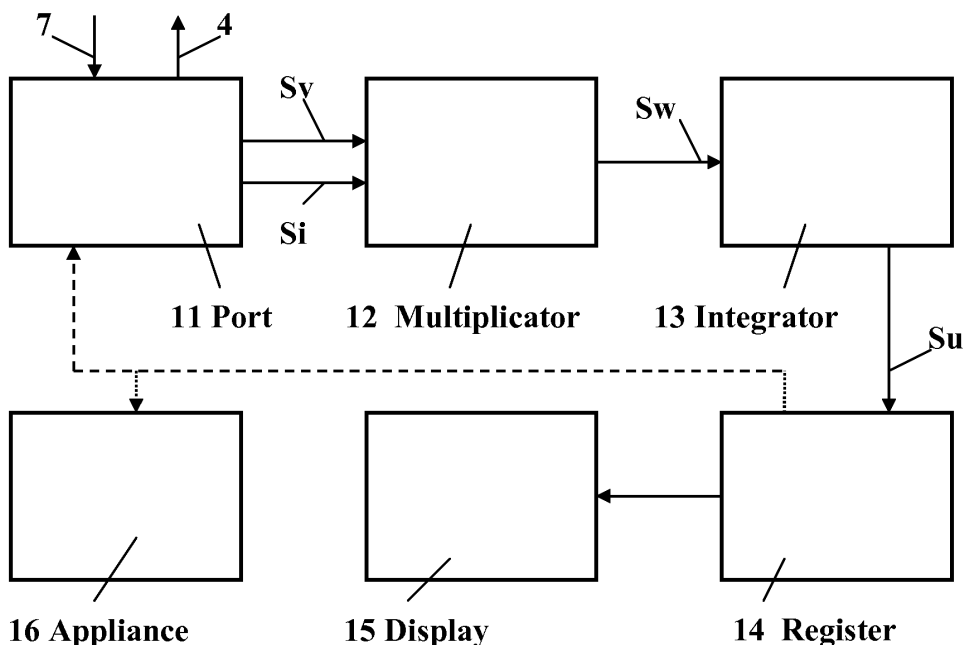


FIG. 2

Description

Technical Field of the Invention

[0001] The present invention relates to monitoring devices for actuators of all kinds, especially as they are used in nursing beds, hoists, wheelchairs, lifts, lifting motors, or the like, for disabled persons.

Background of the Invention

[0002] Monitoring here means the act of observing something and keeping a record of it, especially in order to avoid risks for actuators used for appliances related to disabled persons. Electric actuators used e.g. in nursing beds and patients hoists are exposed to a heavy load, and since there is risk for personal damage if these actuators break down, it is of the utmost importance that the actuators are in good working condition.

[0003] If the working conditions of the actuators are monitored, it will be possible to maintain or replace the actuators before they reach a critical level of wear. There are counters available in the market which count the number of operations of the actuators. This information is however of very limited value, since, for example, operations lasting 1 second or 30 seconds, as well as situations with no load or full load, all counts as one unique operation.

Summary of the Invention

[0004] According to the invention, the monitoring device can be connected to an actuator as used, for example, for appliances related to disabled persons. Said device may be or comprise a unit or means for logging information, for example, from actuators as used in nursing beds, hoists, lifts, etc. In this sense, data logging is the practice of recording sequential data, preferably chronologically.

[0005] The monitoring device according to the invention, in the following called also logging device or simply "Informer", measures and/or monitors the time t the actuator is running and the current it consumes and the voltage at the actuator. So it may calculate the consumption in Wh. A build-in-memory records the data. These data can be displayed directly or be compared to a build-in-profile of the actuator monitored. This comparison can be displayed at a figure or as a limit indicator by means of LEDs or alike.

[0006] Such a device should be highly requested by attendants and service personal, since it will give them valuable information about the present working condition of a lift, nursing bed or similar products. At the same time, it will be used to inform if the product is actually being used, or if it should be moved to other users. Insurance companies and authorities handling the product can in this way use this device to optimize the use of the product.

[0007] Further objects and advantages of this monitor-

ing device will become apparent from the following disclosure, the claims and the attached drawings.

Brief Description of the Drawings

[0008]

FIG. 1 is a schematic illustration showing a device according to the invention, in the state to be connected between a power supply and an actuator.

FIG. 2 shows a block diagram of an embodiment of said monitoring device.

FIG. 3 is a schematic perspective view of said monitoring device.

Description of Preferred Embodiments

[0009] The monitoring device or "Informer" 1 according to the present invention is connectable between an actuator 2 and a power supply 3, as shown in FIG. 1, wherein the actuator 2 preferably may be provided with a first cable 4 and a first plug 5 insertable into a socket 6 of the Informer which, in turn, may be in like manner provided with a second cable 7 and a second plug 8 insertable into a socket 9 of the power supply 3.

[0010] Generally speaking, said plugs 5, 8 may be fittings, for example, of the type having metal prongs for insertion in a fixed socket, used to connect an appliance to a power supply.

[0011] As shown in FIG. 2, a preferred embodiment of an Informer 1 according to the invention comprises a port block 11 giving two signals S_v and S_i to a multiplier block 12. The signal S_v represents data of the voltage applied to the actuator 2 and the signal S_i data of the current absorbed from the actuator. In principle, both signals S_v and S_i are time-variable. However, the Signal S_v may correspond sometimes to a certain constant value of the voltage applied to the actuator 2, but the Signal S_i will rather correspond to values of the current which varies with the time t . The multiplier block 12 performs the product $W = S_v \cdot S_i$ of the power consumption, for example, in watts, and gives a corresponding data signal S_w to an integrator block 13 giving a useful Signal S_u to a register block 14 connected to a monitor or display element 15, wherein said signal S_w corresponds to the integral or totalized product $Wh = W \cdot t$ along the time t , for example in watt-hours. Both S_v and S_i are variable, since the voltage will drop for increasing current. The register block 14 includes a memory device to record the present power consumption. Next time, the actuator is operated this consumption will be added to the value in the memory. The Informer may have means to compare said totalized data with known standard data related to the expected lifetime of said actuator.

[0012] Preferably, the monitoring device or Informer 1 according to the invention is used as a portable device

to be mounted on any low voltage DC supplied actuator 2 to log information of the wear of the actuator. The registration is of practical reason done as Wh, since this registration implicitly holds information on the time of operation and the load. The monitor or display element 15 may be included in a power supply equipment 3 and/or in the actuator 2 itself and/or in the Informer 1 and/or in another independent appliance 16. As the Informer can be placed between the actuator 2 and an assigned control equipment 3, in general, it may be mounted by plugs and sockets, or by any other means such as solder or screw terminals which for that purpose may allow signal transmission in both directions.

[0013] The invention allows the realization of a diversity of further embodiments. To give just one example, the Informer 1 may be implemented either in analog or digital technique.

[0014] In the last case, the port block 11 can include a analog/digital converter, and preferably the Informer has a built-in microprocessor that can hold various programs to calculate the wear or power consumption of the actuator 2. Thus, the microprocessor performs the functions of the blocks 12 and 13 (FIG. 2) and holds data representative to the monitored actuator in order to compare logged data with the data of the actuator 2, and the microprocessor may include or be connected to said register block 14 which holds the various data and programs.

[0015] Preferably, the Informer 1 is power supplied by the same power supply 3 (FIG. 1) which operates the actuator 2 and is able to hold data and programs when the power supply is disconnected. Analogously, the Informer 1 can hold different sets of data and programs representing different types of actuators 2.

[0016] The result of the logging may be represented by a number in the display 15 indicating the last recorded data or up-to-date data related to the totalized power consumption of the actuator 2, and/or preferably giving the difference between this value and the maximum accepted value for the lifetime of the actuator in use.

[0017] The result can alternatively be displayed by a number of LEDs indicating the status with respect to the limit value of the actuator 2, for example, a green LED shows that the actuator it is ok to run, a yellow LED that it is time to make maintenance service, and a red LED that each operation of the actuator must stop immediately. The Informer 1 may be mechanically locked to the actuator 2 to prevent that it will be exchanged with another actuator, for example, so that once it is attached to an actuator it cannot be removed without damaging the device.

[0018] According to further embodiments of the invention, the Informer 1 may be equipped with different adaptors to fit different actuators with different plugs and/or be equipped with a key to convert the actual reading of Wh to the expected remaining lifetime of the actuator. As a supplement the data may be transferred to a PC for further logging or data processing.

[0019] The transferred data may be related to the

number of operations, the time of an operation (min/max and average values) and/or the current per operation (min./max and average values), wherein these values may be converted to load values by operations using parameters of the actual actuator, and the frequency of use (duty cycle, day by day use, etc.).

[0020] Fig. 3 shows an example of a mechanical realization of a "Informer" with rounded contours achieving a practical design together with an esthetic appearance.

[0021] According to a further embodiment of the invention, the "Informer" for preventing risk of damage during the use of an actuator comprises main means to obtain information data of the total power consumption of said actuator 2 along the time t and to compare said information data with data available about the expected lifetime of the type of actuator 2 monitored, said comparison allowing to decide whether said actuator 2 is to be maintained or replaced, before it reaches a critical level of wear, and wherein said "Informer" 1 includes means to be connected between a power supply means 3 and said actuator 2.

[0022] The monitoring device according to the invention is a kind of an informer device advising about the aging of actuators, which may be devices which transform an input signal, preferable an electrical signal, into motion, for example, electrical motors.

Claims

1. Monitoring device for actuators intended for preventing risk of damage during the use of an actuator, comprising main means to obtain information data of the total power consumption of said actuator (2) along the time and to compare said information data with data available about the expected lifetime of the type of actuator (2) monitored, said comparison allowing to decide whether said actuator (2) is to be maintained or replaced, before it reaches a critical level of wear.
2. Device in accordance with claim 1, wherein said monitoring device (1) includes means to be connected between a power supply means (3) and said actuator (2).
3. Device in accordance with claim 1 or 2, wherein said main means comprises a port block (11) including means to obtain time data by measuring the time the actuator is running and further comprising means (12, 13) to obtain power data about the power the actuator consumes, in order to obtain totalized data about the total power consumption of said actuator along the time, and further comprising register means (14) to compare said totalized data with known standard data related to the expected lifetime of said actuator.

4. Device in accordance with one of the claims 1 to 3, including a build-in-memory which records the totalized data and compares it to a build-in-profile of the actuator monitored.

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5. Device in accordance with one of the claims 1 to 4, comprising means to display the totalized data numerically or at a figure or as a limit indication by means of LEDs or alike.

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6. Device in accordance with one of the claims 1 to 5, comprising a microprocessor to calculate said total power consumption along the time of the actuator.

7. Device in accordance with one of the claims 1 to 6, for monitoring actuators as are used in nursing beds, hoists, wheelchairs, lifts, lifting motors or the like, to preventing damage to persons with disabilities.

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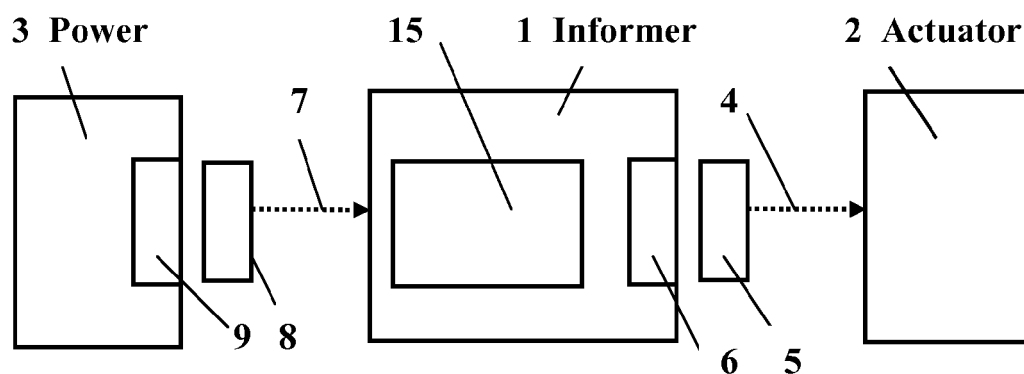


FIG. 1

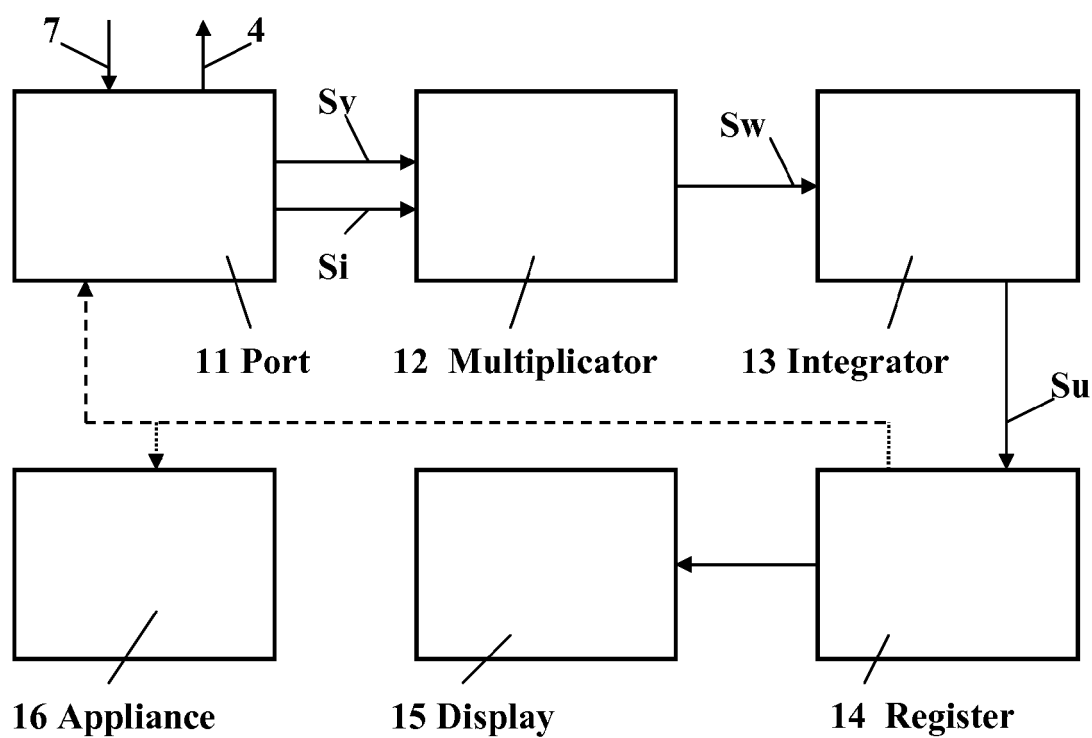


FIG. 2

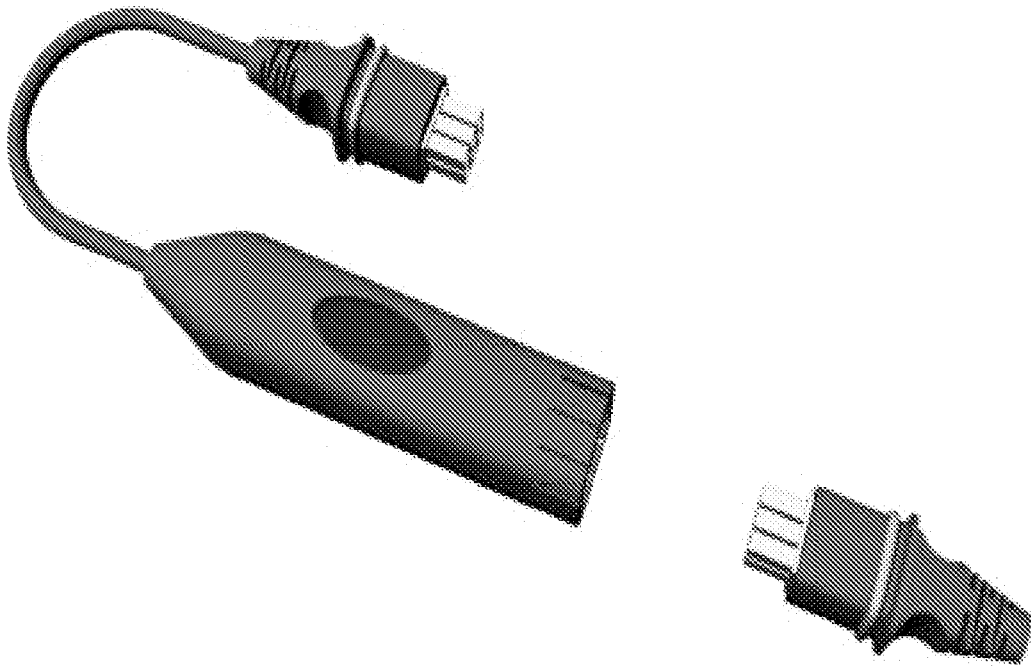


FIG. 3



EUROPEAN SEARCH REPORT

Application Number
EP 09 15 4223

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	US 6 445 188 B1 (LUTZ TONY [US] ET AL) 3 September 2002 (2002-09-03) * column 1, line 55 - line 64 * * column 2, line 3 - line 32 * * column 3, line 9 - column 4, line 28 * -----	1-7	INV. G07C3/08 G01R21/06
A	US 4 920 549 A (DINOVO JOHN [US]) 24 April 1990 (1990-04-24) * column 1, line 5 - line 15 * * column 5, line 27 - line 50 * -----	1	
A	US 2006/036380 A1 (LEE CHENG-LIANG [TW] ET AL) 16 February 2006 (2006-02-16) * paragraph [0007] * * figures 1-4 * * paragraph [0015] - paragraph [0020] * -----	1	
A	US 2008/042640 A1 (SUN KE [CN] ET AL) 21 February 2008 (2008-02-21) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			G07C G01R
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 July 2009	Examiner Paraf, Edouard
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

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

EP 09 15 4223

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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07-07-2009

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