



(51) International Patent Classification:

H04Q 9/00 (2006.01) **G01D 5/39** (2006.01)
G01D 4/00 (2006.01)

(21) International Application Number:

PCT/IN2012/000643

(22) International Filing Date:

26 September 2012 (26.09.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

3354/CHE/2011 27 September 2011 (27.09.2011) IN

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

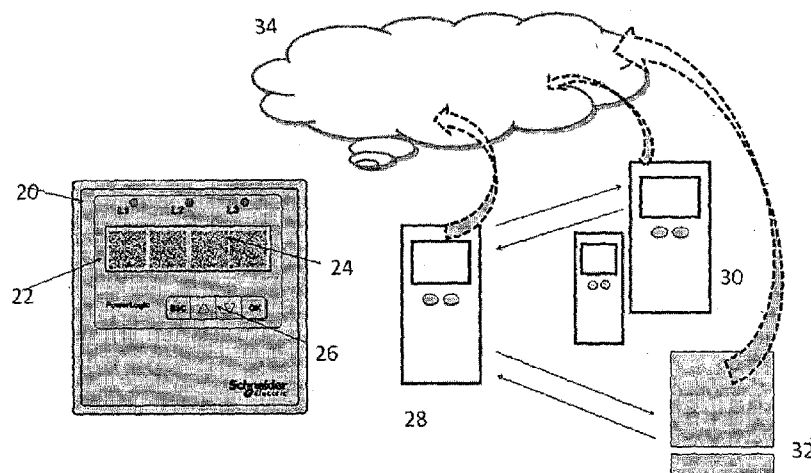
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BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
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TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

(54) Title: DYNAMIC QUICK RESPONSE (QR) CODE WITH EMBEDDED MONITORING DATA FOR EASE OF MOBILE ACCESS



(57) Abstract: A method and a system for monitoring at least one parameter by a monitoring device 20 are disclosed. The monitoring device 20 comprises a graphical LCD display unit 22, at least one QR code 24, and/or keys 26. The at least QR code is displayed in the LCD display unit 22. The parameter (12, 12a) is embedded in the QR code 24. The monitoring device 20 dynamically generates the QR code 24 with the change of the parameter (12, 12a). A mobile/handheld device 28 is used to scan and decode each of the dynamically generated QR code 24 to extract data about the at least one parameter. With the data dynamically updating, a user has to be physically in front of the monitoring device 20, thereby ensuring the security of the monitoring device 20. When the mobile device 28 is connected to the other devices 30, a computer 32, and a cloud server 34, the processing of the data related to the parameter is processed by these connected devices, thereby reducing the processing burden on the monitoring device 20 and the mobile device 28.



5. DYNAMIC QUICK RESPONSE (QR) CODE WITH EMBEDDED MONITORING DATA FOR EASE OF MOBILE ACCESS

FIELD OF THE INVENTION

10 The present invention relates generally to a monitoring device and more particularly relates to dynamic generation of the QR code in the metering/monitoring devices on its display, which can be scanned by a mobile/handheld device and be used to transfer this data across other devices, computer or/and cloud server.

15 BACKGROUND OF THE INVENTION

The monitoring device is used to measure several parameters related to it and updates the measured parameters in the display available. Due to the constraints in the display size, the parameters are grouped and displayed as many pages using
20 the keys available in the device.

FIG. 1 shows a monitoring device 10 according to a prior art system. In one embodiment, the monitoring device 10 is a digital meter. The monitoring device 10 is used to measure electrical parameters of the load connected to it and is also used to
25 diagnose the load. The monitoring device 10 will measure parameters (12, 12a) like voltage, current, apparent power, active power, reactive power, power factor, frequency and so forth. It also gives information about the different Phase currents available, different Phase voltages available, the direction of the current flow etc. 12a shows the navigation chart showing the various pages and the parameters (12, 12 a)
30 shown on each pages. These parameters (12, 12a) mentioned above are calculated by the monitoring device 10 at a specific interval for real time monitoring of the load. This data is further used to accumulate the energy counter, which records the energy consumption of the load for the given time.

35 The monitoring device will have a graphical LCD display unit 14 & some keys 16 for human interface to view the measured parameters (12, 12a). Some monitoring

device 10 will have a communication option through which the measured parameters (12, 12a) can be transferred to a remotely available computer. The number of parameters (12, 12a) that can be displayed depends on the size of the graphical display used. So to view more parameters (12, 12a) a user has to navigate through several pages using the keys 16 in front of the monitoring device. To analyze the data the user has to manually note down the data by navigating to several pages.

FIG. 2 is a flow diagram to illustrate the steps involved in the monitoring of the parameter by the monitoring device 10 according to the prior art system shown in FIG. 1. At step S100, load connected to the monitoring device 10 is measured. Some of the data related to the load is displayed on the LCD display unit 14 (S102). The user then presses the keys 16 to see rest of the measured data (S104). Or in other words, there is wait for the keys 16 to press by the user. When the keys 16 are pressed by the user, step S104 goes back to S102 to see some of the rest of the measured data related to the connected load.

Typically when a user is near a monitoring device and wants to see some set of data or information (12, 12a), he needs to navigate through the pages and note the parameters for the analysis. This is time consuming and may also lead to human errors. This is more difficult in the devices with smaller size displays. The cost of bigger display increases overall product cost but still have limitation of providing all the data in single page. Also for the monitoring devices without connectivity, it is difficult to analyze and share the data with others.

One alternative to overcome above problems is to use quick response (QR) codes. Various parameters are embedded in the QR code. When scanned and decoded by a mobile device, the parameters are displayed on screen of the mobile device. But the problem with use of these QR codes in the monitoring device 10 is that they provide static parameters or information like website link, text of information, or price of something.

Therefore, there exists a need for a monitoring device that provides a dynamically updating of the QR codes with the change in the embedded parameters.

Further, it would be desirable to provide for an increase in the number of parameters embedded in the QR codes.

SUMMARY OF THE INVENTION

5 An object of the invention is to provide for a monitoring device to provide a dynamically updating QR codes with the change in the embedded parameters.

10 Another object of the invention is to provide for an increase in the number of parameters embedded in the QR codes.

To achieve the above objects, disclosed herein is a monitoring device for monitoring at least one parameter that includes at least one display unit, at least one quick response (QR) code being displayed on the display unit, and at least one
15 parameter being embedded in the at least one QR code, the QR code being dynamically generated with change of the at least one parameter.

In some embodiments, the parameter is selected from a group comprising of a voltage, a current, an apparent power, an active power, a reactive power, a power
20 factor, a frequency of connected load, availability of different phase voltages, availability of different phase currents, direction of current flow, a link to a webpage, a price of a product, and a fault in the monitoring device.

In another embodiment, the quick response (QR) code is scanned and
25 decoded by a mobile device having a QR reader application installed therein, the mobile device showing the at least one parameter on its display after the step of scanning and display.

In a further embodiment, the mobile device sends parameter to at least one of
30 a connected devices, a computer, and a cloud server for analysis, thereby reducing processing by both the monitoring device and the mobile device.

In a still further embodiment, the analysis is performed in the mobile device using an application installed therein.

In some embodiments, when the monitoring device is not connected to a other devices/internet, the parameter is accessed on dashboard of the mobile device or on the dashboard of any other device connected to the mobile device through internet.

In another aspect of the invention, a method for monitoring at least one parameter by a monitoring device includes the steps of providing at least one display unit in the monitoring device, providing at least one quick response (QR) code being displayed on the display unit, the at least one parameter being embedded in the QR code, dynamically updating the QR code with change of at least one parameter, and scanning and decoding each of the dynamically generated QR code by a mobile device to extract data about the at least one parameter.

In some embodiments, the mobile device transmits data to a cloud server to provide accessibility to users, the cloud server being accessible worldwide.

In another embodiment, no back-end software is needed for viewing the parameter, thereby obviating need for connection and authentication.

It is to be understood that both the foregoing general description and the following detailed description of the present embodiments of the invention are intended to provide an overview or framework for understanding the nature and character of the invention as it is claimed. The accompanying drawings are included to provide a further understanding of the invention and are incorporated into and constitute a part of this specification. The drawings illustrate various embodiments of the invention and together with the description serve to explain the principles and operation of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and other advantages of the invention will be better understood and will become more apparent by

referring to the exemplary embodiments of the invention, as illustrated in the accompanying drawings, wherein

FIG. 1 shows a monitoring device according to a prior art system;

FIG. 2 is an example of flow diagram to illustrate the steps involved in the monitoring of the parameters by the monitoring device according to the prior art system shown in FIG. 1;

FIG. 3 is a diagram of a monitoring device according to an exemplary embodiment in accordance with the principles of the present invention;

FIG. 4 illustrates the monitoring device according to another exemplary embodiment in accordance with the principles of the present invention; and

FIG. 5 is a flow diagram illustrating the steps involved in monitoring of the parameters by the monitoring device according to an exemplary embodiment in accordance with the principles of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made to the exemplary embodiments of the invention, as illustrated in the accompanying drawings. Where ever possible, same reference numerals will be used to refer to the same or like parts.

FIG. 3 is a diagram of a monitoring device 20 according to an exemplary embodiment in accordance with the principles of the present invention. For the purpose of illustration, the monitoring device 20 is a digital meter. The digital meter 20 comprises a LCD display unit 22, a quick response (QR) codes 24 that are generated on the display unit 22, and keys 26. The keys 26 can be page up and page down keys used to navigating to different pages that display different parameters.

There is dynamic updating of the QR code 24 on the LCD display unit 22 of the digital meter 20, with increased number of parameters (12, 12a shown in FIG. 1), which can be customized to specific needs. This data can be captured by using mobile/hand held devices 28 (shown in FIG. 4) with a QR code reader. The digital meter 20 generates the QR code 24 for the measured parameters (12, 12a) like voltage, current, power energy, diagnostic etc. The generated QR code 24 is displayed on the graphical LCD display unit 22 for the user to read with the mobile phones having QR reader installed therein. For every cycle when the digital meter 20 finishes the calculation of the parameters (12, 12a), the QR Code is generated for the new changed values and updated on the LCD display unit 22. Thus the digital meter 20 incorporates the mechanism of generating the QR Code dynamically for the measured real time values. The QR Code 24 generated dynamically by the digital meter 20 will include all the useful data required for a user to understand & analyze about the behavior of the load connected to the digital meter 20. This overcomes the display limitation of having 2 or 3 data in one page which requires the user to navigate across the pages using the keys 16 available. The displayed data in QR Code format is read by a mobile device or any handheld devices 28 & can be processed further. This avoids the manual entry of the data from the digital meter 20 which in turn reduces the manual error in the data manipulation. The data can be used in various forms.

FIG. 4 illustrates the monitoring device 20 according to another exemplary embodiment in accordance with the principles of the present invention. In a preferred embodiment, the monitoring device 20 is a digital meter. The QR code 24 can now be scanned by a mobile/handheld device with a QR reader application installed therein. This QR scanning mobile device 28 can be stand alone or connected to net or connected to other devices 30 by any standard communication medium (Bluetooth, Wi-Fi, etc.). The data scanned by the mobile device 28 can be shared with other devices 30 through an electronic notification, like SMS. The data can be shared with other connected devices 30 or to a computer 32 by any standard medium like email. Further, the data related to the parameters (12, 12a) extracted by the mobile device 28 through scanning and decoding can be stored in the mobile device 28 itself or the connected device 30 or the computer 32 for further analysis.

Further, the data related to extracted parameters (12, 12a) can be pushed to a cloud server 34 to overcome accessibility as the cloud server 34 can be accessed worldwide. Further analysis includes drawings, making tables, making pie chart etc to interpret the pattern of various parameters (12, 12a) extracted by the mobile device 28. Whether the pattern shows an upward pattern or a downward pattern.

In case of any errors/malfunction/faulty settings, the metering/monitoring device 10 can generate a QR code (24) that represents that error data. This QR code 24 can also be scanned by the mobile/handheld devices 28, which can be shared across to other connected devices 30, computer 32 and the cloud server 34 through SMS, mail, net etc. for further analysis. The further analysis can be done in the mobile device 28 itself.

The QR code 24 can also be used for billing purpose in the utility meters. The utility meters or any other devices can be configured to generate a QR code to represent a present energy value and the previous energy values along with the other relevant data, such as meter owner, location, tariff, payment, due date, etc. This QR code is displayed on the meter/devices LCD display unit 22 and can be scanned by a mobile/handheld device. This data can be used in any of the above mentioned form.

The mobile device 28 doesn't actually need connected to a network or the internet for viewing information. This allows a user to view information in the usual dashboard online either on the mobile device 28 or if connected to other devices 30, then on the dashboard of the devices 30. This could be very useful during commissioning when devices which are not setup to the network yet. Further, security of the digital meter 20 is enhanced because with the data dynamically updating, the user physically has to be in front of the meter to view the QR code. In one embodiment, analysis of the data related to the parameters (12, 12a) is handled by a back end server like the cloud server 34, thereby reducing the processing burden of the monitoring device 20 and the mobile device 28. Further no back-end software is needed for viewing parameter, thereby obviating the need for connection and authentication.

FIG. 5 is a flow diagram illustrating the steps involved in monitoring of parameter by the monitoring device 20 according to an exemplary embodiment in accordance with the principles of the present invention. At step S200, the digital meter 20 measures the load connected to it and generate QR code corresponding to the measure load. The measured data in the form of QR code are displayed on the LCD display unit 22 (S202).

It is to be understood by a person of ordinary skill in the art that various modifications and variations may be made without departing from the scope and spirit of the present invention. Therefore, it is intended that the present invention covers such modifications and variations provided they come within the ambit of the appended claims and their equivalents.

WE CLAIM:

- 5 1. A monitoring device for monitoring at least one parameter, comprising:
at least one display unit;
at least one quick response (QR) code being displayed on the display unit;
and
at least one parameter being embedded in the at least one QR code, the QR
10 code being dynamically generated with change of the at least one parameter.
2. The monitoring device as claimed in claim 1, wherein the monitoring device is a digital meter.
- 15 3. The monitoring device as claimed in claim 1, wherein the parameter is selected from a group comprising of a voltage, a current, an apparent power, an active power, a reactive power, a power factor, a frequency of connected load, availability of different phase voltages, availability of different phase currents, direction of current flow, a link to a webpage, a price of a product, a fault in the monitoring device and/or
20 any parameter, information, analysis that the monitoring device can provide.
4. The monitoring device as claimed in claim 1, wherein the quick response (QR) code is scanned and decoded by a mobile device having a QR reader application installed therein, the mobile device showing the at least one parameter on its display
25 after the step of scanning and decoding.
5. The monitoring device as claimed in claim 4, wherein the mobile device sends parameter to at least one of a other connected devices, computer, and a cloud server for analysis, thereby reducing processing by both the monitoring device and
30 the mobile device.
6. The monitoring device as claimed in claim 4, wherein the analysis comprises at least one of drawing tables, creating graphs to interpret the at least one parameter.

7. The monitoring device as claimed in claim 4, wherein the analysis is performed in the mobile device using an application installed therein.

8. The monitoring device as claimed in claim 4, wherein no back-end software is needed for viewing the parameter, thereby obviating need for connection and authentication.

9. The monitoring device as claimed in claim 4, wherein when the monitoring device is not connected to a connection/internet, the parameter is accessed on dashboard of the mobile device or on the dashboard of any other device connected to the mobile device through internet

10. The monitoring device as claimed in claim 4, wherein a user has to be present in front of the monitoring device to view the QR code when data related to the parameter is continuously changing, thereby ensuring the security of the monitoring device and data related to the parameter.

11. The monitoring device as claimed in claim 4, wherein the mobile device shares the data related to the parameter with other users through an electronic notification.

12. The monitoring device as claimed in claim 4, wherein the mobile device transmits data to a cloud server to provide accessibility to users, the cloud server being accessible worldwide.

13. A method for monitoring at least one parameter by a monitoring device, comprising the steps of:

providing at least one display unit in the monitoring device;

providing at least one quick response (QR) code being displayed on the display unit, the at least one parameter being embedded in the QR code;

dynamically generating the QR code with change of at least one parameter; and

scanning and decoding each of the dynamically generated QR code by a mobile device to extract data about the at least one parameter.

14. The method as claimed in claim 13, comprising selecting parameter from a group comprising of a voltage, a current, an apparent power, an active power, a reactive power, a power factor, a frequency of connected load, availability of different phase voltages, availability of different phase currents, direction of current flow, a link to a webpage, a price of a product, a fault in the monitoring device and/or any parameter, information, analysis that the monitoring device can provide.

15. The method as claimed in claim 13, comprising providing the mobile device with a QR reader application to scan and decode the QR code and mobile device showing the at least one parameter on its display after the step of scanning and decoding.

16. The method as claimed in claim 15, comprising sending by the mobile device, the parameter to at least one of a plurality of connected devices, a computer, and a cloud server for analysis.

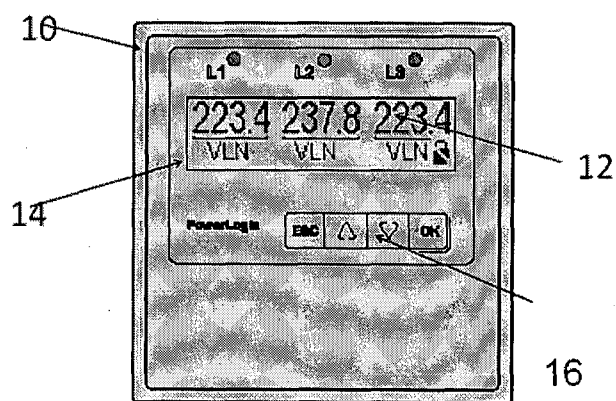
17. The method as claimed in claim 15, wherein a user has to be present in front of the monitoring device to view the QR code when data related to the parameter is continuously changing, thereby ensuring the security of the monitoring device and data related to the parameter.

18. The method as claimed in claim 15, wherein the mobile device shares the data related to the parameter with other users through an electronic notification.

19. The method as claimed in claim 15, wherein the mobile device transmits data to a cloud server to provide accessibility to users, the cloud server being accessible worldwide.

20. The method as claimed in claim 15, wherein no back-end software is needed for viewing the parameter, thereby obviating need for connection and authentication.

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RMS	3601	2883	0.800
KVA	KVA	KVA	PF
2883	2157	0.800	
KVA	KVA	PF	
1200	1199	1202	
KVAR	KVAR	KVAR	
961.6	958.0	964.1	
KWH	KWH	KWH	
718.6	721.0	718.1	
KVARH	KVARH	KVARH	
0.800	0.799	0.802	
PF1	PF2	PF3	
Energy	987654321.012		
KWH	KWH		
987654321.012	KWH		
987654321.012	KVARH		
0000005059	Run M. Miss		
0000005059	On M. Miss		
000000	Interrupts		

12a

FIG. 1

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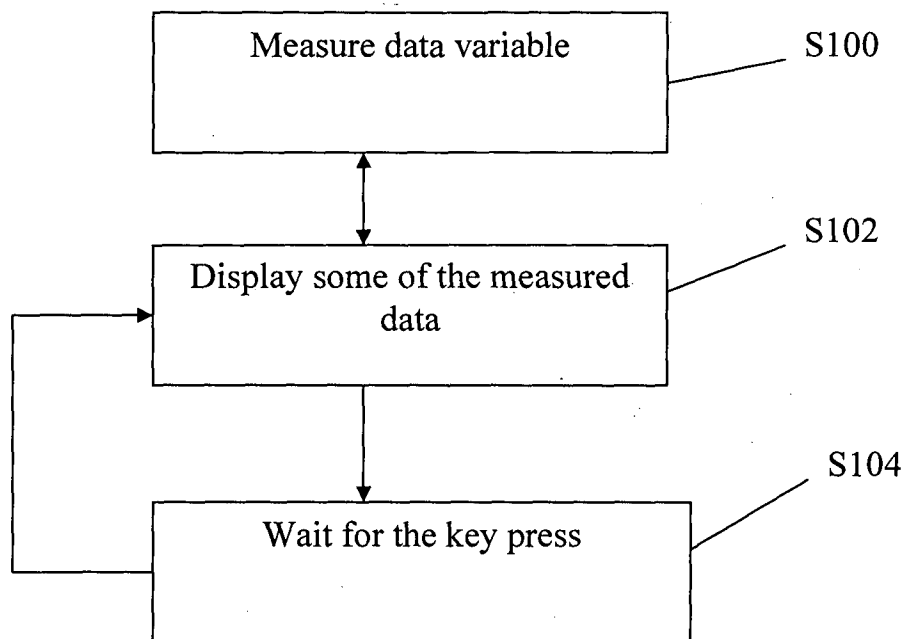


FIG. 2

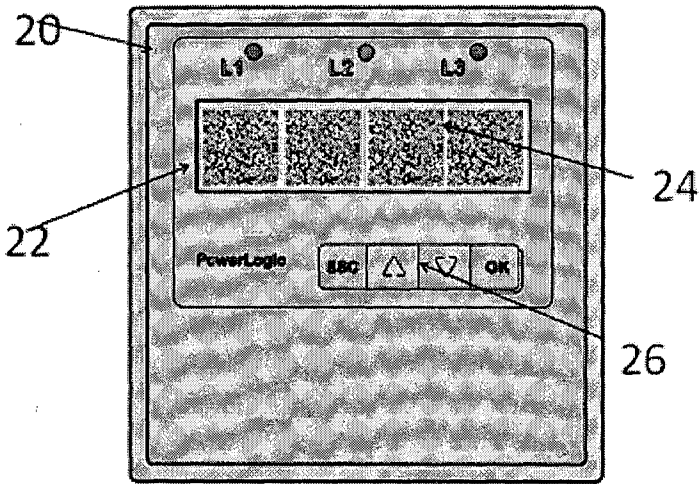


FIG. 3

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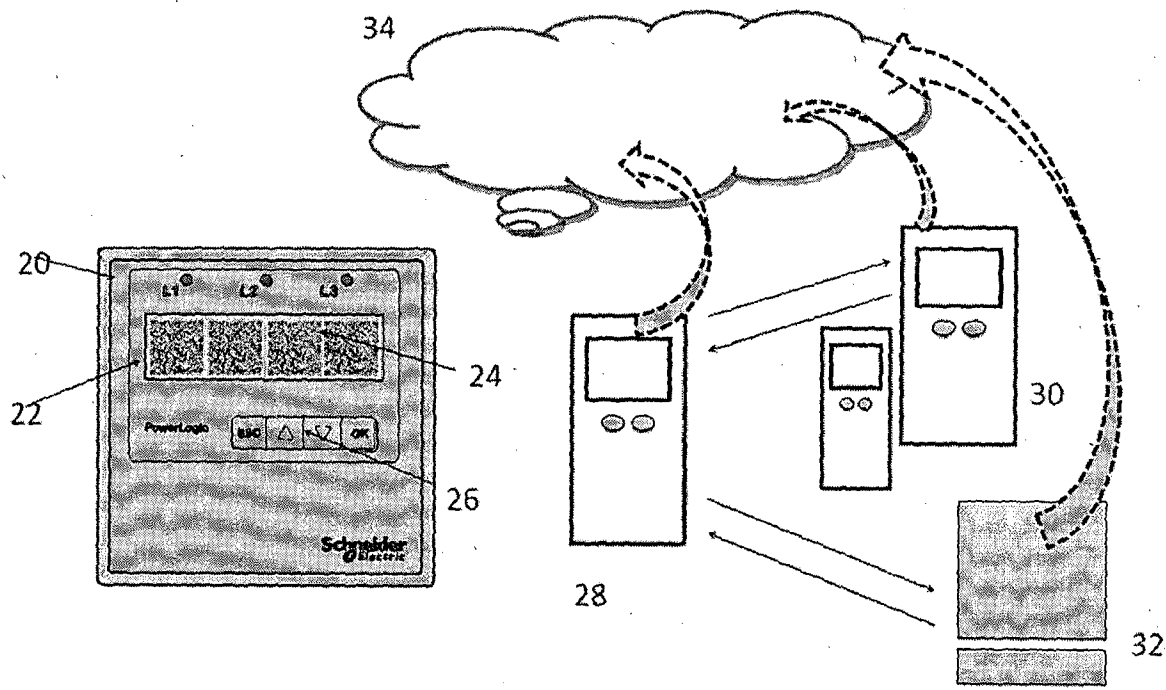


FIG. 4

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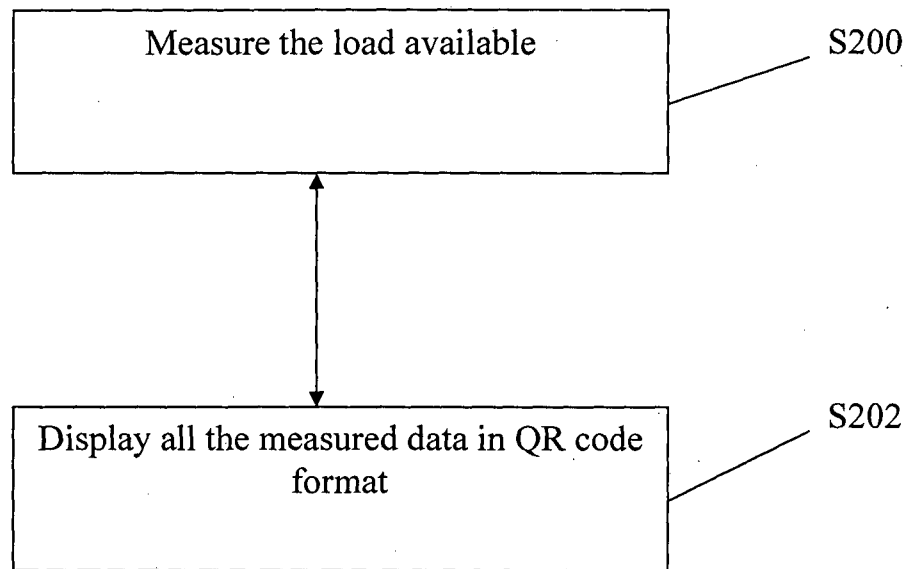


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/IN2012/000643

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04Q9/00 G01D4/00 G01D5/39
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G01D G06K H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/078482 A1 (BRADFORD GLENN PATTON [US]) 1 April 2010 (2010-04-01)	1
Y	paragraph [0010] - paragraph [0014] paragraph [0023] - paragraph [0026] paragraph [0029] - paragraph [0032] claims 1-3, 8, 10	2-20
X	US 2006/071077 A1 (SUOMELA HARTTI [US] ET AL) 6 April 2006 (2006-04-06)	1
Y	paragraph [0008] - paragraph [0011] paragraph [0032] - paragraph [0036] paragraph [0038] - paragraph [0041] paragraph [0044]	2-20
A	EP 1 757 222 A1 (ARKRAY INC [JP]) 28 February 2007 (2007-02-28) paragraph [0006] - paragraph [0011] paragraph [0015] paragraph [0023] - paragraph [0026]	1,13



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

24 January 2013

Date of mailing of the international search report

01/02/2013

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IN2012/000643

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010078482 A1	01-04-2010	NONE	

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