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

(11) **EP 3 539 922 A1**

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.09.2019 Bulletin 2019/38

(21) Application number: **19162787.6**

(22) Date of filing: **14.03.2019**

(51) Int Cl.:
B67D 7/32 *(2010.01)* ***B67D 7/78*** *(2010.01)*
F04B 23/00 *(2006.01)* ***G01F 23/00*** *(2006.01)*

(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:
KH MA MD TN

(30) Priority: **14.03.2018 IT 201800003554**

(71) Applicant: **GM-TECH S.r.l.**
59100 Prato (PO) (IT)

(72) Inventors:
- **BARSI, Gianni**
  59100 Prato (PO) (IT)
- **GRASSI, Matteo**
  59100 Prato (PO) (IT)

(74) Representative: **Zoli, Filippo**
BRUNACCI & PARTNERS S.r.l.
Via Scaglia Est, 19-31
41126 Modena (IT)

(54) CONTROL SYSTEM FOR FILLING STATIONS

(57) The control system (1) for filling stations comprises:
- a plurality of level sensors (2) of fuel fluid (3), each of which is connected to at least one dispensing assembly (5), each of the level sensors (2) being configured to generate at least one warning signal;
- control means configured to deactivate at least one of the dispensing assemblies (5) depending on said warning signal;
wherein said control means comprise:
- one control board (7) comprising:
- a plurality of inputs (8), each of which is configured to receive the warning signal;
- a plurality of outputs (9), each of which is connected to one of the dispensing assemblies (5);
- one processing unit (10, 11) configured to generate at least one blocking signal and to transmit it to at least one of the outputs (9) depending on at least one warning signal, each of the outputs (9) being configured to transmit the blocking signal to one of the dispensing assemblies (5).

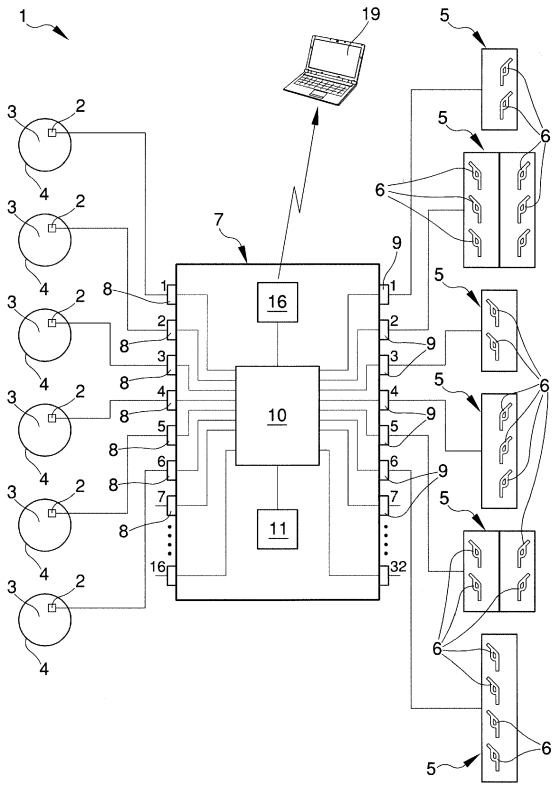


Fig.1

EP 3 539 922 A1

Description

[0001] The present invention relates to a control system for filling stations.

[0002] Several control systems for filling stations are known which are used compulsorily by law at all fuel filling stations with the aim of shutting down the supply of fuel in the event that the latter is close to depletion.

[0003] In particular, the fuel fluid is generally stored in special tanks, which are connected in a fluid-operated manner to the corresponding dispensing assemblies generally installed in the yards of the filling stations and used to supply the vehicles with fuel.

[0004] Generally, known control systems comprise an electric panel generally defined as "minimum level panel" and provided with a plurality of electronic components and safety devices, e.g. of the type of active Zener barriers and/or intrinsic barrier relays, connected in series and/or in parallel to each other in order to implement a control logic of the AND/OR type adapted to command the dispensing assemblies.

[0005] In addition, the known control systems use a plurality of level sensors connected to the minimum level panel and arranged inside the tanks containing the fuel fluid to measure the level thereof.

[0006] This way, when the fuel fluid is close to depletion, the corresponding level sensor generates a minimum level signal that is processed by the minimum level panel, which in turn generates a signal blocking the dispensing assemblies connected in a fluid-operated manner to the tank containing the fuel fluid under depletion.

[0007] The control systems made this way allow implementing a control logic adapted to deactivate one or more dispensing assemblies in the event of the fuel fluid contained inside one or more of the tanks being close to depletion.

[0008] The control systems of this type are however subject to improvements linked to the implementation of the control logic adapted to command the dispensing assemblies.

[0009] In fact, the control logic made by the known control systems is a control logic of the wired type, i.e., all the electronic components and safety devices of the minimum level panel are specifically connected in series and/or in parallel with each other depending on the characteristics of the filling station, such as the number of level sensors and the number of dispensing assemblies installed.

[0010] In other words, the control logic should be planned and installed specifically for each filling station.

[0011] In fact, the number of level sensors and of dispensing assemblies used by the filling station is substantially proportionate to the number of electronic components and safety devices provided by the minimum level panel and to the complexity of wiring of the latter.

[0012] For this reason, the minimum level panel requires long planning and installation times by a specialized operator.

[0013] In addition, the control systems of this type are not very flexible, e.g. in relation to the change in the number of tanks and/or dispensing assemblies of the filling station.

[0014] In fact, the installation of an additional dispensing assembly would require making drastic changes to the wiring of the minimum level panel with the aim of changing the control logic, integrating the electronic components thereof and the additional safety devices necessary to achieve a control logic that is able to control the dispensing assembly added in line with the others.

[0015] It is also well known that the electric panels of this type can be easily tampered with through more or less complex modifications to the wiring of the electronic components and safety systems.

[0016] For these reasons, the planning and installation of the control system of this type is particularly complex and has clear limitations in terms of integration of additional tanks and/or dispensing assemblies.

[0017] The main aim of the present invention is to devise a control system for filling stations that can be installed quickly and easily.

[0018] Another object of the present invention is to devise a particularly flexible control system for filling stations that can be used to control a wide variety of filling stations regardless of their number of tanks and dispensing assemblies. An additional object of the present invention is to devise a control system for filling stations capable of detecting any tampering with the system itself.

[0019] An additional object of the present invention is to devise a control system for filling stations that allows overcoming the mentioned drawbacks of the prior art in a simple, rational, easy, effective to use and cost effective solution.

[0020] The above objects are achieved by the present control system for filling stations having the characteristics of claim 1.

[0021] Other characteristics and advantages of the present invention will be more evident from the description of a preferred, but not exclusive, embodiment of a control system for filling stations, illustrated by way of an indicative, but nonlimiting example, in the attached tables of drawings in which:

Figure 1 is a schematic representation of the system according to the invention;

Figure 2 is a schematic representation of the filling station controlled by the system according to the invention;

Figures 3 to 9 are graphic representations of some software screens of the system according to the invention;

Figure 10 is a graphic representation of a system configuration document according to the invention.

[0022] With particular reference to these figures, reference numeral 1 globally indicates a control system for filling stations.

[0023] The control system 1 for filling stations comprises:

- a plurality of level sensors 2 of fuel fluid 3 contained inside a plurality of tanks 4, each of which is connected in a fluid-operated manner to at least one dispensing assembly 5 provided with at least one dispenser element 6 of the fuel fluid 3, each of the level sensors 2 being configured to generate at least one warning signal when the level of fuel fluid 3 drops below a predetermined minimum level value;
- control means for controlling the dispensing of the fuel fluid 3 configured to deactivate at least one of the dispensing assemblies 5 depending on the warning signal.

[0024] Appropriately, each tank 4 contains a different type of fuel fluid 3, such as e.g. gasoline, diesel, LPG (liquid propane gas) and the like.

[0025] In addition, a level sensor 2, e.g. of the float type, is inserted into each tank 4, as shown in Figure 2.

[0026] Advantageously, each dispensing assembly 5 comprises at least one pumping assembly immersed at least partly in the fuel fluid 3 and connected in a fluid-operated manner to a corresponding dispenser element 6.

[0027] Preferably, the dispenser element 6 is a dispensing gun adapted to fill a wide variety of motor vehicles with fuel.

[0028] With reference to the embodiment shown in the illustrations, the control means are used to control the dispensing of the fuel fluid 3 through six dispensing assemblies 5 connected in a fluid-operated manner to 6 tanks 4.

[0029] Alternative embodiments of the system 1 cannot however be ruled out, wherein the control means are used to control a different number of dispensing assemblies 5 connected to a different number of tanks 4, for example wherein the control means control thirty-two dispensing assemblies connected to sixteen tanks 4.

[0030] In particular, the control means comprise:

- at least one control board 7 comprising:
  - a plurality of inputs 8, each of which is connected to one of the level sensors 2 and is configured to receive the warning signal generated by the latter;
  - a plurality of outputs 9, each of which is connected to one of the dispensing assemblies 5;
  - at least one processing unit 10, 11 for processing the warning signal, the processing unit being connected to the inputs 8 and to the outputs 9, configured to generate at least one blocking signal and to transmit it to at least one of the outputs 9 depending on at least one warning signal received by at least one of the inputs 8, each of the outputs 9 being configured to transmit the blocking signal to one of the dispensing assemblies 5.

[0031] Advantageously, the system 1 comprises connection means to power supply means, such as a home or industrial power supply network, and configured to power the system itself.

[0032] The connection means are preferably electrically connected to the control board 7, so as to power the processing unit 10, 11.

[0033] With reference to the embodiment shown in the illustrations, the processing unit 10, 11 comprises at least one microcontroller 10 and at least one storage unit 11 electronically connected to the microcontroller 10.

[0034] The control board 7 preferably comprises sixteen inputs 8 and thirty-two outputs 9 connected to the microcontroller 10, as shown in Figure 1.

[0035] Alternative embodiments of the control board 7 cannot however be ruled out, wherein the latter comprises a different number of inputs 8 and outputs 9, for example, wherein it comprises eight inputs 8 and sixteen outputs 9 or wherein it comprises thirty-two inputs 8 and sixty-four outputs 9.

[0036] The control board 7 preferably comprises at least a first control module on which the inputs 8 are made and at least a second control module that can be electronically connected to the first one and on which the outputs 9 are made. Furthermore, the control board 7 comprises a first control module on which the sixteen inputs 8 are made and to which four second control modules are electronically connected, on each of which eight outputs 9 are made. Alternative embodiments of the control board 7 cannot however be ruled out, e.g. wherein the latter comprises a first control module and a second control module.

[0037] This way, the first control module can be connected to a variable number of second control modules depending on the number of dispensing assemblies 5 to be connected to the control board 7.

[0038] The inputs 8 can be advantageously connected to different devices from the level sensors 2, such as e.g. sensors for the chemical analysis of the fuel fluids 3 contained in tanks or status sensors of the hydraulic system for pumping these fluids.

[0039] In fact, it often happens that the filling stations are provided with a smaller number of tanks 4 than the number of inputs 8 of the control board 7 and it is therefore possible, according to the invention, to connect the inputs 8 remained free to other sensors or devices depending on the characteristics of the filling station, for example according to the fuel fluids 3 contained in tanks 4 or to the hydraulic characteristics of the dispensing assemblies 5.

[0040] Conveniently, the control means comprise user graphic interface means configured to logically connect at least one of the inputs 8 to at least one of the outputs 9, the control board 7 transmitting the blocking signal to the outputs 9 logically connected to at least one of the

inputs 8 receiving the warning signal. In particular, the graphic interface means comprise at least one connecting module, e.g. of the type of a USB module, made on the control board 7 and connectable to a hardware device, such as a computer, and at least one dedicated software installed on the hardware device and configured to program the control board 7.

[0041] In addition, the graphic interface means comprise at least one graphic representation 12 of the logical connections between the inputs 8 and the outputs 9, the graphic representation 12 being configurable by a user.

[0042] The graphic representation 12 advantageously comprises a plurality of selectable/de-selectable graphic elements 18 corresponding to the inputs 8, the selection/de-selection of the graphic elements 18 logically connecting/disconnecting at least one of the inputs 8 to/from at least one of the outputs 9.

[0043] In particular, the graphic representation 12 can be viewed through the hardware device and is provided with one or more setup screens of the logical connections between the inputs 8 and the outputs 9.

[0044] In addition, the graphic representation 12 preferably comprises a number of setup screens equal to the number of second control modules connected to the first control module.

[0045] In particular, each of the setup screens comprises a plurality of alphanumeric indicators 13 corresponding to the eight outputs of a second control module.

[0046] In addition, at each of said alphanumeric indicators 13 sixteen graphic elements 18 are arranged so as to create a logical scheme that puts each input 8 in relation with each output 9, as shown in Figure 3.

[0047] The control means advantageously comprise processing means for processing the blocking signals, the dispensing assemblies 5 being provided with at least one operational connection to at least one of the outputs of the normally closed or of the normally open type and the processing means processing the blocking signal to open such an operational connection when of the normally closed type and to close such an operational connection when of the normally open type.

[0048] In fact, depending on the technical and commercial choices made by the companies producing dispensing assemblies 5, the operational connections of the dispensing assemblies 5 are generally made of the normally closed type or of the normally open type.

[0049] Consequently, the characteristics of the blocking signal must be different depending on the type of connection of each of the dispensing assemblies 5. This way, regardless of the type of connection of the dispensing assemblies 5, the control means, through the processing means, are able to block the dispensing of the fuel fluid 3.

[0050] Conveniently, the graphic interface means comprise at least one graphic table 14 provided with a plurality of selectable/de-selectable graphic components 15 corresponding to the operational connections, the graphic components 15 being selected/deselected according to whether the operational connection is of the normally closed type or of the normally open type.

[0051] In particular, similarly to what has been described for the graphic representation 12, the graphic table 14 comprises one or more setting pages of the type of a connection of each of the dispensing assemblies 5.

[0052] With reference to the embodiment shown in the illustrations, the graphic table 14 preferably comprises a number of setting screens equal to the number of second control modules connected to the first control module.

[0053] In particular, each of the setting screens comprises a plurality of alphanumeric strings 17 corresponding to the eight outputs of a second module.

[0054] In addition, at each of the alphanumeric strings 17 is arranged a graphic component 15, e.g. of the type of a drop-down menu, through which it is possible to select the type of operational connection of the corresponding dispensing assembly 5, as shown in Figure 4, in which the letters "NC" and "NO" are used to indicate a normally closed connection and a normally open connection, respectively.

[0055] The control board 7 conveniently comprises connecting means 16 to at least one external computer network provided with at least one remote access unit to the graphic interface means.

[0056] The connecting means 16 are preferably of the type of a network card configured to connect the system 1 to the Internet.

[0057] This way, the graphic interface means are always accessible remotely to one or more specialized operators who are able to carry out, for example, monitoring and configuration operations of the system 1.

[0058] Advantageously, the control means can comprise command means of each of the dispenser elements 6 configured to deactivate at least one of the dispenser elements 6 of the fuel fluid 3 depending on the blocking signal.

[0059] In particular, the command means comprise a command module for each of the dispensing assemblies 5.

[0060] In addition, each command module is placed between an output 9 and the corresponding dispensing assembly 5 and is configured to process the blocking signal and to deactivate the dispenser element 6 connected in a fluid-operated manner to the tank 4 containing the fuel fluid 3 that has reached the minimum preset level.

[0061] Advantageously, the graphic interface means are configured to logically connect at least one of the outputs 9 to at least one of the dispenser elements 6.

[0062] In particular, as described with reference to the graphic representation 12, the graphic interface means comprise at least one graphic schematization, not shown in the figures, provided with a plurality of selectable/de-selectable graphic blocks corresponding to the outputs 9 and to the dispenser elements 6. In addition, an operator can select/de-select the graphic blocks in order to create a logical connection between each of the outputs 9 and at least one of the dispenser elements 6.

[0063] This way, the reception of a blocking signal does not deactivate the entire dispensing assembly 5, but selectively deactivates one or more dispenser elements 6 leaving the others operational.

[0064] The system 1 conveniently comprises at least one switch device interposed between each of the outputs 9 and each of the dispensing assemblies 5, the switch device being configurable between one closed state, in which the switch device is closed and operatively connects the dispensing assembly 5 to the control board 7, and an open state, in which the switch device is open and disconnects the dispensing assembly 5 from the control board 7.

[0065] Preferably, the switch device is of the type of a relay.

[0066] Advantageously, the control means comprise at least one layout interface 20 provided with a plurality of selectable/de-selectable graphic indicators 21 corresponding to the dispensing assemblies 5, the selection/de-selection of the graphic indicators 21 configuring the switch element in the open state and in the closed state, respectively.

[0067] In particular, a series of alphanumeric characters identifying the dispensing assemblies 5 are shown at each of the graphic indicators 21.

[0068] The layout interface 20 advantageously comprises a plurality of management screens that can be accessed by at least one authorized user via a remote connection from a hardware device, e.g. via the Internet connection of a computer.

[0069] In addition, the management screens comprise a plurality of status indicators of the dispensing assemblies 5 as shown in Figure 8, in which timers are shown which are configurable to monitor, e.g., the time during which the dispensing assemblies 5 are connected to or disconnected from the control board 7, or to keep the switch device in the closed state or open state for a certain period of time.

[0070] Conveniently, the system 1 also comprises automatic configuration means of the system itself.

[0071] In particular, the automatic configuration means are configured to save all the settings of the control means, i.e. to store the logical connections between the inputs 8 and the outputs 9 and/or the type of operational connection of the dispensing assemblies 5 set by the operator through the graphic representation 12 and/or the graphic table 14.

[0072] The automatic configuration means preferably store the settings of the control means under the form of a configuration file, which can be used to automatically set the control means without forcing the operator to use the graphic interface means.

[0073] In addition, the automatic configuration means are configured to be able to restore the factory settings of the system 1.

[0074] The graphic interface means preferably comprise a plurality of configuration graphic representations, each of which is provided with a plurality of graphic classification blocks to be filled in, for example through the hardware device, depending on the characteristics of the filling station, such as e.g. the type of fuel fluid 3 that contains each individual tank 4, the characteristics of each individual dispensing assembly 5, in this case whether of the "single" or "MPD"

[0075] (Multi Product Dispenser) type, and/or the data of the filling station, such as the operator's personal data and/or the domicile of the station itself, as shown in Figure 4 and Figure 5.

[0076] In particular, the words "single" or "MPD" are meant to indicate the number of hydraulic connections of the dispensing assemblies 5 to the tanks 4, i.e. the number of fuel fluids 3 that can be delivered by a specific dispensing assembly 5, as shown in Figure 4.

[0077] The graphic interface means also comprise verification means for verifying the connections of the inputs 8 to the tanks 4 and of the outputs 9 to the dispensing assemblies, as shown in Figures 6 and 7, in which two screens are shown, created according to the aesthetic and structural graphic principles used to create the graphic representation 12.

[0078] In particular, these screens allow one or more tests to be carried out in order to verify the soundness of the logical connections and of the physical connections of the inputs 8 and the outputs 9.

[0079] Advantageously, the control means comprise alarm means connected to the control board 7 and configured to send at least one alarm signal to at least one remote station 19 by means of the connecting means 16, the alarm signal being sent to the remote station 19 when at least one of the graphic elements 18 is selected or deselected.

[0080] The alarm means can be preferably configured to transmit an alarm signal to the remote station 19 under different circumstances, for example, the alarm means can be provided with a connection to a security cabin containing the control means and be configured to transmit an alarm signal in case the cabin is open or tampered with.

[0081] In the same way, the alarm means can be provided with additional connections to other components of the system 1, e.g. as in the control board 7. Conveniently the remote station 19 may be any device provided with an Internet connection.

[0082] In fact, the alarm means transmit the alarm signal by means of the connecting means 16, which through the Internet connection can in turn transmit the alarm signal to any remote station 19 provided with an Internet connection, such as e.g. a smart-phone, a computer, a tablet or the like.

[0083] In addition, alternative embodiments of the alarm means cannot be ruled out, e.g. wherein the generation of the alarm signal is due to different causes, such as e.g. the lack of power by the power supply means or even in the event of tampering with the system 1.

[0084] In addition, the control means comprise stop means for stopping the dispensing of all the dispensing

assemblies 5 of the system 1.

[0085] In particular, the stop means are configured to block the dispensing of the fuel fluid 3 by the dispensing assemblies 5 when the power supply to the control board 7 fails.

[0086] This way, in the event of a power failure or even in the event of the system 1 being tampered with, all dispensing assemblies are blocked.

[0087] In addition, in the event of the system 1 being re-powered and not being tampered with, the dispensing assemblies 5 are re-powered.

[0088] The stop means preferably coincide with the processing unit 10, 11, which transmits the blocking signal to all the dispensing assemblies 5 in the event of failure, for whatever reason, of the power supply to the control board 7. Alternative embodiment of the stop means cannot however be ruled out, for example wherein the stop means are an electronic board connected to the control board.

[0089] In particular, the graphic interface means comprise at least one selection block of the graphic type, for example made on one of the setup screens of the graphic representation 12, the selection/de-selection of which enables/disables the stoppage of the dispensing assemblies 5 in case of power failure of the control board 7 by the stop means, as shown in Figure 4.

[0090] Conveniently, the system 1 comprises auxiliary power supply means provided with at least one electric charge accumulator and configured to supply the control board 7.

[0091] In particular, the auxiliary power supply means are electrically connected to the control board 7 and are configured to supply power to the latter in the event of a power failure from the power supply means.

[0092] Preferably, the auxiliary power supply means are of the type of an uninterruptible power source positioned between the connection means to the power supply means and the control board 7.

[0093] The configuration method of the invention and its operation are described below.

[0094] The configuration method of at least one system 1 comprises at least the steps of:

- connecting the inputs 8 of the control board 7 to the level sensors 2;
- connecting the outputs 9 of the control board 7 to the dispensing assemblies 5;
- logically connecting at least one of the inputs 8 to at least one of the outputs 9 by means of the graphic interface means.

[0095] In particular, logically connecting comprises at least one step of assignment of at least one of the logic connections through the selection of at least one of the graphic elements 18 of the graphic representation 12.

[0096] Advantageously, the assignment comprises a step of connecting to the graphic interface means that involves connecting the hardware device, in this case a computer, to the control board 7.

[0097] In addition, the connection described above can be made by means of the physical connection of the hardware device to the USB module, e.g. by means of a corresponding USB cable, or by means of a wireless connection, e.g. by means of an Internet connection, of the hardware device to the remote access unit.

[0098] This way, a specialized user can access the dedicated software and configure the control board 7 through the selection/de-selection of the graphic elements 18 and of the graphic components 15.

[0099] In particular, the data related to the configuration of the control board 7, i.e. all the logical connections made by means of the selection of the corresponding graphic elements 18, graphic components 15 and graphic blocks, are saved inside the storage unit 11 and can be viewed by means of the graphic interface means.

[0100] In addition, the graphic interface means allow displaying a variety of information relating to the status of the system 1, such as e.g. the status of each level sensor 2, as shown in Figure 9, which indicates whether the minimum preset level of the fuel fluid 3 has been reached with reference to the corresponding tanks 4.

[0101] In addition, the saved data are processed by the system 1, which produces a printable document listing the logical connections made by the operator and which can be used to issue a configuration certificate of the system 1 to the holder of the filling station, as shown in Figure 10.

[0102] Once this configuration has been reached, each time the level of fuel fluid 3 in the tank 4 drops below the minimum level, the corresponding level sensor 2 sends the input alarm signal to the control board 7, which processes the warning signal and generates a corresponding blocking signal.

[0103] In particular, the processing unit 10, 11 transmits the blocking signal to all the outputs logically connected to the input 8 that received the warning signal.

[0104] This way, the dispensing assemblies 5 connected to the outputs 9 that receive the blocking signal are deactivated, i.e. they no longer dispense the fuel fluid 3. It has in practice been found that the described invention achieves the intended objects.

[0105] In particular, it is underlined that the use of the control board allows the system to be installed quickly and easily, significantly reducing the long wiring times required for the installation of known control systems.

[0106] In addition, the control board in combination with the graphic interface means make the system particularly flexible, i.e., the tanks or the dispensing assemblies that are added to the filling station are easily integrated into the control logic implemented by the control means.

[0107] In addition, the connecting means in combination with the alarm means allow monitoring substantially in real time the status of the system and allow detecting certain types of tampering of the latter.

Claims

1. Control system (1) for filling stations, comprising:

   - a plurality of level sensors (2) of fuel fluid (3) contained inside a plurality of tanks (4), each of which is connected in a fluid-operated manner to at least one dispensing assembly (5) provided with at least one dispenser element (6) of said fuel fluid (3), each of said level sensors (2) being configured to generate at least one warning signal when the level of said fuel fluid (3) drops below a predetermined minimum level value;
   - control means for controlling the dispensing of said fuel fluid (3) configured to deactivate at least one of said dispensing assemblies (5) depending on said warning signal;

   characterized by the fact that said control means comprise:

   - at least one control board (7) comprising:

     - a plurality of inputs (8), each of which is connected to one of said level sensors (2) and is configured to receive said warning signal generated by the latter;
     - a plurality of outputs (9), each of which is connected to one of said dispensing assemblies (5);
     - at least one processing unit (10, 11) for processing said warning signal connected to said inputs (8) and to said outputs (9), configured to generate at least one blocking signal and to transmit it to at least one of said outputs (9) depending on at least one warning signal received by at least one of said inputs (8), each of said outputs (9) being configured to transmit said blocking signal to one of said dispensing assemblies (5).

2. System (1) according to claim 1, **characterized by** the fact that said control means comprise user graphic interface means configured to logically connect at least one of said inputs (8) to at least one of said outputs (9), said control board (7) transmitting said blocking signal to said outputs (9) logically connected to at least one of said inputs (8) receiving said warning signal.

3. System (1) according to one or more of the preceding claims, **characterized by** the fact that said graphic interface means comprise at least one graphic representation (12) of the logical connections between said inputs (8) and said outputs (9), said graphic representation (12) being configurable by a user.

4. System (1) according to one or more of the preceding claims, **characterized by** the fact that said graphic representation (12) comprises a plurality of selectable / de-selectable graphic elements (18) corresponding to said inputs (8), the selection / de-selection of said graphic elements (18) logically connecting / disconnecting at least one of said inputs (8) to / from at least one of said outputs (9).

5. System (1) according to one or more of the preceding claims, **characterized by** the fact that said control means comprise processing means for processing said blocking signals, said dispensing assemblies (5) being provided with at least one operational connection to at least one of said outputs of the normally closed or of the normally open type and said processing means processing said blocking signal to open said operational connection when of the normally closed type and to close said operational connection when of the normally open type.

6. System (1) according to one or more of the preceding claims, **characterized by** the fact that said graphic interface means comprise at least one graphic table (14) provided with a plurality of selectable / de-selectable graphic components (15) corresponding to said operational connections, said graphic components (15) being selected / deselected according to whether said operational connection is of the normally closed type or of the normally open type.

7. System (1) according to one or more of the preceding claims, **characterized by** the fact that said processing unit (10, 11) comprises at least one microcontroller (10) and at least one storage unit (11) electronically connected to said microcontroller (10).

8. System (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises auxiliary power supply means provided with at least one electric charge accumulator and configured to supply said control board (7).

9. System (1) according to one or more of the preceding claims, **characterized by** the fact that said control board (7) comprises connecting means (16) to at least one external computer network provided with at least one remote access unit to said graphic interface means.

10. System (1) according to one or more of the preceding claims, **characterized by** the fact that said control means comprise alarm means connected to said control board (7) and configured to send at least one alarm signal to at least one remote station (19) by means of said connecting means (16), said alarm signal being sent to said remote station (19) when at least one of said graphic elements (18) is selected or deselected.

11. System (1) according to one or more of the preceding

claims, **characterized by** the fact that it comprises at least one switch device interposed between each of said outputs (9) and each of said dispensing assemblies (5), said switch device being configurable between one closed state, in which said switch device is closed and operatively connects said dispensing assembly (5) to said control board (7), and an open state, in which said switch device is open and disconnects said dispensing assembly (5) from said control board (7).

12. System (1) according to one or more of the preceding claims, **characterized by** the fact that said control means comprise at least one layout interface (20) provided with a plurality of selectable / de-selectable graphic indicators (21) corresponding to said dispensing assemblies (5), the selection / de-selection of said graphic indicators (21) configuring said switch element in said open state and in said closed state, respectively.

13. Configuration method of at least one system (1) according to one or more of claims from 1 to 12, comprising at least the steps of:

- connecting said inputs (8) of the control board (7) to said level sensors (2);
- connecting said outputs (9) of the control board (7) to said dispensing assemblies (5);
- logically connecting at least one of said inputs (8) to at least one of said outputs (9) by means of said graphic interface means.

14. Configuration method according to claim 13, **characterized by** the fact that said logically connecting comprises at least one step of assignment of at least one of said logic connections through the selection of at least one of said graphic elements (18) of said graphic representation (12).

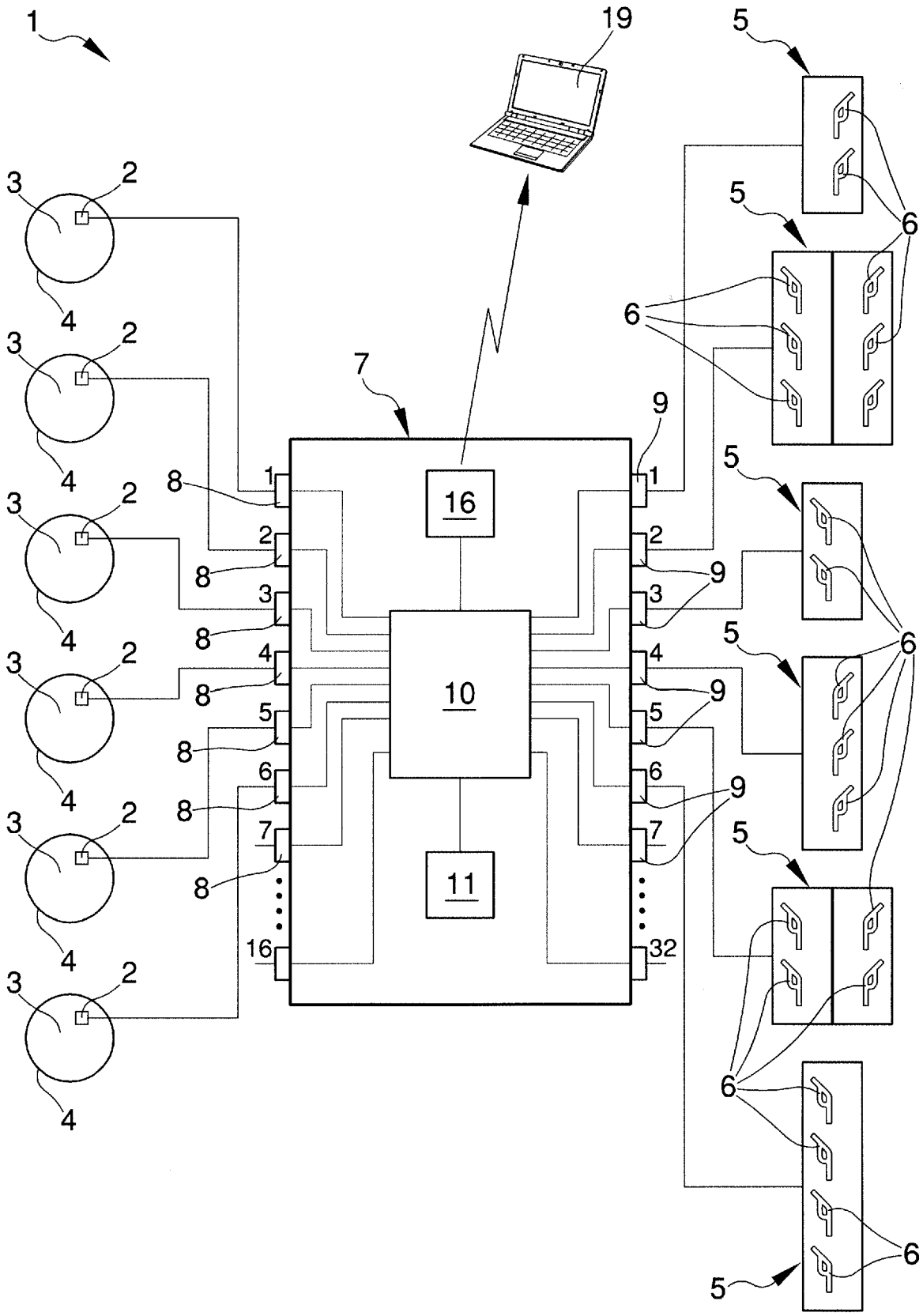


Fig.1

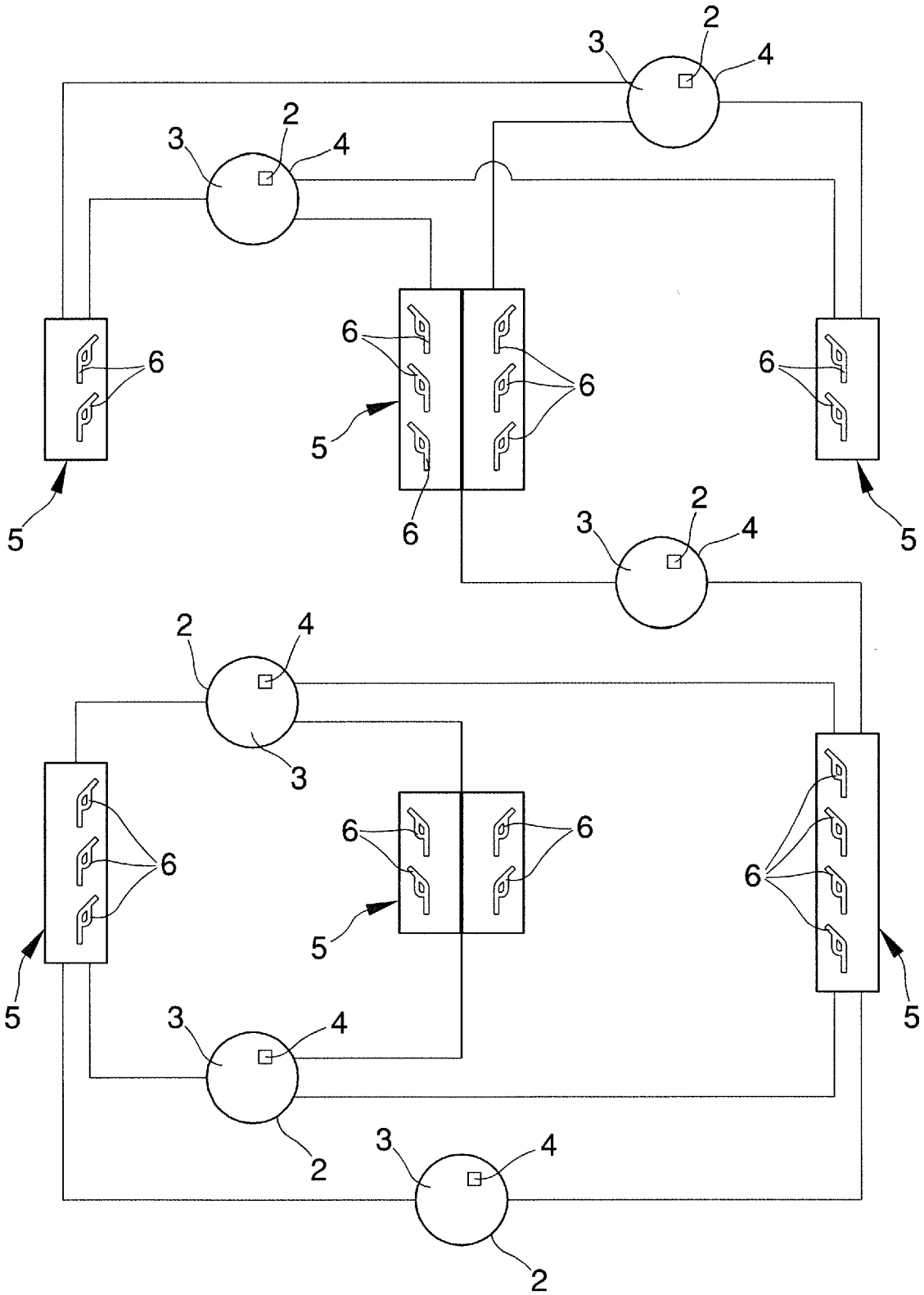


Fig.2

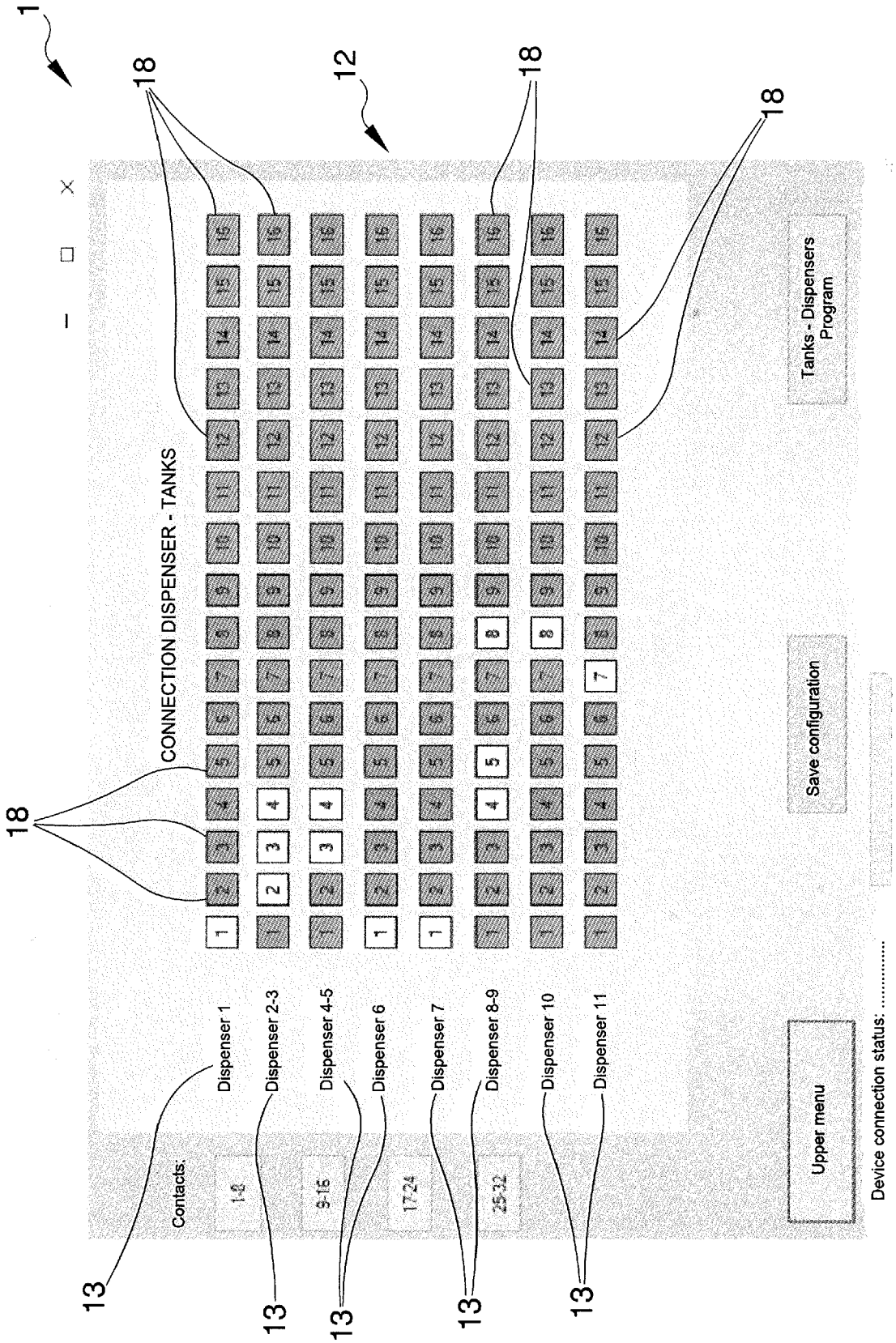
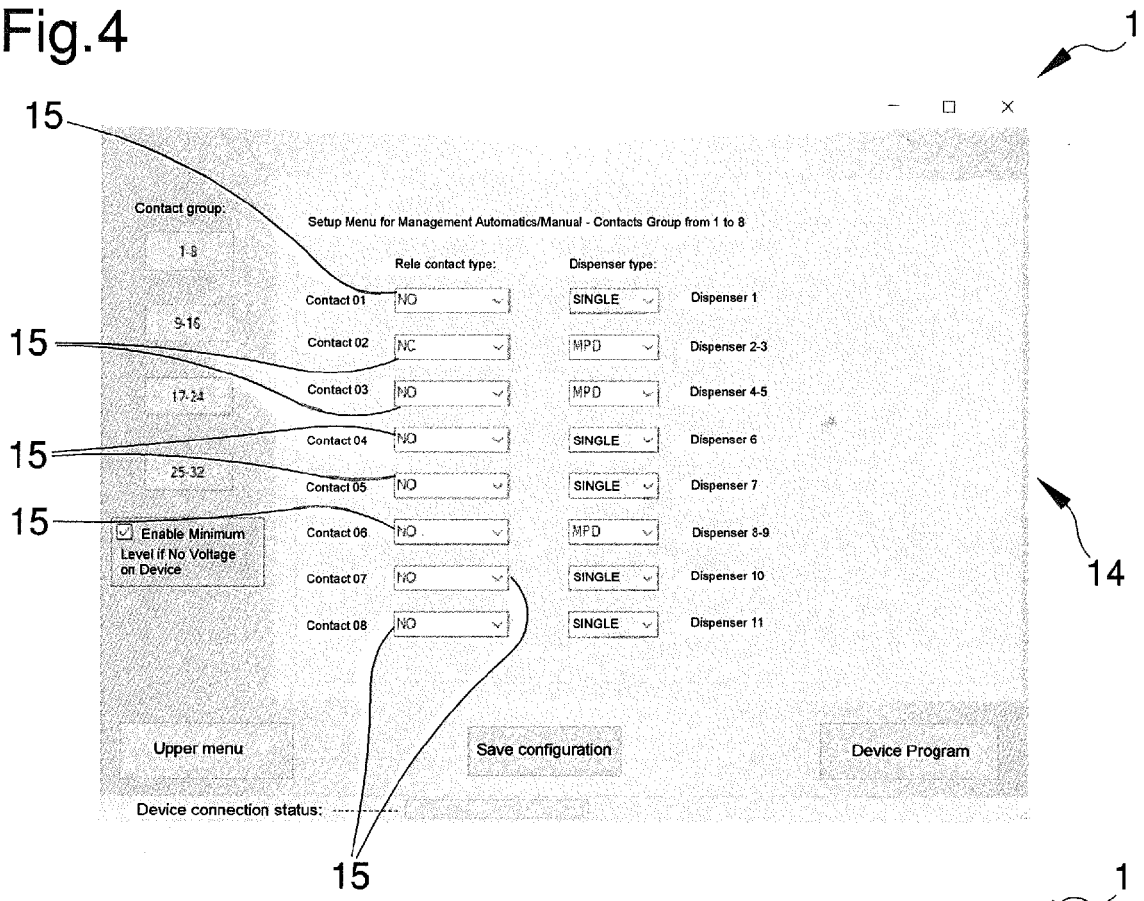

1
18
12
18
18
CONNECTION DISPENSER - TANKS
Contacts:
1-8
9-16
17-24
25-32
Dispenser 1
Dispenser 2-3
Dispenser 4-5
Dispenser 6
Dispenser 7
Dispenser 8-9
Dispenser 10
Dispenser 11
13
13
13
13
13
Tanks - Dispensers Program
Save configuration
Upper menu
Device connection status: .....

Fig.3

Fig.4


1
15
15
15
15
14
Contact group:
1-8
9-16
17-24
25-32
Setup Menu for Management Automatics/Manual - Contacts Group from 1 to 8
Rele contact type:
Dispenser type:
Contact 01
NO
SINGLE
Dispenser 1
Contact 02
NC
MPD
Dispenser 2-3
Contact 03
NO
MPD
Dispenser 4-5
Contact 04
NO
SINGLE
Dispenser 6
Contact 05
NO
SINGLE
Dispenser 7
Enable Minimum Level if No Voltage on Device
Contact 06
NO
MPD
Dispenser 8-9
Contact 07
NO
SINGLE
Dispenser 10
Contact 08
NO
SINGLE
Dispenser 11
Upper menu
Save configuration
Device Program
Device connection status:

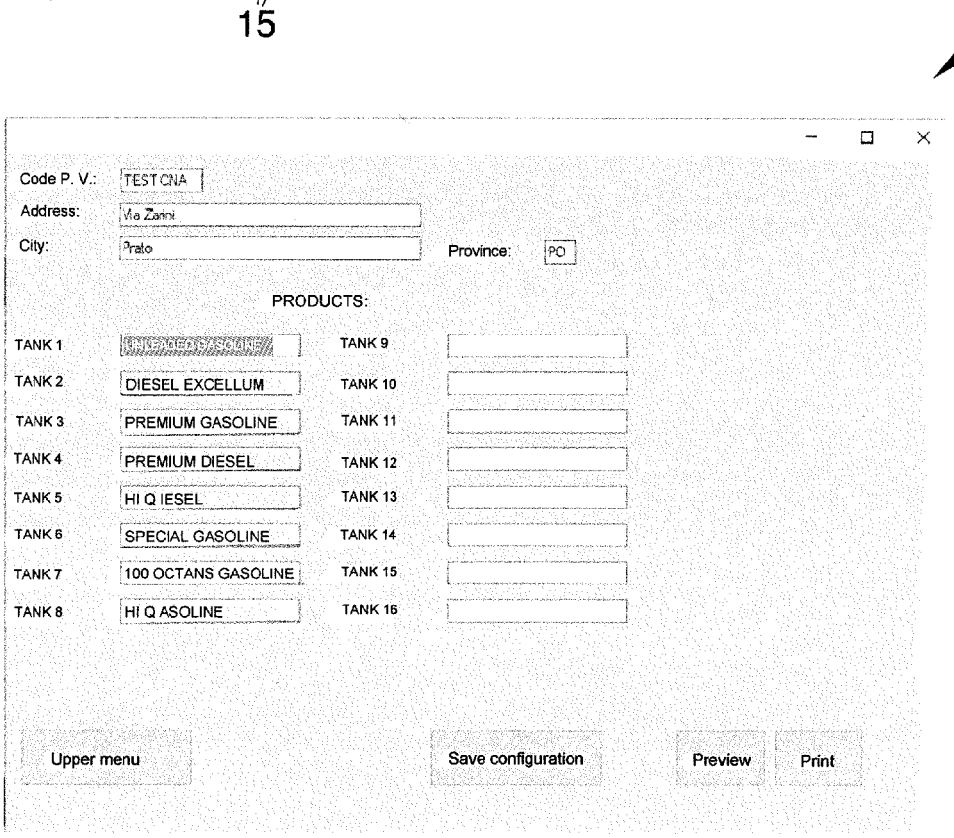

1
Code P. V.:
TEST CNA
Address:
Via Zanni
City:
Prato
Province:
PO
PRODUCTS:
TANK 1
TANK 2
DIESEL EXCELLUM
TANK 3
PREMIUM GASOLINE
TANK 4
PREMIUM DIESEL
TANK 5
HI Q IESEL
TANK 6
SPECIAL GASOLINE
TANK 7
100 OCTANS GASOLINE
TANK 8
HI Q ASOLINE
TANK 9
TANK 10
TANK 11
TANK 12
TANK 13
TANK 14
TANK 15
TANK 16
Upper menu
Save configuration
Preview
Print

Fig.5

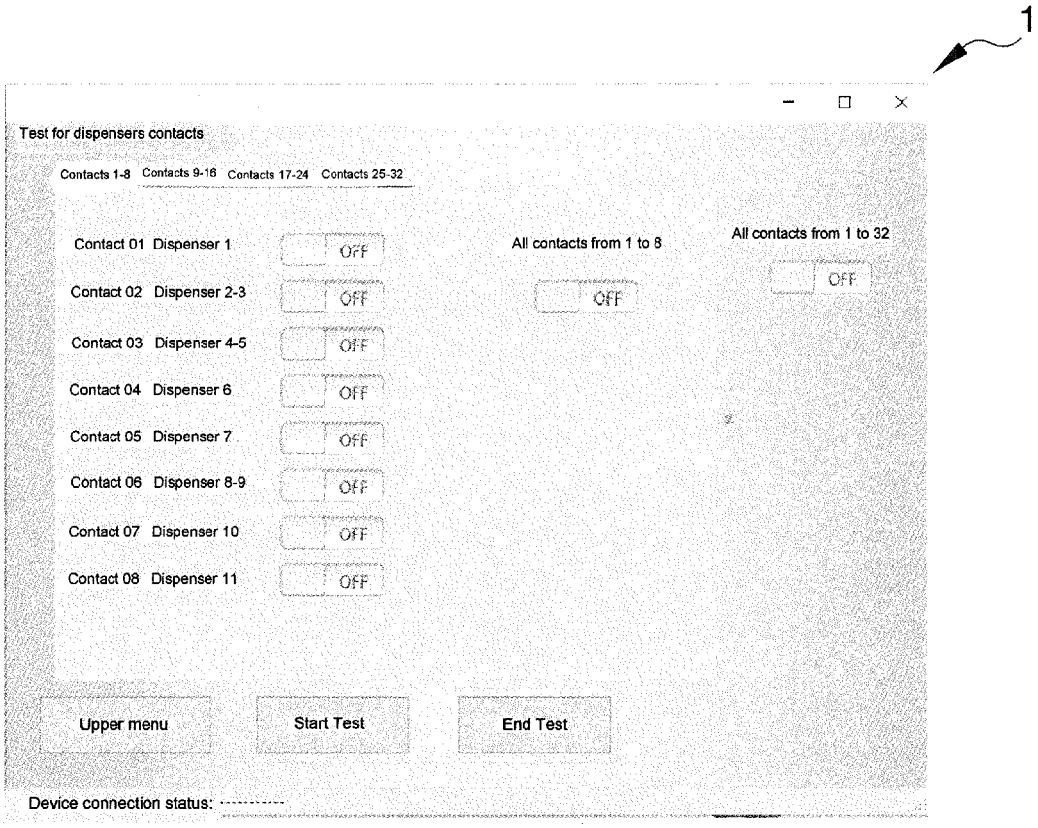

1
Test for dispensers contacts
Contacts 1-8
Contacts 9-16
Contacts 17-24
Contacts 25-32
Contact 01 Dispenser 1
Contact 02 Dispenser 2-3
Contact 03 Dispenser 4-5
Contact 04 Dispenser 6
Contact 05 Dispenser 7
Contact 06 Dispenser 8-9
Contact 07 Dispenser 10
Contact 08 Dispenser 11
OFF
All contacts from 1 to 8
All contacts from 1 to 32
Upper menu
Start Test
End Test
Device connection status: ----------

Fig.6

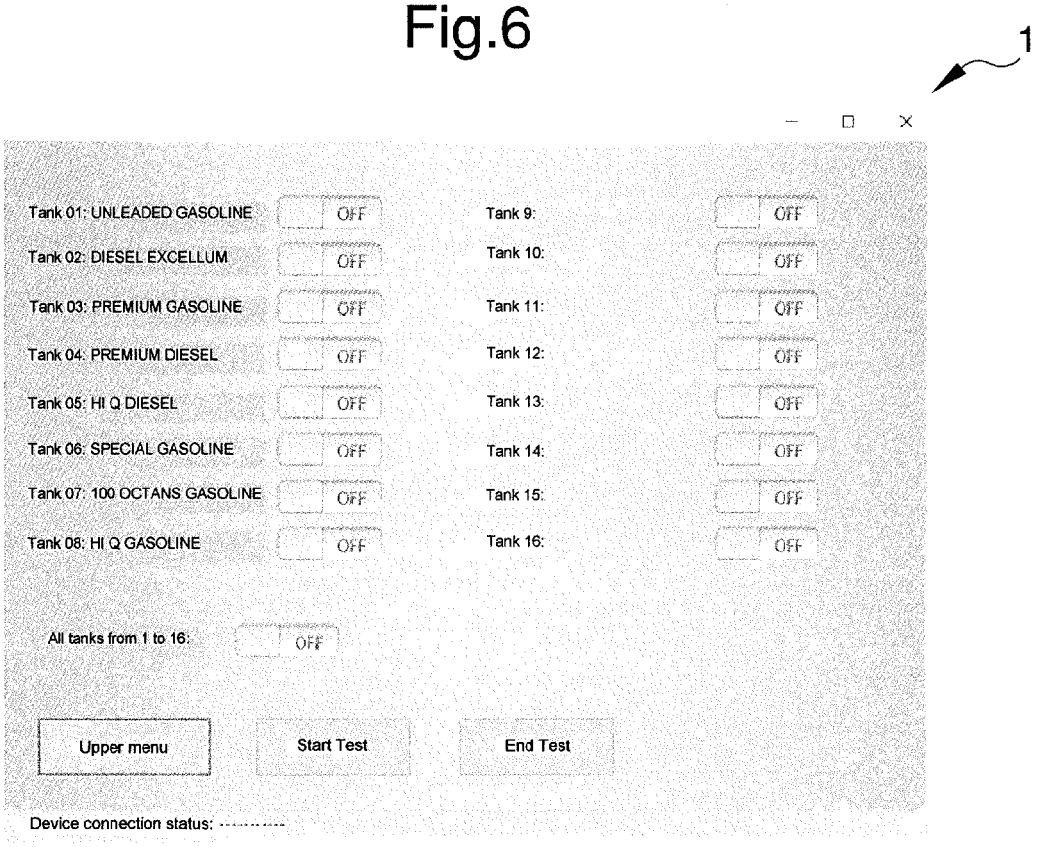
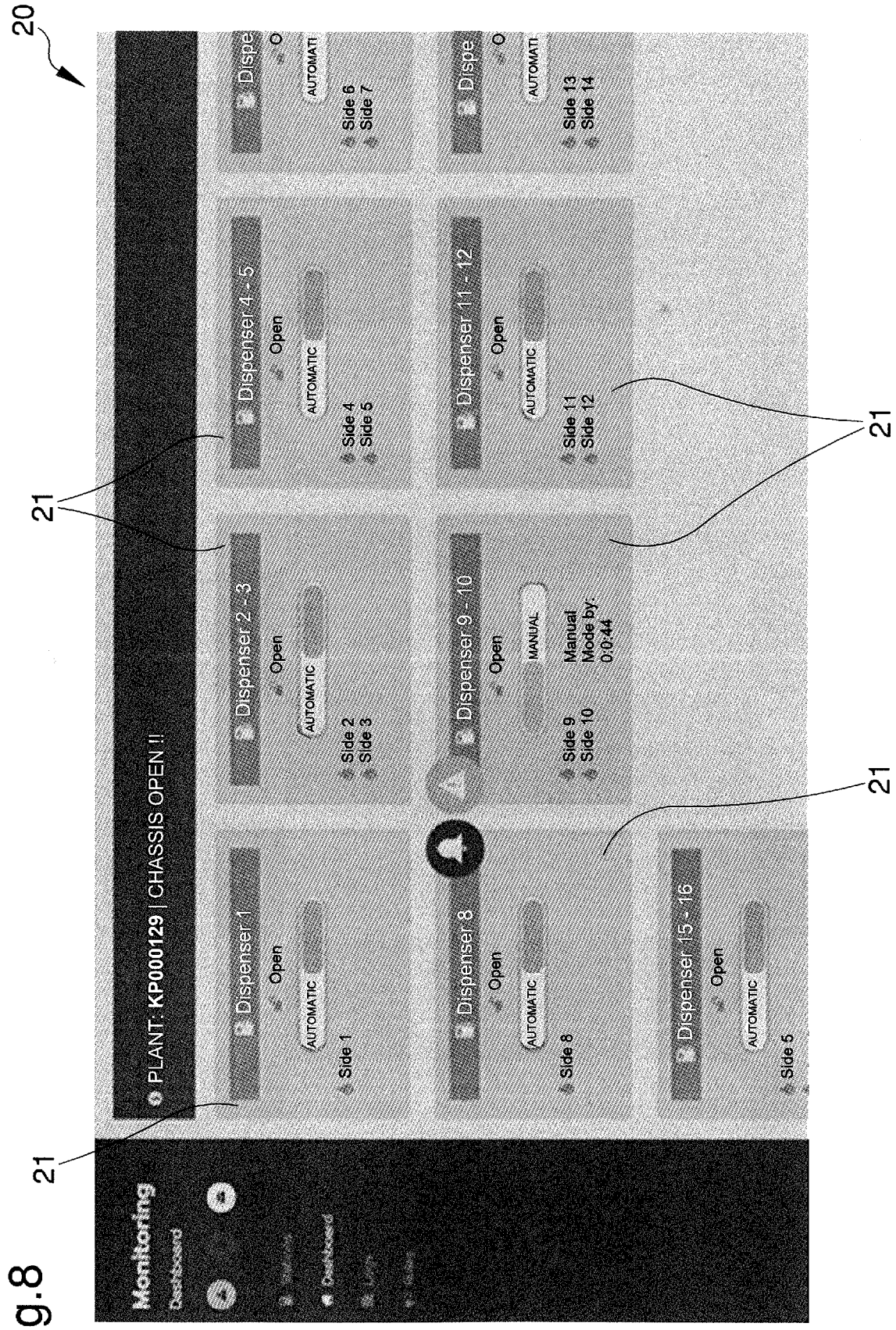

1
Tank 01: UNLEADED GASOLINE
Tank 02: DIESEL EXCELLUM
Tank 03: PREMIUM GASOLINE
Tank 04: PREMIUM DIESEL
Tank 05: HI Q DIESEL
Tank 06: SPECIAL GASOLINE
Tank 07: 100 OCTANS GASOLINE
Tank 08: HI Q GASOLINE
Tank 9:
Tank 10:
Tank 11:
Tank 12:
Tank 13:
Tank 14:
Tank 15:
Tank 16:
OFF
All tanks from 1 to 16:
Upper menu
Start Test
End Test
Device connection status: ----------

Fig.7

Fig.8


20
21
21
21
21
Monitoring
Dashboard
PLANT: KP000129 | CHASSIS OPEN !!
Dispenser 1
Open
AUTOMATIC
Side 1
Side 3
Dispenser 2 - 3
Open
AUTOMATIC
Side 2
Side 3
Dispenser 4 - 5
Open
AUTOMATIC
Side 4
Side 5
Dispe
O
AUTOMATI
Side 6
Side 7
Dispenser 8
Open
AUTOMATIC
Side 8
Dispenser 9 - 10
Open
MANUAL
Side 9
Side 10
Manual
Mode by:
0:0:44
Dispenser 11 - 12
Open
AUTOMATIC
Side 11
Side 12
Dispe
O
AUTOMATI
Side 13
Side 14
Dispenser 15 - 16
Open
AUTOMATIC
Side 5

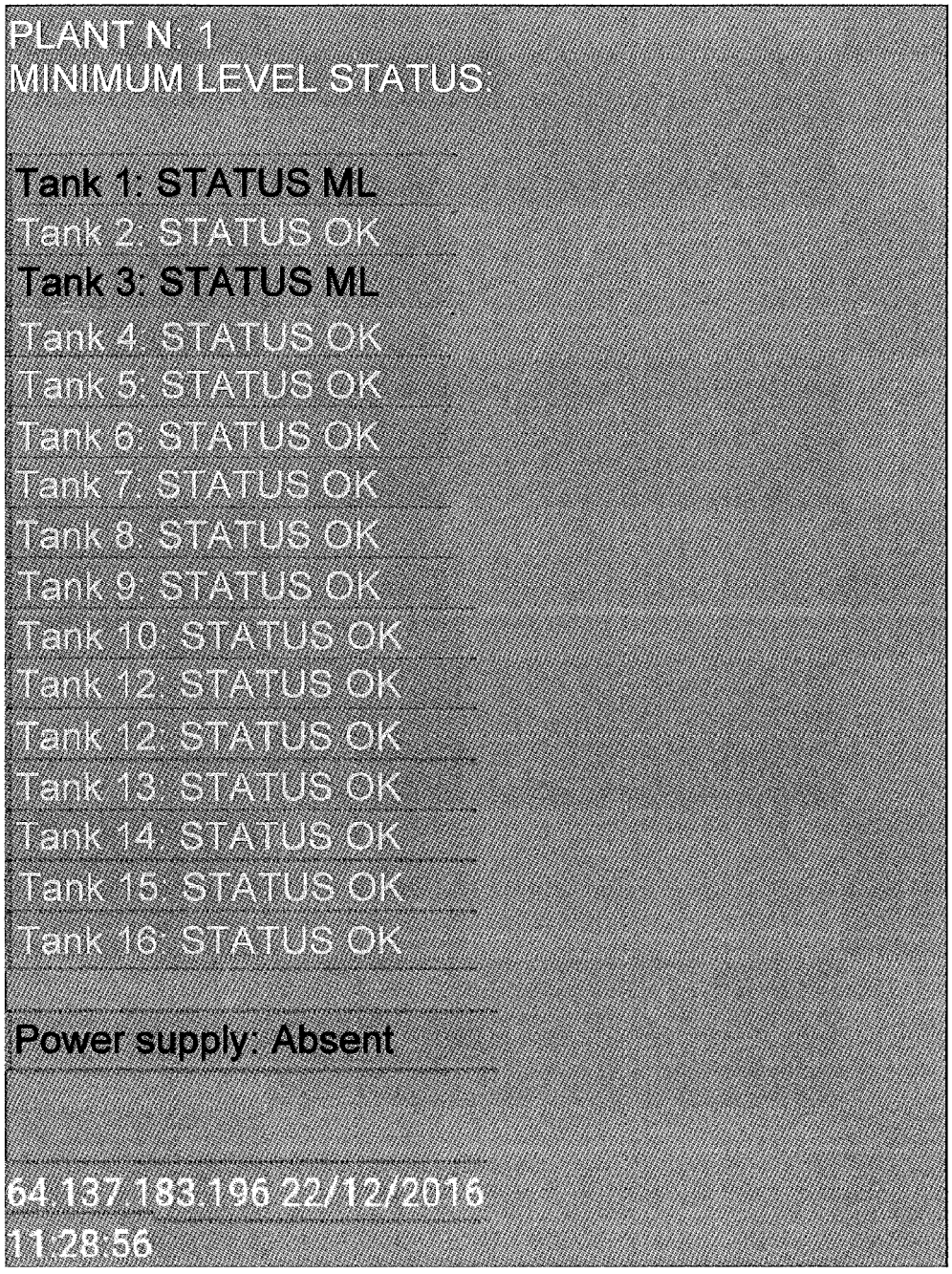

1
PLANT N. 1
MINIMUM LEVEL STATUS:
Tank 1: STATUS ML
Tank 2: STATUS OK
Tank 3: STATUS ML
Tank 4: STATUS OK
Tank 5: STATUS OK
Tank 6: STATUS OK
Tank 7: STATUS OK
Tank 8: STATUS OK
Tank 9: STATUS OK
Tank 10: STATUS OK
Tank 12: STATUS OK
Tank 12: STATUS OK
Tank 13: STATUS OK
Tank 14: STATUS OK
Tank 15: STATUS OK
Tank 16: STATUS OK
Power supply: Absent
64.137.183.196 22/12/2016
11:28:56

Fig.9

Configuration Certificate ML2

Code P. V.: CCIA Test
Address: Via del Romito, 71
City: PRATO CAP 59100 Province: PO

Contact1	NO	MPD	Dispenser 1-2	Tanks Number: -1 -4
Contact2	NO	SINGLE	Dispenser 3	Tanks Number: -1
Contact3	NO	MPD	Dispenser 4-5	Tanks Number: -1 -2 -7
Contact4	NO	SINGLE	Dispenser 6	Tanks Number: -1
Contact5	NO	MPD	Dispenser 7-8	Tanks Number: -1 -3 -6
Contact6	NO	SINGLE	Dispenser 9	Tanks Number: -3
Contact7	NO	MPD	Dispenser 10-11	Tanks Number: -3 -7
Contact8	NO	SINGLE	Dispenser 12	Tanks Number: -1
Contact9	NO	SINGLE	Dispenser 13	Tanks Number:
Contact10	NO	SINGLE	Dispenser 14	Tanks Number:
Contact11	NO	SINGLE	Dispenser 15	Tanks Number:
Contact12	NO	SINGLE	Dispenser 16	Tanks Number:
Contact13	NO	SINGLE	Dispenser 17	Tanks Number:
Contact14	NO	SINGLE	Dispenser 18	Tanks Number:
Contact15	NO	SINGLE	Dispenser 19	Tanks Number:
Contact16	NO	SINGLE	Dispenser 20	Tanks Number:
Contact17	NO	SINGLE	Dispenser 21	Tanks Number:
Contact18	NO	SINGLE	Dispenser 22	Tanks Number:
Contact19	NO	SINGLE	Dispenser 23	Tanks Number:
Contact20	NO	SINGLE	Dispenser 24	Tanks Number:
Contact21	NO	SINGLE	Dispenser 25	Tanks Number:
Contact22	NO	SINGLE	Dispenser 26	Tanks Number:
Contact23	NO	SINGLE	Dispenser 27	Tanks Number:
Contact24	NO	SINGLE	Dispenser 28	Tanks Number:
Contact25	NO	SINGLE	Dispenser 29	Tanks Number:
Contact26	NO	SINGLE	Dispenser 30	Tanks Number:
Contact27	NO	SINGLE	Dispenser 31	Tanks Number:
Contact28	NO	SINGLE	Dispenser 32	Tanks Number:
Contact29	NO	SINGLE	Dispenser 33	Tanks Number:
Contact30	NO	SINGLE	Dispenser 34	Tanks Number:
Contact31	NO	SINGLE	Dispenser 35	Tanks Number:
Contact32	NO	SINGLE	Dispenser 36	Tanks Number:

Minimum level enablingin case of feed falure: YES

Date: ___/___/_____

Instaler Stamp and Signature:

_____

Fig.10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 16 2787

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2011/308624 A1 (KOBRYN ALEXANDER P [US] ET AL) 22 December 2011 (2011-12-22) * paragraph [0020] - paragraph [0022] * * paragraph [0036] - paragraph [0044]; figures 1, 2, 5, 6 *	1,13	INV. B67D7/32 B67D7/78 F04B23/00 G01F23/00
A	EP 1 391 417 A1 (FE PETRO INC [US]) 25 February 2004 (2004-02-25) * paragraph [0010] - paragraph [0015] * * paragraph [0019] - paragraph [0021]; figures 1, 2 *	1,13	
A	US 5 363 093 A (WILLIAMS BARRY N [US] ET AL) 8 November 1994 (1994-11-08) * column 3, line 6 - line 26 * * column 8, line 47 - column 9, line 5; figure 1 *	1,13	
A	US 4 349 882 A (ASMUNDSSON EINAR ET AL) 14 September 1982 (1982-09-14) * column 1, line 6 - line 11 * * column 2, line 10 - line 67 * * figures 1, 2 *	1,13	TECHNICAL FIELDS SEARCHED (IPC) B67D F04B G01F
A	US 2014/096057 A1 (MARSTON DANIEL H [US] ET AL) 3 April 2014 (2014-04-03) * paragraphs [0001], [0077], [0078], [0082] - [0089]; figure 1 *	1,13	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 June 2019	Schultz, Tom

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 16 2787

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-06-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011308624 A1	22-12-2011	US 2011308624 A1	22-12-2011
		WO 2011163130 A1	29-12-2011
EP 1391417 A1	25-02-2004	CA 2437935 A1	20-02-2004
		EP 1391417 A1	25-02-2004
		MX PA03007473 A	03-09-2004
		US 2004039549 A1	26-02-2004
		US 2008195354 A1	14-08-2008
US 5363093 A	08-11-1994	NONE	
US 4349882 A	14-09-1982	NONE	
US 2014096057 A1	03-04-2014	US 2014096057 A1	03-04-2014
		US 2017096325 A1	06-04-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82