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

(11) EP 1 426 621 A1

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**09.06.2004 Bulletin 2004/24**

(51) Int Cl.[7]: **F04D 15/02**

(21) Application number: **03380274.5**

(22) Date of filing: **28.11.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
**AL LT LV MK**

(30) Priority: **05.12.2002 ES 200202932 U**

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## (54) Electric pump operation control device

(57) The control device according to the invention is characterized in that it comprises an electric motor (3) operating conditions control circuit (8), to prevent idling, and an electric pump (1) operation programming circuit (9) programmable by the user, arranged in the electric motor (3) junction box (6).

The electric pump operation control device of the invention is applicable to electric pumps (1) comprised of a multi-stage pump (2) and of an electric motor (3) coupled together coaxially.

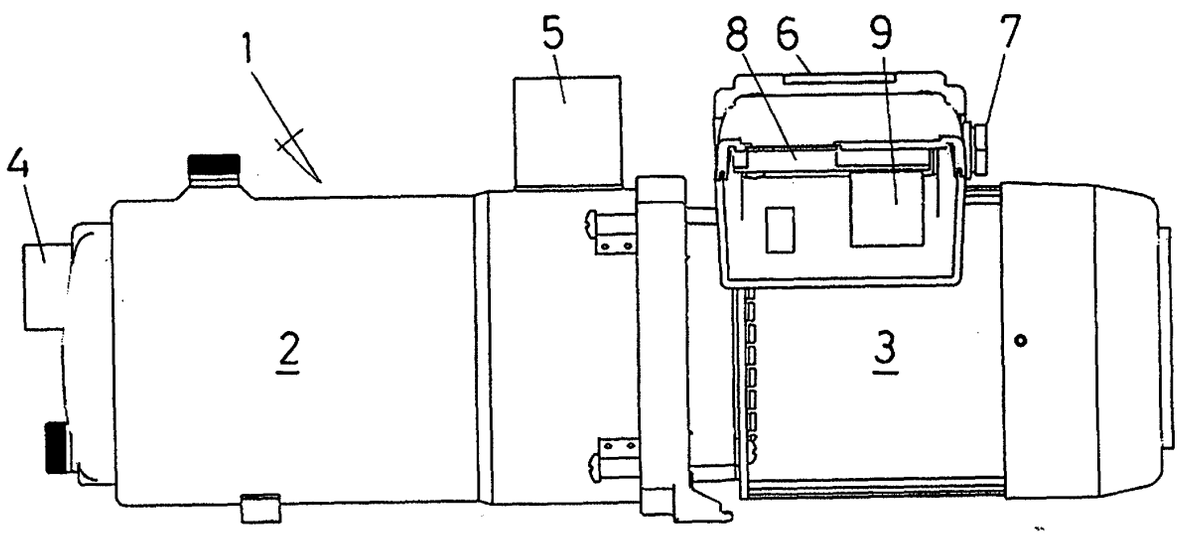


FIG. 1

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## Description

### Technical field of the invention

**[0001]** The invention has the object of an electric pump operation control device, of those that are comprised of a multi-stage pump and by an electric motor coupled together coaxially, and which are widely used to lift water.

### Background of the invention

**[0002]** Multiple embodiments are known of electric pumps comprised of a multi-stage pump and by an electric motor coupled together coaxially. To control the operation of electric pumps, devices which control operation variables thereof can be installed; amongst said operation variables we should highlight the control of the electric motor operating conditions, specifically the loaded operating conditions which correspond to the pumping of water by the multi-stage pump and the idle operating conditions which correspond to the non-pumping of water by the multi-stage pump, and the control of the electric pump operating periods, to adapt them to the conditions preset by the requirements of use such as those of automatic watering of garden areas.

**[0003]** Up to the present date, said operation control devices have to be externally arranged in relation to the electric pump, which, in any case, implies high assembly costs, which make the total cost of the installations more expensive.

### Explanation of the invention

**[0004]** The electric pump operation control device of the invention is applicable to electric pumps comprised of a multi-stage pump and of an electric motor coaxially coupled, the electric motor being equipped with a junction box adapted to connect a single-phase or three-phase AC line to power the electric motor.

**[0005]** The control device according to the invention is characterized in that it characterized in that it comprises an electric motor operating conditions control circuit to prevent idling, and an electric pump operation programming circuit, programmable by the user, arranged in the electric motor junction box.

**[0006]** It is also a characteristic of the invention that the control circuit comprises an electronic controller which permanently determines the power factor of the charged loaded electric motor, all of this adapted so that when said power factor reaches a certain predetermined minimum value indicative of the idling of the electric motor, the circuit disconnects the electric motor from the power supply.

**[0007]** Another characteristic of the invention consists of electric motor disconnecting when the power factor reaches a value less than or equal to 0.70.

**[0008]** According to another characteristic of the invention, the programming circuit comprises a programming keyboard and a viewing screen.

### Brief description of the drawings

**[0009]** In the only figure of the attached drawings, an electric pump equipped with the electric pump operation control device according to the invention is diagrammatically illustrated by way of non-limiting example.

### Detailed description of the drawings

**[0010]** In the figure of the sheet of drawings, an electric pump 1 has been represented, essentially comprised of a suction-discharge multi-stage pump 2 and of an electric motor 3 coaxially coupled together. The multi-stage pump 2 is equipped with a suction inlet 4 and a discharge outlet 5 to which a water pipe, not represented, can be coupled to distribute it to the consumption points. The electric motor 3, which can be an AC short-circuit rotor powered by a single-phase line or a three-phase line, is equipped with a junction box 6 of ample size, equipped with a watertight inlet 7 to permit the passage of the electric conduction to power the electric motor 3.

**[0011]** An electric motor 3 operating conditions control circuit 8, and an electric pump 1 operation programming circuit 9 are arranged inside the junction box 6.

**[0012]** The control circuit 8 comprises an electronic controller which, from electric power data of the electric motor 3, such as the terminal voltage and sink current value, permanently determines the power factor of the loaded electric motor 3. The circuit further comprises means to disconnect the electric motor 3 from the supply network when the power factor determined by the electronic controller reaches a value equal to or less than 0.7, values which are indicative that the electric motor 3 is idling, i.e. the water is not pumped by the multi-stage pump 2.

**[0013]** The programming circuit 9 permits the user to program the electric pump 1 operating conditions adapting, in this way, the electric pump 1 operating periods to the consumption requirements of each specific case, this being particularly advantageous in those installations where automatic operation is required, such as to water garden areas on certain days, at certain times and for a determined period of time. For the purpose of making it easily programmable by the user, the programming circuit 9 comprises a programming keyboard and a viewing screen, not represented.

**[0014]** The characteristics described in the example of the embodiment of the electric pump operation control device of the invention, provide a solution to the drawbacks derived from the high costs of the installation of control devices external to electric pumps, specifically as regards the control of idling and the programming of the automatic operation of the electric pump. The fact that both the electric motor 3 operating conditions con-

trol circuit 8 and the electric pump 1 operation programming circuit 9 are located in the electric motor 3 junction box 6, eliminates the requirement for any type of installations external to the electric pump 1 for devices with said purposes, achieving, in this way, a large reduction in costs of the installations.

## Claims

1. Electric pump operation control device, which is applicable to electric pumps (1) comprised of a multistage pump (2) and an electric motor (3) coupled together coaxially, the electric motor (3) being equipped with a junction box (6) adapted for the connection of an AC line to power the electric motor (3), which is **characterized in that** it comprises an electric motor (3) operating conditions control circuit (8), to prevent idling, and an electric pump (1) operation programming circuit (9), programmable by the user, arranged in the electric motor (3) junction box (6).

2. Control device according to claim 1, **characterized in that** the control circuit (8) comprises an electronic controller which permanently determines the power factor of the loaded electric motor (3), all of this adapted so that when said power factor reaches a certain predetermined minimum value indicative of idling of the electric motor (3), the circuit disconnects the electric motor (3) from the electric power line.

3. Control device according to claim 2, **characterized in that** the electric motor (3) disconnects when the power factor reaches a value less than or equal to 0.70.

4. Control device according to claim 1, **characterized in that** the programming circuit (9) comprises a programming keyboard and a viewing screen.

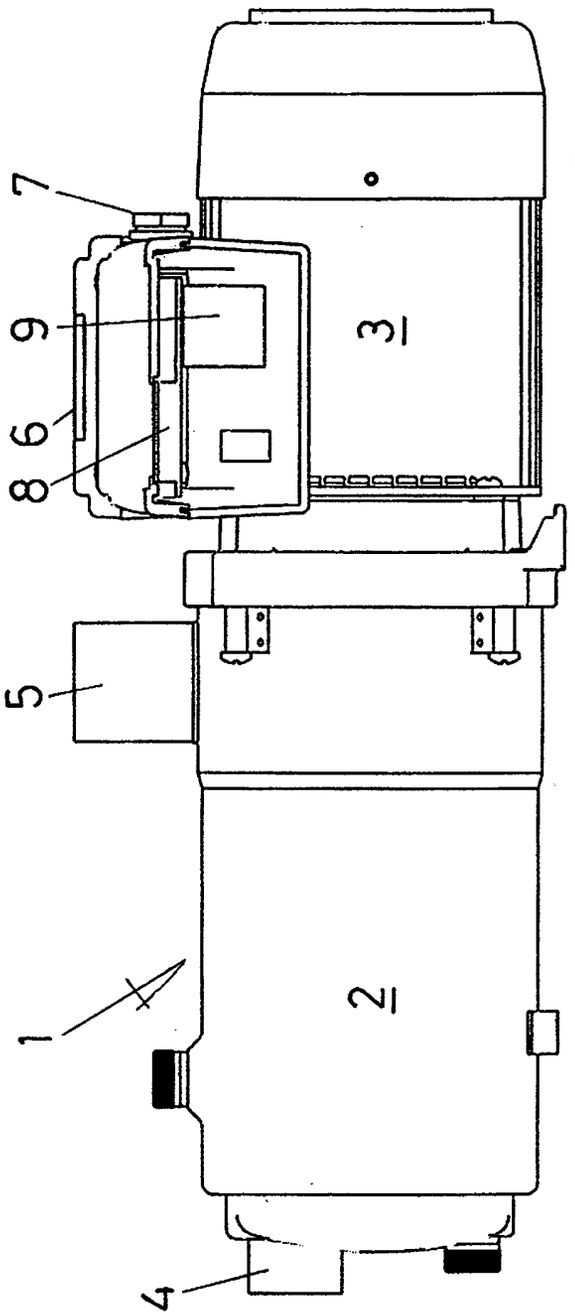


FIG. 1

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# EUROPEAN SEARCH REPORT

Application Number
EP 03 38 0274

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
|---|---|---|---|
| A | US 4 420 787 A (TIBBITS JOHN L ET AL) 13 December 1983 (1983-12-13) * column 2, line 17 - line 34 * * column 3, line 23 - column 4, line 61; figure 1 * | 1,2 | F04D15/02 |
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| A | PATENT ABSTRACTS OF JAPAN vol. 007, no. 047 (M-196), 24 February 1983 (1983-02-24) & JP 57 195886 A (HITACHI SEISAKUSHO KK), 1 December 1982 (1982-12-01) * abstract * | 1 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F04D
F04B
A01G
H02H

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| MUNICH | 19 April 2004 | Di Giorgio, F |

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EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 38 0274

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