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(54) **Control device for an actuating element in washing machines, particularly a dishwasher, supplied starting from an alternate voltage**

Steuerungsvorrichtung für ein Betätigungselement in Waschmaschinen, insbesondere in Geschirrspülmaschinen, das ausgehend von einer Wechselspannung versorgt wird

Dispositif de commande pour actionneur, dans les machines à laver, en particulier les lave vaisselle, alimenté à partir d'une tension alternative

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Description

The present invention refers to a control device of an actuating element in washing machines, particularly a dishwasher, of the type comprising an electronic control circuit and means for supplying a control signal to the actuating element.

In domestic washing machines, such as laundry washers and dishwashers, various actuating elements are present. Such actuating elements are used for activating other components being part of the washing machine and which carry out well defined functions.

For instance said functional elements can be electrovalves which have to be controlled in a suitable way for providing the water supply to the washing machines; or they can be used for energizing an electromagnet which allows the release of the small lid of a washing agent dispenser, so as to cause the delivery of said agents (detergents) in the inside of a washing chamber of a washing machine.

Actuating elements are also used for allowing the execution of other internal functions of said washing machines.

When said actuating elements require for their operation of a non alternate or unidirectional supply, this latter must be obtained in a certain way starting from the alternate supply which supplies the whole machine.

In particular, when in the inside of the machine electronic modules are provided, which themselves require a supply voltage in direct current, one of the simplest ways for obtaining the supply voltage for said actuators is that of taking the supply from the circuit which already produces the direct current for the other electronic components, instead of specifically providing a transformer, a rectifier circuit and a filtering and stabilizing circuit of the rectified current.

Such a solution has however the drawback of determining an increase in the manufacturing costs of the washing machine, inasmuch as it obliges to oversize the supply circuit of direct current; furthermore, this causes a reduction of the useful space in the inside of the washing machine, and it also makes more difficult the mounting of the components on the electronic module.

On the other hand, FR-A-2 519 660 shows a control device of actuating elements in washing machines or dish-washers, which allows to interrupt electrical supply to the motor of the washing machine during an automatic selection of washing programs, so as to avoid unwanted switching between the power supply and the ground by the various actuating elements and/or to avoid unwanted developing of eddy currents and electromagnetic noises. This prior art forms the preamble of independent claim 1.

The control device comprises a switch of a relay, which is supplied by DC electrical supply, through a bridge rectifier, that is connected in series to the motor of the washing machine.

However, for attaining the purpose of this device, it

is necessary to provide a specific electric component, such as a relay, comprising a switch, which simultaneously works together with the motor of the washing machine, during washing programs.

It follows that such a solution has the drawback of determining an increase in the manufacturing costs of the washing machine, inasmuch as it obliges to provide an additional electric component; it also obliges to oversize the DC electric circuit and reduce the useful space inside the washing machine.

Moreover, for instance, for a power supply of 220 Volts, the relay, which has to be used, is a DC relay of 24 Volts, with an output power of about 0.3 Watts. This means that said relay has to be measured for such values of tension and power and therefore it must comprise a high value of inductance with respect to the value of impedance of the actuating elements.

Aim of the present invention is that of obtaining a device which does not suffer the above described drawbacks and which, in the meanwhile, results in being reliable, efficient and of low cost.

Consequently, for attaining said aims, the present invention has for subject a control device of an actuating element in washing machine, particularly a dishwasher, according to claim 1.

Further aims and advantages of the present invention will result in being clear from the description which follows, supplied as an explanatory and not limiting example, and from the annexed drawing, wherein a circuit implementation of the device according to the invention is represented.

As an applicative, but not limiting, example, with reference to the essential part of the drawing a control device for an automatic detergent dispenser in a dishwashing machine is described.

In the figure, with M an electric motor is indicated, for the driving, by means of a pump, of the sprinklers in the inside of the washing chamber of a dishwashing machine.

Said motor is generally constituted by a stator element and a rotor element, in addition to a ferromagnetic core.

With RL1 a control relay of the motor M is indicated, while with P a programmer, or timer, of the dishwashing machine is indicated.

With reference letter T a driver transistor is indicated, the output of which (collector) is connected to relays RL1; the emitter is connected to ground and its base receives, through a resistor R16, a driving signal from a pin of a integrated electronic circuit of control (micro controller), indicated with MP.

Between the base and the emitter of said transistor T a biasing resistor is connected, indicated with R17.

At one of the ends of said motor M, by means of a terminal indicated with 10, the anode of a diode indicated with D5 and the cathode of a second diode indicated with D2 are connected.

To the anode of diode D2 the anode of a third diode

indicated with D4 is connected. To the cathode of this last diode D4 the anode of a fourth diode D7 is connected, having its cathode connected to the cathode of said diode D5.

Said four diodes D2, D5, D4 and D7 are connected in a diode bridge configuration. At the common point between the cathode of diode D4 and the anode of diode D7 a terminal MT2 of an electronic switch (triac) indicated with TR1 is connected.

A second terminal of said triac, indicated with MT1, is connected to ground, while gate G of said triac TR1 is connected, through a resistor R14 and a capacitor C7, to one of the pins of said microcontroller MP.

The cathodes of said diodes D5 and D7 are connected, by means of a terminal indicated with 1, to an end of a coil indicated with EA.

The second end of said coil EA is connected, by means of a terminal 3, to the anodes of diodes D2 and D4. Said coil EA realizes the actuating element of the detergent dispenser of the dishwashing machine.

Finally, two conductors indicated with N and F refer to the electric mains supply and identify respectively phase and neutral pole of the electric supply signal.

The circuit operates in the following way.

During the washing phase, relay RL1, appropriately energized by the microcontroller MP, allows that the electric supply coming from the two conductors N or F reaches the ends of the motor M.

During the washing, in a predetermined period of time, microcontroller MP produces the stop of motor M, by disconnecting it from at least one of the two conductors N or F which carry the supply voltage; in this case from conductor N.

Just during this stop the delivery of the washing agents in the inside of the washing chamber is carried out.

For obtaining this, the triac TR1 is driven by microcontroller MP so as to be made conductive.

The conduction of triac TR1 delivers therefore a signal of alternate supply to the gates of diodes D2, D4, D5, D7.

In particular the triac TR1 is driven by microcontroller MP on gate G, through resistor R14 and condenser C7.

Diodes D2, D4, D5 and D7 deliver to the ends of coil EA a unidirectional supply having the higher potential on terminal 1. The flow of current in coil EA allows, for instance, the release of the washing agents, so that the latters fall in the inside of the washing chamber of the dishwashing machine.

The inductance constituted by windings of motor M, connected to the common point of diodes D2 and D5, and therefore in series to the triac, has the purpose of reducing the speed with which the current in the triac decreases, so as to overcoming the difficulty of the triac in sustaining this kind of commutation, wherein the use of the triac for controlling a load by means of a rectifying bridge is particularly hard.

The inductance value of the windings of motor M must be substantially lower than that of the windings of coil EA. This has the purpose of avoiding that a too high value of the inductance presented by the windings of motor M prevents the normal flow towards the rectifying circuit of the electric supply signal coming from conductor F.

The present implementation of the device is made possible by the acknowledgement of the fact that, during the phase of release of the washing agents in the inside of the washing chamber of a washing machine, the washing motor is deactivated.

In this way it is therefore possible to take advantage of the windings of the motor M of the washing machine, using them as inductance of the triac driving circuit, without requiring the use of a dedicated inductance. The characteristics of the control device of an actuating element in washing machine subject of the present invention result in being clear from the given description; from the given description are also clear its advantages.

Particularly they are represented by the fact that an economic saving is obtained in the embodiment of the device, inasmuch as the use of transformers or other devices is not required, for obtaining a direct current supply having high value for driving the actuating device; as inductance to be connected in series to the electronic switch (triac TR1) and to the rectifying means of direct current, an inductance already being present in the washing machine is used, normally employed for different purposes.

In addition the simplicity of the realization of the devices and its efficiency in operation are highlighted.

It is however clear that numerous changes can be made to the control device of an actuating element in washing machine subject of the present invention (for instance applying such a device for the control of an electrovalve of a washing machine, or using another inductance presented by windings provided in the machine, such as those of a drain pump of a washing machine) without departing from the novelty principles inherent the invention; it is also clear that in the practical embodiment the used components could be realized by technical equivalents.

Claims

1. Control device of an actuating element (EA) in washing machine, particularly a dish-washer, of the type comprising:

- an electronic control circuit (MP), supplied by an AC electric system, which, through electric and electronic means (R16, R17, T), controls the switching of a relay (RL1), causing, during a washing phase, the electric supply coming from at least one (N) of two conductors (N, F) of the AC electric system to reach the ends of

an electric load (M) of the washing machine and, alternatively, disconnecting said electric load (M) from at least one (N) of said two conductors (N, F) for a certain period, during stops occurring when the washing machine is operative;

- means (C7, R14, R15, TR1, D2, D4, D5, D7) for supplying a control signal, coming from said electronic control circuit (MP), to said actuating element (EA), said control signal depending on the switching of said relay (RL1),

characterised in that said means (C7, R14, R15, TR1, D2, D4, D5, D7) for supplying a control signal to said actuating element (EA) comprise an electronic switch (TR1), that supplies an AC control signal to a rectifying diodes bridge (D2, D4, D5, D7), which produces a unidirectional DC control signal for the actuating element (EA), said electronic switch being supplied from the AC electric system through said electric load (M) of the washing machine, that is connected in series to the electronic switch (TR1).

2. Control device of an actuating element (EA) according to claim 1, characterised in that said electronic switch (TR1) is constituted by a TRIAC.

3. Control device of an actuating element (EA) according to claim 1, characterised in that said electric load (M) of the washing machine is constituted by the impedance that exists at the ends of a washing motor.

4. Control device of an actuating element (EA) according to claim 3, characterised in that the value of said impedance is lower than the value of the impedance that exists at the ends of said actuating element (EA).

5. Control device of an actuating element (EA) according to claim 1, characterised in that, during stops of the washing machine, said unidirectional DC control signal for the actuating element (EA) causes the release of washing agents inside the washing chamber of the machine.

6. Control device of an actuating element (EA) according to claim 1, characterised in that said unidirectional DC control signal for the actuating element (EA) is used for the control of an electrovalve.

7. Control device of an actuating element (EA) according to claim 1, characterised in that said electric load (M) of the washing machine is constituted by the impedance which exists at the ends of a drain pump.

8. Control device of an actuating element (EA) according to claim 1, characterised in that said electronic control circuit (MP) is constituted by a microcontroller.

Patentansprüche

1. Steuerungsvorrichtung für ein Betätigungselement (EA) in Waschmaschinen, insbesondere in Geschirrspülmaschinen, welche folgendes umfaßt:

- eine von einem Wechselstromsystem versorgte elektronische Steuerschaltung (MP), die durch elektrische und elektronische Mittel (R16, R17, T) das Schalten eines Relais (RL1) steuert, welches während einer Waschphase bewirkt, daß die Stromzufuhr, die von wenigstens einem (N) von zwei Leitern (N, F) des Wechselstromsystems kommt, die Enden einer elektrischen Last (M) der Waschmaschine erreicht und alternativ die Verbindung zwischen der elektrischen Last (M) und wenigstens einem (N) der zwei Leiter (N, F) eine gewisse Zeit lang während Stillständen, die auftreten, wenn die Waschmaschine in Betrieb ist, unterbricht;
- Mittel (C7, R14, R15, TR1, D2, D4, D5, D7) zur Zufuhr eines Steuersignals, das von der elektronischen Steuerschaltung (MP) kommt, zu dem Betätigungselement (EA), wobei das Steuersignal von dem Schalten des Relais (RL1) abhängt,

dadurch gekennzeichnet, daß die Mittel (C7, R14, R15, TR1, D2, D4, D5, D7) zur Zufuhr eines Steuersignals zu dem Betätigungselement (EA) einen elektronischen Schalter (TR1) umfassen, der ein Wechselstromsteuersignal an eine Gleichrichtungsdiodenbrücke (D2, D4, D5, D7) schickt, die ein in eine Richtung fließendes Gleichstromsteuersignal für das Betätigungselement (EA) erzeugt, wobei der elektronische Schalter von dem Wechselstromsystem durch die elektrische Last (M) der Waschmaschine versorgt wird, die mit dem elektronischen Schalter (TR1) in Reihe geschaltet ist.

2. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 1, dadurch gekennzeichnet, daß der elektronische Schalter (TR1) aus einem Triac besteht.
3. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 1, dadurch gekennzeichnet, daß die elektrische Last (M) der Waschmaschine aus dem Scheinwiderstand besteht, der an den En-

den eines Waschmaschinenmotors existiert.

4. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 3, dadurch gekennzeichnet, daß der Wert des genannten Scheinwiderstands niedriger ist als der Wert jenes Scheinwiderstands, der an den Enden des Betätigungselements (EA) besteht.

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5. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 1, dadurch gekennzeichnet, daß während Stillständen der Waschmaschine das in eine Richtung fließende Gleichstromsteuersignal für das Betätigungselement (EA) die Freisetzung von Waschmitteln in der Waschkammer der Maschine bewirkt.

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6. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 1, dadurch gekennzeichnet, daß das in eine Richtung fließende Gleichstromsteuersignal für das Betätigungselement (EA) zur Steuerung eines Elektroventils verwendet wird.

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7. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 1, dadurch gekennzeichnet, daß die elektrische Last (M) der Waschmaschine aus dem Scheinwiderstand besteht, der an den Enden einer Ablaufpumpe existiert.

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8. Steuerungsvorrichtung für ein Betätigungselement (EA) nach Anspruch 1, dadurch gekennzeichnet, daß die elektronische Steuerschaltung (MP) aus einer Mikrosteuerung besteht.

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Revendications

1. Dispositif de commande d'un élément d'actionnement (EA) d'une machine à laver, en particulier d'un lave-vaisselle, du type comprenant:

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- un circuit de commande électronique (MP), alimenté par un système électrique en courant alternatif, qui, par des moyens électriques et électroniques (R16, R17, T), commande la commutation d'un relais (RL1), commandant, pendant une phase de lavage, la connexion de l'alimentation électrique depuis au moins un (N) des deux conducteurs (N, F) du système électrique en courant alternatif aux bornes d'une charge électrique (M) de la machine à laver et, réciproquement, la déconnexion de ladite charge électrique (M) d'au moins un (N) desdits

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deux conducteurs (N, F) pendant une certaine période, durant les arrêts apparaissant pendant que la machine à laver est en fonctionnement;

- des moyens (C7, R14, TR1, D2, D4, D5, D7) pour fournir un signal de commande, provenant dudit circuit de commande électronique (MP), audit élément d'actionnement (EA), ledit signal de commande dépendant de la commutation dudit relais (RL1),

caractérisé en ce que lesdits moyens (C7, R14, R15, TR1, D2, D4, D5, D7) pour fournir un signal de commande audit élément d'actionnement (EA) comprennent un commutateur électronique (TR1), qui fournit un signal de commande alternatif à un pont redresseur à diodes (D2, D4, D5, D7), qui délivre un signal continu unidirectionnel à l'élément d'actionnement (EA), ledit commutateur électronique étant alimenté par le système électrique en courant alternatif par ladite charge électrique (M) de la machine à laver, qui est connectée en série au commutateur électronique (TR1).

2. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 1, caractérisé en ce que ledit commutateur électronique (TR1) est constitué par un triac.

3. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 1, caractérisé en ce que ladite charge électrique (M) de la machine à laver est constituée par l'impédance mesurée aux bornes du moteur de la machine à laver.

4. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 3, caractérisé en ce que la valeur de ladite impédance est inférieure à la valeur de l'impédance mesurée aux bornes dudit élément d'actionnement (EA).

5. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 1, caractérisé en ce que, pendant les arrêts de la machine à laver, ledit signal de commande continu unidirectionnel pour l'élément d'actionnement (EA) commande la délivrance d'agents lavants à l'intérieur du compartiment de lavage de la machine.

6. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 1, caractérisé en ce que ledit signal de commande continu unidirectionnel pour l'élément d'actionnement (EA) est utilisé pour la commande d'une électrovalve.

7. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 1, caractérisé en ce que ladite charge électrique (M) de la machine

à laver est constituée par l'impédance mesurée aux bornes d'une pompe de vidange.

8. Dispositif de commande d'un élément d'actionnement (EA) selon la revendication 1, caractérisé en ce que ledit circuit de commande électronique (MP) est constitué par un organe de commande micro-programmé.

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