

A CONTROL ASSEMBLY FOR A CONTACTOR

The invention relates to a control assembly for a contactor housed in a contactor box; comprising power switches which are actuated by an electromagnet having an energization coil one of whose terminals is permanently connected to a pole of a power supply source, whereas the other terminal is connectable to a programmable controller which supplies signals of opposite polarity, said control assembly including a further power supply source also generating further signals of opposite polarity and of identical potential, and a selector circuit having a first state in which it transmits to said other terminal the said signals of opposite polarity, supplied by the programmable controller, and a second state in which it transmits to said other terminal said further signals of opposite polarity.

Said further signals are used for checking purposes, for checking for example the correct operation of the contactor by a manual forced operation and interruption order.

Control systems known in prior art generally require a cabinet or a board for mounting the selector.

In one prior art assembly which is widely used, the selector is disposed on the front face of the cover of a small box which contains the contactor with which it is connected by conductors going from the cover to the terminals of the coil of the contactor, the latter being fixed on a base member of the box.

In these prior art control assemblies, the manual control member of the selector, which should be easily accessible to the operator, may be incorrectly manipulated or inadvertently moved, and this drawback is quite unacceptable as the need to carry out an operating check is infrequent. Moreover, the

prior art assemblies require the use of comparatively long conductors which are themselves likely to be the cause of breakdowns or troubles.

It is an object of the invention to provide a control assembly having a selector capable of being directly associated with a contactor with which it co-operates, so as to make its operation more reliable and reduce the size of the cabinets, boards or boxes used in the prior art.

According to the invention there is provided a control assembly, for a contactor housed in a contactor box and comprising power switches which are actuated by an electromagnet having an energization coil one of the terminals of which is permanently connected to a pole of a power supply source, whereas the other terminal is connectable to a programmable controller which supplies signals of opposite polarity, said control assembly including a further power supply source also generating further signals of opposite polarity and of identical potential, and a selector circuit having a first state in which it transmits to said other terminal said signals of opposite polarity supplied by the programmable controller and a second state in which it transmits to said other terminal said further signals of opposite polarity, said selector circuit being disposed in an insulating case distinct from the contactor box and removably attached to said contactor box through two rigid electric output pins of the selector circuit, said pins being adapted to be engaged in two upper connection terminals of the contactor coil, said upper connection terminals providing mechanical holding of said insulating case with said box by clamping and connections between said pins and input terminals of the selector circuit disposed on a front face of said insulating

case, and which front face is generally parallel to the front face of the contactor box.

The invention, as well as different embodiments to which it may apply, will be better understood from the following description and the accompanying figures which illustrate:

Figure 1, an electric connection diagram of a contactor with which is associated a selector according to the invention;

Figures 2 and 3, an elevational view and a side view of a first embodiment;

Figures 4 and 5, an elevational view and a side view of a second embodiment of the case of the selector ;

5 Figure 6, an elevational view of a third embodiment of the case of the selector ;

Figure 7, a second embodiment of the internal circuit of the selector ;

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Figure 8, a front view of the selector corresponding to the circuit of Figure 7 ;

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Figure 9, one embodiment of a circuit comparable to that of Figure 7, better adapted to DC control signals ;

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Figure 10, a third embodiment of a selector circuit having galvanic insulation between the control signals and the power supply source ;

Figure 11, another embodiment of a selector circuit having galvanic insulation ; and

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Figure 12, a variant of the circuit of Figure 10.

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The wiring diagram of a control system 20 for an electromagnetic contactor which is shown in Figure 1 comprises, for example, two power supply lines L_1 , L_2 which serve as a source for a programmable controller 22 ; the latter has a multiplicity of pairs of output terminals such as 23, 25, 23a, 25a which are each intended to supply a coil 26 of a contactor, such as 21.

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Contactor 21 comprises, for example, three pairs of input and output terminals 1, 2 ; 3, 4 ; 5, 6 ; of power switches 27, 28, 29 which are supplied by an RST network and are actuated by the coil ; an auxiliary signalling or

latching switch such as 31 having terminals 13, 14 is frequently disposed in the box 30 housing the contactor.

5 The ends of the conductor of the coil are connected to two input and output terminals 17, 18, a third terminal 19 connected to the preceding one being generally disposed like the other two on a cheek of the coil carcase, but on an opposite side, see also Figure 2. The indexed letters A_1 , A_2 , A_2 shown correspond to those
10 which are usually employed on apparatus for identifying the function of the coil terminals.

Between contactor 21 and the programmable controller 22 is disposed, in an insulating case 32, a selector 33,
15 comprising a three position change-over switch 7 whose mobile contact - c - which is connected to a terminal of a first type or output terminal 8, may come into contact with two fixed contact studs - p - respectively - m -, which are respectively connected to two terminals of a
20 second type or input terminals 9 and 11.

In a particular position 0 of the mobile contact, the latter is connected to no terminal.

25 A third input terminal 15 of the second type is further connected to a pin or second output terminal 16 of the first type by a conductor 59, whereas a light indicator, such as a LED, a neon lamp or an incandescent lamp 10 is connected between terminals 8 and 16. Accessorily, a fuse
30 12 may be inserted between terminal 11 and stud - m -.

Finally, the input terminal 11 of the selector 33, having the function referenced B_1 , is connected to a terminal 35 of a power supply source 36 which is able to present a potential identical to that which appears at terminal 23 of the programmable controller and which is advantageously, but not necessarily distinct from the power supply source of the latter.

In the non limitative example of circuit 20, the auxiliary switch 31 supplies a monitoring indicator 37 which shows the state of the mobile pieces of the contactor.

As can be seen in Figures 2 and 3, case 32 of the selector 33 has a generally parallelepipedic shape with a lower face 38 carrying two projecting pins 8, 16 which form the terminals of the same references and are adapted to be engaged in upper terminals 17, 18 of coil 26 during an association placing this face 38 against a parallel upper face 39 of box 30 of contactor 21.

This case may be fastened, either solely by nipping the rigid pins 8, 16 which is provided by the screws of the upper terminals 17, 18 of the carcass of the coil, or further in conjunction with the provision of complementary fastening obtained by the penetration of a hook 41 of the case in a recess with shoulder 42 formed on the upper face 39, see figure 3 ; this fastening device is advantageously placed in a region 38a of face 38 distant from pins 8, 16.

A front face 43 of case 32 has terminals 9, 11, 15 so as to facilitate screwing up of the corresponding screws from the front, as well as an orientable knob 44, preferably flush, which is coupled to the mobile contact of the change-over switch 7 and which can only be operated by means of a tool such as a screwdriver. Conductors such as 55 are introduced into terminals 9, 11, 15 through the upper face of the selector.

A window 45, also placed on this front face, makes it possible to observe the light emitted by lamp 10.

The assembly of terminals 9, 11, 15 of the selector and terminals of the contactor (the position of which is

indicated in dashed lines at 1-3-5 and 2-4-6) is therefore accessible on the parallel front faces 43, respectively 46.

5 In a variant shown in Figures 4 and 5, the connection pins 47, 48 adapted for cooperation with the coil terminals project from the front face 49 of a second type of case 40, where projecting portions 47', 48' of this case serve for holding them in position.

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Another variant shown in Figure 6 comprises pins 51, 52 projecting from two opposite lateral faces 53, 54 of a case 50, on which are placed projecting portions 51', 52' serving for holding them in position.

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In all the illustrated embodiments (see Figures 2 to 6), pins 8, 16 ; 47, 48 ; 51, 52 may be protected over a part of their length by molding or by an insulating sheath shown in black and the width - d - of the case is substantially equal to the width - D - of the associated contactor, measured along the associated faces such as 38 and 39 or parallel to the rows of terminals 1, 3, 5, whereas the rear face 57 of the selector does not extend beyond the rear face 58 of the contactor, see Figure 3, so as not to come into contact with a wall on which the contactor is fixed.

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Instead of conductor 55 connecting terminal 15 and module 33 to terminal 25 of the programmable controller and serving for the current return, a conductor 56 may be provided connected between the lower terminal A₂ of the contactor and a line L₃ having an appropriate potential.

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If it is desired to avoid possible confusion relating to the choice of the operating or stopping mode which the user desires, the function of knob 44 and that of the associated switch 7 may, in a variant, be dissociated by using, in a selector 60, a circuit as shown in Figure 7.

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In this variant, a change-over switch 61 and a switch 62 are placed in series between the upper function current inputs A_1 , B_1 , having terminals 63, 64 and the lower function current output A_1 having a pin 65.

The case 66 of selector 60 then has on its front face 67 two operating knobs 68 and 69 which are respectively coupled to the mobile contacts of the change-over switch 61 and of switch 62, see Figure 8.

When a selector 70 is more particularly intended to be placed in series with a contactor whose electromagnet is fed with DC current, better performances will be obtained if double cut-off change-over switches 71 or switch 72 are used, as can be seen in Figure 9.

When the functions provided by the selector and switch 80 require electric decoupling between the coil and the control signals, a circuit may be used such as that shown in Figure 10 where, as in the preceding examples, the input terminal A_2 is connected directly to the output terminal 82, whereas the input terminal A_1 is connected to the output terminal 81 through two switches 83 and 84 connected in parallel.

The first switch 83 is here actuated by a low consumption relay 84 with which are associated, for example, components for protection against the reversal of polarity (diode D_1) and for signalling (LED DL_1); the coil 85 of this relay is connected to input terminals E_1 , E_2 which are, like A_1 , A_2 advantageously connected to an external programmable controller: this circuit portion is therefore isolated.

The second switch is again shown as a double cut-off switch 84' having two sections 86, 87 mounted in series

and having a common manual control member 88 accessible from the same front face, by means of which forced operation and interruption of such operation may be provided, independently of the signals present at E_1 , E_2 ; a limiter component Z is here placed between terminal 82 and terminal A_1 .

Should it prove necessary, because of the working mode of the programmable controller, the same manual control member 91 of a selector 90, see Figure 11, may at the same time provide forced opening of switch 92 of a relay 93 and of the manual switch, see Figure 11. In a variant of Figure 10, shown in Figure 12, a selector 100 has a first section 101 of a double section manual switch 102 which may be connected in parallel across the switch 103 of the relay 104 and a second section 105 which may be placed in series with the isolated circuit of the coil of the relay 104 for inhibiting possible energization by signals applied to terminals E_1 , E_2 .

The different embodiments will advantageously each comprise a voltage limiter component, such as a variable resistor Z incorporating for example zinc oxide, which will be connected in parallel across the output terminals. As a complement, an RC circuit serving as an anti-interference device may also be connected between these terminals or be disposed externally of the module in direct relation with the terminals of the coil.



WHAT IS CLAIMED IS

1. A control assembly, for a contactor housed in a contactor box and comprising power switches which are actuated by an electromagnet having an energization coil one of the terminals of which is permanently connected to a pole of a power supply source, whereas the other terminal is connectable to a programmable controller which supplies signals of opposite polarity, said control assembly including a further power supply source also generating further signals of opposite polarity and of identical potential, and a selector circuit having a first state in which it transmits to said other terminal said signals of opposite polarity supplied by the programmable controller and a second state in which it transmits to said other terminal said further signals of opposite polarity, said selector circuit being disposed in an insulating case distinct from the contactor box and removably attached to said contactor box through two rigid electric output pins of the selector circuit, said pins being adapted to be engaged in two upper connection terminals of the contactor coil, said upper connection terminals providing mechanical holding of said insulating case with said box by clamping and connections between said pins and input terminals of the selector circuit disposed on a front face of said insulating case, and which front face is generally parallel to the front face of the contactor box.

2. A control assembly as claimed in claim 1, wherein the case of said selector circuit is disposed on the upper face of the contactor box with which it is further associated by a hook and recess system placed in a region distant from said pins.

3. A control assembly as claimed in claims 1 or 2, wherein the selector circuit comprises an electric change-over switch with three positions, one of which provides opening of the selector circuit.
4. A control assembly as claimed in claim 1 or 2, wherein the selector circuit comprises an electric change-over switch with two positions, and the mobile contact is connected to a further switch placed in series with one of said pins.
5. A control assembly as claimed in claim 4, wherein said change-over switch and said further switch are of the double-break type.
6. A control assembly as claimed in claims 1,2,3,4 or 5, wherein said selector circuit comprises a first electric switch across the terminals of which a second switch is placed in parallel and which is controlled by a small relay having connection terminals placed on the front face of said case and isolated from the selector circuit.
7. A control assembly as claimed in claim 6, wherein said first switch is of the double-break type.
8. A control assembly as claimed in claims 4,5,6 or 7, wherein control members, coupled to said change-over switch and said further switch, are accessible from the front face of the case.
9. A control assembly as claimed in any of the preceding claims wherein said selector circuit comprises a conductor connecting one of the input terminals directly to one of said pins.
10. A control assembly as claimed in any preceding claim, wherein an electric or electronic light means, visible on the front face of the case, indicates the presence or absence of a voltage between the two pins.



11. A control assembly as claimed in any one of the preceding claims, wherein a voltage limiting component is connected between the two output terminals of the selector circuit.

12. A control assembly as claimed in any one of the preceding claims, wherein said selector circuit comprises a first electric switch across the terminals of which a second switch is placed in parallel, said second switch is controlled by a relay provided with two connection terminals disposed on the front face of the case and isolated with respect to the selector circuit, and a third switch placed in series with the circuit of the coil of the relay, said third switch being actuated in synchronism with the first switch by means of a common actuating member.

13. A control assembly substantially as described herein with reference to the accompanying drawings.

