

TITLE OF THE INVENTION

A control and testing system for an installation using contactors.

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BACKGROUND OF THE INVENTION

The invention relates to a control and testing system for an installation using a multiplicity of contactor apparatus each comprising power switches which are actuated by an electromagnet having an energization coil whose accessible terminals are connected electrically to a supply and processing circuit capable of amplifying, respectively delivering or interrupting, automatically or manually, current signals having appearance or disappearance delays with respect to reference signals or not.

Known control systems of the prior art generally comprise a cabinet or board in which in particular are disposed circuits for processing different information which may comprise programmable automatic devices, timers, function selectors, signalling lamps, as well as manual control means, independent of the automatic device, for carrying out adjustments for example.

25 In one embodiment, also widely used, some of these means are disposed in reduced number, not on the panel of a cabinet, but on the front face of the cover of a small box containing the contactor(s) concerned to which they are connected by conductors going either from the cover to the terminals of the contactor coils or extending directly between some of these means and the terminals in question, when these members are all fixed to the base of the box.

A certain number of simple functions whose execution is left to an automatic device assembly when the final structure of the latter has been worked out beforehand, may nevertheless subsequently become necessary in simpler

installations where progressive evolution must accompany the increase in the number of functions related for example to new regulations, such as those concerning safety, or being justified when new manufacturing units are added to the original units.

In this latter case, the sizes of a cabinet or respectively a box may be insufficient if the capacities of this automatic device were not originally widely calculated.

The object of the present invention is to provide the user of a conventional automatic system with simple and compact means for responding to an extension of the original functions or to special needs which would justify neither the partial reconstruction of an existing system nor the use of a more sophisticated automatic system. Further, the invention is able to respond also to the needs of the users of the simple systems, considering the choice which is offered them of obtaining, in an extended range of products of the same size, the elementary functions which they may require.

According to the present invention there is provided a system for controlling an electric installation said system being equipped with contactor/relays or relays and a plurality of removable function modules, each contactor/relay or relay being provided in a separate casing and having an electromagnet energised by a coil which is connected to connecting terminals, comprising screws, wherein the operating conditions of the coil can be modified by one of the plurality of removable function modules which can be electrically connected to the connecting terminals of the coil by electrically conductive projecting pins also cooperating in holding the module mechanically in position on the casing of the contactor/relay, wherein each module comprises a casing having a lower face and a front face, said lower face being provided with said projecting pins which extend parallel to the front face of the casing and which are located so as to be engaged with said connecting terminals; in use, the module being in a position where its lower face extends parallel to and adjacent an upper

face of the contactor/relay while its front face extends parallel to a front face of the contactor/relay, preferably in the same plane; and,

wherein each module comprises at least two input terminals, adapted to be connected to external control devices, the input terminals being accessible through respective openings formed in the front face of said module casing, said projecting pins being connected to the outputs of an electronic function circuit provided within the module; and,

wherein each said contactor/relay casing is provided with a recess and each said module is provided with a hook means, which hook means and recess cooperate so as to help retain the module of the contactor/relay when the projecting pins are engaged and held in their respective connecting terminals.

Preferably a manual control means, a signalling means, an adjustment means or a selector means of said function circuit is disposed on the front face of the corresponding module, without the presence of conductors connected to the input terminals forming an obstacle for these means.

In a preferred embodiment the said lower face of the casing of the module has two of said projecting pins and a hook located in a region distant from these pins for engaging a matching recess provided in the upper face of the contactor/relay.

Preferably when said front face of the module lies parallel to the front face of the contactor/relay with which it is associated, a gap is formed between the module and the contactor/relay which allows passage of conductors connected to the contactor/relay.

In a preferred embodiment the projecting pins of said modules are of sufficient length so that they may be held in the connecting terminals of the coil of the contactor/relay while leaving between the latter and the module a gap adapted to receive an auxiliary case of small thickness which cooperates electrically with the terminals of the coil.

The invention will be better understood from the following description of a preferred embodiment of the system, with reference to the accompanying drawings in which :

Figure 1 is a front view of a multiplicity of contactors mounted side by side on a wall and equipped with modules in accordance with the invention.

Figure 2 is a front view of a contactor coil, opposite the terminals of which is situated a special module,

Figure 3 is a side view of Figure 2 in which the module is effectively associated with the terminals of the coil,

Figure 4 is a schematic view of the electromechanical or electronic circuits which may be incorporated in appropriate module cases, and

Figure 5 is a schematic side view illustrating one method of mounting a module of the invention on a contactor.

A plurality of contactors 31, 32, 33, 34, 35, 36 of a single automatic device or of a portion of a more extensive

automatic system, is shown in Figure 1, wherein these contactors are attached side by side on a conventional rail 2 which may be fixed to a wall.

05 As can be seen in Figures 2 and 3, each of these contactors, such as 3, comprises terminals 5, 6 which are connected to a coil 7, or are carried by the carcass 7a thereof, which coil is disposed in a case 8 for energizing an electromagnet 9, a mobile armature 10 of which actuates power switches such as 11 and, possibly, a signalling or latching switch 14 when the yoke 13 is magnetized.

15 These switches are connected to input power terminals such as 15, 16, 17, and output power terminals 18, 19, 20. It will be noted in Figure 1 that the numbers placed adjacent these terminals, and which are not accompanied by a reference line, must not be confused with the references numerals of the same rank. These numbers correspond to references which are standardized for facilitating recognition of the functions provided by these switches.

20 In a way which is known per se, a third terminal 21 electrically connected to terminal 6 is placed opposite the latter and on the carcass 7a so as to comply with certain wiring requirements.

25 With each of the contactors 31...36 are associated intermediate modules such as 41...46 which belong to a multiplicity 40 of modules, each of which provides a particular function which is directly related to the operation of the coil.

30 For this, each case 47 of a module such as 48, see Figures 2 and 3, has on a lower face 49 two projecting partially insulated output terminals 51, 52 which are adapted to co-operate with upper terminals such as 5, 6, adjacent the coil, opening on to the upper face 53 of the contactor. This same face has a recess with shoulder 54 which is placed in a region 55 distant from terminals 5, 6

and which is adapted to receive a hook 56 integral with face 49; the mechanical fixing and electric connection, which might be provided solely by nipping the ends of the pins in the corresponding terminals, is here advantageously completed by the presence of these hooking means 56, 54.

As can be seen in Figure 3, each module case 47 has a front face 57 which is placed in the vicinity of the front face 58 of the contactor and parallel thereto, without encroaching on a volume 60 devoted to the passage of conductors which, such as 61, lead to the upper input power terminals 15, 16, 17.

The front face 57 of the module 48 which has for example an indicator light 62 and an adjustment knob 63 also has the inlets required for a screwdriver for tightening the conductors, such as 64, connected to the input terminals of the module, such as 65, 66; these inlets themselves opening on to an upper face of the module.

In the example chosen, these terminals are only two in number, but their number may be greater, as can be seen in particular in Figure 1.

Each module case 47, such as those shown at 41, 46 in Figure 1, preferably has a width $-d-$ which is close to the width $-D_1-$ respectively $-D_2-$, of the contactor 31...36 with which it is associated; these widths are measured parallel to the rows of power terminals.

When the contactor case, such as 36, is wider than a contactor such as 31...35, the same modules may be associated therewith, either because of the existence of coil terminals having spacings corresponding to those of the pins, or because of the fact that even if these coil terminals are spaced wider apart, the pins of the modules may penetrate therein in adequate regions by passing from one side or the other of the corresponding clamping screws.

It will be further noted, in Figures 1 to 3, that the

heights of the module cases may range between two values shown by $-h_1-$ and $-h_2-$ depending on the volume 70 which is required for disposing the internal components chosen for providing a particular function.

05 Among the functions which may be provided by these modules, there may be for example, and non limitatively :

- a module 41 serving as relay amplifier,
- a module 42 providing in series electronic rest timing which introduces an adjustable delay on de-energization with respect to the disappearance of a reference signal through the adjustment member 79,
- 10 - a module 43 whose function is to provide either a voluntary interruption of the power supply to the coil through the manual control member 77, or a choice of the origin of the supply signals coming from a controller 84 or from an independent source 85, through the presence of an orientation switch whose manual control member is shown at 78, see also Figure 4,
- 15 - a module 44 serving as electronic amplifier for low level signals,
- 20 - a module 45 providing, electronically and in series, working timing which introduces an adjustable delay between the moment when a signal appears and the moment when the current flows through the coil, by means of the adjustment knob 81,
- 25 - a module 46 whose function makes it possible to provide in parallel a voluntary power supply for the coil, through the manual member 82, whereas this coil is normally fed through a small relay so as to provide galvanic insulation between the control signals and the supply source for the coil.
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It will be advantageous to dispose an indicator light on the front face of each of the modules, using for example a LED such as those shown at 71...76, so as to signal the presence of voltage at the terminals of the coil or,

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respectively, the flow of a current therethrough.

05 The electromechanical and electronic circuits and means
for carrying out the above mentioned functions may have
different constructions, so that only equivalent diagrams
have been illustrated in Figure 4. It will be noted that a
component 100 for protecting against overvoltages, using for
example a zinc oxide, is systematically connected between
the terminals 51, 52. Generally, the input terminals such
as A_2 are connected directly to one of the output terminals
10 52.

Finally, these output terminals 51, 52 have a sufficient
length -q-, and the terminals 5, 6 of the coil have a
penetration possibility such that each of these modules 90
may be mounted and associated with a contactor 91 despite
15 the presence between it and this contactor of an auxiliary
case 92 serving for protecting the coil against parasitics,
using an RC circuit.

This auxiliary case has, for this purpose, a very small
thickness -e-, see Figure 5. So that the fastening of the
20 module has in this case the same qualities, a recess and a
shoulder 93 may advantageously be provided on an upper face
97 of this auxiliary protection device, comparable to those
which are provided on the upper face of the contactor for
co-operating with hook 99.

25 This auxiliary case will advantageously be connected to
the terminals of coil 94, such as 95, by means of the
resilient bearing forces of conducting pieces 96 of the
auxiliary case coming into contact with terminal regions not
occupied by the clamping screws, such as region 98.

CLAIMS

1. A system for controlling an electric installation said system being equipped with contactor/relays or relays and a plurality of removable function modules, each contactor/relay or relay being provided in a separate casing and having an electromagnet energised by a coil which is connected to connecting terminals, comprising screws, wherein the operating conditions of the coil can be modified by one of the plurality of removable function modules which can be electrically connected to the connecting terminals of the coil by electrically conductive projecting pins also cooperating in holding the module mechanically in position on the casing of the contactor/relay, wherein each module comprises a casing having a lower face and a front face, said lower face being provided with said projecting pins which extend parallel to the front face of the casing and which are located so as to be engaged with said connecting terminals; in use, the module being in a position where its lower face extends parallel to and adjacent an upper face of the contactor/relay while its front face extends parallel to a front face of the contactor/relay, preferably in the same plane; and,

wherein each module comprises at least two input terminals, adapted to be connected to external control devices, the input terminals being accessible through respective openings formed in the front face of said module casing, said projecting pins being connected to the outputs of an electronic function circuit provided within the module; and,

wherein each said contactor/relay casing is provided with a recess and each said module is provided with a hook means, which hook means and recess cooperate so as to help retain the module of the contactor/relay when the projecting pins are engaged and held in their respective connecting terminals.



2. A system as claimed in claim 1, wherein a manual control means, a signalling means, an adjustment means or a selector means of said function circuit is disposed on the front face of the corresponding module, without the presence of conductors connected to the input terminals forming an obstacle for these means.

3. A system as claimed in claim 1 or 2, wherein said lower face of the casing of the module has two of said projecting pins and a hook located in a region distant from these pins for engaging a matching recess provided in the upper face of the contactor/relay.

4. A control system as claimed in claims 1, 2 or 3, wherein when said front face of the module lies parallel to the front face of the contactor/relay with which it is associated, a gap is formed between the module and the contactor/relay which allows passage of conductors connected to the contactor/relay.

5. A system as claimed in claims 2,3 or 4, wherein the projecting pins of said modules are of sufficient length so that they may be held in the connecting terminals of the coil of the contactor/relay while leaving between the latter and the module a gap adapted to receive an auxiliary case of small thickness which cooperates electrically with the terminals of the coil.

6. A system for controlling an electric installation equipped with contactor/relays or relays, substantially as herein before described with reference to and as illustrated in the accompanying drawings.
