

Method of Configuring Elevator Controls

5 Description

The invention relates to a method of configuring elevator controls which consists in essence of a control processor, an input/output module with connection points for
10 decentrally arranged signal emitters and signal receivers, and of these signal emitters and signal receivers themselves.

Controls of elevator installations have connected to them
15 a large number of different external signal emitters and signal receivers whose function and number is often not yet definitely fixed at the time of their configuration at the place of manufacture. For example, the number of stories to be served, together with the necessary call
20 buttons, displays, landing switches, etc., can be subsequently increased, or the customer wishes to have additional control-dependent safety measures, or new regulations require changes to control functions. It is usual for defined input or output signals from the control
25 processor to be assigned to defined connection points on an input/output module, and modification to these assignments to be possible only with substantial outlay and risk of error.

30 From US 4,490,775 a "universal programmable interface" is known which allows the free assignment of terminal

connectors on a circuit board to pluggable contacts which take the form of conductors arranged on both sides of the same circuit board and are connected, for example, to the inputs and outputs of a microprocessor. The terminal
5 contacts as well as the pluggable contacts are led by means of conductors, also on both sides of the circuit board, to the supports penetrating the circuit board. Mutual assignment of one terminal contact to one pluggable contact in each case is effected by placing a wire bridge
10 between the two supports connected to them.

With this method it is necessary for a person who has to make on-site changes or additions to the control, and the corresponding assignment of connection points to inputs
15 and outputs of a control, to have corresponding technical knowledge and knowledge of schematic wiring diagrams. Furthermore, the work is time-consuming and causes the elevator to be out of service for a correspondingly long time because when making modifications on site mistakes
20 are also frequently made.

The purpose of the invention is to create a method of configuring elevator controls which permits rapid and error-free assignment of input and output signals of a
25 control processor to freely selectable connection points of external signal emitters and signal receivers, such as limit switches, sensors, display devices, alarm signals, etc., without requiring special knowledge of controls, without wiring modifications having to be made, and
30 without the control processor having to be reprogrammed on site.

According to the invention, these characteristics are achieved in an elevator control by means of a configuration method which allows the external signal emitters and signal receivers to be connected to freely selectable connection points arranged on an input/output module, in that assigned to each occupied connection point is at least one programmable, preferably pluggable, connection configuration module which delivers to the control processor the requisite information concerning the type and function of the signal emitter or signal receiver connected to the corresponding connection point.

With the method according to the invention, important advantages are achieved. It allows fast and error-free configuration of an elevator control by persons who have no special knowledge of control and programming technology. On-site adaptations of the connection configuration to modified or additional signal emitters and signal receivers resulting from installation-specific peculiarities, local safety regulations, or post-installation extensions or modifications to the elevator installation, require neither time-consuming interventions in wiring nor program changes in the control processor. Such adaptations can also be implemented by persons without profound knowledge of controls and programming by using the method to connect the new signal emitters and signal receivers to freely selectable connection points and install the configuration modules programmed at the place of manufacture corresponding to the related functions in the corresponding places provided, preferably by plugging the modules into receptacles. This practically

rules out connection errors and programming errors, thereby avoiding unnecessary out-of-service times of the elevator installation.

5 Moreover, with this method, unused connection points and the corresponding space provided for them are saved because they need only be present for the number of signal emitters and signal receivers actually installed, and there is no need to have permanently assigned connection
10 points for the maximum possible number of every different device and every different function.

Advantageous embodiments and further developments of the invention derive from the subclaims.

15

In a preferred embodiment of the method according to the invention, the flow of information between the connection configuration modules arranged on the input/output module and the control processor takes place via a suitable bus
20 system. The bus system forms a simple communication connection between a large and variable number of configuration modules and the control processor, it being possible for the latter also to be part of a decentral elevator control system subordinated to a main processor.
25 Each configuration module has programmed into it a bus address which is unambiguous and unique for every function of a signal emitter or signal receiver represented by the module.

30 According to a further embodiment of the invention, the aforementioned bus system can have coupled to it

programmed instruction configuration modules which deliver installation-specific instructions to the control processor. Such information relates, for example, to peculiarities of an elevator installation which are not definitely known at the time of programming the control processor at the place of manufacture, or to processes and data which are subject to subsequent change through being dependent on country-specific regulations, building modifications, improvements in convenience, climatic conditions, etc. With such a system, maximum possible flexibility is achieved for an elevator control which in its core is standardized, thereby avoiding outlay and risk of error for reprogramming.

It is preferable to use as configuration modules memory chips or processor chips which are commercially available without difficulty and can be programmed by usual means.

Special advantages are achieved with the proposed system in that the control processor is programmed at the place of manufacture for a large number of control variants which for the delivered version of an elevator are not yet used, but for which it can be regarded as probable that they will be necessary in the more distant future. Should they subsequently become necessary, such control variants are automatically activated by coupling to the aforementioned bus system corresponding configuration modules with the necessary connection points for signal emitters or signal receivers. This method makes it possible for elevator specialists with no special knowledge of control or programming technology to adapt

control functions without error and with minimal out-of-service times.

The connection configuration method described in Subclaim 5 6 has the advantage that memory chips can be used for the connection configuration modules which are relatively simple and available from a large number of suppliers.

The connection configuration method described in Subclaim 10 7 is based on the application of so-called "addressable switches" with integral data storage which are connected to the control processor via a bus system, and to the corresponding connection point via a directly connecting conductor. In this manner, these connection configuration 15 modules firstly deliver to the control processor stored information about the type and function of the signal emitters and signal receivers connected to the corresponding connection points, and secondly can be caused by the control processor via the bus to generate 20 via the directly connecting conductor an output signal on the corresponding connection point, or to detect a signal present there and communicate it via the bus to the control processor. With this method, there is no need on the control processor for separate inputs and outputs with 25 related conductors connecting them to the connection points, as a result of which a particularly simple and clear system is achieved.

It is preferable for the configuration modules to take the 30 form of pluggable units which can be plugged into receptacles arranged on the input/output module and

connected to the control processor via the bus system.
Clear markings on the input/output module, which usually
takes the form of a printed circuit, indicate the
assignment of the connection configuration module

5 receptacles to their corresponding connection points. This
embodiment of the invention makes it possible to install
or replace the configuration modules in minimal time and
with very low risk of error.

10 Application is facilitated further by the configuration
modules being marked with abbreviations which symbolize
the control function for which they deliver programmed
instructions. Signal emitters and signal receivers to be
connected are also marked with the corresponding
15 abbreviations.

A significant simplification of the administration and
updating of the installation documentation is achieved in
that, based on the assignment of the plugged-in connection
20 configuration modules to the corresponding connection
points, as well as based on the instructions programmed in
these and in the plugged-in instruction configuration
modules, the control processor delivers the requisite data
for printing a schematic wiring diagram which documents
25 the connection configuration actually present and the
specific conditions defined by means of instruction
configuration modules.

Exemplary embodiments of the invention are shown in
30 Figures 1 and 2, and described in more detail below.

Fig. 1 shows diagrammatically the arrangement of an elevator control according to the invention with connection configuration modules on which the connection points are connected directly to inputs and outputs of the control processor.

Fig. 2 shows diagrammatically the arrangement of an elevator control according to the invention with "addressable switches" as connection configuration modules, on which these connection configuration modules, which are controlled by the control processor via a bus system, themselves generate signals to external signal receivers and receive signals from external signal emitters and pass them on.

Fig. 1 shows diagrammatically an input/output module 1 of an elevator control which takes the form of a printed circuit on which a control processor 2 is integrated. This processor 2 could, of course, also be mounted on a separate module. Visible at the lower edge of the input/output module 1 are connection points 4 which are connected individually via connecting conductors 3 to the inputs and outputs of the control processor 2 and to which external signal emitters and signal receivers 5 are connected. Assigned to each of these connection points is a connection configuration module A 6 which is connected via a bus system 7 to the control processor 2 and which contains programmed information and instructions relating to the signal emitters or signal receivers 5 connected to the corresponding connection points 4. With the assistance

of the selector switches 9, the control processor 2 can activate or deactivate the connection configuration module A 6 via selector conductors 8. Also connected to the conductors of the same bus system 7, and thereby also to the control processor 2, are instruction configuration modules 10 which have integral programmable data storage. For completeness, 13 represents a power pack with a connection for supplying power to the control processor and the bus system.

10

The configuration method according to the invention functions with the components shown in Fig. 1 as follows: On initialization of the elevator control, as a first step the control processor 2 generates a reset command on the bus system connecting the configuration modules 6, 10 which causes all the configuration modules 6, 10 mounted on the input/output module 1 to communicate their addresses via the bus system 7 to the control processor 2, which registers these addresses. In a second step, the control processor 2 activates via the aforementioned selector conductors 8, and the selector switches 9, each connection configuration module A 6 in turn, and in each case simultaneously initiates an identification command on the bus system 7, whereupon the connection configuration module A 6 activated in each case again communicates its address to the control processor 2, which from it recognizes the assignment of this connection configuration module to the corresponding connection point 4 and thereby to the signal emitter or signal receiver 5 connected to it, and registers this assignment together with the instructions stored in the connection configuration module

30

A 6. In a last initialization step, the installation-specific instructions contained in the instruction configuration module 10 are read into the control processor 2 via the bus system 7.

5

Fig. 2 shows an input/output module 1, which in essence has the same components as that described in Fig. 1 and also makes possible the same method of configuring elevator controls. Here, however, for the configuration modules B 11 use is made of commercially available so-called "addressable switches" with integral programmable data storage which are also connected to the control processor 2 via a bus system 7. Such a connection configuration module B 11, when caused to do so by the control processor 2 via the bus system 7, is able via a directly connecting conductor 12 to generate an output signal on the corresponding connection point 4 or to detect a signal present there and communicate it via the bus system 7 to the control processor 2. Here, in contrast to the method explained by reference to Fig. 1, on initialization of the elevator control no assignment of connection configuration modules and signal emitters or signal receivers to specific inputs or outputs of the control processor 2 is necessary, since the signals of this device travel over the connection configuration modules B 11 assigned to each connection point, and over the bus system 7, and are identified by means of the respective bus addresses. On initialization of the elevator control, the programmed data stores of the connection configuration modules B 11 also deliver to the control processor 2 via the bus system 7 programmed

information and instructions concerning the signal emitters or signal receivers connected to the corresponding connection points 4. The input/output module 1 described here also has connected to it instruction 5 configuration modules 10 on the bus system 7 which contain in their programmable data stores installation-specific information and instructions which are called up and stored by the control processor 2 when the elevator control is initialized.

List of Reference Numbers

1. Input/output module
2. Control processor
- 5 3. Connecting conductors
4. Connection points
5. Signal emitters or signal receivers
6. Connection configuration module A
7. Bus system
- 10 8. Selector conductor
9. Selector switch
10. Instruction configuration module
11. Connection configuration module B
12. Connecting conductor
- 15 13. Power pack

Patent Claims

1. Method of configuring elevator controls which consists in essence of a control processor (2), an input/output module (1) with connection points (4) for decentrally arranged signal emitters and signal receivers (5), and of these signal emitters and signal receivers themselves, characterized in that the external signal emitters and signal receivers (5) can be connected to freely selectable connection points (4) arranged on an input/output module (1), it being possible to assign to each of the occupied connection points a programmable connection configuration module (6,11) which delivers to the control processor (2) the requisite information concerning the type and function of the signal emitter or signal receiver (5) connected to the corresponding connection point (4).
2. Method according to Claim 1, characterized in that the flow of information between the connection configuration modules (6,11) and the control processor (2) takes place via a bus system (7), it being possible for this control processor also to be part of a decentral elevator control system which is subordinated to a main processor.
3. Method according to Claim 2, characterized in that programmable instruction configuration modules (10) can also be coupled to the bus system (7) and via it deliver installation-

specific instructions to the control processor (2).

4. Method according to Claim 3,
characterized in that

5 the configuration modules (6,10,11) contain
programmable memory chips or processor chips whose
programmable information can be called up by the
control processor (2).

- 10 5. Method according to Claim 4,
characterized in that the control processor (2), when
programmed at the place of manufacture, is also
programmed for the processing of processes which could
become necessary in the event of subsequent extensions
15 or modifications to the elevator installation, and
that the activation of such processes, including
assignment of the corresponding input and output
signals to specific connection points (4), takes place
on the basis of the information contained in the
20 additionally installed configuration modules
(9,10,11).

6. Method according to Claim 4 or 5,
characterized in that

25 between each connection configuration module (6) and
the conductors of the bus system (7) there is a
selector switch (9) with which these modules can be
activated or deactivated by the control processor (2)
via separate selector conductors (8) corresponding to
30 the connection points (4),
that when the elevator control is initialized, in a

first step the control processor (2) generates a reset command on the bus system (7) connecting the configuration modules (9,10), which causes all configuration modules mounted on the input/output module (1) to communicate their addresses via the bus system to the communication processor (2) which registers these addresses,

that in a second step the control processor, via the aforementioned selector conductors (8), briefly activates each connector configuration module in turn and in each case simultaneously effects an identification command on the bus system (7), whereupon the connection configuration module (6) which is activated in each case again sends its address to the control processor (2) which recognizes from it the assignment of this connection configuration module to one of its own inputs or outputs and which registers this assignment together with the instructions stored in this configuration module (6) regarding the connected signal emitters or signal receivers.

7. Method according to Claim 4 or 5, characterized in that

for the connection configuration modules B (11), usual commercially available so-called "addressable switches" with integral data storage are used, which are connected via the bus system (7) to the control processor (2) and via a directly connecting conductor (12) to the corresponding connecting point (4), and that these connection configuration modules B (11)

firstly deliver to the control processor (2) stored information concerning the type and function of the signal emitters and signal receivers connected to the corresponding contact points (4), and secondly can be
5 caused by the control processor (2) via the bus system (7) to generate via the direct connection conductor (12) an output signal on the corresponding connection point (4) or to detect a signal present there and communicate it via the bus system (7) to the control
10 processor (2).

8. Method according to Claim 1,
characterized in that
the configuration modules (9,10,11) are made as
15 pluggable units and can be plugged into plug receptacles on the input/output module (1), the assignment of the connector configuration module plug receptacles to their corresponding connection points (4) being identifiable by means of markings.

20 9. Method according to Claim 1,
characterized in that each control function for which a signal emitter or signal receiver (5) can be connected is symbolized by an abbreviation, and that
25 each configuration module (9,10,11) is designated by the abbreviation which corresponds to that control function for which the module is programmed.

10. Method according to Claim 5,
30 characterized in that
based on the assignment of the plugged-in connection

configuration modules (9,11) to the corresponding connection points, as well as based on the instructions programmed in these and in the plugged-in instruction configuration modules (10), the control processor (2) delivers the requisite data for printing a schematic wiring diagram which documents the connection configuration actually present and the specific conditions defined by means of instruction configuration modules (10).