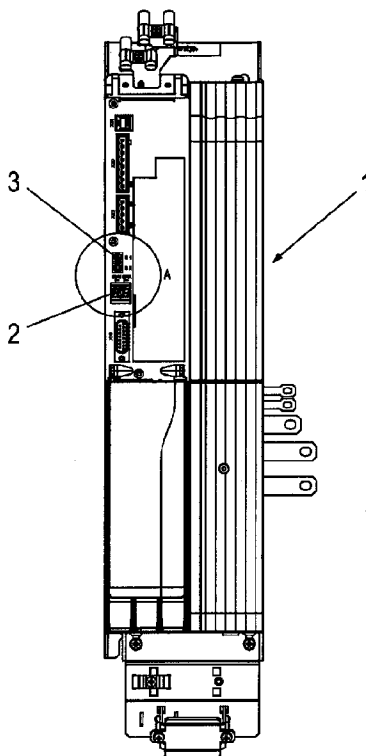




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(54) Title: USE OF A DISPLAY MEANS OF A CONVERTER, METHOD FOR OPERATING A CONVERTER, AND CONVERTER



(57) Abrégé/Abstract:

Use of a display means of a converter, method for operating a converter, and converter, the converter having an address code switch, in particular on its housing, and in an actuation of the address code switch and during a subsequent, predefined period of time, a respective value corresponding to the respective switch position of the address code switch is displayed by the display means, and operating information of the converter is displayed in all other cases.

Abstract

Use of a display means of a converter, method for operating a converter, and converter,
the converter having an address code switch, in particular on its housing,
and in an actuation of the address code switch and during a subsequent,
predefined period of time, a respective value corresponding to the respective
switch position of the address code switch is displayed by the display means,
and operating information of the converter is displayed in all other cases.

**USE OF A DISPLAY MEANS OF A CONVERTER, METHOD FOR OPERATING A
CONVERTER, AND CONVERTER**

TECHNICAL FIELD

The present invention relates to a use of a display means of a converter, a method for operating a converter, and a converter.

BACKGROUND

It is generally known that a converter includes display means for displaying an operating status.

Therefore, the present invention is based on the objective of avoiding faults in the operation of industrial systems.

SUMMARY

According to the present invention, in the use of a display means of a converter, the objective is achieved according to the features described herein; in the method for operating a converter, it is achieved according to the features described herein; and in the converter, it is achieved according to the features described herein.

Important features of the present invention in the use of a display means of a converter are that the converter has an address code switch, in particular on its housing,

and that when the address code switch is actuated and following a subsequent, predefined period of time, a respective value corresponding to a respective switch position of the address code switch is displayed by the display means,

and that operating information of the converter is displayed in all other cases.

This has the advantage that when setting the address, a display means used for other purposes, in particular a 7-segment display, may be utilized for displaying the address, thus making it possible to reduce faults. In particular, not only may the direct labeling of

1 the address code switch at a small type size be used, but also the much larger display
2 of the display means. The type size of the display means is preferably twice as large as
3 the labeling of the address code switch on the housing of the address code switch. This
4 ensures reliable readability, and thus reduces the fault rate.

5 In one advantageous development, the time period has a value between 1 second and
6 100 seconds. This is advantageous insofar as after the actuation of the address code
7 switch, the address value input with the aid of the address code switch is displayed for
8 the period of time, so that the operator receives optical feedback of his input. The
9 operator is therefore able to check his input within an adequate period of time.

10 In one advantageous development, the operating information includes a status,
11 especially an operating status, e.g., the type of control method of the converter, enable
12 information or a fault status, in particular. This is advantageous in that operating
13 information is displayed when no address is input. Only when an address is input will
14 the input address be visualized for a period of time.

15 In one advantageous development, the address code switch has a rotary switch, in
16 particular a rotary switch having discrete rotary positions and/or address code rotary
17 switches, or a DIP switch,

18 the address code switch having a finite number of switch positions, in particular. This
19 has the advantage that a digital display, in particular such as a 7-segment display, is
20 advantageous since the finite number can then be displayed in an uncomplicated
21 manner. The display is particularly simple if each rotary switch of the address code
22 switch has only 16 or fewer switch positions. The switch position of the respective rotary
23 switch is thus representable by a 7-segment display in each case, in particular
24 hexadecimally.

25 In one advantageous development, a hexadecimal number is allocated to each switch
26 position of the address code switch, and the switch position is correspondingly labeled
27 on the address code switch. This has the advantage that the operator can view the
28 labeling on the one hand and the display means on the other. The fault rate is therefore

1 able to be reduced further. In addition, an item of information regarding the address
2 allocated to the converter during the initial startup operation is also displayed during a
3 normal operation due to the fact that it can be read out on the address code switch
4 itself.

5 In one advantageous development, the address code switch has labeled surface
6 sections, and a respective labeled surface section is assigned to each switch position of
7 the address code switch. This has the advantage of allowing a simple readout, which
8 also remains in a power outage.

9 In one advantageous development, the information displayed by the display means in
10 an actuation of the address code switch and during a subsequent predefined period of
11 time corresponds to the labeling assigned to the corresponding switch position, in
12 particular the allocated labeled surface section. This is advantageous insofar as a
13 redundant display of information is provided and as a result, the fault rate is reduced.

14 Important features of the method for operating a converter are that the converter has an
15 address code switch, in particular on its housing, and a display means,

16 wherein

- 17 - the actuation of the address code switch is detected, and a respective value
18 corresponding to the respective current switch position of the address code
19 switch is displayed by the display means temporally after the detection instant for
20 a subsequent, predefinable period of time,

21 and operating information of the converter is displayed in all other cases.

22 This has the advantage that on account of the redundant display, the type size of the
23 display means being greater than the type size of the labeling of the address code
24 switch.

25 Important features of the alternative method for operating a converter are that the
26 converter has an address code switch, in particular on its housing, and a display means,

wherein

- the actuation of the address code switch is detected,
- following each detected actuation, a value corresponding to the respective switch position of the address code switch is displayed by the display means for a subsequent, predefined period of time,

and different operating information of the converter is displayed in all other cases, that is to say, values or information not related to the switch position, in particular.

This is advantageous inasmuch as no further display means are required, since the existing display means may be used for displaying the address information for the duration of the time period.

Important features of the converter are that the converter has an address code switch, in particular on its housing, and a display means,

wherein

- the converter includes a means for detecting an actuation of the address code switch,
- a means for the time delay after a respective detected actuation, in particular for a subsequent predefined period of time,
- the means for the delay time generating an enable signal, which
 - in an enablement, controls an actuating means actuating the display means in such a way that it actuates the display means so that a respective value corresponding to the respective switch position of the address code switch is displayed by the display means;
 - and in the absence of an enablement, the enable signal controls the actuating means in such a way that it controls the display means so that other operating

information of the converter is displayed, that is to say, values or information not related to the switch position, in particular.

This is advantageous in that the actuation is detectable with the aid of a sensor, i.e. a means for detecting the actuation of the address code switch. The sensor preferably detects an electric variable that depends on the switch position, such as a current or voltage.

Additional advantages are described below. The present invention is not restricted to certain example embodiments, the scope of protection being defined by the appended claims.

BRIEF DESCRIPTION OF DRAWINGS

The present invention will now be described in greater detail with the aid of figures:

Figure 1 shows a field device according to the present invention in a frontal view.

Figure 2 shows an enlarged cut-away section.

DETAILED DESCRIPTION

Field device 1 is developed as a bus device of a data bus. For this purpose, an address, i.e. a device address, is assigned to field device 1 during the start-up operation.

This allows a higher-level control, preferably a master, to transmit data to field device 1. The address is added to each transmitted data packet, so that field device 1 receives the data and other field devices that are also possibly connected to the data bus as bus devices disregard the data packet. The data packet, for example, includes command data and/or other data.

The inputting of the address on field device 1 is accomplished with the aid of address code switches, which are here developed as address code rotary switches 3. This means that the address is codable by turning, i.e. adjusting the rotary position. In the

exemplary embodiment, 16 rotary positions are possible. However, since two such address code switches 3 are used, addresses between 0 and 255 are able to be set.

Although address code switch 3 is labeled so that each rotary position is assigned a corresponding value, the labeling is implemented at a type size whose numbers or letters are smaller than the diameter of the rotatable part of address code switch 3.

Field device 1 also has a display means 3. In the exemplary embodiment, it is realized by two 7-segment displays.

During an operation, display means 3 is used for the display of operating information, such as the status of the converter. The operating type or a fault status of the converter, for instance, is shown.

During the start-up operation, especially when setting the address, no operating information of the converter is displayed, but instead, the switch position of the address code switches is shown.

The switch position of the first address code switch 3 is digitally displayed in the first one of the two 7-segment displays. In the same way, the switch position of second address code switch 3 is displayed with the aid of the second one of the two 7-segment displays.

Following a certain period of time, the 7-segment displays are once again used for the display of the operating information.

In one preferred development, the actuation, or in other words, the modification of the position of address code switch 3, is detected. As soon as the actuation has been detected, the 7-segment display will then be used to display the address information, i.e. the position of the address code switch. Once the actuation has been concluded, the display of the address information will continue to be maintained for a predefined period of time, whereupon a switch to the display of the operating information takes place.

1 Therefore, during the setting of the address information and during a subsequent,
2 predefined period of time, display means 3 is used for the display of the input address
3 information and then for the display of the operating information.

4 Even in the case of an address change that takes place after the startup operation, i.e.
5 an actuation of address code switch 3, the display means will once again be used to
6 display the address information assigned to the switch position for the time period of the
7 actuation and a subsequent period of time.

8 Preferably, a hexadecimal number is able to be displayed by each one of the 7-segment
9 displays, thereby utilizing the 7-segment display in an optimal manner. 256 different
10 addresses are thus able to be displayed by the two hexadecimal numbers.

11 In one further exemplary embodiment according to the present invention, address code
12 switches other than address code rotary switches 3 are employed. DIP switches may
13 preferably be used for this purpose. These too have labeling on each switch. When the
14 respective DIP switch is actuated, the information that corresponds to the respective
15 switch position will be displayed.

List of Reference Numerals

- 1 field device, in particular converter
- 2 Display means, in particular 7-segment display
- 3 Address code rotary switch

CLAIMS

1. A method of using a display of a converter, the converter including an address code switch adapted to set a device address of the converter, comprising:
 - displaying on the display, during a predefined time period after actuation of the address code switch to set and/or change the device address of the converter, a value corresponding to a switch position of the address code switch and to the device address of the converter; and
 - displaying on the display, other than during the predefined time, operating information of the converter.
2. The method according to claim 1, wherein the address code switch is provided on a housing of the converter.
3. The method according to claim 1, wherein the time period is between 1 second and 100 seconds.
4. The method according to claim 1, wherein the operating information includes a status, an operating status, a type of control method of the converter, enable information, and/or a fault status.
5. The method according to claim 1, wherein the address code switch includes a rotary switch, includes a rotary switch having discrete rotary positions and/or address code rotary switches, includes a DIP switch, and/or has a finite number of switch positions.
6. The method according to claim 1, wherein each switch position of the address code switch is assigned a hexadecimal number, and the switch position is labeled accordingly on the address code switch.
7. The method according to claim 1, wherein the address code switch includes labeled surface sections, and each switch position of the address code switch is assigned a respective labeled surface section.

8. The method according to claim 1, wherein information displayed by the display in an actuation of the address code switch and during a subsequent, predefined period of time corresponds to labeling assigned to respective switch position and/or an allocated labeled surface section.

9. A method for operating a converter having an address code switch adapted to set a device address of the converter and a display, comprising:

detecting an actuation of the address code switch to set and/or change the device address of the converter;

temporarily displaying, on the display, following detection of the actuation of the address code switch, a value corresponding to a current switch position of the address code switch and to the device address of the converter; and

displaying, on the display, other than during the predefined time, operating information of the converter.

10. The method according to claim 9, wherein the address code switch is provided on a housing of the converter.

11. A method for operating a converter having an address code switch adapted to set a device address of the converter and a display, comprising:

detecting actuation of the address code switch to set and/or change the device address of the converter;

after a detected actuation, displaying by the display for a subsequent predefined period of time, a value corresponding to a switch position of the address code switch and to the device address of the converter;

displaying, on the display, other than during the predefined time, other operating information of the converter.

12. The method according to claim 11, wherein the address code switch is provided on a housing of the converter.

13. The method according to claim 11, wherein the other information includes values and/or information not related to the switch position.

14. A converter, comprising:

- an address code switch adapted to set a device address of the converter;
- a display;
- a detection device adapted to detect an actuation of the address code switch to set and/or change the device address of the converter;
- a control device adapted to generate an enable signal after a time delay following an actuation detected by the detection device, the control device adapted to control, where the enable signal is generated, the display to display a value corresponding to a switch position of the address code switch and to the device address of the converter and adapted to control, where the enable signal is not generated, the display to display other operating information of the converter.

15. The converter according to claim 14, wherein the address switch is provided on a housing of the converter.

16. The converter according to claim 14, wherein the other information includes values and/or information not related to the switch position.

17. The converter according to claim 14, wherein the converter is adapted to perform a method including:

- displaying on the display, during a predefined time period after actuation of the address code switch to set and/or change the device address of the converter, a value corresponding to a switch position of the address code switch and to the device address of the converter; and
- displaying on the display, other than during the predefined time, operating information of the converter.

18. The converter according to claim 14, wherein the converter is adapted to perform a method including:

detecting an actuation of the address code switch to set and/or change the device address of the converter;

temporarily displaying, on the display, following detection of the actuation of the address code switch, a value corresponding to a current switch position of the address code switch and to the device address of the converter; and

displaying, on the display, other than during the predefined time, operating information of the converter.

19. The converter according to claim 14, wherein the converter is adapted to perform a method including:

detecting actuation of the address code switch to set and/or change the device address of the converter;

after a detected actuation, displaying by the display for a subsequent predefined period of time, a value corresponding to a switch position of the address code switch and to the device address of the converter;

displaying, on the display, other than during the predefined time, other operating information of the converter.

20. A method of using a display of a converter, the converter including at least one address code switch adapted to set a device address of the converter, comprising:

displaying, on at least one display of a converter, during a predefined time period after setting and/or changing the device address of the converter based on a switch position of the address code switch, a value corresponding to the switch position of the address code switch and to the device address of the converter; and

displaying on the display, other than during the predefined time, operating information of the converter.

21. The method according to claim 20, wherein the device address of the converter is set based on the switch position of the address code switch during a start-up operation of the converter.

22. The method according to claim 20, wherein the converter includes a plurality of address code switches and a plurality of displays, each display corresponding to a respective one of the address code switches.

23. The method according to claim 20, wherein the display includes a 7-segment display adapted to display a hexadecimal number corresponding to the device address.

24. The method according to claim 20, wherein the address code switch and/or the display is provided on a housing of the converter.

25. The method according to claim 20, wherein the period is between 1 second and 100 seconds.

26. The method according to claim 20, wherein the operating information includes a status, an operating status, a type of control method of the converter, enable information, and/or a fault status.

27. The method according to claim 20, wherein the address code switch includes a rotary switch, includes a rotary switch having discrete rotary positions and/or address code rotary switches, includes a DIP switch, and/or has a finite number of switch positions.

28. The method according to claim 20, wherein each switch position of the address code switch is assigned a hexadecimal number, and the switch is labeled accordingly on the address code switch.

29. The method according to claim 20, wherein the address code switch includes labeled surface sections, and each switch position of the address code switch is assigned a respective labeled surface section.

30. The method according to claim 20, wherein information displayed on the display in an actuation of the address code switch and during a subsequent, predefined period of time

corresponds to labeling assigned to a respective switch position and/or an allocated labeled surface section.

31. The method according to claim 20, wherein the setting and/or changing of the device address including actuating the address code switch.

32. The method according to claim 20, wherein the setting and/or changing of the device address includes modification of the switch position of the address code switch.

33. The method according to claim 20, further comprising detecting an actuation of the address code switch, the displaying of the value corresponding to the switch position of the address code switch and to the device address of the converter being performed in response to the detection of the actuation of the address code switch.

34. The method according to claim 20, wherein the value corresponding to the switch position of the address code switch and to the device address of the converter is displayed temporarily in response to detection of actuation of the address code switch.

35. The method according to claim 20, wherein the operating information of the converter includes values and/or information not related to the switch position.

36. The method according to claim 31, further comprising detecting the actuation of the address code switch.

37. The method according to claim 36, wherein the actuation of the address code switch is detected by a sensor.

38. The method according to claim 36, wherein the actuation of the address code switch is detected by detecting an electric variable that depends on the switch position.

39. The method according to claim 38, wherein the electric variable includes current and/or voltage.

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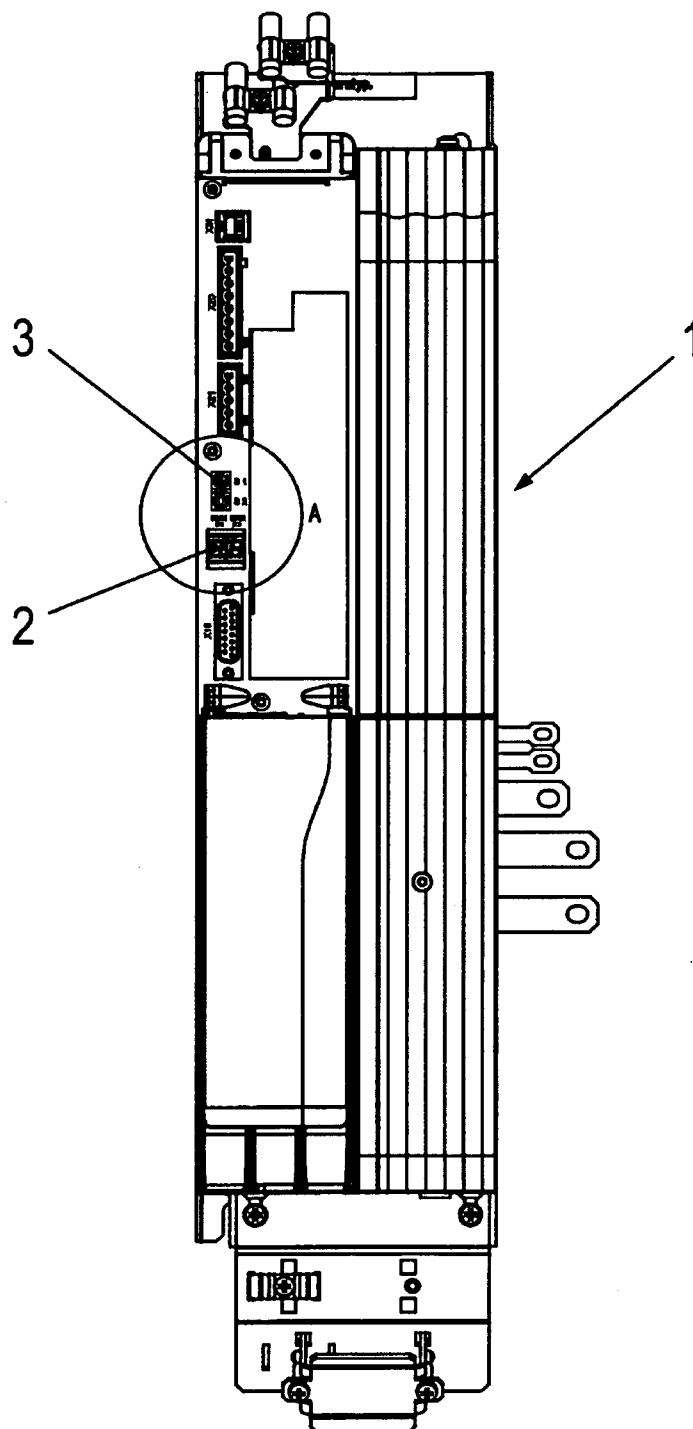


Fig. 1

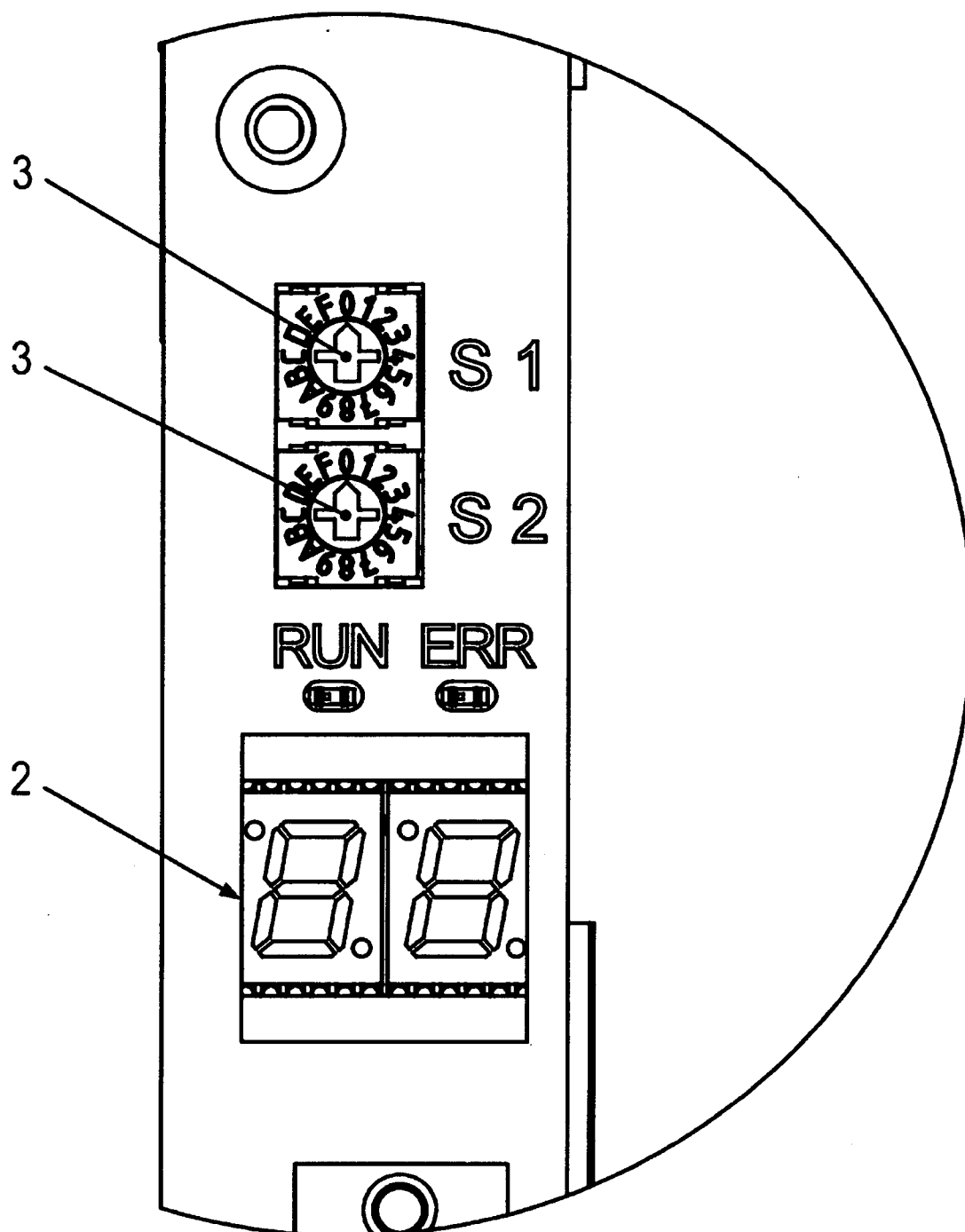


Fig. 2

