

FUSEHOLDER HAVING AN INTEGRATED CONNECTING LINE FOR
STATUS INDICATORS

Description

5

The invention relates to a fuseholder having a fuse status indicator according to the precharacterizing clause of Patent Claim 1. Such a fuseholder is known from DE 41 27 214.5 A1.

10

Electrical fuses having a fuseholder for insertion into a fuse housing are in widespread use. The fuse link, the actual protection element, is accommodated in the fuseholder such that it can be replaced. The fuseholder may, for example, be in the form disclosed in DE 34 06 815 A1, or the form disclosed in DE 37 41 743.6 A1. According to Application DE 197 34 234.5, the latter is preferably equipped with a coding tongue, which rests elastically against the foot contact of the fuse link.

15

20

A flashing status indicator according to DE 41 27 214.5 A1, which was mentioned above, is in each case fitted in the fuseholder. This status indicator comprises a glow lamp, which is arranged behind a window in the upper part of the fuseholder, and a small board in the vicinity of the glow lamp, with the electronic components such as capacitors, diodes and resistors required to actuate the glow lamp. The status indicator is electrically connected via connecting lines to the head contact and foot contact of the fuse link and, when the glow lamp flashes, this indicates whether the fuse link has been tripped and has blown.

25

30

In the past, the electrical connection between the head contact and foot contact of the fuse link and the board of the status indicator was produced by means of small pieces of wire, which were soldered at one end to the board and at the other end to the contact elements which are connected in the fuseholder to the head contact and foot contact of the fuse link.

35

This arrangement has the disadvantage that the steps for insertion of the pieces of wire into the fuseholder and their soldering during the production of the fuseholder can be carried out only manually. The
5 production process is thus rather complex.

DE 35 13 833 C2 discloses a melting fuse link which has a high cylindrical insulating-material body, in the interior of which a melting conductor is provided between two contact caps arranged at the ends
10 of the insulating body, with a series circuit comprising a high-value resistor and an optoelectronic display device being connected in parallel with the melting conductor. The high-value resistor may comprise an electrically conductive, high-resistance layer or an
15 electrically conductive, high-resistance plastic insert, which extends from one contact cap to the other and rests against the inner surface of the hollow-cylindrical insulating-material body. This arrangement also has the disadvantage that the plastic insert must
20 be inserted in and attached to the insulating-material body separately, although this can be done manually or automatically.

The invention is based on the object of refining the fuseholder with the built-in status
25 indicator so that the production process is simple. In order to achieve this object, the invention provides a fuseholder having the features of Claim 1, and a method for producing a fuseholder having the method steps of Claim 7.

30 According to the invention, this object as stated in the patent claims is achieved in that the connecting lines for the status indicator are no longer composed of wire, but of a conductive plastic for which channels which have accurately predetermined dimensions
35 are provided in the fuseholder, the rest of which is composed of insulating plastic.

The connecting lines for the status indicator can thus easily and quickly be configured by means of

so-called two-component spraying during the process of molding the plastic fuseholder.

The conductive plastic may make contact with the head contact and/or foot contact of the fuse link directly, or indirectly via the metallic connections for the fuse link in the fuseholder.

Exemplary embodiments of the fuseholder according to the invention and having an integrated connecting line for a status indicator are explained in more detail in the following text with reference to the drawing, in which:

Figure 1 shows a section view of a first version of a fuseholder having a built-in status indicator;

Figure 2 shows a section view of a second version of a fuseholder having a built-in status indicator; and

Figure 3 shows a side view of the second version of the fuseholder.

Figure 1 shows a section view from the side of a fuseholder 10, as is used in conventional fused switches. In fused switches of this type which are described, for example, in the abovementioned DE 34 06 815 A1, the fuseholder 10 is used in conjunction with the fuse link 20 which is located in it and, in general, is a melting fuse, not only to protect the load side against short circuits, but also to isolate the load side from the power supply, as is required, for example, when working on the electrical installation. To this end, when the fuseholder 10 is inserted into the housing of the fused switch, it can tilt from a switched-on position to a switched-off position.

The fuseholder 10 has an operating handle 11, in which the board 25 and the glow lamp 26 of a fuse status indicator are accommodated. The glow lamp 26 is fitted behind a window 12 at the front, visible end of the operating handle 11. The electrical circuit of the status indicator, having the diodes, capacitors,

resistors, etc. for actuating the glow lamp 26, is essentially located on the board 25 in such a manner that the glow lamp 26 flashes when the fuse link 20 has blown.

5 The fuse link 20 has a metallic head contact 22 and a metallic foot contact 23. The head contact 22 of the fuse link 20 is connected to a metallic holding and connecting element 14 of the fuseholder 10, and the foot contact 23 of the fuse link 20 is connected to a
10 metallic holding and connecting element 15 of the fuseholder 10. The metallic holding and connecting elements 14, 15 are used firstly to fix the fuse link 20 elastically in the fuseholder 10 such that it can be replaced, for which purpose, for example, the upper
15 holding and connecting element 14 may include a compression spring 14a and, secondly, to produce the electrical contact between the fuse link 20 and the corresponding connections in the fused switch when in the switched-on position.

20 Apart from the metallic holding and connecting elements 14, 15, the board 25 and the glow lamp 26 of the status indicator and the window 12, the fuseholder 10 (except for the fuse link 20) is composed of plastic, which is molded by injection molding. A
25 channel is provided in the electrically insulating plastic, of which the housing of the fuseholder 10 is essentially composed, in one of the walls of the housing, which runs between the board 25 and the holding and connecting element 15 for the foot contact
30 23, and this channel is filled with an electrically conductive plastic, forming a first connecting line 16. The connecting line 16, which is composed of the conductive plastic, is formed by means of two-component spraying; this produces the connection between the
35 board 25 and the holding and connecting element 15 for the foot contact 23 of the fuse link 20.

In the same way, a further channel is provided in another wall of the housing, which runs between the board 25 and the holding and connecting element 14 for

the head contact 23, and this channel is filled with the conductive plastic, forming a second connecting line 17. The connecting line 17 produces the connection between the board 25 and the holding and connecting element 14 for the head contact 22 of the fuse link 20.

Instead of the connecting lines 16, 17 making contact with the holding and connecting elements 14, 15, they may alternatively make direct contact with the head and foot contacts 22, 23 of the fuse link 20, for example via projecting tabs, which are formed on the housing of the fuseholder 10 such that, when the fuse link 20 is inserted, they are connected to its head contact 22 and foot contact 23.

The connecting lines 16, 17 are preferably connected to the board 25 via appropriately positioned contact pieces 18, in such a manner that the board 25 need be inserted only into the cavity provided for this purpose in the operating handle 11, with the electrical contact between the board 25 and the connecting lines 16, 17 then being produced automatically.

The channels for the connecting lines 16, 17 may be of such a size that they result in a specific conductivity and a specific resistance by virtue of the channel length and the channel cross section together with the type of conductive plastic provided in each case. The circuit on the board 25 may thus be simplified. Typical resistances of the connecting lines 16, 17 are 10^3 to 10^4 ohms.

In order to obtain particular resistance values, different plastics may also be used for the two connecting lines 16, 17, that is to say plastics with different conductivity.

The connecting lines 16, 17 may also be formed only partially from conductive plastic, in particular if the other part of the connecting lines 16, 17 can be formed, for example, by a special configuration, for example, of the holding and connecting elements 14, 15.

The connecting lines 16, 17 are, of course, routed or covered such that it is impossible to touch any live parts.

Figures 2 and 3 show a second version of the fuseholder, which is denoted by the reference symbol 30. This version is intended for a fuse which has a separate on/off switch. Like the fuseholder 10, the fuseholder 30 also accommodates a fuse link 20 having a head contact 22 and a foot contact 23.

In this version of the fuseholder, only the head contact 22 of the fuse link 20 is connected to a holding and connecting element 34 of the fuseholder 30; the foot contact 23 of the fuse link 20 is, in contrast, free, and is directly connected to a corresponding contact in the fused switch.

However, a coding tongue 35 rests elastically against the foot contact 23 of the fuse link 20 and projects to a different extent from the housing of the fuse link 20 depending on the rating of the fuse, and thus the diameter of the foot contact 23, as is disclosed in Application DE 197 34 234.5.

The board 25 and the glow lamp 26 of the fuse status indicator are once again accommodated in the upper part 31 of the fuseholder 30, with the fuse status indicator being arranged behind a window 32.

As in the first version of the fuseholder, apart from the metallic holding and connecting element 34, the board 25, the glow lamp 26 of the status indicator and the window 32 (excluding the fuse link 20), the fuseholder 30 is once again composed of injection-molded plastic. In the electrically insulating plastic for the housing of the fuseholder 30, a channel is provided in the coding tongue 35, which rests elastically against the foot contact 23, and this channel is filled with an electrically conductive plastic, forming a first connecting line 36. The connecting line 36, composed of the electrically conductive plastic, is formed by means of two-component spraying, as in the first version of the fuseholder. As

can be seen from the section view in Figure 2 and the view of the narrow side of the fuseholder 30 with the coding tongue 35 in Figure 3, the connecting line 36 runs from the contact point between the coding tongue 35 and the foot contact 23 along the length through the coding tongue 35, and further onwards through the housing of the fuseholder 30 as far as the board 25.

Furthermore, another channel is provided in the housing of the fuseholder 30 between the board 25 and the holding and connecting element 34 for the head contact 22, and this channel is likewise filled with conductive plastic, forming a second connecting line 37.

Instead of making contact with the holding and connecting element 34, the connecting line 37 may in this case as an alternative also make direct contact with the head contact 22 of the fuse link 20.

The connecting lines 36, 37 are preferably once again connected to the board 25 via contact pieces 38, in such a way that, when the board 25 is inserted into the cavity in the upper part 31 provided for this purpose, this at the same time produces the electrical contact between the board 25 and the connecting lines 36, 37.

In this embodiment, the channels for the connecting lines 36, 37 may also be of a size such that they produce a specific electrical resistance, preferably between 10^3 and 10^4 ohms. Apart from this, various plastics may also be used for the two connecting lines 36, 37 for the fuseholder 30; and the connecting lines 36, 37 may be only partially composed of conductive plastic.

In both the described embodiments, the external shape of the fuseholder 10, 30 with the built-in status indicators corresponds exactly to the shape of fuseholders without status indicators, so that the fuseholders 10, 30 with the integrated connecting lines for the built-in status indicators can also be replaced by fused plugs without any status indicators even in

already existing systems, without any work being required to the wiring and connections of the fused switch.

5 The electrically conductive plastics used may
be plastics composed of polyphenylenesulfite which are
mixed with carbon fibers in such a way as to comply
with the requirements for the mechanical, thermal and
electrical characteristics demanded of such
electrically conductive, thermoplastic construction
10 materials.

Patent claims

1. Fuseholder (10; 30) having a housing composed of insulating plastic; and having

5 a fuse status indicator with a board (25) and a glow lamp (26);

in which case a fuse link (20) having a head contact (22) and a foot contact (23) can be inserted into the fuseholder (10; 30);

10 in which case the board (25) of the fuse status indicator is electrically connected by at least one connecting line (16, 17; 36, 37) to the head contact (22) and foot contact (23) of the fuse link (20);

characterized in that

15 the housing of the fuseholder (10; 30) is produced from the insulating plastic by injection molding, and has at least one channel for the connecting line (16, 17; 36, 37) between the board (25) of the fuse status indicator and the head contact (22) and/or the foot contact (23) of the fuse link; and

20 the connecting line (16, 17; 36, 37) is at least partially composed of conductive plastic, which is sprayed into the channel.

2. Fuseholder according to Claim 1, characterized in that the channel for the connecting line (16, 17; 36, 37) composed of conductive plastic has predetermined dimensions such that the channel length and the channel cross section result in a particular resistance when the plastic has a given conductivity.

3. Fuseholder according to Claim 1, characterized in that the connecting line (16, 17; 36, 37) is in each case directly connected to the head contact (22) and foot contact (23) of the fuse link

35 (20).

4. Fuseholder according to Claim 1, characterized in that the connecting line (16, 17; 36, 37) is in each case connected via a holding and connecting element (14, 15; 34) of the fuseholder (10;



30) to the head contact (22) and foot contact (23) of the fuse link (20).

5 5. Fuseholder according to Claim 1, characterized in that the fuseholder (30) has a coding tongue (35) which rests against the foot contact (23) of the fuse link (20), with the connecting line (36) running through the coding tongue (35).

10 6. Fuseholder according to Claim 1, characterized by contact pieces (18; 38) between the connecting lines (16, 17; 36, 37) and the board (25), which make the contact between the connecting lines (16, 17; 36, 37) and the board (25) when the board (25) is inserted into the fuseholder (10; 30).

15 7. Method for producing a fuseholder according to one of the preceding claims, characterized in that the housing of the fuseholder (10; 30) is formed by injection molding from the insulating plastic, and the channel for the connecting line is formed in the process, and

20 the conductive plastic is then sprayed into the channel, in order to form the connecting line.

8. Method according to Claim 7, characterized in that the housing and the connecting line are formed by two-component spraying.

