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"PLUG-IN CONNECTOR"

This invention relates to a plug-in connector which incorporates arresters, comprising a cartridge type housing of insulating material including receptacles for the arresters, each of which arresters is connected through a respective fuse element and an earth contact to a common earth strip and is exchangeably retained within the respective receptacle by means of a compression spring.

To protect the various functional parts e.g. of a telecommunication system from excess currents, particularly from the commercial mains alternating currents, arresters in the form of plug-in cartridges or connectors are employed which in the case of an excess current of long duration will connect the protected conductors to ground potential, due to fusing or melting of a fuse element.

Such a plug-in connector incorporating arresters is described in German Published Specification DOS 2,428,266 and comprises a double-shell plastics housing in which ten recesses are formed so as to extend in two rows offset against one another. Each recess is adapted to accommodate an arrester which is inserted by hand and is retained within the recess by means of a compression spring assembly, wherein a compression spring disposed within a dish-like bulging portion of the housing urges a tapping contact disposed within the housing so as to be longitudinally slidable towards an end face of the cylindrical arrester. Under the action of the spring pressure the arrester is supported via a fuse element, by an earth contact which is a bent extension integral with a continuous common earth strip.

This known plug-in connector has been widely accepted because it is inexpensive to manufacture and easily

manipulated. But like other known devices, as shown in German Published Specifications DOS 1,929,845 and DOS 2,555,394, German Patent Specification 1,196,281 and the Swiss Patent Specification 507,599, this known
5 plug-in connector cannot be used in combination with so-called two-way arresters each of which replaces two conventional arresters.

The object of the present invention is to provide a plug-in connector incorporating two-way arresters.

10 According to the invention a plug-in connector incorporating arresters comprises a cartridge-type housing formed from insulating material and including receptacles for the arresters, each of said arresters being connected electrically and mechanically through a
15 respective fuse element and an earth contact to a common earth strip and being exchangeably retained within the housing receptacles by means of springs characterized in that each of the arresters includes three electrodes each of which is connected to a
20 contact pin, that the contact pins engage into clamping contacts the two outer ones of which are connected each to a tapping contact extending to the outside of the housing and the central clamping contact being connected to a U-shaped earth strip, that the fuse
25 element is in the form of a solder pellet disposed between the central electrode and an earth bar which faces outwardly and is electrically and mechanically connected to the earth strip and that the spring assemblies for resiliently retaining the arresters
30 comprise electrical contact elements associated with the respective outer electrodes of the arresters.

One example of a plug in connector in accordance with the invention will now be described with reference to

the accompanying drawing, in which:

Figure 1 is a plan view, partially in section, of a plug-in connector including five inserted arresters, and

Figure 2 is a sectional view along the line A-A of the plug-in connector shown in Figure 1.

As will be apparent from Figure 1 the plastics housing 20 of the plug-in connector is formed with five apertures 9 extending in a row in side-by-side relationship, and in each of said apertures there is disposed a two-way arrester having three electrodes. Each arrester 1 is provided with three contact pins, a, b, c which are inserted longitudinally into a respective one of clamping terminals 2, 3, 4 formed by longitudinally directed resilient tabs. The two lateral contact pins a and c are electrically connected to lateral electrodes 12', and 12'', and the central contact pin b is electrically connected to a central electrode 12 of the respective arrester 1.

The two outer clamping terminals 2, 4 which are adapted to receive the contact pins a, c are electrically and mechanically connected to outwardly extending tapping contacts 5, 6 adapted to be connected to the respective contact elements of the separator block.

The central contact pin b engages the central clamping terminal 3 which together with further central clamping terminals 3 associated with the remaining two-way arresters 1 is connected to a continuously extending common earth strip 7.

As will be apparent from Figure 1, the earth strip 7 is U-shaped, wherein the two parallel legs of the U extend longitudinally within the plastics housing over approximately the entire length thereof and the lower leg (as seen in Figure 1) is formed as an outwardly protruding earth return bar 8.

Each of the two-way arresters 1 is retained within the plastics housing 20 by means of a compression spring assembly 10, a solder pellet 11 being secured between said spring assembly 10 and the lower surface (as seen in the Figure) of the two-way arrester.

The compression spring assembly 10 comprises two metal housing parts 13, 14 which are slidable one over the other with a compression spring 10a disposed between the parts. The maximum extension of the compression spring assembly 10 under the action of the compression spring 10a is limited by stop members 15, 16 which are attached to the two housing parts 13, 14 respectively.

Opposite to each of the two outer or lateral electrodes 12', 12" of the two-way arresters 1 and at a predetermined intermediate spacing which is slightly smaller than the height of the solder pellet 11 there are disposed two contact elements 17, 18 respectively which may be formed as separate spring elements or as shown by portions of the stop members 15, and which are electrically and mechanically connected to the upper metal housing part 13 of the compression spring assembly 10.

The earth return bar 8 defines a support 19 on which the lower metal housing part 14 is supported in direct contact therewith.

The plastics housing 20 consists of the actual housing 22 on which a plastics lid has been fixed in a single operation e.g. by ultrasonic welding.

As is apparent from the right-hand portion of Figure 1, stops 23 are integrally formed at one end of the housing part 22, the stops acting to limit the insertion depth of the strip in use.

In the case of an excess current of long duration the solder pellet 11 mounted on the upper surface of the upper metal housing part 13 will melt whereby the contact elements 17, 18 will be brought into conductive engagement with the electrodes 12', 12" and will thus, together with the central electrode, be short-circuited via the electrically

conductive compression spring assembly to the grounded earth bar.

Between the electrodes 12, 12', 12" there is provided a gas which the increasing voltage becomes ionized to form an arc and will thus become conductive. Therefore in the case of an excess voltage of short duration current will flow from the tapping contact 5 or 6 respectively via the electrodes 12' or 12" respectively, to the central electrode 12. From the central electrode 12 current will flow via the solder pellet 11 to the earth bar. If this condition continues for some time the solder pellet 11 will melt, thus short-circuiting all three electrodes 12, 12' and 12" and preventing damage to the arresters as well as damage to the system.

The current may flow to the earth return bar via two paths, viz. on the one hand - this being the main path via the tapping contacts 5, 6, the short-circuited path from the respective outer electrode 12' and, respectively 12" through the central electrode 12 to the earth return bar, and on the other hand from the respective tapping contact 5 or 6 respectively, via the associated outer electrode 12' or 12", respectively direct to the earth return bar. This two-way discharge will considerably improve the reliability.

CLAIMS

1. A plug-in connector incorporating arresters, comprising a cartridge-type housing formed from insulating material and including receptacles for the arresters, each of said arresters being connected electrically and mechanically through a respective fuse element and an earth contact to a common earth strip and being exchangeably retained within the housing receptacles by means of springs, characterized in that each of the arresters includes three electrodes each of which is connected to a contact pin, that the contact pins engage into clamping contacts the two outer ones of which are connected each to a tapping contact extending to the outside of the housing and the central clamping contact being connected to a U-shaped earth strip, that the fuse element is in the form of a solder pellet disposed between the central electrode and an earth bar which faces outwardly and is electrically and mechanically connected to the earth strip and that the spring assemblies for resiliently retaining the arresters comprise electrical contact elements associated with the respective outer electrodes of the arresters.

2. A plug-in connector according to Claim 1, characterized in that the spring assembly comprises two metal housing parts movable relative to each other, the parts being urged apart by means of a compression spring.

3. A plug-in connector according to Claim 2, characterized in that the two metal housing parts of each spring assembly include stop members acting to limit the extension of the respective spring.



4. A plug-in connector according to Claim 2 or Claim 3 characterized in that the electrical contact elements are integrally formed on the metal housing part presented to the arrester.

5. A plug-in connector according to any of the preceding claims characterized in that within the plastics housing there are disposed five two-way arresters disposed in longitudinal side-by-side relationship.

6. A plug-in connector according to any of the preceding claims characterized in that the earth bar includes a support face for each spring assembly.

7. A plug-in connector according to any of claims 2-6 characterized in that during normal operation the upper metal housing part is pressed by the compression spring against the solder pellet secured to the bottom side of the arrester.

8. A plug-in connector according to any of the preceding claims characterized in that the earth strip and the earth bar are formed integrally as a stamped sheet-metal member, wherein the two legs of the U-shaped earth strip extend parallel to one another over the entire length of the plug-in connector.

9. A plug-in connector comprising the combination and arrangement of parts substantially as hereinbefore described with reference to the accompanying drawings.

