

A surge arrester

The invention relates to a surge arrester according to the preamble of claim 1.

It is known to form surge arresters as an insertable device combination consisting of a bottom part or device base and a plug-in module or insert. The device base comprises terminals for making contact with the electric leads and a receptacle to accommodate the insert part to be inserted, whereas at least one surge voltage protection element is arranged in the insert part. The electric connection between the insert part and the device base usually occurs by means of plug contacts. The advantage of such a modular arrangement lies in the ability to simply check the actual surge voltage protection element. It is necessary to remove the same from the electric circuit in order to check the same. As a result of the modular arrangement, the surge voltage protection element can be removed from the electric circuit without having to remove the entire surge arrester from the electrical installation for this purpose.

The disadvantageous aspect in this modular arrangement is that the insert part can be moved out of the device base by high electrodynamic forces which occur during a lightning phenomenon for example. The respective connection between the insert part and the device base is therefore often arranged in such a way that the application of tools is required for connecting or disconnecting the insert part and the device base.

Surge arresters which are identical from an electrotechnical standpoint are produced for different customers and markets with different housing configurations. The housings of modern switching devices are usually produced as injection-molded parts made of plastic. The disadvantageous aspect is that the tools for injection-molding machines are very complex and accordingly expensive, so that the production of different housings for different markets entails considerable additional production costs. Moreover, the thus entailing large number of different switching devices lead to costly warehousing, thus making it difficult to respond to changed market requirements.

WO 2008/009507 A describes an insertable surge arrester apparatus which comprises a U-shaped base and a plug-in module which can be arranged on the same. Resiliently yielding arms with latching projections are formed on the plug-in module which engage in respective receivers of the base.

It is therefore the object of the invention to provide a surge arrester of the kind mentioned above with which the mentioned disadvantages can be avoided, in which a secure connection between the insert part and the device base can be achieved without the use of tools

and with which the expenditure for warehousing or production can be reduced.

This is achieved in accordance with the invention by the features of claim 1.

A secure connection of the insert part with the device base can thus be achieved, which can also withstand the high electrodynamic forces that occur during a lightning phenomenon. This ensures a simple insertion and connection of the insert part with the device base without any tools. This enables a simple removal of the insert part from the device base without making use of tools. Surge arresters can thus be arranged for different customers and different markets in an electrotechnically identical manner, thus requiring a lower number of production tools. The production expenditure and the expenditure for warehousing can be reduced by using the arresting cap. As a result, it is possible to respond within a short period to changed orders because a surge arrester can be adjusted to the design requirements of a customer and market merely by matching arresting caps.

The subclaims, which simultaneously form a part of the description like claim 1, relate to further advantageous embodiments of the invention.

The invention is now explained in closer detail by reference to the enclosed drawings which merely show preferred embodiments by way of example, wherein:

Fig. 1 shows a preferred embodiment of a surge arrester in accordance with the invention in an axonometric view;

Fig. 2 shows the individual components of a surge arrester according to Fig. 1 in an axonometric exploded view;

Fig. 3 shows one housing half each of a device base and an insert part, and an arresting cap of the embodiment according to Fig. 1 in an axonometric view, and

Fig. 4 shows a detail of the arrangement according to Fig. 3 in a vertical projection.

Fig. 1 shows a surge arrester 1, comprising a device base 2 and at least one insert part 3, with the device base 2 being provided for fixing to a mounting rail, with the insert part 3 having at least one surge voltage protection element and a partial insert housing 4, and with the insert part 3 being arranged in a U-shaped receptacle 5 of the device base 2, with the insert part 3

being arrested by an arresting cap 6 in the U-shaped receptacle 5, and the arresting cap 6 is arranged to be separate from the insert part 3 and/or from the device base 2.

A secure connection of the insert part 3 with the device base 2 can thus be achieved which also withstands the high electrodynamic forces which occurs during a lightning phenomenon. This enables a simple insertion and connection of the insert part 3 with the device base 2 without any tools. This enables a simple removal of the insert part 3 from the device base 2 without making use of tools. Surge arresters 1 can thus be arranged for different customers and different markets in an electrotechnically identical manner, thus requiring a lower number of production tools and requiring only one single technical acceptance procedure for the surge arrester 1. The production expenditure and the expenditure for warehousing can be reduced by using the arresting cap 6. As a result, it is possible to respond within a short period to changed orders because a surge arrester 1 can be adjusted to the design requirements of a customer and market merely by matching arresting caps 6.

Surge arresters 1 in accordance with the invention are used for the protection of electric installations and/or humans from electric surge voltages which propagate on an electric line. Especially the sensitivity and the importance of computers have led to a large dissemination of surge arresters 1. Surge arresters 1 are usually arranged as components which under mains voltage produce a highly resistive or insulating connection between at least one phase and an external conductor of an electric network, especially an electric power supply network, and a neutral conductor or a further phase of the network. If no surge voltage occurs, virtually no current flows through the surge arrester 1, and the function of the subsequent network is not influenced by the presence of the surge arrester 1. When a surge voltage occurs, the surge arrester 1 forms a very low-resistance junction between phase and neutral conductor or a further phase, and thus bridges the subsequent network. The surge arrester 1 comprises for this purpose at least one surge voltage protection element, which is preferably arranged as a varistor, surge voltage protection diode, gas-discharge arrester or the like.

Surge arresters 1 in accordance with the invention have a modular arrangement and comprise a device base 2 and an insert part 3.

The device base 2 is provided for arrangement on a mounting rail such as top-hat rails and comprises for this purpose a respective mounting rail receptacle 25 and the necessary mounting means 26. In order to connect to the electric network to be protected, the device base 2 comprises at least one first and one second terminal 27. Fig. 1 shows a surge arrester 1 with merely two terminals 27 for the protection of a single-phase electric network, with surge arresters 1 for the protection of multi-phase networks being provided which accordingly have a respectively large number of terminals 27.

Device base 2 accordingly comprises an especially preferred two-part device base housing 28 which is shown in the Figs. 1 to 4 and which is made of an insulating material. Fig. 3 shows among other things a half shell of a device base housing 28. The receptacles 29 for the two terminals 27 (not shown) are clearly shown.

Device base 2 comprises a substantially U-shaped receptacle 5 for the insert part 3. The U-shaped receptacle 5 comprises a first and a second side part 13, 14 and a base part 20 which connects the same, and is arranged in a diametrically opposed manner in relation to a bottom part 30 of the insert part 3 which is provided to be inserted in the U-shaped receptacle 5. The U-shaped receptacle 5 comprises inner contacts (also not shown) for making contact with the insert part 3, preferably in the region of the base part 20. In order to simplify the insertion of insert part 3 in the U-shaped receptacle 5, one insertion region 16 each is arranged on the first and/or second side part 13, 14.

The insert part 3 comprises in accordance with the illustrated preferred embodiment an insert housing 4 made of an insulating material which is preferably made of several parts. The insert housing 4 encloses the insert part 3 in a substantially complete manner and on all sides, with merely the regions for making contact with the device base 2 and for display means being arranged to be free of the insert housing. The insert part 3 is arranged as a component that is fully functional from an electrotechnical standpoint even without the arresting cap 6 in accordance with the invention, and can therefore be tested and accepted in an electrotechnical way as such. The insert housing 4 encloses the insert part 3 in such a way that no inner modules are accessible from the outside. The insert part 3 further comprises electric contact pins 32 which protrude from the insert housing 4 in order to make contact with the inner contacts of the device base 2.

It is provided in accordance with the invention that the insert part 3 is arrested by an arresting cap 6 in the U-shaped receptacle 5 and the arresting cap 6 is arranged to be separate from the insert part 3 and/or the device base 2. The device base 2 comprises a device base housing 28 and the insert part 3 comprises an insert housing 4. Both the device base 2 and the insert part 3 are already finished electric devices even without the arresting cap 6. The feature that the arresting cap 6 is arranged to be separate from the insert part 3 and/or the device base 2 is illustrated by the fact that the arresting cap 6 is neither a part of the device base housing 28 nor the insert housing 4, but that it is an additional component which is independent from these.

The arresting cap 6 is preferably made of an insulating material, especially of a plastic material which can be processed by means of injection molding, and can have any shaping that is suitable for arresting the insert part 3 in the device base 2. It is preferably provided that the arresting cap 6 comprises means which enable the arresting of the insert part 3 in the device base 2 without the application of tools such as bayonet catches, screws with wing nuts, or latching connections. In accordance with the especially preferred embodiment of the present invention as shown in Figs. 1 to 4, it is provided that the arresting cap 6 is connected to the device base 2 by means of a latching connection.

The shaping of the arresting cap 6 is adjusted to the cooperation with the insert part 3 and a device base 2. According to the preferred embodiment of an insert part 3 and a device base 2 in which the insert part 3 protrudes beyond the device base 2 in the case of an arrangement in the U-shaped receptacle 5 of the device base 2, it is provided that the arresting cap 6 is arranged as a U-shaped clamp 7 comprising a first and a second leg 8, 9, and the first and second leg 8, 9 encompass the insert part 3 in a first and second region 10, 11. The encompassing of the insert part 3 ensures that it is secured permanently against removal from the device base 2, and especially a so-called levering of the insert part 3 can be prevented. The arresting cap 6 comprises a middle part 33 on which the first and second leg 8, 9 are formed. The middle part 33 is preferably arranged in such a way that the same encompasses the insert part 3 on five areas at least in sections. It is provided especially preferably that the middle part 33 is arranged in the manner of a trough, and encompasses an upper side 23 of the insert part which is averted from the base part 20 of the U-shaped receptacle 5 and the regions of the side

surfaces 24 of the insert part 3 which are directly adjacent to said upper side 23. This helps achieve an especially good hold of the arresting cap 6. The insert part 3 can thus also be secured against lateral loading states. The middle part 33 further preferably comprises a breakthrough 31 in order to show a display of the insert part 3 to the user.

The first leg 8 and the second leg 9 are preferably arranged in a resilient manner, and each comprises at least one latching nose 12 which is arranged to face the U-shaped receptacle. The latching noses 12 are arranged as a flat wedge according to the preferred embodiment. It can also be provided that several latching noses 12 are provided, e.g. in the form of several latching noses 12 arranged next to one another or on top of one another. At least one latching opening 15 each is arranged on the first and/or the second side part 13, 14 for engagement of the latching noses 12, with the latching openings 15 being arranged to be diametrically opposite to the latching noses 12 in order to ensure secure latching of the latching noses 12. In order to enable simple removal of the arresting cap 6 and further the insert part 3 from the device base 2, the insert housing 4 comprises an undercut 17 each in the first and second region 10, 11. The first and second regions 10, 11 of the insert part are regions between the upper side 23 of the insert part 3 and the latching openings 15 of the device base 2, when the insert part 3 is arranged in the U-shaped receptacle 6.

It is preferably provided that the U-shaped receptacle 5, preferably the first and second leg 8, 9, comprises at least one guide means 21 which has a progression along the direction of insertion of the insert part 3 in the U-shaped receptacle 5. For this purpose it is preferably further provided that the insert part 3 comprises at least one projection 22 for engagement in the guide means 21 of the U-shaped receptacle 5. This helps achieve a secure guidance of the insert part 3 in the insertion into the U-shaped recess 5. At the same time, the insert part 3 is protected against lateral removal thereby. The guide means 21 is preferably arranged as a groove or step, as is shown in Figs. 2 and 3 for example. The insert part 3 further comprises side surfaces 24 which are preferably plane-parallel and which are arranged such that they protrude laterally beyond the arresting cap 6, when the arresting cap 6 is arranged on the insert part 3, and thus forms the preferably rail-like projection 22.

CLAIMS:

1. A surge arrester (1), comprising a device base (2) and at least one insert part (3), with the device base (2) being provided for fixing to a mounting rail, with the insert part (3) having at least one surge voltage protection element and an insert housing (4), and with the insert part (3) being arranged in a U-shaped receptacle (5) of the device base (2), characterized in that the insert part (3) is arrested by an arresting cap (6) in the U-shaped receptacle (5), and the arresting cap (6) is arranged to be separate from the insert part (3) and/or from the device base (2).
2. A surge arrester (1) according to claim 1, characterized in that the arresting cap (6) is arranged as an additional component, independent of an insert housing (4) of the insert (3).
3. A surge arrester (1) according to claim 1 or 2, characterized in that the arresting cap (6) is arranged to be separate from the device base (2).
4. A surge arrester (1) according to claim 1, 2 or 3, characterized in that the arresting cap (6) is connected to the device base (2) by means of a latching connection.
5. A surge arrester (1) according to one of the claims 1 to 4, characterized in that the arresting cap (6) is arranged as a U-shaped clamp (7) comprising a first and second leg (8, 9), and the first and second leg (8, 9) encompass the insert part (3) in a first and second region (10, 11).
6. A surge arrester (1) according to claim 5, characterized in that the first leg (8) and the second leg (9) are arranged in a resilient way, and each comprise at least one latching nose (12).
7. A surge arrester (1) according to claim 6, with the U-shaped receptacle (5) having a first and second side part (13, 14), characterized in that at least one latching opening (15) each

for the engagement of the latching noses (12) is arranged on the first and/or second side part (13, 14).

8. A surge arrester (1) according to claim 7, characterized in that one insertion region (16) each is arranged on the first and/or second side part (13, 14).
9. A surge arrester (1) according to one of the claims 1 to 8, characterized in that the insert housing (4) comprises an undercut (17) each in the first and second region (10, 11).
10. A surge arrester (1) according to one of the claims 1 to 9, characterized in that the U-shaped receptacle (5), and preferably the first and the second leg (8, 9), comprises at least one guide means (21).
11. A surge arrester (1) according to claim 10, characterized in that the insert (3) comprises at least one projection (22) for engagement in the guide means (21) of the U-shaped recess (5).