interrupt the signal flow. In the event of overload or aging, suppressor diodes typically show low-impedance behavior (up to a short circuit). Gas discharge arresters (especially for data technology applications) behave like suppressor diodes and go into short-circuit (or become low-impedance) in the event of overload.

To date, possible aging or overloading of the above-mentioned surge protection components has occasionally been observed and signaled via a display, or defective components have been disconnected. In the event of a defect in the surge protection, the useful signal circuit has until now either been short-circuited (by a suppressor diode or gas discharge arrester) or interrupted (high-impedance resistor), resulting in a signal interruption and thus failure of the entire signal transmission path (signal/data loss).

Disclosure of the invention

Embodiments of the present invention provide a surge protection apparatus, in particular for information technology and/or communications technology systems.

According to an aspect of the present invention, there is provided a surge protection apparatus, in particular for information technology and/or communication technology systems, having: a housing; a first input terminal for applying a first external voltage signal, a second input terminal for applying a second external voltage signal, a first output terminal for outputting the first external voltage signal, a second output terminal for outputting the second external voltage signal; a surge protection circuit device which is at least partially provided on a printed circuit board in the housing; a first current path for conducting the first external voltage signal from the first input terminal to the first output terminal while bypassing the surge protection circuit device; a second current path for conducting the second external voltage signal from the second input terminal to the second output terminal while bypassing the surge protection circuit device; a third current path for conducting the first external voltage signal from the first input terminal to the first output terminal via the surge protection circuit device; a first switching contact device for opening and closing the first current path; a first electrical surge protection component which is connected between the first and the second current path; and a mechanical tripping device for opening the first switching contact

device in a non-tripped state and for closing the first switching contact device to interrupt the third current path in a tripped state given a tripping current in the surge protection circuit device caused by exceedance of a nominal parameter and/or by degradation of the components.

Embodiments of the present invention prevent failure of the signal transmission path when the surge protection apparatus is tripped. In order to achieve this, a mechanical tripping device is implemented, which separates the current path or paths leading through the surge protection circuit device and provides one or more current paths which carry the external voltage signal or signals from the respective input to the respective output, while bypassing the surge protection circuit device. The mechanical tripping device can be designed in such a way that it responds to both overload and aging phenomena.

According to a preferred development, the mechanical tripping device has a conductor track connection device which is attached to the printed circuit board using a soldered connection or conductive adhesive connection and which in a tripped state can be melted through the soldered connection or conductive adhesive connection if the predetermined tripping current is exceeded, wherein the conductor track connection device bypasses a first interruption point in the third current path in the non-tripped state, and a displaceable mechanical actuating

CLAIMS

1. A surge protection apparatus, in particular for information technology and/or communication technology systems, having:

a housing (ST, BT; GT);

a first input terminal (E1) for applying a first external voltage signal, a second input terminal (E2) for applying a second external voltage signal, a first output terminal (A1) for outputting the first external voltage signal, a second output terminal (A2) for outputting the second external voltage signal;

a surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2) which is at least partially provided on a printed circuit board (P) in the housing (ST, BT; G);

a first current path (ST1) for conducting the first external voltage signal from the first input terminal (E1) to the first output terminal (A1) while bypassing the surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2);

a second current path (ST2) for conducting the second external voltage signal from the second input terminal (E2) to the second output terminal (A2) while bypassing the surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2);

a third current path (ST3) for conducting the first external voltage signal from the first input terminal (E1) to the first output terminal (A1) via the surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2);

a first switching contact device (F1) for opening and closing the first current path (ST1);

a first electrical surge protection component (G1) which is connected between the first and the second current path (ST1, ST2); and

a mechanical tripping device (AU; B, S, EF, SL) for opening the first switching contact device (F1) in a non-tripped state and for closing the first switching contact device (F1) to interrupt the third current path (ST3) in a tripped state given a tripping current in the surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2) caused by exceedance of a nominal parameter and/or by degradation of the components.

2. The surge protection apparatus as claimed in claim 1, wherein the mechanical tripping device (AU; B, S, EF, SL) comprises:

a conductor track connection device (B) which is attached to the printed circuit board (P) using a soldered connection or conductive adhesive connection and which in the tripped state can be melted through the soldered connection or conductive adhesive connection if the predetermined tripping current is exceeded;

wherein the conductor track connection device (B) bypasses a first interruption point (U1) in the third current path (ST3) in the non-tripped state; and

a displaceable mechanical actuating device (S, EF, SL) for opening the first switching contact device (F1) in the non-tripped state and for closing the first switching contact device (F1) in the tripped state and for removing the conductor track connection device (B) in the tripped state.

3. The surge protection apparatus as claimed in claim 2, wherein a second electrical surge protection component (Z1) is connected in a fifth current path (ST5) between the first output terminal (A1) and the second output terminal (A2) and the conductor track connection device (B) bypasses a third interruption point (U1') in the fifth current path (ST5) in the non-tripped state.

4. The surge protection apparatus as claimed in claim 2 or 3, comprising

a fourth current path (ST4) for conducting the second external voltage signal from the second input terminal (E2) to the second output terminal (A2) via the surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2);

a second switching contact device (F2) for opening and closing the second current path (ST2);

a third electrical surge protection component (G2) which is connected between the fourth current path (ST4) and the first electrical surge protection component (G1);

wherein the conductor track connection device (B) bypasses a second interruption point (U2) in the fourth current path (ST4) in the non-tripped state;

wherein a ground terminal (M) is provided and a first node (KN1) between the first electrical surge protection component (G1) and the third electrical surge protection component (G2) is connected to the ground terminal (M); and

wherein the mechanical actuating device (S, EF, SL) is set up for parallel opening of the first and second switching contact device (F1, F2) in the non-tripped state and for parallel closing of the closing of the first and second switching contact device (F1, F2) in the tripped state.

5. The surge protection apparatus as claimed in claim 4 when dependent on claim 3, wherein a fourth electrical surge protection component (Z2) is connected between the second output terminal (A2) and the second electrical surge protection component (Z1), wherein a second node (KN2) between the second and fourth electrical surge protection components (Z1, Z2) is connected to the ground terminal (M);

wherein the conductor track connection device (B) bypasses a fourth interruption point (U2') in the fifth current path (ST5) between the fourth electrical surge protection component (Z2) and the second output terminal (A2) in the non-tripped state.

6. The surge protection apparatus as claimed in any one of the preceding claims, wherein the mechanical actuating device (S, EF; SL) has a rotatable pivoting part (S) which is prestressed against the conductor track connection device (B) by means of a spring device (EF).

7. The surge protection apparatus as claimed in claim 6, wherein the mechanical actuating device (S, EF; SL) has a plunger (SL) which can be deflected by the pivoting part and which is connected to the first switching contact device (F1) or to the first and second switching contact devices (F1, F2) via a link part (KU).

8. The surge protection apparatus as claimed in any one of the preceding claims, wherein an impedance device (R1, R2), preferably a resistor, is provided in the third and/or fourth current path (ST3, ST4).

9. The surge protection apparatus as claimed in any one of the preceding claims, wherein the first and/or third electrical surge protection component (G1, G2) have a gas discharge tube.

10. The surge protection apparatus as claimed in any one of the preceding claims, wherein the second and/or fourth electrical surge protection component (Z1, Z2) have a bidirectional Zener diode.

11. The surge protection apparatus as claimed in any one of the preceding claims, wherein the first switching contact device (F1) or the first and second switching contact devices (F1, F2) are designed as elastic spring tongues.

12. The surge protection apparatus as claimed in any one of the preceding claims, wherein the housing (GT) is designed in one piece and has a trough-like lower part (WGT) which can be closed by means of a cover plate (DGT).

13. The surge protection apparatus as claimed in any one of the preceding claims 1 to 11, wherein the housing (BT, ST) is designed in two parts and has a base part (BT) and a plug-in part (ST), wherein the plug-in part (ST) is able to be plugged in in the base part (BT) in a latching and releasable manner, wherein the first and second current path (ST1, ST2), the first and second input terminal (E1, E2) and the first and second output terminal (A1, A2) and the first or the first and second switching contact device (F1, F2) are provided in the base part (BT) and wherein the
surge protection circuit device (G1, R1, Z1; G1, G2, R1, R2, Z1; G1, G2, R1, R2, Z1, Z2), the printed circuit board (P) and the mechanical actuating device (S, EF; SL) are provided in the plug-in part (ST).

14. The surge protection apparatus as claimed in claim 13, wherein a plurality of plug-in contacts (P1, P2, P1', P2', PM) for electrically connecting the plug-in part (ST) to the base

part (BT) are attached to the printed circuit board (P) and protrude out of the plug-in part (ST) and can be inserted into the base part (BT).

15. The surge protection apparatus as claimed in any one of claims 13 or 14, wherein the mechanical actuating device (S, EF, SL) is designed in such a way that, when the plug-in part (ST) is not plugged into the base part (BT), the first or the first and second switching contact device (F1, F2) are closed.

16. The surge protection apparatus as claimed in any one of claims 13, 14 or 15, wherein the mechanical actuating device (S, EF; SL) has a plunger (SL) which can be deflected by the pivoting part and which can be inserted into the base part (BT) to open the first switching contact device (F1) or the first and second switching contact devices (F1, F2) in the non-tripped state.

17. The surge protection apparatus as claimed in any one of claims 13 to 16, wherein the plug-in part (ST) and the base part (BT) each have a trough-like lower part (WST, WBT) which can be closed by means of a respective cover plate (DST, DBT).