Claims

1. Safety circuit, comprising:

   a safety switch or a series circuit of safety switches, which comprises an input for an electrical safety circuit signal as well as an output, in which the electrical safety circuit signal being supplied to the input is present when all the safety switches are closed;

   c h a r a c t e r i z e d in that the safety circuit comprises:

   a cable comprising an optical fiber;

   a transmitter circuit for an optical signal, the output of which circuit is connected to the cable comprising an optical fiber, wherein the input of the transmitter circuit is connected to the output of the safety switch or of the series circuit of safety switches and the transmitter circuit is configured to transmit in the optical fiber of the cable the safety circuit signal that is present in the output of the safety switch or of the series circuit of safety switches, and wherein the transmitter circuit comprises an electrically-operated radiation source, which forms the signal to be transmitted when the necessary operating voltage is supplied to the radiation; and

   a safety relay, wherein the input of the transmitter circuit is connected to a contact of the safety relay in such a way that the radiation source receives its operating voltage via the contact of the safety relay, and wherein the control coil of the safety relay is connected to the output of the aforementioned safety switch/series circuit of safety switches.

2. Safety circuit according to claim 1, c h a r a c t e r i z e d in that the safety switches are positive-opening safety switches.

3. Safety circuit according to claim 1 or 2, c h a r a c t e r i z e d in that the input of the transmitter circuit is connected to the output of the aforementioned safety switch/series circuit of safety switches in such a way that the radiation

source receives its operating voltage from the safety circuit signal that is present in the output of the safety switch/series circuit of safety switches.

4. Safety circuit according to any of the preceding claims, c h a r a c t e r i z e d in that the safety circuit comprises a receiver circuit for the optical signal, the input of which circuit is connected to the cable comprising an optical fiber.

5. Safety circuit according to claim 4, c h a r a c t e r i z e d in that the output of the receiver circuit is connected to the control pole of the safety relay in such a way that the contact of the safety relay opens when the safety circuit signal in the input of receiver circuit is disconnected.

6. Safety circuit according to claim 4 or 5, c h a r a c t e r i z e d in that the receiver circuit for the optical signal is duplicated, and in that the duplicated inputs of the receiver circuit are connected to the cable comprising an optical fiber.

7. Safety circuit according to any of the preceding claims, c h a r a c t e r i z e d in that the safety circuit is a safety circuit for an elevator.

8. Safety circuit according to claim 7, c h a r a c t e r i z e d in that the safety switches are closed during uninterrupted operation of the elevator system;

and in that each of the safety switches is configured to open owing to some functional nonconformance of the elevator system.

9. Safety circuit according to claim 7 or 8, c h a r a c t e r i z e d in that the output of the receiver circuit for the optical signal is connected to the electric drive of the elevator.

10. Safety circuit according to any of claims 1 – 6, c h a r a c t e r i z e d in that the safety circuit is a safety circuit of an escalator or of a travelator;

and in that the safety switches are closed during uninterrupted operation of the escalator/travelator;

and in that each of the safety switches is configured to open owing to some functional nonconformance of the escalator/travelator.

11. Elevator system, comprising an elevator car and also an electric drive, which is configured to drive the elevator car in an elevator hoistway according to elevator calls, c h a r a c t e r i z e d in that the elevator system comprises a safety circuit according to any of claims 1 – 9.

12. Elevator system according to claim 11, c h a r a c t e r i z e d in that the output of the receiver circuit is connected to the electric drive;

and in that electric drive is configured to prevent a run with the elevator when the safety circuit signal is disconnected.

13. Elevator system according to claim 11 or 12, c h a r a c t e r i z e d in that the transmitter circuit for the optical signal is fitted in connection with the elevator car;

and in that the receiver circuit for the optical signal is fitted in connection with an immobile structure of the elevator system;

and in that the aforementioned transmitter circuit for the optical signal and the aforementioned receiver circuit for the optical signal are connected to each other with a cable comprising an optical fiber.

Claims

1. Safety circuit, comprising:

a safety switch or a series circuit of safety switches (1), which comprises an input (2) for an electrical safety circuit signal as well as an output (3), in which the electrical safety circuit signal being supplied to the input (2) is present when all the safety switches (1) are closed;

characterized in that the safety circuit comprises:

a cable (4) comprising an optical fiber;

a transmitter circuit (5) for an optical signal, the output of which circuit is connected to the cable comprising an optical fiber;

and the input of which transmitter circuit (5) is connected to the output (3) of the safety switch or of the series circuit of safety switches;

and which transmitter circuit (5) is configured to transmit in the optical fiber of the cable (4) the safety circuit signal that is present in the output (3) of the safety switch or of the series circuit of safety switches.

2. Safety circuit according to claim 1, characterized in that the safety switches (1) are positive-opening safety switches.

3. Safety circuit according to claim 1 or 2, characterized in that the transmitter circuit (5) comprises an electrically-operated radiation source (7), which forms the signal to be transmitted when the necessary operating voltage is supplied to the radiation source.

4. Safety circuit according to claim 3, characterized in that the input of the transmitter circuit (5) is connected to the output (3) of the aforementioned safety switch/series circuit of safety switches in such a way that the radiation source (7) receives its operating voltage from the safety circuit signal that is present in the output (3) of the safety switch/series circuit of safety switches.

5. Safety circuit according to claim 3, characterized in that the safety circuit comprises a safety relay (8),

and in that the input of the transmitter circuit (5) is connected to a contact of the safety relay (8) in such a way that the radiation source (7) receives its operating voltage via the contact of the safety relay (8),

and in that the control coil of the safety relay (8) is connected to the output (3) of the aforementioned safety switch/series circuit of safety switches.

6. Safety circuit according to any of the preceding claims, characterized in that the safety circuit comprises a receiver circuit (6) for the optical signal, the input of which circuit is connected to the cable (4) comprising an optical fiber.

7. Safety circuit according to claim 6, characterized in that the output of the receiver circuit (6) is connected to the control pole of the safety relay (16) in such a way that the contact of the safety relay (16) opens when the safety circuit signal in the input of receiver circuit (6) is disconnected.

8. Safety circuit according to claim 6 or 7, characterized in that the receiver circuit (6) for the optical signal is duplicated, and in that the duplicated inputs of the receiver circuit are connected to the cable (4) comprising an optical fiber.

9. Safety circuit according to any of the preceding claims, characterized in that the safety circuit is a safety circuit for an elevator.

10. Safety circuit according to claim 9, characterized in that the safety switches (1) are closed during uninterrupted operation of the elevator system;

and in that each of the safety switches (1) is configured to open owing to some functional nonconformance of the elevator system.

11. Safety circuit according to claim 9 or 10, characterized in that the output of the receiver circuit (6) for the optical signal is connected to the electric drive (9, 10, 11) of the elevator.

12. Safety circuit according to any of claims 1 – 8, characterized in that the safety circuit is a safety circuit of an escalator or of a travelator;

and in that the safety switches (1) are closed during uninterrupted operation of the escalator/travelator;

and in that each of the safety switches (1) is configured to open owing to some functional nonconformance of the escalator/travelator.

13. Elevator system, comprising an elevator car (12) and also an electric drive (9, 10, 11), which is configured to drive the elevator car (12) in an elevator hoistway (13) according to elevator calls, characterized in that the elevator system comprises a safety circuit according to any of claims 1 – 11.

14. Elevator system according to claim 13, characterized in that the output of the receiver circuit (6) is connected to the electric drive (9, 10, 11);

and in that electric drive is configured to prevent a run with the elevator when the safety circuit signal is disconnected.

15. Elevator system according to claim 13 or 14, characterized in that the transmitter circuit (5) for the optical signal is fitted in connection with the elevator car (12);

and in that the receiver circuit (6) for the optical signal is fitted in connection with an immobile structure of the elevator system;

and in that the aforementioned transmitter circuit (5) for the optical signal and the aforementioned receiver circuit (6) for the optical signal are connected to each other with a cable (4) comprising an optical fiber.