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(12) (19) (CA) **Demande-Application**

(21) (A1) **2,243,468**
(86) 1997/01/08
(87) 1997/07/24

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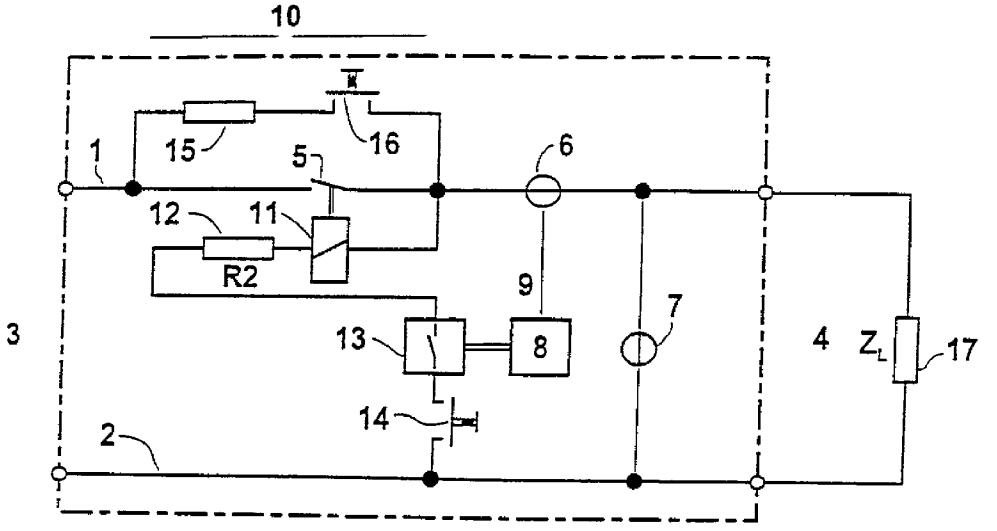
(51) Int.Cl.[6] H02H 11/00
(30) 1996/01/19 (196 01 878.1) DE

(54) **CONNECTEUR POUR RESEAUX D'UTILISATION**
(54) **CONNECTOR FOR CONSUMER NETWORKS**



(57) Connecteur pour réseaux d'utilisation (1, 2) établissant une connexion, dans des conditions exemptes de court-circuit, dans des limites de fonctionnement admissibles, par l'intermédiaire d'au moins un intervalle de coupure (5). En plus des détecteurs de courant (6) et de tension (7) avec leur unité de traitement (8), une branche de conjonction (9), en parallèle avec une branche de charge et une branche de pont (10), agit comme diviseur de tension, de manière à assurer une protection supplémentaire contre un enclenchement en cas de court-circuit. L'intervalle de coupure (5) est ponté par la branche de pont (10), celle-ci renfermant, suivant la fonction, également un dispositif d'introduction par clavier (16). En cas de court-circuit, la tension à l'actuateur (11) n'est pas suffisante pour connecter l'intervalle de coupure (5).

(57) Described is a connector for consumer networks (1, 2) which creates a connection with no short-circuit within permitted operating limits by means of at least one switch (5). In addition to current (6) and voltage (7) sensors with their associated processing unit (8), a connection arm (9) in parallel with the load and a bridge arm (10) connected up as a voltage divider provide additional protection against switching on in the event of a short-circuit. The switch (5) is bridged by the bridge arm (10) which also includes a device (16) with a keying function. In the event of a short-circuit, the voltage at the actuator (11) is not sufficient to connect in the switch (5).

Abstract

Connection arrangement for load networks

Connection arrangement for load networks (1, 2) which creates a connection in the absence of a short circuit within permissible operating values by means of at least one contact gap (5). In addition to current (6) and voltage sensors (7) having a processing unit (8), a connection path (9) in parallel with the load and a bridge path (10) as a voltage divider additionally provide protection against circuit-making in the event of a short circuit. The contact gap (5) is bridged by the bridge path (10) and this contains a momentary-contact on switch (16) in line with its function. In the event of a short circuit, the voltage at the actuator (11) is not sufficient to activate the contact gap (5).

FIG 1

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Description

Arrangement for connecting a load to load networks

The invention relates to a connection arrangement for load networks which creates a connection in the absence of a short circuit within permissible operating values by means of at least one contact gap.

Many short circuits occur when switching on because a related release, for example of a circuit-breaker, does not act until the short circuit has already been made. Similarly, a lot of circuits remain connected up even though no current is being drawn. Most circuits usually remain connected up even when there is an over- or undervoltage. Some of the problems described already have partial solutions, such as undervoltage releases for contactors and circuit-breakers and short-circuit releases in circuit-breakers.

The invention is based on the object of developing an arrangement for connecting a load to load networks which allows protection against making on a short circuit in a single arrangement. The solution to the object described is achieved by means of a connection arrangement as claimed in claim 1. In addition to using current and voltage sensors and a processing unit, it operates with a series circuit comprising a connection path, in parallel with the load, and a bridge path which bridges the contact gap. The bridge path contains a momentary-contact on switch in line with its function, the bridge path forming a voltage divider with the connection path. Testing for a short circuit is also understood here as meaning that anticipated, unacceptably high overloading is tested for using error states. These can be taken as meaning excessively low resistances on the load side.

A relevant connection arrangement is known without a series circuit comprising a connection path and a bridge path, that is to say without a voltage divider either (EP-A1-0 621 674). The known connection arrangement also connects a load only when there is no short circuit on the load side. To this end, an impedance measurement is taken. Specifically, this is also an arrangement for connecting a load to load networks which creates a connection in the absence of a short circuit within permissible operating values by means of at least one contact gap current and voltage sensors being connected to a processing unit which can be used to connect and disconnect a connection path. The connection path, which in the stricter sense is designed as a connection circuit, is DC-isolated from the load circuit and the bridge by means of the normally open contact. In the known connection arrangement, the connection circuit contains an actuator which is operatively connected to a contact gap in the load network. The contact gap is also bridged in this case by a bridge path with a resistor. In the known connection arrangement, however, a momentary-contact on switch provided in the bridge path does not have the function of turning on the connection arrangement so that it is operational.

The connection arrangement operates as a universal monitoring relay which may be produced centrally, that is to say compactly, or in decentralized

fashion. It has the following characteristics or allows the following adjustments to be made:

- not making on an existing short circuit or large overload;
- not making or turning off in the event of excessively high and excessively low mains voltage;
- not making or turning off in the event of overload, adjustable or permanently set;
- not making or turning off if the load is too small or there is no load at all;
- manually connectable and disconnectable in situ;
- remotely controllable, in particular via a bus interface.

The voltage divider comprising the bridge path and the connection path can advantageously be designed as claimed in claim 2.

Further advantageous embodiments are the subject matter of the connection arrangements as claimed in claim 3 and as claimed in claim 4.

The invention will now be explained in greater detail using exemplary embodiments shown in the drawings in highly schematic fashion.

Fig. 2 shows a connection arrangement with additional protective conductor supervision.

FIG. 1 illustrates a basic embodiment of the connection arrangement.

FIG. 2 shows a connection arrangement with additional protective conductor supervision.

FIG. 3 shows the arrangement according to FIG. 1 with an additional device for remote control.

FIG. 4 illustrates the device according to FIG. 3 with an additional bus interface.

The connection arrangement shown in FIG. 1 for a load network having the outer conductor 1, previously called phase conductor, and the neutral conductor 2 enables a supply side 3 to be connected to a load side 4 using a contact gap 5. In the exemplary embodiment shown in FIG. 1, the connection arrangement has a current sensor 6, a voltage sensor 7 and a processing unit 8. A connection path 9 is arranged in parallel with the load and is connected to the outer conductor 1 and the neutral conductor 2. In contrast, the connection path 9 is connected in series with a bridge path 10.

In the exemplary embodiment, the connection path 9 has a solenoid actuator 11, which has an impedance Z which may or may not be complex, a resistor 12, R 2 and a switching element 13. An off switch 14, for example in the form of a momentary-contact off switch, may additionally be provided. The bridge path 10 has a resistor 15 and an on switch 16 with the function of a momentary-contact on switch.

When the momentary-contact on switch 16 is actuated, the current sensor 6 and the voltage sensor 7 can measure values which are fed to the processing unit 8. If these values lie within a permitted range, the switching element 13 is turned on and voltage is divided by means of the bridge path 10 and the connection path 9.

In an embodiment as claimed in claim 2, the bridge path 10 forms a resistor which is designed, on the one hand, such that only an insignificant voltage drop occurs with a permissible load 17 and, in the event of a short circuit, limiting to tolerable currents takes place. On the other hand, the resistance of the bridge path 10 with respect to the connection path 9 as a voltage divider is designed such that, in the event of a short circuit instead of a load 17, the voltage drop across the bridge path 10 is so large that the voltage in the connection path 9 is not sufficient

to drive the actuator 11. In general, suitable precautions can be taken

to produce a correspondingly reduced voltage on the connection path in the event of a short circuit. On the other hand, the switching element 13 permits the supply voltage or mains voltage to be connected to a load 17 only for as long as the current sensor 6 reports to the processing unit 8 that the current is not excessively large. The voltage sensor 7 is used to check whether the voltage present is excessively high or excessively low with respect to specified permitted voltages.

The existence of a short circuit on the load side 4 before connection of the contact gap is detected by voltage division by the bridge path 10 and the connection path 9. In this case, the connection path is shunted with the load using a resistance which is comparatively low in the event of a short circuit.

Increased protection is obtained using protective conductor supervision as shown in FIG. 2. The protective conductor 18 receives a test current which is measured by a sensor 19 used as a measurement current sensor. In the exemplary embodiment, the measurement current is applied from the outer conductor 1 to the protective conductor 18 via a series resistor 20. The mains current can be detected in the sensor 19 by means of an optocoupler.

It is possible to control connection remotely with a connection arrangement as shown in FIG. 3. The on switch 16 is shunted inside or outside a connection arrangement, designed as a device, using a separate switching element 21. It is also possible to enable remote releasing by means of a series circuit comprising switching elements as break contacts for the off switch 14 in the connection path 9. In addition, remote releasing can also be controlled directly by means of the processing unit 8 and the switching element 13.

All the connection arrangements shown in Figures 1, 2 or 3 can be connected to a bus line 23 of a bus system using a bus interface 22. The embodiment shown in FIG. 4 corresponds

for the rest with that shown in FIG. 3. The contact gap 5 and the actuator 11 can be produced together as a circuit breaker. As regards remote control, the functions of the arrangement shown in FIG. 4 can additionally be produced as a circuit breaker with a remote-control mechanism, for example with a solenoid actuator or a motor drive.

Patent Claims

1. An arrangement for connecting a load to load networks (1, 2) which creates a connection in the absence of a short circuit within permissible operating values by means of at least one contact gap 5, current (6) and voltage sensors (7) being connected to a processing unit (8) which can be used to connect and disconnect a connection path (9) in parallel with the load (17), said connection path containing an actuator (11) which is operatively connected to at least one contact gap (5) in the load network, the contact gap (5) being bridged by a bridge path (10) with a resistor (15) which contains a momentary-contact on switch (16) in line with its function, the bridge path (10) forming a voltage divider with the connection path (9).

2. The connection arrangement as claimed in claim 1, characterized in that the bridge path (10) forms a resistor (15) which is designed, on the one hand, such that only an insignificant voltage drop occurs with a permissible load (17) and, in the event of a short circuit, limiting to tolerable currents is produced, and the resistance of the bridge path (10) with respect to the connection path (9) as a voltage divider being designed such that, in the event of a short circuit instead of a load (17), the voltage drop across the bridge path (10) is so large that the voltage in the connection path (9) is not sufficient to drive the actuator (11).

3. The connection arrangement as claimed in claim 1 or 2, characterized in that the processing unit (8) is connected to bus conductors (23) of a bus system.

4. The connection arrangement as claimed in claim 1 or 2, characterized in that the contact gap (5) and the actuator (11) are formed by a circuit-breaker with a remote-control mechanism.

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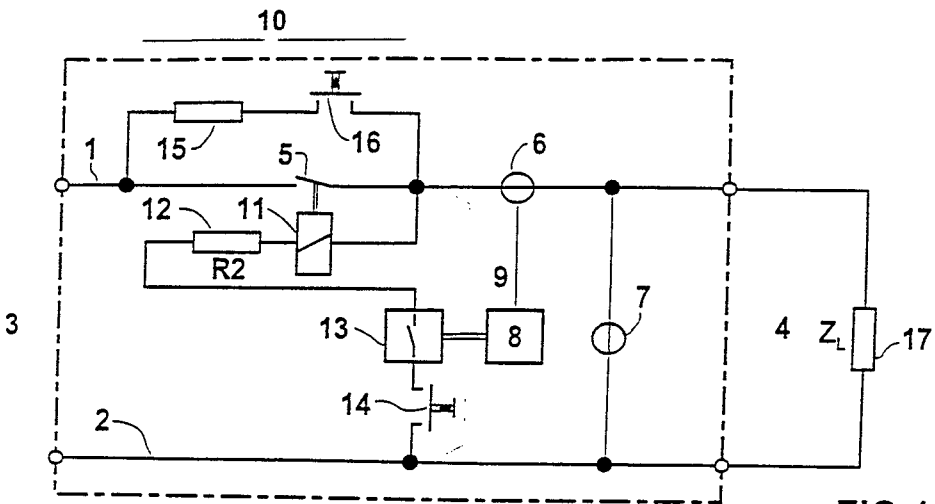

FIG 1

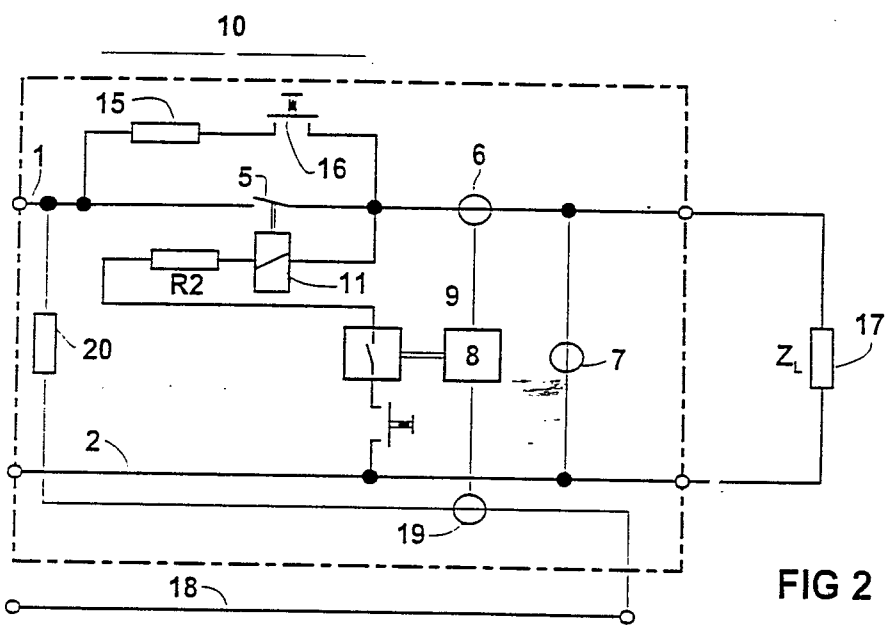

FIG 2

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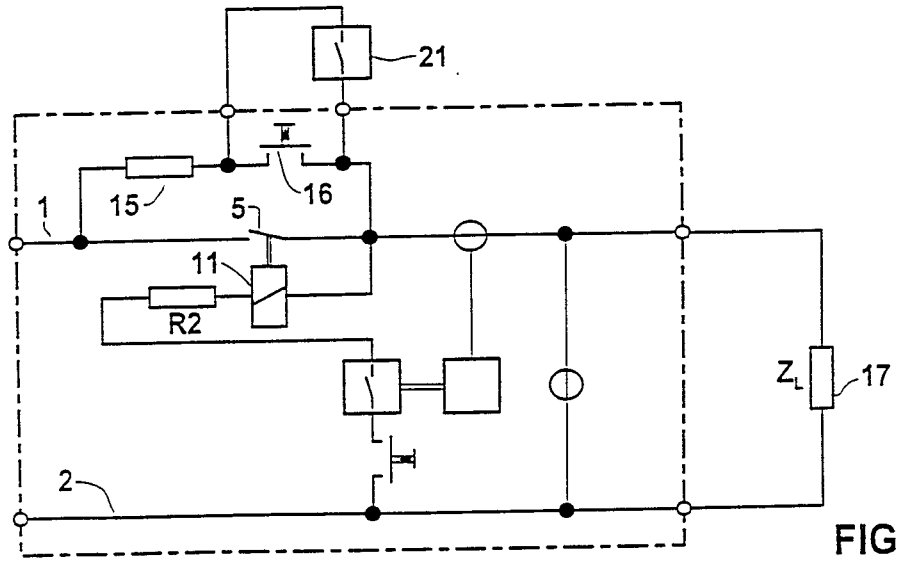
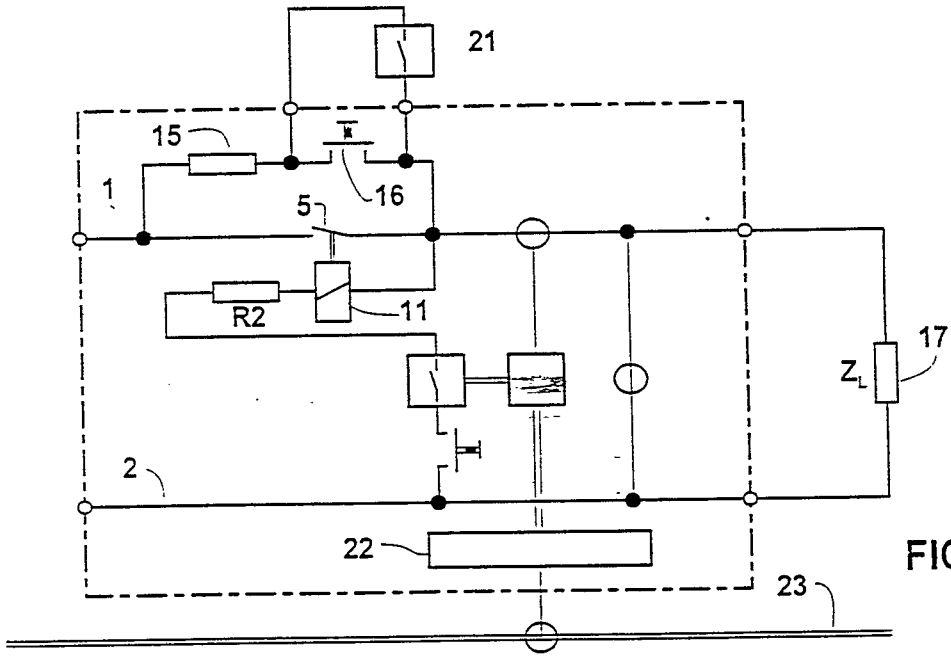


FIG 3



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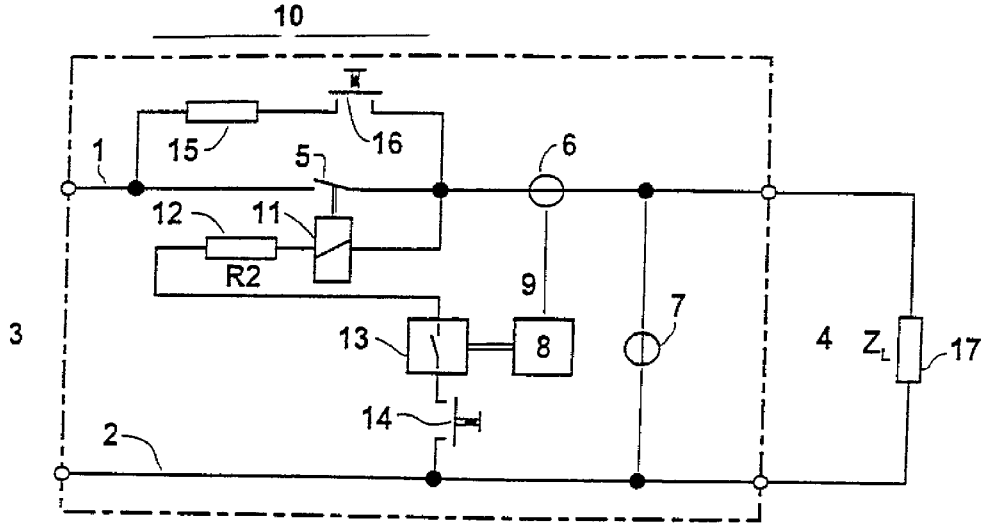
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