

COLLECTIVE REMOTE SIGNALLING APPARATUS

The invention relates to a collective remote signalling apparatus.

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Background of the invention

From a wide range of areas of electrical engineering it is known to provide
10 overvoltage protection devices, e.g. overvoltage protection devices for
network protection applications.

Overvoltage protection devices typically comprise a local status display. Some
overvoltage protection devices also have an integrated remote signalling
15 device for reporting the faults to a remote location.

Increasingly, however, overvoltage protection is also in demand in other fields,
such as telecommunications, measurement and control engineering.

20 Since in these fields complex networks are often set up, exchanging
overvoltage protection devices during operation is generally not possible
without having to shut down a system.

The user is therefore faced with the problem that on a first installation, they
25 must decide between overvoltage protection devices with a remote signalling
device or without a remote signalling device.

In the past therefore, systems have been proposed in which the overvoltage
protection devices were scanned by means of a light barrier, wherein certain
30 conditions were signalled by the change in the optical properties of the light
beam of the light barrier.

These systems proved disadvantageous however, as they required additional
installation space for the overvoltage protection devices - e.g. for head and/or
35 central modules - so that a retrofitting capability, e.g. in control cabinets, was
not readily achievable and under certain circumstances necessitated rewiring
of the system. There was also often the problem that, depending on the

arrangement of the light path there was a danger that cables or dust intruded into the light path, thus causing erroneous states to be signalled.

Given this situation, the object of the invention is to provide a solution that
5 does not cause a plant to be shut down and leaves it up to the user to decide if and when he/she wants to deploy a remote signalling device.

The object is achieved by an apparatus according to Claim 1. Other advantageous configurations are in particular the subject matter of the
10 dependent claims.

Brief Description of the Drawings

Hereafter, the invention is explained in more detail with reference to the
15 drawings. These show:

Fig. 1 an overvoltage protection device and a remote signalling module in accordance with embodiments of the invention in a perspective schematic view in the non-installed state,

20 Fig. 2 the overvoltage protection device and the remote signalling module in accordance with embodiments of the invention in a lateral schematic view in the non-installed state,

Fig. 3 the overvoltage protection device and the remote signalling module in accordance with embodiments of the invention in a lateral schematic
25 view in the installed state,

Fig. 4 a detail of remote signalling modules according to embodiments of the invention,

Fig. 5 the detail of remote signalling modules in accordance with embodiments of the invention together with overvoltage protection
30 devices in a frontal schematic view in the installed state,

Fig. 6 another detail of remote signalling modules in accordance with embodiments of the invention together with an overvoltage protection device in a lateral schematic view in the installed state in the operational case,

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Fig. 7 the further detail of remote signalling modules in accordance with embodiments of the invention together with an overvoltage protection device in a lateral schematic view in the installed state in the event of a fault,

5 Fig. 8 an electrical equivalent circuit diagram in accordance with embodiments of the invention, and

Fig. 9 another electrical equivalent circuit diagram in accordance with embodiments of the invention.

10 **Description of Embodiments of the Invention**

Figure 1 shows an overvoltage protection device USG_1 which can be connected in series and a remote signalling module FM_1 in accordance with embodiments of the invention, in a perspective schematic view in the non-
15 installed state. A plurality of overvoltage protection devices and remote signalling modules can then be interconnected such that an electrical collective remote signal - such as shown in Figure 8 - can be implemented.

In the arrangement, each of the plurality of overvoltage protection devices
20 USG_1 , USG_2 that can be connected in series has means for mounting an assigned remote signalling module FM_1 , FM_2 . Similarly, the plurality of remote signalling modules FM_1 , FM_2 comprises corresponding facilities for mounting an overvoltage protection device USG_1 , USG_2 .

25 For example, in Figure 1 an embodiment for sliding in and out is shown, in which corresponding recesses interact with matching protrusions, so that a remote signalling module can be subsequently mounted on an overvoltage protection device and possibly in a detachable manner.

30 This is indicated in a lateral view in Figures 2 and 3 in relation to an overvoltage protection device USG_1 and an associated remote signalling module FM_1 , wherein the assignment results from the module being slid onto an overvoltage protection device. It is particularly advantageous if the housing of the overvoltage protection device USG_1 and the housing of the assigned
35 remote signalling module FM_1 cooperate with each other as shown in the

Figures, i.e. if they are matched to the respective dimensions, e.g. the same lattice pitch.

As shown in Figure 5 the remote signalling modules FM_1 , FM_2 can also be arranged in series, wherein on the sides that can be adjacent to another remote signalling module FM_1 , FM_2 , the remote signalling modules FM_1 , FM_2 comprise electrical contact means $KM_{1,1}$, $KM_{1,2}$; $KM_{2,1}$, $KM_{2,2}$, so that adjacent remote signalling modules FM_1 , FM_2 can be connected in series.

For this purpose, the contact means can be designed in the form of a bent sheet metal element - see Figure 4 and Figure 5 - so that from the side a contact-spring-type connection is produced when connecting them in series. Also, the contact means $KM_{1,1}$, $KM_{2,1}$ can be formed, for example, more flat on one side while on the other side the contact means $KM_{1,2}$, $KM_{2,2}$ can be more rounded in shape, to rest on the next contact in a spring-load manner and so produce an electrical contact.

If a plurality of remote signalling modules are chained together thus, an (interruptible) electrical connection is created between the remote signalling modules, i.e. a series circuit.

In the event of a fault in an overvoltage protection device, e.g. USG_2 , the associated remote signalling module FM_2 will interrupt the electrical series connection to an adjacent remote signalling module FM_1 or plurality of adjacent remote signalling modules FM_1 , FM_3 . This means that from the interruption of the electric connection a signal can be derived, which displays the interruption at one or more locations.

Since the remote signalling modules FM_1 , FM_2 , FM_3 can subsequently be mounted on the overvoltage protection devices USG_1 , USG_2 , USG_3 , a retrofit is now easily possible at a later date. Also, any existing cabling does not have to be removed and there is also no installation space required at the side.

In an advantageous design, the devices have latching means for mounting purposes. This enables a secure (and depending on the configuration, a releasable) connection of the overvoltage protection device and remote

signalling module. This is advantageous in, for example, environments subject to vibrations, since an unintentional release (and thus disconnection of the electrical series connection) of the remote signalling module can then be prevented.

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In embodiments of the invention each overvoltage protection device USG_1 , USG_2 is provided with, for example, at least one mechanical display means Z_1 , which in the event of a fault give rise to a change of the display.

10 For example, a mechanical tab Z_1 is displaced, so that a display window is changed. The remote signalling modules FM_1 , FM_2 can then comprise, e.g., means for scanning T_1 the mechanical display of an associated overvoltage protection device USG_1 , USG_2 . The scanning means can, for example, engage with a display window in a spring-loaded manner and in the event of a
15 fault, can be raised/moved by the mechanical tongue and thus interrupt the electrical contact in the remote signalling module. For example, the scanning means can act directly on an electrical tab in the remote signalling module, so that the electrical contact between the laterally arranged contact means of a remote signalling module is interrupted.

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In other words, a simple mechanical scanning of a mechanical indicator can be coupled to the remote signalling module. Alternatively or additionally, it can of course also be provided that, for example, an electrical contact is implemented from the respective overvoltage protection device to the remote
25 signalling module, with which the electrical connection of the remote signalling modules can be interrupted. An example of this is shown in Figure 6 in the operational case and in Figure 7 in the fault case. In other words, in the case of operation without a remote signalling module a simple mechanical display can be visually evaluated, and in the case in which a remote signaling module
30 is used, the display can be "mechanically" evaluated. By means of the mechanical evaluation, the wiring requirement is minimized.

As shown in Figures 1-3, 5-7 and 8, it can also be provided that, for example, a first remote signalling module FM_1 has an additional connection means FK_1

and a second remote signalling module FM_2 also has an additional connection means FK_2 , in order to provide a front-side electrical connection to the respective contact means $KM_{1,1}$, $KM_{1,2}$; $KM_{2,1}$, $KM_{2,2}$ of the respective remote signalling module FM_1 , FM_2 . In other words, with the proposed measure a
5 simple incoming / outgoing feed of the series connection can be provided that requires no lateral electrical contact.

In addition, by connecting different rows a collective remote signalling can be facilitated across different rows of a control cabinet or else across gaps in a row. This means that the solution presented is highly flexible and cost-
10 effective.

If a fault does then occur, e.g. the location of the defect can be quickly confined by tapping off at the other connection means, so that troubleshooting the fault proves extremely easy. Alternatively or additionally, a single query
15 can be implemented by means of any other connection means.

By means of the invention, remote signalling modules FM_1 are provided that can be mounted / clipped on to the overvoltage protection devices $\ddot{U}SE_1$, which together with the contact means $KM_{1,1}$, $KM_{1,2}$ implement the remote
20 signalling function.

A remote signaling module FM_1 is then connected to, e.g. clipped onto, an overvoltage protection device $\ddot{U}SE_1$. By means of lateral contact means $KM_{1,1}$, $KM_{1,2}$ of the remote signalling module FM_1 , when connecting in series to one
25 or more other remote signalling modules FM_2 , FM_3 the connection to adjacent modules is produced quasi-automatically. In this case, the individual remote signalling contacts are connected in series by the serial interconnection. Advantageously each of the outermost remote signalling modules of a series are contacted with connecting cables. All assigned overvoltage protection
30 devices are then included in the collective remote signalling.

Furthermore, the remote signalling module has spring contacts, which rest on a display element present in the overvoltage protection device and are

thereby closed during operation. The closed status enables the series connection to the adjacent module.

- 5 If a spring contact opens, e.g. by triggering the overvoltage protection device, the path is disconnected, so that the series circuit is interrupted and the modified status can be queried.

List of reference labels

10	1	collective Remote Signalling Apparatus
	USG ₁ , USG ₂ , USG ₃	overvoltage protection device
	FM ₁ , FM ₂ , FM ₃	remote signalling module
	KM _{1,1} , KM _{1,2} , KM _{2,1} , KM _{2,2} , KM _{2,3} , KM _{3,1} , KM _{3,2}	contact means
	Z ₁	mechanical display means
15	T	means for scanning
	FK ₁ , FK ₂	additional connection means

CLAIMS

1. Collective remote signalling apparatus (1) for a plurality of overvoltage protection devices (USG₁, USG₂) that can be connected in series, wherein
5 each overvoltage protection device (USG₁, USG₂) comprises devices for mounting an assigned remote signalling module (FM₁, FM₂), wherein a remote signalling module (FM₁, FM₂) comprises corresponding devices for mounting on an overvoltage protection device (USG₁, USG₂), wherein the remote signalling modules (FM₁, FM₂) can also be connected to others in
10 series, wherein the remote signalling modules (FM₁, FM₂) comprise contact means (KM_{1.1}, KM_{1.2}, KM_{2.1}, KM_{2.2}) on the sides which can be adjacent to another remote signalling module (FM₁, FM₂), so that adjacent remote signalling modules (FM₁, FM₂) are connected in series, wherein in the event of a fault in an overvoltage protection device (USG₂) the
15 associated remote signalling module (FM₂) interrupts the electrical series connection to an adjacent remote signalling module (FM₁) or a plurality of adjacent remote signalling modules.
2. Collective remote signalling apparatus according to Claim 1, wherein the
20 devices for mounting comprise latching means.
3. Collective remote signalling apparatus according to Claim 1 or 2, wherein the overvoltage protection device (USG₁, USG₂) has mechanical display means (Z₁), which in the event of a fault give rise to a change in the
25 display, wherein the remote signalling modules (FM₁, FM₂) comprise means for scanning (T₁) the mechanical display means of an assigned overvoltage protection device (USG₁, USG₂).
4. Collective remote signalling apparatus according to any of the previous
30 claims, wherein a first remote signalling module (FM₁) has an additional connection means (FK₁) and a second remote signalling module (FM₂) also has a further connection means (FK₂), in order to provide a front-side electrical connection to the respective contact means (KM_{1.1}, KM_{1.2}, KM_{2.1}, KM_{2.2}) of the respective remote signalling module (FM₁, FM₂).