

The invention relates to a quick-release fastening device for an electrical installation apparatus according to the precharacterizing clause of Claim 1.

5 A quick-release fastening or a snap-connection fastening is used for snapping electrical installation apparatuses, especially line protection circuit breakers, on to a standard profiled mounting rail. The standard profiled mounting rail is in general constructed as a top-hat profiled rail, and the fixed tab on the installa-
10 tion apparatus is hooked in behind an edge of the top-hat profiled rail for snapping on, and the moving tab is latched over the other edge of the top-hat profiled rail.

In the case of the known snap-action fastenings which have been normal until now, the fastening movement
15 is always a rotary movement about that edge which is hooked in behind the fixed tab. If, in this case, a connecting rail, which connects a plurality of installation apparatuses which are snapped on to the top-hat profiled rail alongside one another, or a phase busbar block is connected to a terminal, especially to the
20 terminal in whose region the movable slide is located, then the busbar or the phase busbar block must be removed first in order to be able to remove an installation apparatus, especially a line protection circuit breaker.
25 This results in the electrical power supply to other networks being interrupted, which networks are supplied with electricity via the same busbar or the phase busbar block.

DE-OS 37 32 434 has disclosed a snap-action
30 fastening having a slide arrangement which is formed, with the moving tab, on a sliding element and a slide which is guided therein; the sliding element is fitted displaceably on the fastening side of the line protection circuit breaker and can be latched in two positions. The
35 sliding element can be displaced so far that the installation apparatus can be displaced in the direction of its base plane or base surface on the top-hat profiled mounting rail, so that the housing is free of the busbar. In consequence, it is directly possible to remove the

electrical installation apparatus from the standard
profiled mounting rail, at right angles to it, without
being impeded by the built-in busbar; twisting about the
so-called fixed tab and thus removal of the busbar with
5 disconnection of other installation apparatuses which are
connected to the same busbar is no longer necessary.

Similar solutions have also been disclosed, for
example, in DE-GM 83 13 273 or, in a somewhat different
refinement, in DE-OS 38 19 669.

10 In the case of the known arrangements, the
problem exists that a plurality of individual parts are
required which increase the cost of the snap-action
connection and thus of the electrical switching appar-
atus.

15 The object of the invention is to reduce the cost
of the snap-action connection or device of the type
mentioned initially.

This object is achieved according to the inven-
tion by the characterizing features of Claim 1.

20 In a particularly advantageous refinement of the
invention, the spring is a helical compression spring,
one of whose ends is fixed on the housing and whose other
end is fixed on the slide.

In this case, there are two design possibilities:
25 in the first case, the axis of the direction of the force
in the dead-centre position of the helical compression
spring runs essentially at right angles to the base
surface or to the plane which is formed by the slide
movement, and in the case of the other refinement, the
30 effect of the force or direction of the force of the
helical compression spring runs precisely parallel
thereto.

According to the invention, only two components
are required, to be precise, the slide on the one hand,
35 and the helical compression spring on the other hand.

In the first position, in which the tab is
pressed in a sprung manner against the edge of the top-
hat profiled rail, the direction of the force of the
helical compression spring runs at an angle to the plane

which is defined by the standard profiled mounting rail, the effect of the force on the slide containing a force component in the direction of the standard profiled mounting rail; this force component is sufficient to anchor the line protection circuit breaker firmly on the standard profiled mounting rail, but also allows the installation apparatus to be removed in the normal manner. In the case of the other refinement, in which the direction of the force runs parallel to the plane of the slide movement and hence also parallel to that plane which is defined by the standard profiled mounting rail, the force of the helical compression spring likewise has a force component which presses the slide in the direction of the standard profiled mounting rail.

If the slide is intended to be displaced out of the first position into the second position, then that end of the helical compression spring which is connected to the slide is displaced with respect to the other end of the helical compression spring, which is connected to the housing, a dead-centre position being passed through, in which the fixing ends of the helical compression spring are precisely opposite: in the first refinement the connecting line between the fixing points and hence the direction of the force of the helical compression spring runs [sic] approximately at right angles to the plane which is defined by the standard profiled mounting rail, and in the other refinement the connecting line of the two fixing points of the helical compression spring runs parallel to the edge of the standard profiled mounting rail. When the dead-centre position is passed through, then the slide is automatically pressed into the second position by the force of the compression spring, the distance of which second position from the first position is dimensioned such that the installation apparatus, that is to say the line protection circuit breaker, can be displaced parallel to the plane which is defined by the top-hat profiled mounting rail and at right angles to the top-hat profiled mounting rail so that a busbar which is possibly inserted in the

connecting terminal located adjacent to the slide comes free of the installation apparatus, or vice versa, and the installation apparatus can then be raised at right angles to the standard profiled mounting rail and at right angles to its plane, for removal.

In this case, assembly can be carried out in the reverse direction.

The invention is intended to be explained and described in more detail with reference to the drawing, in which two exemplary embodiments of the invention are illustrated, and in which:

Figure 1 shows a schematic illustration of a first embodiment of the invention, in which the slide is located in a first position,
Figure 2 shows the device according to Figure 1, having the slide in its second position,
Figure 3 shows a sectional view along the section line III-III,
Figure 4 shows a side view similar to that in Figure 1 of a second embodiment of the invention, and
Figure 5 shows a sectional view along the section line V-V in Figure 4.

A line protection circuit breaker 11 is snapped on to a standard profiled mounting rail 10. Said line protection circuit breaker 11 has on its base, that is to say on the fastening side, a U-shaped recess 12, on one of whose ends a fixed tab 13 is fitted and on whose other end a movable tab 14 is fitted. The movable tab 14 is arranged or integrally formed on a slide 15 which has a rectangular first region 16 and a C-shaped bend 17 which forms the tab 14, one limb of the bend 17 being formed by the region 16 and the other limb being formed by a guide section 18, which is constructed to be considerably shorter than the region 16. Transversely with respect to the displacement direction P, the section 18 has two lateral lugs 19 and 20 which engage in grooves 21 and in which the section 18 is guided on the housing of the line protection circuit breaker 11. At right angles to the displacement direction P, the section 16 [sic] is

constructed to be as wide as the distance between the free side edges of the lugs 19 and 20, and the side edges of the region 16 are accordingly located in further grooves 22 in the housing, so that the slide 15 is guided both in [sic] the grooves 21 and 22.

A stop surface 23 is located on the housing in the displacement region of the slide 15, is aligned parallel to the displacement direction of the slide 15 and has integrally formed on it a stud 24 which engages in the interior of the winding of a helical compression spring 25 and fixes the helical compression spring 25 by means of one end on the stop surface 23 on the housing of the line protection circuit breaker 11. Located on the region 16 is a recess 27 which surrounds a hook 26 which is aligned at right angles to the region 16 and projects from the region 16 towards the stop surface and towards the stud 24. This hook 26 engages in the interior of the other end of the helical compression spring 25, so that the helical compression spring is fixed on the slide 15 by means of this end.

Located on that end of the region 16 which is opposite the tab 14 is a recess 28 by means of which the slide can be displaced against the direction of the arrow P, by means of a tool.

It can be seen from Figures 1 and 2 that the slide can be displaced through the distance A, to be precise until the tab is located behind the other boundary wall 30 of the recess 12. This distance A corresponds to the width of a busbar, which is not illustrated in more detail, or to the width of a screw terminal opening of such a design that, in the second position illustrated in Figure 2, the line protection circuit breaker 11 can be displaced in the direction of the arrow P, it being possible to displace the base of the recess 12 on the top-hat profiled rail 10 until that edge of the top-hat profiled rail 10 which is adjacent to the tab 14 rests against the boundary wall 30 of the recess 12. In consequence, the line protection circuit breaker 11 comes free from the busbar and can be lifted off the top-hat

profiled mounting rail 10, at right angles to it.

Figure 1 shows the slide in the first position, in which the fixing point of the compression spring 25 on the slide 15 is located closer to the top-hat profiled rail 10 than in the position 2 of the slide illustrated in Figure 2; in this first position, the helical compression spring 25 presses the slide against the top-hat profiled rail 10, and in the second position, the helical compression spring presses the slide 15 against a stop in the groove 18. When the spring is in the dead-centre position which is visible in Figure 3, the helical compression spring and its force component run at right angles to the displacement direction and at right angles to the plane which is defined by the top-hat profiled rail between the stud 24 and the hook 26. The helical spring is thus like a type of snap-action spring.

Figures 4 and 5 show a further refinement of the invention. The slide 40 has an an [sic] upward bend 41 on its guide edge by means of which it engages in the groove 22, on which upward bend 41 a stud 42 is integrally formed and which bend is used for fixing one end of the helical compression spring 25. The other end of the helical compression spring is looped around a stud 43 on the housing 44, securing projections 45 and 46 also being provided on both sides of the stud 43. The surface on which the stud 43 is integrally formed runs at right angles to the plane which is defined by the slide 15.

Incidentally, the helical compression spring runs parallel to the plane of the top-hat profiled rail and parallel to the longitudinal edge of the top-hat profiled rail against which the tab 14 of the slide 15 is pressed, to be precise in the dead-centre position of the helical compression spring 25, when the studs 42 and 43 are opposite.

In the first position, which is illustrated in Figures 4 and 5, the helical compression spring 25 presses the slide in the direction of the arrow P against the top-hat profiled rail by means of a force component which is directed towards the top-hat profiled rail 10;

if the slide is intended to be displaced against the direction of the arrow P, out of this first position into the second position (similar to the position illustrated in Figure 2), then the stud 42 moves past the stud 43, initially until the two studs are opposite and the helical compression spring is in a dead-centre position; as soon as the stud 42 has passed the stud 43, the helical compression spring 25 presses the slide, by means of a force component, into the second position which corresponds to the position illustrated in Figure 2.



Patent Claims

1. Quick-release fastening device for snapping an installation apparatus (11), especially a line protection circuit breaker, on to a standard profiled mounting rail (10), especially on to a top-hat profiled mounting rail, having a recess (12) which is provided on the base of the switching apparatus and on one of whose ends a fixed tab (14) [sic] is provided, while a movable tab (14) is provided on its other end, which tab is integrally formed on a slide (15) which is pressed in a sprung manner against the top-hat profiled rail (10), it being possible to displace the slide (15) from a first position, in which the movable tab is pressed against the top-hat profiled mounting rail, into a second position, in which the tab (14) is arranged remote from the top-hat profiled mounting rail, and back, characterized in that a spring (25) is provided between the slide (15) and the housing of the installation apparatus (11), which spring (25) fixes the slide in the first position and in the second position, it being possible to move the spring, via a dead-centre position, from a first stable position, in which the slide is located in its first position, into a second stable position, in which the slide is located in its second position.
2. Quick-release fastening device according to Claim 1, characterized in that the spring (25) is a helical compression spring, one of whose ends is fixed on the housing and whose other end is fixed on the slide (15).
3. Quick-release fastening device according to Claim 2, characterized in that the helical compression spring (25) is provided with the dead-centre position approximately at right angles to the housing and at right angles to the slide, between the housing and the slide.
4. Quick-release fastening device according to one of Claims 1 and 2, characterized in that the helix axis runs parallel to the plane which is formed by the displacement of the slide.