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Connecting terminal for an electric installation device

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Description

The invention relates to a connecting terminal for an electric installation device in accordance with the preamble of Claim 1.

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Connecting terminals in electric installation devices, in particular in line safety switches, fault-current protective switches and the like, serve to connect electric connecting conductors in the form of round
15 conductors, bunched conductors or flat-strip conductors to the installation device.

In the case of conventional line safety switches a clamping terminal is provided which has a box-shaped
20 clamping frame whose wall, which accommodates the clamping screw, is formed by two web ends folded one above the other. Projections are provided on the web ends, which projections are pressed into the side walls of the clamping frame so that the clamping frame is not
25 deformed when locked in position, see, for example, EP 0 454 019 A1.

WO 88/07772 provides a connecting terminal in which a forged part, which is rectangular in cross section, is
30 provided, which forged part has an internal duct having a threaded section into which a screw can be screwed, it being possible for a tool with a hexagon socket to be used, for example, as the manipulating tool.

35 In this arrangement it is not possible for round wire connectors, bunched connectors and also flat-strip

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connectors to be screwed down and connected to the terminal.

DE 196 21 194 A1 has disclosed a connecting terminal of the type mentioned at the beginning, which has a cylindrical clamping body which has, at its one end, an internal thread for receiving a clamping screw and, moreover, has axial openings or slots on the diametrically opposite wall sections, through which openings or slots the space is accessible in which connection to the terminal takes place.

In the case of known connecting terminals the end side of the clamping screw presses on the conductor which, in particular in the case of fine-stranded conductors may lead to them becoming damaged during the clamping procedure because of the rotating clamping screw. Moreover, the clamping frame of the clamping body may become twisted and in doing so exert a torque on the terminal, so that the housing of the installation device into which the connecting terminal is inserted, can be expanded or even damaged. There is moreover the problem that when unscrewing, the clamping screw may be screwed out of the clamping frame. If this happens, it may become tilted resulting in problems during retightening, or may knock against the housing, which may likewise lead to damage.

The object of the invention is to provide a connecting terminal of the type mentioned at the beginning in which damage to the housing and also complete screwing-out of the clamping screw can be reliably avoided.

According to the invention, this object is achieved by the features of Claim 1.

By virtue of the provision of a pressure plate on the inner end of the clamping screw, said pressure plate



having shoulders which engage into the openings for axial guidance and being secured on the clamping screw in a manner such that it can rotate with respect to the clamping screw, damage to fine-stranded conductors as they are being clamped is initially avoided.

According to a further advantageous refinement of the invention, the internal threaded section of the clamping body can end at a distance from the upper end side of the clamping body, which distance is slightly greater than the axial threaded region of the clamping screw; in this arrangement, the internal diameter of this thread-free section is slightly larger than the external diameter of the clamping screw, so that after the clamping screw is unscrewed from the internal threaded section, the clamping-screw thread enters into the thread-free section of the clamping body and this section guides the clamping screw outside the internal threaded section.

According to a further refinement of the invention, the length of the slots on the clamping body, which slots accommodate and guide the pressure plate, can be dimensioned in such a manner that whenever the clamping screw enters into the thread-free section of the clamping body, the pressure plate is placed against the actuation-side slot ends.

This has the result that even when the clamping screw is completely unscrewed from the internal thread of the clamping body, the clamping screw is prevented from tilting, so that when the clamping screw is retightened the external thread of the clamping screw is able to engage without any problem into the internal thread of the clamping body. In this arrangement, the placing of the pressure plate against the slot ends prevents the clamping screw from falling out.

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According to a further refinement of the invention and according to Claim 5, the pressure plate can be secured on the clamping screw by a riveting procedure, in which case the pressure plate can be rotated relative to the
5 clamping screw.

According to a further refinement of the invention, the internal thread of the clamping body and the external thread of the clamping screw can be designed as a
10 buttress thread, in which case according to a further embodiment of the invention, the flank, which runs approximately radially, is directed towards the clamping point or points in the clamping direction.

15 Further advantageous refinements and improvements of the invention can be seen in the other subclaims.

The invention and further advantageous refinements and improvements of the invention and further advantages
20 will be explained and described in more detail with reference to the drawing in which an exemplary embodiment of the invention is illustrated.

In the drawing:

25 Fig. 1 shows a perspective view of a connecting terminal,

Fig. 2 shows the connecting terminal according to Fig. 1, inserted into half of a housing for a line
30 safety switch,

Fig. 3 shows a perspective illustration of the clamping screw and a clamping part, and

35 Fig. 4 shows a longitudinal sectional view through a connecting terminal according to Fig. 1, partially cut away.

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The connecting terminal 10 which is shown in Fig. 1 has a cylindrical clamping body 11 which has two diametrically facing slots 12 which run axially and of which only one of these slots can be seen.

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The internal surface of the cylindrical clamping body 11 has between the slots 12, on diametrically facing internal wall sections, internal threaded regions 13 which are formed by being pressed in from the outside, which can be seen in Fig. 1 with reference to the depression 14 which runs axially. Screwed into the internal threaded section 13, which ends at a distance L from the upper end of the clamping body 11 (see Fig. 4), is a locking screw 15 whose inner end has an extension 16 having a reduced diameter to which a riveted joint 17 having a larger diameter than the projection or extension 16 is adjoined, a pressure plate 18 being situated in the section between the clamping screw 15 and the riveted joint 17, which section has a hole (not shown) in which the pressure plate as the pressure piece 18 is riveted by means of the riveted joint. In this arrangement, the pressure piece 18 engages on both sides into the slots 12 which run axially, so that it is guided axially in the slots 13 by means of their axial longitudinal edges 19, 20.

At the end at the bottom of Fig. 1, i.e. at that end which lies opposite the screwing-in direction, the lower edge 20, which runs transversely to the longitudinal axis, has a tab 21 which is bent into the interior of the clamping body 11 and runs perpendicularly to the central axis of the clamping body. Projections 23, 24, which run axially, are integrally formed on the outer surfaces, approximately in a line with the depressions 14 for the internal threaded sections 13, which projections are guided in corresponding depressions on a housing into which the terminal 10 is inserted and may, for example, be the housing of a line safety switch or fault-current



protective switch. As a result, as the clamping screw is being tightened concomitant rotation of the clamping frame is prevented and the force is introduced in a defined manner into the housing and prevents it from
5 gaping open.

Inserted into the intermediate space between the longitudinal edges 19 and 20 is a clamping piece 25 which is of U-shaped design and has two limbs 26 and 27
10 running transversely to the central axis of the clamping body 11, a connecting tab 28 being integrally formed on the limb 26 perpendicularly to the latter and parallel to the central axis of the clamping body 11, to which connecting tab connecting elements for
15 components situated in the interior of the installation device are fastened. A pressure element 29 is situated between the two limbs 26 and 27, with the result that the two limbs 26 and 27 cannot be deformed on each other as the clamping screw is being tightened.

20 On the upper side of the limb 26 there is situated a strip 30 which runs transversely to the limb 26, and on that side of the pressure piece 18 which faces the limb 26 there are situated two pressure-piece strips 31, 32
25 which are parallel to the said strip 30 and are arranged transversely to the profile of an inserted conducting wire and in this manner prevent the conducting wire from being pulled out. In Fig. 3 the edge flange 17 for the fixing of the screw 15 can also
30 be seen.

Fig. 4 shows part of the clamping body 11 in which it can be seen that the internal threaded section 13 ends at the distance L from the upper end surface, so that
35 the internal surface of the clamping body is provided with a thread-free section 33 whose internal diameter, as far as the edge of the clamping body, corresponds to the external diameter of the screw 15, so that the screw 15 is guided in this section. This has the effect



that when the screw 15 is screwed in again, the external thread of the screw 15 immediately meshes with the internal thread 13. As the clamping screw is being screwed out, the clamping screw emerges from the internal thread of the clamping body before the pressure plate knocks against the frame, and the pressure plate serves to prevent the clamping screw from falling out.

Fig. 2 shows the installation of the connecting terminal 10 in a housing part 40 which is complemented by a corresponding, shell-shaped housing part (not shown) to form a line safety switch housing. This housing part 40 has a terminal accommodating space 41 whose length and internal diameter is matched to the connecting terminal 10. From the front side 62 the housing 40 has a circular aperture 43 through which a tool can be guided to the screw 15. On the so-called narrow-side surfaces 44 of the housing part openings 45 and 46 are provided through which connecting conductors to the clamping screw can be introduced in the arrow direction P1 and P2. In this case, the arrangement is selected in such a manner that a connecting lug for a busbar can be introduced through the opening 46, whereas a round wire or stranded wire can be connected through the opening 45.

The housing part 40 is complemented by a housing part which is of identical design and in which the halves of the openings 43, 45 and 46 (which are shown in Fig. 2) are complemented to form "closed" openings, thereby resulting in a circular aperture 43, a rectangular aperture 45 and a rectangular aperture 46 when assembled.

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Patent Claims

1. Connecting terminal for an electric installation device, in particular for a line safety switch or
5 fault-current protective switch or the like, having a cylindrical clamping body (11) which has axial slots which face one another on diametrically opposite circumferential surfaces, having a clamping screw and a clamping piece which
10 can be inserted into the openings, so that in each case at least one conductor can be clamped between the clamping screw and the clamping piece and between the clamping piece and the adjacent edge of the slots, which edge runs transversely to the
15 central axis of the clamping body, characterized in that a pressure plate (18) having shoulders which engage into the slots for axial guidance is secured on the inner end of the clamping screw (15) in a manner such that it can rotate with
20 respect to the clamping screw (15).
2. Connecting terminal according to Claim 1, characterized in that the internal threaded section (13) of the clamping body (11) ends at a
25 distance (L) from the actuation-side end side of the clamping body, which distance is approximately the same size as the axial threaded region of the clamping screw (15) or else is smaller, and in that the internal diameter of the thread-free
30 section is slightly larger than the external diameter of the clamping screw (15), so that after the clamping screw is unscrewed from the internal threaded section, the clamping-screw thread enters into the thread-free section of the clamping body
35 and this section guides the clamping screw (15) outside the internal threaded section.
3. Connecting terminal according to Claim 2, characterized in that the length of the slots





which accommodate and guide the pressure plate is dimensioned in such a manner that whenever the clamping screw enters into the thread-free section, the pressure plate can be placed against the actuation-side slot ends, so that the clamping screw is prevented from falling out by the pressure plate.

4. Connecting terminal according to one of Claims 1 to 3, characterized in that a tab (22) is integrally formed on an edge, lying opposite the actuation side, of one of the slots and is bent into the clamping body, so that the said tab runs perpendicularly to the longitudinal axis of the clamping body (11) and serves as a counterbearing for conductors to be connected to the terminal.

5. Connecting terminal according to one of the preceding claims, characterized in that the screw has an extension having a smaller diameter to which a rivet extension having a larger diameter is adjoined, and in that the pressure plate (18) surrounds, with its internal hole, the extension having a smaller diameter and is riveted to it.

6. Connecting terminal according to one of the preceding claims, characterized in that the internal thread of the clamping body and the external thread of the clamping screw is a buttress thread.

7. Connecting terminal according to Claim 6, characterized in that the flanks, which run approximately radially, are directed towards the clamping point or point in the clamping direction.

8. Connecting terminal according to one of the preceding claims, characterized in that diametrically opposite, strip-like mouldings are





made on the outside of the clamping body, which mouldings engage into corresponding recesses in the housing into which the connecting terminal can be inserted and in this manner guide the clamping body.

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