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Connecting element for two items of installation
equipment lined up beside each other with their broad
sides against each other, and method of connecting the
items of installation equipment

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Description

The invention relates to a connecting element according
to the precharacterizing clause of Claim 1, and to a
15 method according to the precharacterizing clause of
Claim 7.

A single-pole electrical line-protection circuit
breaker has a housing which is of shell-like design,
20 the front edges of the shell walls being placed against
each other; the two shells are fixed to each other by
means of riveted connections.

Such single-pole line-protection circuit breakers can
25 be combined to form multipole circuit breakers. It is
known to rivet the individual poles to each other.

Such riveted connections are technically complicated,
since, firstly, they make it necessary to keep a stock
30 of rivets and, secondly, an operation has to be
provided with which the riveting is performed.

The object of the invention is to provide a connecting
element of the type mentioned at the beginning in which
35 the connection operation of two items of installation

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equipment that are to be connected to each other is simplified.

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

According to the invention, the connecting element has an approximately cylindrical base body with a first outside diameter onto which, on both sides, two
10 radially springy spreading arms projecting axially in opposite directions are integrally moulded, their radial outer contour constituting a cylindrical surface and their free ends having, on opposite envelope lines,
15 in behind rebates on the housings of the items of installation equipment to be connected by the connecting part.

The assembly, that is to say the method of assembling
20 two items of installation equipment using the connecting element designed in accordance with the invention is then simple: the connecting element is pushed with the spreading arms into the one housing and the other housing is slipped over the spreading arms
25 projecting from this one housing, which produces the connection between the two items of installation equipment. As far as the outlay on assembly is concerned, this type of connection is very simple and can be carried out without tools. When connecting two
30 or more line-protection circuit breakers to form a multipole device, additional operations, which would be necessary to place the switches on one another, are no longer needed.

35 According to an advantageous refinement of the invention, the connecting element has the shape of a sleeve which has an axial longitudinal slot which is arranged centrally between the two envelope lines. With this refinement, the base body is also springy, so that



it serves to centre the items of installation equipment located beside each other.

In this way, by means of this one longitudinal slot, the spreading arms are separated from each other on one side; in order to form the spreading arms, further slots are introduced in the area of the spreading arms, diametrically opposite the longitudinal slot, and matched to the first.

In order that the assembly of the connecting elements is simplified, the free ends of the arms with the lugs are tapered conically to a point, so that the diameter of the sleeve shape at the ends is smaller than the diameter in the area of the lugs.

In order that tolerances in the housings can be compensated for, the transition face of the base body to the spreading arms and the transition face from the spreading arms to the lugs is in each case conical, the cone angle being slightly less than 180° .

This achieves the situation where the rebate bears on the lugs, even in the event of an unfavourable tolerance situation.

In order that the connecting element remains firmly held between the two housings, a pin that can be inserted into the interior of the sleeve shape can be provided for the purpose of fixing. The pin prevents the longitudinal edges of the longitudinal slot or of the spreading arms springing towards one another. If, for example, an auxiliary switch is to be fixed to an item of switchgear, such a pin is generally not necessary. Ultimately, a pin is not necessary when the elasticity of the connecting element is not high, that is to say the connecting element is relatively stiff.



The invention and further advantageous refinements and improvements, and further advantages, will be explained in more detail and described by using the drawing, in which an exemplary embodiment of the invention is
5 illustrated. In the drawing:

Fig. 1 shows a partial sectional view of two items of installation equipment with a connecting element, in a perspective illustration, and
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Fig. 2 shows a longitudinal sectional view through the connecting element.

Figure 1 shows, in a partial sectional view, two
15 housings 10 and 11 arranged beside each other and belonging to an item of installation switchgear, each housing 10, 11 being composed of two shell-like housing parts 12, 13 and 14, 15, the dividing joint between the housing parts 12 and 13 bearing the reference number
20 16, and the dividing joint between the housing parts 14 and 15 bearing the reference number 17. The contact area of the two housings 10, 11 is designated by 18.

Starting from the dividing joints 16, 17, each housing
25 part has a cylindrical depression 19, 20 and 21, 22 which, when assembled and when the two housing parts 12, 13 and 14, 15 are placed against each other, form a cylindrical internal space with one another. On the broad side 23 of the housing part 12 there is a
30 depression 24, which is connected to the depression 19 by an aperture 25. In a similar way, the broad side of the housing part 13, which forms the dividing joint or contact face 18, has a depression 26 which opens into this face and is connected to the depression 20 by a
35 through hole 27.

Between the depression 28 and the depression 30 which is open towards the broad side 29 there is likewise in each case a through hole 31, 32, the depressions 19,



20, 21 and 22, 24 and 30 being aligned with one another, as are the through holes 25, 27, 31, 32.

5 Inserted into these depressions and through holes is a connecting element 33, which is illustrated in section in Figure 2.

10 The connecting element 33 has a cylindrical base body 34 which is located at the centre, and springy spreading arms 37, 38, 39 and 40 which protrude in the axial direction from its ends 35 and 36. The outer diameter of the base body 34 is selected such that it fits into the depressions 26, 28. The cylindrical surface enclosing the spreading arms 37 to 40 has an
15 outer diameter which corresponds to the inner diameter of the through holes 25, 27, 31 and 32. In each case, lugs 41, 42, 43 and 44 are integrally moulded onto the spreading arms 37 to 40, protrude radially in opposite directions and are located on diametrically opposite
20 envelope lines or envelope faces.

It can be seen from Figure 1 that the lugs 41, 42, 43 and 44 have an outer surface which forms a conical shape or truncated conical shape, the truncated cones
25 tapering towards the free ends of the spreading arms 37, 38, 39 and 40.

A longitudinal hole 45 passes through the spreading arms 37, 38, 39 and 40 and the base body 34, so that
30 this results in a sleeve shape for the connecting element. This sleeve shape has a longitudinal slot 46 and, together with the slots 47 and 48, which project approximately as far as into the direction of the base body 34, the springy spreading arms 37 to 40 are
35 formed.

It can be seen from Figure 2 that the end walls 35 and 36 form a conical shape whose open sides are oriented



towards each other; the cone angle is slightly less than 180° . It is a very obtuse cone angle.

On their faces 49 and 50 opposite the end faces 35 and 36, the lugs 41 to 44 likewise have a conical shape, which is open towards the free end and likewise has a similar opening angle to that of the end faces 35 and 36.

These conical faces 35, 36; 49, 50 are used to compensate for tolerances in the longitudinal extent of the holes 25, 27, 31 and 32 and tolerances in the diameters.

Figure 2 shows - just like Figure 1 - that the slots 47 and 48 and the longitudinal slot 46 have a widening 51, 52, 53 and 54 in the area of the lugs. These widenings are used to insert a pin 55 into the through hole 56, which prevents the sleeve shape of the connecting element giving way springily inwards by the mutually opposite edges of the longitudinal slot springing towards each other. To this extent, the pin 55 is a locking element.

For the purpose of assembly, firstly the two housing parts 12, 13 and 14, 15 are put together to form one item of installation equipment 10 and 11 in each case. Then, the connecting element is led with the spreading arms 39, 40 through the passage opening 31; as soon as they have slid through the passage opening 31, they engage behind the rebate 57 which adjoins the passage opening.

For the purpose of fastening the other item of installation equipment 10, the latter is plugged with the opening 27 over the lugs 41, 42 until the lugs engage behind the rebate 58 in the through opening 27. The pin 55 can then be inserted into the interior of

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the connecting element, and the spreading arms 37 to 40 are prevented from springing towards each other.

At its free ends, the pin 55 has a circumferential thickening 55a, 55b in each case, by means of which tolerances can also be compensated for here.

Only one connecting element is illustrated in Figures 1 and 2. In order to connect two items of installation equipment located beside each other, for example two line-protection circuit breakers, to form a two-pole line-protection circuit breaker, three or four connecting elements would then be necessary.

A three-pole line-protection circuit breaker could also be produced from the two-pole one with the two poles 10, 11. For this purpose, a connecting element 33 is plugged with the spreading arms 37, 38 through the opening 32 until the lugs 41, 42 latch into the depression 22; a further item of switchgear is then latched over the latching arms 39 and 40.

As opposed to a riveted connection, such a spreading connection is simple. Stock keeping corresponds to stock keeping for the rivets; however, assembly is simplified, since an additional riveting operation is avoided.

The internal space of the sleeve does not have to be circularly cylindrical; the internal space can also be bounded by two approximately parallel walls. The circularly cylindrical shape is preferably used when there is a possibility that the pin must be inserted. The circularly cylindrical shape is practical for stock keeping reasons, since it is then possible for only one type of connecting element to be kept in store.

Patent Claims

1. Connecting element for two items of installation
equipment lined up beside each other with their
5 broad sides against each other, in particular
line-protection circuit breakers, residual current
circuit breakers and the like, whose housings are
each formed from two shell-like housing parts,
characterized in that the connecting element has
10 an approximately cylindrical base body (34) with a
first outer diameter onto which, on both sides,
two radially springy spreading arms (37 to 40)
projecting axially in opposite directions are
integrally moulded, their outside diameter being
15 smaller than the outside diameter of the base body
(34) and their free end having, on opposite
envelope lines, radially protruding lugs (41, 42,
43, 44) which, when assembled, latch in behind
rebates (58, 57) on the housings of the items of
20 installation equipment (10, 11) located beside
each other and to be connected by the connecting
element.
2. Connecting element according to Claim 1,
25 characterized in that it has the shape of a sleeve
which has an axial longitudinal slot (46) which is
arranged centrally between the two outer areas
bearing the lug.
3. Connecting element according to one of the
30 preceding claims, characterized in that the free
ends of the lugs (41 to 44) are tapered conically
to a point.
- 35 4. Connecting element according to one of the
preceding claims, characterized in that the end
faces (35, 36) of the base body (34) onto which
the spreading arms (37 to 40) are integrally
moulded are obtusely conical, the cone angles



being open towards each other, and in that the cone angle is slightly less than 180° .

5. Connecting element according to Claim 4, characterized in that the rear faces (49, 50) of the lugs (41 to 44), opposite the end faces (35, 36), have a conical shape whose cone angle is open in the opposite direction and is likewise slightly less than 180° .
6. Connecting element according to one of the preceding claims, characterized in that to fix and to avoid the spreading arms (37 to 40) springing towards each other, a pin (55) is put into the interior of the sleeve.
7. Method of connecting two items of installation equipment with a connecting element according to one of Claims 1 to 6, characterized in that a connecting element is latched into each of the openings with rebates arranged on the one broad side of a first item of installation equipment, and in that a second item of installation equipment is pressed against the first item of installation equipment, at right angles to the broad side, each connecting element engaging in openings with rebates on the other broad side of the second item of installation equipment.



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