of the test probe, which has a different outer cross section compared to the initial position, which allows for a larger maximum tilting or rotation angle, now lies in the guide opening. In the spring-deflected state, the test probe can thus be twisted farther than in the rebounded state. A similar test probe device is known from the published patent application EP 2 666 022 B1.

Summary

In an aspect, the present disclosure refers to a test probe device (1) for making electrical contact with an in particular multi-pole contact partner, with a carrier part (2), which has at least one guide opening (4), and with at least one test probe (5), which is longitudinally displaceably mounted in the guide opening (4), wherein the test probe (5) has a cylindrical housing (6) in which one or more in particular pin-shaped contact elements (7) are arranged, each of which have a contact end (8) for making contact with the contact partner, wherein the housing (6) has a guide portion (11) longitudinally displaceably mounted in the guide opening (4) and a contact portion (9) spaced apart therefrom, and wherein the contact ends (8) are assigned to the contact portion (9), wherein a spring element (10) is pretensioned between the contact portion (9) and the carrier part (2) and, adjoining the guide portion (11) at the housing (6), on the side of the carrier part (2) facing away from the spring element (10), an axial stop (12) is formed, which interacts with the carrier part (2) against the spring force of the spring element (10), wherein a maximum rotational and/or tilting angle of the test probe (5) is limited about a longitudinal axis relative to the carrier part (2) by the guide opening (4) and the guide portion (11), for the purpose of which the guide opening (4) and the guide portion (11) in each case have a cross section with at least one straight line, in particular in each case a polygonal cross section, and wherein guide portion (11) and guide opening (4) are formed in such a way that the test probe (5) can tumble in at least one sliding position relative to the carrier part (2), characterized in that a transfer portion (17) is formed between the guide portion (11) and the axial stop (12), that the transfer portion (17) has a circular cross section, the diameter of which is at most as large as the smallest diagonal of the cross section of the guide opening (4) on the one hand and smaller than the largest diagonal and larger than the smallest diagonal of the cross section of the guide portion (11) on the other hand, so that the transfer portion (17), when viewed over its circumference, radially projects beyond the guide portion (11) only in some regions.

The present disclosure is based on the object of creating an improved test probe device, which in particular has a low error rate when carrying out contact-making processes with contact partners, ensures low wear and is formed so as to save installation space.

The object on which the present disclosure is based is solved by means of a test probe device with the features of the above aspect. Said test probe device has the advantage that the twistability of the rotary probe relative to the carrier part is always identical or is limited identically, respectively, independently of the sliding position of the test probe. A maximally permitted angle of rotation of the test probe to the carrier part is thus constant over the entire longitudinal extension or over the entire displacement travel of the test probe, respectively, in the carrier part. It is thus avoided that the test probe is twisted unnecessarily far in response to a contact-making with the contact partner, wherein this twisting would have to be moved back to a corresponding extent again in response to the return of the test probe into the initial position by means of the spring element, with the corresponding consequences for the wear of the test probe device. Should it not be possible to automatically move the test probe back into the region with more strongly limited angle of rotation, for example due to static friction, it can jam and would prevent a further use of the test probe device. Due to the constant maximum angle of rotation of the present invention, it is reliably prevented that problems can arise in response to the transfer of the test probe from the region with increased maximum angle of rotation to reduced maximum angle of rotation. The test probe device is thus less susceptible to errors and is also less fraught with wear. In the case of the present test probe device, the lateral play of the test probe relative to the carrier part is instead reduced in an advantageous manner in the initial position, thus in the rebounded state of the test probe. A wobbling of the test probe relative to the carrier part is understood to be a pivoting or tilting of the test probe or of a central longitudinal axis of the test probe, respectively, relative to a longitudinal axis of the guide opening or of the carrier part, respectively. The compensation of lateral offset between contact partner and carrier part is made possible by means of the tumble movement of the test probe during the contact-making with the contact partner, so that inaccuracies during the positioning of the test probe device relative to the contact partner can be compensated reliably. This is advantageous in the case of test probes, which only have one contact element as well as in

the case of test probes, which have several contact elements. In the rebounded state, the axial stop counteracts the force of the spring element and prevents that the test probe can be moved out of the carrier part by means of the spring element. Said axial stop thus defines the maximum rebound travel of the test probe relative to the carrier part. It is attained by means of the example of the test probe device according to the disclosure that this lateral play is reduced in an advantageous manner in the initial position, thus in the rebounded state of the test probe, so that the test probe reaches a specified initial position with respect to the tumble movement in a simple way. In an advantageous manner, the twistability of the test probe is thereby not influenced, so that a twisting of the test probe already takes place in the first moment of contact with the contact partner, even before a tumble movement is permitted. A safe bringing together of test probe and contact partner is thus ensured at any time. According to the disclosure, this is attained in that a transfer portion is formed between the guide portion of the test probe and the axial stop. The transfer portion leads from the guide portion to the axial stop. According to the disclosure, the transfer portion has a circular cross section, the diameter of which is at most as large as the smallest inner width or diagonal of the cross section of the guide opening and smaller than the largest diagonal of the cross section of the guide portion, so that the transfer portion, when viewed over the its circumference, radially projects beyond the guide portion only in some regions. The circular transfer portion is thus larger in some regions than the guide portion, when viewed in the cross section. Due to the fact that in the cross section the guide portion has at least one straight line, which forms a secant to a circular shape, the cross section has a smaller width in the region of the straight line than in an adjacent region, so that the cross section is reduced by means of the secant or straight line. Due to the fact that the cross section of the guide portion has to be smaller than the cross section of the guide opening, and the transfer portion has a diameter, which is at most as large as the smallest inner width or diagonal of the cross section of the guide opening and larger than the smallest width of the cross section of the guide portion, the circular transfer portion lies between the straight line of the cross section of the guide portion and the inner circumference of the cross section of the guide opening, when viewed radially. The transfer portion thus acts as wobbling centering, but without thereby adversely affecting the rotatability or twistability of the test probe relative to the carrier part. Due to the fact that the wobbling centering is assigned to the axial stop, axial stop as well as wobbling centering lie close together and on the side of the carrier part facing away from the spring element. Centering means within the guide opening, on the side of the guide opening facing the spring element, are thus not necessary. The guide opening itself can thus be produced easily, which saves costs and effort. The maximally necessary length of the guide opening furthermore shortens significantly, whereby the test probe device as a whole according to the

disclosure can be produced in a particularly space-saving manner – when viewed in the axial or in the longitudinal displacement direction, respectively.

According to a preferred further development of the invention, the transfer portion has a lead-in slope in at least one region projecting beyond the guide portion. An abrupt transfer from the guide portion to the wobbling limitation is avoided by means of the lead-in slope. In fact, a gentle and low-wear penetration of the transfer portion into the guide opening as well as a centering of the test probe is thus ensured. Depending on the length of the axial extension of the transfer portion, the lead-in slope can be longer or shorter. Compared to the guide portion, the transfer portion is preferably formed to be significantly shorter, wherein the lead-in slope preferably has approximately half of the length of the transfer portion. Due to the circular shape of the transfer portion, the lead-in slope forms a surface of a portion of a circle, which leads from the guide portion to the outer diameter or diameter, respectively, of the transfer portion. For logical reasons, the lead-in slope is formed in the region projecting radially beyond the guide portion and thus leads in particular and preferably from the straight line – when viewed in the cross section of the guide portion – to the transfer portion. A corresponding lead-in slope is preferably assigned to each straight line of the guide portion, which additionally leads to the transfer portion projecting beyond its straight line. When viewed over the longitudinal extension of the guide portion, the respective straight line in the cross section of the guide portion forms a guide surface, which interacts in particular with a guide counter surface of the guide opening, in order to serve as twisting limitation.

The lead-in slope preferably leads from the guide portion so as to rise into the transfer portion, thus with increasing distance from the longitudinal central axis of the test probe, and thus from a guide surface to the larger transfer portion or to the guide portion projecting beyond the guide surface, respectively.

The guide portion preferably has a square cross section. In the cross section, the guide portion is thus characterized by four or at least four straight lines and thus by four guide surfaces, which have the same length and width. It is ensured by means of the square cross section that the profile probe can be inserted into the carrier part or into the guide opening of the carrier part, respectively, in several rotational positions, in each case twisted by 90 degrees. On the one hand, this results in an easy assembly and it is ensured on the other hand that the anti-twist protection or the maximum angle of rotation, respectively, is always the same independently of the assembly position of the test probe.