

Connecting Device for an Electrical Conductor with a Marking Device

This invention relates to a connecting device according to the preamble of Claim 1.

Widely varying models of such connecting devices are known. They can be made in a single-pole or multi-pole model. In preferred models, the electrical conductors are fixed without screws by means of at least one compression spring.

To designate/identify the conductors, the marking elements are advantageous or perhaps even necessary, provided they have a printable identification surface or a surface that can be written upon in some other way. The arrangement of these elements on the connection devices or in the vicinity of the connection devices often causes a problem because the available space is very limited.

According to an aspect of the invention, there is provided a connecting device for connection of an electrical conductor on a bus bar or the like with a connection element, in particular, a friction spring for the fixation of the electrical conductor with at least one actuation element which has a plug-in duct and with at least marking device which is made as a plug-in element for designation, wherein each plug-in element has a head and a shaft; and wherein the marking device is arranged on the actuation element, whereby the shaft engages in the plug-in duct and the head rests against the actuation element.

According to embodiments of the invention, the marking devices are arranged in a particularly space-saving manner on the actuation element of the connecting device.

Embodiments of the invention is particularly suitable for actuation elements of connecting devices in the push-in technique. Here it may be

particularly advantageous because precisely when the connecting devices are designed for conductors with a small cross-section, only little space is available for the attachment of markers or marking devices. In contrast, the actuation elements may offer an existing advantageous spot for the attachment of the marking devices.

This is because the space on the actuation element is in this way almost used doubly: on the one hand, for the actuation function, and on the other hand, for the marking function. The operability of the push-in connection is not impeded in the process by the marking function.

As an alternative, we can also figure on arranging marking devices on the actuation elements of connection devices using a different connection technique, for example, especially on actuation devices for extension spring terminals or IDC terminals.

The connection devices as such can again be employed on plug-in devices, terminal blocks, or other instruments of the most varied kind.

A particularly advantageous way of handling each plug-in element exists when the shaft, according to a preferred embodiment, is made cylindrical, whereby the basic diameter of the cylinder is less than the inside diameter of each plug-in duct and whereby the shaft of each plug-in element has at least one drastically deformable locking pin, which extends at least over the terminal section of the shaft. By the basic diameter, we mean the diameter of the massive shaft upon which the locking pin or pins are molded. Alternate embodiments for the cylindrical shape are

conceivable: for example, a quadratic cross-section or a polygonal cross-section in some other way.

During the insertion of each plug-in element, there occurs a deformation of the locking pin or the locking pins so that, accordingly, a form-locking fixation takes place, which is to be seen like an undercut. Each locking pin extends along the longitudinal direction of the shaft.

Preferably, three locking pins are provided on the shaft, and they are arranged at an angular interval with respect to each other. In that way, the locking pins, so to speak, create a guide.

To make sure that the plastic deformation and the formation of an undercut will be possible, it is provided that each plug-in duct have a free space on the side facing away from the head of the applied plug-in element.

An optional form-locking effect between the actuation element and the head on the mutually facing sides provides for security against twisting between the head and the actuation element. In a preferred embodiment, it is provided here that every head of the plug-in element on the side facing toward the actuation element have at least one forming pin that rests against the outside surface of the actuation element in a corresponding forming pin recess.

With a view to saving material and good mold ejectability out of the tool, it is provided that the cross-section of the forming pin be made trapezoidal. Usually, the plug-in elements are made

of synthetic substance by way of the injection-molding method using appropriate tools.

The invention will be explained in greater detail by an exemplary embodiment with reference to the attached drawings.

Figure 1 is a connecting device in a perspective presentation;

Figure 2 is a detail in the area adjoining the plug-in duct by way of a profile view and

Figure 3 shows a marking and plug-in element inserted in an actuation element in the form of a cross-section.

Figure 1, by way of example, illustrates a socket board 1, which has a plug-in front 2 upon which are arranged socket contacts 3 in two neighboring rows shown by way of example here. The socket board 1 and its socket contacts 3 are made for contacting a corresponding pin strip, not illustrated here, with pin contacts or for the contacting of pin contacts upon a printed circuit board.

On the side facing away from the plug-in front, each pin contact 3 is connected in a conducting manner with a connecting device 4 for a conductor. These connecting devices 4 for conductors are made here as push-in terminals. Push-in terminals are known, for example, from DE 20 2010 008 028 U1. In each case, they have at least one preferably V-shaped friction spring 5, which is made in friction cage 6, for example, inserted into the latter.

Friction spring 5 has a friction leg 7, which is designed to press a conductor in the area of a friction point 8 against an inside wall 9 of the friction cage or against a bus bar.

The connecting devices 4 and the socket contacts connected with them in a conducting manner are inserted in a housing 10. This housing 10 is provided with a plurality of conductor plug-in ducts 11 that are here arranged next to each other and on top of each other into which the conductors (not shown here) can be inserted into the friction points 8.

Associated with each connecting device 4 is an actuation element 12, which is used and made so as to push the friction leg down (in the conductor insertion direction X) in order to open the friction point of the gate, for example, for the removal of a connecting conductor (or also for the connection of a conductor). The actuation element has a plug-in duct, here specifically a plug-in duct 13, that extends in or parallel to the conductor insertion opening and that is made as a passage opening that runs through the actuation element in plug-in direction X.

Associated with each one or here specifically in a preferred embodiment associated with each connecting device 4, there is furthermore a marking device M, which is made as a plug-in element. The precise shape of the plug-in elements can be seen in Figure 1 in conjunction with Figure 3. Accordingly, each plug-in element consists of a head 14 and a shaft 15. Shaft 15 here is made cylindrical, while head 14 in this exemplary embodiment is made quadratic.

As seen particularly in Figure 3, shaft 15 of plug-in element M is provided with, in this case, three safety pins 16 extending in the longitudinal direction, whereby the basic diameter of shaft 15 is less than the diameter of the plug-in duct 13. In that way, each plug-in element M can be inserted with a certain expenditure of force into the plug-in duct 13. In the process, the form-elastic and material-elastic properties of synthetic substances are utilized so that there will be a form-locking fixation of each plug-in element F. For this purpose, a free space 17 is then provided in connection upon each plug-in duct 13.

Figure 1 shows that each plug-in element M or the head 14 of each plug-in element M on the side facing toward housing 10 has at least one form pin 18, which preferably has a trapezoidal cross-section here. These form pins 18 in the assembled state engage in correspondingly shaped form pin recesses 19 on the side of the actuation element 12 that faces toward head 14. As a result, during assembly, there will be an alignment as well as a centering, and with simple means, there will be an additional position and turning safety between head 14 and the actuation element. It is also conceivable for the purpose of taking out each plug-in element M to insert a tool into this area. Preferably, the surface of head 14 in a plane perpendicularly to the plug-in direction X is greater than the surface of the corresponding side of the actuation element 12 so that, on the one hand, a large surface will be available for lettering and, on the other hand, removal will be made easier.

It is advantageous that shaft 15 of each plug-in element M is provided with pins 16 extending in the longitudinal direction and that below each plug-in duct 13 there is a free space 17 so

that a form-locking fixation of each plug-in element M is possible, which will act like an undercut. Furthermore, it is advantageous that each head 14 of plug-in element M is provided with form pins 18 so that an alignment and an extraction will be possible.

List of References

Socket board	1
Plug-in front side	2
Socket contacts	3
Connecting device	4
Friction spring	5
Friction cage	6
Friction leg	7
Friction point	8
Inside wall	9
Housing	10
Conductor plug-in ducts	11
Actuation element	12
Plug-in duct	13
Head	14
Shaft	15
Safety strips	16
Free space	17
Form strip	18
Form strip recess	19
Plug-in direction	X
Marking device	M

Claims

1. Connecting device for connection of an electrical conductor on a bus bar or the like with a connection element, in particular, a friction spring for the fixation of the electrical conductor with at least one actuation element which has a plug-in duct and with at least marking device which is made as a plug-in element for designation,
wherein each plug-in element has a head and a shaft;
and
wherein the marking device is arranged on the actuation element, whereby the shaft engages in the plug-in duct and the head rests against the actuation element.
2. Connecting device according to Claim 1, wherein the spring strip is a plug-in friction spring to which is associated the actuation element that is designed to press down the friction leg of a friction spring in order to open the friction point and wherein the actuation element has the plug-in duct that extends preferably in or parallel to the conductor insertion opening.
3. Connecting device according to Claim 1 or 2, wherein the plug-in duct is made as a passage opening that runs through the actuation element in the plug-in direction.

4. Connecting device according to one of the above claims, wherein the head and the actuation element outside the shaft engage each other in a form-locking manner at least in one area.
5. Connecting device according to one of the above claims, wherein shaft of each plug-in element is made cylindrical.
6. Connecting device according to one of the above claims, wherein shaft of each plug-in element is made oval or polygonal.
7. Connecting device according to one of the above claims, wherein the basic diameter of each shaft is smaller than the inside diameter of the plug-in duct.
8. Connecting device according to one of the above claims, wherein shaft of each plug-in element is provided with at least one or several safety strips, preferably with three safety strips.
9. Connecting device according to one of the above claims, wherein shaft completely passes through the plug-in opening and that, together with the safety strips, it protrudes out of the plug-in opening on the end facing away from the head.

10. Connecting device according to one of the above claims, wherein shaft of each plug-in element has at least one drastically deformable safety strip that extends at least over the terminal section of the shaft of the plug-in element.
11. Connecting device according to one of the above claims, wherein the friction spring is a compression spring terminal.
12. Connecting device according to one of the above claims, wherein friction spring is a push-in spring.