

(19)



(11)

EP 4 819 398 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
07.10.2026 Bulletin 2026/41

(51) International Patent Classification (IPC):
H01R 13/436 ^(2006.01)

(21) Application number: **25168560.8**

(52) Cooperative Patent Classification (CPC):
H01R 13/501; H01R 13/4362; H01R 13/506

(22) Date of filing: **04.04.2025**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
GE KH LA MA MD TN

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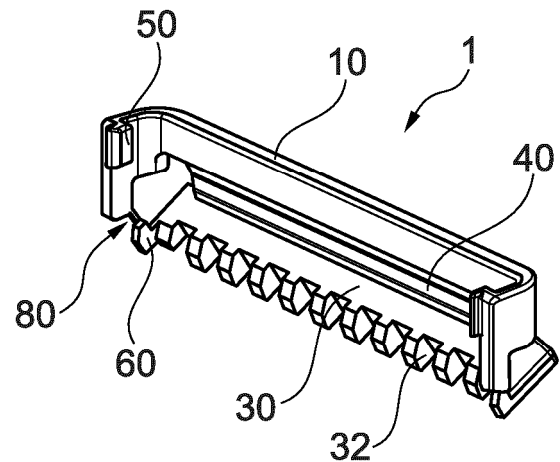
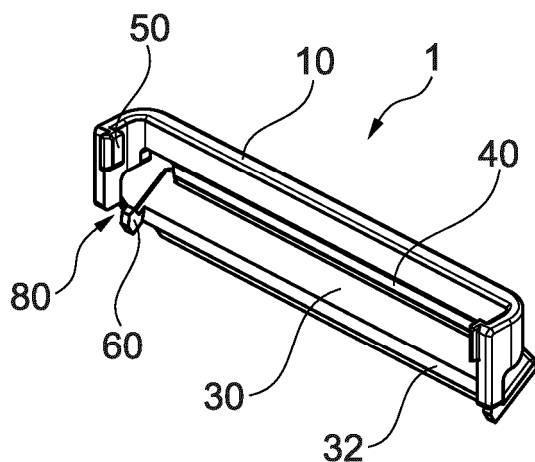
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(54) TERMINAL POSITION ASSURANCE FOR ELECTRICAL CONNECTOR

(57) A terminal position assurance, TPA, device for an electrical connector, the TPA device comprising: an assembly body configured to be attached to an electrical connector housing, and a locking body having at least one locking member extending from the locking body and corresponding to a terminal receiving cavity within the electrical connector housing, characterized in that the locking body is connected to the assembly body by means of a hinge member, wherein a first position of

the hinge member defines an open state of the TPA device in which the locking member is not operable to engage a terminal within the terminal receiving cavity, and a second position of the hinge member defines a closed state of the TPA device in which the locking member is operable to engage a terminal within the terminal receiving cavity. A kit and an assembly with such a TPA device.

**Fig. 3**

Description

TECHNICAL FIELD

[0001] The present disclosure relates to a terminal position assurance (TPA) device for an electrical connector. The present disclosure also relates to a kit comprising an electrical connector and at least one separate TPA device, and to an assembly comprising an electrical connector and at least one TPA device.

BACKGROUND

[0002] In the field of electrical connectors, it is common to use mechanisms called terminal position assurance (TPA) devices that ensure that electrical terminals are correctly and securely positioned within a connector housing. A TPA is critical for maintaining reliable electrical connections, especially in applications where connectors are subjected to vibrations or other mechanical stresses. Known electrical connectors typically involve TPAs that are either integral parts of the connector housing or are inseparably attached to the housing. A TPA has an open position and can be closed by moving it to a second position. In the closed position, a TPA typically reaches into terminal receiving cavities of the connector housing to engage with the electrical terminals therein. This design ensures that the electrical terminals remain securely seated within their respective cavities, preventing disconnections or electrical failures.

[0003] Despite the widespread use of TPAs in electrical connectors, known TPAs lack flexibility. Typically, a connector housing comes with one specific type of TPA. This lack of flexibility can be problematic in various applications, particularly when connectors need to be adapted to different configurations or when maintenance and repairs require a new TPA. Additionally, the fixed nature of these TPAs can complicate the manufacturing process of the connector, as it necessitates precise alignment and attachment during assembly, potentially increasing production costs and time.

[0004] Furthermore, the increasing demand for connectors capable of handling higher voltages introduces additional challenges for TPAs. Higher voltages necessitate the introduction of dielectric materials between the terminals within the housing to ensure insulation and ensure safe operation. However, having a connector housing with a fixed TPA restricts the connector to certain voltage ranges, limiting its versatility and applicability in various high-voltage scenarios. This restriction can be particularly limiting in industries such as automotive, aerospace, and industrial equipment, where connectors must meet stringent electrical and mechanical requirements.

[0005] It is therefore a technical problem underlying the present invention to provide a TPA device that at least partially overcomes the disadvantages of known systems.

SUMMARY OF THE INVENTION

[0006] It is an object of this invention to provide a terminal position assurance device that overcomes one or more of the disadvantages of known systems.

[0007] A first aspect of the invention provides a terminal position assurance, TPA, device for an electrical connector, the TPA device comprising: an assembly body configured to be attached to an electrical connector housing, and a locking body having at least one locking member extending from the locking body and corresponding to a terminal receiving cavity within the electrical connector housing. The locking body is connected to the assembly body by means of a hinge member, wherein a first position of the hinge member defines an open state of the TPA device in which the locking member is not operable to engage a terminal within the terminal receiving cavity (when mounted to the connector housing), and a second position of the hinge member defines a closed state of the TPA device in which the locking member is operable to engage a terminal within the terminal receiving cavity.

[0008] The advantage of this design is that it provides a separate TPA with a hinge mechanism for electrical connectors, allowing the device to be pre-assembled on an electrical connector housing and delivered to harness makers, or to be delivered separately. This enhances the flexibility in designing the TPA, as they can be mounted separately on an electrical connector. Both, the assembly body and the locking body can be designed more flexible to be optimized for the intended task.

[0009] Generally, the material for the TPA is preferably a dielectric material and in particular a dielectric thermoplastic material. The most preferred method for producing the TPA of the invention is by injection-molding the TPA as one single, integral part. Of course, other manufacturing methods or materials are not excluded and likewise feasible.

[0010] In a first embodiment of the device according to the first aspect, the locking body may comprise a plurality of locking members.

[0011] This design enhances the functionality of the TPA device by allowing it to engage multiple terminals within the terminal receiving cavities of the electrical connector housing. The communication mechanism between components in this context involves the interaction between the plurality of locking members and the terminal receiving cavities. The locking members are designed to correspond to the cavities, ensuring that each member can engage a terminal securely when the TPA device is in the closed state. The hinge member facilitates the transition between the open and closed states of the TPA device. In the open state, the hinge member positions the locking body such that the locking members are not operable to engage the terminals. Conversely, in the closed state, the hinge member aligns the locking body so that the locking members can engage the terminals effectively.

[0012] The introduction of multiple locking members brings several advantages to the TPA device. It increases the reliability of the terminal engagement by providing multiple points of contact, which can enhance the overall stability and security of the electrical connection. This is particularly beneficial in applications where multiple terminals are used and need to be secured simultaneously. The plurality of locking members also allows for greater flexibility in the design of the electrical connector housing, as it can accommodate various configurations of terminal receiving cavities. Furthermore, the presence of multiple locking members can contribute to the redundancy of the locking mechanism, ensuring that even if one member fails to engage a terminal properly, others can compensate, thus maintaining the integrity of the connection. Overall, the addition of a plurality of locking members to the locking body significantly enhances the operational capabilities of the TPA device, providing a more robust and versatile solution for securing terminals within electrical connectors.

[0013] In a further embodiment of the device according to the first aspect, the locking members may be locking teeth.

[0014] The locking teeth are designed to interact with the terminals within the terminal receiving cavity in a more secure and reliable manner, ensuring that the terminals are properly engaged and retained within the connector housing, potentially reducing the risk of terminal dislodgement or improper connection. Locking teeth are also particularly suitable for separating multiple electrical terminals within the housing, as they may fill a free space between the electrical terminals. Thereby, the locking teeth may fill the free space of the terminal receiving cavities that is not occupied by electrical terminals, thus preferably providing a dielectric material between the terminals. This enhancement is particularly relevant in applications where secure electrical connections are critical at higher voltages (like for example 48 V), such as in automotive or industrial electrical systems, where vibrations and other environmental factors could otherwise compromise the integrity of the connections. By specifying the locking members as locking teeth, the embodiment ensures that the terminal position assurance device can provide a consistent and dependable performance, thereby increasing the overall effectiveness and utility of the electrical connector system.

[0015] In a further embodiment of the device according to the first aspect, the locking member may be a locking blade.

[0016] The locking blade, as opposed to other possible forms of locking members, such as teeth or clips, provides an elongated contact surface that can engage simultaneously with a number of electrical terminals within the terminal receiving cavities of a connector housing in a secure and stable manner. The hinge member's positions define the operational states of the TPA device, with the open state rendering the locking blade inoperative and the closed state enabling the locking blade to engage

the terminal. The introduction of the locking blade as the locking member refines the functionality of the TPA device by potentially offering a more robust locking mechanism. This enhancement leads to improved performance in securing terminals within the electrical connector housing, ensuring that the terminals remain in their intended positions and reducing the risk of disconnection or electrical faults. The specific design of the locking blade may be especially suitable in applications at lower voltages (like for example 12 V), where no additional material needs to be placed in a free space between multiple electrical terminals. In summary, the embodiment's specification of the locking member as a locking blade introduces a new feature that refines the locking mechanism's functionality, potentially offering a more secure engagement, improved performance, and enhanced manufacturing and assembly efficiency.

[0017] In a further embodiment of the device, the assembly body may comprise a fastening member configured for attaching the assembly body to an electrical connector housing.

[0018] The introduction of a fastening member provides a specific mechanism for securing the assembly body to the electrical connector housing of an electrical connector. This feature ensures that the assembly body remains firmly attached to the housing, which may be beneficial for maintaining the integrity of the terminal position assurance device's operation. By incorporating a fastening member, the embodiment addresses potential issues related to movement or dislodging of the assembly body, which could lead to improper engagement of the locking member with the terminal. The fastening member may enhance the communication between the assembly body and the electrical connector housing by providing a secure attachment mechanism, which is beneficial for the proper functioning of the hinge member and the locking body. This secure attachment facilitates the transition between the open and closed states of the device, ensuring that the locking member can engage and disengage terminals as required.

[0019] The fastening member may be a latching hook configured to engage with a receptacle on the electrical connector housing.

[0020] The inclusion of a latching hook as the fastening member provides a secure and reliable means of attachment, ensuring that the TPA device can easily be mounted onto the housing and remains firmly in place once installed. The mechanism of communication between the latching hook and the receptacle ensures that the TPA device can transition smoothly between its open and closed states, as defined by the positions of the hinge member.

[0021] Preferably, the locking body may comprise a closing member configured to secure the hinge member in the second position by engaging with the electrical connector housing.

[0022] The mechanism of communication between the components of this embodiment enhances the function-

ality of the TPA device by ensuring that the hinge member remains in the closed state, thereby allowing the locking member to engage a terminal within the terminal receiving cavity. The closing member provides an additional level of security and stability to the hinge member's positioning, preventing accidental disengagement or movement that could compromise the terminal's connection within the electrical connector housing. By engaging with the electrical connector housing, the closing member acts as a physical barrier or lock that maintains the hinge member in its closed position, thereby ensuring the reliability and integrity of the terminal engagement. This feature addresses potential issues related to the hinge member's movement and adds a layer of assurance that the TPA device will function correctly in maintaining the terminal's position. This enhancement is particularly relevant in applications where the electrical connector may be subject to vibrations, movements, or other external forces that could otherwise cause the hinge member to shift from its closed state.

[0023] In a further improvement, the assembly body may be configured to be attached to the electrical connector housing via a mating axis.

[0024] The assembly body may be designed to be attached to the electrical connector housing via a mating axis, which establishes a precise alignment for the attachment process. This feature ensures that the assembly body is accurately positioned relative to the electrical connector housing, facilitating a reliable connection. Furthermore, the hinge axis of the hinge member is arranged in a plane perpendicular to the mating axis. By positioning the hinge axis in a perpendicular plane, the hinge member can pivot more effectively, providing a clear distinction between the open and closed states of the TPA device. In the open state, the locking member is not operable to engage a terminal within the terminal receiving cavity, while in the closed state, the locking member is operable to engage a terminal within the terminal receiving cavity. This perpendicular arrangement of the hinge axis allows for a more controlled and precise movement of the hinge member, thereby improving the overall operability and reliability of the TPA device.

[0025] In a further improvement, the hinge member may be a living hinge.

[0026] A living hinge (also known as film hinge) is a thin flexible hinge made from the same material as the assembly body, the locking body, and the hinge member itself. The material is preferably a polymer like a plastic. The use of a living hinge brings several advantages to the TPA device. Firstly, by being made from the same material, the living hinge allows for a seamless integration of the hinge member with the other components, ensuring uniformity in material properties such as flexibility, durability, and resistance to environmental factors. This uniformity can lead to a more reliable performance of the hinge member, as it reduces the risk of material incompatibility or failure at the junctions between different materials. Furthermore, the living hinge provides a

cost-effective solution by eliminating the need for additional components or materials to create the hinge mechanism, simplifying the manufacturing process and reducing production costs. The living hinge also enhances the ease of assembly and operation of the TPA device. Its inherent flexibility allows for smooth transition between the open and closed states of the device, facilitating the engagement and disengagement of the locking member with the terminal within the terminal receiving cavity. This flexibility can improve the user experience by making the device easier to handle and operate, particularly in applications where frequent adjustments are required. Additionally, the use of plastic as the preferred material for the living hinge and other components can offer benefits such as lightweight construction, dielectric properties, corrosion resistance, and the ability to be molded into complex shapes, further enhancing the design possibilities and functionality of the terminal position assurance device.

[0027] In a further improvement, the at least one locking member may correspond to the terminal receiving cavity so that in the second position of the hinge member the locking member may fill the cavity by at least 70%.

[0028] The embodiment introduces a specific mechanism of communication between the locking member and the terminal receiving cavity within the electrical connector housing. In the second position of the hinge member, the locking member may be designed to correspond to the terminal receiving cavity in such a manner that it fills the free space in the cavity by at least 70%, with a preference for 80%, and more preferably 90%. The free space is space not occupied by the inserted terminals or other components. This feature enhances the functionality and reliability of the TPA device by ensuring a more secure engagement between the locking member and the terminal within the cavity. The detailed correspondence between the locking member and the cavity ensures that the terminal is held firmly in place, providing a higher degree of assurance that the electrical connection remains stable and secure. In particular, by substantially filling the cavities between the terminals, a dielectric material is introduced between the terminals, increasing signal integrity. The more the locking member fills the cavity, the less free space is there between multiple electrical terminals, which may be especially beneficial for applications with higher voltages.

[0029] In a further improvement, the device may further comprise a breakable support member connecting the locking body to the assembly body so that the hinge member is held in the first position.

[0030] The embodiment introduces a breakable support member as an additional component in the TPA device. This breakable support member serves as a temporary connection between the locking body and the assembly body, effectively maintaining the hinge member in its first position. The breakable support member thus acts as a mechanism to hold the hinge member in the open state until a predetermined condition neces-

sitates its transition to the closed state. The introduction of the breakable support member brings several new features and advantages to the terminal position assurance device. Firstly, it provides a mechanism for a controlled transitioning of the hinge member from the open state to the closed state. This ensures that the locking member remains disengaged from the terminal until the breakable support member is intentionally broken or otherwise removed, thereby allowing the hinge member to move to its second position. In the closed state, the locking member becomes operable to engage a terminal within the terminal receiving cavity, securing the terminal in place. The breakable support member thus enhances the reliability and functionality of the terminal position assurance device by preventing premature engagement of the locking member with the terminal. Moreover, the breakable support member introduces a fail-safe feature to the device. In scenarios where the terminal position assurance device needs to remain in the open state for extended periods, the breakable support member ensures that the hinge member does not inadvertently transition to the closed state. This is particularly beneficial in applications where the electrical connector may be subject to vibrations or other external forces that could otherwise cause unintended movement of the hinge member. Additionally, the breakable support member can be designed to break under specific conditions, such as the application of a certain amount of force or pressure, providing a controlled and predictable mechanism for transitioning the device to its closed state.

[0031] In a further improvement, the assembly body, the locking body, and the breakable support member may be moulded in one piece.

[0032] This feature brings a significant enhancement to the TPA device for an electrical connector by ensuring that all the primary components are integrally formed, thereby eliminating the need for separate assembly processes and reducing the potential for misalignment or mechanical failure between the parts. The communication between the components is inherently streamlined, as the moulding process ensures that the assembly body, locking body, and breakable support member are precisely positioned relative to each other from the outset. This integral moulding enhances the structural integrity of the TPA device, providing a more robust and reliable mechanism for ensuring terminal position assurance. The one-piece moulding also contributes to the ease of installation and maintenance of the TPA device, as there are fewer parts to manage and align during the attachment to the electrical connector housing.

[0033] A second aspect of the invention provides a kit comprising: an electrical connector having an electrical connector housing with at least one terminal receiving cavity, and a separate terminal position assurance, TPA, device according to the first aspect.

[0034] The subject matter described in the second aspect is a kit that comprises an electrical connector and at least one separate terminal position assurance

(TPA) device according to the first aspect. The electrical connector features a housing that contains at least one cavity designed to receive a terminal. The TPA device is distinct and can be any of the devices or combinations thereof described in previous embodiments of the first aspect.

[0035] An electrical connector is a device used to join electrical circuits together, and its housing is the outer shell that encases the internal components. The terminal receiving cavity is a specific compartment within the housing where electrical terminals can be inserted and held in place.

[0036] The separate TPA device ensures, and allows a verification, that the terminals are correctly positioned within the cavities, providing a secondary locking mechanism to prevent dislodgement or misalignment. This device can be pre-assembled or delivered separately to harness makers, offering flexibility in design and assembly processes.

[0037] A third aspect of the invention provides an assembly comprising: an electrical connector having an electrical connector housing with at least one terminal receiving cavity, and at least one terminal position assurance, TPA, device according to the first aspect, wherein the TPA device is attached to the electrical connector housing.

[0038] In a first embodiment of the assembly according to the third aspect, the hinge member of each TPA device is in the first position, and the locking body of each TPA device is configured to impede movement of the TPA device along the mating axis by making contact with a contact point on the electrical connector housing.

[0039] This configuration ensures that the TPA device remains securely attached to the electrical connector housing and prevents any unintended final mating until the hinge member is in its second position. The interaction between the locking body and the contact point may ensure that the TPA device cannot move freely along the mating axis until the hinge member is in its second position.

[0040] This embodiment is particularly suitable for delivery to harness makers because, after equipping the connector with an electrical terminal, they only need to bring the hinge member into the second position so that the TPA device can mate with the housing.

SHORT DESCRIPTION OF THE FIGURES

[0041]

Figure 1: shows a prior art TPA device attached to an electrical connector housing and a separate view of the locking body;

Figure 2: shows another prior art electrical connector housing with an integrated TPA;

Figure 3: shows embodiments of TPA devices with a

locking blade and locking teeth according to the invention;

Figure 4: shows an embodiment of a TPA device of Fig. 3 attached to an electrical connector housing;

Figure 5: shows the embodiment of Fig. 4 in a different view with two TPA devices attached to the housing.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0042] Figure 1 shows a TPA device as known in the prior art. The TPA device is depicted in two views: one attached to an electrical connector housing 20 and the other as a standalone component. The electrical connector housing 20 is part of an electrical connector 2, which includes multiple terminal receiving cavities 22. These cavities are designed to receive and secure electrical contact terminals.

[0043] The known TPA device comprises an assembly body 10 and a locking body 30, which are arranged in a U-shaped configuration. The assembly body 10 is configured to attach to the electrical connector housing 20. The locking body 30 features a plurality of locking members 32. These locking members 32 are arranged in a manner that corresponds to the terminal receiving cavities 22 within the electrical connector housing 20. The working principle of such TPAs is generally known to the skilled person, so it is refrained from giving a detailed explanation thereof.

[0044] Figure 2 shows an integrated TPA as known in the prior art. The electrical connector 2 is depicted with an electrical connector housing 20. The housing 20 includes terminal receiving cavities 22, which are designed to accommodate electrical terminals. The TPA is integrated within the housing 20.

[0045] The housing 20 is shown with a pair of flexible locking arms 26 that form the TPA and extend outwardly from the sides of the housing. These locking arms 26 are designed to engage with corresponding features on the connector housing 20 to ensure a secure connection. The locking arms 26 are typically made from a resilient material that allows them to flex and snap into place when the connectors are mated. The locking arms 26 are flexibly connected to the connector housing 20 by means of a connection portion 28. Again, the working principle of such integrated TPAs is generally known to the skilled person, so it is refrained from giving a detailed explanation thereof.

[0046] Figure 3 illustrates two embodiments of a TPA device 1 designed to be attached to an electrical connector 2. The assembly body 10 forms the main structural element, providing the framework to which other components are attached. This assembly body 10 is configured to be affixed to an electrical connector housing 20, en-

suring stability and proper alignment of the device.

[0047] Attached to (in the shown embodiments integrally formed with) the assembly body 10 is the locking body 30, which features multiple locking members 32. These locking members 32 are designed to correspond with terminal receiving cavities 22 within the electrical connector housing 20, ensuring secure engagement with terminals when the device is in the closed state. The left embodiment comprises one locking member in the form of a locking blade, whereas the right embodiment comprises multiple locking members 32 in the form of locking teeth.

[0048] The hinge member 40 connects the locking body 30 to the assembly body 10, facilitating movement between an open and closed state. In the open state, the locking members 32 are not engaged with the terminals, allowing for insertion or removal of terminals from the connector housing. Conversely, in the closed state, the hinge member 40 positions the locking body 30 such that the locking members 32 engage the terminals, securing them within the terminal receiving cavities.

[0049] The fastening member 50 is depicted as a latching hook, which is configured to engage with a receptacle 24 on the electrical connector housing 20. This engagement ensures that the assembly body 10 is securely attached to the connector housing, preventing accidental detachment or misalignment during operation.

[0050] Additionally, the closing member 60 is shown as part of the locking body 30. This component is designed to secure the hinge member 40 in the closed position by engaging with the electrical connector housing 20. This engagement prevents the hinge member 40 from inadvertently moving to the open position, thus maintaining the secure engagement of the terminals.

[0051] A breakable support member 80 is also illustrated, connecting the locking body 30 to the assembly body 10. This breakable support member 80 holds the hinge member 40 in the first position, facilitating initial assembly and handling of the device. Once the device is ready for operation, the breakable support member 80 can be broken to allow movement of the hinge member to the closed position.

[0052] Figure 4 shows an electrical connector 2 equipped with two TPA devices 1, of which one (on the left) is already mounted to the housing and the other one on the right-hand side is not yet mounted. The assembly body 10 of the TPA device 1 is configured to be secured to the electrical connector housing 20, and the locking body 30 features at least one locking member 32 (cf. to Fig. 3) that corresponds to openings in the housing 20 that allow access to the terminal receiving cavity 22 within the housing 20.

[0053] The assembly body 10 is attached to the electrical connector housing 20 by first clipping on the assembly body 10 along a connecting axis 70 and then sliding it down along the mating axis 74. The hinge axis 72 of the hinge member 40 is arranged in a plane perpendicular to the mating axis 74, allowing the hinge member 40

to pivot between the open and closed states. The mating axis 74 is the axis along which the connector 2 is moved for mating with a corresponding counter connector (not shown).

[0054] In both Figures 3 and 4, the hinge member 40 is depicted as a living hinge (film hinge), indicating that the assembly body 10, the locking body 30, and the hinge member 40 are integrally made from the same material, preferably injection molded plastic.

[0055] The locking member 32 is designed to correspond to the terminal receiving cavity 22 such that, in the closed state, the locking member 32 fills the free space in the cavity 22, i.e., space not occupied by the terminals or other components, by at least 70%, preferably 80%, and more preferably 90%. This ensures a secure engagement with the terminal within the cavity 22 and may increase signal integrity.

[0056] The assembly body 10, the locking body 30, and the breakable support member 80 shown in the preferred embodiments are injection molded in one piece, providing a seamless and integrated construction for the TPA device 1.

[0057] Figure 5 shows the embodiment of Fig. 4 in a side view, with the TPA devices 1 attached to the electrical connector 2. Together, the electrical connector 2 and the TPA devices 1 form an assembly 1000.

[0058] The assembly body 10 of each TPA device 1 is attached to the electrical connector housing 20 by first clipping the assembly body 10 on the housing along the connecting axis 70. In this state, the locking body 30 of each TPA device 1 impedes movement of the TPA device 1 along the mating axis 74 by making contact with a contact point 100 on the electrical connector housing 20. Thereby, a movement along the mating axis 74 is prevented.

[0059] The hinge member 40 is arranged with a hinge axis 72 that is perpendicular to the mating axis 74 and the connecting axis 70. This perpendicular arrangement allows for the pivoting action of the hinge member 40, facilitating the transition between the open and closed states.

[0060] Figure 5 further illustrates the TPA devices 1 in both the open (on the left) and closed (on the right) states, showing how the locking members 32 engage with the terminal receiving cavities 22 in the closed state. The hinge member 40 is shown pivoting around the hinge axis 74, which facilitates the transition between states. When moved into the closed state, each TPA device 1 slides down along the mating axis 74, which results in a free space 90. In other words, the TPA device 1 is closed along the axis 70 to its final position, whereby the locking body 30 comes into contact with the contact surface on which contact point 100 is situated to impede further movement along the axis 74.

Claims

1. A terminal position assurance, TPA, device (1) for an electrical connector (2), the TPA device (1) comprising:

an assembly body (10) configured to be attached to an electrical connector housing (20), and

a locking body (30) having at least one locking member (32) extending from the locking body (30) and corresponding to a terminal receiving cavity (22) within the electrical connector housing (20),

characterized in that

the locking body (30) is connected to the assembly body (10) by means of a hinge member (40),

wherein a first position of the hinge member (40) defines an open state of the TPA device (1) in which the locking member (32) is not operable to engage a terminal within the terminal receiving cavity (22),

and a second position of the hinge member (40) defines a closed state of the TPA device (1) in which the locking member (32) is operable to engage a terminal within the terminal receiving cavity (22).

2. The TPA device (1) of claim 1, wherein the locking body (30) comprises a plurality of locking members (32).

3. The TPA device (1) of claim 2, wherein the locking members (32) are locking teeth.

4. The TPA device (1) of claim 1, wherein the locking member (32) is a locking blade.

5. The TPA device (1) of any one of claims 1-4, wherein the assembly body (10) comprises a fastening member (50) configured for attaching the assembly body (10) to an electrical connector housing (20).

6. The TPA device (1) of claim 5, wherein the fastening member (50) is a latching hook configured to engage with a receptacle (24) on the electrical connector housing (20).

7. The TPA device (1) of any one of claims 1-6, wherein the locking body (30) comprises a closing member (60) configured to secure the hinge member (40) in the second position by engaging with the electrical connector housing (20).

8. The TPA device (1) of any one of claims 1-7, wherein the assembly body (10) is configured to be attached to the electrical connector housing (20) via a mating

axis (74), and
 wherein a hinge axis (72) of the hinge member (40) is
 arranged in a plane perpendicular to the mating axis
 (74).

- 5
9. The TPA device (1) of any one of claims 1-8, wherein
 the hinge member (40) is a living hinge, so that the
 assembly body (10), the locking body (30), and the
 hinge member (40) are all made from the same
 material, preferably plastic. 10
10. The TPA device (1) of any one of claims 1-9, wherein
 the at least one locking member (32) corresponds to
 the terminal receiving cavity (22) so that in the sec-
 ond position of the hinge member (40) the locking
 member (32) fills the free space in the cavity (22) by 15
 at least 70%, preferably 80%, and more preferably
 90%.
11. The TPA device (1) of any one of claims 1-10, further 20
 comprising a breakable support member (80) con-
 necting the locking body (30) to the assembly body
 (10) so that the hinge member (40) is in held the first
 position, preferably wherein the breakable support
 member (80) connects the closing member (80) to 25
 the assembly body (10).
12. The TPA device (1) of claim 11, wherein the assem-
 bly body (10), the locking body (30), and the break-
 able support member (80) are moulded in one piece. 30
13. A kit comprising:
- an electrical connector (2) having an electrical
 connector housing (20) with at least one terminal 35
 receiving cavity (22), and
 a separate terminal position assurance, TPA,
 device (1) according to any one of claims 1-12.
14. An assembly (1000) comprising: 40
- an electrical connector (2) having an electrical
 connector housing (20) with at least one terminal
 receiving cavity (22), and
 at least one terminal position assurance, TPA, 45
 device (1) according to any one of claims 1-12,
 wherein the TPA device (1) is attached to the
 electrical connector housing (20).
15. The assembly of claim 14, wherein the hinge mem- 50
 ber (40) of each TPA device (1) is in the first position,
 and the locking body (30) of each TPA device (1) is
 configured to impede movement of the TPA device
 (1) along the mating axis (74) by making contact with
 a contact point (100) on the electrical connector 55
 housing (20).

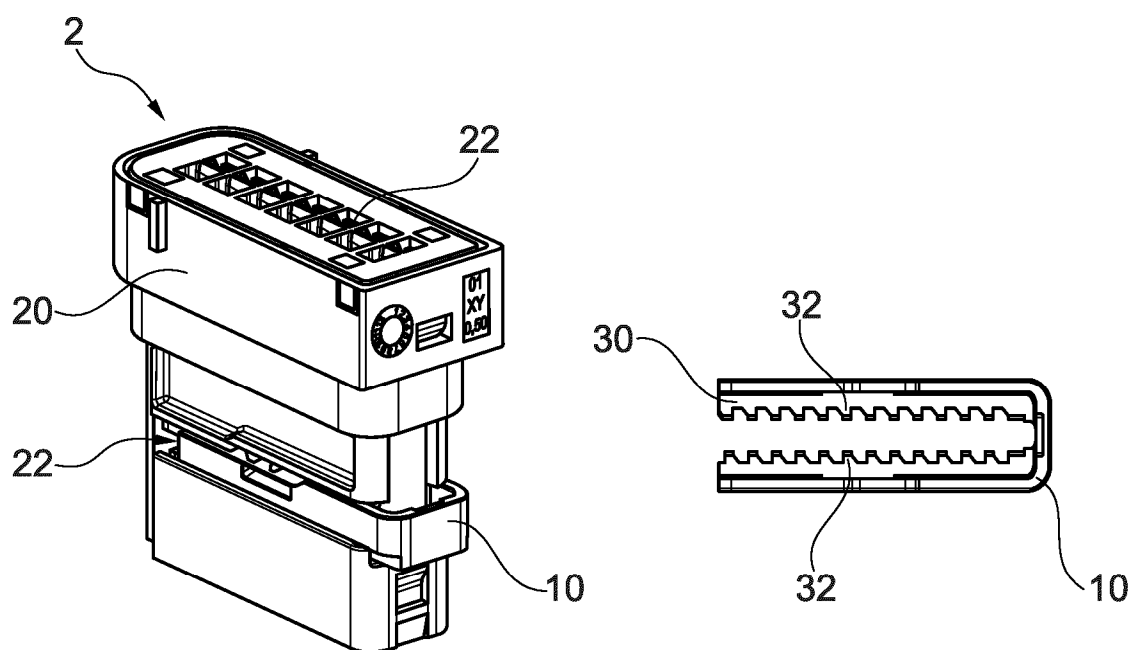


Fig. 1

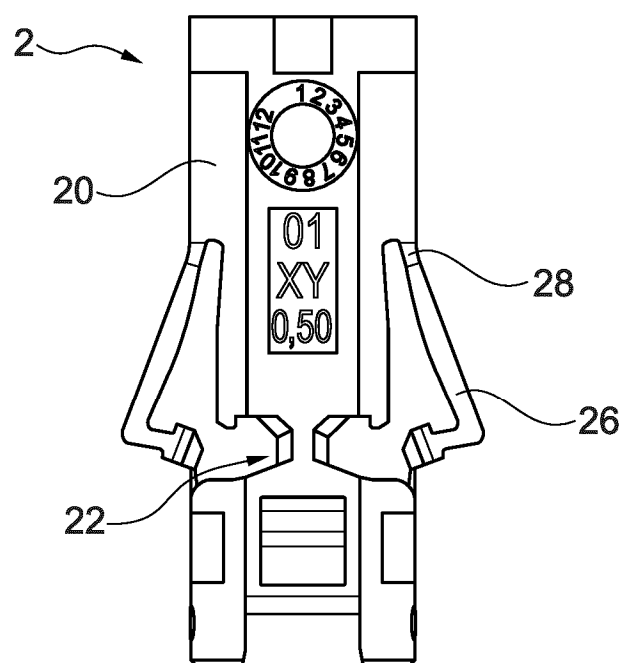


Fig. 2

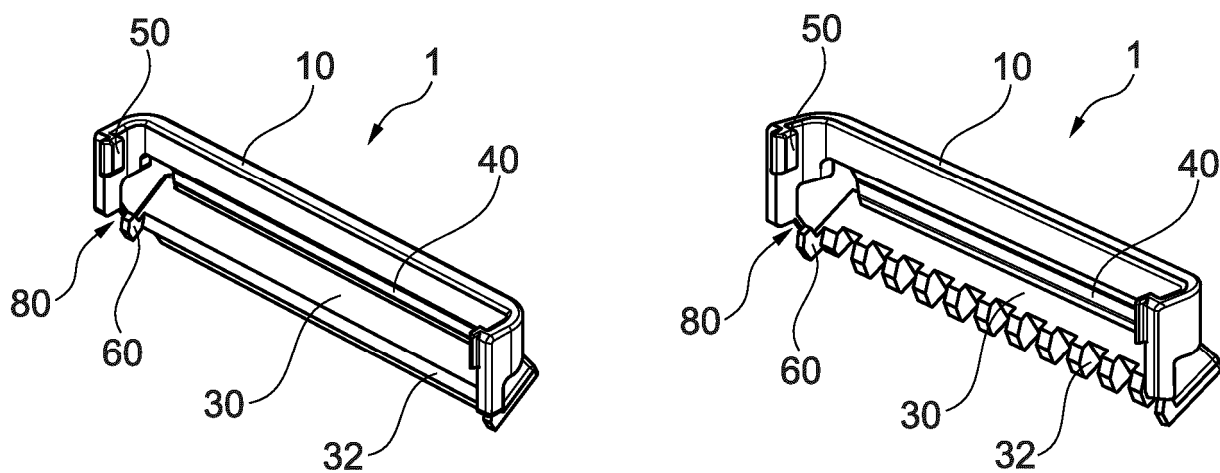


Fig. 3

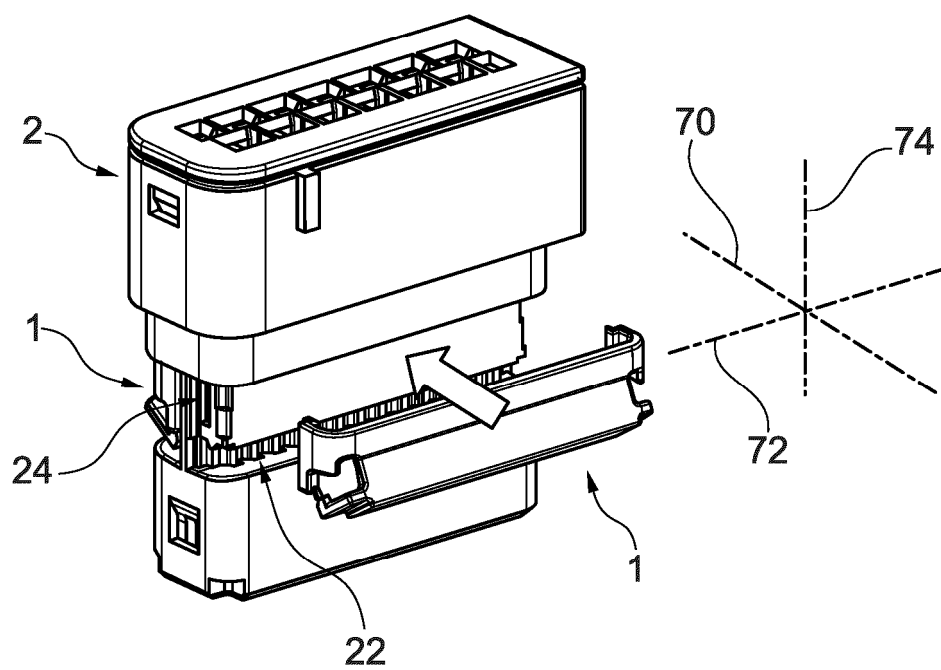


Fig. 4

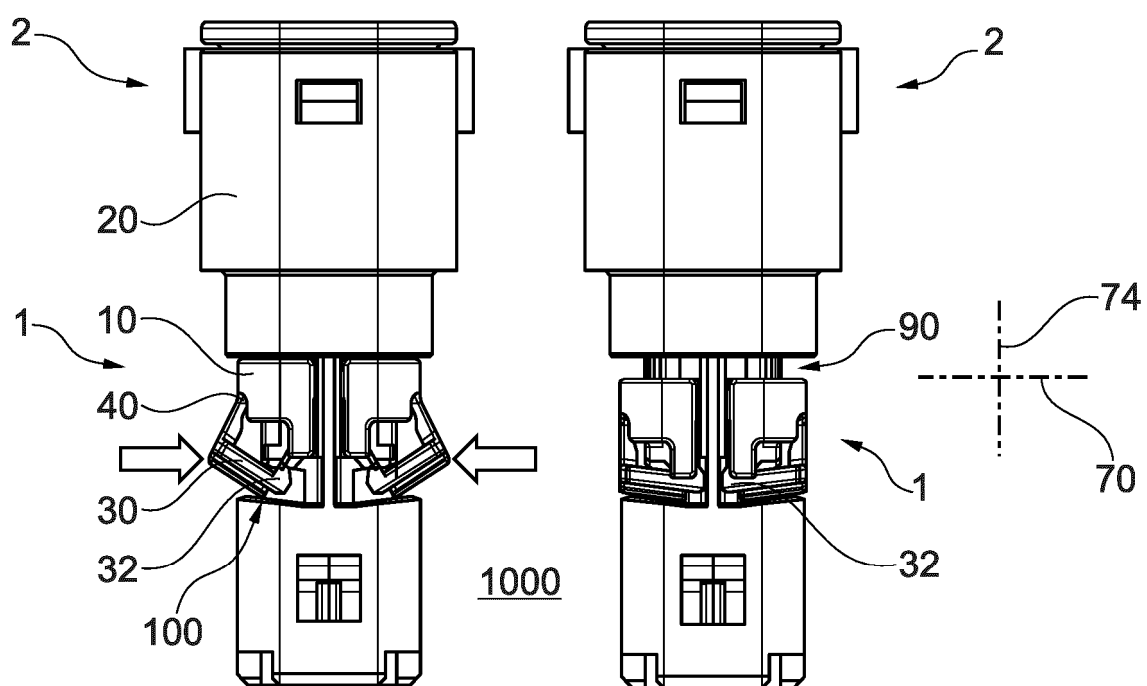


Fig. 5



EUROPEAN SEARCH REPORT

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