

Description

Field of the Invention

The invention relates to a high-density connector, and particularly to such a connector for use in electrical connection between computer devices.

Background of the Invention

In the prior art, there is a connector for electrical connection of a flat-ribbon cable, as described in, for example, Japanese Utility Model Laid-Open Publication No. 26768/1980. In the connector described in that publication, a flat-ribbon cable is held in a cable guide groove and cable holding grooves to be subjected to insulating displacement, both of which grooves are formed in a cover.

When a connector of that type is used for electrical connection of a cable having discrete wires or twisted-pair wires, it is quite troublesome to pass discrete wires of a cable through the cable guide groove of the cover, and it is necessary prior to insulation displacement to adhesively bond respective wires to the cable holding grooves of the cover.

GB-A-1 487 124 discloses a terminal device for connection to an electrical conductor wherein the device has a connector body containing a multiplicity of insulation displacement contact elements and a cover for retaining insulated electrical conductors. The cover has a longitudinal slit extending from one end throughout a majority of the length of the cover, a multiplicity of contact element receiving recesses for receiving the ends of the contact elements and a multiplicity of transverse insulated electrical conductor receiving grooves, each extending from the longitudinal slot to the adjacent edge of the cover assembly, with one groove passing across each of the contact element receiving recesses.

Summary of the Invention

According to the present invention there is provided a high density electrical connector having a connector body containing a multiplicity of insulation displacement contact elements and a cover portion for retaining insulated electrical conductors, said cover portion having a longitudinal slit extending throughout a majority of length of said cover portion, a multiplicity of contact element receiving recesses on both sides of said longitudinal slit for receiving the ends of said contact elements extending through contact insertion holes and a multiplicity of transverse insulated electrical conductor receiving grooves, each groove extending from

said longitudinal slit to the adjacent edge of said cover portion, with one groove passing across each of said contact element receiving recesses, characterised in that said cover portion together with a further cover portion form a cover assembly;

said further cover portion having said contact insertion holes for receiving the conductor connecting ends of said insulation displacement contact elements and said further cover portion having a central longitudinal rib; and said connector body has a corresponding central recess to receive said rib when said body and cover assembly are assembled with the ends of the contact elements extending through said contact insertion holes in said further cover portion and being connected to insulated electrical conductors between said cover portions in said grooves.

The Drawing

In the drawing:

Figure 1 is an exploded, perspective view of a high-density connector according to the invention;

Figure 2 is a perspective view of a first cover portion;

Figure 3 is a perspective view of a second cover portion and an electrical cable; and

Figure 4 is a plan view of the second cover portion.

Description of the Preferred Embodiment

Referring now to Figure 1, a high-density connector 10 according to the invention is illustrated, and comprises a cover assembly 9 for mounting the insulated electrical conductors 27 of a cable 24, and a connector body 3 containing a multiplicity of insulation displacement contact elements 22. The cover assembly 9 comprises a first cover portion 1 and a second cover portion 2. The cover portions 1 and 2 and body 3 are formed of an insulating plastic material.

As illustrated in Figure 2, the first cover portion 1 is formed with two pairs of first engaging projections 4, each pair of which are disposed on the longitudinally opposite ends of the first cover portion. The first cover portion also has press fitting holes 5 on the opposite sides of the first engaging projections 4, a misfit preventing hole 6 adjacent to one end of said first cover portion, a rib 7 extending longitudinally and centrally of the upper surface of said first cover portion, and a multiplicity of contact insertion holes 8 arranged in four rows and extending through the first cover portion.

As illustrated in Figure 3, the second cover portion 2 is formed with stepped portions 11 on its upper surface at its ends, an insulated electrical

conductor surface 12 disposed between said stepped portions, a longitudinal slit 13 extending through one of said stepped portions and the insulated electrical conductor bearing surface, two pairs of press fitting posts 14 on both stepped portions, a misfit preventing projection 15 on one of said stepped portions, and pairs of second engaging projections 18 on the opposite ends of said second cover.

As illustrated in Figures 2 and 3, in assembling the first and second cover portions 1, 2 to form the cover assembly 9, the first cover portion 1 is forceably applied to the second cover 2, in which the insulated electrical conductors 27 of a cable 25 have been placed, and the misfit preventing hole 6 and the press fitting holes 5 in the first cover are fitted on the misfit preventing projection 15 and the press fitting posts 14 on the second cover 2.

As shown in Figures 3 and 4, the insulated electrical conductor surface 12 is formed with insulated electrical conductor receiving grooves 17 extending transversely to the length of the slit 13, and with contact receiving recesses 16 parallel to the slit 13 and arranged in rows a, b, c and d on the opposite sides of the slit. One groove 17 passes across each recess 16. Insulated conductor receiving grooves 17 are uniformly spaced, for example spaced 1.27 mm, and on the opposite sides of the slit 13 are disposed in offset relationship of, for example 0.635 mm, with the insulated conductor receiving grooves 17 disposed on the opposite side of the slit 13. Each insulated conductor receiving groove 17 has a semicircular shaped cross-section which is sized to accommodate different wire sizes. The contact receiving recesses 16 extend transversely to the length of each cable holding groove 17 and are arranged in rows a, b, c and d on either side of the slit 13 such that the contact receiving recesses 16 in rows a and b are offset by, for example, 0.635 mm with respect to the contact receiving recesses 16 in rows c and d.

Referring to Figure 1, the connector body 3 contains a multiplicity of insulation displacement contact elements 22 mounted in the insulating plastic body, a pair of opposed side walls 20 extending from the body, and a pair of opposed resilient legs 21. The resilient legs 21 are formed with slots 21a which receive the first engaging projections 4 of the first cover portion and the second engaging projections 18 of the second cover portion when the connector body 3 is joined with the cover assembly 9.

While the high-density connector 10 according to the invention, can be applied on a flat-ribbon cable, it is particularly useful for a cable 24 having discrete insulated conductors 27 or twisted-pair wires. For that reason, mounting of the present high-density connector to such a cable is de-

scribed hereinbelow. First, a cable covering 25 and a cable sheath 26 are stripped off from the cable 24, and discrete insulated electrical conductors 27 of the cable are introduced through a slit opening 13a into the slit 13. The insulated conductors 27 are then placed in the insulated conductor receiving grooves 17 of the second cover portion 2. Thereafter, the first cover portion 1 is placed on and forceably applied to the second cover portion 2 to retain the insulated electrical conductors between the first cover portion and the second cover portion. In this step the misfit preventing projection 15 and the press fitting posts 14 on the second cover portion 2 are tightly fitted into the misfit preventing hole 6 and the press fitting holes 5 in the first cover 1 to hold the cover portions 1 and 2 together. In this condition, the portions of the insulated conductors 27, which protrude laterally from the cover assembly 9, are cut. Since the height of the steps 11 on the second cover portion 2 and the cross-section of each insulated conductor retaining groove 17 are sized so as to accommodate several cables having different wire sizes, the insulated conductors 27 are securely retained between the first and second covers 1, 2.

Conventional insulation displacement connection to the insulated conductors is made by joining the connector body 3 to the cover assembly 9 with the ends of the insulation displacement contact elements 22 passing through the contact insertion holes 8 through the first cover portion 1 to make insulation displacement connection to the insulated conductors 27. In this condition, the resilient engaging legs 21 of the connector body 3 snap over and engage the first engaging projections 4 and the second engaging projections 18 of the cover assembly 9 in the slots 21a. Side walls 20 of the connector body 3 enclose the cover assembly 9 to eliminate the need for any closed end cover. In addition, the longitudinal rib 7 on the first cover portion is fitted into a central recess 23 in the connector body 3, so that any misalignment between the cover assembly 9 and the connector body 3 is eliminated during the step of insulation displacement.

Claims

1. A high density electrical connector having a connector body (3) containing a multiplicity of insulation displacement contact elements (22) and a cover portion (2) for retaining insulated electrical conductors, said cover portion having a longitudinal slit (13) extending throughout a majority of length of said cover portion, a multiplicity of contact element receiving recesses (16) on both sides of said longitudinal slit (13) for receiving the ends of said contact elements

conductor surface 12 disposed between said stepped portions, a longitudinal slit 13 extending through one of said stepped portions and the insulated electrical conductor bearing surface, two pairs of press fitting posts 14 on both stepped portions, a misfit preventing projection 15 on one of said stepped portions, and pairs of second engaging projections 18 on the opposite ends of said second cover.

As illustrated in Figures 2 and 3, in assembling the first and second cover portions 1, 2 to form the cover assembly 9, the first cover portion 1 is forceably applied to the second cover 2, in which the insulated electrical conductors 27 of a cable 25 have been placed, and the misfit preventing hole 6 and the press fitting holes 5 in the first cover are fitted on the misfit preventing projection 15 and the press fitting posts 14 on the second cover 2.

As shown in Figures 3 and 4, the insulated electrical conductor surface 12 is formed with insulated electrical conductor receiving grooves 17 extending transversely to the length of the slit 13, and with contact receiving recesses 16 parallel to the slit 13 and arranged in rows a, b, c and d on the opposite sides of the slit. One groove 17 passes across each recess 16. Insulated conductor receiving grooves 17 are uniformly spaced, for example spaced 1.27 mm, and on the opposite sides of the slit 13 are disposed in offset relationship of, for example 0.635 mm, with the insulated conductor receiving grooves 17 disposed on the opposite side of the slit 13. Each insulated conductor receiving groove 17 has a semicircular shaped cross-section which is sized to accommodate different wire sizes. The contact receiving recesses 16 extend transversely to the length of each cable holding groove 17 and are arranged in rows a, b, c and d on either side of the slit 13 such that the contact receiving recesses 16 in rows a and b are offset by, for example, 0.635 mm with respect to the contact receiving recesses 16 in rows c and d.

Referring to Figure 1, the connector body 3 contains a multiplicity of insulation displacement contact elements 22 mounted in the insulating plastic body, a pair of opposed side walls 20 extending from the body, and a pair of opposed resilient legs 21. The resilient legs 21 are formed with slots 21a which receive the first engaging projections 4 of the first cover portion and the second engaging projections 18 of the second cover portion when the connector body 3 is joined with the cover assembly 9.

While the high-density connector 10 according to the invention, can be applied on a flat-ribbon cable, it is particularly useful for a cable 24 having discrete insulated conductors 27 or twisted-pair wires. For that reason, mounting of the present high-density connector to such a cable is de-

scribed hereinbelow. First, a cable covering 25 and a cable sheath 26 are stripped off from the cable 24, and discrete insulated electrical conductors 27 of the cable are introduced through a slit opening 13a into the slit 13. The insulated conductors 27 are then placed in the insulated conductor receiving grooves 17 of the second cover portion 2. Thereafter, the first cover portion 1 is placed on and forceably applied to the second cover portion 2 to retain the insulated electrical conductors between the first cover portion and the second cover portion. In this step the misfit preventing projection 15 and the press fitting posts 14 on the second cover portion 2 are tightly fitted into the misfit preventing hole 6 and the press fitting holes 5 in the first cover 1 to hold the cover portions 1 and 2 together. In this condition, the portions of the insulated conductors 27, which protrude laterally from the cover assembly 9, are cut. Since the height of the steps 11 on the second cover portion 2 and the cross-section of each insulated conductor retaining groove 17 are sized so as to accommodate several cables having different wire sizes, the insulated conductors 27 are securely retained between the first and second covers 1, 2.

Conventional insulation displacement connection to the insulated conductors is made by joining the connector body 3 to the cover assembly 9 with the ends of the insulation displacement contact elements 22 passing through the contact insertion holes 8 through the first cover portion 1 to make insulation displacement connection to the insulated conductors 27. In this condition, the resilient engaging legs 21 of the connector body 3 snap over and engage the first engaging projections 4 and the second engaging projections 18 of the cover assembly 9 in the slots 21a. Side walls 20 of the connector body 3 enclose the cover assembly 9 to eliminate the need for any closed end cover. In addition, the longitudinal rib 7 on the first cover portion is fitted into a central recess 23 in the connector body 3, so that any misalignment between the cover assembly 9 and the connector body 3 is eliminated during the step of insulation displacement.

Claims

1. A high density electrical connector having a connector body (3) containing a multiplicity of insulation displacement contact elements (22) and a cover portion (2) for retaining insulated electrical conductors, said cover portion having a longitudinal slit (13) extending throughout a majority of length of said cover portion, a multiplicity of contact element receiving recesses (16) on both sides of said longitudinal slit (13) for receiving the ends of said contact elements



(22) extending through contact insertion holes (8) and a multiplicity of transverse insulated electrical conductor receiving grooves (17), each groove (17) extending from said longitudinal slit (13) to the adjacent edge of said cover portion, with one groove passing across each of said contact element receiving recesses, characterised in that said cover portion (2) together with a further cover portion form a cover assembly;

said further cover portion (1) having said contact insertion holes (8) for receiving the conductor connecting ends of said insulation displacement contact elements (22) and said further cover portion (1) having a central longitudinal rib (7); and said connector body has a corresponding central recess (23) to receive said rib (7) when said body (3) and cover assembly (9) are assembled with the ends of the contact elements (22) extending through said contact insertion holes (8) in said further cover portion (1) and being connected to insulated electrical conductors (27) between said cover portions (1, 2) in said grooves (17).

2. The connector of claim 1 characterised in that said cover portion (2) has steps (11) formed at both longitudinal ends of a height to define a spacing between the major portions of said cover portion and said further cover portion to firmly retain insulated electrical conductors (27) between said cover portions in said insulated electrical conductor receiving grooves (17) in said cover portion.

3. The connector of claim 2 characterised in that said cover assembly has projections (4, 18) at its ends that mate with slots (21a) in resilient legs (21) at the ends of said connector body (3) to hold said body and said cover assembly (9) together with the ends of the contact elements (22) extending through said contact insertion holes (8) in said further cover portion (1) and being connected to insulated electrical conductors (27) between said cover portions (1, 2) in said grooves (17).

4. The connector of claim 1 characterised in that said cover assembly has projections (4, 18) at its ends that mate with slots (21a) in resilient legs (21) at the ends of said connector body (3) to hold said body and said cover assembly (9) together when they are assembled to connect said contact elements (22) to the insulated electrical wires (27).

Patentansprüche

1. Kompakt aufgebauter elektrischer Steckverbinder mit einem Steckverbinderkörper (3), der eine Mehrzahl von Schneidklemmkontakt-elementen (22) umfaßt, sowie einen Abdeckungs-
teil (2) zum Halten der isolierten elektrischen
Leiter, wobei der genannte Abdeckungsteil einen
Langschlitz (13) aufweist, der sich über
den größten Teil der Länge des genannten
Abdeckungsteils erstreckt, dadurch gekennzeichnet,
daß eine Mehrzahl von die Kontakt-
elemente aufnehmenden Einschnitten (16) an
beiden Seiten des genannten Langschlitzes
(13) vorhanden ist, um die Enden der genannten
Kontakt-elemente (22) aufzunehmen, die
sich durch die genannten Kontakteinführlöcher
(8) erstrecken und eine Mehrzahl von transversalen,
isolierten Aufnahme-nuten (17) für elektrische
Leiter, wobei sich jede Nut (17) von dem
genannten Langschlitz (13) zu der benachbarten
Kante des genannten Abdeckungsteils erstreckt,
wobei eine Nut jeweils über einen genannten
Einschnitt zur Aufnahme von Kontakt-
elementen verläuft, dadurch gekennzeichnet,
daß der genannte Abdeckungsteil (2) zusammen
mit einem weiteren Abdeckungsteil einen
Abdeckungszusammenbau bildet;

wobei der genannte weitere Abdeckungsteil (1) die genannten Kontakteinführlöcher (8) aufweist, um die leiterverbindenden Enden der genannten Schneidklemmkontakt-elemente (22) zu empfangen und wobei der genannte weitere Abdeckungsteil (1) einen zentralen Langsteg (7) aufweist; und dadurch gekennzeichnet, daß der genannte Steckverbinderkörper eine entsprechende zentrale Aussparung (23) aufweist, um den genannten Steg (7) zu empfangen, wenn der genannte Körper (3) und der genannte Abdeckungszusammenbau (9) zusammengesetzt werden, wobei sich die Enden der Kontakt-elemente (22) durch die genannten Kontakteinführlöcher (8) in dem genannten weiteren Abdeckungsteil (1) erstrecken und zwischen den genannten Abdeckungsteilen (1, 2) in den genannten Nuten (17) mit den isolierten elektrischen Leitern (27) verbunden werden.

2. Steckverbinder nach Anspruch 1, dadurch gekennzeichnet, daß der genannte Abdeckungsteil (2) die Stufen (11) aufweist, die an beiden Längsenden mit einer Höhe ausgebildet sind, um einen Zwischenraum zwischen den Hauptteilen des genannten Abdeckungsteils und des genannten weiteren Abdeckungsteils zu definieren, um die isolierten elektrischen Leiter (27) fest zwischen den genannten Abdek-



kungsteilen zu halten, und zwar in den genannten Nuten (17) zur Aufnahme der isolierten elektrischen Leiter in dem genannten Abdeckungsteil.

3. Steckverbinder nach Anspruch 2, dadurch gekennzeichnet, daß der genannte Abdeckungszusammenbau an dessen Ende die Vorsprünge (4, 18) aufweist, die mit Schlitz (21a) in elastischen Füßen (21) an den Enden des genannten Steckverbinderkörpers (3) zusammenpassen, um so den genannten Körper und den genannten Abdeckungszusammenbau (9) zusammenzuhalten, wobei sich die Enden der Kontaktelemente (22) durch die genannten Kontakteinführlöcher (8) in dem genannten weiteren Abdeckungsteil (1) erstrecken und mit den isolierten elektrischen Leitern (27) zwischen den genannten Abdeckungsteilen (1, 2) in den genannten Nuten (17) verbunden sind.

4. Steckverbinder nach Anspruch 1, dadurch gekennzeichnet, daß der genannte Abdeckungszusammenbau an dessen Enden die Vorsprünge (4, 18) aufweist, die mit Schlitz (21a) in elastischen Füßen (21) an den Enden des genannten Steckverbinderkörpers (3) zusammenpassen, um so den genannten Körper und den genannten Abdeckungszusammenbau (9) zusammenzuhalten, wenn diese zusammengesetzt werden, um die genannten Kontaktelemente (22) mit den isolierten elektrischen Drähten (27) zu verbinden.

Revendications

1. Connecteur électrique compact comportant un corps de connecteur (3) contenant une multiplicité d'éléments de contact par déplacement d'isolant (22) et une partie de couvercle (2) pour retenir des conducteurs électriquement isolés, ladite partie de couvercle comportant une fente longitudinale (13) s'étendant sur une majeure partie de la longueur de ladite partie de couvercle, une multiplicité d'évidements de réception d'élément de contact (16) ménagés sur les deux côtés de ladite fente longitudinale (13) pour recevoir les extrémités desdits éléments de contact (22) s'étendant au travers desdits trous d'insertion de contact (8) et une multiplicité de gorges de réception de conducteur électriquement isolé transversales (17), chaque gorge (17) s'étendant depuis ladite fente longitudinale (13) jusqu'aux bords adjacents de ladite partie de couvercle, une gorge traversant chacun desdits évidements de réception d'élément de contact, caractérisé en ce que ladite partie de couvercle (2) ensemble

avec une autre partie de couvercle forme un assemblage de couvercle ;

ladite autre partie de couvercle (1) comportant lesdits trous d'insertion de contact (8) pour recevoir les extrémités de connexion de conducteur desdits éléments de contact par déplacement d'isolant (22) et ladite autre partie de couvercle (1) comportant une nervure longitudinale centrale (7) ; et ledit corps de connecteur comportant un évidement central correspondant (23) pour recevoir ladite nervure (7) lorsque ledit corps (3) et ledit assemblage de couvercle (9) sont assemblés de sorte que les extrémités des éléments de contact (22) s'étendent au travers desdits trous d'insertion de contact (8) dans ladite autre partie de couvercle (1) et soient connectées à des conducteurs électriquement isolés (27) situés entre lesdites parties de couvercle (1, 2), dans lesdites gorges (17).

2. Connecteur électrique selon la revendication 1, caractérisé en ce que ladite partie de couvercle (2) comporte des marches (11) formées au niveau de deux extrémités longitudinales d'une hauteur afin de définir un espacement entre les parties principales de ladite partie de couvercle et ladite autre partie de couvercle pour retenir fermement des conducteurs électriquement isolés (27) entre lesdites parties de couvercle dans lesdites gorges de réception de conducteur électriquement isolé (17), dans ladite partie de couvercle.

3. Connecteur selon la revendication 2, caractérisé en ce que ledit assemblage de couvercle comporte des protubérances (4, 18) au niveau de ses extrémités qui sont reçues dans des fentes (21a), des jambages élastiques (21) situés au niveau des extrémités dudit corps de connecteur (3) afin de maintenir ledit corps et ledit assemblage de couvercle (9) ensemble, les extrémités des éléments de contact (22) s'étendant au travers desdits trous d'insertion de contact (8) dans ladite autre partie de couvercle (1) et étant connectées à des conducteurs électriquement isolés (27) situés entre lesdites parties de couvercle (1, 2), dans lesdites gorges (17).

4. Connecteur selon la revendication 1, caractérisé en ce que ledit assemblage de couvercle comporte des protubérances (4, 18) au niveau de ses extrémités qui sont reçues dans des fentes (21a) et des jambages élastiques (21) au niveau des extrémités dudit corps de connecteur (3) afin de maintenir ledit corps et ledit assemblage de couvercle (9) ensemble



lorsqu'ils sont assemblés afin de connecter lesdits éléments de contact (22) aux fils électriquement isolés (27).

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