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The invention relates to ducts for electrical power distribution.

It is well known to distribute electrical power in industrial plant using ducting built up from prefabricated modular elements, usually disposed end-to-end as required and feeding power consuming equipment from a distribution panel connected to a source of power such as the public utility supply network.

It is also entirely conventional to distribute relatively low power supplies (e.g. lighting) separately from the distribution of medium power, i.e. other items of electrical equipment having a fairly high power consumption, often involving high currents which can for example amount to something in the order of 100 amperes to 1 500 amperes.

This leads to two separate power distribution circuits coexisting on the same premises, using separate ducting that follows at least partly the same route, with consequent disadvantages in the areas of cost, space taken up and operation.

The invention therefore provides a modular element for electrical power distribution ducting comprising an elongate box-section structure inside which conducting electrical power distribution busbars are arranged to which lateral access can be gained through distribution openings in said box-section structure, at least some of said openings being protected by a closing-off protective device in the absence of a branch connection, the element being adapted to simplify and facilitate the installation and operation of the distribution circuits in a plant.

According to one feature of the invention, the box-section structure of a modular element includes two beam members each having two longitudinal grooves into which respective longitudinal edges of two preshaped strips having a U-shape cross-section engage elastically and thereby become fixedly retained in, the preshaped strips together with the beam members defining a longitudinal cavity in which medium power electrical power distribution busbars are housed.

The invention, its features and its advantages will now be described in detail with reference to the appended drawings described below.

Figure 1 is a partially exploded perspective view of part of a ducting system consisting of modular elements in accordance with the invention.

Figure 2 is a cross-section of a modular element of a duct according to the invention at a branch connection flap.

The part of the electrical power distribution ducting

system shown in figure 1 consists of two modular elements 1 adapted to be connected end-to-end.

Each modular element comprises an elongate box-section structure 2 in which medium power electrical distribution busbars 3 are arranged longitudinally, comprising three phase busbars and one neutral busbar, for example; a protective conductor is associated with these busbars and consists of a conductive beam of said box-section structure, for example the beam 8 or 9.

Access can be gained to the busbars 3 at their ends via at least one outer end of the box-section structure 2 which contains them and via lateral distribution openings 4 along the box-section structure 2 and alternating between two opposite sides of the box-section structure.

Connecting parts known in themselves (not shown) provide electrical continuity between corresponding busbars 3 of two modular elements 1 joined end-to-end.

In the embodiment shown these connecting parts are enclosed in a shroud consisting of two mating half-shells 5 which in this embodiment are identical and are fitted over the end portions of two box-sections 2 joined together end-to-end. They are offered up from opposite sides of the resulting assembly to constitute a protective sleeve.

One shroud provides a support for the electrical connecting parts mentioned above, for example.

The busbars 3 are conventionally held in place in their box-section structure by mounting blocks 6 which are of the insulative comb type, for example. In this embodiment a mounting block of this kind is common to the various busbars 3 and is of one-piece construction, for example (see figure 2).

In accordance with the invention, the box-section structure of a modular element is formed from preshaped sheet metal strips 7 which are fastened longitudinally onto stiffener beams 8 and 9.

In the embodiment shown, a modular element comprises two identical channel-section preshaped strips 7 defining a housing for conductive busbars 3 when they are joined together in an appropriate manner with their longitudinal sides in contact.

In the example shown, each preshaped strip 7 has a long flat middle region flanked by two regions which are curved symmetrically about a longitudinal plane of symmetry of the strip in order to provide the strip with a predetermined degree of transverse elasticity.

In a manner that is known in itself in this art, the required elasticity can instead be obtained from a roughly equivalent symmetrical structure which uses complementary and

approximately equivalent inclined flat faces or by using a strip which has only one curved region or one inclined flat face along one side only of the flat longitudinal region, the other side of which can then be fitted onto one of the beams 8 and 9.

In the embodiment shown, the lateral distribution openings 4 are in the central flat region of the strips and are rectangular in shape, for example.

Each of the beams 8 and 9 has a longitudinal groove 10 on each of two opposite sides shaped to receive and to retain a longitudinal edge of the preshaped strip 7 inserted into it during assembly of the box-section structure 2 of which it forms part.

Each longitudinal edge of the pre-shaped strip is bent or rolled to shape in such a way that it fits resiliently into the longitudinal retaining groove in which it is inserted, the latter having a complementary shape in order to retain it, these techniques being well known in this art and therefore not described here.

In a preferred embodiment, the beam 8 is adapted to serve as a mounting member for the box-section structure of the modular element 1 which carries it and is preferably a symmetrical part comprising a T-section longitudinal channel 11 flanked on both sides by the longitudinal grooves 10 for retaining the preshaped strip 7.

A central longitudinal slot 11A providing access to the longitudinal channel 11 of the beam 8 is open at the top of the box-section structure, between the curved parts of the two preshaped strips 7 each fixed to one side of the beam. This slot enables the modular element to be engaged on a support member, for example a suspension hook (not shown) which is itself T-shaped, for example, and engages in the longitudinal channel 11, its shape being complementary to that of this channel.

The beam 8 is an elongate pre-shaped aluminium member, for example, and can therefore be used as an earth conductor.

The beam 9 is preferably also a pre-shaped aluminium member, including longitudinal grooves 10 for fixing the preshaped strip at both sides.

The beam 9 has a central longitudinal cavity 12 which has an open slot 12A and is oriented in a direction parallel to that of the grooves 10. It is open at the bottom of the box-section structure between the curved parts of the two preshaped strips 7, i.e. the edge of the latter opposite the longitudinal channel 11 in the beam 8.

The longitudinal cavity 12 is fitted out internally with longitudinal conductive busbars 13 of a type designed for

relatively low-power electrical distribution systems (e.g. lighting systems), carrying currents in the order of 20 amperes to 40 amperes, for example. Alternatively, it is of the type used for remote control (e.g. tripping or resetting) of electrical equipment or for monitoring electrical receivers.

In a conventional arrangement in the field of lighting ducts, the busbars 13 are fixed internally of the cavity by gripping them in fastening members 14 made from an insulative material.

In this well-known design, the fastening members leave most of the conductive busbars 13 bare so that a connection can be made to them at virtually any point along the modular element.

Such connections are made by dedicated plugs 15 (figure 1), known in themselves, which are inserted into the cavity 12 through the slot 12A so that contact members (not shown because they are entirely conventional in this art) bear against the conductive busbars 13.

This enables electrical equipment such as a lighting unit 20 to be connected to a medium-power distribution circuit at various levels, some of the equipment items being fixable directly onto the modular element from which they are powered.

This also enables an item of electrical equipment 21 to be remote controlled via an electrical unit (not shown) housed in a distribution box 26 and connected to the busbars by a plug 15.

For example, as mentioned above, a modular element 1 may include one or more lateral distribution openings 4 each closed by a closure device including a movable shutter arrangement which has to be moved out of its normal position to make a branch connection.

Each device includes in the usual way a closure flap 16 which is fixed and has parallel slots and an insulative material internal shutter 17 with parallel slots in corresponding relationship to the slots in the flap, along which the shutter slides.

The shutter is spring-loaded by a spring 18 so that when no branch connection is made the slots in the shutter 17 are not aligned with those in the flap 16, with the result that the flap and shutter combination isolates the medium power distribution conductive busbars 3 from any contact with the outside via the lateral distribution opening 4 comprising the flap and shutter combination in question.

On the other hand, aligning the slots in the shutter 17 and the flap 16 allows flat parallel contacts carried by a suitable plug (known in itself) to be inserted into the

longitudinal cavity 12 through the slots and engaged against the corresponding conductive busbars 3 and the protection beam 8.

In a preferred embodiment of the modular element the beam 9 of a box-section structure is spring-loaded towards the beam 8 of the box-section structure by the preshaped strips 7 by virtue of the elasticity of the sheet metal from which they are made and their respective curvature.

In this embodiment, the fixing blocks 6 for the conductive busbars 3 housed in a box-section structure are held against the beam 8 by the beam 9 due to the spring force of the preshaped strips 7 which are mechanically stressed by a system of wedge-shaped packing members.

To this end, an entry hole for a mechanical stressing packing member 19 is provided at each of the lateral distribution openings 4, through the flap 16 closing off the opening.

In this embodiment each entry hole for a wedge-shape packing member is in the region between the beam 9 and an adjacent part of a block 6 for fixing the busbars, to enable the beam concerned to be spaced from the fixing block by forcing a suitably sized packing member 19 between them, the result of which is application of the required transverse stressing to the preshaped strips 7 of the box-section structure concerned, combined with simultaneous forcible immobilisation of the beams 8 and 9 with respect to each other.

The outer portion of a wedge-shaped packing member 19 is preferably adapted to act as a polariser for a distribution box at the distribution opening.

This prevents distribution boxes other than those designed to be connected to the ducting in question from being fitted when the ducting carries one or more dedicated lines, for example lines supplying specific voltages or connected to specific items of equipment in an installation.

A polariser system of the male-female type, for example, allows a compatible box to be connected and prevents connection of an incompatible box.



CLAIMS

1. A modular element for electrical power distribution ducting comprising an elongate box-section structure inside which conductive electrical power distribution busbars (3) are longitudinally disposed to which lateral access can be gained through distribution openings (4) in the box-section structure, at least some of the openings being protected by a closing-off device in the absence of a connection thereto, characterised in that the box-section structure comprises two beams (8, 9) each having two longitudinal grooves (10) into which respective longitudinal edges (7B) of two channel-section preshaped strips (7) engage elastically and thereby become fixedly retained, said pre-shaped strips and the beams defining between them a longitudinal cavity in which medium power electrical distribution busbars (3) are housed, at least one of the beams forming a protection conductor.

2. A modular element for electrical power distribution ducting according to claim 1 characterised in that each of the two preshaped strips (7) of a box-section identically includes a first long flat central region flanked by two second regions (7A) symmetrically curved with respect to a longitudinal plane of symmetry of the strip in order to impart a predetermined transverse elasticity thereto and which each have a shaped edge (7B) enabling the strip to be fixed into a complementary groove (10) on the beam.

3. A modular element for electrical power distribution ducting according to claim 1 or claim 2 in which the medium power electrical power distribution busbars (3) are immobilised by at least one fixing block (6), characterised in that it includes at least one wedge-shape packing member (19) forced between a beam (9) and one end portion of a fixing block fixed to the other beam (8) by its other end portion.

4. A modular element for electrical power distribution ducting according to claim 1 characterised in that one beam (9) of its two beams includes a longitudinal cavity (12) forming a lighting and/or remote control distribution duct fitted out internally with bare conductive busbars that are accessible for electrical branch connections via an externally open longitudinal slot (12A) extending along the beam concerned, on one outer surface of the box-section structure, between the preshaped strips (7).

5. A modular element for electrical power distribution ducting according to claim 1 or claim 2 characterised in that one beam (8) of its two beams includes a T-section longitudinal mounting channel (11) having an external opening on the box-section between the preshaped strips (7) and which is bordered on both sides by the two longitudinal grooves (10)



for fixing the preshaped strips.

6. A modular element for electrical power distribution ducting according to claim 3 characterised in that it includes openings for the insertion of wedge-shaped packing members between one beam (9) and at least some of the fixing blocks (6) for the conductive busbars (3), each opening being at one of the lateral distribution openings (4) provided in a flat median region of the preshaped strip (7).

7. A modular element for electrical power distribution ducting according to claim 6 characterised in that said opening at a lateral distribution opening (4) for inserting wedge-shape packing members (19) is formed in a flap (16) for closing said opening.

8. A modular element for electrical power distribution ducting according to claim 6 characterised in that it includes at least one wedge-shape packing member (19) which is additionally adapted to serve as a polariser for a branch connection box (26) at a lateral distribution opening (4).