

Description

Encapsulated, gas-insulated high-voltage system with compartmented connecting module

5

The invention is in the field of power distribution and is to be applied in the configuration of encapsulated, gas-insulated high-voltage systems which have an inner conductor and an outer conductor arranged concentrically therewith, and in which a connecting module is arranged between two encapsulated gas spaces and essentially comprises an encapsulating housing and an inner conductor connection which extends axially, has several parts and can be disconnected, as well as two conical compartment insulators arranged at the flange-shaped ends of the encapsulating housing.

In encapsulated, gas-insulated high-voltage switching systems, it is normal to arrange a connecting module in the form of a disconnecter between two gas spaces of the system, for example between the cable entry and the circuit-breaker or between the circuit-breaker and an adjacent busbar. The said connecting module contains an axially extending, disconnectable inner conductor connection in an encapsulating housing and is provided at the ends of the encapsulating housing with two compartment isolators which are of conical construction and into which adjacent gas spaces project in each case. The multi-part inner conductor connection in this case comprises a stationary switching contact which is axially and radially fixed in the one compartment insulator and has an associated screen electrode, also comprises an axially movable switching pin and a switching pin guide which is axially and radially fixed on the other compartment insulator and has an associated screen electrode. The drive for the switching pin is radially flange-mounted on the circumference of the encapsulating housing. For earthing purposes, a further closable opening may be

35

provided opposite (Brown, Boveri Mitt. 4-75, page 140, Figure 3).

In the case of gas-insulated power transmission systems having tubular inner conductors and tubular
5 outer conductors, use is likewise made of compartment insulators in order to separate the gas spaces of the individual sections of the system from one another. For this purpose, the compartment insulators are normally clamped in tightly between two connecting flanges in
10 the region of the outer conductor, while in the region of the inner conductor a tight seat on the inner conductor or, likewise, a sealing clamping between two inner conductor parts is considered (US-A 3,331,911; US-A 4,053,700). It is further known to provide, in the
15 region of a compartment insulator, an inner conductor connection which can be disconnected in the mounted state of the system, in which two longitudinal sections of the inner conductor engage over one another like a claw and are axially locked by pins engaging through
20 the claws at right angles to the conductor axis. In the region of this conductor connection, use is made of a specific housing part whose one connecting flange is inclined with respect to the axis of the system. It is also possible for two such housing parts to be arranged
25 one behind the other, so that the connecting flanges of the two adjoining system sections in each case run at right angles to the tube axis (US-A 4,323,720).

Proceeding from a high-voltage system having the features of the precharacterizing clause of Patent
30 Claim 1, the invention is based on the object of configuring the connecting module in such a way that, using it, two sections of a gas-insulated power transmission system, in which a tubular inner conductor is supported with respect to a tubular outer conductor
35 by means of insulating spacers, can be separated off from one another, and a test access to the inner conductors of the adjacent gas spaces is made possible.

In order to achieve this object, provision is made according to the invention that the inner

conductor connection comprises four conductor portions of tubular construction, of which the first and the second and the second and the third conductor portion are in each case detachably connected to one another in a claw shape, for which purpose the encapsulating housing is provided with a closable mounting opening, and of which conductor portions the third is connected by plugging in to the fourth, axially fixed conductor portion; in this case it is intended that the first and the fourth conductor section be axially fixed by in each case using a further conductor portion arranged on the other side of the respective compartment insulator. Furthermore, it is essential for the invention that the encapsulating housing is provided, in the region of the first and/or of the fourth conductor portion, with further closable openings.

In the case of such a configuration of the connecting module and an arrangement of the connecting module between two sections of a gas-insulated power transmission system, the inner conductor of the system can be disconnected in a simple manner by taking out the second conductor portion of the multi-part inner conductor connection, so that the system sections located on both sides of the connector module are accessible, independently of each other, for test purposes. For this purpose, special contact pieces can be placed onto the first and the third conductor portion, and are then alternately accessible by means of a test connection placed onto the mounting opening. The connector module can be ventilated and refilled with gas once more via the further closable openings in the encapsulating housing of the connector module, and earthing of the inner conductor can also be undertaken via such openings.

The new connector module can also be used for the connection of further system parts to the power transmission system, for example for the connection of a branch or of an overvoltage suppressor, if the second conductor portion of the four-part inner conductor

connection is of T-shaped construction and the encapsulating housing is provided with a flange-like connection stub concentric with the branching part of the second conductor portion, this connection stub
5 likewise being assigned a compartment insulator in which the branching conductor part of the second conductor portion is axially guided and radially fixed.

In order to connect the connector module to the two adjacent gas spaces of the power transmission
10 system in an easy-to-mount way, it is also advantageous if the encapsulations of the adjacent gas spaces in each case comprise a tubular outer conductor which, at its end assigned to the connecting module, is provided with a tube-like cast housing part, this housing part
15 being provided with a connection flange to connect it to the encapsulating housing of the connecting module, with a mounting opening arranged like a flange on the circumference and with at least one further closable opening arranged on the circumference. In this case,
20 the further openings serve in particular as a gas connection and as entry points for the insertion of sensors into the gas space.

An exemplary embodiment of a high-voltage system which is constructed according to the invention
25 and configured as a power transmission system, as well as supplementary configurations of the connecting module used in this case, are illustrated in Figures 1 to 5. In the figures:

Figure 1 shows a power transmission system having a
30 tubular inner conductor and a tubular outer conductor in the region of a connecting module,

Figure 2 shows the connecting module on its own,

Figure 3 shows the connecting module in a design
35 reconfigured for test purposes,

Figure 4 shows the transition from the connecting module to an adjacent gas space and

Figure 5 shows the configuration of the connecting module for the connection of a further system

part in the form of an overvoltage suppressor.

Figure 1 shows the connecting module 1, which is arranged in the course of a gas-insulated tubular conductor system having the tubular inner conductor 20 and the tubular outer conductor 30. As can also be seen from Figure 2, the connecting module essentially comprises an encapsulating housing 2 and a multi-part, disconnectable inner conductor connection 11, the encapsulating housing 2 having connecting flanges 3 and 4 at the ends, a flange-like mounting opening 5 and an additional mounting opening 6. Arranged in the region of the connecting flanges 3 and 4 are disc-shaped compartment insulators 7 and 8, which are of conical or bowl-like construction and project into the adjacent gas spaces 18 and 19 of the gas-insulated tubular conductor system.

The tubular inner conductor 20 of the tubular conductor system is arranged in the tubular outer conductor 30 with the aid of insulating supports 21 arranged at intervals. The tubular inner conductor 20 ends in a plug connection 22, whose plug-in contact 23 is connected to the inner conductor connection 11 of the connecting module 1. Arranged on the other side of the connecting module is an end portion 24 of the tubular inner conductor which continues at that point and which is connected through the compartment insulator 8 to a conductor portion of the inner conductor connection 11. In the region of the two compartment insulators 7 and 8, the inner conductor connections in each case form a conductor fixed point, as is described in the German Utility Model application 296 (Siemens file reference 96 G 4113) filed on the same date.

According to Figure 2, the inner conductor connection 11 of the connecting module 1 comprises four conductor portions of tubular construction, of which the first conductor portion 12 is axially and radially fixed in the compartment insulator 7, and of which the

fourth conductor portion 15, which is constructed as a tubular plug-in contact, is radially and axially fixed on the compartment insulator 8. The third conductor portion 14, which is likewise of tubular construction and provided with a control electrode constructed as a socket-like contact piece 16, is seated on the fourth conductor portion 15. The contact piece 16 makes contact with the conductor portion 15 via annular lamellar contacts.

The conductor portions 12 and 14 are in each case provided, towards the centre of the connecting module 1, with a claw 16, into which corresponding claws 16a of the second tubular conductor portion 13 engage. In the region of these claws, the conductor portion 13 can be firmly connected to the two conductor portions 12 and 14, so as to yield the same diameter, by means of a screw connection 17.

The encapsulating housing 2 is further provided with additional, smaller mounting openings 9 and closable holes 10, the holes 10 serving, for example, for ventilating the inner space or for filling with insulating gas, as well as for connecting to the adjacent gas spaces of the tubular conductor system.

The second conductor portion 13 can be detached and removed through the mounting opening 5 of the connecting module 1. For test purposes, a contact piece 18 or 19 having a spherical electrode can be placed onto the first conductor portion 12 and onto the third conductor portion 14, according to Figure 3. With the aid of a rotatable contact piece 42, a test or measuring voltage can then be led to these contact pieces, a compartment insulator 40 having a conductor leadthrough 41 having to be placed into the mounting opening 5 and also being capable of being designed to be gas-tight by means of appropriate connecting flanges, etc.

According to Figure 4, the external conductor 30 adjoining the connecting module is connected at the end of the conductor pipe 31 to a cast housing part 32,

which has a tubular connection flange 35. This connection flange serves for the fixing of the compartment insulator 7 and - on the other side of the connecting module 1 - for the axial fixing of the compartment insulator 8. The connection flange 35 is provided with a closable opening 33, for example for the supply of insulating gas, and with a mounting opening 34 which serves, for example, for the introduction of sensors into the gas space 18.

10 According to Figure 5, an overvoltage suppressor 47 is flange-mounted onto the connecting module 1 with the interposition of the compartment insulator 45, and, via a conductor connection 6, is connected through the connection stub 48 to the
15 conductor portion 43 of the inner conductor connection of the connecting module. The second conductor portion 43 of the inner conductor connection is in this case of T-shaped configuration, the branching tube portion 44 being connected to the conductor connection 46 in a
20 firm or plug-in manner.



Patent Claims

1. Encapsulated, gas-insulated high-voltage system having inner and outer conductors and having a connecting module arranged between two encapsulated gas spaces of the high-voltage system, which essentially comprises an encapsulating housing and an inner conductor connection which extends axially, has several parts and can be disconnected, as well as two conical compartment insulators arranged at the flange-shaped ends of the encapsulating housing, a first part of the inner conductor connection being axially and radially fixed on the one compartment insulator and another part of the inner conductor connection being axially and radially fixed on the other compartment insulator and the compartment insulators being axially fixed by means of a flanged connection, characterized in that the connecting module (1) is arranged between two sections of a gas-insulated power transmission system, in which a tubular inner conductor (20) is supported with respect to a tubular outer conductor (30) by means of insulating spacers (21), in that the inner conductor connection (11) comprises four conductor portions (12, 13, 14, 15) of tubular construction, of which the first (12) and the second (13), and the second (13) and the third (14) conductor portion are in each case detachably connected to one another in a claw shape, for which purpose the encapsulating housing (2) is provided with a closable mounting opening (5), and of which conductor portions the third (14) is connected by plugging in to the fourth (15), axially fixed conductor portion, the first (12) and the fourth (15) conductor portion being axially fixed by in each case using a further conductor portion (23, 24) arranged on the other side of the compartment insulator (7, 8), and in that the encapsulating housing (2) is provided, in the region of the first and/or of the fourth



conductor portion (12, 15), with further closable openings (9, 10).

2. Encapsulated high-voltage system according to Claim 1, characterized in that

5 the second conductor portion (43) of the four-part inner conductor connection is of T-shaped construction, and in that the encapsulating housing (2) is provided with a flange-like connection stub (48) concentric with the branching part (44) of the second conductor portion
10 (43), this connection stub likewise being assigned a compartment insulator (45) in which the branching conductor part (44) of the second conductor portion (43) is axially guided and radially fixed.

3. High-voltage system according to Claim 1 or 2,
15 characterized in that the encapsulations of the adjacent gas spaces (18, 19) in each case comprise a tubular outer conductor (31) which, at its end assigned to the connecting module (1), is provided with a tube-like, cast housing part (32), this housing part being
20 provided with a connection flange (35) to connect it to the encapsulating housing (2) of the connecting module, with a mounting opening (34) arranged like a flange on the circumference and with at least one further closable opening (33) that is likewise arranged on the
25 circumference.