

N827

The invention relates to a circuit arrangement for generating phase-displaced, sinusoidal voltages by means of a resistance converter for converting direct current into multi-phase alternating current, wherein the resistance converter comprises a number of resistors connected in series to form a closed circuit, and the sinusoidal voltages can be tapped at connecting points of the interconnected resistors.

An arrangement of this type is described e.g. in DE-C-800 308, in which a DC voltage is supplied through brushes and slip rings. An AC voltage is tapped through brushes, by means of a collector, the bars of which are bridged by resistors interconnected to form a chain. This entails a large mechanical outlay, as at least four brushes, a pair of slip rings and a collector are required. There is also the disadvantage that known brush sparking may be caused by contact resistors as a result of dirty conditions.

The invention described in this application, on the other hand, is an electronic arrangement which does not have this disadvantage, since the cyclic switching over of the DC voltage source takes place almost without power, through electronic switching steps.

The problem underlying the invention is to avoid these disadvantages. It is solved by the measure recited in the main claim. Other advantageous embodiments of the invention are described in the sub-claims.

Phase-displaced, sinusoidal voltages are necessary e.g. when starting multiple-lead motors, where the individual leads have to be supplied with as far as possible the same type of voltages with minimum differences in waveform.

An example of the invention in its application to a multiple-lead motor will be explained below with reference to the accompanying drawings, in which:

Fig. 1 shows the circuit principle on which the invention is based,

Fig. 2 shows the starting voltages arising from Fig. 1,

Fig. 3 is a detailed example of the invention,

Fig. 4 is a pulse diagram, and

Fig. 5 is a fragment of the circuit arrangement in Fig. 3.

Fig. 1 shows the principle on which the example of the circuit described later operates. Here six resistors R1 - R6 are arranged in a circle and linked by the connection points P1 - P6. The leads S1, S2 and S3 of an e.g. three-lead motor are linked symmetrically, e.g. in a star connection, with the resistance network 7, comprising the resistors R1 - R6, by the connection points P1, P3 and P5. Alternatively the connection points could be P2, P4 and P6. The only essential feature is that there should always be the same number of resistors of equal value between the connections to the motor leads. The motor leads are started with voltages which can be varied step by step, through a control

circuit applying a DC voltage source U to two diametrically opposed points of the resistance network 7 at a time in a cyclic transfer, e.g. between the connection points P_1, P_4 ; P_2, P_5 ; P_3, P_6 ; P_1, P_4 , etc. It will be appreciated that the graduation of the starting of the motor leads S_1, S_2 and S_3 will be more precise, the more resistors the network 7 has. It should be noted that the number of resistors is an even number, and that the quotient of the number of resistors and the number of motor leads or of connection points is an integer.

The voltage shape shown in Fig. 2 appears at the motor leads $S_1 - S_3$.

A detailed example of the invention is given in Fig. 3.

A generator 2 arranged on the shaft 1 of the multiple-lead motor, e.g. a tachogenerator, forms pulses over the sensor 3, which are transmitted to the clock input Cl of a cyclic shift register 4. The register 4 supplies pulses in cyclic sequence at its outputs $A_0 - A_5$, as illustrated in Fig. 4. These pulses successively control switching steps 51 - 56, which connect the voltage source 6 with voltage U to the connection points P_1, P_4 ; P_2, P_5 ; P_3, P_6 ; P_1, P_4 etc of the resistance network 7. Corresponding control voltages shown in Fig. 2 reach the current amplifiers V_1, V_2 and V_3 for starting the leads S_1, S_2 and S_3 .

Switching steps 51 - 56 may have a structure as shown in Fig. 5. The pulse received from the cyclic shift register 4 switches the transistor T_2 through by way of a switching transistor T_1 , whereby e.g. the connection point P_4 is linked with one pole of the voltage source 6, and the other pole of the source 6 is applied to the connection point P_1 of the resistance network 7, as a result of the switching through of the transistor T_1 and the consequent switching through of the transistor T_3 . The same applies to the other connection points in relation to their associated switching steps.



CLAIMS

1. A circuit arrangement for generating phase-displaced, sinusoidal voltages by means of a resistance converter for converting direct current into multi-phase alternating current, wherein the resistance converter comprises a number of resistors connected in series to form a closed circuit, and the sinusoidal voltages can be tapped at connecting points of the interconnected resistors, characterised in that an equal number of resistors is located between the connection points (P), that a system (4, 51, 52, 53, 54, 55, 56) is provided to connect a DC voltage (U) in cyclic sequence to the resistance network (7) comprising N(R) resistors, and that two parallel branches with an equal number $(N(R)/2)$ of resistors are located between the poles of the DC voltage U.
2. An arrangement according to claim 1, characterised in that the resistors (R) of the resistance network (7) have equal values.
3. An arrangement according to claim 1 or 2, characterised in that the number N(R) of resistors (R) in the resistance network (7) is an even number, and that the quotient of the number N(R) of resistors (R) and the number N(P) of connection points (P) is an integer.
4. An arrangement according to claim 1, 2 or 3, characterised in that said system has a cyclic shift register (4), which is clocked by the pulses of a generator and which has a number of outputs (A) equal to the number N(R) of resistors (R) in the resistance network (7), and that the outputs (A) are connected to switching steps (50), which switch the DC voltage (U) to the resistance network (7) in cyclic sequence, controlled by the outputs (A) of the register (4), in such a way that two parallel branches of the resistance network (7) with an equal number of resistors are located between the poles of the DC voltage source (U).