

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H02 GENERATION; CONVERSION OR DISTRIBUTION OF ELECTRIC POWER

## H02K DYNAMO-ELECTRIC MACHINES (dynamo-electric relays [H01H 53/00](#); conversion of DC or AC input power into surge output power {[H03K 3/53](#)})

### NOTES

1. This subclass covers the structural adaptation of dynamo-electric machines for the purpose of their control.
2. This subclass does not cover starting, regulating, electronically commutating, braking, or otherwise controlling motors, generators or dynamo-electric converters, in general, which is covered by subclass [H02P](#).
3. Attention is drawn to the Notes following the titles of class [B81](#) and subclass [B81B](#) relating to "microstructural devices" and "microstructural systems".
4. Group [H02K 16/00](#) takes precedence over groups [H02K 17/00](#) - [H02K 53/00](#).  
{This Note corresponds to IPC Note (1) relating to [H02K 17/00](#) - [H02K 53/00](#).}
5. {In this subclass, it is desirable to add the indexing codes of [H02K 2201/00](#)-[H02K 2213/12](#).}

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<b>1/00</b>	<b>Details of the magnetic circuit</b> (magnetic circuits for relays <a href="#">H01H 50/16</a> )	1/223	. . . {Rotor cores with windings and permanent magnets (for additional excitation in synchronous motors or generators <a href="#">H02K 21/042</a> ; in synchronous motors having additional short-circuited winding for starting as an asynchronous motor <a href="#">H02K 21/46</a> )}
1/02	. characterised by the magnetic material		
1/04	. characterised by the material used for insulating the magnetic circuit or parts thereof		
1/06	. characterised by the shape, form or construction		
1/08	. . Salient poles	1/24	. . . Rotor cores with salient poles {; Variable reluctance rotors}
1/10	. . . Commutating poles		
1/12	. . Stationary parts of the magnetic circuit	1/243	. . . . {of the claw-pole type}
1/14	. . . Stator cores with salient poles	1/246	. . . . {Variable reluctance rotors}
1/141	. . . . {consisting of C-shaped cores}	1/26	. . . Rotor cores with slots for windings
1/143	. . . . . {of the horse-shoe type}	1/265	. . . . {Shape, form or location of the slots}
1/145	. . . . . {having an annular coil, e.g. of the claw-pole type}	1/27	. . . Rotor cores with permanent magnets
1/146	. . . . {consisting of a generally annular yoke with salient poles}	1/2706	. . . . Inner rotors
1/148	. . . . . {Sectional cores ( <a href="#">H02K 1/141</a> takes precedence)}	1/2713	. . . . . the magnetisation axis of the magnets being axial, e.g. claw-pole type
1/16	. . . Stator cores with slots for windings	1/272	. . . . . the magnetisation axis of the magnets being perpendicular to the rotor axis
1/165	. . . . {Shape, form or location of the slots}	1/2726	. . . . . the rotor consisting of a single magnet or two or more axially juxtaposed single magnets
1/17	. . . Stator cores with permanent magnets		
1/18	. . . Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures	1/2733	. . . . . Annular magnets
1/182	. . . . {to stators axially facing the rotor, i.e. with axial or conical air gap}	1/274	. . . . . the rotor consisting of two or more circumferentially positioned magnets
1/185	. . . . {to outer stators}	1/2746	. . . . . the rotor consisting of magnets arranged with the same polarity, e.g. consequent pole type
1/187	. . . . {to inner stators}		
1/20	. . . with channels or ducts for flow of cooling medium	1/2753	. . . . . the rotor consisting of magnets or groups of magnets arranged with alternating polarity
1/22	. . Rotating parts of the magnetic circuit	1/276	. . . . . Magnets embedded in the magnetic core, e.g. interior permanent magnets [IPM]
		1/2766	. . . . . {having a flux concentration effect}

1/2773 . . . . . {consisting of tangentially magnetized radial magnets}

1/278 . . . . . Surface mounted magnets; Inset magnets

#### **WARNING**

Group [H02K 1/278](#) is impacted by reclassification into groups [H02K 1/2781](#) and [H02K 1/2783](#).

Groups [H02K 1/278](#), [H02K 1/2781](#) and [H02K 1/2783](#) should be considered in order to perform a complete search.

1/2781 . . . . . Magnets shaped to vary the mechanical air gap between the magnets and the stator

#### **WARNING**

Group [H02K 1/2781](#) is incomplete pending reclassification of documents from group [H02K 1/278](#).

Groups [H02K 1/278](#) and [H02K 1/2781](#) should be considered in order to perform a complete search.

1/2783 . . . . . with magnets arranged in Halbach arrays

#### **WARNING**

Group [H02K 1/2783](#) is incomplete pending reclassification of documents from group [H02K 1/278](#).

Groups [H02K 1/278](#) and [H02K 1/2783](#) should be considered in order to perform a complete search.

1/2786 . . . . . Outer rotors

#### **WARNING**

Group [H02K 1/2786](#) is impacted by reclassification into groups [H02K 1/2787](#), [H02K 1/2788](#), [H02K 1/2789](#), [H02K 1/279](#), [H02K 1/2791](#), [H02K 1/27915](#) and [H02K 1/2792](#).

All groups listed in this Warning should be considered in order to perform a complete search.

1/2787 . . . . . the magnetisation axis of the magnets being perpendicular to the rotor axis

#### **WARNING**

Groups [H02K 1/2787](#), [H02K 1/2788](#), [H02K 1/2789](#), [H02K 1/279](#), [H02K 1/2791](#), [H02K 1/27915](#) and [H02K 1/2792](#) are incomplete pending reclassification of documents from group [H02K 1/2786](#).

All groups listed in this Warning should be considered in order to perform a complete search.

1/2788 . . . . . the rotor consisting of a single magnet or two or more axially juxtaposed single magnets

1/2789 . . . . . the rotor consisting of two or more circumferentially positioned magnets

1/279 . . . . . Magnets embedded in the magnetic core

1/2791 . . . . . Surface mounted magnets; Inset magnets

1/27915 . . . . . Magnets shaped to vary the mechanical air gap between the magnets and the stator

1/2792 . . . . . with magnets arranged in Halbach arrays

1/2793 . . . . . Rotors axially facing stators

#### **WARNING**

Group [H02K 1/2793](#) is impacted by reclassification into groups [H02K 1/2795](#), [H02K 1/2796](#) and [H02K 1/2798](#).

All groups listed in this Warning should be considered in order to perform a complete search.

1/2795 . . . . . the rotor consisting of two or more circumferentially positioned magnets

#### **WARNING**

Groups [H02K 1/2795](#), [H02K 1/2796](#) and [H02K 1/2798](#) are incomplete pending reclassification of documents from group [H02K 1/2793](#).

All groups listed in this Warning should be considered in order to perform a complete search.

1/2796 . . . . . where both axial sides of the rotor face a stator

1/2798 . . . . . where both axial sides of the stator face a rotor

1/28 . . . Means for mounting or fastening rotating magnetic parts on to, or to, the rotor structures

1/30 . . . . . using intermediate parts, e.g. spiders

1/32 . . . with channels or ducts for flow of cooling medium

1/325 . . . . . {between salient poles}

1/34 . . . Reciprocating, oscillating or vibrating parts of the magnetic circuit

### **3/00 Details of windings**

3/02 . Windings characterised by the conductor material

3/04 . Windings characterised by the conductor shape, form or construction, e.g. with bar conductors

3/12 . . arranged in slots

3/14 . . . with transposed conductors, e.g. twisted conductors

3/16 . . . for auxiliary purposes, e.g. damping or commutating

3/18 . . Windings for salient poles

3/20 . . . for auxiliary purposes, e.g. damping or commutating

3/22 . . consisting of hollow conductors

3/24 . . with channels or ducts for cooling medium between the conductors

3/26 . . consisting of printed conductors

- 3/28 . . Layout of windings or of connections between windings ([windings for pole-changing H02K 17/06, H02K 17/14, H02K 19/12, H02K 19/32](#))
- 3/30 . Windings characterised by the insulating material
- 3/32 . Windings characterised by the shape, form or construction of the insulation
- 3/325 . . {for windings on salient poles, such as claw-shaped poles}
- 3/34 . . between conductors or between conductor and core, e.g. slot insulation
- 3/345 . . . {between conductor and core, e.g. slot insulation}
- 3/38 . . around winding heads, equalising connectors, or connections thereto
- 3/40 . . for high voltage, e.g. affording protection against corona discharges
- 3/42 . Means for preventing or reducing eddy-current losses in the winding heads, e.g. by shielding
- 3/44 . Protection against moisture or chemical attack; Windings specially adapted for operation in liquid or gas
- 3/46 . Fastening of windings on the stator or rotor structure
- 3/47 . . Air-gap windings, i.e. iron-free windings
- 3/48 . . in slots
- 3/487 . . . Slot-closing devices
- 3/493 . . . . magnetic
- 3/50 . . Fastening of winding heads, equalising connectors, or connections thereto
- 3/505 . . . {for large machine windings, e.g. bar windings ([H02K 3/51 takes precedence](#))}
- 3/51 . . . applicable to rotors only
- 3/52 . . Fastening salient pole windings or connections thereto
- 3/521 . . . {applicable to stators only}
- 3/522 . . . . {for generally annular cores with salient poles}
- 3/524 . . . . {for U-shaped, E-shaped or similarly shaped cores}
- 3/525 . . . . {Annular coils, e.g. for cores of the claw-pole type}
- 3/527 . . . {applicable to rotors only}
- 3/528 . . . . {of the claw-pole type}
- 5/00 Casings; Enclosures; Supports**
- 5/02 . Casings or enclosures characterised by the material thereof
- 5/04 . Casings or enclosures characterised by the shape, form or construction thereof
- 5/06 . . Cast metal casings
- 5/08 . . Insulating casings
- 5/10 . . with arrangements for protection from ingress, e.g. water or fingers
- 5/12 . . specially adapted for operating in liquid or gas ([combined with cooling arrangements H02K 9/00](#))
- 5/124 . . . Sealing of shafts
- 5/128 . . . using air-gap sleeves or air-gap discs
- 5/1282 . . . . {the partition wall in the air-gap being non cylindrical}
- 5/1285 . . . . {of the submersible type}
- 5/132 . . . Submersible electric motors ([H02K 5/128 takes precedence](#))
- 5/136 . . . explosion-proof
- 5/14 . . Means for supporting or protecting brushes or brush holders
- 5/141 . . . {for cooperation with slip-rings}
- 5/143 . . . {for cooperation with commutators}
- 5/145 . . . . {Fixedly supported brushes or brush holders, e.g. leaf or leaf-mounted brushes}
- 5/146 . . . . {Pivotally supported brushes or brush holders}
- 5/148 . . . . {Slidably supported brushes}
- 5/15 . . Mounting arrangements for bearing-shields or end plates
- 5/16 . . Means for supporting bearings, e.g. insulating supports or means for fitting bearings in the bearing-shields ([magnetic bearings H02K 7/09](#))
- 5/161 . . . {radially supporting the rotary shaft at both ends of the rotor ([H02K 5/165, H02K 5/167, H02K 5/173 take precedence](#))}
- 5/163 . . . {radially supporting the rotary shaft at only one end of the rotor ([H02K 5/165, H02K 5/167, H02K 5/173 take precedence](#))}
- 5/165 . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly ([H02K 5/167, H02K 5/173 take precedence](#))}
- 5/167 . . . using sliding-contact or spherical cap bearings
- 5/1672 . . . . {radially supporting the rotary shaft at both ends of the rotor ([H02K 5/1677 takes precedence](#))}
- 5/1675 . . . . {radially supporting the rotary shaft at only one end of the rotor ([H02K 5/1677 takes precedence](#))}
- 5/1677 . . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly}
- 5/173 . . . using bearings with rolling contact, e.g. ball bearings
- 5/1732 . . . . {radially supporting the rotary shaft at both ends of the rotor ([H02K 5/1737 takes precedence](#))}
- 5/1735 . . . . {radially supporting the rotary shaft at only one end of the rotor ([H02K 5/1737 takes precedence](#))}
- 5/1737 . . . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly}
- 5/18 . . with ribs or fins for improving heat transfer
- 5/20 . . with channels or ducts for flow of cooling medium
- 5/203 . . . {specially adapted for liquids, e.g. cooling jackets}
- 5/207 . . . {with openings in the casing specially adapted for ambient air}
- 5/22 . . Auxiliary parts of casings not covered by groups [H02K 5/06-H02K 5/20](#), e.g. shaped to form connection boxes or terminal boxes
- 5/225 . . . {Terminal boxes or connection arrangements ([specially adapted for submersible motors H02K 5/132](#))}
- 5/24 . specially adapted for suppression or reduction of noise or vibrations
- 5/26 . Means for adjusting casings relative to their supports

<b>7/00</b>	<b>Arrangements for handling mechanical energy structurally associated with dynamo-electric machines, e.g. structural association with mechanical driving motors or auxiliary dynamo-electric machines</b>	7/1125	. . . {Magnetically influenced friction clutches and brakes}
7/003	. {Couplings; Details of shafts (means for mounting rotors on shafts <a href="#">H02K 1/28</a> )}	7/114	. . with dynamo-electric clutches in combination with brakes
7/006	. {Structural association of a motor or generator with the drive train of a motor vehicle}	7/116	. . with gears
7/02	. Additional mass for increasing inertia, e.g. flywheels	7/1163	. . . {where at least two gears have non-parallel axes without having orbital motion}
7/025	. . {for power storage}	7/1166	. . . . {comprising worm and worm-wheel (structural association with bearings specially adapted for worm gear drives <a href="#">H02K 7/081</a> )}
7/04	. Balancing means	7/118	. . with starting devices
7/06	. Means for converting reciprocating motion into rotary motion or vice versa	7/1185	. . . {with a mechanical one-way direction control, i.e. with means for reversing the direction of rotation of the rotor}
7/061	. . {using rotary unbalanced masses (for generating mechanical vibrations in general <a href="#">B06B 1/16</a> )}	7/12	. . with auxiliary limited movement of stators, rotors or core parts, e.g. rotors axially movable for the purpose of clutching or braking
7/063	. . . {integrally combined with motor parts, e.g. motors with eccentric rotors}	7/125	. . . {magnetically influenced}
7/065	. . Electromechanical oscillators; Vibrating magnetic drives	7/14	. Structural association with mechanical loads, e.g. with hand-held machine tools or fans (with fan or impeller for cooling the machine <a href="#">H02K 9/06</a> )
7/07	. . using pawls and ratchet wheels	7/145	. . {Hand-held machine tool}
7/075	. . using crankshafts or eccentrics	7/16	. . for operation above the critical speed of vibration of the rotating parts
7/08	. Structural association with bearings	7/18	. Structural association of electric generators with mechanical driving motors, e.g. with turbines
7/081	. . {specially adapted for worm gear drives ( <a href="#">H02K 7/09</a> takes precedence)}	7/1807	. . {Rotary generators ( <a href="#">H02K 7/006</a> takes precedence)}
7/083	. . {radially supporting the rotary shaft at both ends of the rotor ( <a href="#">H02K 7/086</a> , <a href="#">H02K 7/09</a> take precedence)}	7/1815	. . . {structurally associated with reciprocating piston engines (general aspects of generating sets, e.g. housing, <a href="#">F02B 63/04</a> )}
7/085	. . {radially supporting the rotary shaft at only one end of the rotor ( <a href="#">H02K 7/086</a> , <a href="#">H02K 7/09</a> take precedence)}	7/1823	. . . {structurally associated with turbines or similar engines}
7/086	. . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly ( <a href="#">H02K 7/09</a> takes precedence)}	7/183	. . . . {wherein the turbine is a wind turbine (adaptation of a wind turbine to an electric generator <a href="#">F03D 9/25</a> )}
7/088	. . . {radially supporting the rotor directly}	7/1838	. . . . . {Generators mounted in a nacelle or similar structure of a horizontal axis wind turbine}
7/09	. . with magnetic bearings	7/1846	. . . . {structurally associated with wheels or associated parts (dynamos arranged in the wheel hub of cycles <a href="#">B62J 6/12</a> )}
7/10	. Structural association with clutches, brakes, gears, pulleys or mechanical starters	7/1853	. . . . {driven by intermittent forces}
<b>NOTE</b>		7/1861	. . . . {driven by animals or vehicles ( <a href="#">H02K 7/1853</a> takes precedence)}
{Group <a href="#">H02K 7/12</a> takes precedence over groups <a href="#">H02K 7/102</a> - <a href="#">H02K 7/118</a> }		7/1869	. . {Linear generators; sectional generators}
7/1004	. . {with pulleys}	7/1876	. . . {with reciprocating, linearly oscillating or vibrating parts}
7/1008	. . . {structurally associated with the machine rotor ( <a href="#">H02K 7/1012</a> takes precedence)}	7/1884	. . . . {structurally associated with free piston engines}
7/1012	. . . . {Machine arranged inside the pulley}	7/1892	. . {Generators with parts oscillating or vibrating about an axis}
7/1016	. . . . {Machine of the outer rotor type}	7/20	. Structural association with auxiliary dynamo-electric machines, e.g. with electric starter motors or exciters
7/102	. . with friction brakes	<b>9/00</b> <b>Arrangements for cooling or ventilating (channels or ducts in parts of the magnetic circuit <a href="#">H02K 1/20</a>, <a href="#">H02K 1/32</a>; channels or ducts in or between conductors <a href="#">H02K 3/22</a>, <a href="#">H02K 3/24</a>)</b>	
7/1021	. . . {Magnetically influenced friction brakes}	9/02	. by ambient air flowing through the machine
7/1023	. . . . {using electromagnets}	9/04	. . having means for generating a flow of cooling medium
7/1025	. . . . . {using axial electromagnets with generally annular air gap}		
7/1026	. . . . . {using stray fields}		
7/1028	. . . . . {axially attracting the brake armature in the frontal area of the magnetic core}		
7/104	. . with eddy-current brakes		
7/106	. . with dynamo-electric brakes		
7/108	. . with friction clutches		
7/1085	. . . {Magnetically influenced friction clutches}		
7/11	. . with dynamo-electric clutches		
7/112	. . with friction clutches in combination with brakes		

9/06	. . . with fans or impellers driven by the machine shaft	11/049	. . Rectifiers associated with stationary parts, e.g. stator cores
9/08	. by gaseous cooling medium circulating wholly within the machine casing ( <a href="#">H02K 9/10 takes precedence</a> )	11/05	. . . Rectifiers associated with casings, enclosures or brackets
9/10	. by gaseous cooling medium flowing in closed circuit, a part of which is external to the machine casing	11/20	. for measuring, monitoring, testing, protecting or switching ( <a href="#">rectifiers H02K 11/04</a> ; <a href="#">power electronics H02K 11/33</a> )
9/12	. . wherein the cooling medium circulates freely within the casing	11/21	. . Devices for sensing speed or position, or actuated thereby ( <a href="#">specially adapted for machines having non-mechanical commutating devices H02K 29/06</a> , <a href="#">H02K 29/14</a> )
9/14	. wherein gaseous cooling medium circulates between the machine casing and a surrounding mantle	11/215	. . . Magnetic effect devices, e.g. Hall-effect or magneto-resistive elements
9/16	. . wherein the cooling medium circulates through ducts or tubes within the casing	11/22	. . . Optical devices
9/18	. . wherein the external part of the closed circuit comprises a heat exchanger structurally associated with the machine casing	11/225	. . . Detecting coils
9/19	. for machines with closed casing and closed-circuit cooling using a liquid cooling medium, e.g. oil	11/23	. . . Mechanically-actuated centrifugal switches
9/193	. . with provision for replenishing the cooling medium; with means for preventing leakage of the cooling medium	11/24	. . Devices for sensing torque, or actuated thereby ( <a href="#">H02K 11/27 takes precedence</a> )
9/197	. . in which the rotor or stator space is fluid-tight, e.g. to provide for different cooling media for rotor and stator	11/25	. . Devices for sensing temperature, or actuated thereby
9/20	. . wherein the cooling medium vaporises within the machine casing	11/26	. . Devices for sensing voltage, or actuated thereby, e.g. overvoltage protection devices
9/22	. by solid heat conducting material embedded in, or arranged in contact with, the stator or rotor, e.g. heat bridges	11/27	. . Devices for sensing current, or actuated thereby ( <a href="#">overcurrent protection responsive to temperature of the machines or parts thereof, e.g. windings, H02K 11/25</a> )
9/223	. . {Heat bridges}	11/28	. . Manual switches
9/225	. . {Heat pipes}	11/30	. Structural association with control circuits or drive circuits
9/227	. . {Heat sinks}	11/33	. . Drive circuits, e.g. power electronics ( <a href="#">H02K 11/38 takes precedence</a> )
9/24	. Protection against failure of cooling arrangements, e.g. due to loss of cooling medium or due to interruption of the circulation of cooling medium	11/35	. . Devices for recording or transmitting machine parameters, e.g. memory chips or radio transmitters for diagnosis
9/26	. Structural association of machines with devices for cleaning or drying cooling medium, e.g. with filters	11/38	. . Control circuits or drive circuits associated with geared commutator motors of the worm-and-wheel type
9/28	. Cooling of commutators, slip-rings or brushes e.g. by ventilating	11/40	. Structural association with grounding devices
<b>11/00</b>	<b>Structural association of dynamo-electric machines with electric components or with devices for shielding, monitoring or protection (casings, enclosures or supports <a href="#">H02K 5/00</a>)</b>	<b>13/00</b>	<b>Structural associations of current collectors with motors or generators, e.g. brush mounting plates or connections to windings (<a href="#">supporting or protecting brushes or brush holders in motor casings or enclosures H02K 5/14</a>); Disposition of current collectors in motors or generators; Arrangements for improving commutation</b>
11/0094	. {Structural association with other electrical or electronic devices}	13/003	. {Structural associations of slip-rings}
11/01	. for shielding from electromagnetic fields {, i.e. structural association with shields} ( <a href="#">means for preventing or reducing eddy-current losses in the winding heads by shielding H02K 3/42</a> )	13/006	. {Structural associations of commutators}
11/012	. . {Shields associated with rotating parts, e.g. rotor cores or rotary shafts}	13/02	. Connections between slip-rings and windings
11/014	. . {Shields associated with stationary parts, e.g. stator cores}	13/04	. Connections between commutator segments and windings
11/0141	. . . {Shields associated with casings, enclosures or brackets}	13/06	. . Resistive connections, e.g. by high-resistance chokes or by transistors
11/02	. for suppression of electromagnetic interference	13/08	. . Segments formed by extensions of the winding
11/026	. . Suppressors associated with brushes, brush holders or their supports	13/10	. Arrangements of brushes or commutators specially adapted for improving commutation
11/028	. . Suppressors associated with the rotor	13/105	. . {Spark suppressors associated with the commutator}
11/04	. for rectification	13/12	. Arrangements for producing an axial reciprocation of the rotor and its associated current collector part, e.g. for polishing commutator surfaces
11/042	. . Rectifiers associated with rotating parts, e.g. rotor cores or rotary shafts	13/14	. Circuit arrangements for improvement of commutation, e.g. by use of unidirectionally conductive elements



## 15/00 Methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing of dynamo-electric machines

- 15/0006 . {Disassembling, repairing or modifying dynamo-electric machines (repairing of cooling fluid boxes [H02K 15/0093](#))}
- 15/0012 . {Manufacturing cage rotors}
- 15/0018 . {Applying slot closure means in the core; Manufacture of slot closure means}
- 15/0025 . {Shaping or compacting conductors or winding heads after the installation of the winding in the core or machine (methods or apparatus for simultaneously twisting a plurality of hairpins prior to mounting [H02K 15/0428](#)); Applying fastening means on winding heads}
- 15/0031 . . {Shaping or compacting conductors in slots or around salient poles ([H02K 15/005](#) takes precedence)}
- 15/0037 . . {Shaping or compacting winding heads ([H02K 15/005](#), [H02K 15/0087](#) and [H02K 15/0428](#) take precedence)}
- 15/0043 . . . {Applying fastening means on winding heads (fastening by applying resin, glue, varnish and similar means [H02K 15/12](#))}
- 15/005 . . {by means of electrodynamic forces}
- 15/0056 . {Manufacturing winding connections}
- 15/0062 . . {Manufacturing the terminal arrangement per se; Connecting the terminals to an external circuit}
- 15/0068 . . {Connecting winding sections; Forming leads; Connecting leads to terminals}
- 15/0081 . . . {for form-wound windings}
- 15/0087 . . . . {characterised by the method or apparatus for simultaneously twisting a plurality of hairpins open ends after insertion into the machine (for simultaneously twisting a plurality of hairpins prior to mounting into the machine [H02K 15/0428](#))}
- 15/0093 . . . . {Manufacturing or repairing cooling fluid boxes, i.e. terminals of fluid cooled windings ensuring both electrical and fluid connection}
- 15/02 . of stator or rotor bodies
- 15/022 . . {with salient poles or claw-shaped poles}
- 15/024 . . {with slots}
- 15/026 . . . {Wound cores}
- 15/028 . . . {for fastening to casing or support, respectively to shaft or hub}
- 15/03 . . having permanent magnets
- 15/04 . of windings, prior to mounting into machines ([insulating windings H02K 15/10](#), [H02K 15/12](#))
- 15/0407 . . {Windings manufactured by etching, printing or stamping the complete coil}
- 15/0414 . . {Windings consisting of separate elements, e.g. bars, hairpins, segments, half coils}
- 15/0421 . . . {consisting of single conductors, e.g. hairpins}
- 15/0428 . . . . {characterised by the method or apparatus for simultaneously twisting a plurality of hairpins (for simultaneously twisting a plurality of hairpins open ends after insertion into the machine [H02K 15/0087](#))}
- 15/0435 . . {Wound windings}
- 15/0442 . . . {Loop windings (manufacturing of windings consisting of overlapped loops [H02K 15/0464](#))}
- 15/045 . . . . {Form wound coils}
- 15/0464 . . . {Lap windings (when on diagonally wound hollow coils [H02K 15/0492](#))}
- 15/0471 . . . . {manufactured by flattening a spiral winding}
- 15/0478 . . . {Wave windings, undulated windings (when on diagonally wound hollow coils [H02K 15/0492](#))}
- 15/0485 . . . . {manufactured by shaping an annular winding}
- 15/0492 . . . {Diagonally wound hollow coils}
- 15/06 . Embedding prefabricated windings in machines
- 15/061 . . {Air-gap windings}
- 15/062 . . {Windings in slots; salient pole windings}
- 15/063 . . . {Windings for large electric machines, e.g. bar windings (windings consisting of cables [H02K 15/065](#))}
- 15/064 . . . {Windings consisting of separate segments, e.g. hairpin windings ([H02K 15/063](#) takes precedence)}
- 15/065 . . . {Windings consisting of complete sections, e.g. coils, waves (windings for large electric machines other than those consisting of cables [H02K 15/063](#))}
- 15/066 . . . . {inserted perpendicularly to the axis of the slots or inter-polar channels}
- 15/067 . . . . {inserted in parallel to the axis of the slots or inter-polar channels}
- 15/068 . . . . . {Strippers}
- 15/08 . Forming windings by laying conductors into or around core parts
- 15/085 . . by laying conductors into slotted stators
- 15/09 . . by laying conductors into slotted rotors
- 15/095 . . by laying conductors around salient poles
- 15/10 . Applying solid insulation to windings, stators or rotors
- 15/105 . . {to the windings}
- 15/12 . Impregnating, heating or drying of windings, stators, rotors or machines
- 15/125 . . {Heating or drying of machines in operational state, e.g. standstill heating}
- 15/14 . Casings; Enclosures; Supports
- 15/16 . Centering rotors within the stator; Balancing rotors
- 15/165 . . {Balancing the rotor}
- 16/00 Machines with more than one rotor or stator** {(machines for transmitting mechanical power from a driving shaft to a driven shaft and comprising structurally interrelated motor and generator parts [H02K 51/00](#); permanent magnet machines with multiple rotors or stators relatively rotated for vectorially combining the excitation fields or the armature voltages [H02K 21/029](#))}
- 16/005 . {Machines with only rotors, e.g. counter-rotating rotors (DC commutator machines or universal AC/DC commutator motors having a rotating armature and a rotating excitation field [H02K 23/60](#))}
- 16/02 . Machines with one stator and two {or more} rotors
- 16/025 . . {with rotors and moving stators connected in a cascade (cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter [H02K 17/34](#))}
- 16/04 . Machines with one rotor and two stators

- 17/00 Asynchronous induction motors; Asynchronous induction generators**
- 17/02 . Asynchronous induction motors
  - 17/04 . . for single phase current
  - 17/06 . . . having windings arranged for permitting pole-changing
  - 17/08 . . . Motors with auxiliary phase obtained by externally fed auxiliary windings, e.g. capacitor motors
  - 17/10 . . . Motors with auxiliary phase obtained by split-pole carrying short-circuited windings
  - 17/12 . . for multi-phase current
  - 17/14 . . . having windings arranged for permitting pole-changing
  - 17/16 . . having rotors with internally short-circuited windings, e.g. cage rotors

**WARNING**

Groups [H02K 17/16](#), [H02K 17/166](#), [H02K 17/168](#), [H02K 17/18](#) and [H02K 17/20](#) are incomplete pending reclassification of documents from group(s) [H02K 17/165](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 17/165 . . . {characterised by the squirrel-cage or other short-circuited windings} (Frozen)

**WARNING**

Group [H02K 17/165](#) is no longer used for the classification of documents as of May 1, 2023.

The content of this group is being reclassified into groups [H02K 17/16](#), [H02K 17/166](#), [H02K 17/168](#), [H02K 17/18](#) and [H02K 17/20](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 17/166 . . . {having short-circuited rotor windings}
- 17/168 . . . {having single-cage rotors}
- 17/18 . . . having double-cage or multiple-cage rotors
- 17/20 . . . having deep-bar rotors
- 17/22 . . having rotors with windings connected to slip-rings
- 17/24 . . . in which both stator and rotor are fed with AC
- 17/26 . . having rotors or stators designed to permit synchronous operation
- 17/28 . . having compensating winding for improving phase angle
- 17/30 . . Structural association of asynchronous induction motors with auxiliary electric devices influencing the characteristics of the motor or controlling the motor, e.g. with impedances or switches
- 17/32 . . Structural association of asynchronous induction motors with auxiliary mechanical devices, e.g. with clutches or brakes
- 17/34 . . Cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter
- 17/36 . . . with another asynchronous induction motor
- 17/38 . . . with a commutator machine
- 17/40 . . . with a rotary AC/DC converter

- 17/42 . Asynchronous induction generators ([H02K 17/02 takes precedence](#))
- 17/44 . . Structural association with exciting machines
- 19/00 Synchronous motors or generators (having permanent magnets [H02K 21/00](#))**
- 19/02 . Synchronous motors
- 19/04 . . for single-phase current
- 19/06 . . . Motors having windings on the stator and a variable-reluctance soft-iron rotor without windings, e.g. inductor motors
- 19/08 . . . Motors having windings on the stator and a smooth rotor without windings of material with large hysteresis, e.g. hysteresis motors
- 19/10 . . for multi-phase current
- 19/103 . . . {Motors having windings on the stator and a variable reluctance soft-iron rotor without windings}
- 19/106 . . . {Motors having windings in the stator and a smooth rotor of material with large hysteresis without windings}
- 19/12 . . . characterised by the arrangement of exciting windings, e.g. for self-excitation, compounding or pole-changing
- 19/14 . . having additional short-circuited windings for starting as asynchronous motors
- 19/16 . Synchronous generators
- 19/18 . . having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar generators
- 19/20 . . . with variable-reluctance soft-iron rotors without winding
- 19/22 . . having windings each turn of which co-operates alternately with poles of opposite polarity, e.g. heteropolar generators
- 19/24 . . . with variable-reluctance soft-iron rotors without winding
- 19/26 . . characterised by the arrangement of exciting windings
- 19/28 . . . for self-excitation
- 19/30 . . . for compounding
- 19/32 . . . for pole-changing
- 19/34 . . Generators with two or more outputs
- 19/36 . . Structural association of synchronous generators with auxiliary electric devices influencing the characteristic of the generator or controlling the generator, e.g. with impedances or switches
- 19/365 . . . {with a voltage regulator}
- 19/38 . . Structural association of synchronous generators with exciting machines
- 21/00 Synchronous motors having permanent magnets; Synchronous generators having permanent magnets**
- 21/02 . Details
- 21/021 . . {Means for mechanical adjustment of the excitation flux}
- 21/022 . . . {by modifying the relative position between field and armature, e.g. between rotor and stator (vectorial combination of field or armature sections [H02K 21/029](#))}
- 21/023 . . . . {by varying the amount of superposition, i.e. the overlap, of field and armature}
- 21/024 . . . . . {Radial air gap machines}

21/025	. . . . {by varying the thickness of the air gap between field and armature}	21/44	. . with armature windings wound upon the magnets
21/026	. . . . . {Axial air gap machines}	21/46	. Motors having additional short-circuited winding for starting as an asynchronous motor
21/027	. . . . . {Conical air gap machines}	21/48	. Generators with two or more outputs
21/028	. . . {by modifying the magnetic circuit within the field or the armature, e.g. by using shunts, by adjusting the magnets position, by vectorial combination of field or armature sections}	<b>23/00</b>	<b>DC commutator motors or generators having mechanical commutator; Universal AC/DC commutator motors</b>
21/029	. . . . {Vectorial combination of the fluxes generated by a plurality of field sections or of the voltages induced in a plurality of armature sections}	23/02	. characterised by arrangement for exciting
21/04	. . Windings on magnets for additional excitation ; Windings and magnets for additional excitation}	23/023	. . {having short-circuited brushes}
21/042	. . . {with permanent magnets and field winding both rotating}	23/026	. . {having an unregular distribution of the exciting winding or of the excitation over the poles}
21/044	. . . . {Rotor of the claw pole type}	23/04	. . having permanent magnet excitation
21/046	. . . {with rotating permanent magnets and stationary field winding}	23/06	. . having shunt connection of excitation windings
21/048	. . . . {Rotor of the claw pole type}	23/08	. . having series connection of excitation windings
21/10	. . Rotating armatures	23/10	. . having compound connection of excitation windings
21/12	. with stationary armatures and rotating magnets	23/12	. . having excitation produced by current sources independent of the armature circuit
21/125	. . {having an annular armature coil (H02K 21/14 - H02K 21/24 take precedence)}	23/14	. . having high-speed excitation or de-excitation, e.g. by neutralising the remanent excitation field
21/14	. . with magnets rotating within the armatures	23/16	. . having angularly adjustable excitation field, e.g. by pole reversing or pole switching
21/145	. . . {having an annular armature coil (with homopolar co-operation H02K 21/20)}	23/18	. . having displaceable main or auxiliary brushes
21/16	. . . having annular armature cores with salient poles (with homopolar co-operation H02K 21/20)	23/20	. . having additional brushes spaced intermediately of the main brushes on the commutator, e.g. cross-field machines, metadynes, amplidynes or other armature-reaction excited machines
21/18	. . . having horse-shoe armature cores (with homopolar co-operation H02K 21/20)	23/22	. . having compensating or damping windings
21/185	. . . . {with the axis of the rotor perpendicular to the plane of the armature}	23/24	. . having commutating-pole windings
21/20	. . . having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar machine	23/26	. characterised by the armature windings
21/22	. . with magnets rotating around the armatures, e.g. flywheel magnetos	23/28	. . having open windings, i.e. not closed within the armatures
21/222	. . . {Flywheel magnetos}	23/30	. . having lap or loop windings
21/225	. . . . {having I-shaped, E-shaped or similarly shaped armature cores}	23/32	. . having wave or undulating windings
21/227	. . . {having an annular armature coil}	23/34	. . having mixed windings
21/24	. . with magnets axially facing the armatures, e.g. hub-type cycle dynamos	23/36	. . having two or more windings; having two or more commutators; having two or more stators
21/26	. with rotating armatures and stationary magnets	23/38	. . having winding or connection for improving commutation, e.g. equipotential connection
21/28	. . with armatures rotating within the magnets	23/40	. characterised by the arrangement of the magnet circuits
21/30	. . . having annular armature cores with salient poles (with homopolar co-operation H02K 21/36)	23/405	. . {Machines with a special form of the pole shoes}
21/32	. . . having horse-shoe magnets (with homopolar co-operation H02K 21/36)	23/42	. . having split poles, i.e. zones for varying reluctance by gaps in poles or by poles with different spacing of the air gap
21/325	. . . . {with the axis of the rotating armature perpendicular to the plane of the magnet}	23/44	. . having movable, e.g. turnable, iron parts
21/34	. . . having bell-shaped or bar-shaped magnets, e.g. for cycle lighting (with homopolar co-operation H02K 21/36)	23/46	. . having stationary shunts, i.e. magnetic cross flux
21/36	. . . with homopolar co-operation	23/48	. . having adjustable armatures
21/38	. with rotating flux distributors, and armatures and magnets both stationary	23/50	. Generators with two or more outputs
21/40	. . with flux distributors rotating around the magnets and within the armatures	23/52	. Motors acting also as generators, e.g. starting motors used as generators for ignition or lighting
21/42	. . with flux distributors rotating around the armatures and within the magnets	23/54	. Disc armature motors or generators
		23/56	. Motors or generators having iron cores separated from armature winding
		23/58	. Motors or generators without iron cores
		23/60	. Motors or generators having rotating armatures and rotating excitation field
		23/62	. Motors or generators with stationary armatures and rotating excitation field
		23/64	. Motors specially adapted for running on DC or AC by choice



23/66	• Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the machine, e.g. with impedances or switches	33/02	• with armatures moved one way by energisation of a single coil system and returned by mechanical force, e.g. by springs
23/68	• Structural association with auxiliary mechanical devices, e.g. with clutches or brakes	33/04	• • wherein the frequency of operation is determined by the frequency of uninterrupted AC energisation
<b>24/00</b>	<b>Machines adapted for the instantaneous transmission or reception of the angular displacement of rotating parts, e.g. synchro, selsyn</b>	33/06	• • • with polarised armatures
<b>25/00</b>	<b>DC interrupter motors or generators</b>	33/08	• • • with DC energisation superimposed on AC energisation
<b>26/00</b>	<b>Machines adapted to function as torque motors, i.e. to exert a torque when stalled</b>	33/10	• • wherein the alternate energisation and de-energisation of the single coil system is effected or controlled by movement of the armatures
<b>27/00</b>	<b>AC commutator motors or generators having mechanical commutator</b>	33/12	• with armatures moving in alternate directions by alternate energisation of two coil systems
27/02	• characterised by the armature winding	33/14	• • wherein the alternate energisation and de-energisation of the two coil systems are effected or controlled by movement of the armatures
27/04	• having single-phase operation in series or shunt connection	33/16	• with polarised armatures moving in alternate directions by reversal or energisation of a single coil system
27/06	• • with a single or multiple short-circuited commutator, e.g. repulsion motor	33/18	• with coil systems moving upon intermittent or reversed energisation thereof by interaction with a fixed field system, e.g. permanent magnets
27/08	• • with multiple-fed armature	<b>35/00</b>	<b>Generators with reciprocating, oscillating or vibrating coil system, magnet, armature or other part of the magnetic circuit (arrangements for handling mechanical energy structurally associated with generators H02K 7/00, e.g. H02K 7/06)</b>
27/10	• • with switching devices for different modes of operation, e.g. repulsion-induction motor	35/02	• with moving magnets and stationary coil systems
27/12	• having multi-phase operation	35/04	• with moving coil systems and stationary magnets
27/14	• • in series connection	35/06	• with moving flux distributors, and both coil systems and magnets stationary
27/16	• • in shunt connection with stator feeding	<b>37/00</b>	<b>Motors with rotor rotating step by step and without interrupter or commutator driven by the rotor, e.g. stepping motors</b>
27/18	• • in shunt connection with rotor feeding	37/02	• of variable reluctance type
27/20	• Structural association with a speed regulating device	37/04	• • with rotors situated within the stators
27/22	• having means for improving commutation, e.g. auxiliary fields, double windings, double brushes	37/06	• • with rotors situated around the stators
27/24	• having two or more commutators	37/08	• • with rotors axially facing the stators
27/26	• having disc armature	37/10	• of permanent magnet type (H02K 37/02 takes precedence)
27/28	• Structural association with auxiliary electric devices influencing the characteristic of the machine or controlling the machine	37/12	• • with stationary armatures and rotating magnets
27/30	• Structural association with auxiliary mechanical devices, e.g. with clutches or brakes	37/125	• • • {Magnet axially facing armature}
<b>29/00</b>	<b>Motors or generators having non-mechanical commutating devices, e.g. discharge tubes or semiconductor devices</b>	37/14	• • • with magnets rotating within the armatures
29/03	• with a magnetic circuit specially adapted for avoiding torque ripples or self-starting problems	37/16	• • • • having horseshoe armature cores
29/06	• with position sensing devices (H02K 29/03 takes precedence)	37/18	• • • • of homopolar type
29/08	• • using magnetic effect devices, e.g. Hall-plates, magneto-resistors (H02K 29/12 takes precedence)	37/20	• • with rotating flux distributors, the armatures and magnets both being stationary
29/10	• • using light effect devices	37/22	• Damping units
29/12	• • using detecting coils {using the machine windings as detecting coil}	37/24	• Structural association with auxiliary mechanical devices
29/14	• with speed sensing devices (H02K 29/03 takes precedence)	<b>39/00</b>	<b>Generators specially adapted for producing a desired non-sinusoidal waveform</b>
<b>31/00</b>	<b>Acyclic motors or generators, i.e. DC machines having drum or disc armatures with continuous current collectors</b>	<b>41/00</b>	<b>Propulsion systems in which a rigid body is moved along a path due to dynamo-electric interaction between the body and a magnetic field travelling along the path {(electromagnetic launchers F41B 6/00)}</b>
31/02	• with solid-contact collectors	41/02	• Linear motors; Sectional motors
31/04	• with at least one liquid-contact collector	41/025	• • Asynchronous motors
<b>33/00</b>	<b>Motors with reciprocating, oscillating or vibrating magnet, armature or coil system (arrangements for handling mechanical energy structurally associated with motors H02K 7/00, e.g. H02K 7/06)</b>		

41/03	. . Synchronous motors; Motors moving step by step; Reluctance motors ( <a href="#">H02K 41/035 takes precedence</a> )	47/30	. . Single-armature phase-number converters without frequency conversion
41/031	. . . {of the permanent magnet type}	<b>49/00</b>	<b>Dynamo-electric clutches; Dynamo-electric brakes</b>
41/033	. . . . {with armature and magnets on one member, the other member being a flux distributor}	49/02	. of the asynchronous induction type
41/035	. . DC motors; Unipolar motors	49/04	. . of the eddy-current hysteresis type
41/0352	. . . {Unipolar motors}	49/043	. . . {with a radial airgap}
41/0354	. . . . {Lorentz force motors, e.g. voice coil motors}	49/046	. . . {with an axial airgap}
41/0356	. . . . . {moving along a straight path}	49/06	. of the synchronous type {( <a href="#">H02K 49/10 takes precedence</a> )}
41/0358	. . . . . {moving along a curvilinear path}	49/065	. . {hysteresis type}
41/06	. Rolling motors, i.e. motors having the rotor axis parallel to the stator axis and following a circular path as the rotor rolls around the inside or outside of the stator {; Nutating motors, i.e. having the rotor axis parallel to the stator axis inclined with respect to the stator axis and performing a nutational movement as the rotor rolls on the stator}	49/08	. of the collector armature type
41/065	. . {Nutating motors}	49/10	. of the permanent-magnet type
<b>44/00</b>	<b>Machines in which the dynamo-electric interaction between a plasma or flow of conductive liquid or of fluid-borne conductive or magnetic particles and a coil system or magnetic field converts energy of mass flow into electrical energy or vice versa</b>	49/102	. . {Magnetic gearings, i.e. assembly of gears, linear or rotary, by which motion is magnetically transferred without physical contact ( <a href="#">magnetized gearings with physical contact F16H 13/12, F16H 49/005</a> )}
44/02	. Electrodynamic pumps	49/104	. . {Magnetic couplings consisting of only two coaxial rotary elements, i.e. the driving element and the driven element}
44/04	. . Conduction pumps	49/106	. . . {with a radial air gap}
44/06	. . Induction pumps	49/108	. . . {with an axial air gap}
44/08	. Magnetohydrodynamic [MHD] generators	49/12	. of the acyclic type
44/085	. . {with conducting liquids}	<b>51/00</b>	<b>Dynamo-electric gears, i.e. dynamo-electric means for transmitting mechanical power from a driving shaft to a driven shaft and comprising structurally interrelated motor and generator parts</b>
44/10	. . Constructional details of electrodes	<b>53/00</b>	<b>Alleged dynamo-electric perpetua mobilia</b>
44/12	. . Constructional details of fluid channels	<b>55/00</b>	<b>Dynamo-electric machines having windings operating at cryogenic temperatures</b>
44/14	. . . Circular or screw-shaped channels	55/02	. of the synchronous type
44/16	. . Constructional details of the magnetic circuits	55/04	. . with rotating field windings
44/18	. . for generating AC power	55/06	. of the homopolar type
44/20	. . . by changing the polarity of the magnetic field	<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
44/22	. . . by changing the conductivity of the fluid	99/10	. {Generators}
44/24	. . . by reversing the direction of fluid	99/20	. {Motors}
44/26	. . . by creating a travelling magnetic field	<b>2201/00</b>	<b>Specific aspects not provided for in the other groups of this subclass relating to the magnetic circuits</b>
44/28	. Association of MHD generators with conventional generators ( <a href="#">nuclear power plants including a MHD generator G21D 7/02</a> )	2201/03	. Machines characterised by aspects of the air-gap between rotor and stator
<b>47/00</b>	<b>Dynamo-electric converters</b>	2201/06	. Magnetic cores, or permanent magnets characterised by their skew
47/02	. AC/DC converters or <a href="#">vice versa</a>	2201/09	. Magnetic cores comprising laminations characterised by being fastened by caulking
47/04	. . Motor/generators	2201/12	. Transversal flux machines
47/06	. . Cascade converters	2201/15	. Sectional machines
47/08	. . Single-armature converters	2201/18	. Machines moving with multiple degrees of freedom
47/10	. . . with booster machines on the AC side	<b>2203/00</b>	<b>Specific aspects not provided for in the other groups of this subclass relating to the windings</b>
47/12	. DC/DC converters	2203/03	. Machines characterised by the wiring boards, i.e. printed circuit boards or similar structures for connecting the winding terminations
47/14	. . Motor/generators	2203/06	. Machines characterised by the wiring leads, i.e. conducting wires for connecting the winding terminations
47/16	. . Single-armature converters, e.g. metadyne	2203/09	. Machines characterised by wiring elements other than wires, e.g. bus rings, for connecting the winding terminations
47/18	. AC/AC converters		
47/20	. . Motor/generators		
47/22	. . Single-armature frequency converters with or without phase-number conversion		
47/24	. . . having windings for different numbers of poles		
47/26	. . . operating as under- or over-synchronously running asynchronous induction machines, e.g. cascade arrangement of asynchronous and synchronous machines		
47/28	. . . operating as commutator machines with added slip-rings		

## H02K

- 2203/12 . Machines characterised by the bobbins for supporting the windings
- 2203/15 . Machines characterised by cable windings, e.g. high-voltage cables, ribbon cables
- 2205/00 Specific aspects not provided for in the other groups of this subclass relating to casings, enclosures, supports**
- 2205/03 . Machines characterised by thrust bearings
- 2205/06 . Machines characterised by means for keeping the brushes in a retracted position during assembly
- 2205/09 . Machines characterised by drain passages or by venting, breathing or pressure compensating means
- 2205/12 . Machines characterised by means for reducing windage losses or windage noise
- 2207/00 Specific aspects not provided for in the other groups of this subclass relating to arrangements for handling mechanical energy**
- 2207/03 . Tubular motors, i.e. rotary motors mounted inside a tube, e.g. for blinds
- 2209/00 Specific aspects not provided for in the other groups of this subclass relating to systems for cooling or ventilating**
- 2211/00 Specific aspects not provided for in the other groups of this subclass relating to measuring or protective devices or electric components**
- 2211/03 . Machines characterised by circuit boards, e.g. pcb
- 2213/00 Specific aspects, not otherwise provided for and not covered by codes [H02K 2201/00](#) - [H02K 2211/00](#)**
- 2213/03 . Machines characterised by numerical values, ranges, mathematical expressions or similar information
- 2213/06 . Machines characterised by the presence of fail safe, back up, redundant or other similar emergency arrangements
- 2213/09 . Machines characterised by the presence of elements which are subject to variation, e.g. adjustable bearings, reconfigurable windings, variable pitch ventilators
- 2213/12 . Machines characterised by the modularity of some components
- 2215/00 Specific aspects not provided for in other groups of this subclass relating to methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing of dynamo-electric machines**