

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.

1/00	Details of the magnetic circuit (magnetic circuits for relays H01H 50/16)	1/223	. . .	{Rotor cores with windings and permanent magnets (for additional excitation in synchronous motors or generators H02K 21/042 ; in synchronous motors having additional short-circuited winding for starting as an asynchronous motor H02K 21/46)}
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 (H02K 1/141 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	1/2733	. . . . .	Annular magnets
1/18	. . . Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures	1/274	. . . . .	the rotor consisting of two or more circumferentially positioned magnets
1/182	. . . . {to stators axially facing the rotor, i.e. with axial or conical air gap}	1/2746	. . . . .	the rotor consisting of magnets arranged with the same polarity, e.g. consequent pole type
1/185	. . . . {to outer stators}			
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
- 1/2781 Magnets shaped to vary the mechanical air gap between the magnets and the stator
- 1/2783 with magnets arranged in Halbach arrays
- 1/2786 Outer rotors
- 1/2787 the magnetisation axis of the magnets being perpendicular to the rotor axis
- 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
- 1/2795 the rotor consisting of two or more circumferentially positioned magnets
- 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
- 7/00 Arrangements for handling mechanical energy structurally associated with dynamo-electric machines, e.g. structural association with mechanical driving motors or auxiliary dynamo-electric machines**
- 7/003 . {Couplings; Details of shafts (means for mounting rotors on shafts [H02K 1/28](#))}
- 7/006 . {Structural association of a motor or generator with the drive train of a motor vehicle}
- 7/02 . Additional mass for increasing inertia, e.g. flywheels
- 7/025 . . {for power storage}
- 7/04 . Balancing means
- 7/06 . Means for converting reciprocating motion into rotary motion or vice versa
- 7/061 . . {using rotary unbalanced masses (for generating mechanical vibrations in general [B06B 1/16](#))}
- 7/063 . . . {integrally combined with motor parts, e.g. motors with eccentric rotors}
- 7/065 . . Electromechanical oscillators; Vibrating magnetic drives
- 7/07 . . using pawls and ratchet wheels
- 7/075 . . using crankshafts or eccentrics
- 7/08 . Structural association with bearings
- 7/081 . . {specially adapted for worm gear drives ([H02K 7/09](#) takes precedence)}
- 7/083 . . {radially supporting the rotary shaft at both ends of the rotor ([H02K 7/086](#), [H02K 7/09](#) take precedence)}
- 7/085 . . {radially supporting the rotary shaft at only one end of the rotor ([H02K 7/086](#), [H02K 7/09](#) take precedence)}
- 7/086 . . {radially supporting the rotor around a fixed spindle; radially supporting the rotor directly ([H02K 7/09](#) takes precedence)}
- 7/088 . . . {radially supporting the rotor directly}
- 7/09 . . with magnetic bearings
- 7/10 . Structural association with clutches, brakes, gears, pulleys or mechanical starters
- NOTE**
 - {Group [H02K 7/12](#) takes precedence over groups [H02K 7/102](#) - [H02K 7/118](#)}
- 7/1004 . . {with pulleys}
- 7/1008 . . . {structurally associated with the machine rotor ([H02K 7/1012](#) takes precedence)}
- 7/1012 . . . {Machine arranged inside the pulley}
- 7/1016 {Machine of the outer rotor type}
- 7/102 . . with friction brakes
- 7/1021 . . . {Magnetically influenced friction brakes}
- 7/1023 {using electromagnets}
- 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
- 7/1125 . . . {Magnetically influenced friction clutches and brakes}
- 7/114 . . with dynamo-electric clutches in combination with brakes
- 7/116 . . with gears
- 7/1163 . . . {where at least two gears have non-parallel axes without having orbital motion}

- 7/1166 {comprising worm and worm-wheel (structural association with bearings specially adapted for worm gear drives [H02K 7/081](#))}
- 7/118 . . with starting devices
- 7/1185 . . . {with a mechanical one-way direction control, i.e. with means for reversing the direction of rotation of the rotor}
- 7/12 . . with auxiliary limited movement of stators, rotors or core parts, e.g. rotors axially movable for the purpose of clutching or braking
- 7/125 . . . {magnetically influenced}
- 7/14 . Structural association with mechanical loads, e.g. with hand-held machine tools or fans (with fan or impeller for cooling the machine [H02K 9/06](#))
- 7/145 . . {Hand-held machine tool}
- 7/16 . . for operation above the critical speed of vibration of the rotating parts
- 7/18 . Structural association of electric generators with mechanical driving motors, e.g. with turbines
- 7/1807 . . {Rotary generators ([H02K 7/006](#) takes precedence)}
- 7/1815 . . . {structurally associated with reciprocating piston engines (general aspects of generating sets, e.g. housing, [F02B 63/04](#))}
- 7/1823 . . . {structurally associated with turbines or similar engines}
- 7/183 {wherein the turbine is a wind turbine (adaptation of a wind turbine to an electric generator [F03D 9/25](#))}
- 7/1838 {Generators mounted in a nacelle or similar structure of a horizontal axis wind turbine}
- 7/1846 . . . {structurally associated with wheels or associated parts (dynamos arranged in the wheel hub of cycles [B62J 6/12](#))}
- 7/1853 . . . {driven by intermittent forces}
- 7/1861 . . . {driven by animals or vehicles ([H02K 7/1853](#) takes precedence)}
- 7/1869 . . {Linear generators; sectional generators}
- 7/1876 . . . {with reciprocating, linearly oscillating or vibrating parts}
- 7/1884 {structurally associated with free piston engines}
- 7/1892 . . {Generators with parts oscillating or vibrating about an axis}
- 7/20 . Structural association with auxiliary dynamo-electric machines, e.g. with electric starter motors or exciters
- 9/00 Arrangements for cooling or ventilating (channels or ducts in parts of the magnetic circuit [H02K 1/20](#), [H02K 1/32](#); channels or ducts in or between conductors [H02K 3/22](#), [H02K 3/24](#))**
- 9/02 . by ambient air flowing through the machine
- 9/04 . . having means for generating a flow of cooling medium
- 9/06 . . . with fans or impellers driven by the machine shaft
- 9/08 . by gaseous cooling medium circulating wholly within the machine casing ([H02K 9/10](#) takes precedence)
- 9/10 . by gaseous cooling medium flowing in closed circuit, a part of which is external to the machine casing
- 9/12 . . wherein the cooling medium circulates freely within the casing
- 9/14 . wherein gaseous cooling medium circulates between the machine casing and a surrounding mantle
- 9/16 . . wherein the cooling medium circulates through ducts or tubes within the casing
- 9/18 . . wherein the external part of the closed circuit comprises a heat exchanger structurally associated with the machine casing
- 9/19 . for machines with closed casing and closed-circuit cooling using a liquid cooling medium, e.g. oil
- 9/193 . . with provision for replenishing the cooling medium; with means for preventing leakage of the cooling medium
- 9/197 . . in which the rotor or stator space is fluid-tight, e.g. to provide for different cooling media for rotor and stator
- 9/20 . . wherein the cooling medium vaporises within the machine casing
- 9/22 . by solid heat conducting material embedded in, or arranged in contact with, the stator or rotor, e.g. heat bridges
- 9/223 . . {Heat bridges}
- 9/225 . . {Heat pipes}
- 9/227 . . {Heat sinks}
- 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
- 9/26 . Structural association of machines with devices for cleaning or drying cooling medium, e.g. with filters
- 9/28 . Cooling of commutators, slip-rings or brushes e.g. by ventilating
- 11/00 Structural association of dynamo-electric machines with electric components or with devices for shielding, monitoring or protection (casings, enclosures or supports [H02K 5/00](#))**
- 11/0094 . {Structural association with other electrical or electronic devices}
- 11/01 . for shielding from electromagnetic fields {, i.e. structural association with shields} (means for preventing or reducing eddy-current losses in the winding heads by shielding [H02K 3/42](#))
- 11/012 . . {Shields associated with rotating parts, e.g. rotor cores or rotary shafts}
- 11/014 . . {Shields associated with stationary parts, e.g. stator cores}
- 11/0141 . . . {Shields associated with casings, enclosures or brackets}
- 11/02 . for suppression of electromagnetic interference
- 11/026 . . Suppressors associated with brushes, brush holders or their supports
- 11/028 . . Suppressors associated with the rotor
- 11/04 . for rectification
- 11/042 . . Rectifiers associated with rotating parts, e.g. rotor cores or rotary shafts
- 11/049 . . Rectifiers associated with stationary parts, e.g. stator cores
- 11/05 . . . Rectifiers associated with casings, enclosures or brackets
- 11/20 . for measuring, monitoring, testing, protecting or switching (rectifiers [H02K 11/04](#); power electronics [H02K 11/33](#))

- 11/21 . . Devices for sensing speed or position, or actuated thereby ([specially adapted for machines having non-mechanical commutating devices H02K 29/06, H02K 29/14](#))
- 11/215 . . . Magnetic effect devices, e.g. Hall-effect or magneto-resistive elements
- 11/22 . . . Optical devices
- 11/225 . . . Detecting coils
- 11/23 . . . Mechanically-actuated centrifugal switches
- 11/24 . . Devices for sensing torque, or actuated thereby ([H02K 11/27 takes precedence](#))
- 11/25 . . Devices for sensing temperature, or actuated thereby
- 11/26 . . Devices for sensing voltage, or actuated thereby, e.g. overvoltage protection devices
- 11/27 . . Devices for sensing current, or actuated thereby ([overcurrent protection responsive to temperature of the machines or parts thereof, e.g. windings, H02K 11/25](#))
- 11/28 . . Manual switches
- 11/30 . Structural association with control circuits or drive circuits
- 11/33 . . Drive circuits, e.g. power electronics ([H02K 11/38 takes precedence](#))
- 11/35 . . Devices for recording or transmitting machine parameters, e.g. memory chips or radio transmitters for diagnosis
- 11/38 . . Control circuits or drive circuits associated with geared commutator motors of the worm-and-wheel type
- 11/40 . Structural association with grounding devices
- 13/00 Structural associations of current collectors with motors or generators, e.g. brush mounting plates or connections to windings ([supporting or protecting brushes or brush holders in motor casings or enclosures H02K 5/14](#)); Disposition of current collectors in motors or generators; Arrangements for improving commutation**
- 13/003 . {[Structural associations of slip-rings](#)}
- 13/006 . {[Structural associations of commutators](#)}
- 13/02 . Connections between slip-rings and windings
- 13/04 . Connections between commutator segments and windings
- 13/06 . . Resistive connections, e.g. by high-resistance chokes or by transistors
- 13/08 . . Segments formed by extensions of the winding
- 13/10 . Arrangements of brushes or commutators specially adapted for improving commutation
- 13/105 . . {[Spark suppressors associated with the commutator](#)}
- 13/12 . Arrangements for producing an axial reciprocation of the rotor and its associated current collector part, e.g. for polishing commutator surfaces
- 13/14 . Circuit arrangements for improvement of commutation, e.g. by use of unidirectionally conductive elements

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

WARNING

Group [H02K 15/00](#) is impacted by reclassification into groups [H02K 15/40](#), [H02K 15/50](#), [H02K 15/60](#), [H02K 15/70](#), [H02K 15/80](#), [H02K 15/90](#) and [H02K 15/95](#).

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

- 15/02 . of stator or rotor bodies

WARNING

Group [H02K 15/02](#) is impacted by reclassification into groups [H02K 15/021](#), [H02K 15/025](#), [H02K 15/026](#), [H02K 15/027](#), [H02K 15/0273](#), [H02K 15/0275](#), [H02K 15/0278](#) and [H02K 15/028](#).

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

- 15/021 . . Magnetic cores

WARNING

Groups [H02K 15/021](#) and [H02K 15/025](#) are incomplete pending reclassification of documents from group [H02K 15/02](#).

Groups [H02K 15/02](#), [H02K 15/021](#) and [H02K 15/025](#) should be considered in order to perform a complete search.

- 15/022 . . . with salient poles

WARNING

Group [H02K 15/022](#) is impacted by reclassification into groups [H02K 15/0225](#), [H02K 15/026](#) and [H02K 15/028](#).

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

- 15/0225 with claw-shaped poles

WARNING

Group [H02K 15/0225](#) is incomplete pending reclassification of documents from group [H02K 15/022](#).

Groups [H02K 15/022](#) and [H02K 15/0225](#) should be considered in order to perform a complete search.

- 15/023 . . . Cage rotors
- 15/025 . . . characterised by skewed structures in cores
- 15/026 . . . Wound cores

WARNING

Group [H02K 15/026](#) is incomplete pending reclassification of documents from groups [H02K 15/02](#) and [H02K 15/022](#).

Groups [H02K 15/02](#), [H02K 15/022](#) and [H02K 15/026](#) should be considered in order to perform a complete search.

- 15/027 . . . Punching the cores
- WARNING**
- Groups [H02K 15/027](#) is incomplete pending reclassification of documents from group [H02K 15/02](#).
- Groups [H02K 15/02](#) and [H02K 15/027](#) should be considered in order to perform a complete search.
- 15/0273 . . . Laminating the cores
- WARNING**
- Group [H02K 15/0273](#) is incomplete pending reclassification of documents from group [H02K 15/02](#).
- Groups [H02K 15/02](#) and [H02K 15/0273](#) should be considered in order to perform a complete search.
- 15/0275 . . . Annealing the cores
- WARNING**
- Group [H02K 15/0275](#) is incomplete pending reclassification of documents from group [H02K 15/02](#).
- Groups [H02K 15/02](#) and [H02K 15/0275](#) should be considered in order to perform a complete search.
- 15/0278 . . . Welding the cores
- WARNING**
- Group [H02K 15/0278](#) is incomplete pending reclassification of documents from group [H02K 15/02](#).
- Groups [H02K 15/02](#) and [H02K 15/0278](#) should be considered in order to perform a complete search.
- 15/028 . . Fastening stator or rotor bodies to casings, supports, shafts or hubs
- WARNING**
- Group [H02K 15/028](#) is incomplete pending reclassification of documents from groups [H02K 15/02](#) and [H02K 15/022](#).
- Groups [H02K 15/02](#), [H02K 15/022](#) and [H02K 15/028](#) should be considered in order to perform a complete search.
- 15/03 . . having permanent magnets
- WARNING**
- Group [H02K 15/03](#) is impacted by reclassification into groups [H02K 15/035](#) and [H02K 15/038](#).
- Groups [H02K 15/03](#), [H02K 15/035](#) and [H02K 15/038](#) should be considered in order to perform a complete search.
- 15/035 . . . on the rotor
- WARNING**
- Group [H02K 15/035](#) is incomplete pending reclassification of documents from group [H02K 15/03](#).
- Groups [H02K 15/03](#) and [H02K 15/035](#) should be considered in order to perform a complete search.
- 15/038 . . . Polarising or magnetising the permanent magnets
- WARNING**
- Group [H02K 15/038](#) is incomplete pending reclassification of documents from group [H02K 15/03](#).
- Groups [H02K 15/03](#) and [H02K 15/038](#) should be considered in order to perform a complete search.
- 15/04 . . of windings prior to their mounting into the machines (insulating windings [H02K 15/10](#), [H02K 15/12](#))
- WARNING**
- Group [H02K 15/04](#) is impacted by reclassification into groups [H02K 15/043](#), [H02K 15/044](#), [H02K 15/046](#), [H02K 15/047](#) and [H02K 15/048](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/0407 . . Manufacturing of windings by etching, printing or stamping the complete coils
- 15/0414 . . the windings consisting of separate elements, e.g. bars, segments or half coils
- 15/0421 . . . and consisting of single conductors, e.g. hairpins
- 15/0428 Processes or apparatus for simultaneously twisting two or more hairpins
- 15/043 . . winding flat conductive wires or sheets
- WARNING**
- Group [H02K 15/043](#) is incomplete pending reclassification of documents from group [H02K 15/04](#).
- Group [H02K 15/043](#) is also impacted by reclassification into groups [H02K 15/0431](#), [H02K 15/0432](#), [H02K 15/0433](#), [H02K 15/0434](#), [H02K 15/044](#), [H02K 15/046](#) and [H02K 15/047](#).
- All groups listed in this Warning should be considered in order to perform a complete search.

- 15/0431 . . . {Concentrated windings}
- WARNING**
- Group [H02K 15/0431](#) is incomplete pending reclassification of documents from groups [H02K 15/043](#) and [H02K 15/0432](#).
- Group [H02K 15/0431](#) is also impacted by reclassification into groups [H02K 15/0432](#), [H02K 15/046](#) and [H02K 15/047](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/0432 . . . {Distributed windings}
- WARNING**
- Group [H02K 15/0432](#) is incomplete pending reclassification of documents from groups [H02K 15/043](#) and [H02K 15/0431](#).
- Group [H02K 15/0432](#) is also impacted by reclassification into groups [H02K 15/0431](#), [H02K 15/046](#) and [H02K 15/047](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/0433 {of the wave winding type}
- WARNING**
- Group [H02K 15/0433](#) is incomplete pending reclassification of documents from group [H02K 15/043](#).
- Group [H02K 15/0433](#) is also impacted by reclassification into group [H02K 15/048](#).
- Groups [H02K 15/0433](#), [H02K 15/043](#) and [H02K 15/048](#) should be considered in order to perform a complete search.
- 15/0434 {manufactured by shaping an annular winding}
- WARNING**
- Group [H02K 15/0434](#) is incomplete pending reclassification of documents from groups [H02K 15/043](#) and [H02K 15/0485](#).
- Groups [H02K 15/043](#), [H02K 15/0485](#) and [H02K 15/0434](#) should be considered in order to perform a complete search.
- 15/044 . . winding non-flat conductive wires, e.g. cables or cords
- WARNING**
- Group [H02K 15/044](#) is incomplete pending reclassification of documents from groups [H02K 15/04](#) and [H02K 15/043](#).
- Groups [H02K 15/04](#), [H02K 15/043](#) and [H02K 15/044](#) should be considered in order to perform a complete search.
- 15/046 . . . Concentrated windings
- WARNING**
- Group [H02K 15/046](#) is incomplete pending reclassification of documents from groups [H02K 15/04](#), [H02K 15/043](#), [H02K 15/0431](#) and [H02K 15/0432](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/047 . . . Distributed windings
- WARNING**
- Group [H02K 15/047](#) is incomplete pending reclassification of documents from groups [H02K 15/04](#), [H02K 15/043](#), [H02K 15/0431](#) and [H02K 15/0432](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/048 of the wave winding type
- WARNING**
- Group [H02K 15/048](#) is incomplete pending reclassification of documents from groups [H02K 15/04](#) and [H02K 15/0433](#).
- Groups [H02K 15/04](#), [H02K 15/0433](#) and [H02K 15/048](#) should be considered in order to perform a complete search.
- 15/0485 {manufactured by shaping an annular winding}
- WARNING**
- Group [H02K 15/0485](#) is impacted by reclassification into group [H02K 15/0434](#).
- Groups [H02K 15/0485](#) and [H02K 15/0434](#) should be considered in order to perform a complete search.
- 15/06 . Embedding prefabricated windings in the machines
- 15/061 . . Air-gap windings
- 15/062 . . Windings in slots; Salient pole windings
- 15/063 . . . {Windings for large electric machines, e.g. (Frozen) bar windings (windings consisting of cables [H02K 15/065](#))}
- WARNING**
- Group [H02K 15/063](#) is no longer used for the classification of documents as of January 1, 2025.
- The content of this group is being reclassified into groups [H02K 15/0643](#), [H02K 15/0646](#), [H02K 15/065](#), [H02K 15/066](#), [H02K 15/067](#) and [H02K 15/068](#).
- All groups listed in this Warning should be considered in order to perform a complete search.

- 15/064 . . . Windings consisting of separate segments
WARNING
 Group [H02K 15/064](#) is impacted by reclassification into groups [H02K 15/0643](#) and [H02K 15/0646](#).
 Groups [H02K 15/064](#), [H02K 15/0643](#) and [H02K 15/0646](#) should be considered in order to perform a complete search.
- 15/0643 Hairpin windings
WARNING
 Group [H02K 15/0643](#) is incomplete pending reclassification of documents from group [H02K 15/064](#).
 Groups [H02K 15/064](#) and [H02K 15/0643](#) should be considered in order to perform a complete search.
- 15/0646 Bar windings consisting of pre-assembled multiple conductors, e.g. Roebel bars
WARNING
 Group [H02K 15/0646](#) is incomplete pending reclassification of documents from groups [H02K 15/063](#) and [H02K 15/064](#).
 Groups [H02K 15/063](#), [H02K 15/064](#) and [H02K 15/0646](#) should be considered in order to perform a complete search.
- 15/065 . . . Windings consisting of complete sections, e.g. coils or waves
WARNING
 Groups [H02K 15/065](#), [H02K 15/066](#), [H02K 15/067](#) and [H02K 15/068](#) are incomplete pending reclassification of documents from group [H02K 15/063](#).
 All groups listed in this Warning should be considered in order to perform a complete search.
- 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; Embedding windings by 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, e.g. applying insulating tapes
WARNING
 Group [H02K 15/10](#) is incomplete pending reclassification of documents from group [H02K 15/105](#).
 Group [H02K 15/10](#) is also impacted by reclassification into groups [H02K 15/104](#), [H02K 15/106](#) and [H02K 15/108](#).
 All groups listed in this Warning should be considered in order to perform a complete search.
- 15/104 . . Insulating between conductors
WARNING
 Group [H02K 15/104](#) is incomplete pending reclassification of documents from groups [H02K 15/10](#) and [H02K 15/105](#).
 Groups [H02K 15/10](#), [H02K 15/105](#) and [H02K 15/104](#) should be considered in order to perform a complete search.
- 15/105 . . {to the windings}
 (*Frozen*)
WARNING
 Group [H02K 15/105](#) is no longer used for the classification of documents as of January 1, 2025.
 The content of this group is being reclassified into groups [H02K 15/10](#), [H02K 15/104](#), [H02K 15/106](#) and [H02K 15/108](#).
 All groups listed in this Warning should be considered in order to perform a complete search.
- 15/106 . . Insulating between conductors and cores
WARNING
 Group [H02K 15/106](#) is incomplete pending reclassification of documents from groups [H02K 15/10](#) and [H02K 15/105](#).
 All groups listed in this Warning should be considered in order to perform a complete search.
- 15/108 . . with slot liners
WARNING
 Group [H02K 15/108](#) is incomplete pending reclassification of documents from groups [H02K 15/10](#) and [H02K 15/105](#).
 All groups listed in this Warning should be considered in order to perform a complete search.

- 15/12 . . Impregnating, moulding insulation, heating or drying of windings, stators, rotors or machines
- WARNING**
- Group [H02K 15/12](#) is impacted by reclassification into groups [H02K 15/121](#), [H02K 15/122](#) and [H02K 15/123](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/121 . . of cores
- WARNING**
- Group [H02K 15/121](#) is incomplete pending reclassification of documents from group [H02K 15/12](#).
- Groups [H02K 15/12](#) and [H02K 15/121](#) should be considered in order to perform a complete search.
- 15/122 . . of windings
- WARNING**
- Group [H02K 15/122](#) is incomplete pending reclassification of documents from group [H02K 15/12](#).
- Groups [H02K 15/12](#) and [H02K 15/122](#) should be considered in order to perform a complete search.
- 15/123 . . of casings or enclosures
- WARNING**
- Group [H02K 15/123](#) is incomplete pending reclassification of documents from group [H02K 15/12](#).
- Groups [H02K 15/12](#) and [H02K 15/123](#) should be considered in order to perform a complete search.
- 15/125 . . Heating or drying of machines in operational state, e.g. standstill heating
- 15/13 . . Applying slot closure means in the cores; Manufacture of slot closure means
- 15/14 . . Casings; Enclosures; Supports
- WARNING**
- Group [H02K 15/14](#) is impacted by reclassification into groups [H02K 15/142](#), [H02K 15/144](#), [H02K 15/146](#) and [H02K 15/148](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 15/142 . . by moulding
- WARNING**
- Group [H02K 15/142](#) is incomplete pending reclassification of documents from group [H02K 15/14](#).
- Groups [H02K 15/14](#) and [H02K 15/142](#) should be considered in order to perform a complete search.
- 15/144 . . of shafts, bearings or supports therefor
- WARNING**
- Group [H02K 15/144](#) is incomplete pending reclassification of documents from group [H02K 15/14](#).
- Groups [H02K 15/14](#) and [H02K 15/144](#) should be considered in order to perform a complete search.
- 15/146 . . of brush holders
- WARNING**
- Group [H02K 15/146](#) is incomplete pending reclassification of documents from group [H02K 15/14](#).
- Groups [H02K 15/14](#) and [H02K 15/146](#) should be considered in order to perform a complete search.
- 15/148 . . Insulating casings or enclosures ([H02K 15/123 takes precedence](#))
- WARNING**
- Group [H02K 15/148](#) is incomplete pending reclassification of documents from group [H02K 15/14](#).
- Groups [H02K 15/14](#) and [H02K 15/148](#) should be considered in order to perform a complete search.
- 15/16 . . Centring rotors within the stators
- 15/165 . . Balancing the rotors
- 15/20 . . Shaping or compacting conductors or winding heads after the installation of the winding in the cores or machines; Applying fastening means on winding heads
- 15/22 . . Shaping or compacting conductors in slots or around salient poles ([H02K 15/28 takes precedence](#))
- 15/24 . . Shaping or compacting winding heads ([H02K 15/0428](#), [H02K 15/28](#), [H02K 15/36 take precedence](#))
- 15/26 . . . Applying fastening means on winding heads
- 15/28 . . using electrodynamic forces
- 15/30 . . Manufacture of winding connections
- WARNING**
- Group [H02K 15/30](#) is impacted by reclassification into group [H02K 15/34](#).
- Groups [H02K 15/30](#) and [H02K 15/34](#) should be considered in order to perform a complete search.
- 15/32 . . Manufacture of terminal arrangements; Connecting the terminals to external circuits
- 15/33 . . Connecting winding sections; Forming leads; Connecting leads to terminals
- WARNING**
- Group [H02K 15/33](#) is impacted by reclassification into group [H02K 15/34](#).
- Groups [H02K 15/33](#) and [H02K 15/34](#) should be considered in order to perform a complete search.

- 15/34 . . . Connecting the neutral point
WARNING
 Group [H02K 15/34](#) is incomplete pending reclassification of documents from groups [H02K 15/30](#) and [H02K 15/33](#).
 Groups [H02K 15/30](#), [H02K 15/33](#) and [H02K 15/34](#) should be considered in order to perform a complete search.
- 15/35 . . . Form-wound windings
- 15/36 . . . Processes or apparatus for simultaneously twisting two or more open ends of hairpins after their insertion into the machine (for simultaneously twisting two or more hairpins prior to mounting into the machine [H02K 15/0428](#))
- 15/38 . . . Manufacturing or repairing cooling fluid boxes, e.g. ensuring both electrical and fluid connection of terminals of fluid cooled windings
- 15/40 . Assembling dynamo-electric machines ([H02K 15/16](#) takes precedence)
WARNING
 Group [H02K 15/40](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/40](#) should be considered in order to perform a complete search.
- 15/50 . Disassembling, repairing or modifying dynamo-electric machines (repairing of cooling fluid boxes [H02K 15/38](#))
WARNING
 Group [H02K 15/50](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/50](#) should be considered in order to perform a complete search.
- 15/60 . Hoisting or moving dynamo-electric machines
WARNING
 Group [H02K 15/60](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/60](#) should be considered in order to perform a complete search.
- 15/70 . Cleaning dynamo-electric machines
WARNING
 Group [H02K 15/70](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/70](#) should be considered in order to perform a complete search.
- 15/80 . Manufacturing lines specially adapted for dynamo-electrical machines, e.g. feeding or unloading
WARNING
 Group [H02K 15/80](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/80](#) should be considered in order to perform a complete search.
- 15/90 . Positioning or clamping dynamo-electric machines, e.g. jigs
WARNING
 Group [H02K 15/90](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/90](#) should be considered in order to perform a complete search.
- 15/95 . Installation of current collectors, e.g. commutators, slip-rings or brushes
WARNING
 Group [H02K 15/95](#) is incomplete pending reclassification of documents from group [H02K 15/00](#).
 Groups [H02K 15/00](#) and [H02K 15/95](#) should be considered in order to perform a complete search.
- 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
- 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}
- 21/026 {Axial air gap machines}
- 21/027 {Conical air gap machines}
- 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}
- 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}
- 21/04 . . . Windings on magnets for additional excitation {; Windings and magnets for additional excitation}
- 21/042 . . . {with permanent magnets and field winding both rotating}
- 21/044 {Rotor of the claw pole type}
- 21/046 . . . {with rotating permanent magnets and stationary field winding}
- 21/048 {Rotor of the claw pole type}
- 21/10 . . . Rotating armatures
- 21/12 . . . with stationary armatures and rotating magnets
- 21/125 . . . {having an annular armature coil ([H02K 21/14 - H02K 21/24 take precedence](#))}
- 21/14 . . . with magnets rotating within the armatures
- 21/145 {having an annular armature coil (with homopolar co-operation [H02K 21/20](#))}
- 21/16 . . . having annular armature cores with salient poles (with homopolar co-operation [H02K 21/20](#))
- 21/18 . . . having horse-shoe armature cores (with homopolar co-operation [H02K 21/20](#))
- 21/185 {with the axis of the rotor perpendicular to the plane of the armature}
- 21/20 . . . having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar machine
- 21/22 . . . with magnets rotating around the armatures, e.g. flywheel magnetos
- 21/222 {Flywheel magnetos}

- 21/225 {having I-shaped, E-shaped or similarly shaped armature cores}
- 21/227 . . . {having an annular armature coil}
- 21/24 . . with magnets axially facing the armatures, e.g. hub-type cycle dynamos
- 21/26 . with rotating armatures and stationary magnets
- 21/28 . . with armatures rotating within the magnets
- 21/30 . . . having annular armature cores with salient poles (with homopolar co-operation H02K 21/36)
- 21/32 . . . having horse-shoe magnets (with homopolar co-operation H02K 21/36)
- 21/325 {with the axis of the rotating armature perpendicular to the plane of the magnet}
- 21/34 . . . having bell-shaped or bar-shaped magnets, e.g. for cycle lighting (with homopolar co-operation H02K 21/36)
- 21/36 . . . with homopolar co-operation
- 21/38 . with rotating flux distributors, and armatures and magnets both stationary
- 21/40 . . with flux distributors rotating around the magnets and within the armatures
- 21/42 . . with flux distributors rotating around the armatures and within the magnets
- 21/44 . . with armature windings wound upon the magnets
- 21/46 . Motors having additional short-circuited winding for starting as an asynchronous motor
- 21/48 . Generators with two or more outputs
- 23/00 DC commutator motors or generators having mechanical commutator; Universal AC/DC commutator motors**
- 23/02 . characterised by arrangement for exciting
- 23/023 . . {having short-circuited brushes}
- 23/026 . . {having an unregular distribution of the exciting winding or of the excitation over the poles}
- 23/04 . . having permanent magnet excitation
- 23/06 . . having shunt connection of excitation windings
- 23/08 . . having series connection of excitation windings
- 23/10 . . having compound connection of excitation windings
- 23/12 . . having excitation produced by current sources independent of the armature circuit
- 23/14 . . having high-speed excitation or de-excitation, e.g. by neutralising the remanent excitation field
- 23/16 . . having angularly adjustable excitation field, e.g. by pole reversing or pole switching
- 23/18 . . having displaceable main or auxiliary brushes
- 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
- 23/22 . . having compensating or damping windings
- 23/24 . . having commutating-pole windings
- 23/26 . characterised by the armature windings
- 23/28 . . having open windings, i.e. not closed within the armatures
- 23/30 . . having lap or loop windings
- 23/32 . . having wave or undulating windings
- 23/34 . . having mixed windings
- 23/36 . . having two or more windings; having two or more commutators; having two or more stators
- 23/38 . . having winding or connection for improving commutation, e.g. equipotential connection
- 23/40 . characterised by the arrangement of the magnet circuits
- 23/405 . . {Machines with a special form of the pole shoes}
- 23/42 . . having split poles, i.e. zones of varying reluctance by gaps in poles or by poles with different spacing of the air gap
- 23/44 . . having movable, e.g. turnable, iron parts
- 23/46 . . having stationary shunts, i.e. magnetic cross flux
- 23/48 . . having adjustable armatures
- 23/50 . Generators with two or more outputs
- 23/52 . Motors acting also as generators, e.g. starting motors used as generators for ignition or lighting
- 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
- 23/68 . Structural association with auxiliary mechanical devices, e.g. with clutches or brakes
- 24/00 Machines adapted for the instantaneous transmission or reception of the angular displacement of rotating parts, e.g. synchro, selsyn**
- 25/00 DC interrupter motors or generators**
- 26/00 Machines adapted to function as torque motors, i.e. to exert a torque when stalled**
- 27/00 AC commutator motors or generators having mechanical commutator**
- 27/02 . characterised by the armature winding
- 27/04 . having single-phase operation in series or shunt connection
- 27/06 . . with a single or multiple short-circuited commutator, e.g. repulsion motor
- 27/08 . . with multiple-fed armature
- 27/10 . . with switching devices for different modes of operation, e.g. repulsion-induction motor
- 27/12 . having multi-phase operation
- 27/14 . . in series connection
- 27/16 . . in shunt connection with stator feeding
- 27/18 . . in shunt connection with rotor feeding
- 27/20 . Structural association with a speed regulating device
- 27/22 . having means for improving commutation, e.g. auxiliary fields, double windings, double brushes
- 27/24 . having two or more commutators
- 27/26 . having disc armature
- 27/28 . Structural association with auxiliary electric devices influencing the characteristic of the machine or controlling the machine
- 27/30 . Structural association with auxiliary mechanical devices, e.g. with clutches or brakes
- 29/00 Motors or generators having non-mechanical commutating devices, e.g. discharge tubes or semiconductor devices**

- 29/03 . with a magnetic circuit specially adapted for avoiding torque ripples or self-starting problems
- 29/06 . with position sensing devices ([H02K 29/03 takes precedence](#))
- 29/08 . . using magnetic effect devices, e.g. Hall-plates, magneto-resistors ([H02K 29/12 takes precedence](#))
- 29/10 . . using light effect devices
- 29/12 . . using detecting coils {using the machine windings as detecting coil}
- 29/14 . with speed sensing devices ([H02K 29/03 takes precedence](#))
- 31/00 Acyclic motors or generators, i.e. DC machines having drum or disc armatures with continuous current collectors**
- 31/02 . with solid-contact collectors
- 31/04 . with at least one liquid-contact collector
- 33/00 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](#))**
- 33/02 . with armatures moved one way by energisation of a single coil system and returned by mechanical force, e.g. by springs
- 33/04 . . wherein the frequency of operation is determined by the frequency of uninterrupted AC energisation
- 33/06 . . . with polarised armatures
- 33/08 . . . with DC energisation superimposed on AC energisation
- 33/10 . . wherein the alternate energisation and de-energisation of the single coil system is effected or controlled by movement of the armatures
- 33/12 . with armatures moving in alternate directions by alternate energisation of two coil systems
- 33/14 . . wherein the alternate energisation and de-energisation of the two coil systems are effected or controlled by movement of the armatures
- 33/16 . with polarised armatures moving in alternate directions by reversal or energisation of a single coil system
- 33/18 . with coil systems moving upon intermittent or reversed energisation thereof by interaction with a fixed field system, e.g. permanent magnets
- 35/00 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](#))**
- 35/02 . with moving magnets and stationary coil systems
- 35/04 . with moving coil systems and stationary magnets
- 35/06 . with moving flux distributors, and both coil systems and magnets stationary
- 37/00 Motors with rotor rotating step by step and without interrupter or commutator driven by the rotor, e.g. stepping motors**
- 37/02 . of variable reluctance type
- 37/04 . . with rotors situated within the stators
- 37/06 . . with rotors situated around the stators
- 37/08 . . with rotors axially facing the stators
- 37/10 . of permanent magnet type ([H02K 37/02 takes precedence](#))
- 37/12 . . with stationary armatures and rotating magnets
- 37/125 . . . {Magnet axially facing armature}
- 37/14 . . . with magnets rotating within the armatures
- 37/16 having horseshoe armature cores
- 37/18 of homopolar type
- 37/20 . . with rotating flux distributors, the armatures and magnets both being stationary
- 37/22 . Damping units
- 37/24 . Structural association with auxiliary mechanical devices
- 39/00 Generators specially adapted for producing a desired non-sinusoidal waveform**
- 41/00 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](#))}**
- 41/02 . Linear motors; Sectional motors
- 41/025 . . Asynchronous motors
- 41/03 . . Synchronous motors; Motors moving step by step; Reluctance motors ([H02K 41/035 takes precedence](#))
- 41/031 . . . {of the permanent magnet type}
- 41/033 {with armature and magnets on one member, the other member being a flux distributor}
- 41/035 . . DC motors; Unipolar motors
- 41/0352 . . . {Unipolar motors}
- 41/0354 {Lorentz force motors, e.g. voice coil motors}
- 41/0356 {moving along a straight path}
- 41/0358 {moving along a curvilinear path}
- 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}
- 41/065 . . {Nutating motors}
- 44/00 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**
- 44/02 . Electrodynamic pumps
- 44/04 . . Conduction pumps
- 44/06 . . Induction pumps
- 44/08 . Magnetohydrodynamic [MHD] generators
- 44/085 . . {with conducting liquids}
- 44/10 . . Constructional details of electrodes
- 44/12 . . Constructional details of fluid channels
- 44/14 . . . Circular or screw-shaped channels
- 44/16 . . Constructional details of the magnetic circuits
- 44/18 . . for generating AC power
- 44/20 . . . by changing the polarity of the magnetic field
- 44/22 . . . by changing the conductivity of the fluid
- 44/24 . . . by reversing the direction of fluid
- 44/26 . . . by creating a travelling magnetic field
- 44/28 . Association of MHD generators with conventional generators (nuclear power plants including a MHD generator [G21D 7/02](#))
- 47/00 Dynamo-electric converters**

- 47/02 . AC/DC converters or vice versa
- 47/04 . . Motor/generators
- 47/06 . . Cascade converters
- 47/08 . . Single-armature converters
- 47/10 . . . with booster machines on the AC side
- 47/12 . DC/DC converters
- 47/14 . . Motor/generators
- 47/16 . . Single-armature converters, e.g. metadyne
- 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
- 47/30 . . Single-armature phase-number converters without frequency conversion
- 49/00 Dynamo-electric clutches; Dynamo-electric brakes**
- 49/02 . of the asynchronous induction type
- 49/04 . . of the eddy-current hysteresis type
- 49/043 . . . {with a radial airgap}
- 49/046 . . . {with an axial airgap}
- 49/06 . of the synchronous type ([H02K 49/10](#) takes precedence)
- 49/065 . . {hysteresis type}
- 49/08 . of the collector armature type
- 49/10 . of the permanent-magnet type
- 49/102 . . {Magnetic gearings, i.e. assembly of gears, linear or rotary, by which motion is magnetically transferred without physical contact (magnetized gearings with physical contact [F16H 13/12](#), [F16H 49/005](#))}
- 49/104 . . {Magnetic couplings consisting of only two coaxial rotary elements, i.e. the driving element and the driven element}
- 49/106 . . . {with a radial air gap}
- 49/108 . . . {with an axial air gap}
- 49/12 . of the acyclic type
- 51/00 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**
- 53/00 Alleged dynamo-electric perpetua mobilia**
- 55/00 Dynamo-electric machines having windings operating at cryogenic temperatures**
- 55/02 . of the synchronous type
- 55/04 . . with rotating field windings
- 55/06 . of the homopolar type
- 99/00 Subject matter not provided for in other groups of this subclass**
- 99/10 . {Generators}
- 99/20 . {Motors}
- 2201/00 Specific aspects not provided for in the other groups of this subclass relating to the magnetic circuits**
- 2201/03 . Machines characterised by aspects of the air-gap between rotor and stator
- 2201/06 . Magnetic cores, or permanent magnets characterised by their skew
- 2201/09 . Magnetic cores comprising laminations characterised by being fastened by caulking
- 2201/12 . Transversal flux machines
- 2201/15 . Sectional machines
- 2201/18 . Machines moving with multiple degrees of freedom
- 2203/00 Specific aspects not provided for in the other groups of this subclass relating to the windings**
- 2203/03 . Machines characterised by the wiring boards, i.e. printed circuit boards or similar structures for connecting the winding terminations
- 2203/06 . Machines characterised by the wiring leads, i.e. conducting wires for connecting the winding terminations
- 2203/09 . Machines characterised by wiring elements other than wires, e.g. bus rings, for connecting the winding terminations
- 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

H02K

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