

ECLA**EUROPEAN CLASSIFICATION****H02K**

DYNAMO-ELECTRIC MACHINES (measuring instruments G01; dynamo-electric relays [H01H53/00](#); conversion of dc or ac input power into surge output power [N: [H03K3/53](#)]; loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers H04R) [C9410]

Notes

1. This subclass covers structural adaptation of the machine for the purposes of its control.
2. This subclass does not cover starting, regulating, electronically commutating, braking, or otherwise controlling motors, generators or dynamo-electric converters, in general, which are covered by subclass H02P.

H02K1/00

Details of the magnetic circuit (magnetic circuits or magnets in general, magnetic circuits for transformers for power supply [H01F](#); magnetic circuits for relays [H01H50/16](#))

H02K1/02

- . characterised by the magnetic material

H02K1/04

- . characterised by the material used for insulating the magnetic circuit or parts thereof (insulation of windings [H02K3/30](#))

H02K1/06

- . characterised by the shape, form, or construction

H02K1/08

- . . Salient poles

H02K1/10

- . . . Commutating poles

H02K1/12

- . . Stationary parts of the magnetic circuit

H02K1/14

- . . . Stator cores with salient poles

H02K1/14B

- [N: consisting of C-shaped cores] [N0205] [C0410]

H02K1/14B1

- [N: of the horse-shoe type] [N0410]

H02K1/14C

- [N: having an annular coil, e.g. of the claw-pole type] [N0205]

H02K1/14D

- [N: consisting of a generally annular yoke with salient poles] [N0205]

H02K1/14D1

- [N: Sectional cores ([H02K1/14B](#) takes precedence)] [N0403] [C0410]

H02K1/16

- . . . Stator cores with slots for windings

H02K1/16B

- [N: Shape, form or location of the slots]

H02K1/17

- . . . Stator cores with permanent magnets

H02K1/18

- . . . Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures

H02K1/18A

- [N: to stators axially facing the rotor, i.e. with axial or conical air gap] [N9902]

H02K1/18B

- [N: to outer stators] [N9902]

H02K1/18C

- [N: to inner stators] [N9902]

H02K1/20

- . . . with channels or ducts for flow of cooling medium

H02K1/22

- . . Rotating parts of magnetic circuit

H02K1/22B

- . . . [N: Rotor cores with windings and permanent magnets (for additional excitation in synchronous motors or generators [H02K21/04R](#); in synchronous motors

| | | | | |
|-----------------|---|---|---|--|
| | | | | having additional short-circuited winding for starting as an asynchronous motor H02K21/46) [N9907] [C1106] |
| H02K1/22B1 | . | . | . | [N: of the claw-pole type] [N9907] |
| H02K1/24 | . | . | . | Rotor cores with salient poles; [N: Variable reluctance rotors] [C0903] |
| H02K1/24B | . | . | . | [N: of the claw-pole type] [N9602] |
| H02K1/24C | . | . | . | [N: Variable reluctance rotors] [N0903] |
| H02K1/26 | . | . | . | Rotor cores with slots for windings |
| H02K1/26B | . | . | . | [N: Shape, form or location of the slots] |
| H02K1/27 | . | . | . | Rotor cores with permanent magnets [N: (rotor cores for synchronous machines with means for mechanical adjustment of the excitation flux H02K21/02M)] [C1203] |
| H02K1/27B | . | . | . | [N: Inner rotor] |
| H02K1/27B1 | . | . | . | [N: where the magnetisation axis of the magnets is axial] |
| H02K1/27B2 | . | . | . | [N: where the magnetisation axis of the magnets is radial or tangential] |
| H02K1/27B2B | . | . | . | [N: consisting of a single magnet or of a plurality of axially juxtaposed single magnets] |
| H02K1/27B2B2 | . | . | . | {7 dots} [N: Annular magnets] [N0205] |
| H02K1/27B2C | . | . | . | [N: consisting of a plurality of circumferentially positioned magnets] |
| H02K1/27B2C4 | . | . | . | {7 dots} [N: consisting of magnets arranged with the same polarity] [N0903] |
| H02K1/27B2C5 | . | . | . | {7 dots} [N: consisting of magnets or groups of magnets arranged with alternating polarity] [N0903] |
| H02K1/27B2C5E | . | . | . | {8 dots} [N: Magnets embedded in the magnetic core] [N0903] |
| H02K1/27B2C5E2 | . | . | . | {9 dots} [N: having a flux concentration effect] [N0903] |
| H02K1/27B2C5E2R | . | . | . | {10 dots} [N: consisting of tangentially magnetized radial magnets] [N0903] |
| H02K1/27B2C5S | . | . | . | {8 dots} [N: Surface mounted magnets; Inset magnets] [N0903] |
| H02K1/27C | . | . | . | [N: Outer rotor] |
| H02K1/27D | . | . | . | [N: Rotor axially facing stator] [N0205] |
| H02K1/28 | . | . | . | Means for mounting or fastening rotating magnetic parts on to, or to, the rotor structures |
| H02K1/30 | . | . | . | using intermediate part or parts, e.g. spider |
| H02K1/32 | . | . | . | with channels or ducts for flow of cooling medium |
| H02K1/32B | . | . | . | [N: between salient poles] [N9701] |
| H02K1/34 | . | . | . | Reciprocating, oscillating, or vibrating part of magnetic circuit |

H02K3/00 Details of windings (coils in general [H01F5/00](#)) [C9410]

| | | | | |
|----------|---|---|---|---|
| H02K3/02 | . | . | . | Windings characterised by the conductor material (conductors in general H01B1/00 , H01B5/00) |
| H02K3/04 | . | . | . | Windings characterised by the conductor shape, form, or construction, e.g. with bar conductor |
| H02K3/12 | . | . | . | arranged in slots |
| H02K3/14 | . | . | . | with transposed conductors, e.g. twisted conductor |
| H02K3/16 | . | . | . | for damping, commutating, or other auxiliary purposes |

- H02K3/18 . . Windings for salient poles
- H02K3/20 . . . for damping, commutating, or other auxiliary purposes
- H02K3/22 . . consisting of hollow conductors
- H02K3/24 . . with channels or ducts between the conductors for flow of cooling medium
- H02K3/26 . . consisting of printed conductors
- H02K3/28 . . Layout of windings or of connections between windings ([windings for pole-changing H02K17/06, H02K17/14, H02K19/12, H02K19/32](#))

- H02K3/30 . Windings characterised by the insulating material ([insulating bodies in general H01B3/00, H01B17/00](#))

- H02K3/32 . Windings characterised by the shape, form, or construction of the insulation [[N: \(H02K3/46 takes precedence\)](#)] [C1203]
- H02K3/32B . . [[N: for windings on salient poles, such as claw-shaped poles](#)]
- H02K3/34 . . between conductors or between conductor and core, e.g. slot insulation
- H02K3/34B . . . [[N: between conductor and core, e.g. slot insulation](#)]
- H02K3/38 . . around winding heads, equalising connectors, or connections thereto
- H02K3/40 . . for high voltage, e.g. affording protection against corona

- H02K3/42 . Means for preventing or reducing eddy-current losses in the winding heads, e.g. by shielding

- H02K3/44 . Protection against moisture or chemical attack; Windings specially adapted for operation in liquid or gas

- H02K3/46 . Fastening of windings on stator or rotor structure
- H02K3/47 . . Air-gap windings, i.e. iron-free windings
- H02K3/48 . . in slots
- H02K3/487 . . . Slot-closing devices
- H02K3/493 where the devices are magnetic
- H02K3/50 . . Fastening of winding heads, equalising connectors, or connections thereto [[N: \(H02K3/52 takes precedence\)](#)] [C1203]
- H02K3/50B . . . [[N: for large machine windings, e.g. bar windings \(H02K3/51 takes precedence\)](#)][N9709] [C1202]
- H02K3/51 . . . applicable to rotors only
- H02K3/52 . . Fastening salient pole windings or connections thereto
- H02K3/52A . . . [[N: applicable to stators only](#)] [N9705]
- H02K3/52A1 [[N: for generally annular cores with salient poles](#)] [N9705]
- H02K3/52A2 [[N: for U-shaped, E-shaped or similarly shaped cores](#)] [N9705]
- H02K3/52A3 [[N: Annular coils, e.g. for cores of the claw-pole type](#)] [N9705]
- H02K3/52B . . . [[N: applicable to rotors only](#)] [N9505]
- H02K3/52B1 [[N: of the claw-pole type](#)] [N9602]

- H02K5/00** **Casings; Enclosures; Supports** ([casings for electric apparatus in general H05K5/00](#))

- H02K5/02 . Casings or enclosures characterised by the material thereof

- H02K5/04 . Casings or enclosures characterised by the shape, form or construction thereof
- H02K5/06 . . Cast metal casings
- H02K5/08 . . Insulating casings
- H02K5/10 . . affording protection from ingress, e.g. of water, of fingers [N: (means for protecting brushes or brush holders [H02K5/14](#))] [C1203]
- H02K5/12 . . specially adapted for operating in liquid or gas (combined with cooling arrangements [H02K9/00](#))
- H02K5/124 . . . Sealing of the shaft
- H02K5/128 . . . using air-gap sleeve or air-gap disc
- H02K5/128B [N: the partition wall in the air-gap being non cylindrical]
- H02K5/128C [N: of the submersible type]
- H02K5/132 . . . Submersible electric motor ([H02K5/128](#) takes precedence; pumping installations or systems for submerged use [F04D13/08](#))
- H02K5/136 . . . explosion-proof
- H02K5/14 . . Means for supporting or protecting brushes or brush holders
- H02K5/14B . . . [N: for cooperation with slip-rings] [N9602]
- H02K5/14C . . . [N: for cooperation with commutators] [N9602]
- H02K5/14C1 [N: Fixedly supported brushes or brush holders, e.g. leaf or leaf-mounted brushes] [N9606] [C9701]
- H02K5/14C2 [N: Pivotaly supported brushes or brush holders][N9606][C9701]
- H02K5/14C3 [N: Slidably supported brushes] [N9606] [C9701]
- H02K5/15 . . Mounting arrangements for bearing-shields or end plates
- H02K5/16 . . Means for supporting bearings, e.g. insulating support, means for fitting the bearing in the bearing-shield (magnetic bearings [H02K7/09](#))
- H02K5/16C . . . [N: radially supporting the rotary shaft at both ends of the rotor ([H02K5/16E](#), [H02K5/167](#), [H02K5/173](#) take precedence)] [N0001]
- H02K5/16D . . . [N: radially supporting the rotary shaft at only one end of the rotor ([H02K5/16E](#), [H02K5/167](#), [H02K5/173](#) take precedence)] [N0001]
- H02K5/16E . . . [N: radially supporting the rotor around a fixed spindle; radially supporting the rotor directly ([H02K5/167](#), [H02K5/173](#) take precedence)] [N0001]
- H02K5/167 . . . using sliding-contact or spherical cap bearings
- H02K5/167C [N: radially supporting the rotary shaft at both ends of the rotor ([H02K5/167E](#) takes precedence)] [N0001]
- H02K5/167D [N: radially supporting the rotary shaft at only one end of the rotor ([H02K5/167E](#) takes precedence)] [N0001]
- H02K5/167E [N: radially supporting the rotor around a fixed spindle; radially supporting the rotor directly] [N0001]
- H02K5/173 . . . using ball bearings or bearings with rolling contact
- H02K5/173C [N: radially supporting the rotary shaft at both ends of the rotor ([H02K5/173E](#) takes precedence)] [N0001]
- H02K5/173D [N: radially supporting the rotary shaft at only one end of the rotor ([H02K5/173E](#) takes precedence)] [N0001]
- H02K5/173E [N: radially supporting the rotor around a fixed spindle; radially supporting the rotor directly] [N0001]
- H02K5/18 . . with ribs or fins for improving heat transfer
- H02K5/20 . . with channels or ducts for flow of cooling medium

- H02K5/22
 - . . Other additional parts of casings, e.g. shaped to form connection or terminal box
 - H02K5/22B
 - . . . [N: Terminal boxes or connection arrangements (specially adapted for submersible motors [H02K5/132](#))] [C1203]
 - H02K5/24
 - . specially adapted for suppression or reduction of noise or vibration [N: (elastic means for supporting brush holders [H02K5/14](#); elastic means for supporting bearings [H02K5/16](#))] [C1203]
 - H02K5/26
 - . Means for adjusting the casing relative to its support
 - H02K7/00**

Arrangements for handling mechanical energy structurally associated with the machine, e.g. structural association with mechanical driving motor or auxiliary dynamo-electric machine [C9410]
 - H02K7/00B
 - . [N: Couplings; Details of shafts (means for mounting rotors on shafts [H02K1/28](#))] [N0307]
 - H02K7/00C
 - . [N: Structural association of a motor or generator with the drive train of a motor vehicle] [N0403]
 - H02K7/02
 - . Additional mass for increasing inertia, e.g. fly-wheel
 - H02K7/02B
 - . . [N: for power storage] [N0307]
 - H02K7/04
 - . Balancing means
 - H02K7/06
 - . Means for converting reciprocating into rotary motion or vice-versa
 - H02K7/06B
 - . . [N: using rotary unbalanced masses (for generating mechanical vibrations in general [B06B1/16](#))] [N9502]
 - H02K7/06B1
 - . . . [N: integrally combined with motor parts, e.g. motors with eccentric rotors] [N0312]
 - H02K7/065
 - . . Electromechanical oscillators; Vibrating magnetic drives (in time-pieces [G04C5/00](#))
 - H02K7/07
 - . . using pawl and ratchet wheel
 - H02K7/075
 - . . using crankshaft or eccentric
 - H02K7/08
 - . Structural association with bearings (support in machine casing [H02K5/16](#))
 - H02K7/08B
 - . . [N: specially adapted for worm gear drives ([H02K7/09](#) takes precedence)] [C0001]
 - H02K7/08C
 - . . [N: radially supporting the rotary shaft at both ends of the rotor ([H02K7/08E](#), [H02K7/09](#) take precedence)] [N0001]
 - H02K7/08D
 - . . [N: radially supporting the rotary shaft at only one end of the rotor ([H02K7/08E](#), [H02K7/09](#) take precedence)] [N0001]
 - H02K7/08E
 - . . [N: radially supporting the rotor around a fixed spindle; radially supporting the rotor directly ([H02K7/09](#) takes precedence)] [N0001]
 - H02K7/08E1
 - . . . [N: radially supporting the rotor directly] [N0001]
 - H02K7/09
 - . . with magnetic bearings
 - H02K7/10
 - . Structural association with clutches, brakes, gears, pulleys, mechanical starters
- [N: **Note**
Group [H02K7/12](#) takes precedence over groups [H02K7/102](#) to [H02K7/118](#)
]

| | |
|--------------|--|
| H02K7/10B | . . [N: with pulleys] [N0312] |
| H02K7/10B2 | . . . [N: structurally associated with the machine rotor (H02K7/10B3 takes precedence)] [N0312] [C0403] |
| H02K7/10B3 | . . . [N: Machine arranged inside the pulley] [N0312] |
| H02K7/10B3B | [N: Machine of the outer rotor type] [N0312] |
| H02K7/102 | . . with friction brakes |
| H02K7/102B | . . . [N: Magnetically influenced friction brakes] |
| H02K7/102B2 | [N: using electromagnets] [N9904] |
| H02K7/102B2B | [N: using axial electromagnets with generally annular air gap] [N9904] |
| H02K7/102B3 | [N: using stray fields] [N9904] |
| H02K7/102B3B | [N: axially attracting the brake armature in the frontal area of the magnetic core] [N9904] |
| H02K7/104 | . . with eddy-current brakes |
| H02K7/106 | . . with dynamo-electric brakes |
| H02K7/108 | . . with friction clutches |
| H02K7/108B | . . . [N: Magnetically influenced friction clutches] |
| H02K7/11 | . . with dynamo-electric clutches |
| H02K7/112 | . . with friction clutches and brakes |
| H02K7/112B | . . . [N: Magnetically influenced friction clutches and brakes] |
| H02K7/114 | . . with dynamo-electric clutches and brakes |
| H02K7/116 | . . with gears [C9410] |
| H02K7/116B | . . . [N: where at least two gears have non-parallel axes without having orbital motion] [N9907] |
| H02K7/116B1 | [N: comprising worm and worm-wheel (structural association with bearings specially adapted for worm gear drives H02K7/08B)] [N9907] [C1203] |
| H02K7/118 | . . with starting device |
| H02K7/118B | . . . [N: with a mechanical one-way direction control, i.e. with means for reversing the direction of rotation of the rotor] [C1105] |
| H02K7/12 | . . with auxiliary limited movement of stator, rotor, or core parts, e.g. rotor axially movable for the purpose of clutching or braking |
| H02K7/12B | . . . [N: magnetically influenced] |
| H02K7/14 | . Structural association with mechanical load, e.g. hand-held machine tool, fan ([N: H02K7/00C takes precedence;]with fan or impeller for cooling the machine H02K9/06 ; for suction cleaners A47L) [C0403] |
| H02K7/14B | . . [N: Hand-held machine tool] |
| H02K7/16 | . . for operation above critical speed of vibration of rotating parts |
| H02K7/18 | . Structural association of electric generator with mechanical driving motor, e.g. turbine (if the driving-motor aspect predominates, see the relevant subclass of section F, e.g. F03B13/00) |
| H02K7/18A | . . [N: Rotary generators (H02K7/00C takes precedence)] [N9711] [C0403] |
| H02K7/18A1 | . . . [N: structurally associated with reciprocating piston engines (general aspects of generating sets, e.g. housing, F02B63/04)] [N9711] |
| H02K7/18A2 | . . . [N: structurally associated with turbines or similar engines] [N9711] |
| H02K7/18A2W | [N: wherein the turbine is a wind turbine (adaptation of a wind turbine to an |

- electric generator [F03D9/00C](#)) [N1012]
- H02K7/18A2W2 [N: Generators mounted in a nacelle or similar structure of a horizontal axis wind turbine] [N1105] [C1207]
- H02K7/18A3 . . . [N: structurally associated with wheels or associated parts (dynamos arranged in the wheel hub of cycles [B62J6/12](#))] [N9711]
- H02K7/18A4 . . . [N: driven by intermittent forces] [N9711]
- H02K7/18A5 . . . [N: driven by animals or vehicles ([H02K7/18A4](#) takes precedence)] [N9711] [M1203]
- H02K7/18B . . [N: Linear generators; sectional generators] [N9701] [C1105]
- H02K7/18B1 . . . [N: with reciprocating, linearly oscillating or vibrating parts] [C9711]
- H02K7/18B1B [N: structurally associated with free piston engines] [N9711]
- H02K7/18C . . [N: Generators with parts oscillating or vibrating about an axis] [N9711]
- H02K7/20 . Structural association with auxiliary dynamo-electric machine, e.g. with electric starter motor, with exciter
- H02K9/00** **Systems for cooling or ventilating** (channels or ducts in parts of the magnetic circuit [H02K1/20](#), [H02K1/32](#); channels or ducts in or between conductors [H02K3/22](#), [H02K3/24](#))
- H02K9/00B . [N: Details of cooling systems with unspecified cooling medium flowing through channels in or between the conductors]
- H02K9/02 . by ambient air flowing through the machine
- H02K9/04 . . having means for generating flow of cooling medium, e.g. having fan
- H02K9/06 . . . with fan or impeller driven by the machine shaft
- H02K9/08 . by gaseous cooling medium circulating wholly within the machine casing ([H02K9/10](#) takes precedence)
- H02K9/10 . by gaseous cooling medium flowing in closed circuit, a part of which is external to the machine casing
- H02K9/12 . . wherein the cooling medium circulates freely within the casing
- H02K9/14 . wherein gaseous cooling medium circulates between the machine casing and a surrounding mantle
- H02K9/16 . . wherein the cooling medium circulates through ducts or tubes within the casing
- H02K9/18 . . wherein the external part of the closed circuit comprises a heat exchanger structurally associated with the machine casing
- H02K9/19 . for machines with closed casing and with closed circuit cooling using a liquid cooling medium, e.g. oil
- H02K9/193 . . with provision for replenishing the cooling medium; with means for preventing leakage of the cooling medium
- H02K9/197 . . in which the rotor or stator space is fluid tight, e.g. to provide for different cooling media for rotor and stator
- H02K9/20 . . wherein the cooling medium vaporises within the machine casing
- H02K9/22 . by solid heat conducting material embedded in, or arranged in contact with, stator or rotor, e.g. heat bridge

- H02K9/24
 - Protection against failure of cooling arrangements, e.g. due to loss of cooling medium, due to interruption of the circulation of cooling medium ([circuit arrangements affording such protection H02H7/00](#))
- H02K9/26
 - Structural association with machine of devices for cleaning or drying cooling medium, e.g. of filter
- H02K9/28
 - Cooling of commutators, slip-rings, or brushes, e.g. by ventilating, ([current collectors in general H01R39/00](#))
- H02K11/00**
 - Structural association with measuring or protective devices or electric components, e.g. with resistor, with switch, with suppressor for radio interference**
 - [N: (heating or drying of machines in operational state, e.g. standstill heating [H02K15/12B](#); structural association with auxiliary electric devices influencing the characteristic of, or controlling: asynchronous induction motors [H02K17/30](#); synchronous generators without permanent magnets [H02K19/36](#); dc commutator machines or universal ac/dc commutator motors [H02K23/66](#); ac commutator machines [H02K27/28](#))] [C1203]**
- H02K11/00B
 - [N: Electric or magnetic shielding arrangements, i.e. for shielding the electrical machine, the machine components or external devices against electric or magnetic fields generated inside or outside the machine (H02K11/02 takes precedence)] [\[N9711\]](#) [\[C0611\]](#)
- H02K11/00F
 - [N: Structural association with devices for measuring, monitoring, protecting, switching] [\[N0611\]](#)
- H02K11/00F1
 - [\[N: actuated by or sensing speed or position \(specially adapted for machines having non-mechanical commutating devices \[H02K29/06\]\(#\), \[H02K29/14\]\(#\)\)\] \[N0611\]](#) [\[C1203\]](#)
- H02K11/00F1B
 - [\[N: using magnetic effect devices, e.g. Hall, magneto-resistive elements\]](#) [\[N0611\]](#)
- H02K11/00F1C
 - [\[N: using optical devices\]](#) [\[N0611\]](#)
- H02K11/00F1D
 - [\[N: using detecting coils; using the machine windings as detecting coil\]](#) [\[N0611\]](#) [\[C1203\]](#) [\[M1207\]](#)
- H02K11/00F1E
 - [\[N: using mechanically actuated centrifugal switches\]](#) [\[N0611\]](#)
- H02K11/00F2
 - [\[N: actuated by or sensing torque\]](#) [\[N0611\]](#)
- H02K11/00F3
 - [\[N: actuated by or sensing temperature \(overcurrent protection sensitive to other parameters than temperature \[H02K11/00F5\]\(#\)\)\] \[N0611\]](#) [\[C1105\]](#)
- H02K11/00F4
 - [\[N: actuated by or sensing over-voltage, e.g. over-voltage protection\]](#) [\[N0611\]](#)
- H02K11/00F5
 - [\[N: actuated by or sensing overcurrent\]](#) [\[N0611\]](#)
- H02K11/00F6
 - [\[N: Manual switches\]](#) [\[N0611\]](#)
- H02K11/00H
 - [N: Structural association with control circuits, drive circuits] [\[N0611\]](#)
- H02K11/00H1
 - [\[N: Drive circuits, e.g. power electronics \(\[H02K11/00H3\]\(#\) and \[H02K11/04D1\]\(#\) take precedence \)\]](#) [\[N0611\]](#) [\[C1207\]](#)
- H02K11/00H2
 - [\[N: with devices for recording or transmitting machine parameters, e.g. memory chips for diagnostic; radio-transmitters\]](#) [\[N0611\]](#)
- H02K11/00H3
 - [\[N: associated with gear motors of the worm-and-wheel type\]](#) [\[N1204\]](#)
- H02K11/00J
 - [N: Structural association with grounding devices] [\[N0611\]](#)
- H02K11/00K
 - [N: Structural association with other electrical or electronic devices] [\[N0611\]](#)

- H02K11/02 . for suppression of radio interference [N9410]
- H02K11/02A . . [N: Details, e.g. shields] [N9711]
- H02K11/02A1 . . . [N: Suppressors] [N9711]
- H02K11/02A1B [N: associated with brushes, brush holders or their supports] [N9711]
- H02K11/02A1C [N: associated with the rotor ([H02K13/10B](#) takes precedence)] [N9711]
- H02K11/04 . for rectification [N9410]
- H02K11/04B . . [N: with rotating rectifiers] [N9410]
- H02K11/04C . . [N: in motors ([H02K11/04B](#) takes precedence)] [N9410]
- H02K11/04D . . [N: in generators ([H02K11/04B](#) takes precedence)] [N9410]
- H02K11/04D1 . . . [N: Rectifiers combined with drive circuits in starter-generators] [N1204]

H02K13/00 **Structural associations of current collectors with motors or generators, e.g. brush mounting plates, connections to windings (supporting or protecting brushes or brush holders in motor casings or enclosures [H02K5/14](#)); Disposition of current collectors in motors or generators; Arrangements for improving commutation [C9410]**

- H02K13/00B . [N: Structural associations of slip-rings] [N9512]
- H02K13/00C . [N: Structural associations of commutators] [N9512]
- H02K13/02 . Connections of slip-rings with the winding
- H02K13/04 . Connections of commutator segments with the winding
- H02K13/06 . . Resistive connections between winding and commutator segments, e.g. by high-resistance choke, by transistor
- H02K13/08 . . Segments formed by extensions of winding
- H02K13/10 . Special arrangements of brushes or commutators for the purpose of improving commutation
- H02K13/10B . . [N: Spark suppressors associated with the commutator] [N9701] [C9711]
- H02K13/12 . Means for producing an axial reciprocation of the rotor and its associated current collector part, e.g. for polishing commutator surface
- H02K13/14 . Circuit arrangements for improvement of commutation, e.g. by use of unidirectionally conductive element

H02K15/00 **Methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing dynamo-electric machines (manufacture of current collectors in general [H01R43/00](#))**

- H02K15/00A . [N: Disassembling, repairing or modifying dynamo-electric machines (repairing of cooling fluid boxes [H02K15/00E4C2](#))] [C0704]
- H02K15/00B . [N: Manufacturing cage rotors]
- H02K15/00C . [N: Applying slot closure means in the core; Manufacture of slot closure means]

- H02K15/00D . [N: 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 [H02K15/04C1B](#)); Applying fastening means on winding heads] [C1106]
- H02K15/00D2 . . [N: Shaping or compacting conductors in slots or around salient poles (H02K15/00D4 takes precedence)] [N0602]
- H02K15/00D3 . . [N: Shaping or compacting winding heads ([H02K15/00D4](#), [H02K15/00E4C1](#) and [H02K15/04C1B](#) take precedence)] [N0602] [C1207]
- H02K15/00D3B . . . [N: Applying fastening means on winding headS (fastening by applying resin, glue, varnish and similar means [H02K15/12](#))] [N0602] [C1203]
- H02K15/00D4 . . [N: by means of electrodynamic forces] [N0602]
- H02K15/00E . [N: Manufacturing winding connections (manufacturing connectors in general H01R43/00)] [N9602] [C0704]
- H02K15/00E2 . . [N: Manufacturing the terminal arrangement per se; Connecting the terminals to an external circuit] [N0704]
- H02K15/00E4 . . [N: Connecting winding sections; Forming leads; Connecting leads to terminals] [N0704]
- H02K15/00E4B . . . [N: for random-wound windings] [N0704] [C1106]
- [N: **Note**
Windings consisting of cables are classified in [H02K15/00E4](#)]
- H02K15/00E4C . . . [N: for form-wound windings] [N0704] [C1207]
- H02K15/00E4C1 [N: 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 H02K15/04C1B)] [N1204]
- H02K15/00E4C2 [N: Manufacturing or repairing cooling fluid boxes, i.e. terminals of fluid cooled windings ensuring both electrical and fluid connection] [[N0704]
- H02K15/02 . of stator or rotor bodies
- H02K15/02B . . [N: with salient poles or claw-shaped poles]
- H02K15/02C . . [N: with slots]
- H02K15/02C1 . . . [N: Wound cores] [N9711] [C1203]
- H02K15/02C2 . . . [N: for fastening to casing or support, respectively to shaft or hub]
- H02K15/03 . . having permanent magnets
- H02K15/04 . of windings, prior to mounting into the machine (insulating windings [H02K15/10](#), [H02K15/12](#); coil manufacture in general [H01F41/02](#))
- H02K15/04B . . [N: Windings manufactured by etching, printing or stamping the complete coil] [N0704]
- H02K15/04C . . [N: Windings consisting of separate elements, e.g. bars, hairpins, segments, half coils] [N0704]
- H02K15/04C1 . . . [N: consisting of single conductors, e.g. hairpins] [N0704] [C1105]
- H02K15/04C1B [N: 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 [H02K15/00E4C1](#))] [N1106] [C1207]
- H02K15/04D . . [N: Wound windings] [N0704]

- H02K15/04D1 . . . [N: Loop windings (manufacturing of windings consisting of overlapped loops H02K15/04D2)] [N0704]
- H02K15/04D1F [N: Form wound coils] [N1105]
- H02K15/04D1R [N: Random wound coils] [N1105]
- H02K15/04D2 . . . [N: Lap windings (when on diagonally wound hollow coils [H02K15/04D4](#))] [N0704] [C1105]
- H02K15/04D2B [N: manufactured by flattening a spiral winding] [N0704]
- H02K15/04D3 . . . [N: Wave windings, undulated windings (when on diagonally wound hollow coils [H02K15/04D4](#))] [N0704] [M1203]
- H02K15/04D3B [N: manufactured by shaping an annular winding] [N0704]
- H02K15/04D4 . . . [N: Diagonally wound hollow coils] [N1105]

- H02K15/06 . Embedding prefabricated windings in the machine
- H02K15/06C . . [N: Air-gap windings] [N0602]
- H02K15/06D . . [N: Windings in slots; salient pole windings] [N0602]
- H02K15/06D1 . . . [N: Windings for large electric machines, e.g. bar windings (windings consisting of cables [H02K15/06D3](#))] [N0602] [C1203]
- H02K15/06D2 . . . [N: Windings consisting of separate segments, e.g. hairpin windings (H02K15/06D1 takes precedence)] [N0602]
- H02K15/06D3 . . . [N: Windings consisting of complete sections, e.g. coils, waves (windings for large electric machines other than those consisting of cables [H02K15/06D1](#))] [N0602] [C1203]
- H02K15/06D3B [N: inserted perpendicularly to the axis of the slots or inter-polar channels] [N0602] [C1203]
- H02K15/06D3C [N: inserted in parallel to the axis of the slots or inter-polar channels] [N0602] [C1203]
- H02K15/06D3C1 [N: Strippers] [N0602]

- H02K15/08 . Forming windings by laying conductors into or around core part
- H02K15/085 . . by laying conductors into slotted stators
- H02K15/09 . . by laying conductors into slotted rotors
- H02K15/095 . . by laying conductors around salient poles

- H02K15/10 . Applying solid insulation to the windings, the stator, or the rotor
- H02K15/10B . . [N: to the windings]

- H02K15/12 . Impregnating, heating or drying of windings, stators, rotors, or machines
- H02K15/12B . . [N: Heating or drying of machines in operational state, e.g. standstill heating] [N9701]

- H02K15/14 . Casings; Enclosures; Supports

- H02K15/16 . Centering the rotor within the stator; Balancing the rotor ([balancing in general G01M](#))[C9410]
- H02K15/16B . . [N: Balancing the rotor]

- H02K16/00** **Machines with more than one rotor or stator** [N: (machines for transmitting mechanical power from a driving shaft to a driven shaft and comprising structurally interrelated motor and generator parts [H02K51/00](#); permanent magnet machines with multiple rotors or stators relatively rotated for vectorially combining the excitation fields or the armature

voltages [H02K21/02M3V](#))] [C1203]

- H02K16/00B . [N: 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 [H02K23/60](#))] [N0103]
- H02K16/02 . Machines with one stator and two [N: or more] rotors [C0103]
- H02K16/02B . . [N: with rotors and moving stators connected in a cascade (cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter [H02K17/34](#))] [N0103] [M1203]
- H02K16/04 . Machines with one rotor and stators

Note

Group 16/00 takes precedence over groups [H02K17/00](#) to [H02K53/00](#).

H02K17/00

Asynchronous induction motors; Asynchronous induction generators

- H02K17/02 . Asynchronous induction motors
- H02K17/04 . . for single phase current
- H02K17/06 . . . having windings arranged for permitting pole-changing
- H02K17/08 . . . Motors with auxiliary phase obtained by externally fed auxiliary winding, e.g. capacitor motor
- H02K17/10 . . . Motors with auxiliary phase obtained by split-pole carrying short-circuited winding
- H02K17/12 . . for multi-phase current
- H02K17/14 . . . having windings arranged for permitting pole-changing
- H02K17/16 . . having rotor with internally short-circuited windings, e.g. cage rotor
- H02K17/16B . . . [N: characterised by the squirrel-cage or other short-circuited windings]
- H02K17/18 . . . having double or multiple-cage rotor
- H02K17/18B [N: characterised by the double- or multiple cage windings]
- H02K17/20 . . . having deep-bar rotor
- H02K17/20B [N: characterised by the deep-bar windings]
- H02K17/22 . . having rotor with windings connected to slip-rings
- H02K17/24 . . . in which both stator and rotor are fed with ac
- H02K17/26 . . having rotor or stator designed to permit synchronous operation [C1203]
- H02K17/28 . . having compensating winding for improving phase angle
- H02K17/30 . . Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the motor, e.g. with impedance, with switch (control arrangements external to the motor [H02P](#))
- H02K17/32 . . Structural association with auxiliary mechanical devices, e.g. clutch, brake (control arrangements external to the motor [H02P](#))
- H02K17/34 . . Cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter ([N: machines with rotors and moving stators connected in a cascade [H02K16/02B](#);] control of cascade-arrangements [H02P](#)) [C0103]
- H02K17/36 . . . with another asynchronous induction motor

- H02K17/38 . . . with a commutator machine
- H02K17/40 . . . with a rotary ac/dc converter ([cascade ac/dc converters H02K47/06](#))
- H02K17/42 . Asynchronous induction generators ([H02K17/02 takes precedence](#))
- H02K17/44 . . Structural association with exciting machine

H02K19/00 Synchronous motors or generators ([having permanent magnet H02K21/00](#))

- H02K19/02 . Synchronous motors
- H02K19/04 . . for single-phase current
- H02K19/06 . . . Motors having windings on the stator and a variable-reluctance soft-iron rotor without windings, e.g. inductor motor
- H02K19/08 . . . Motors having windings on the stator and a smooth rotor of material with large hysteresis without windings, e.g. hysteresis motor
- H02K19/10 . . for multi-phase current
- H02K19/10B . . . **[N: Motors having windings on the stator and a variable reluctance soft-iron rotor without windings]**
- H02K19/10C . . . **[N: Motors having windings in the stator and a smooth rotor of material with large hysteresis without windings]**
- H02K19/12 . . . characterised by the arrangement of exciting windings, e.g. for self-excitation, for compounding, for pole-changing
- H02K19/14 . . having additional short-circuited winding for starting as an asynchronous motor
- H02K19/16 . Synchronous generators
- H02K19/18 . . having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar generator
- H02K19/20 . . . with variable-reluctance soft-iron rotor without winding
- H02K19/22 . . having windings each turn of which co-operates alternately with poles of opposite polarity, e.g. heteropolar generator
- H02K19/24 . . . with variable-reluctance soft-iron rotor without winding
- H02K19/26 . . characterised by the arrangement of exciting winding
- H02K19/28 . . . for self-excitation
- H02K19/30 . . . for compounding
- H02K19/32 . . . for pole-changing
- H02K19/34 . . Generators with two or more outputs
- H02K19/36 . . Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the generator, e.g. with impedance, with switch ([control arrangements external to the generator H02P](#))
- H02K19/36B . . . **[N: with a voltage regulator] [N0602]**
- H02K19/38 . . Structural association with exciting machine

H02K21/00 Synchronous motors having permanent magnet; Synchronous generators having permanent magnet ([stator cores with permanent magnets H02K1/17](#); [rotor cores with permanent magnets H02K1/27](#))

- H02K21/02 . Details

| | | |
|---------------|-----------|---|
| H02K21/02M | . . | [N: Means for mechanical adjustment of the excitation flux] [N1008] |
| H02K21/02M2 | . . . | [N: by modifying the relative position between field and armature, e.g. between rotor and stator (vectorial combination of field or armature sections H02K21/02M3V)] [N1008] |
| H02K21/02M2S | | [N: by varying the amount of superposition, i.e. the overlap, of field and armature] [N1008] |
| H02K21/02M2S2 | | [N: Radial air gap machines] [N1008] |
| H02K21/02M2T | | [N: by varying the thickness of the air gap between field and armature] [N1008] |
| H02K21/02M2T2 | | [N: Axial air gap machines] [N1008] |
| H02K21/02M2T3 | | [N: Conical air gap machines] [N1008] |
| H02K21/02M3 | . . . | [N: 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] [N1008] |
| H02K21/02M3V | | [N: Vectorial combination of the fluxes generated by a plurality of field sections or of the voltages induced in a plurality of armature sections] [N1008] |
| H02K21/04 | . . | Windings on magnet for additional excitation [N: ; windings and magnets for additional excitation] [C1105] |
| H02K21/04R | . . . | [N: with permanent magnets and field winding both rotating] [N1105] |
| H02K21/04R1 | | [N: Rotor of the claw pole type] [N1105] |
| H02K21/04S | . . . | [N: with rotating permanent magnets and stationary field winding] [N1105] |
| H02K21/04S1 | | [N: Rotor of the claw pole type] [N1105] |
| H02K21/10 | . . | Rotating armatures |
| H02K21/12 | . . | with stationary armature and rotating magnet |
| H02K21/12C | . . | [N: having an annular armature coil (H02K21/14 to H02K21/24 take precedence)] [N9711] [N9711] |
| H02K21/14 | . . | magnet rotating within armature |
| H02K21/14C | . . . | [N: having an annular armature coil (with homopolar co-operation H02K21/20)] [N9711] |
| H02K21/16 | . . . | having an annular armature core with salient poles (with homopolar co-operation H02K21/20) |
| H02K21/18 | . . . | having horse-shoe armature core (with homopolar co-operation H02K21/20) |
| H02K21/18B | | [N: with the axis of the rotor perpendicular to the plane of the armature] [N9711] |
| H02K21/20 | . . . | having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar machine |
| H02K21/22 | . . | magnet rotating around armature, e.g. flywheel magneto |
| H02K21/22B | . . . | [N: Flywheel magnetos] [N9709] |
| H02K21/22B1 | | [N: having I-shaped, E-shaped or similarly shaped armature cores] [N9709] |
| H02K21/22C | . . . | [N: having an annular armature coil] [N9711] |
| H02K21/24 | . . | magnet axially facing armature, e.g. hub-type cycle dynamo |
| H02K21/26 | . . | with rotating armature and stationary magnet |
| H02K21/28 | . . | armature rotating within magnet |
| H02K21/30 | . . . | having an annular armature core with salient poles (with homopolar |

| | |
|----------------------------------|---|
| | co-operation H02K21/36) |
| H02K21/32 | . . . having a horse-shoe magnet (with homopolar co-operation H02K21/36) |
| H02K21/32B | [N: with the axis of the rotating armature perpendicular to the plane of the magnet] |
| H02K21/34 | . . . having bell-shaped or bar-shaped magnet, e.g. for cycle lighting (with homopolar co-operation H02K21/36) |
| H02K21/36 | . . . with homopolar co-operation |
| H02K21/38 | . with rotating flux distributor, and armature and magnet both stationary |
| H02K21/40 | . . flux distributor rotating around magnet and within armature |
| H02K21/42 | . . flux distributor rotating around armature and within magnet |
| H02K21/44 | . . armature windings wound upon magnet |
| H02K21/46 | . Motors having additional short-circuited winding for starting as an asynchronous motor |
| H02K21/48 | . Generators with two or more outputs |
| H02K23/00 | Dc commutator motors or generators having mechanical commutator; Universal ac/dc commutator motors |
| H02K23/02 | . characterised by the exciting arrangement |
| H02K23/02B | . . [N: having short-circuited brushes] |
| H02K23/02C | . . [N: having an unregular distribution of the exciting winding or of the excitation over the poles] |
| H02K23/04 | . . having permanent magnet excitation |
| H02K23/06 | . . having shunt connection of excitation windings |
| H02K23/08 | . . having series connection of excitation windings |
| H02K23/10 | . . having compound connection of excitation windings |
| H02K23/12 | . . having excitation produced by a current source independent of the armature circuit |
| H02K23/14 | . . having high-speed excitation or de-excitation, e.g. by neutralising the remanent excitation field |
| H02K23/16 | . . having angularly adjustable excitation field, e.g. by pole reversing, by pole switching |
| H02K23/18 | . . having displaceable main or auxiliary brushes |
| H02K23/20 | . . having additional brushes spaced intermediately of the main brushes on the commutator, e.g. cross-field machine, metadyne, amplidyne, other armature-reaction excited machine |
| H02K23/22 | . . having compensating or damping winding |
| H02K23/24 | . . having commutating-pole winding |
| H02K23/26 | . characterised by the armature winding |
| H02K23/28 | . . having open winding, i.e. not closed within armature |
| H02K23/30 | . . having lap winding; having loop winding |
| H02K23/32 | . . having wave winding; having undulating winding |
| H02K23/34 | . . having mixed windings |
| H02K23/36 | . . having more than one winding; having more than one commutator; having more |

- than one stator
- H02K23/38
 - having winding or connection for improving commutation, e.g. equipotential connection
- H02K23/40
 - characterised by the arrangement of the magnet circuit
- H02K23/40B
 - [N: Machines with a special form of the pole shoes]
- H02K23/42
 - having split poles, i.e. zones for varying reluctance by gaps in poles or by poles with different spacing of the air gap
- H02K23/44
 - having movable or turnable iron parts
- H02K23/46
 - having stationary shunts, i.e. magnetic cross flux
- H02K23/48
 - having adjustable armature
- H02K23/50
 - Generators with two or more outputs
- H02K23/52
 - Motors acting also as generators, e.g. starting motor used as generator for ignition or lighting
- H02K23/54
 - Disc armature motors or generators
- H02K23/56
 - Motors or generators having the iron core separated from armature winding
- H02K23/58
 - Motors or generators having no iron core
- H02K23/60
 - Motors or generators having a rotating armature and a rotating excitation field [N: (machines with only rotors in general [H02K16/00B](#))] [C0103]
- H02K23/62
 - Motors or generators with stationary armature and rotating excitation field
- H02K23/64
 - Motors specially adapted for running on dc or ac by choice
- H02K23/66
 - Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the machine, e.g. with impedance, with switch ([control arrangements external to the machine H02P](#))
- H02K23/68
 - Structural association with auxiliary mechanical devices, e.g. with clutch, with brake ([control arrangements external to the machine H02P](#))
- H02K24/00

Machines adapted for the instantaneous transmission or reception of the angular displacement of rotating parts, e.g. synchro, selsyn
- H02K25/00

Dc interrupter motors or generators
- H02K26/00

Machines adapted to function as torque motors, i.e. to exert a torque when stalled
- H02K27/00

Ac commutator motors or generators having mechanical commutator ([universal ac/dc motors](#) [N: [H02K23/00](#)], [H02K23/64](#)] [C1203]
- H02K27/02
 - characterised by the armature winding

| | |
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| H02K27/04 | <ul style="list-style-type: none"> having single-phase operation in series or shunt connection |
| H02K27/06 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> with a single or multiple short-circuited commutator, e.g. repulsion motor |
| H02K27/08 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> with multiple-fed armature |
| H02K27/10 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> with switching devices for different modes of operation, e.g. repulsion-induction motor |
| H02K27/12 | <ul style="list-style-type: none"> having multi-phase operation |
| H02K27/14 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> in series connection |
| H02K27/16 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> in shunt connection with stator feeding |
| H02K27/18 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> in shunt connection with rotor feeding |
| H02K27/20 | <ul style="list-style-type: none"> Structural association with a speed regulating device |
| H02K27/22 | <ul style="list-style-type: none"> having means for improving commutation, e.g. auxiliary fields, double windings, double brushes |
| H02K27/24 | <ul style="list-style-type: none"> having two or more commutators |
| H02K27/26 | <ul style="list-style-type: none"> having disc armature |
| H02K27/28 | <ul style="list-style-type: none"> Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the machine (control arrangements external to the machine H02P) |
| H02K27/30 | <ul style="list-style-type: none"> Structural association with auxiliary mechanical devices, e.g. clutch, brake (control arrangements external to the machine H02P) |
| H02K29/00 | Motors or generators having non-mechanical commutating devices, e.g. discharge tubes, semiconductor devices |
| H02K29/03 | <ul style="list-style-type: none"> with a magnetic circuit specially adapted for avoiding torque ripples or self-starting problems [N9410] |
| H02K29/06 | <ul style="list-style-type: none"> with position sensing devices [C1203] |
| H02K29/08 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> using magnetic effect devices, e.g. Hall-plates, magneto-resistors (H02K29/12 takes precedence) |
| H02K29/10 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> using light effect devices |
| H02K29/12 | <ul style="list-style-type: none"> <ul style="list-style-type: none"> using detecting coils [N: using the machine windings as detecting coil] [C1203] |
| H02K29/14 | <ul style="list-style-type: none"> with speed sensing devices ([N: structural association with other mechanical energy devices H02K7/00]) [C1203] |
| H02K31/00 | Acyclic motors or generators, i.e. dc machines having a drum or disc armature with continuous current collectors |
| H02K31/02 | <ul style="list-style-type: none"> with solid-contact collectors |
| H02K31/04 | <ul style="list-style-type: none"> with at least one liquid-contact collector |
| H02K33/00 | Motors with reciprocating, oscillating, or vibrating magnet, armature, or coil system (arrangements for handling mechanical energy structurally associated with |

motors [H02K7/00](#), e.g. [H02K7/06](#))

- H02K33/02
 - with armature moved one way by energisation of a single coil system and returned by mechanical force, e.g. by spring
- H02K33/04
 - . wherein the frequency of operation is determined by the frequency of uninterrupted ac energisation
- H02K33/06
 - . . with polarised armature
- H02K33/08
 - . . with dc energisation superimposed on ac energisation
- H02K33/10
 - . wherein the alternate energisation and de-energisation of the single coil system is effected or controlled by movement of the armature
- H02K33/12
 - with armature moving in alternate directions by alternate energisation of two coil systems
- H02K33/14
 - . wherein the alternate energisation and de-energisation of the two coil systems are effected or controlled by movement of the armature
- H02K33/16
 - with polarised armature moving in alternate directions by reversal or energisation of a single coil system
- H02K33/18
 - with coil system moving upon intermittent or reversed energisation thereof by interaction with a fixed field system, e.g. permanent magnet
- H02K35/00**

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](#) [H02K7/00](#), e.g. [H02K7/06](#))
- H02K35/02
 - with moving magnet and stationary coil system
- H02K35/04
 - with moving coil system and stationary magnet
- H02K35/06
 - with moving flux distributor, and both coil system and magnet stationary
- H02K37/00**

Motors with rotor rotating step by step and without interrupter or commutator driven by the rotor, e.g. stepping motors
- H02K37/02
 - variable reluctance type
- H02K37/04
 - . Rotor situated within stator
- H02K37/06
 - . Rotor situated around stator
- H02K37/08
 - . Rotor axially facing stator
- H02K37/10
 - permanent magnet type [\[C1203\]](#)
- H02K37/12
 - . with stationary armature and rotating magnet
- H02K37/12B
 - . . [\[N: Magnet axially facing armature\]](#)
- H02K37/14
 - . . Magnet rotating within armature
- H02K37/16
 - . . . having horse-shoe armature core
- H02K37/18
 - . . . homopolar type
- H02K37/20
 - . with rotating flux distributor, the armature and magnet both being stationary

- H02K37/22 . Damping units
- H02K37/24 . Structural association with auxiliary mechanical devices
- H02K39/00 Generators specially adapted for producing a desired non-sinusoidal waveform**
- H02K41/00 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 [N: (electromagnetic launchers [F41B6/00](#))] [C9512]**
 - H02K41/02 . Linear motors; Sectional motors
 - H02K41/025 . . Asynchronous motors
 - H02K41/03 . . Synchronous motors; Motors moving step by step; Reluctance motors ([H02K41/035](#) takes precedence)
 - H02K41/03M . . . [N: of the permanent magnet type] [N1203]
 - H02K41/03M1 [N: with armature and magnets on one member, the other member being a flux distributor] [N1203]
 - H02K41/035 . . Dc motors; Unipolar motors
 - H02K41/035B . . . [N: Unipolar motors] [N0103]
 - H02K41/035B1 [N: Lorentz force motors, e.g. voice coil motors] [N0103]
 - H02K41/035B1B [N: moving along a straight path] [N0103]
 - H02K41/035B1C [N: moving along a curvilinear path] [N0103]
 - H02K41/06 . Rolling motors, i.e. 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; [N: Nutating motors, i.e. having the rotor axis inclined with respect to the stator axis and performing a nutational movement as the rotor rolls on the stator] [C1202]
 - H02K41/06B . . [N: Nutating motors] [N1203]
- H02K44/00 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**
 - H02K44/02 . Electrodynamic pumps
 - H02K44/04 . . Conduction pumps
 - H02K44/06 . . Induction pumps
 - H02K44/08 . Magnetohydrodynamic (MHD) generators
 - H02K44/08B . . [N: with conducting liquids]
 - H02K44/10 . . Constructional details of electrodes
 - H02K44/12 . . Constructional details of fluid channel
 - H02K44/14 . . . Circular or screw-shaped channel
 - H02K44/16 . . Constructional details of the magnetic circuit
 - H02K44/18 . . for generating ac power
 - H02K44/20 . . . by changing the polarity of the magnetic field

- H02K44/22 . . . by changing the conductivity of the fluid
- H02K44/24 . . . by reversing the direction of fluid
- H02K44/26 . . . by creating a travelling magnetic field
- H02K44/28 . Association of MHD generators with conventional generators ([nuclear power plants including a MHD generator G21D7/02](#))

H02K47/00 **Dynamo-electric converters**

- H02K47/02 . Ac/dc converters of vica versa
- H02K47/04 . . Motor/generators
- H02K47/06 . . Cascade converters
- H02K47/08 . . Single-armature converters
- H02K47/10 . . . with booster machine on the ac side
- H02K47/12 . Dc/dc converters
- H02K47/14 . . Motor/generators
- H02K47/16 . . Single-armature converters, e.g. metadyne
- H02K47/18 . Ac/ac converters
- H02K47/20 . . Motor/generators
- H02K47/22 . . Single-armature frequency converters with or without phase-number conversion
- H02K47/24 . . . having windings for different numbers of poles
- H02K47/26 . . . operating as under- or over-synchronously running asynchronous induction machines, e.g. cascade arrangement of asynchronous and synchronous machines
- H02K47/28 . . . operating as commutator machines with added slip-rings
- H02K47/30 . . Single-armature phase-number converters without frequency conversion

H02K49/00 **Dynamo-electric clutches; Dynamo-electric brakes** ([electrically or magnetically actuated clutches or brakes F16D27/00, F16D29/00, F16D65/28](#); [magnetic-particle clutches F16D37/02](#); adapted for use as dynamometers G01L)

- H02K49/02 . of the asynchronous induction type
- H02K49/04 . . of the eddy-current hysteresis type [[N: \(eddy current brakes cooperating with a rail B61H7/08A\)](#)] [C1203]
- H02K49/04C . . . [[N: with a radial airgap](#)] [N1203]
- H02K49/04D . . . [[N: with an axial airgap](#)] [N1203]
- H02K49/06 . of the synchronous type [[N: \(H02K49/10 takes precedence\)](#)] [C1203]
- H02K49/06B . . [[N: hysteresis type](#)]
- H02K49/08 . of the collector armature type
- H02K49/10 . of the permanent-magnet type
- H02K49/10B . . [[N: Magnetic gearings, i.e. assembly of gears, linear or rotary, by which motion is magnetically transferred without physical contact \(magnetized gearings with](#)

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| | physical contact F16H13/12 , F16H49/00C) [N9510] [C1203] |
| H02K49/10C | . . [N: Magnetic couplings consisting of only two coaxial rotary elements, i.e. the driving element and the driven element] [N1203] |
| H02K49/10C1 | . . . [N: with a radial air gap] [N1203] |
| H02K49/10C2 | . . . [N: with an axial air gap] [N1203] |
| H02K49/12 | . of the acyclic type |
| H02K51/00 | 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 |
| H02K53/00 | Alleged dynamo-electric perpetua mobilia |
| H02K55/00 | Dynamo-electric machines having windings operating at cryogenic temperatures |
| H02K55/02 | . of the synchronous type |
| H02K55/04 | . . with rotating field windings |
| H02K55/06 | . of the homopolar type |
| H02K57/00 | Dynamo-electric machines not provided for in groups H02K17/00 to H02K55/00 |
| H02K57/00B | . [N: generators] |
| H02K57/00C | . [N: motors] |