H02P

CONTROL OR REGULATION OF ELECTRIC MOTORS, GENERATORS, OR DYNAMO-ELECTRIC CONVERTERS; CONTROLLING TRANSFORMERS, REACTORS OR CHOKE COILS (structure of the starter, brake, or other control devices, see the relevant subclasses, e.g. mechanical brake F16D, mechanical speed regulator G05D, variable resistor H01C, starter switch H01H; systems for regulating electric or magnetic variables using transformers, reactors or choke coils G05F; arrangements structurally associated with motors, generators, dynamo-electric converters, transformers, reactors or choke coils, see the relevant subclasses, e.g. H01F, H02K; connection or control of one generator, transformer, reactor, choke coil, or dynamo-electric converter with regard to conjoint operation with similar or other source of supply H02J; control or regulation of static converters H02M)

Definition statement

This subclass/group covers:

Arrangements for

- starting,
- regulating,
- electronically commutating,
- braking,

or otherwise controlling:

- motors,
- generators,
- dynamo-electric converters, clutches, brakes, gears,
- transformers,
- reactors or choke coils, of the types classified in the relevant subclasses, e.g. H01F, H02K.

References relevant to classification in this group

This subclass/group does not cover:

Arrangements for merely turning on an electric motor to drive a machine or device, e.g.: vacuum cleaner, vehicle starter motor	A47L 9/28, F02N 11/00
Hybrid vehicle, conjoint control, arrangements for mounting	B60K, B60W
Arrangements for controlling electric generators for charging batteries	H02J 7/00
Arrangements for starting, regulating, electronically commutating, braking, or otherwise controlling electric machines not otherwise provided for, e.g. machines using piezo-electric effects	H02N

Informative references

Attention is drawn to the following places, which may be of interest for search:

Curtain	A47H
Hand hammers, drills	B25D 17/00
Printers	B41J
Heating cooling ventilating	B60H 1/00
Electrically propelled vehicles, current collector, maglev	B60L
Lighting	B60Q 1/00
Electric circuits for vehicle	B60R, H02J
Wiper control	B60S 1/00
Power steering	B42D 5/00
Marine	B63H
Elevator	B66B

Washing machines, household appliances	D06F 39/00
Sliding roof, power window	E05F
Gas turbine	F02C
Starting of engine with electric motor	F02N 11/00
Windmills	F03D
Pumps, compressors	F04B
Motor cooling	F04D
Structure of the mechanical brake	F16D
Air-conditioning	F24F
Refrigeration	F25B
Measuring arrangements	G01B 7/00
Electromagnetic actuators	G02B 26/00
Safety, control principles	G05B 9/00
Position control, servos	G05B 19/00
Structure of the mechanical speed regulator	G05D
Control of linear speed, control of angular speed; control of acceleration or deceleration	G05D 13/00
Systems for regulating electric or magnetic variables using transformers, reactors or choke coils	G05F
Cooling fans for computers	G06F 1/00
Data storage device (hard disk CD, DVD BlueRay...)	G11B

Structure of the variable resistor	H01C
Magnets, inductances or transformers structurally associated with motors, generators, dynamo-electric converters, transformers, reactors or choke coils	H01F
Structure of the starter switch	H01H
Emergency protective arrangements with automatic interruption of supply	H02H
Dynamo-electric machines structurally associated with motors, generators, dynamo-electric converters, transformers, reactors or choke coils	H02K
Apparatus for conversion between AC and AC, AC and DC or DC and DC and for use with mains or similar power supply systems; conversion of DC or AC input power into surge output power; control or regulation thereof	H02M
Automatic control, starting, synchronisation, or stabilisation of generators of electronic oscillations or pulses	H03L
Housing, cooling of housing	H05K

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Control	influencing a variable in any way, e.g. changing its direction or its value (including changing it to or from zero), maintaining it constant, limiting its range of variation;
Regulation	maintaining a variable at a desired

	value, or within a desired range of values, by comparison of the actual value with the desired value.

H02P 1/00

Arrangements for starting electric motors or dynamo-electric converters (starting of synchronous motors with electronic commutators except reluctance motors, H02P6/20, H02P6/22; starting dynamo-electric motors rotating step by step H02P8/04; vector control H02P21/00)

References relevant to classification in this group

This subclass/group does not cover:

Starting of synchronous motors with electronic commutators except reluctance motors	H02P 6/20, H02P 6/22
Starting dynamo-electric motors rotating step by step	H02P 8/04
Vector control	H02P 21/00

H02P 1/021

[N: Protection against "no voltage condition"]

Definition statement

This subclass/group covers:

Arrangements or measures for starting a motor when the power re-establishes after a power failure, e.g. when the motor does not automatically starts turning.

H02P 1/029

[N: Restarting, e.g. after power failure]

Definition statement

This subclass/group covers:

In particular restarting before the motor has stopped.

H02P 1/10

Manually-operated on/off switch controlling relays or contactors operating sequentially for starting a motor (sequence determined by power-operated multi-position switch H02P1/08)

References relevant to classification in this group

This subclass/group does not cover:

Sequence determined by power-operated multi-position switch	H02P 1/08

H02P 1/12

Switching devices centrifugally operated by the motor

Definition statement

This subclass/group covers:

Repulsion start induction motor (RS-IM):

An alternating-current motor that starts as a repulsion motor; at a predetermined speed the commutator bars are short-circuited to give the equivalent of a squirrel-cage winding for operation as an induction motor with constant-speed characteristics.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Starting an individual polyphase induction motor	H02P 1/26

H02P 1/18

for starting an individual dc motor

Definition statement

This subclass/group covers:

- Starting of DC motors supplied with a DC voltage, whereby the motor is seen as an independent block not being further elaborated.

- Starting of commutated motors
- Starting of fan motors for a PC, also being supplied with DC

Informative references

Attention is drawn to the following places, which may be of interest for search:

Computer fans	G06F 1/20
Starting of a commutator motor supplied with AC	H02P 1/24

H02P 1/20

by progressive reduction of resistance in series with armature winding

Definition statement

This subclass/group covers:

The resistance may be an actual resistor or it could also be a semiconductor operating in its linear region.

References relevant to classification in this group

This subclass/group does not cover:

PWM controlled semiconductors	H02M 3/00

H02P 1/24

for starting an individual ac commutator motor (starting of ac/dc commutator motors H02P1/18)

Definition statement

This subclass/group covers:

In this group is for starting a commutator motor supplied by AC.

References relevant to classification in this group

This subclass/group does not cover:

Starting of ac/dc commutator motors	H02P 1/18

H02P 1/26

for starting an individual polyphase induction motor

Definition statement

This subclass/group covers:

Repulsion start induction motor (RS-IM):

An alternating-current motor that starts as a repulsion motor; at a predetermined speed the commutator bars are short-circuited to give the equivalent of a squirrel-cage winding for operation as an induction motor with constant-speed characteristics.

Relationship between large subject matter areas

The polyphase refers to the supply. An induction motor having main and auxiliary windings could be considered as a polyphase motor, but not within the meaning of H02P 1/26. They are classified in H02P 1/42 because they are supplied by a single phase power supply which supplies the main and auxiliary windings.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Repulsion start induction motor (RS-IM)	H02P 1/12

H02P 1/265

[N: Means for starting or running a triphase motor on a single phase supply]

Definition statement

This subclass/group covers:

Other means than an inverter

H02P 1/28

by progressive increase of voltage applied to primary circuit of motor

Definition statement

This subclass/group covers:

Other means than an inverter.

H02P 1/30

by progressive increase of frequency of supply to primary circuit of motor

Definition statement

This subclass/group covers:

Other means than an inverter.

H02P 1/34

by progressive reduction of impedance in secondary circuit

Definition statement

This subclass/group covers:

The resistance may be an actual resistor or it could also be a semiconductor operating in its linear region.

References relevant to classification in this group

This subclass/group does not cover:

PWM controlled semiconductors	H03M 3/00

H02P 1/38

by pole-changing

Informative references

Attention is drawn to the following places, which may be of interest for search:

Pole changing for purposes other then starting	H02P 25/20

H02P 1/42

for starting an individual single-phase induction motor [N: (H02P27/04 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Using variable-frequency supply voltage, e.g. inverter or converter supply voltage	H02P 27/04

Informative references

Attention is drawn to the following places, which may be of interest for search:

Running of a single phase induction motor	H02P 25/04

H02P 1/426

[N: by using a specially adapted frequency converter]

Definition statement

This subclass/group covers:

Any typical frequency converter can be used to start from almost DC to nominal speed without modifications. These documents are not to be classified in this group except in the case where special measures are integrated with the sole purpose of starting.

H02P 1/46

for starting an individual synchronous motor [N: (H02P27/04 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Using variable-frequency supply voltage, e.g. inverter or converter supply voltage	H02P 27/04

H02P 1/48

by pole-changing

Informative references

Attention is drawn to the following places, which may be of interest for search:

Pole changing for purposes other then starting	H02P 25/20

H02P 1/50

by changing over from asynchronous to synchronous operation (H02P1/48 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Starting an individual synchronous motor by pole-changing	H02P 1/48
Pole changing for purposes other then starting	H02P 25/20

H02P 3/00

Arrangements for stopping or slowing electric motors, generators, or dynamo-electric converters (stopping of synchronous motors with electronic commutators except reluctance motors, H02P6/24; stopping dynamo-elecric motors rotating step by step H02P8/24; vector control H02P21/00

References relevant to classification in this group

This subclass/group does not cover:

Electrodynamic brake systems for vehicles in general	B60L 7/00
Dynamic electric resistor braking	B60L 7/02
Dynamic electric regenerative braking	B60L 7/10

Eddy-current braking	B60L 7/28
Arrangements for controlling dynamo-electric brakes or clutches	H02P 15/00
Vector control	H02P 21/00
Stopping of synchronous motors with electronic commutators except reluctance motors,	H02P 6/24
Stopping dynamo-electric motors rotating step by step	H02P 8/24

H02P 3/04

Means for stopping or slowing by a separate brake, e.g. friction brake, eddy-current brake (brakes F16D, H02K49/00)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Brakes	F16D, H02K 49/00

H02P 3/08

for stopping or slowing a dc motor

Definition statement

This subclass/group covers:

DC motors, i.e. a motor supplied with a DC voltage, whereby the motor is seen as an independent block not further elaborated. Typically this is a commutated motor, however e.g. a fan motor for a PC is also supplied with DC and therefore the starting of a PC fan motor is also classified here.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Commutator motor supplied with AC	H02P 3/18

H02P 3/12

by short-circuit or resistive braking

Definition statement

This subclass/group covers:

Arrangements where energy is not regenerated but lost in resistors or in the impedances of the motor.

H02P 3/14

by regenerative braking

Definition statement

This subclass/group covers:

Arrangements or measures where the energy is regenerated, e.g. kinetic energy is reused by sending it back to the supply or stored in an energy buffer.

H02P 3/18

for stopping or slowing an ac motor

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

AC motor	a motor supplied with an AC voltage, whereby the motor is seen as an independent block not further elaborated

H02P 3/22

by short-circuit or resistive braking

Definition statement

This subclass/group covers:

Arrangements where energy is not regenerated but lost in resistors or in the impedances of the motor.

H02P 4/00

Arrangements specially adapted for regulating or controlling the speed or torque of electric motors that can be connected to two or more different voltage or current supplies (starting H02P1/00; stopping or slowing H02P3/00; vector control H02P21/00)

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping or slowing	H02P 3/00
Vector control	H02P 21/00

H02P 5/00

Arrangements specially adapted for regulating or controlling the speed or torque of two or more electric motors (starting H02P1/00; stopping or slowing H02P3/00; [N: synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position H02P6/00; motors rotating step by step H02P8/00;] vector control H02P21/00)

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping	H02P 3/00
Synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position	H02P 6/00
Motors rotating step by step	H02P 8/00
Vector control	H02P 21/00

H02P 5/483

[N: using differential movement]

Definition statement

This subclass/group covers:

Differential gearboxes where the output speed or phase represents the difference in speeds or phase.

H02P 5/503

[N: using equalising lines]

Definition statement

This subclass/group covers:

Rotor and stator lines of first motor coupled in parallel with rotor and stator lines of second motor.

H02P 5/506

[N: Direct ratio control]

Definition statement

This subclass/group covers:

First motor switches second motor on during a limited period in one turn (e.g. 120 degrees of 360 degrees).

H02P 5/52

additionally providing control of relative angular displacement of relative angular position or phase

Definition statement

This subclass/group covers:

Not only the speed is equalized but also the phase, e.g. newspaper printing presses where a phase difference results in paper jams.

H02P 5/60

controlling combinations of dc and ac dynamo-electric motors (H02P5/46 takes precedence)

Definition statement

This subclass/group covers:

In this group a DC motor is a motor supplied with a DC voltage, whereby the motor is seen as an independent block not further elaborated. Typically this is a commutated motor, however e.g. a fan motor for a PC is also supplied with DC and therefore the starting of a PC fan motor is also classified here although anno 2010 they are most likely BLDC. A commutator motor supplied with AC goes to H02P 5/74 and subgroups.

In this group an AC motor is a motor supplied with an AC voltage, whereby the motor is seen as an independent block not further elaborated.

References relevant to classification in this group

This subclass/group does not cover:

For speed regulation of two or more dynamo-electric motors in relation to one another	H02P 5/46

H02P 5/68

controlling two or more dc dynamo-electric motors (H02P5/46, H02P5/60 take precedence)

Definition statement

This subclass/group covers:

In this group a DC motor is a motor supplied with a DC voltage, whereby the motor is seen as an independent block not further elaborated. Typically this is a commutated motor, however e.g. a fan motor for a PC is also supplied with DC and therefore the starting of a PC fan motor is also classified here.

References relevant to classification in this group

This subclass/group does not cover:

For speed regulation of two or more dynamo-electric motors in relation to one another	H02P 5/46
Controlling combinations of dc and ac dynamo-electric motors	H02P 5/60
Commutator motor supplied with AC	H02P 5/74

H02P 5/74

controlling two or more ac dynamo-electric motors (H02P5/46, H02P5/60 take precedence)

Definition statement

This subclass/group covers:

In this group an AC motor is a motor supplied with an AC voltage, whereby the motor is seen as an independent block not further elaborated.

References relevant to classification in this group

This subclass/group does not cover:

For speed regulation of two or more dynamo-electric motors in relation to one another	H02P 5/46
Controlling combinations of dc and ac dynamo-electric motors	H02P 5/60

H02P 6/00

Arrangements for controlling synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position; Electronic commutators therefor (stepping motors H02P8/00; vector control H02P21/00; reluctance motors H02P25/08)

Definition statement

This subclass/group covers:

Arrangements for controlling synchronous motors with electronic commutators where commutation is done in dependence on the rotor position, or other dynamo-electric motors with electronic commutators where commutation is done in dependence on the rotor position; Electronic commutators therefore

Brushless DC motors, e.g. BLDC motors, BL motors, electronically commutated motors, ECMs, EC motors

References relevant to classification in this group

This subclass/group does not cover:

Motors rotating step by step	H02P 8/00

Vector control	H02P 21/00
Reluctance motors	H02P 25/08

Informative references

Attention is drawn to the following places, which may be of interest for search:

Other aspects of synchronous motors	H02P 25/021

H02P 6/002

[N: Arrangements for controlling current (H02P6/10 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Change in current is for reducing torque ripple	H02P 6/10

H02P 6/003

[N: Controlling the direction of rotation]

Definition statement

This subclass/group covers:

In a cost effective approach for the control of a Brushless motor there is a direct link between the Hall sensors and the switching transistors, which enable it to turn only in one direction. An additional circuit for enabling it to run in both direction fall under this group.

H02P 6/08

Arrangements for controlling the speed or torque of a single motor [N: (H02P6/002 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Arrangements for controlling the current	H02P 6/002

H02P 6/10

providing reduced torque ripple; controlling torque ripple

Relationship between large subject matter areas

The source of the torque ripple is commutation in this group. Reducing is done e.g. by controlling with trapezoidal current or other waveforms.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Reduction by changing commutation time	H02P 6/142
Any other source for reduction in torque ripple	H02P 29/0038

H02P 6/142

Changing commutation time

Definition statement

This subclass/group covers:

Creating a delay or advance between the measured or calculated position of the rotor and the commutation itself. e.g. switching before (e.g. for higher speed) or after (e.g. lower torque) or to compensate for misalignment.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Change in current for reducing torque ripple	H02P 6/10

H02P 6/16

Circuit arrangements for detecting position (structural arrangement of position sensors H02K29/06)

Definition statement

This subclass/group covers:

All circuits and methods which detect the rotor position inside the motor (or outside if the rotor is mounted on the outside and the stator on the inside).

Informative references

Attention is drawn to the following places, which may be of interest for search:

Position control outside the motor e.g. position of elements which are externally connected to the motor	G05B 19/00
Synchronous motor detecting rotor position	H02P 25/023
Structural arrangement of position sensors	H02K 29/06

H02P 6/18

without separate position detecting elements, e.g. using back-emf in windings [N: (H02P6/165 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Circuit arrangements for detecting position	H02P 6/16

H02P 6/185

N: using pulse excitation

References relevant to classification in this group

This subclass/group does not cover:

Current being modulated, e.g. by a high frequency component	H02P 6/18

H02P 6/20

Arrangements for starting (H02P6/08, H02P6/22 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Controlling speed or torque of a single motor	H02P 6/08
Starting in a selected direction	H02P 6/22

H02P 6/205

[N: Open loop start]

Definition statement

This subclass/group covers:

Starting without feedback from the position detection e.g. when back emf is to low.

H02P 6/22

Arrangements for starting in a selected direction of rotation

Definition statement

This subclass/group covers:

Starting without a movement in the wrong direction e.g. for hard disks spindle motor.

H02P 7/00

Arrangements for regulating or controlling the speed or torque of electric DC motors (starting H02P1/00; stopping or slowing H02P3/00; [N: synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position H02P6/00; motors rotating step by step H02P8/00;] vector control H02P21/00)

Definition statement

This subclass/group covers:

DC motor is typically a brushed commutator motor. The DC motor can be supplied by an AC voltage or AC current. There are three types of connections used for DC electric commutator motors: series, shunt and compound. An armature generally refers to one of the two principal electrical components of an electromechanical machine–generally in a motor or generator, but it may also mean the pole piece of a permanent magnet or electromagnet, or the moving iron part of a solenoid or relay. The other component is the field winding or field magnet. The role of the "field" component is simply to create a magnetic field (magnetic flux) for the armature to interact with, so this component can comprise either permanent magnets, or electromagnets formed by a conducting coil. The armature, in contrast, must carry current so it is always a conductor or a conductive coil, oriented normal to both the field and to the direction of motion, torque (rotating machine), or force (linear machine). The armature's role is twofold. The first is to carry current crossing the field, thus creating shaft torque in a rotating machine or force in a linear machine. The second role is to generate an electromotive force (EMF). Other DC motors are (from Wikipedia) A homopolar motor is an electric motor that works without the need for a commutator, by rotating along a fixed axis that is parallel to the external magnetic field produced by a permanent magnet. The name homopolar indicates that the electrical polarity of the motor does not change (i.e., that it does not require commutation). Such motors necessarily have a single-turn coil, which restricts their practical applications, since they must be used with low voltages and produce relatively small torques. A ball bearing motor is an electric motor that consists of two ball-bearing-type bearings, with the inner races mounted on a common conductive shaft, and the outer races connected to a high current, low voltage power supply.

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping	H02P 3/00
Synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position	H02P 6/00
Motors rotating step by step	H02P 8/00
Vector control	H02P 21/00

H02P 7/066

[N: using a periodic interrupter, e.g. Tirrill regulator]

Definition statement

This subclass/group covers:

Tirrill regulator: A device for regulating the voltage of a generator, in which the field resistance of the exciter is short-circuited temporarily when the voltage drops (source: McGraw-Hill Dictionary of Scientific & Technical Terms).

H02P 7/14

of voltage applied to the armature with or without control of field [N: Ward-Leonard]

Definition statement

This subclass/group covers:

A Ward Leonard drive is a high-power amplifier in the multi-kilowatt range, built from rotating electrical machinery. A Ward Leonard drive unit consists of a motor and generator with shafts coupled together. The motor, which turns at a constant speed, may be AC or DC powered. The generator is a DC generator, with field windings and armature windings. The input to the amplifier is applied to the field windings, and the output comes from the armature windings. The amplifier output is usually connected to a second motor, which moves the load, such as an elevator. With this arrangement, small changes in current applied to the input, and thus the generator field, result in large changes in the output, allowing smooth speed control. Armature voltage control only controls the motor speed from zero to motor base speed. If higher motor speeds are needed the motor field current can be lowered, however by doing this the available torque at the motor armature will be reduced. Another advantage for this method is that the speed of the motor can be controlled in both directions of rotation. (From Wikipedia).

H02P 7/20

using multi-position switch, e.g. drum, controlling motor circuit by means of relays (H02P7/24, H02P7/30 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Using discharge tubes or semiconductor devices	H02P 7/24
Using magnetic devices with	H02P 7/30

controllable degree of saturation, i.e. transductors	

H02P 7/22

using multi-position switch, e.g. drum, controlling motor circuit by means of pilot-motor-operated multi-position switch or pilot-motor-operated variable resistance (H02P7/24, H02P7/30 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Using discharge tubes or semiconductor devices	H02P 7/24
Using magnetic devices with controllable degree of saturation, i.e. transductors	H02P 7/30

H02P 7/288

using variable impedance

Definition statement

This subclass/group covers:

The use of a transistor or FET in linear mode (non switching)

H02P 7/2906

[N: with on-off control between two set points]

Definition statement

This subclass/group covers:

Using a Schmitt trigger with two thresholds.

H02P 7/2925

[N: using phase control (H02P7/295 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Of the kind having a thyristor or the like in series with the power supply and the motor	H02P 7/295

H02P 7/295

of the kind having a thyristor or the like in series with the power supply and the motor

Definition statement

This subclass/group covers:

Electronic switches that do not extinguish automatically.

H02P 7/32

using armature-reaction-excited machines, e.g. metadyne, amplidyne, rototrol

Definition statement

This subclass/group covers:

Rotating amplifiers, e.g. metadyne, amplidyne, rototrol, magnicon and magnavolt.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Metadyne	an electrical machine with three, or more, brushes. It can be used as an amplifier or rotary transformer. It is similar to a third brush dynamo but much more complex, having additional regulator or "variator" windings. It is also similar to an amplidyne except that the latter has a compensating winding. The technical description is "a cross-field direct current machine designed to utilize armature reaction". A metadyne can convert a constant-voltage input into a constant current, variable voltage,

	output.
Amplidyne	is a special type of motor-generator which uses regeneration to increase its gain. Energy comes from the motor, and the power output is controlled by changing the field current of the generator. In a typical generator the load brushes are positioned perpendicular to the magnetic field flux. To convert a generator to an amplidyne you connect what would be the load brushes together and take the output from another set of brushes that are parallel with the field. The perpendicular brushes are now called the 'quadrature' brushes. This simple change can increase the gain by a factor of 10,000 or more.
A rototrol (American Westinghouse Co.)	is defined by the author as a machine having an initial excitation on one pair only of diametrically opposite polar projections and an output obtained from a four pole excitation with either two or three stages of amplification.

Source:

“Rotating amplifiers: The amplidyne, metadyne, magnicon and magnavolt and their use in control systems” by M. G. Say.

“Direct current machines for control systems” by Arnold Tustin metadyne, amplidyne, rototrol are now obsolete technology. Modern electronic devices for controlling power in the kilowatt range include MOSFET and IGBT devices.

H02P 7/34

using Ward-Leonard arrangements

Special rules of classification within this group

A Ward Leonard drive is a high-power amplifier in the multi-kilowatt range, built from rotating electrical machinery. A Ward Leonard drive unit consists of a motor and generator with shafts coupled together. The motor, which turns at a constant speed, may be AC or DC powered. The generator is a DC generator, with field windings and armature windings. The input to the

amplifier is applied to the field windings, and the output comes from the armature windings. The amplifier output is usually connected to a second motor, which moves the load, such as an elevator. With this arrangement, small changes in current applied to the input, and thus the generator field, result in large changes in the output, allowing smooth speed control. Armature voltage control only controls the motor speed from zero to motor base speed. If higher motor speeds are needed the motor field current can be lowered, however by doing this the available torque at the motor armature will be reduced. Another advantage for this method is that the speed of the motor can be controlled in both directions of rotation. (From Wikipedia)

H02P 8/00

Arrangements for controlling dynamo-electric motors of the kind having motors rotating step by step (vector control H02P21/00)

Definition statement

This subclass/group covers:

Stepper motors have typically a large number poles which results in a large number of steps, and use permanent magnets resulting in high cogging torque and therefore in a large holding torque, even when the motor is not energized. The motor's position can be controlled precisely without any feedback mechanism (Open-loop control).

References relevant to classification in this group

This subclass/group does not cover:

Vector control	H02P 21/00

H02P 8/12

Control or stabilisation of current

Definition statement

This subclass/group covers:

Control of current to increase commutation speed through the inductive windings, e.g. by measuring the coil current and generating a PWM controlled current or e.g. by applying a first higher voltage and a thereafter a lower voltage.

H02P 8/14

Arrangements for controlling speed or speed and torque (H02P8/12, H02P8/22 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Using two level supply voltage	H02P 8/12
Control of step size; Intermediate stepping, e.g. micro-stepping	H02P 8/22

H02P 8/16

Reducing energy dissipated or supplied

Definition statement

This subclass/group covers:

e.g. by lowering the current to the minimum required to hold the position or by increasing the current when a step is required in particular using feedback to determine the movement.

H02P 8/18

Shaping of pulses, e.g. to reduce torque ripple

References relevant to classification in this group

This subclass/group does not cover:

Reducing overshoot	H02P 8/32

H02P 8/22

Control of step size; Intermediate stepping, e.g. micro-stepping

Definition statement

This subclass/group covers:

Control of step size, including half step.

H02P 8/24

Arrangements for stopping (H02P8/32 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Holding position when stopped	H02P 8/32

H02P 8/34

Monitoring operation (H02P8/36 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Protection against faults	H02P 8/32

H02P 8/36

Protection against faults, e.g. against overheating, step-out; Indicating faults (emergency protective arrangements with automatic interruption of supply H02H7/08)

References relevant to classification in this group

This subclass/group does not cover:

Emergency protective arrangements with automatic interruption of supply	H02H 7/08

H02P 9/00

Arrangements for controlling electric generators for the purpose of obtaining a desired output (Ward-Leonard arrangements H02P7/34; vector control H02P21/00; feeding a network by two or more generators H02J; for charging batteries H02J7/14)

References relevant to classification in this group

This subclass/group does not cover:

Ward-Leonard arrangements	H02P 7/34

Vector control	H02P 21/00
Feeding a network by two or more generators	H02J
For charging batteries	H02J 7/14

H02P 9/006

[N: Means for protecting the generator by using control (H02H7/06 takes precedence; control effected upon generator excitation circuit to reduce harmful effects of overloads or transients H02P9/10)]

References relevant to classification in this group

This subclass/group does not cover:

Emergency protective arrangements with automatic interruption of supply	H02H 7/06

H02P 9/007

[N: Control circuits for doubly fed generators]

Definition statement

This subclass/group covers:

Typically the rotor is moved by an external force and the rotor current is controlled such that a desired output voltage is achieved without an additional converter at the power output stage. The generator has typically two electrical connections and one mechanical input.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Wind mills	F03D 7/00, H02P 9/42

H02P 9/14

by variation of field (H02P9/08, H02P9/10 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Control of generator circuit during starting or stopping of driving means	H02P 9/08
Control effected upon generator excitation circuit to reduce harmful effects of overloads or transients, e.g. sudden application of load, sudden removal of load, sudden change of load	H02P 9/10

H02P 9/24

due to variation of make-to-break ratio of intermittently-operating contacts, e.g. using Tirrill regulator

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Tirrill regulator	A device for regulating the voltage of a generator, in which the field resistance of the exciter is short-circuited temporarily when the voltage drops (source: McGraw-Hill Dictionary of Scientific & Technical Terms).

H02P 9/26

using discharge tubes or semiconductor devices (H02P9/34 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device	H02P 9/34

H02P 9/305

[N: controlling voltage (H02P9/302 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Brushless excitation	H02P 9/302

H02P 9/32

using magnetic devices with controllable degree of saturation (H02P9/34 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device	H02P 9/34

H02P 9/42

to obtain desired frequency without varying speed of the generator

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control circuits for doubly fed generators	H02P 9/007

H02P 9/48

Arrangements for obtaining a constant output value at varying speed of the generator, e.g. on vehicle (H02P9/04 to H02P9/46

take precedence)

References relevant to classification in this group

This subclass/group does not cover:

Control effected upon non-electric prime mover and dependent upon electric output value of the generator (effecting control of the prime mover in general, see the relevant class for such prime mover)	H02P 9/04
Using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device	H02P 9/34

Informative references

Attention is drawn to the following places, which may be of interest for search:

Balancing the load in a network (e.g. switching in extra loads like the airconditioning pump)	H02J 1/14
For charging batteries from dynamo-electric generators driven at varying speed, e.g. on vehicle	H02J 7/14
For the electrical supply of for the functioning of the battery or the electrical generator	B60R 16/03
Starter - generator	F02N 11/04

H02P 11/00

Arrangements for controlling dynamo-electric converters (starting H02P1/00; stopping or slowing H02P3/00; vector control H02P21/00 ; feeding a network in conjunction with a generator or another converter H02J)

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping	H02P 3/00
Synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position	H02P 6/00
Vector control	H02P 21/00
Feeding a network in conjunction with a generator or another converter	H02J

Special rules of classification within this group

Dynamo-electric converters are rotating machines whose purpose is not to provide mechanical power to loads but to convert one type of electric current into another, for example DC into AC. They are multi-field single-rotor devices with two or more sets of rotating contacts (either commutators or slip rings, as required), one to provide power to one set of armature windings to turn the device, and one or more attached to other windings to produce the output current. The rotary converter can directly convert, internally, any type of electric power into any other. This includes converting between direct current (DC) and alternating current (AC), three phase and single phase power, 25 Hz AC and 60 Hz AC, or many different output voltages at the same time. The size and mass of the rotor was made large so that the rotor would act as a flywheel to help smooth out any sudden surges or dropouts in the applied power. (source Wikipedia) Dynamo-electric converters are now obsolete technology. Modern electronic devices for controlling power in the kilowatt range include MOSFET and IGBT devices.

H02P 13/00

Arrangements for controlling transformers, reactors or choke coils, for the purpose of obtaining a desired output (regulation systems using transformers, reactors or choke coils G05F; transformers H01F; feeding a network in conjunction with a generator or a converter H02J; control or regulation of converters H02M)

References relevant to classification in this group

This subclass/group does not cover:

Regulation systems using transformers, reactors or choke coils	G05F
Transformers	H01F
Feeding a network in conjunction with a generator or a converter	H02J
Control or regulation of converters	H02M

H02P 15/00

Arrangements for controlling dynamo-electric brakes or clutches (controlling speed of dynamo-electric motors by means of a separate brake H02P29/04, vector control H02P21/00) [N: see provisionally also H02K49/00 and H02P29/0022]

References relevant to classification in this group

This subclass/group does not cover:

Controlling speed of dynamo-electric motors by means of a separate brake	H02P 29/04
Vector control	H02P 21/00

H02P 17/00

Arrangements for controlling dynamo-electric gears (vector control H02P21/00)

References relevant to classification in this group

This subclass/group does not cover:

Vector control	H02P 21/00

H02P 21/00

Arrangements or methods for the control of electric machines by vector control, e.g. by control of field orientation

Special rules of classification within this group

The stator phase currents are measured and converted into a corresponding complex (space) vector. This current vector is then transformed to a coordinate system rotating with the rotor of the machine. Control of the machine is done in this in this rotating coordinate system. The calculated voltages in this in this rotating coordinate system are then transformed into real voltages which usually generated by an inverter bridge are then applied to the motor.

H02P 21/0003

[N: Control strategies related to vector control, e.g. linear type P, PI, PID, sliding mode control, fuzzy control, robust control, neural network (control strategies in general H02P23/0036)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control strategies in general	H02P 23/0036

H02P 21/0053

[N: Determining the initial rotor position (arrangements for starting H02P21/0032; position detection in general H02P6/16-H02P6/185)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements for starting	H02P 21/0032
Position detection in general	H02P 6/16 - H02P 6/185

H02P 21/04

specially adapted for very low speeds [N: (arrangements for starting H02P21/0032; determining the initial rotor position H02P21/0053)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements for starting	H02P 21/0032
Determining the initial rotor position	H02P 21/0053

H02P 21/05

specially adapted for damping motor oscillations, e.g. for reducing hunting

Definition statement

This subclass/group covers:

Synchronous Motor having an inherent instability, e.g. when it is used to drive a high inertia load. The motor ideally should spin at a constant angular velocity, but it instead sporadically oscillates about synchronous speed. This phenomenon is known as ‘hunting’. This problem produces current ripples at the motor’s electrical terminals and induces noise.

H02P 21/06

Rotor flux based control involving the use of rotor position or speed sensor [N: involving the use of rotor position or speed sensor]

Definition statement

This subclass/group covers:

- Reference frame conversion being based in the rotor
- Control is based on the rotor flux.

H02P 21/12

Stator flux based control, involving the use of rotor position or speed sensor [N: involving the use of rotor position or speed sensor]

Definition statement

This subclass/group covers:

- Reference frame conversion being based in the rotor
- Control is based on the stator flux.

H02P 21/145

[N: constants estimation, e.g. of the rotor time constant] [N0502]

Definition statement

This subclass/group covers:

Temperature related changes in constants like resistance

H02P 23/00

Arrangements or methods for the control of AC motors characterised by a control method other than vector control (starting H02P1/00; stopping or slowing H02P3/00; of two or more motors H02P5/00; of synchronous motors with electronic commutators H02P6/00; of DC motors H02P7/00; of stepping motors H02P8/00)

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping	H02P 3/00
Two or more motor	H02P 5/00
Synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position	H02P 6/00
DC motors	H02P 7/00

H02P 23/0036

[N: Control strategies in general (H02P23/0045 to H02P23/14 take precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Control of angular speed of one shaft by controlling the prime mover	H02P 23/0045

Estimation or adaptation of motor parameters, e.g. rotor time constant, flux, speed, current or voltage	H02P 23/14

H02P 23/004

[N: Direct torque control (DTC); Field acceleration method (FAM)]

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

DTC	Direct torque control is one method used in variable frequency drives to control the torque (and thus finally the speed) of three-phase AC electric motors. This involves calculating an estimate of the motor's magnetic flux and torque based on the measured voltage and current of the motor.

H02P 23/0045

[N: Control of angular speed of one shaft by controlling the prime mover (H02P23/005 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Control of angular speed together with angular position or phase	H02P 23/005

H02P 23/005

[N: Control of angular speed together with angular position or phase]

Definition statement

This subclass/group covers:

The speed and the phase (or position) of a rotating shaft are both controlled to reach both a predetermined reference signal

H02P 23/0054

[N: of one shaft without controlling the prime mover]

Definition statement

This subclass/group covers:

By acting on a device that is not the driving motor; for example, by acting on a brake (see document US4086520).

References relevant to classification in this group

This subclass/group does not cover:

Suitable for AC and DC motors	H02P 29/0022

H02P 23/0059

[N: of one shaft by controlling the prime mover]

Definition statement

This subclass/group covers:

By acting on the supply of the motor that drives the shaft (see document US4885793).

H02P 23/0077

[N: Characterised by the use of a particular software algorithm]

Definition statement

This subclass/group covers:

A software algorithm that is only suitable in motor control which enables the implementation of a strategy in a processor (minimalising computing steps).

The motor parameters are stored in the in memory chip located in (or in the proximity of e.g. installed coder) the motor identifying the motor.

H02P 23/0081

[N: Power Factor Control]

Definition statement

This subclass/group covers:

Special control of the motor e.g. by adapting the voltage and the phase/frequency fed to the motor

H02P 23/04

specially adapted for damping motor oscillations, e.g. for reducing hunting

Definition statement

This subclass/group covers:

A Synchronous Motor has an inherent instability when it is used to drive a high inertia load. The motor ideally should spin at a constant angular velocity, but it instead sporadically oscillates about synchronous speed. This phenomenon is known as ‘hunting’. This problem produces current ripples at the motor’s electrical terminals and induces noise.

References relevant to classification in this group

This subclass/group does not cover:

Motor oscillations that are synchronous to the motor position	H02P 29/0038
For reluctance motors	H02P 25/088
Torque ripple from brushless commutation	H02P 6/10

H02P 23/10

Controlling by adding a dc current (dc current braking H02P3/24)

Informative references

Attention is drawn to the following places, which may be of interest for search:

DC current braking	H02P 3/24

H02P 25/00

Arrangements or methods for the control of AC motors characterised by the kind of AC motor or by structural details (starting H02P1/00; stopping or slowing H02P3/00; of two or more motors H02P5/00; of synchronous motors with electronic commutators H02P6/00; of DC motors H02P7/00; of stepping motors H02P8/00)

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping	H02P 3/00
Two or more motor	H02P 5/00
Synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position	H02P 6/00
DC motors	H02P 7/00
Stepping motors	H02P 8/00

H02P 25/023

[N: thereby detecting the rotor position]

Definition statement

This subclass/group covers:

The motor position is determined as a result of the motor control. If the motor is controlled based on the determined position see H02P 6/00.

H02P 25/028

[N: Control of voice coil motors (Note: see also H01F)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Head positioning in hard disks	G11B

H02P 25/083

[N: Sensorless control, see also direct torque control H02P23/004]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Direct torque control	H02P 23/004

H02P 25/088

[N: Arrangements for reducing torque ripple]

Definition statement

This subclass/group covers:

Torque ripple here is torque ripple that comes from the construction of the motor: high cogging torque produce by the switching of the reluctance paths.

References relevant to classification in this group

This subclass/group does not cover:

Motor oscillation	H02P 23/04
In other motors	H02P 29/0038

H02P 25/10

Commutator motors, e.g. repulsion motors

References relevant to classification in this group

This subclass/group does not cover:

DC motors	H02P 7/00

H02P 25/102

[N: Repulsion motors]

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Repulsion motor	a type of electric motor for use on alternating current. It was formerly used as a traction motor for electric trains but has been superseded by other types of motors and is now only of historical interest. Repulsion motors are classified under Single Phase motors. In magnetic repulsion motors the stator windings are connected directly to the ac power supply and the rotor is connected to commutator and brush assembly, similar to that of a DC armature.

H02P 25/12

with shiftable brushes

Definition statement

This subclass/group covers:

Shiftable brushes allow control of speed and/or torque

H02P 25/14

Universal motors (H02P25/12 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Motors with shiftable brushes	H02P 25/12

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Series-wound motor	a universal motor when it has been designed to operate on either AC or DC power. It can operate well on AC because the current in both the field

	and the armature (and hence the resultant magnetic fields) will alternate (reverse polarity) in synchronism, and hence the resulting mechanical force will occur in a constant direction of rotation.

H02P 25/186

[N: whereby the speed is regulated by using a periodic interrupter (H02P25/30 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Motor being controlled by a control effected upon an ac generator supplying it	H02P 25/30

H02P 25/20

for pole-changing

Definition statement

This subclass/group covers:

Pole changing for starting an individual polyphase induction motor	H02P 1/38
Pole changing for starting an individual synchronous motor	H02P 1/46

H02P 27/00

Arrangements or methods for the control of AC motors characterised by the kind of supply voltage (starting H02P1/00; stopping or slowing H02P3/00; of two or more motors H02P5/00; of synchronous motors with electronic commutators H02P6/00; of DC motors H02P7/00; of stepping motors H02P8/00)

References relevant to classification in this group

This subclass/group does not cover:

Starting	H02P 1/00
Stopping	H02P 3/00
Two or more motor	H02P 5/00
Synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position	H02P 6/00
DC motors	H02P 7/00
Stepping motors	H02P 8/00

Special rules of classification within this group

If the supply is not particularly adapted for the control of a motor than it should not be classified here e.g. a variable voltage supply is suitable for a DC motor however it is suitable for various loads and therefore should be classified in a general voltage supply group e.g. H02M or G05B Only when the supply is exclusively for the control of AC motors these groups are used e.g. because control is influenced in function of a motor parameter (e.g. speed, torque, position, motor parameters etc)

H02P 27/05

using ac supply for both rotor and stator circuits, the frequency of supply to at least one circuit being variable [N: (see also H02P6/005 or H02P9/007 , doubly fed motors or generators respectively)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Doubly fed motors	H02P 6/005
Doubly fed generators	H02P 9/007

H02P 27/06

using dc to ac converters or inverters (H02P27/05 takes precedence

References relevant to classification in this group

This subclass/group does not cover:

AC supply for both rotor and stator circuits, the frequency of supply to at least one circuit being variable	H02P 27/05

H02P 27/10

using bang-bang controllers

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Bang–bang controller (on–off controller)	is also known as a hysteresis controller, is a feedback controller that switches abruptly between two states

H02P 27/12

pulsing by guiding the flux-, current-, or voltage-vector on a circle or a closed curve, e.g. direct torque control [N: (direct torque control per se, H02P23/004)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Direct torque control per se	H02P 23/004

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

DTC	Direct torque control is one method

	used in variable frequency drives to control the torque (and thus finally the speed) of three-phase AC electric motors. This involves calculating an estimate of the motor's magnetic flux and torque based on the measured voltage and current of the motor.

H02P 27/16

using ac to ac converters without intermediate conversion to dc (H02P27/05 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Using ac supply for both rotor and stator circuits, the frequency of supply to at least one circuit being variable	H02P 27/05

H02P 29/00

Arrangements for regulating or controlling electric motors, appropriate for both ac- and DC motors (starting H02P1/00; stopping or slowing H02P3/00; control of motors that can be connected to two or more different voltage or current supplies H02P4/00; vector control H02P21/00)

References relevant to classification in this group

This subclass/group does not cover:

Emergency protective circuit arrangements for electric machines involving automatic switching	H02H 7/00
Emergency protective circuit arrangements for electric machines for limiting excess current or voltage without disconnection	H02H 9/00
Starting	H02P 1/00
Stopping	H02P 3/00

Control of motors that can be connected to two or more different voltage or current supplies	H02P 4/00
Vector control	H02P 21/00

H02P 29/0016

[N: Control of angular speed of one shaft without controlling the prime mover]

Definition statement

This subclass/group covers:

The (prime mover) motor is supplied with a constant power supply. Some means connected (mechanically) with the motor and the load influences the speed.

H02P 29/0038

[N: Reduction of harmonics]

Definition statement

This subclass/group covers:

Reduction of high and low order harmonics in the motor and / or harmonics in the power line supplying the motor. Harmonics here refer to frequencies which corresponding with a multiple of the motor speed (or load speed), e.g. caused by asymmetry of the motor. EMI interference is therefore reduced. Fourier analysis and frequency / amplitude graphs are common for this application. Standards to regulate the harmonic current drawn IEC 1000-3-2 and VDE0871.

References relevant to classification in this group

This subclass/group does not cover:

EMI interference reduction on the converter side	H02M
From commutation	H02P 6/00
Motor oscillation	H02P 23/04
In Reluctance motors	H02P 25/088

H02P 29/0044

[N: Controlling or determining the motor or drive temperature (AC motor parameter estimation H02P23/14; motor parameter estimation for vector control H02P21/14; protection against overload H02P29/02; protection against faults of stepper motores H02P8/36)]

References relevant to classification in this group

This subclass/group does not cover:

Measuring temperature	G01K 7/42

Informative references

Attention is drawn to the following places, which may be of interest for search:

Protection against faults of stepper motors	H02P 8/36
Motor parameter estimation for vector control	H02P 21/14
AC motor parameter estimation	H02P 23/14
Protection against overload	H02P 29/02

H02P 29/0055

[N: controlling or determining the winding temperature (H02P29/0072 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

Rotor windings	H02P 29/0072

H02P 29/0066

[N: the rotor having permanent magnets (H02P29/0083 takes precedence)]

References relevant to classification in this group

This subclass/group does not cover:

By back-emf evaluation to obtain the motor temperature	H02P 29/0083

H02P 29/0083

[N: by back-emf evaluation to obtain the motor temperature (back-emf based rotor position determination H02P6/182)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Back-emf based rotor position determination	H02P 6/182

H02P 29/02

Providing protection against overload without automatic interruption of supply, e.g. monitoring [N: (protection during start H02P1/022; protection for stepper motors H02P8/36; generator overload and transient protection H02P9/10; protection with automatic interruption H02H7/0833)]

Definition statement

This subclass/group covers:

Protection of the motor by measures taken in the motor controller.

Measures taken in the motor controller to assure the best possible operation of the motor under the given (faulty) circumstance.

e.g. protection against broken phase, against power failure, against power failure.

References relevant to classification in this group

This subclass/group does not cover:

Protection during start	H02P 1/022

Protection for stepper motors	H02P 8/36
Generator overload and transient protection	H02P 9/10
Protection of inverter circuit	H02M 1/32

Informative references

Attention is drawn to the following places, which may be of interest for search:

Emergency protective arrangements with automatic interruption of supply	H02H 7/0833
Emergency protective circuit arrangements for limiting excess current or voltage without disconnection, in general	H02H 9/00

H02P 31/00

Arrangements for regulating or controlling electric motors not provided for in groups H02P1/00 to H02P5/00, H02P7/00 or H02P21/00 to H02P29/00