

CPC COOPERATIVE PATENT CLASSIFICATION

B PERFORMING OPERATIONS; TRANSPORTING (NOTES omitted)

TRANSPORTING

B60 VEHICLES IN GENERAL (NOTE omitted)

B60L PROPULSION OF ELECTRICALLY-PROPELLED VEHICLES (arrangements or mounting of electrical propulsion units or of plural diverse prime-movers for mutual or common propulsion in vehicles [B60K 1/00](#), [B60K 6/20](#); arrangements or mounting of electrical gearing in vehicles [B60K 17/12](#), [B60K 17/14](#); preventing wheel slip by reducing power in rail vehicles [B61C 15/08](#); dynamo-electric machines [H02K](#); control or regulation of electric motors [H02P](#)); **SUPPLYING ELECTRIC POWER FOR AUXILIARY EQUIPMENT OF ELECTRICALLY-PROPELLED VEHICLES** (electric coupling devices combined with mechanical couplings of vehicles [B60D 1/64](#); electric heating for vehicles [B60H 1/00](#)); **ELECTRODYNAMIC BRAKE SYSTEMS FOR VEHICLES IN GENERAL** (control or regulation of electric motors [H02P](#)); **MAGNETIC SUSPENSION OR LEVITATION FOR VEHICLES; MONITORING OPERATING VARIABLES OF ELECTRICALLY-PROPELLED VEHICLES; ELECTRIC SAFETY DEVICES FOR ELECTRICALLY-PROPELLED VEHICLES**

NOTES

1. This subclass, subject to the above references, covers:
 - feeding of power to auxiliary circuits;
 - current collectors; arrangements thereof on rail or road vehicles or on vehicles in general
 - electrodynamic brake systems;
 - electric propulsion of vehicles; control and regulation therefor
2. In this subclass it is desirable to classify any "additional information" which is of interest for search.

WARNING

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

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|-------------|--|-------------|---|
| 1/00 | Supplying electric power to auxiliary equipment of vehicles (circuit arrangements for charging batteries H02J 7/00) | 3/00 | Electric devices on electrically-propelled vehicles for safety purposes; Monitoring operating variables, e.g. speed, deceleration or energy consumption (methods or circuit arrangements for monitoring or controlling batteries or fuel cells B60L 58/00) |
| 1/003 | • {to auxiliary motors, e.g. for pumps, compressors} | | |
| 1/006 | • {to power outlets} | | |
| 1/02 | • to electric heating circuits | | |
| 1/04 | • . . fed by the power supply line | 3/0007 | • {Measures or means for preventing or attenuating collisions} |
| 1/06 | • . . . using only one supply | 3/0015 | • . {Prevention of collisions} |
| 1/08 | • . . . Methods and devices for control or regulation | 3/0023 | • {Detecting, eliminating, remedying or compensating for drive train abnormalities, e.g. failures within the drive train} |
| 1/10 | • . . . with provision for using different supplies | 3/003 | • . {relating to inverters} |
| 1/12 | • . . . Methods and devices for control or regulation | 3/0038 | • . {relating to sensors} |
| 1/14 | • to electric lighting circuits | 3/0046 | • . {relating to electric energy storage systems, e.g. batteries or capacitors} |
| 1/16 | • . fed by the power supply line | 3/0053 | • . {relating to fuel cells} |
| 1/20 | • {Energy regeneration from auxiliary equipment} | 3/0061 | • . {relating to electrical machines} |
| | | 3/0069 | • . {relating to the isolation, e.g. ground fault or leak current} |
| | | 3/0076 | • . {relating to braking} |

- 3/0084 . . {relating to control modules}
- 3/0092 . {with use of redundant elements for safety purposes}
- 3/02 . Dead-man's devices
- 3/04 . Cutting off the power supply under fault conditions (protective devices and circuit arrangements in general [H01H](#); [H02H](#))
- 3/06 . Limiting the traction current under mechanical overload conditions
- 3/08 . Means for preventing excessive speed of the vehicle
- 3/10 . Indicating wheel slip {; [Correction of wheel slip](#)}
- 3/102 . . {of individual wheels}
- 3/104 . . {by indirect measurement of vehicle speed}
- 3/106 . . {for maintaining or recovering the adhesion of the drive wheels}
- 3/108 . . . {whilst braking, i.e. ABS}
- 3/12 . Recording operating variables {; [Monitoring of operating variables](#)}
- 5/00 Current collectors for power supply lines of electrically-propelled vehicles (current collectors in general [H01R 41/00](#))**
- 5/005 . {without mechanical contact between the collector and the power supply line}
- 5/02 . with ice-removing device
- 5/04 . using rollers or sliding shoes in contact with trolley wire ([B60L 5/40](#) takes precedence)
- 5/045 . . {with trolley wire finders}
- 5/06 . . Structure of the rollers or their carrying means
- 5/08 . . Structure of the sliding shoes or their carrying means
- 5/085 . . . {with carbon contact members}
- 5/10 . . Devices preventing the collector from jumping off
- 5/12 . . Structural features of poles or their bases
- 5/14 . . . Devices for automatic lowering of a jumped-off collector
- 5/16 . . . Devices for lifting and resetting the collector ([B60L 5/34](#) takes precedence)
- 5/18 . using bow-type collectors in contact with trolley wire
- 5/19 . . using arrangements for effecting collector movement transverse to the direction of vehicle motion
- 5/20 . . Details of contact bow
- 5/205 . . . {with carbon contact members}
- 5/22 . . Supporting means for the contact bow
- 5/24 . . . Pantographs
- 5/26 . . . Half pantographs, e.g. using counter rocking beams
- 5/28 . . . Devices for lifting and resetting the collector
- 5/30 using springs
- 5/32 using fluid pressure
- 5/34 . with devices to enable one vehicle to pass another one using the same power supply line
- 5/36 . with means for collecting current simultaneously from more than one conductor, e.g. from more than one phase
- 5/38 . for collecting current from conductor rails ([B60L 5/40](#) takes precedence)
- 5/39 . . from third rail
- 5/40 . for collecting current from lines in slotted conduits
- 5/42 . for collecting current from individual contact pieces connected to the power supply line
- 7/00 Electrodynamic brake systems for vehicles in general**
- 7/003 . {Dynamic electric braking by short circuiting the motor}
- 7/006 . {Dynamic electric braking by reversing current, i.e. plugging}
- 7/02 . Dynamic electric resistor braking ([B60L 7/22](#) takes precedence)
- 7/04 . . for vehicles propelled by DC motors
- 7/06 . . for vehicles propelled by AC motors
- 7/08 . . Controlling the braking effect ([B60L 7/04](#), [B60L 7/06](#) take precedence)
- 7/10 . Dynamic electric regenerative braking ([B60L 7/22](#) takes precedence)
- 7/12 . . for vehicles propelled by DC motors
- 7/14 . . for vehicles propelled by AC motors
- 7/16 . . for vehicles comprising converters between the power source and the motor
- 7/18 . . Controlling the braking effect ([B60L 7/12](#), [B60L 7/14](#), [B60L 7/16](#) take precedence)
- 7/20 . Braking by supplying regenerated power to the prime mover of vehicles comprising engine-driven generators
- 7/22 . Dynamic electric resistor braking, combined with dynamic electric regenerative braking
- 7/24 . with additional mechanical or electromagnetic braking
- 7/26 . . Controlling the braking effect
- 7/28 . Eddy-current braking
- 8/00 Electric propulsion with power supply from forces of nature, e.g. sun or wind**
- 8/003 . {Converting light into electric energy, e.g. by using photo-voltaic systems}
- 8/006 . {Converting flow of air into electric energy, e.g. by using wind turbines}
- 9/00 Electric propulsion with power supply external to the vehicle (electric propulsion for monorail vehicles, suspension vehicles or rack railways [B60L 13/00](#); in combination with batteries or fuel cells within the vehicle [B60L 50/53](#))**
- 9/005 . {Interference suppression}
- 9/02 . using DC motors
- 9/04 . . fed from DC supply lines
- 9/06 . . . with conversion by metadyne
- 9/08 . . fed from AC supply lines
- 9/10 . . . with rotary converters
- 9/12 . . . with static converters
- 9/14 . . fed from different kinds of power-supply lines
- 9/16 . using AC induction motors
- 9/18 . . fed from DC supply lines
- 9/20 . . . single-phase motors
- 9/22 . . . polyphase motors
- 9/24 . . fed from AC supply lines
- 9/26 . . . single-phase motors
- 9/28 . . . polyphase motors
- 9/30 . . fed from different kinds of power-supply lines
- 9/32 . using AC brush displacement motors

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| 13/00 | Electric propulsion for monorail vehicles, suspension vehicles or rack railways; Magnetic suspension or levitation for vehicles ({tracks for Maglev-type trains E01B 25/30;} electromagnets per se H01F 7/06; linear motors per se H02K 41/00) | 15/24 | <ul style="list-style-type: none"> with main controller driven by a servomotor (B60L 15/28 takes precedence) |
| 13/003 | <ul style="list-style-type: none"> {Crossings; Points} | 15/26 | <ul style="list-style-type: none"> with main controller driven through a ratchet mechanism (B60L 15/28 takes precedence) |
| 13/006 | <ul style="list-style-type: none"> {Electric propulsion adapted for monorail vehicles, suspension vehicles or rack railways (B60L 13/03 takes precedence)} | 15/28 | <ul style="list-style-type: none"> without contact making and breaking, e.g. using a transductor |
| 13/03 | <ul style="list-style-type: none"> Electric propulsion by linear motors | 15/30 | <ul style="list-style-type: none"> with means to change over to human control |
| 13/035 | <ul style="list-style-type: none"> {Suspension of the vehicle-borne motorparts} | 15/32 | Control or regulation of multiple-unit electrically-propelled vehicles |
| 13/04 | <ul style="list-style-type: none"> Magnetic suspension or levitation for vehicles | 15/34 | <ul style="list-style-type: none"> with human control of a setting device |
| 13/06 | <ul style="list-style-type: none"> Means to sense or control vehicle position or attitude with respect to railway | 15/36 | <ul style="list-style-type: none"> with automatic control superimposed, e.g. to prevent excessive motor current |
| 13/08 | <ul style="list-style-type: none"> for the lateral position | 15/38 | <ul style="list-style-type: none"> with automatic control |
| 13/10 | <ul style="list-style-type: none"> Combination of electric propulsion and magnetic suspension or levitation | 15/40 | Adaptation of control equipment on vehicle for remote actuation from a stationary place (devices along the route for controlling devices on rail vehicles B61L 3/00; central rail-traffic control systems B61L 27/00) |
| 15/00 | Methods, circuits, or devices for controlling the traction-motor speed of electrically-propelled vehicles | 15/42 | Adaptation of control equipment on vehicle for actuation from alternative parts of the vehicle or from alternative vehicles of the same vehicle train (B60L 15/32 takes precedence) |
| 15/002 | <ul style="list-style-type: none"> {for control of propulsion for monorail vehicles, suspension vehicles or rack railways; for control of magnetic suspension or levitation for vehicles for propulsion purposes} | 50/00 | Electric propulsion with power supplied within the vehicle (with power supply from force of nature, e.g. sun or wind, B60L 8/00; for monorail vehicles, suspension vehicles or rack railways B60L 13/00) |
| 15/005 | <ul style="list-style-type: none"> {for control of propulsion for vehicles propelled by linear motors} | 50/10 | <ul style="list-style-type: none"> using propulsion power supplied by engine-driven generators, e.g. generators driven by combustion engines |
| 15/007 | <ul style="list-style-type: none"> {Physical arrangements or structures of drive train converters specially adapted for the propulsion motors of electric vehicles} | 50/11 | <ul style="list-style-type: none"> using DC generators and DC motors |
| 15/02 | <ul style="list-style-type: none"> characterised by the form of the current used in the control circuit | 50/12 | <ul style="list-style-type: none"> using AC generators and DC motors |
| 15/025 | <ul style="list-style-type: none"> {using field orientation; Vector control; Direct Torque Control [DTC]} | 50/13 | <ul style="list-style-type: none"> using AC generators and AC motors |
| 15/04 | <ul style="list-style-type: none"> using DC | 50/14 | <ul style="list-style-type: none"> using DC generators and AC motors |
| 15/06 | <ul style="list-style-type: none"> using substantially sinusoidal AC | 50/15 | <ul style="list-style-type: none"> with additional electric power supply (with capacitors charged by engine-driven generators B60L 50/40; with batteries charged by engine-driven generators B60L 50/61) |
| 15/08 | <ul style="list-style-type: none"> using pulses | 50/16 | <ul style="list-style-type: none"> with provision for separate direct mechanical propulsion |
| 15/10 | <ul style="list-style-type: none"> for automatic control superimposed on human control to limit the acceleration of the vehicle, e.g. to prevent excessive motor current (electric devices for safety purposes B60L 3/00) | 50/20 | <ul style="list-style-type: none"> using propulsion power generated by humans or animals |
| 15/12 | <ul style="list-style-type: none"> with circuits controlled by relays or contactors | 50/30 | <ul style="list-style-type: none"> using propulsion power stored mechanically, e.g. in fly-wheels |
| 15/14 | <ul style="list-style-type: none"> with main controller driven by a servomotor (B60L 15/18 takes precedence) | 50/40 | <ul style="list-style-type: none"> using propulsion power supplied by capacitors |
| 15/16 | <ul style="list-style-type: none"> with main controller driven through a ratchet mechanism (B60L 15/18 takes precedence) | 50/50 | <ul style="list-style-type: none"> using propulsion power supplied by batteries or fuel cells |
| 15/18 | <ul style="list-style-type: none"> without contact making and breaking, e.g. using a transductor | 50/51 | <ul style="list-style-type: none"> characterised by AC-motors |
| 15/20 | <ul style="list-style-type: none"> for control of the vehicle or its driving motor to achieve a desired performance, e.g. speed, torque, programmed variation of speed | 50/52 | <ul style="list-style-type: none"> characterised by DC-motors |
| 15/2009 | <ul style="list-style-type: none"> {for braking} | 50/53 | <ul style="list-style-type: none"> in combination with an external power supply, e.g. from overhead contact lines |
| 15/2018 | <ul style="list-style-type: none"> {for braking on a slope} | 50/60 | <ul style="list-style-type: none"> using power supplied by batteries (in combination with fuel cells B60L 50/75) |
| 15/2027 | <ul style="list-style-type: none"> {whilst maintaining constant speed} | 50/61 | <ul style="list-style-type: none"> by batteries charged by engine-driven generators, e.g. series hybrid electric vehicles |
| 15/2036 | <ul style="list-style-type: none"> {Electric differentials, e.g. for supporting steering vehicles} | 50/62 | <ul style="list-style-type: none"> charged by low-power generators primarily intended to support the batteries, e.g. range extenders |
| 15/2045 | <ul style="list-style-type: none"> {for optimising the use of energy} | 50/64 | <ul style="list-style-type: none"> Constructional details of batteries specially adapted for electric vehicles |
| 15/2054 | <ul style="list-style-type: none"> {by controlling transmissions or clutches} | | |
| 15/2063 | <ul style="list-style-type: none"> {for creeping} | | |
| 15/2072 | <ul style="list-style-type: none"> {for drive off} | | |
| 15/2081 | <ul style="list-style-type: none"> {for drive off on a slope} | | |
| 15/209 | <ul style="list-style-type: none"> {for overtaking} | | |
| 15/22 | <ul style="list-style-type: none"> with sequential operation of interdependent switches, e.g. relays, contactors, programme drum | | |

NOTE

This group covers adaptation of battery structures of electric vehicles, e.g. integration into control or safety systems,

B60L

B60L 50/64
(continued)

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|--------------|--|--------------|---|
| | crash-resistant casings or vibration-damping means. | 53/37 | . . . using optical position determination, e.g. using cameras |
| 50/66 | . . . {Arrangements of batteries} | 53/38 | . . . specially adapted for charging by inductive energy transfer |
| 50/70 | . . using power supplied by fuel cells (in combination with batteries B60L 50/75) | 53/39 | with position-responsive activation of primary coils |
| 50/71 | . . . Arrangement of fuel cells within vehicles specially adapted for electric vehicles | 53/50 | . Charging stations characterised by energy-storage or power-generation means |
| 50/72 | . . . Constructional details of fuel cells specially adapted for electric vehicles | 53/51 | . . Photovoltaic means |
| | NOTE | 53/52 | . . Wind-driven generators |
| | This group covers adaptation of fuel cell structures of electric vehicles, e.g. integration into control or safety systems, crash-resistant casings or vibration-damping means. | 53/53 | . . Batteries |
| | | 53/54 | . . Fuel cells |
| | | 53/55 | . . Capacitors |
| | | 53/56 | . . Mechanical storage means, e.g. fly wheels |
| | | 53/57 | . . Charging stations without connection to power networks |
| 50/75 | . . using propulsion power supplied by both fuel cells and batteries | 53/60 | . Monitoring or controlling charging stations |
| 50/90 | . . using propulsion power supplied by specific means not covered by groups B60L 50/10 - B60L 50/50, e.g. by direct conversion of thermal nuclear energy into electricity | 53/62 | . . in response to charging parameters, e.g. current, voltage or electrical charge |
| | | 53/63 | . . in response to network capacity |
| | | 53/64 | . . Optimising energy costs, e.g. responding to electricity rates |
| | | 53/65 | . . involving identification of vehicles or their battery types |
| 53/00 | Methods of charging batteries, specially adapted for electric vehicles; Charging stations or on-board charging equipment therefor; Exchange of energy storage elements in electric vehicles | 53/66 | . . Data transfer between charging stations and vehicles |
| 53/10 | . characterised by the energy transfer between the charging station and the vehicle | 53/665 | . . . {Methods related to measuring, billing or payment} |
| 53/11 | . . {DC charging controlled by the charging station, e.g. mode 4} | 53/67 | . . Controlling two or more charging stations |
| 53/12 | . . Inductive energy transfer | 53/68 | . . Off-site monitoring or control, e.g. remote control |
| 53/122 | . . . Circuits or methods for driving the primary coil, e.g. supplying electric power to the coil | 53/80 | . Exchanging energy storage elements, e.g. removable batteries |
| 53/124 | . . . Detection or removal of foreign bodies | 55/00 | Arrangements for supplying energy stored within a vehicle to a power network, i.e. vehicle-to-grid [V2G] arrangements |
| 53/126 | . . . Methods for pairing a vehicle and a charging station, e.g. establishing a one-to-one relation between a wireless power transmitter and a wireless power receiver | 58/00 | Methods or circuit arrangements for monitoring or controlling batteries or fuel cells, specially adapted for electric vehicles |
| 53/14 | . . Conductive energy transfer | | NOTE |
| 53/16 | . . . Connectors, e.g. plugs or sockets, specially adapted for charging electric vehicles | | This group covers the monitoring of the operating state of batteries or fuel cells in combination with controlling the propulsion in response to the detected variables of the state. |
| 53/18 | . . . Cables specially adapted for charging electric vehicles | | |
| 53/20 | . characterised by converters located in the vehicle | | |
| 53/22 | . . Constructional details or arrangements of charging converters specially adapted for charging electric vehicles | 58/10 | . for monitoring or controlling batteries |
| 53/24 | . . Using the vehicle's propulsion converter for charging | 58/12 | . . responding to state of charge [SoC] |
| 53/30 | . Constructional details of charging stations | 58/13 | . . . Maintaining the SoC within a determined range |
| 53/302 | . . Cooling of charging equipment | 58/14 | . . . Preventing excessive discharging |
| 53/305 | . . {Communication interfaces} | 58/15 | . . . Preventing overcharging |
| 53/31 | . . Charging columns specially adapted for electric vehicles | 58/16 | . . responding to battery ageing, e.g. to the number of charging cycles or the state of health [SoH] |
| 53/32 | . . {by charging in short intervals along the itinerary, e.g. during short stops} | 58/18 | . . of two or more battery modules |
| 53/34 | . . Plug-like or socket-like devices specially adapted for contactless inductive charging of electric vehicles (positioning means for charging devices using inductive energy transfer B60L 53/38) | 58/19 | . . . Switching between serial connection and parallel connection of battery modules |
| 53/35 | . . Means for automatic or assisted adjustment of the relative position of charging devices and vehicles | 58/20 | . . . having different nominal voltages |
| 53/36 | . . . by positioning the vehicle | 58/21 | . . . having the same nominal voltage |
| | | 58/22 | . . . Balancing the charge of battery modules |
| | | 58/24 | . . for controlling the temperature of batteries |
| | | 58/25 | . . . by controlling the electric load |
| | | 58/26 | . . . by cooling |
| | | 58/27 | . . . by heating |
| | | 58/30 | . for monitoring or controlling fuel cells |

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|----------------|---|----------|---|
| 58/31 | . . for starting of fuel cells | 2240/00 | Control parameters of input or output; Target parameters |
| 58/32 | . . for controlling the temperature of fuel cells, e.g. by controlling the electric load | 2240/10 | . Vehicle control parameters |
| 58/33 | . . . by cooling | 2240/12 | . . Speed |
| 58/34 | . . . by heating | 2240/14 | . . Acceleration |
| 58/40 | . for controlling a combination of batteries and fuel cells | 2240/16 | . . . longitudinal |
| | | 2240/18 | . . . lateral |
| | | 2240/20 | . . . angular |
| | | 2240/22 | . . Yaw angle |
| | | 2240/24 | . . Steering angle |
| | | 2240/26 | . . Vehicle weight |
| | | 2240/28 | . . Door position |
| | | 2240/30 | . . Parking brake position |
| | | 2240/32 | . . Driving direction |
| | | 2240/34 | . . Cabin temperature |
| | | 2240/36 | . . Temperature of vehicle components or parts |
| | | 2240/40 | . Drive Train control parameters |
| | | 2240/42 | . . related to electric machines |
| | | 2240/421 | . . . Speed |
| | | 2240/423 | . . . Torque |
| | | 2240/425 | . . . Temperature |
| | | 2240/427 | . . . Voltage |
| | | 2240/429 | . . . Current |
| | | 2240/44 | . . related to combustion engines |
| | | 2240/441 | . . . Speed |
| | | 2240/443 | . . . Torque |
| | | 2240/445 | . . . Temperature |
| | | 2240/46 | . . related to wheels |
| | | 2240/461 | . . . Speed |
| | | 2240/463 | . . . Torque |
| | | 2240/465 | . . . Slip |
| | | 2240/48 | . . related to transmissions |
| | | 2240/485 | . . . Temperature |
| | | 2240/486 | . . . Operating parameters |
| | | 2240/50 | . . related to clutches |
| | | 2240/507 | . . . Operating parameters |
| | | 2240/52 | . . related to converters |
| | | 2240/525 | . . . Temperature of converter or components thereof |
| | | 2240/526 | . . . Operating parameters |
| | | 2240/527 | . . . Voltage |
| | | 2240/529 | . . . Current |
| | | 2240/54 | . . related to batteries |
| | | 2240/545 | . . . Temperature |
| | | 2240/547 | . . . Voltage |
| | | 2240/549 | . . . Current |
| | | 2240/60 | . Navigation input |
| | | 2240/62 | . . Vehicle position |
| | | 2240/622 | . . . by satellite navigation |
| | | 2240/625 | . . . by GSM |
| | | 2240/627 | . . . by WLAN |
| | | 2240/64 | . . Road conditions |
| | | 2240/642 | . . . Slope of road |
| | | 2240/645 | . . . Type of road |
| | | 2240/647 | . . . Surface situation of road, e.g. type of paving |
| | | 2240/66 | . . Ambient conditions |
| | | 2240/662 | . . . Temperature |
| | | 2240/665 | . . . Light intensity |
| | | 2240/667 | . . . Precipitation |
| | | 2240/68 | . . Traffic data |
| | | | |
| 2200/00 | Type of vehicles | | |
| 2200/10 | . Air crafts | | |
| 2200/12 | . Bikes | | |
| 2200/14 | . Vehicles with one wheel only | | |
| 2200/16 | . Single-axle vehicles | | |
| 2200/18 | . Buses | | |
| 2200/20 | . Vehicles specially adapted for children, e.g. toy vehicles | | |
| 2200/22 | . Microcars, e.g. golf cars | | |
| 2200/24 | . Personal mobility vehicles | | |
| 2200/26 | . Rail vehicles | | |
| 2200/28 | . Trailers | | |
| 2200/30 | . Trolleys | | |
| 2200/32 | . Waterborne vessels | | |
| 2200/34 | . Wheel chairs | | |
| 2200/36 | . Vehicles designed to transport cargo, e.g. trucks | | |
| 2200/40 | . Working vehicles | | |
| 2200/42 | . . Fork lift trucks | | |
| 2200/44 | . . Industrial trucks or floor conveyors | | |
| 2200/46 | . Vehicles with auxiliary ad-on propulsions, e.g. add-on electric motor kits for bicycles | | |
| 2210/00 | Converter types | | |
| 2210/10 | . DC to DC converters | | |
| 2210/12 | . . Buck converters | | |
| 2210/14 | . . Boost converters | | |
| 2210/20 | . AC to AC converters | | |
| 2210/22 | . . without intermediate conversion to DC | | |
| 2210/30 | . AC to DC converters | | |
| 2210/40 | . DC to AC converters | | |
| 2210/42 | . . Voltage source inverters | | |
| 2210/44 | . . Current source inverters | | |
| 2210/46 | . . with more than three phases | | |
| 2220/00 | Electrical machine types; Structures or applications thereof | | |
| 2220/10 | . Electrical machine types | | |
| 2220/12 | . . Induction machines | | |
| 2220/14 | . . Synchronous machines | | |
| 2220/16 | . . DC brushless machines | | |
| 2220/18 | . . Reluctance machines | | |
| 2220/20 | . . DC electrical machines | | |
| 2220/30 | . . Universal machines | | |
| 2220/40 | . Electrical machine applications | | |
| 2220/42 | . . with use of more than one motor | | |
| 2220/44 | . . Wheel Hub motors, i.e. integrated in the wheel hub | | |
| 2220/46 | . . Wheel motors, i.e. motor connected to only one wheel | | |
| 2220/50 | . Structural details of electrical machines | | |
| 2220/52 | . . Clutch motors | | |
| 2220/54 | . . Windings for different functions | | |
| 2220/56 | . . with switched windings | | |
| 2220/58 | . . with more than three phases | | |

- 2240/70 . Interactions with external data bases, e.g. traffic centres
- 2240/72 . . Charging station selection relying on external data
- 2240/80 . Time limits

2250/00 Driver interactions

- 2250/10 . by alarm
- 2250/12 . by confirmation, e.g. of the input
- 2250/14 . by input of vehicle departure time
- 2250/16 . by display
- 2250/18 . by enquiring driving style
- 2250/20 . by driver identification
- 2250/22 . by presence detection
- 2250/24 . by lever actuation
- 2250/26 . by pedal actuation
- 2250/28 . . Accelerator pedal thresholds
- 2250/30 . by voice

2260/00 Operating Modes

- 2260/10 . Temporary overload
- 2260/12 . . of combustion engines
- 2260/14 . . of transmissions
- 2260/16 . . of electrical drive trains
- 2260/162 . . . of electrical cells or capacitors
- 2260/165 . . . of converters
- 2260/167 . . . of motors or generators
- 2260/20 . Drive modes; Transition between modes
- 2260/22 . . Standstill, e.g. zero speed
- 2260/24 . . Coasting mode
- 2260/26 . . Transition between different drive modes
- 2260/28 . . Four wheel or all wheel drive
- 2260/30 . . Engine braking emulation
- 2260/32 . . Auto pilot mode
- 2260/34 . . Stabilising upright position of vehicles, e.g. of single axle vehicles
- 2260/40 . Control modes
- 2260/42 . . by adaptive correction
- 2260/44 . . by parameter estimation
- 2260/46 . . by self learning
- 2260/48 . . by fuzzy logic
- 2260/50 . . by future state prediction
- 2260/52 . . . drive range estimation, e.g. of estimation of available travel distance
- 2260/54 . . . Energy consumption estimation
- 2260/56 . . . Temperature prediction, e.g. for pre-cooling
- 2260/58 . . . Departure time prediction

2270/00 Problem solutions or means not otherwise provided for

- 2270/10 . Emission reduction
- 2270/12 . . of exhaust
- 2270/14 . . of noise
- 2270/142 . . . acoustic
- 2270/145 . . . Structure borne vibrations
- 2270/147 . . . electro magnetic [EMI]
- 2270/20 . Inrush current reduction, i.e. avoiding high currents when connecting the battery
- 2270/30 . Preventing theft during charging
- 2270/32 . . of electricity
- 2270/34 . . of parts
- 2270/36 . . of vehicles
- 2270/38 . . of data

- 2270/40 . related to technical updates when adding new parts or software
- 2270/42 . Means to improve acoustic vehicle detection by humans
- 2270/44 . Heat storages, e.g. for cabin heating
- 2270/46 . Heat pumps, e.g. for cabin heating