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.

1/00 **Supplying electric power to auxiliary equipment of vehicles** (circuit arrangements for charging batteries H02J 7/00)

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
1/06 . . . using only one supply
1/08 . . . . Methods and devices for control or regulation
1/10 . . . with provision for using different supplies
1/12 . . . . Methods and devices for control or regulation
1/14 . to electric lighting circuits
1/16 . . fed by the power supply line
1/20 . {Energy regeneration from auxiliary equipment}

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)

WARNING

Group B60L 3/00 is impacted by reclassification into groups B60L 58/00, B60L 58/10, B60L 58/12, B60L 58/13, B60L 58/14, B60L 58/15, B60L 58/16, B60L 58/18, B60L 58/19, B60L 58/20, B60L 58/21, B60L 58/22, B60L 58/24, B60L 58/25, B60L 58/26, B60L 58/27, B60L 58/30, B60L 58/31, B60L 58/32, B60L 58/33, B60L 58/34, and B60L 58/40.

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

3/0007 . {Measures or means for preventing or attenuating collisions}

3/0015 . . {Prevention of collisions}
3/0023 . {Detecting, eliminating, remedying or compensating for drive train abnormalities, e.g. failures within the drive train}
3/003 . . {relating to inverters}
3/0038 . . {relating to sensors}
3/0046 . . {relating to electric energy storage systems, e.g. batteries or capacitors}

WARNING

Group B60L 3/0046 is impacted by reclassification into groups B60L 58/00, B60L 58/10, B60L 58/12, B60L 58/13, B60L 58/14, B60L 58/15, B60L 58/16, B60L 58/18, B60L 58/19, B60L 58/20, B60L 58/21, B60L 58/22, B60L 58/24, B60L 58/25, B60L 58/26, B60L 58/27, and B60L 58/40.

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

3/0053 . . {relating to fuel cells}

WARNING

Group B60L 3/0053 is impacted by reclassification into groups B60L 58/00, B60L 58/30, B60L 58/31, B60L 58/32, B60L 58/33, B60L 58/34, and B60L 58/40.

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

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)

WARNING

Group B60L 9/00 is impacted by reclassification into group B60L 50/53.

Groups B60L 9/00 and B60L 50/53 should be considered in order to perform a complete search.

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

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)
13/003 . {Crossings; Points}
13/006 . {Electric propulsion adapted for monorail vehicles, suspension vehicles or rack railways (B60L 13/03 takes precedence)}
13/03 . Electric propulsion by linear motors
13/035 . . {Suspension of the vehicle-borne motorparts}
13/04 . Magnetic suspension or levitation for vehicles
13/06 . . Means to sense or control vehicle position or attitude with respect to railway
13/08 . . . for the lateral position
13/10 . Combination of electric propulsion and magnetic suspension or levitation

15/00 Methods, circuits, or devices for controlling the traction-motor speed of electrically-propelled vehicles
15/002 . {for control of propulsion for monorail vehicles, suspension vehicles or rack railways; for control of magnetic suspension or levitation for vehicles for propulsion purposes}
15/005 . . {for control of propulsion for vehicles propelled by linear motors}
15/007 . {Physical arrangements or structures of drive train converters specially adapted for the propulsion motors of electric vehicles}
15/02 . characterised by the form of the current used in the control circuit
15/025 . . {using field orientation; Vector control; Direct Torque Control [DTC]}
15/04 . . using dc
15/06 . . using substantially sinusoidal ac
15/08 . . using pulses
15/10 . 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)
15/12 . . with circuits controlled by relays or contactors
15/14 . . with main controller driven by a servomotor (B60L 15/18 takes precedence)
15/16 . . with main controller driven through a ratchet mechanism (B60L 15/18 takes precedence)
15/18 . . without contact making and breaking, e.g. using a transductor
15/20 . for control of the vehicle or its driving motor to achieve a desired performance, e.g. speed, torque, programmed variation of speed
15/2009 . . {for braking}
15/2018 . . . {for braking on a slope}
15/2027 . . . . {whilst maintaining constant speed}
15/2036 . . {Electric differentials, e.g. for supporting steering vehicles}
15/2045 . . {for optimising the use of energy}
15/2054 . . {by controlling transmissions or clutches}
15/2063 . . {for creeping}
15/2072 . . {for drive off}
15/2081 . . . {for drive off on a slope}
15/209 . . {for overtaking}
15/22 . . with sequential operation of interdependent switches, e.g. relays, contactors, programme drum
15/24 . . with main controller driven by a servomotor (B60L 15/28 takes precedence)
15/26 . . with main controller driven through a ratchet mechanism (B60L 15/28 takes precedence)
15/28 . . without contact making and breaking, e.g. using a transductor
15/30 . . with means to change over to human control
15/32 . Control or regulation of multiple-unit electrically-propelled vehicles
15/34 . . with human control of a setting device
15/36 . . . with automatic control superimposed, e.g. to prevent excessive motor current
15/38 . . with automatic control
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)
15/42 . 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)

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)

50/10 . using propulsion power supplied by engine-driven generators, e.g. generators driven by combustion engines

50/11 . . using DC generators and DC motors

50/12 . . using AC generators and DC motors

50/13 . . using AC generators and AC motors

50/14 . . using DC generators and AC motors

50/15 . . 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)

50/16 . . with provision for separate direct mechanical propulsion

50/20 . using propulsion power generated by humans or animals

50/30 . using propulsion power stored mechanically, e.g. in fly-wheels

50/40 . using propulsion power supplied by capacitors

50/50 . using propulsion power supplied by batteries or fuel cells

WARNING

Group B60L 50/50 is impacted by reclassification into groups B60L 50/60, B60L 50/64, B60L 50/70, and B60L 50/75.

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

50/51 . . characterised by AC-motors

50/52 . . characterised by DC-motors

50/53 . . in combination with an external power supply, e.g. from overhead contact lines

WARNING

Group B60L 50/53 is incomplete pending reclassification of documents from group B60L 9/00.

Groups B60L 9/00 and B60L 50/53 should be considered in order to perform a complete search.

50/60 . . using power supplied by batteries (in combination with fuel cells B60L 50/75)

WARNING

Group B60L 50/60 is incomplete pending reclassification from group B60L 50/50.

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

50/61 . . . by batteries charged by engine-driven generators, e.g. series hybrid electric vehicles

50/62 . . . . charged by low-power generators primarily intended to support the batteries, e.g. range extenders

50/64 . . . Constructional details of batteries specially adapted for electric vehicles

NOTE

This group covers adaptation of battery structures of electric vehicles, e.g. integration into control or safety systems, crash-resistant casings or vibration-damping means.

WARNING

Group B60L 50/64 is incomplete pending reclassification of documents from groups B60L 50/50 and H01M 50/20.

Groups B60L 50/50, H01M 50/20 and B60L 50/64 should be considered in order to perform a complete search.

50/66 . . . {Arrangements of batteries}

50/70 . . using power supplied by fuel cells (in combination with batteries B60L 50/75)

WARNING

Group B60L 50/70 is incomplete pending reclassification from group B60L 50/50.

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

50/71 . . . Arrangement of fuel cells within vehicles specially adapted for electric vehicles

50/72 . . . Constructional details of fuel cells specially adapted for electric vehicles

NOTE

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.

50/75 . . using propulsion power supplied by both fuel cells and batteries

WARNING

Group B60L 50/75 is incomplete pending reclassification from groups B60L 50/50 and B60L 58/40.

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

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

53/00 **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**

WARNING

Group B60L 53/00 is impacted by reclassification into groups B60L 53/50, B60L 53/51, B60L 53/52, B60L 53/53, B60L 53/54, B60L 53/55, B60L 53/56, B60L 53/57, B60L 53/67, and B60L 53/68.

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

53/10 . characterised by the energy transfer between the charging station and the vehicle

WARNING

Group B60L 53/10 is incomplete pending reclassification of documents from group B60L 53/60.

Groups B60L 53/60 and B60L 53/10 should be considered in order to perform a complete search.

53/11 . . {DC charging controlled by the charging station, e.g. mode 4}

53/12 . . Inductive energy transfer

WARNING

Group B60L 53/12 is impacted by reclassification into groups B60L 53/122, B60L 53/124, and B60L 53/126.

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

53/122 . . . Circuits or methods for driving the primary coil, e.g. supplying electric power to the coil

WARNING

Group B60L 53/122 is incomplete pending reclassification of documents from group B60L 53/12.

Groups B60L 53/12 and B60L 53/122 should be considered in order to perform a complete search.

53/124 . . . Detection or removal of foreign bodies

WARNING

Group B60L 53/124 is incomplete pending reclassification of documents from group B60L 53/12.

Groups B60L 53/12 and B60L 53/124 should be considered in order to perform a complete search.

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

WARNING

Group B60L 53/126 is incomplete pending reclassification of documents from group B60L 53/12.

Groups B60L 53/12 and B60L 53/126 should be considered in order to perform a complete search.

53/14 . . Conductive energy transfer

WARNING

Group B60L 53/14 is impacted by reclassification into group B60L 53/18.

Groups B60L 53/14 and B60L 53/18 should be considered in order to perform a complete search.

53/16 . . . Connectors, e.g. plugs or sockets, specially adapted for charging electric vehicles

53/18 . . . Cables specially adapted for charging electric vehicles

WARNING

Group B60L 53/18 is incomplete pending reclassification of documents from group B60L 53/14.

Groups B60L 53/14 and B60L 53/18 should be considered in order to perform a complete search.

53/20 . characterised by converters located in the vehicle

53/22 . . Constructional details or arrangements of charging converters specially adapted for charging electric vehicles

53/24 . . Using the vehicle's propulsion converter for charging

53/30 . Constructional details of charging stations

WARNING

Group B60L 53/30 is impacted by reclassification into groups B60L 53/302, B60L 53/305, B60L 53/34, B60L 53/67, and B60L 53/68.

Groups B60L 53/30, B60L 53/302, B60L 53/305, B60L 53/34, B60L 53/67, and B60L 53/68 should be considered in order to perform a complete search.

53/302 . . Cooling of charging equipment

WARNING

Group B60L 53/302 is incomplete pending reclassification of documents from group B60L 53/30.

Groups B60L 53/30 and B60L 53/302 should be considered in order to perform a complete search.

53/305 . . {Communication interfaces}

WARNING

Group B60L 53/305 is incomplete pending reclassification of documents from group B60L 53/30.

Groups B60L 53/30 and B60L 53/305 should be considered in order to perform a complete search.

53/31 . . Charging columns specially adapted for electric vehicles

53/32 . . {by charging in short intervals along the itinerary, e.g. during short stops}

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)

WARNING

Group B60L 53/34 is incomplete pending reclassification of documents from group B60L 53/30.

Groups B60L 53/30 and B60L 53/34 should be considered in order to perform a complete search.

53/35 . . Means for automatic or assisted adjustment of the relative position of charging devices and vehicles

53/36 . . . by positioning the vehicle

53/37 . . . using optical position determination, e.g. using cameras

53/38 . . . specially adapted for charging by inductive energy transfer

53/39 . . . . with position-responsive activation of primary coils

53/50 . Charging stations characterised by energy-storage or power-generation means

WARNING

Groups B60L 53/50 - B60L 53/57 are incomplete pending reclassification of documents from group B60L 53/00.

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

53/51 . . Photovoltaic means

53/52 . . Wind-driven generators

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

53/60 . Monitoring or controlling charging stations

WARNING

Group B60L 53/60 is impacted by reclassification into groups B60L 53/10, B60L 53/62, B60L 53/66, B60L 53/67, and B60L 53/68.

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

53/62 . . in response to charging parameters, e.g. current, voltage or electrical charge

WARNING

Group B60L 53/62 is incomplete pending reclassification of documents from groups B60L 53/60.

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

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

53/66 . . Data transfer between charging stations and vehicles

WARNING

Group B60L 53/66 is incomplete pending reclassification of documents from group B60L 53/60.

Groups B60L 53/60 and B60L 53/66 should be considered in order to perform a complete search.

53/665 . . . {Methods related to measuring, billing or payment}

53/67 . . Controlling two or more charging stations

WARNING

Group B60L 53/67 is incomplete pending reclassification of documents from groups B60L 53/00, B60L 53/30, and B60L 53/60.

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

53/68 . . Off-site monitoring or control, e.g. remote control

WARNING

Group B60L 53/68 is incomplete pending reclassification of documents from groups B60L 53/00, B60L 53/30, and B60L 53/60.

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

53/80 . Exchanging energy storage elements, e.g. removable batteries

WARNING

Group B60L 53/80 is incomplete pending reclassification of documents from groups B60K 1/04 and B60S 5/06.

Groups B60K 1/04, B60S 5/06, and B60L 53/80 should be considered in order to perform a complete search.

55/00 Arrangements for supplying energy stored within a vehicle to a power network, i.e. vehicle-to-grid [V2G] arrangements

58/00 **Methods or circuit arrangements for monitoring or controlling batteries or fuel cells, specially adapted for electric vehicles**

NOTE

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.

WARNING

Group B60L 58/00 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, B60L 3/0053, B60L 50/60, and B60L 50/70.

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

58/10 . for monitoring or controlling batteries

WARNING

Group B60L 58/10 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, and B60L 50/60.

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

58/12 . . responding to state of charge [SoC]

WARNING

Group B60L 58/12 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

Group B60L 58/12 is also impacted by reclassification into group B60L 58/15.

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

58/13 . . . Maintaining the SoC within a determined range

WARNING

Group B60L 58/13 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

Group B60L 58/13 is also impacted by reclassification into group B60L 58/15.

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

58/14 . . . Preventing excessive discharging

WARNING

Group B60L 58/14 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

Group B60L 58/14 is also impacted by reclassification into group B60L 58/15.

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

58/15 . . . Preventing overcharging

WARNING

Group B60L 58/15 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, B60L 58/12, B60L 58/13, and B60L 58/14.

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

58/16 . . responding to battery ageing, e.g. to the number of charging cycles or the state of health [SoH]

WARNING

Group B60L 58/16 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/18 . . of two or more battery modules

WARNING

Group B60L 58/18 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/19 . . . Switching between serial connection and parallel connection of battery modules

WARNING

Group B60L 58/19 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/20 . . . having different nominal voltages

WARNING

Group B60L 58/20 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/21 . . . having the same nominal voltage

WARNING

Group B60L 58/21 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/22 . . . Balancing the charge of battery modules

WARNING

Group B60L 58/22 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/24 . . for controlling the temperature of batteries

WARNING

Group B60L 58/24 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/25 . . . by controlling the electric load

WARNING

Group B60L 58/25 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/26 . . . by cooling

WARNING

Group B60L 58/26 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/27 . . . by heating

WARNING

Group B60L 58/27 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0046.

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

58/30 . for monitoring or controlling fuel cells

WARNING

Group B60L 58/30 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0053, and B60L 50/70.

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

58/31 . . for starting of fuel cells

WARNING

Group B60L 58/31 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.

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

58/32 . . for controlling the temperature of fuel cells, e.g. by controlling the electric load

WARNING

Group B60L 58/32 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.

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

58/33 . . . by cooling

WARNING

Group B60L 58/33 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.

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

58/34 . . . by heating

WARNING

Group B60L 58/34 is incomplete pending reclassification of documents from groups B60L 3/00 and B60L 3/0053.

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

58/40 . for controlling a combination of batteries and fuel cells

WARNING

Group B60L 58/40 is incomplete pending reclassification of documents from groups B60L 3/00, B60L 3/0046, B60L 3/0053.

Group B60L 58/40 is also impacted by reclassification into group B60L 50/75.

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

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

2240/00 Control parameters of input or output; Target parameters
2240/10 . Vehicle control parameters
2240/12 . . Speed
2240/14 . . Acceleration
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
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