

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}	5/06	. . Structure of the rollers or their carrying means
3/0023	. {Detecting, eliminating, remedying or compensating for drive train abnormalities, e.g. failures within the drive train}	5/08	. . Structure of the sliding shoes or their carrying means
3/003	. . {relating to inverters}	5/085	. . . {with carbon contact members}
3/0038	. . {relating to sensors}	5/10	. . Devices preventing the collector from jumping off
3/0046	. . {relating to electric energy storage systems, e.g. batteries or capacitors}	5/12	. . Structural features of poles or their bases
WARNING		5/14	. . . Devices for automatic lowering of a jumped-off collector
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 .		5/16	. . . Devices for lifting and resetting the collector (B60L 5/34 takes precedence)
All groups listed in this Warning should be considered in order to perform a complete search.		5/18	. using bow-type collectors in contact with trolley wire
3/0053	. . {relating to fuel cells}	5/19	. . using arrangements for effecting collector movement transverse to the direction of vehicle motion
WARNING		5/20	. . Details of contact bow
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 .		5/205	. . . {with carbon contact members}
All groups listed in this Warning should be considered in order to perform a complete search.		5/22	. . Supporting means for the contact bow
3/0061	. . {relating to electrical machines}	5/24	. . . Pantographs
3/0069	. . {relating to the isolation, e.g. ground fault or leak current}	5/26	. . . Half pantographs, e.g. using counter rocking beams
3/0076	. . {relating to braking}	5/28	. . . Devices for lifting and resetting the collector
3/0084	. . {relating to control modules}	5/30 using springs
3/0092	. {with use of redundant elements for safety purposes}	5/32 using fluid pressure
3/02	. Dead-man's devices	5/34	. with devices to enable one vehicle to pass another one using the same power supply line
3/04	. Cutting off the power supply under fault conditions (protective devices and circuit arrangements in general H01H ; H02H)	5/36	. with means for collecting current simultaneously from more than one conductor, e.g. from more than one phase
3/06	. Limiting the traction current under mechanical overload conditions	5/38	. for collecting current from conductor rails (B60L 5/40 takes precedence)
3/08	. Means for preventing excessive speed of the vehicle	5/39	. . from third rail
3/10	. Indicating wheel slip {; Correction of wheel slip}	5/40	. for collecting current from lines in slotted conduits
3/102	. . {of individual wheels}	5/42	. for collecting current from individual contact pieces connected to the power supply line
3/104	. . {by indirect measurement of vehicle speed}	7/00	Electrodynamic brake systems for vehicles in general
3/106	. . {for maintaining or recovering the adhesion of the drive wheels}	7/003	. {Dynamic electric braking by short circuiting the motor}
3/108	. . . {whilst braking, i.e. ABS}	7/006	. {Dynamic electric braking by reversing current, i.e. plugging}
3/12	. Recording operating variables {; Monitoring of operating variables}	7/02	. Dynamic electric resistor braking (B60L 7/22 takes precedence)
5/00	Current collectors for power supply lines of electrically-propelled vehicles (current collectors in general H01R 41/00)	7/04	. . for vehicles propelled by dc motors
5/005	. {without mechanical contact between the collector and the power supply line}	7/06	. . for vehicles propelled by ac motors
5/02	. with ice-removing device	7/08	. . Controlling the braking effect (B60L 7/04 , B60L 7/06 take precedence)
5/04	. using rollers or sliding shoes in contact with trolley wire (B60L 5/40 takes precedence)	7/10	. Dynamic electric regenerative braking (B60L 7/22 takes precedence)
5/045	. . {with trolley wire finders}	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	15/005	. . {for control of propulsion for vehicles propelled by linear motors}
7/28	. Eddy-current braking	15/007	. {Physical arrangements or structures of drive train converters specially adapted for the propulsion motors of electric vehicles}
8/00	Electric propulsion with power supply from forces of nature, e.g. sun or wind	15/02	. characterised by the form of the current used in the control circuit
8/003	. {Converting light into electric energy, e.g. by using photo-voltaic systems}	15/025	. . {using field orientation; Vector control; Direct Torque Control [DTC]}
8/006	. {Converting flow of air into electric energy, e.g. by using wind turbines}	15/04	. . using dc
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)	15/06	. . using substantially sinusoidal ac
	WARNING	15/08	. . using pulses
	Group B60L 9/00 is impacted by reclassification into group B60L 50/53 .	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)
	Groups B60L 9/00 and B60L 50/53 should be considered in order to perform a complete search.	15/12	. . with circuits controlled by relays or contactors
9/005	. {Interference suppression}	15/14	. . with main controller driven by a servomotor (B60L 15/18 takes precedence)
9/02	. using dc motors	15/16	. . with main controller driven through a ratchet mechanism (B60L 15/18 takes precedence)
9/04	. . fed from dc supply lines	15/18	. . without contact making and breaking, e.g. using a transducer
9/06	. . . with conversion by metadyne	15/20	. for control of the vehicle or its driving motor to achieve a desired performance, e.g. speed, torque, programmed variation of speed
9/08	. . fed from ac supply lines	15/2009	. . {for braking}
9/10	. . . with rotary converters	15/2018	. . . {for braking on a slope}
9/12	. . . with static converters	15/2027 {whilst maintaining constant speed}
9/14	. . fed from different kinds of power-supply lines	15/2036	. . {Electric differentials, e.g. for supporting steering vehicles}
9/16	. using ac induction motors	15/2045	. . {for optimising the use of energy}
9/18	. . fed from dc supply lines	15/2054	. . {by controlling transmissions or clutches}
9/20	. . . single-phase motors	15/2063	. . {for creeping}
9/22	. . . polyphase motors	15/2072	. . {for drive off}
9/24	. . fed from ac supply lines	15/2081	. . . {for drive off on a slope}
9/26	. . . single-phase motors	15/209	. . {for overtaking}
9/28	. . . polyphase motors	15/22	. . with sequential operation of interdependent switches, e.g. relays, contactors, programme drum
9/30	. . fed from different kinds of power-supply lines	15/24	. . with main controller driven by a servomotor (B60L 15/28 takes precedence)
9/32	. using ac brush displacement motors	15/26	. . with main controller driven through a ratchet mechanism (B60L 15/28 takes precedence)
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)	15/28	. . without contact making and breaking, e.g. using a transducer
13/003	. {Crossings; Points}	15/30	. . with means to change over to human control
13/006	. {Electric propulsion adapted for monorail vehicles, suspension vehicles or rack railways (B60L 13/03 takes precedence)}	15/32	. Control or regulation of multiple-unit electrically-propelled vehicles
13/03	. Electric propulsion by linear motors	15/34	. . with human control of a setting device
13/035	. . {Suspension of the vehicle-borne motorparts}	15/36	. . . with automatic control superimposed, e.g. to prevent excessive motor current
13/04	. Magnetic suspension or levitation for vehicles	15/38	. . with automatic control
13/06	. . Means to sense or control vehicle position or attitude with respect to railway	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)
13/08	. . . for the lateral position	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)
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}		

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	2240/425	. . . Temperature
2200/32	. Waterborne vessels	2240/427	. . . Voltage
2200/34	. Wheel chairs	2240/429	. . . Current
2200/36	. Vehicles designed to transport cargo, e.g. trucks	2240/44	. . related to combustion engines
2200/40	. Working vehicles	2240/441	. . . Speed
2200/42	. . Fork lift trucks	2240/443	. . . Torque
2200/44	. . Industrial trucks or floor conveyors	2240/445	. . . Temperature
2200/46	. Vehicles with auxiliary ad-on propulsions, e.g. add-on electric motor kits for bicycles	2240/46	. . related to wheels
		2240/461	. . . Speed
2210/00	Converter types	2240/463	. . . Torque
2210/10	. DC to DC converters	2240/465	. . . Slip
2210/12	. . Buck converters	2240/48	. . related to transmissions
2210/14	. . Boost converters	2240/485	. . . Temperature
2210/20	. AC to AC converters	2240/486	. . . Operating parameters
2210/22	. . without intermediate conversion to DC	2240/50	. . related to clutches
2210/30	. AC to DC converters	2240/507	. . . Operating parameters
2210/40	. DC to AC converters	2240/52	. . related to converters
2210/42	. . Voltage source inverters	2240/525	. . . Temperature of converter or components thereof
2210/44	. . Current source inverters	2240/526	. . . Operating parameters
2210/46	. . with more than three phases	2240/527	. . . Voltage
		2240/529	. . . Current
2220/00	Electrical machine types; Structures or applications thereof	2240/54	. . related to batteries
2220/10	. Electrical machine types	2240/545	. . . Temperature
2220/12	. . Induction machines	2240/547	. . . Voltage
2220/14	. . Synchronous machines	2240/549	. . . Current
2220/16	. . DC brushless machines	2240/60	. Navigation input
2220/18	. . Reluctance machines	2240/62	. . Vehicle position
2220/20	. . DC electrical machines	2240/622	. . . by satellite navigation
2220/30	. . Universal machines	2240/625	. . . by GSM
2220/40	. Electrical machine applications	2240/627	. . . by WLAN
2220/42	. . with use of more than one motor	2240/64	. . Road conditions
2220/44	. . Wheel Hub motors, i.e. integrated in the wheel hub	2240/642	. . . Slope of road
2220/46	. . Wheel motors, i.e. motor connected to only one wheel	2240/645	. . . Type of road
2220/50	. Structural details of electrical machines	2240/647	. . . Surface situation of road, e.g. type of paving
2220/52	. . Clutch motors	2240/66	. . Ambient conditions
2220/54	. . Windings for different functions	2240/662	. . . Temperature
2220/56	. . with switched windings	2240/665	. . . Light intensity
2220/58	. . with more than three phases	2240/667	. . . Precipitation
		2240/68	. . Traffic data
2240/00	Control parameters of input or output; Target parameters	2240/70	. Interactions with external data bases, e.g. traffic centres
2240/10	. Vehicle control parameters	2240/72	. . Charging station selection relying on external data
2240/12	. . Speed	2240/80	. Time limits
2240/14	. . Acceleration		
2240/16	. . . longitudinal	2250/00	Driver interactions
2240/18	. . . lateral	2250/10	. by alarm
2240/20	. . . angular	2250/12	. by confirmation, e.g. of the input
2240/22	. . Yaw angle	2250/14	. by input of vehicle departure time
2240/24	. . Steering angle	2250/16	. by display
2240/26	. . Vehicle weight	2250/18	. by enquiring driving style
2240/28	. . Door position	2250/20	. by driver identification
2240/30	. . Parking brake position	2250/22	. by presence detection
2240/32	. . Driving direction	2250/24	. by lever actuation
2240/34	. . Cabin temperature	2250/26	. by pedal actuation
2240/36	. . Temperature of vehicle components or parts	2250/28	. . Accelerator pedal thresholds
2240/40	. Drive Train control parameters	2250/30	. by voice
2240/42	. . related to electric machines		
2240/421	. . . Speed	2260/00	Operating Modes
2240/423	. . . Torque	2260/10	. Temporary overload
		2260/12	. . of combustion engines

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- 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