

ECLA**EUROPEAN CLASSIFICATION****B60L**

ELECTRIC EQUIPMENT OR PROPULSION OF ELECTRICALLY-PROPELLED VEHICLES; MAGNETIC SUSPENSION OR LEVITATION FOR VEHICLES; ELECTRODYNAMIC BRAKE SYSTEMS FOR VEHICLES, IN GENERAL (electric coupling devices combined with mechanical couplings of vehicles [B60D1/62](#); electric heating for vehicles B60H; transmitting drive from electric motors to ultimate propulsive elements in vehicles B60K; disposition of electric propulsion equipment, other than current collectors, in vehicles B60K; auxiliary generator drives on vehicles B60K; lighting for vehicles B60Q; vehicle brake control systems in general B60T; preventing wheel slip by reducing power in rail vehicles B61C; railway track circuits in general B61L; lighting in general F21; H05B; switches in general H01H; coupling devices for electric connections in general H01R; dynamo-electric machines H02K; electric converters H02M; starting, controlling, braking of electric machines or converters in general H02P; electric heating in general H05B) [C9507]

[N: **Note**[M1207]

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.

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B60L1/00

Supplying electric power to auxiliary equipment of vehicles (circuit arrangements for charging batteries [H02J7/00](#)) [C9512]

B60L1/00B

- . [N: to auxiliary motors, e.g. for pumps, compressors] [N0204]

B60L1/00D

- . [N: to power outlets] [N1204]

B60L1/02

- . to electric heating circuits

B60L1/04

- . . fed by the power supply line

B60L1/06

- . . . using only one supply

B60L1/08

- Methods and devices for control or regulation

B60L1/10

- . . . with provision for using different supplies

B60L1/12

- Methods and devices for control or regulation

B60L1/14

- . to electric lighting circuits

B60L1/16	<ul style="list-style-type: none"> <ul style="list-style-type: none"> fed by the power supply line
B60L1/20	<ul style="list-style-type: none"> [N: Energy regeneration from auxiliary equipment] [N1204]
B60L3/00	Electric devices on electrically-propelled vehicles for safety purposes; Monitoring operating variables, e.g. speed, deceleration, power consumption (measuring in general G01)
B60L3/00C	<ul style="list-style-type: none"> [N: Measures or means for preventing or attenuating collisions] [N9712] [C1207]
B60L3/00C1	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: Prevention of collisions] [N1204]
B60L3/00F	<ul style="list-style-type: none"> [N: Detecting, eliminating, remedying or compensating for drive train abnormalities, e.g. failures within the drive train] [N9712] [C1207]
B60L3/00F2	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to inverters] [N0404] [C1203]
B60L3/00F4	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to sensors] [N0404] [C1203]
B60L3/00F6	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to electric energy storage systems, e.g. batteries or capacitors] [N0404] [C1203]
B60L3/00F8	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to fuel cells] [N0404] [C1203]
B60L3/00F10	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to electrical machines] [N1204]
B60L3/00F12	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to the isolation, e.g. ground fault or leak current] [N1204]
B60L3/00F14	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to braking] [N1204]
B60L3/00F16	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: relating to control modules] [N1204]
B60L3/00R	<ul style="list-style-type: none"> [N: with use of redundant elements for safety purposes] [N1204]
B60L3/02	<ul style="list-style-type: none"> Dead-man`s devices
B60L3/04	<ul style="list-style-type: none"> Cutting off the power supply under fault conditions (protective devices and circuit arrangements in general H01H; H02H)
B60L3/06	<ul style="list-style-type: none"> Limiting the traction current under mechanical overload conditions
B60L3/08	<ul style="list-style-type: none"> Means for preventing excessive speed of the vehicle
B60L3/10	<ul style="list-style-type: none"> Indicating wheel slip; [N: Correction of wheel slip] [C1203]
B60L3/10B	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: of individual wheels] [N9910]
B60L3/10D	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: by indirect measurement of vehicle speed] [N1204]
B60L3/10E	<ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: for maintaining or recovering the adhesion of the drive wheels] [N1204]
B60L3/10E2	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> [N: whilst braking , i.e. ABS] [N1204]
B60L3/12	<ul style="list-style-type: none"> Recording operating variables; [N: Monitoring of operating variables] [C1203]
B60L5/00	Current collectors for power supply lines of electrically-propelled vehicles (current collectors in general H01R41/00)
B60L5/00B	<ul style="list-style-type: none"> [N: without mechanical contact between the collector and the power supply line]
B60L5/02	<ul style="list-style-type: none"> with ice-removing device

- B60L5/04 . using rollers or sliding shoes in contact with trolley wire ([B60L5/40 takes precedence](#))
- B60L5/04B . . [N: with trolley wire finders]
- B60L5/06 . . Structure of the rollers or their carrying means
- B60L5/08 . . Structure of the sliding shoes or their carrying means
- B60L5/08B . . . [N: with carbon contact members]
- B60L5/10 . . Devices preventing the collector from jumping off
- B60L5/12 . . Structural features of poles or their bases
- B60L5/14 . . . Devices for automatic lowering of a jumped-off collector
- B60L5/16 . . . Devices for lifting and resetting the collector ([B60L5/34 takes precedence](#))

- B60L5/18 . using bow-type collectors in contact with trolley wire
- B60L5/19 . . using arrangements for effecting collector movement transverse to the direction of vehicle motion
- B60L5/20 . . Details of contact bow
- B60L5/20B . . . [N: with carbon contact members]
- B60L5/22 . . Supporting means for the contact bow
- B60L5/24 . . . Pantographs
- B60L5/26 . . . Half pantographs, e.g. using counter rocking beams
- B60L5/28 . . . Devices for lifting and resetting the collector
- B60L5/30 using springs
- B60L5/32 using fluid pressure

- B60L5/34 . with devices to enable one vehicle to pass another one using the same power supply line

- B60L5/36 . with means for collecting current simultaneously from more than one conductor, e.g. from more than one phase

- B60L5/38 . for collecting current from conductor rails ([B60L5/40 takes precedence](#))
- B60L5/39 . . from third rail [N9512]

- B60L5/40 . for collecting current from lines in slotted conduits

- B60L5/42 . for collecting current from individual contact pieces connected to the power supply line

- B60L7/00 Electrodynamic brake systems for vehicles in general**

- B60L7/00B . [N: Dynamic electric braking by short circuiting the motor] [N1204]
- B60L7/00D . [N: Dynamic electric braking by reversing current, i.e. plugging] [N1204]

- B60L7/02 . Dynamic electric resistor braking ([B60L7/22 takes precedence](#))
- B60L7/04 . . for vehicles propelled by dc motors
- B60L7/06 . . for vehicles propelled by ac motors
- B60L7/08 . . Controlling the braking effect ([B60L7/04, B60L7/06 take precedence](#))

- B60L7/10 . Dynamic electric regenerative braking ([B60L7/22 takes precedence](#))

- B60L7/12 . . for vehicles propelled by dc motors
- B60L7/14 . . for vehicles propelled by ac motors
- B60L7/16 . . for vehicles comprising converters between the power source and the motor
- B60L7/18 . . Controlling the braking effect ([B60L7/12](#), [B60L7/14](#), [B60L7/16](#) take precedence)
- B60L7/20 . Braking by supplying regenerated power to the prime mover of vehicles comprising engine-driven generators
- B60L7/22 . Dynamic electric resistor braking, combined with dynamic electric regenerative braking
- B60L7/24 . with additional mechanical or electromagnetic braking [M1203]
- B60L7/26 . . Controlling the braking effect
- B60L7/28 . Eddy-current braking
- B60L8/00** **Electric propulsion with power supply from force of nature, e.g. sun, wind**
- B60L8/00B . [N: Converting light into electric energy, e.g. by using photo-voltaic systems] [N1204]
- B60L8/00D . [N: Converting flow of air into electric energy, e.g. by using wind turbines] [N1204]
- B60L9/00** **Electric propulsion with power supply external to vehicle ([B60L8/00](#), [B60L13/00](#) take precedence) [C9512]**
- B60L9/00B . [N: Interference suppression] [N9712]
- B60L9/02 . using dc motors
- B60L9/04 . . fed from dc supply lines
- B60L9/06 . . . with conversion by metadyne
- B60L9/08 . . fed from ac supply lines
- B60L9/10 . . . with rotary converters
- B60L9/12 . . . with static converters
- B60L9/14 . . fed from different kinds of power-supply lines
- B60L9/16 . using ac induction motors
- B60L9/18 . . fed from dc supply lines
- B60L9/20 . . . single-phase motors
- B60L9/22 . . . polyphase motors
- B60L9/24 . . fed from ac supply lines
- B60L9/26 . . . single-phase motors
- B60L9/28 . . . polyphase motors
- B60L9/30 . . fed from different kinds of power-supply lines
- B60L9/32 . using ac brush displacement motors
- B60L11/00** **Electric propulsion with power supplied within the vehicle([B60L8/00](#),[B60L13/00](#)take precedence; arrangements or mounting of plural diverse prime-movers for mutual or common propulsion[B60K6/20](#); control systems specially adapted for hybrid vehicles**

B60W20/00)[C0705]

- B60L11/00B . [N: using electric power supply other than engine driven generators, electrical or fuel-cells] [N9512] [C1203]
- B60L11/00B2 . . [N: using capacitors] [N1204]
- B60L11/00B4 . . [N: using auxiliary power supplied by humans] [N1204]
- B60L11/02 . using engine-driven generators
- B60L11/04 . . using dc generators and motors
- B60L11/06 . . using ac generators and dc motors
- B60L11/08 . . using ac generators and motors
- B60L11/10 . . using dc generators and ac motors
- B60L11/12 . . with additional electric power supply, e.g. accumulator
- B60L11/12D . . . [N: using range extenders, e. g. series hybrid vehicles] [N9611] [C1203]
- B60L11/12D2 [N: the range extender having low power output with respect to maximum power output of the vehicle] [N1204]
- B60L11/14 . . with provision for direct mechanical propulsion
- B60L11/16 . using power stored mechanically, e.g. in fly-wheel
- B60L11/18 . using power supply from primary cells, secondary cells, or fuel cells
- B60L11/18A . . [N: combined with an external power supply]
- B60L11/18C . . [N: for vehicles propelled by ac-motors] [C1203]
- B60L11/18E . . [N: for vehicles propelled by dc-motors] [C1203]
- B60L11/18H . . [N: for vehicles propelled by position controlled motors] [N9507] [C1203]
- B60L11/18L . . [N: Charging electric vehicles] [N9507]
- B60L11/18L2 . . . [N: using converters] [N9507]
- B60L11/18L2A [N: Physical arrangements or structures of charging converters specially adapted for charging electric vehicles] [N1204]
- B60L11/18L2C [N: the vehicle's propulsion converter is used for charging] [N1204]
- B60L11/18L4 . . . [N: by conductive energy transfer, e.g. connectors] [N0104]
- B60L11/18L4A [N: Adaptations of plugs or sockets for charging electric vehicles] [N1204]
- B60L11/18L5 . . . [N: by inductive energy transfer] [N0104]
- B60L11/18L6 . . . [N: by exchange of energy storage elements, e.g. removable batteries] [N0104]
- B60L11/18L7 . . . [N: Details of charging stations, e.g. vehicle recognition or billing ([B60L11/18L2](#), [B60L11/18L5](#), [B60L11/18L6](#) take precedence)] [N0104]
- B60L11/18L7A [N: Charging columns for electric vehicles] [N1204]
- B60L11/18L7C [N: Automatic adjustment of relative position between charging device and vehicle] [N1204]
- B60L11/18L7C2 [N: for inductive energy transfer] [N1204]
- B60L11/18L7C2B [N: with position related activation of primary coils] [N1204]
- B60L11/18L7C4 [N: the vehicle being positioned] [N1204]
- B60L11/18L7C6 [N: with optical position determination, e.g. by a camera] [N1204]
- B60L11/18L7F [N: by charging in short intervals along the itinerary, e.g. during short stops]

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B60L11/18L7J	[N: Methods for the transfer of electrical energy or data between charging station and vehicle] [N1203]
B60L11/18L7J2	.	.	.	.	[N: Optimising energy costs, e.g. by charging depending on electricity rates] [N1204]
B60L11/18L7J4	.	.	.	.	[N: Energy stored in the vehicle is provided to the network, i.e. vehicle to grid (V2G) arrangements] [N1204]
B60L11/18L7J6	.	.	.	.	[N: the charging being dependent on network capabilities] [N1204]
B60L11/18L7J8	.	.	.	.	[N: Identification of the vehicle] [N1204]
B60L11/18L7J10	.	.	.	.	[N: Methods related to measuring, billing or payment] [N1204]
B60L11/18L7J12	.	.	.	.	[N: Fast charging] [N1204]
B60L11/18M	.	.			[N: Battery monitoring or controlling; Arrangements of batteries, structures or switching circuits therefore] [N9507] [C1203]
B60L11/18M22	.	.	.		[N: by battery splitting] [N1204]
B60L11/18M22S	.	.	.	.	[N: by series/parallel switching] [N1204]
B60L11/18M24	.	.	.		[N: Battery age determination] [N1204]
B60L11/18M26	.	.	.		[N: Preventing deep discharging] [N1204]
B60L11/18M28	.	.	.		[N: Monitoring or controlling state of charge (SOC)] [N1204]
B60L11/18M28T	.	.	.	.	[N: Target range for state of charge (SOC)] [N1204]
B60L11/18M30	.	.	.		[N: Control of a battery packs, i.e. of a set of batteries with the same voltage][N0403] [N1204]
B60L11/18M30B	.	.	.	.	[N: Balancing the charge of multiple batteries or cells] [N1204]
B60L11/18M32	.	.	.		[N: Controlling two or more batteries with different voltages] [N1204]
B60L11/18M34	.	.	.		[N: Battery temperature regulation] [N1204]
B60L11/18M34B	.	.	.	.	[N: by control of electric loads] [N1204]
B60L11/18M34D	.	.	.	.	[N: by cooling] [N1204]
B60L11/18M34F	.	.	.	.	[N: by heating] [N1204]
B60L11/18M36	.	.	.		[N: Arrangements of batteries] [N1204]
B60L11/18M38	.	.	.		[N: Adaptation of battery structures for electric vehicles] [N1207]
B60L11/18R	.	.			[N: Fuel cells monitoring or controlling; Arrangements of fuel cells, structures or switching circuits therefore] [N9611]
B60L11/18R0	.	.	.		[N: Details of fuel cells] [N1203]
B60L11/18R2	.	.	.		[N: Starting of fuel cells] [N0202]
B60L11/18R4	.	.	.		[N: combined with battery control] [N0209]
B60L11/18R8	.	.	.		[N: Fuel cell temperature regulation] [N1204]
B60L11/18R8B	.	.	.	.	[N: by control of electric loads] [N1204]
B60L11/18R8D	.	.	.	.	[N: by cooling] [N1204]
B60L11/18R8F	.	.	.	.	[N: by heating] [N1204]
B60L11/18R10	.	.	.		[N: Arrangements of the fuel cells] [N1204]
B60L11/18R12	.	.	.		[N: Adaptation of fuel cell structures for electric vehicles] [N1207]

B60L13/00

Electric propulsion for monorail vehicles, suspension vehicles or rack railways; Magnetic suspension or levitation for vehicles ([N: tracks for Maglev-type trains [E01B25/00B](#);] [electromagnets per se H01F7/06](#); [linear motors per se H02K41/00](#)) [C9512]

- B60L13/00B . [N: Crossings; Points]
- B60L13/00D . [N: Electric propulsion adapted for monorail vehicles, suspension vehicles or rack railways ([B60L13/03](#) takes precedence)] [N9512]
- B60L13/03 . Electric propulsion by linear motors [N9512]
- B60L13/03B . . [N: Suspension of the vehicle-borne motorparts] [N9512]
- B60L13/04 . Magnetic suspension or levitation for vehicles
- B60L13/06 . . Means to sense or control vehicle position or attitude with respect to railway
- B60L13/08 . . . for the lateral position
- B60L13/10 . Combination of electric propulsion and magnetic suspension or levitation
- B60L15/00** **Methods, circuits, or devices for controlling the traction-motor speed of electrically-propelled vehicles**
- B60L15/00B . [N: for control of propulsion for monorail vehicles, suspension vehicles or rack railways; for control of magnetic suspension or levitation for vehicles for propulsion purposes] [C1203]
- B60L15/00B1 . . [N: for control of propulsion for vehicles propelled by linear motors] [C1203]
- B60L15/00D . [N: Physical arrangements or structures of drive train converters specially adapted for the propulsion motors of electric vehicles] [N1204]
- B60L15/02 . characterised by the form of the current used in the control circuit
- B60L15/02B . . [N: using field orientation; Vector control; Direct Torque Control (DTC)] [N9906]
- B60L15/04 . . using dc
- B60L15/06 . . using substantially sinusoidal ac
- B60L15/08 . . using pulses
- B60L15/10 . 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 B60L3/00](#))
- B60L15/12 . . with circuits controlled by relays or contactors
- B60L15/14 . . with main controller driven by a servomotor ([B60L15/18](#) takes precedence)
- B60L15/16 . . with main controller driven through a ratchet mechanism ([B60L15/18](#) takes precedence)
- B60L15/18 . . without contact making and breaking, e.g. using a transducer
- B60L15/20 . for control of the vehicle or its driving motor to achieve a desired performance, e.g. speed, torque, programmed variation of speed
- B60L15/20B . . [N: for braking] [N1207]
- B60L15/20B1 . . . [N: for braking on a slope] [N1203]
- B60L15/20B1C [N: whilst maintaining constant speed] [N1203]
- B60L15/20D . . [N: Electric differentials, e.g. for supporting steering of vehicles ([arrangement of control devices for differential gearing B60K23/02](#))] [C1203]
- B60L15/20E . . [N: for optimising the use of energy] [N9910] [C1203]

- B60L15/20G . . [N: by controlling transmissions or clutches] [N9910] [C1203]
- B60L15/20I . . [N: for creeping] [N1204]
- B60L15/20K . . [N: for drive off] [N1207]
- B60L15/20K1 . . . [N: for drive off on a slope] [N1207]
- B60L15/20O . . [N: for overtaking] [N1204]
- B60L15/22 . . with sequential operation of interdependent switches, e.g. relays, contactors, programme drum
- B60L15/24 . . with main controller driven by a servomotor ([B60L15/28 takes precedence](#))
- B60L15/26 . . with main controller driven through a ratchet mechanism ([B60L15/28 takes precedence](#))
- B60L15/28 . . without contact making and breaking, e.g. using a transducer
- B60L15/30 . . with means to change over to human control
- B60L15/32 . Control or regulation of multiple-unit electrically-propelled vehicles
- B60L15/34 . . with human control of a setting device
- B60L15/36 . . . with automatic control superimposed, e.g. to prevent excessive motor current
- B60L15/38 . . with automatic control
- B60L15/40 . Adaptation of control equipment on vehicle for remote actuation from a stationary place ([devices along the route for controlling devices on rail vehicles B61L3/00; central rail-traffic control systems B61L27/00](#))
- B60L15/42 . Adaptation of control equipment on vehicle for actuation from alternative parts of the vehicle or from alternative vehicles of the same vehicle train ([B60L15/32 takes precedence](#))