

## 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 . . . fed by the power supply line
- B60L1/20 . [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 . [N: Measures or means for preventing or attenuating collisions] [N9712] [C1207]
- B60L3/00C1 . . [N: Prevention of collisions] [N1204]
- B60L3/00F . [N: Detecting, eliminating, remedying or compensating for drive train abnormalities, e.g. failures within the drive train] [N9712] [C1207]
- B60L3/00F2 . . [N: relating to inverters] [N0404] [C1203]
- B60L3/00F4 . . [N: relating to sensors] [N0404] [C1203]
- B60L3/00F6 . . [N: relating to electric energy storage systems, e.g. batteries or capacitors] [N0404] [C1203]
- B60L3/00F8 . . [N: relating to fuel cells] [N0404] [C1203]
- B60L3/00F10 . . [N: relating to electrical machines] [N1204]
- B60L3/00F12 . . [N: relating to the isolation, e.g. ground fault or leak current] [N1204]
- B60L3/00F14 . . [N: relating to braking] [N1204]
- B60L3/00F16 . . [N: relating to control modules] [N1204]
- B60L3/00R . [N: with use of redundant elements for safety purposes] [N1204]
- B60L3/02 . Dead-man`s devices
- B60L3/04 . Cutting off the power supply under fault conditions (protective devices and circuit arrangements in general [H01H](#); [H02H](#))
- B60L3/06 . Limiting the traction current under mechanical overload conditions
- B60L3/08 . Means for preventing excessive speed of the vehicle
- B60L3/10 . Indicating wheel slip; [N: Correction of wheel slip] [C1203]
- B60L3/10B . . [N: of individual wheels] [N9910]
- B60L3/10D . . [N: by indirect measurement of vehicle speed] [N1204]
- B60L3/10E . . [N: for maintaining or recovering the adhesion of the drive wheels] [N1204]
- B60L3/10E2 . . . [N: whilst braking , i.e. ABS] [N1204]
- B60L3/12 . 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 . [N: without mechanical contact between the collector and the power supply line]
- B60L5/02 . 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 transductor
- 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](#))