

**CPC****B60W****COOPERATIVE PATENT CLASSIFICATION****CONJOINT CONTROL OF VEHICLE SUB-UNITS OF DIFFERENT TYPE OR DIFFERENT FUNCTION; CONTROL SYSTEMS SPECIALLY ADAPTED FOR HYBRID VEHICLES; ROAD VEHICLE DRIVE CONTROL SYSTEMS FOR PURPOSES NOT RELATED TO THE CONTROL OF A PARTICULAR SUB-UNIT****NOTES**

1. This subclass does not cover the control of a single sub-unit; such control is classified in the relevant place for the sub-unit, e.g. [F02D](#), [F16H](#). Where a single sub-unit is controlled by means of signals or commands from other sub-units, the control of this single sub-unit is classified in the relevant place for this sub-unit. For example, the control of variable-ratio gearing by means of signals from the engine or the accelerator is classified in the subclass for gearing, [F16H](#).
2. Conjoint control of driveline units, e.g. engines, and variable-ratio gearing occurring only transiently during ratio shift and being also characterised by the control of the gearing is also classified in the subclass for gearing, [F16H](#).
3. In groups [B60W 20/00](#) - [B60W 50/00](#), the first place priority rule is applied, i.e. at each hierarchical level, classification is made in the first appropriate place.
4. When classifying in group [B60W 10/00](#), classification must also be made in groups [B60W 20/00-B60W 50/00](#) in order to identify the purpose or use of the control.
5. In this subclass, the following terms are used with the meanings indicated:
  - "conjoint control" means that a programmed or condition-responsive { main } automatic controller on board the vehicle, embodying control logic for vehicle sub-units of different type or different function, sends control signals to actuators of two or more vehicle sub-units, { three or more vehicle sub-units for groups [B60W 30/00-B60W 30/16](#) }, so that the sub-units act together to solve a particular problem or in response to a particular driving condition, { in order to improve stability, comfort or safety by managing the global dynamics of the vehicle };
  - "drive control system" means an electronic system in a road vehicle for automatically controlling the movement { by managing the global dynamics } of that vehicle in order to take certain actions { in order to improve stability, comfort or safety };
  - "road vehicle" means a { motorised passenger } vehicle normally under the control of a human driver for transportation on roads, e.g. an automobile, truck or bus;
  - "sub-unit" means one of the following vehicle systems: { driveline systems, e.g. } propulsion system, clutch system, change-speed gearing system, system for distributing drive torque between front and rear axles, axle differential system, brake system, steering system, suspension system, { and, particularly for hybrid vehicles, } energy storage means, fuel cells, or auxiliary equipment.

**B60W 10/00**

**Conjoint control of vehicle sub-units of different type or different function** (for propulsion of purely electrically-propelled vehicles with power supplied within the vehicle [B60L 11/00](#))

**NOTE**

When classifying in this group, each controlled sub-unit must be separately identified by a classification in a relevant place in this group.

- B60W 10/02 . including control of driveline clutches
- B60W 10/023 . . {Fluid clutches, e.g. torque converters}
- B60W 10/026 . . {Clutches for bridging a fluid gearing, e.g. lock-up}
- B60W 10/04 . including control of propulsion units
- B60W 10/06 . . including control of combustion engines
- B60W 10/08 . . including control of electric propulsion units, e.g. motors or generators
- B60W 10/10 . including control of change-speed gearings
- B60W 10/101 . . Infinitely variable gearings
- B60W 10/103 . . . of fluid type
- B60W 10/105 . . . of electric type
- B60W 10/107 . . . with endless flexible members
- B60W 10/108 . . . Friction gearings
- B60W 10/109 . . . . of the toroid type
- B60W 10/11 . . Stepped gearings
- B60W 10/111 . . . with separate change-speed gear trains arranged in series
- B60W 10/113 . . . with two input flow paths, e.g. double clutch transmission selection of one of the torque flow paths by the corresponding input clutch
- B60W 10/115 . . . with planetary gears
- B60W 10/119 . including control of all-wheel-driveline means, e.g. transfer gears or clutches for dividing torque between front and rear axle ([B60W 10/14](#) takes precedence)
- B60W 10/12 . including control of differentials
- B60W 10/14 . . Central differentials for dividing torque between front and rear axles
- B60W 10/16 . . Axle differentials, e.g. for dividing torque between left and right wheels
- B60W 10/18 . including control of braking systems
- B60W 10/182 . . {including control of parking brakes}
- B60W 10/184 . . with wheel brakes
- B60W 10/188 . . . hydraulic brakes

**WARNING**

this group is not complete pending a reorganisation, see also [B60W 10/184](#)

- B60W 10/192 . . . electric brakes

**WARNING**

this group is not complete pending a reorganisation, see also [B60W 10/184](#)

- B60W 10/196 . . . acting within the driveline, e.g. retarders
- B60W 10/198 . . . with exhaust brakes
- B60W 10/20 . . including control of steering systems
- B60W 10/22 . . including control of suspension systems
- B60W 10/24 . . including control of energy storage means
- B60W 10/26 . . . for electrical energy, e.g. batteries or capacitors
- B60W 10/28 . . including control of fuel cells
- B60W 10/30 . . including control of auxiliary equipment, e.g. air-conditioning compressors or oil pumps

## **B60W 20/00 Control systems specially adapted for hybrid vehicles**

### **NOTE**

Classification is also made in [B60K 6/42](#) for the different types of hybrid electric vehicles

- B60W 20/10 . . Controlling the power contribution of each of the prime movers to meet required power demand
- B60W 20/11 . . . using model predictive control [MPC] strategies, i.e. control methods based on models predicting performance
- B60W 20/12 . . . using control strategies taking into account route information
- B60W 20/13 . . . in order to stay within battery power input or output limits; in order to prevent overcharging or battery depletion
- B60W 20/14 . . . . in conjunction with braking regeneration
- B60W 20/15 . . . Control strategies specially adapted for achieving a particular effect
- B60W 20/16 . . . . for reducing engine exhaust emissions
- B60W 20/17 . . . . for noise reduction
- B60W 20/18 . . . . for avoiding ageing of fuel
- B60W 20/19 . . . . for achieving enhanced acceleration
- B60W 20/20 . . Control strategies involving selection of hybrid configuration, e.g. selection between series or parallel configuration
- B60W 20/30 . . Control strategies involving selection of transmission gear ratio
- B60W 20/40 . . Controlling the engagement or disengagement of prime movers, e.g. for transition between prime movers
- B60W 20/50 . . Control strategies for responding to system failures, e.g. for fault diagnosis, failsafe operation or limp mode

## **B60W 30/00 Purposes of road vehicle drive control systems not related to the control of a particular sub-unit, e.g. of systems using conjoint control of vehicle sub-units, {or advanced driver assistance systems for ensuring comfort, stability and safety or drive control systems for propelling or retarding the vehicle (anti-lock brake systems [ABS] [B60T 8/00](#))}**

- B60W 30/02 . . Control of vehicle driving stability
- B60W 30/025 . . . {related to comfort of drivers or passengers}
- B60W 30/04 . . . related to roll-over prevention
- B60W 2030/041 . . . . {about the pitch axis}

- B60W 2030/043 . . . {about the roll axis}
- B60W 30/045 . . Improving turning performance
- WARNING**
- This group is not complete pending a reorganisation, see also [B60W 30/02](#)
- B60W 30/06 . Automatic manoeuvring for parking ([controlling only the steering B62D 15/0285](#))
- WARNING**
- [B60W 30/06](#) and subgroups are not complete pending a reorganisation; see provisionally also group [B62D 15/0285](#)
- B60W 30/08 . {Active safety systems} predicting or avoiding probable or impending collision {or attempting to minimise its consequences}
- B60W 2030/082 . . {Vehicle operation after collision}
- B60W 30/085 . . Taking automatic action to adjust vehicle attitude in preparation for collision, e.g. braking for nose dropping
- B60W 30/09 . . Taking automatic action to avoid collision, e.g. braking and steering
- B60W 30/095 . . Predicting travel path or likelihood of collision
- B60W 30/0953 . . . {the prediction being responsive to vehicle dynamic parameters}
- B60W 30/0956 . . . {the prediction being responsive to traffic or environmental parameters}
- B60W 30/10 . Path keeping {(cruise control for automatically following a preceding vehicle [B60W 30/165](#))}
- B60W 30/12 . . Lane keeping
- B60W 30/14 . {Adaptive} cruise control
- B60W 30/143 . . {Speed control ([B60W 30/16](#) takes precedence)}
- B60W 30/146 . . . {Speed limiting}
- B60W 30/16 . . Control of distance between vehicles, e.g. keeping a distance to preceding vehicle
- B60W 30/162 . . . {Speed limiting therefor}
- B60W 30/165 . . . Automatically following the path of a preceding lead vehicle, e.g. "electronic tow-bar"
- B60W 30/17 . . . with provision for special action when the preceding vehicle comes to a halt, e.g. stop and go
- B60W 30/18 . Propelling the vehicle
- WARNING**
- Subgroups of [B60W 30/18](#) are not complete. Documents from [B60K 41/00](#) and [B60W 30/18](#) are in the process of being reorganised to the new groups
- B60W 30/18009 . . {related to particular drive situations}
- B60W 30/18018 . . . {Start-stop drive, e.g. in a traffic jam}
- B60W 30/18027 . . . {Drive off, accelerating from standstill}
- B60W 30/18036 . . . {Reversing}
- B60W 30/18045 . . . . {Rocking, i.e. fast change between forward and reverse}

B60W 30/18054	. . .	{at stand still, e.g. engine in idling state ( <a href="#">hill holding B60W 30/18118</a> )}
B60W 30/18063	. . .	{Creeping}
B60W 30/18072	. . .	{Coasting}
B60W 2030/18081	. . . .	{With torque flow from driveshaft to engine, i.e. engine being driven by vehicle}
B60W 2030/1809	. . . .	{Without torque flow between driveshaft and engine, e.g. with clutch disengaged or transmission in neutral}
B60W 30/181	. . .	{Preparing for stopping}
B60W 30/18109	. . .	{Braking}
B60W 30/18118	. . . .	{Hill holding}
B60W 30/18127	. . . .	{Regenerative braking}
B60W 30/18136	. . . .	{Engine braking}
B60W 30/18145	. . .	{Cornering}
B60W 30/18154	. . .	{Approaching an intersection}
B60W 30/18163	. . .	{Lane change; Overtaking manoeuvres}
B60W 30/18172	. .	{Preventing, or responsive to skidding of wheels}
B60W 30/18181	. .	{Propulsion control with common controlling member for different functions}
B60W 30/1819	. .	{Propulsion control with control means using analogue circuits, relays or mechanical links}
B60W 30/182	. .	Selecting between different operative modes, e.g. comfort and performance modes
B60W 30/184	. .	Preventing damage resulting from overload or excessive wear of the driveline
B60W 30/1843	. . .	{Overheating of driveline components ( <a href="#">B60W 30/186</a> takes precedence)}
B60W 30/1846	. . .	{Preventing of breakage of drive line components, e.g. parts of the gearing}
B60W 30/186	. . .	excessive wear or burn out of friction elements, e.g. clutches
B60W 30/188	. .	Controlling power parameters of the driveline, e.g. determining the required power
B60W 30/1882	. . .	{characterised by the working point of the engine, e.g. by using engine output chart}
B60W 30/1884	. . .	{Avoiding stall or overspeed of the engine}
B60W 30/1886	. . .	{Controlling power supply to auxiliary devices}
B60W 30/1888	. . . .	{Control of power take off [PTO]}
B60W 30/19	. .	Improvement of gear change, e.g. by synchronisation or smoothing gear shift
B60W 30/192	. .	Mitigating problems related to power-up or power-down of the driveline, e.g. start-up of a cold engine
B60W 30/194	. . .	related to low temperature conditions, e.g. high viscosity of hydraulic fluid
B60W 30/20	. .	Reducing vibrations in the driveline
B60W 2030/203	. . .	{related or induced by the clutch}
B60W 2030/206	. . .	{related or induced by the engine}

<b>B60W 40/00</b>	<b>Estimation or calculation of {non-directly measurable} driving parameters for road vehicle drive control systems not related to the control of a particular sub unit, {e.g. by using mathematical models}</b>
B60W 40/02	. related to ambient conditions
B60W 40/04	. . Traffic conditions [0605]
B60W 40/06	. . Road conditions [0605]
B60W 40/064	. . . Degree of grip
B60W 40/068	. . . Road friction coefficient
B60W 40/072	. . . Curvature of the road
B60W 40/076	. . . Slope angle of the road
B60W 40/08	. related to drivers or passengers
B60W 2040/0809	. . {Driver authorisation; Driver identical check}
B60W 2040/0818	. . {Inactivity or incapacity of driver}
B60W 2040/0827	. . . {due to sleepiness}
B60W 2040/0836	. . . {due to alcohol}
B60W 2040/0845	. . . {due to drugs}
B60W 2040/0854	. . . {due to driver cheating, e.g. to circumvent driver tests}
B60W 2040/0863	. . . {due to erroneous selection or response of the driver}
B60W 2040/0872	. . {Driver physiology}
B60W 2040/0881	. . {Seat occupation; Driver or passenger presence}
B60W 2040/089	. . {Driver voice}
B60W 40/09	. . Driving style or behaviour
B60W 40/10	. related to vehicle motion
B60W 40/1005	. . {Driving resistance}
B60W 40/101	. . Side slip angle of tyre
B60W 40/103	. . Side slip angle of vehicle body
B60W 40/105	. . Speed
B60W 40/107	. . Longitudinal acceleration
B60W 40/109	. . Lateral acceleration
B60W 40/11	. . Pitch movement
B60W 40/112	. . Roll movement
B60W 40/114	. . Yaw movement
B60W 40/12	. related to parameters of the vehicle itself, {e.g. tyre models}
B60W 40/13	. . Load or weight
B60W 2040/1307	. . . {Load distribution on each wheel suspension}
B60W 2040/1315	. . . {Location of the centre of gravity}
B60W 2040/1323	. . . {Moment of inertia of the vehicle body}
B60W 2040/133	. . . . {about the roll axis}
B60W 2040/1338	. . . . {about the pitch axis}
B60W 2040/1346	. . . . {about the yaw axis}

B60W 2040/1353	. . . {Moment of inertia of a sub-unit}
B60W 2040/1361	. . . . {the component being the engine}
B60W 2040/1369	. . . . {the component being the clutch}
B60W 2040/1376	. . . . {the component being the transmission}
B60W 2040/1384	. . . . {the component being the wheel}
B60W 2040/1392	. . . {Natural frequency of components}

**B60W 50/00**

**Details of control systems for road vehicle drive control not related to the control of a particular sub-unit, {e.g. process diagnostic or vehicle driver interfaces}**

**WARNING**

New subgroups of IPC8 are not yet complete. Documents from [B60K](#), in particular [B60K 41/00](#) and subgroups, are in the process of being reclassified to the new groups

B60W 2050/0001	. {Details of the control system}
B60W 2050/0002	. . {Automatic control, details of type of controller or control system architecture}
B60W 2050/0003	. . . {In analogue systems, e.g. continuous systems}
B60W 2050/0004	. . . {In digital systems, e.g. discrete-time systems involving sampling}
B60W 2050/0005	. . . . {Processor details or data handling, e.g. memory registers or chip architecture}
B60W 2050/0006	. . . . {Digital architecture hierarchy}
B60W 2050/0008	. . . {Feedback, closed loop systems or details of feedback error signal}
B60W 2050/0009	. . . . {Proportional differential [PD] controller}
B60W 2050/001	. . . . {Proportional integral [PI] controller}
B60W 2050/0011	. . . . {Proportional Integral Differential [PID] controller}
B60W 2050/0012	. . . {Feedforward or open loop systems}
B60W 2050/0013	. . . {Optimal controllers}
B60W 2050/0014	. . . {Adaptive controllers}
B60W 2050/0016	. . . {State machine analysis}
B60W 2050/0017	. . . {Modal analysis, e.g. for determining system stability}
B60W 2050/0018	. . . {Method for the design of a control system}
B60W 2050/0019	. . {Control system elements or transfer functions}
B60W 2050/002	. . . {Integrating means}
B60W 2050/0021	. . . {Differentiating means}
B60W 2050/0022	. . . {Gains, weighting coefficients or weighting functions}
B60W 2050/0024	. . . . {Variable gains}
B60W 2050/0025	. . . . {Transfer function weighting factor}
B60W 2050/0026	. . . {Lookup tables or parameter maps}
B60W 2050/0027	. . . {Minimum/maximum value selectors}
B60W 2050/0028	. . . {Mathematical models, e.g. for simulation}
B60W 2050/0029	. . . . {Mathematical model of the driver}



B60W 2050/0031	. . . .	{Mathematical model of the vehicle}
B60W 2050/0032	. . . . .	{Quarter vehicle model, i.e. only one vehicle corner}
B60W 2050/0033	. . . . .	{Single-track, 2D vehicle model, i.e. two-wheel bicycle model}
B60W 2050/0034	. . . . .	{Multiple-track, 2D vehicle model, e.g. four-wheel model}
B60W 2050/0035	. . . . .	{Multiple-track, 3D vehicle model, e.g. including roll and pitch conditions}
B60W 2050/0036	. . . . .	{Multiple-track, 3D multi-body vehicle model, e.g. combination of models for vehicle sub-units}
B60W 2050/0037	. . . . .	{Mathematical models of vehicle sub-units}
B60W 2050/0039	. . . . .	{of the propulsion unit}
B60W 2050/004	. . . . .	{of the clutch}
B60W 2050/0041	. . . . .	{of the drive line}
B60W 2050/0042	. . .	{Transfer function lag; delays}
B60W 2050/0043	. .	{Signal treatments, identification of variables or parameters, parameter estimation or state estimation}
B60W 2050/0044	. . .	{In digital systems}
B60W 2050/0045	. . . .	{using databus protocols}
B60W 2050/0047	. . .	{Digital-analogue (D/A) or analogue-digital (A/D) conversion}
B60W 2050/0048	. . .	{Addition or subtraction of signals}
B60W 2050/0049	. . . .	{Signal offset}
B60W 2050/005	. . .	{Sampling}
B60W 2050/0051	. . . .	{combined with averaging}
B60W 2050/0052	. . .	{Filtering, filters}
B60W 2050/0054	. . . .	{Cut-off filters, retarders, delaying means, dead zones, threshold values or cut-off frequency}
B60W 2050/0055	. . . . .	{High-pass filters}
B60W 2050/0056	. . . . .	{Low-pass filters}
B60W 2050/0057	. . .	{Frequency analysis, spectral techniques or transforms}
B60W 2050/0058	. . .	{Signal modulation for data transmission}
B60W 2050/0059	. . .	{Signal noise suppression}
B60W 2050/006	. . .	{Interpolation; Extrapolation}
B60W 2050/0062	. .	{Adapting control system settings}
B60W 2050/0063	. .	{Manual parameter input, manual setting means, manual initialising or calibrating means (for vehicle control input means, control panels see <a href="#">B60K 37/00</a> )}
B60W 2050/0064	. . .	{using a remote, e.g. cordless, transmitter or receiver unit, e.g. remote keypad or mobile phone}
B60W 2050/0065	. . .	{using a personalised data carrier, e.g. magnetic card, memory card or electronic ignition key}
B60W 2050/0066	. . .	{using buttons or a keyboard connected to the on-board processor}
B60W 2050/0067	. . . .	{Confirmation by the driver}
B60W 2050/0068	. . .	{Giving intention of direction, e.g. by indicator lights, steering input}



B60W 2050/007	. . {Switching between manual and automatic parameter input, and vice versa}
B60W 2050/0071	. . . {Controller overrides driver automatically}
B60W 2050/0072	. . . {Controller asks driver to take over}
B60W 2050/0073	. . . {Driver overrides controller}
B60W 2050/0074	. . . {Driver shifts control to the controller, e.g. by pressing a button}
B60W 2050/0075	. . {Automatic parameter input, automatic initialising or calibrating means}
B60W 2050/0077	. . . {involving external transmission of data to or from the vehicle}
B60W 2050/0078	. . . . {using Global Position System data}
B60W 2050/0079	. . . . {using telemetry}
B60W 2050/008	. . . . . {using data transmitted between vehicles, e.g. for platooning, control of inter-vehicle distance}
B60W 2050/0081	. . . . . {using satellite communication}
B60W 2050/0082	. . . {for initialising the control system}
B60W 2050/0083	. . . {Setting, resetting, calibration}
B60W 2050/0085	. . . . {Setting or resetting initial positions}
B60W 2050/0086	. . . . {Recalibrating datum positions, e.g. by using check cycles}
B60W 2050/0087	. . . . {Resetting start and end points of actuator travel}
B60W 2050/0088	. . . . {Adaptive recalibration}
B60W 2050/0089	. . . {Historical data record of previous events}
B60W 2050/009	. . . {Priority selection}
B60W 2050/0091	. . . . {of control inputs}
B60W 2050/0093	. . . . . {of the engine}
B60W 2050/0094	. . . . {of control units}
B60W 2050/0095	. . . {Automatic control mode change}
B60W 2050/0096	. . . . {Control during transition between modes}
B60W 50/0097	. {Predicting future conditions}
B60W 50/0098	. {Details of control systems ensuring comfort, safety or stability not otherwise provided for}
B60W 50/02	. Ensuring safety in case of control system failures, e.g. by diagnosing, circumventing or fixing failures
B60W 50/0205	. . {Diagnosing or detecting failures; Failure detection models}
B60W 2050/021	. . . {Means for detecting failure or malfunction}
B60W 2050/0215	. . . {Sensor drifts or sensor failures}
B60W 2050/022	. . . {Actuator failures}
B60W 50/0225	. . {Failure correction strategy}
B60W 50/023	. . Avoiding failures by using redundant parts
B60W 50/029	. . Adapting to failures or work around with other constraints, e.g. circumvention by avoiding use of failed parts
B60W 2050/0292	. . . {Fail-safe or redundant systems, e.g. limp-home or backup systems}
B60W 2050/0295	. . . {Inhibiting action of specific actuators or systems}
B60W 2050/0297	. . . {Control Giving priority to different actuators or systems}

- B60W 50/032 . . . Fixing failures by repairing failed parts, e.g. loosening a sticking valve
- B60W 50/035 . . . Bringing the control units into a predefined state, e.g. giving priority to particular actuators
- B60W 50/038 . . . Limiting the input power, torque or speed
- B60W 50/04 . . Monitoring the functioning of the control system
- B60W 2050/041 . . . {Built in Test Equipment [BITE]}
- B60W 2050/043 . . . . {Testing equipment at KEY-ON}
- B60W 50/045 . . . {Monitoring control system parameters}
- B60W 2050/046 . . . . {involving external transmission of data to or from the vehicle, e.g. via telemetry, satellite, Global Positioning System [GPS]}
- B60W 2050/048 . . . . . {displaying data transmitted between vehicles, e.g. for platooning, control of inter-vehicle distance}
- B60W 50/06 . . Improving the dynamic response of the control system, e.g. improving the speed of regulation or avoiding hunting or overshoot
- B60W 2050/065 . . . {by reducing the computational load on the digital processor of the control computer}
- B60W 50/08 . . Interaction between the driver and the control system
- B60W 50/082 . . . {Selecting or switching between different modes of propelling}
- B60W 50/085 . . . {Changing the parameters of the control units, e.g. changing limit values, working points by control input}
- B60W 50/087 . . . {where the control system corrects or modifies a request from the driver}
- B60W 50/10 . . Interpretation of driver requests or demands
- B60W 50/12 . . . Limiting control by the driver depending on vehicle state, e.g. interlocking means for the control input for preventing unsafe operation
- B60W 50/14 . . . Means for informing the driver, warning the driver or prompting a driver intervention
- B60W 2050/143 . . . . {Alarm means (B60W 50/16 takes precedence)}
- B60W 2050/146 . . . . {Display means}
- B60W 50/16 . . . . Tactile feedback to the driver, e.g. vibration or force feedback to the driver on the steering wheel or the accelerator pedal

**B60W 2300/00****Indexing codes relating to the type of vehicle**

- B60W 2300/10 . . Buses
- B60W 2300/105 . . . Ambulances
- B60W 2300/12 . . Trucks; Load vehicles
- B60W 2300/121 . . . Fork lift trucks, Clarks
- B60W 2300/123 . . . Light trucks
- B60W 2300/125 . . . Heavy duty trucks
- B60W 2300/126 . . . . Multi-axes trucks
- B60W 2300/128 . . . . Silo or fluid transporting vehicles
- B60W 2300/13 . . Independent Multi-axle long vehicles
- B60W 2300/135 . . . Vehicles having wheels mounted on a vertical steerable column

B60W 2300/14	<ul style="list-style-type: none"> <li>Trailers, e.g. full trailers, caravans (<a href="#">relation between towing and towed vehicle B60Y 2300/28</a>)</li> </ul>
B60W 2300/145	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Semi-trailers</li> </ul> </li> </ul>
B60W 2300/15	<ul style="list-style-type: none"> <li>Agricultural vehicles</li> </ul>
B60W 2300/152	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Tractors</li> </ul> </li> </ul>
B60W 2300/154	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Boom carrying vehicles, e.g. for crop spraying</li> </ul> </li> </ul>
B60W 2300/156	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Ridable lawn mowers</li> </ul> </li> </ul>
B60W 2300/158	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Harvesters</li> </ul> </li> </ul>
B60W 2300/16	<ul style="list-style-type: none"> <li>Cranes</li> </ul>
B60W 2300/17	<ul style="list-style-type: none"> <li>Construction vehicles, e.g. graders, excavators</li> </ul>
B60W 2300/18	<ul style="list-style-type: none"> <li>Four-wheel drive vehicles</li> </ul>
B60W 2300/185	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Off-road vehicles</li> </ul> </li> </ul>
B60W 2300/26	<ul style="list-style-type: none"> <li>Military</li> </ul>
B60W 2300/28	<ul style="list-style-type: none"> <li>Racing vehicles, e.g. Formula one cars</li> </ul>
B60W 2300/285	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Go-karts</li> </ul> </li> </ul>
B60W 2300/30	<ul style="list-style-type: none"> <li>Toys</li> </ul>
B60W 2300/32	<ul style="list-style-type: none"> <li>Amphibious vehicles</li> </ul>
B60W 2300/34	<ul style="list-style-type: none"> <li>Compact city vehicles</li> </ul>
B60W 2300/345	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Three wheelers not including single track vehicles</li> </ul> </li> </ul>
B60W 2300/36	<ul style="list-style-type: none"> <li>Cycles; Motorcycles; Scooters</li> </ul>
B60W 2300/362	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Buggies; Quads</li> </ul> </li> </ul>
B60W 2300/365	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Scooters</li> </ul> </li> </ul>
B60W 2300/367	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Tricycles</li> </ul> </li> </ul>
B60W 2300/38	<ul style="list-style-type: none"> <li>Wheelchairs; Perambulators</li> </ul>
B60W 2300/40	<ul style="list-style-type: none"> <li>Carts, e.g. trolleys</li> </ul>
B60W 2300/405	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Golf carts</li> </ul> </li> </ul>
B60W 2300/42	<ul style="list-style-type: none"> <li>Loading ramps</li> </ul>
B60W 2300/43	<ul style="list-style-type: none"> <li>Snowmobile</li> </ul>
B60W 2300/44	<ul style="list-style-type: none"> <li>Tracked vehicles</li> </ul>
B60W 2300/45	<ul style="list-style-type: none"> <li>Skid-steer</li> </ul>
B60W 2300/46	<ul style="list-style-type: none"> <li>Variable track or wheelbase vehicles</li> </ul>
B60W 2300/48	<ul style="list-style-type: none"> <li>Low or lowerable bed vehicles</li> </ul>
B60W 2300/50	<ul style="list-style-type: none"> <li>Tilting frame vehicles</li> </ul>
<b>B60W 2400/00</b>	<b>Indexing codes relating to detected, measured or calculated conditions or factors</b>
<b>B60W 2420/00</b>	<b>Indexing codes relating to the type of sensors based on the principle of their operation</b>
B60W 2420/10	<ul style="list-style-type: none"> <li>Transducer, e.g. piezoelectric elements</li> </ul>
B60W 2420/20	<ul style="list-style-type: none"> <li>Resistance type, e.g. potentiometer as level indicator</li> </ul>
B60W 2420/22	<ul style="list-style-type: none"> <li>Strain gauge</li> </ul>

B60W 2420/225	. . Wheatstone bridge circuit
B60W 2420/24	. Capacitance type, e.g. as level indicator
B60W 2420/30	. Switches, e.g. mercury or ball type switches
B60W 2420/40	. Photo or light sensitive means, e.g. infrared sensors
B60W 2420/403	. . Image sensing, e.g. optical camera
B60W 2420/406	. . Fiber optic sensor
B60W 2420/42	. Image sensing, e.g. optical camera
B60W 2420/50	. Magnetic or electromagnetic sensors
B60W 2420/503	. . Hall effect or magnetoresistive, i.e. active wheel speed sensors
B60W 2420/506	. . Inductive sensors, i.e. passive wheel sensors
B60W 2420/52	. Radar, Lidar
B60W 2420/54	. Audio sensitive means, e.g. ultrasound
B60W 2420/60	. Doppler effect
B60W 2420/62	. Laser
B60W 2420/90	. Single sensor for two or more measurements
B60W 2420/905	. . the sensor being an xyz axis sensor

#### **B60W 2422/00 Indexing codes relating to the special location or mounting of sensors**

B60W 2422/10	. on a suspension arm
B60W 2422/20	. on or inside a spring
B60W 2422/202	. . the spring being a coil spring
B60W 2422/205	. . the spring being a pneumatic spring
B60W 2422/207	. . the spring being a leaf spring
B60W 2422/40	. on a damper
B60W 2422/50	. on a steering column
B60W 2422/70	. on the wheel or the tire
B60W 2422/80	. on wheel hub bearing
B60W 2422/90	. on bumper, e.g. collision sensor
B60W 2422/95	. Measuring the same parameter at multiple locations of the vehicle

#### **B60W 2510/00 Input parameters relating to a particular sub-units**

B60W 2510/02	. Clutches
B60W 2510/0208	. . Clutch engagement state, e.g. engaged or disengaged
B60W 2510/0216	. . . Clutch engagement rate
B60W 2510/0225	. . . Clutch actuator position
B60W 2510/0233	. . . of torque converter lock-up clutch
B60W 2510/0241	. . Clutch slip, i.e. difference between input and output speeds
B60W 2510/025	. . . Slip change rate
B60W 2510/0258	. . Clutch friction coefficient
B60W 2510/0266	. . Moment of inertia
B60W 2510/0275	. . Clutch torque

B60W 2510/0283	. . Clutch input shaft speed
B60W 2510/0291	. . Clutch temperature
B60W 2510/06	. Combustion engines, Gas turbines
B60W 2510/0604	. . Throttle position
B60W 2510/0609	. . . Throttle change rate
B60W 2510/0614	. . Position of fuel or air injector
B60W 2510/0619	. . . Air-fuel ratio
B60W 2510/0623	. . . Fuel flow rate
B60W 2510/0628	. . . Inlet air flow rate
B60W 2510/0633	. . Turbocharger state
B60W 2510/0638	. . Engine speed
B60W 2510/0642	. . . Idle condition
B60W 2510/0647	. . . Coasting condition
B60W 2510/0652	. . . Speed change rate
B60W 2510/0657	. . Engine torque
B60W 2510/0661	. . . Torque change rate
B60W 2510/0666	. . Engine power
B60W 2510/0671	. . Engine manifold pressure
B60W 2510/0676	. . Engine temperature
B60W 2510/068	. . Engine exhaust temperature
B60W 2510/0685	. . Engine crank angle
B60W 2510/069	. . Engine braking signal
B60W 2510/0695	. . Inertia
B60W 2510/08	. Electric propulsion units
B60W 2510/081	. . Speed
B60W 2510/082	. . . Speed change rate
B60W 2510/083	. . Torque
B60W 2510/084	. . . Torque change rate
B60W 2510/085	. . Power
B60W 2510/086	. . . Power change rate
B60W 2510/087	. . Temperature
B60W 2510/088	. . Inertia
B60W 2510/09	. Other types of propulsion units, e.g. fluid motors, or type not specified
B60W 2510/10	. Change speed gearings
B60W 2510/1005	. . Transmission ratio engaged
B60W 2510/101	. . . Transmission neutral state
B60W 2510/1015	. . Input shaft speed, e.g. turbine speed
B60W 2510/102	. . . Input speed change rate
B60W 2510/1025	. . Input torque
B60W 2510/103	. . . Input torque change rate

B60W 2510/1035	. . Input power
B60W 2510/104	. . Output speed
B60W 2510/1045	. . . Output speed change rate
B60W 2510/105	. . Output torque
B60W 2510/1055	. . . Output torque change rate
B60W 2510/106	. . Output power
B60W 2510/1065	. . . Transmission of zero torque
B60W 2510/107	. . Temperature
B60W 2510/1075	. . fluid pressure, e.g. oil pressure
B60W 2510/108	. . . pressure of control fluid
B60W 2510/1085	. . . pressure of working fluid
B60W 2510/109	. . Direction of power flow
B60W 2510/1095	. . Inertia
B60W 2510/12	. Differentials
B60W 2510/125	. . Locking status
B60W 2510/18	. Braking system
B60W 2510/182	. . Brake pressure, e.g. of fluid or between pad and disc
B60W 2510/184	. . Brake temperature, e.g. of fluid, pads or discs
B60W 2510/186	. . Status of parking brakes
B60W 2510/188	. . Parking lock mechanisms
B60W 2510/20	. Steering systems
B60W 2510/202	. . Steering torque
B60W 2510/205	. . Steering speed
B60W 2510/207	. . Oversteer or understeer
B60W 2510/22	. Suspension systems
B60W 2510/222	. . Stiffness
B60W 2510/225	. . Damping
B60W 2510/227	. . Oscillation frequency
B60W 2510/24	. Energy storage means
B60W 2510/242	. . for electrical energy
B60W 2510/244	. . . Charge state
B60W 2510/246	. . . Temperature
B60W 2510/248	. . . Age of storage means
B60W 2510/28	. Fuel cells
B60W 2510/285	. . Temperature
B60W 2510/30	. Auxiliary equipments
B60W 2510/305	. . Power absorbed by auxiliaries
<b>B60W 2520/00</b>	<b>Input parameters relating to overall vehicle dynamics</b>
B60W 2520/04	. Vehicle stop

B60W 2520/06	. Direction of travel
B60W 2520/10	. Longitudinal speed
B60W 2520/105	. . Longitudinal acceleration
B60W 2520/12	. Lateral speed
B60W 2520/125	. . Lateral acceleration
B60W 2520/14	. Yaw
B60W 2520/16	. Pitch
B60W 2520/18	. Roll
B60W 2520/20	. Sideslip angle
B60W 2520/22	. Articulation angle, e.g. between tractor and trailer
B60W 2520/26	. Wheel slip
B60W 2520/263	. . Slip values between front and rear axle
B60W 2520/266	. . Slip values between left and right wheel
B60W 2520/28	. Wheel speed
B60W 2520/30	. Wheel torque
B60W 2520/40	. Torque distribution
B60W 2520/403	. . between front and rear axle
B60W 2520/406	. . between left and right wheel

#### **B60W 2530/00 Input parameters relating to other vehicle conditions or values**

B60W 2530/10	. Weight
B60W 2530/12	. Catalyst or filter state
B60W 2530/14	. Historical data
B60W 2530/145	. . Mileage
B60W 2530/16	. Driving resistance
B60W 2530/18	. Distance travelled
B60W 2530/20	. Tyre data
B60W 2530/22	. Towing force

#### **B60W 2540/00 Input parameters relating to the driver**

B60W 2540/02	. Driver's voice
B60W 2540/04	. Driver selection, e.g. driver confirmation
B60W 2540/06	. Ignition switch
B60W 2540/10	. Accelerator pedal position
B60W 2540/103	. . Accelerator thresholds , e.g. kickdown
B60W 2540/106	. . Rate of change
B60W 2540/12	. Brake pedal position
B60W 2540/14	. Clutch pedal position
B60W 2540/16	. Ratio selector position
B60W 2540/165	. . Rate of change
B60W 2540/18	. Steering angle



- B60W 2540/20 . Direction indicator values
- B60W 2540/22 . Psychological state; Stress level or workload
- B60W 2540/24 . Drug level, e.g. alcohol
- B60W 2540/26 . Incapacity of driver
- B60W 2540/28 . Identity of driver
- B60W 2540/30 . Driving style

**B60W 2550/00 Input parameters relating to exterior conditions**

- B60W 2550/10 . from obstacle detection
- B60W 2550/12 . Ambient conditions, e.g. wind or rain
- B60W 2550/13 . Altitude
- B60W 2550/14 . Road conditions, road types or road features
  - B60W 2550/141 . . Type of road
  - B60W 2550/142 . . Road slope
  - B60W 2550/143 . . Road profile
  - B60W 2550/145 . . Road altitude
  - B60W 2550/146 . . Road curve radius
  - B60W 2550/147 . . Road bumpiness, e.g. pavement or potholes
  - B60W 2550/148 . . Coefficient of friction
- B60W 2550/16 . Country codes
- B60W 2550/20 . Traffic related input parameters
  - B60W 2550/22 . . Traffic rules, e.g. traffic signs
  - B60W 2550/30 . . Distance or speed relative to other vehicles
    - B60W 2550/302 . . . the longitudinal speed of preceding vehicle
    - B60W 2550/304 . . . the lateral speed of preceding vehicle
    - B60W 2550/306 . . . the position of preceding vehicle
    - B60W 2550/308 . . . Distance between vehicles
- B60W 2550/40 . Involving external transmission of data to or from the vehicle
  - B60W 2550/402 . . for navigation systems
  - B60W 2550/404 . . using telemetry
  - B60W 2550/406 . . using satellite communication
  - B60W 2550/408 . . Data transmitted between vehicles

**B60W 2560/00 Other vehicle related input parameters not covered by groups [B60W 2510/00](#) to [B60W 2550/00](#)**

- B60W 2560/02 . Remaining fuel quantity in tank
- B60W 2560/04 . Fuel quality, e.g. water content due to age of fuel
- B60W 2560/06 . Fuel type

**B60W 2600/00 Indexing codes relating to automatic control systems or control processes**

**B60W 2710/00 Output or target parameters relating to a particular sub-units**

B60W 2710/02	. Clutches
B60W 2710/021	. . Clutch engagement state
B60W 2710/022	. . . Clutch actuator position
B60W 2710/023	. . . Clutch engagement rate
B60W 2710/024	. . . of torque converter lock-up clutch
B60W 2710/025	. . Clutch slip, i.e. difference between input and output speeds
B60W 2710/026	. . . Slip change rate
B60W 2710/027	. . Clutch torque
B60W 2710/028	. . Clutch input shaft speed
B60W 2710/029	. . Clutch temperature
B60W 2710/06	. Combustion engines, Gas turbines
B60W 2710/0605	. . Throttle position
B60W 2710/0611	. . . Throttle change rate
B60W 2710/0616	. . Position of fuel or air injector
B60W 2710/0622	. . . Air-fuel ratio
B60W 2710/0627	. . . Fuel flow rate
B60W 2710/0633	. . . Inlet air flow rate
B60W 2710/0638	. . Turbocharger state
B60W 2710/0644	. . Engine speed
B60W 2710/065	. . . Idle condition
B60W 2710/0655	. . . Coasting condition
B60W 2710/0661	. . . Speed change rate
B60W 2710/0666	. . Engine torque
B60W 2710/0672	. . . Torque change rate
B60W 2710/0677	. . Engine power
B60W 2710/0683	. . Engine manifold pressure
B60W 2710/0688	. . Engine temperature
B60W 2710/0694	. . Engine exhaust temperature
B60W 2710/08	. Electric propulsion units
B60W 2710/081	. . Speed
B60W 2710/082	. . . Speed change rate
B60W 2710/083	. . Torque
B60W 2710/085	. . . Torque change rate
B60W 2710/086	. . Power
B60W 2710/087	. . . Power change rate
B60W 2710/088	. . Temperature
B60W 2710/09	. Other types of propulsion units, e.g. fluid motors, or type not specified
B60W 2710/10	. Change speed gearings
B60W 2710/1005	. . Transmission ratio engaged
B60W 2710/1011	. . Input shaft speed, e.g. turbine speed

B60W 2710/1016	. . . Input speed change rate
B60W 2710/1022	. . Input torque
B60W 2710/1027	. . . Input torque change rate
B60W 2710/1033	. . Input power
B60W 2710/1038	. . Output speed
B60W 2710/1044	. . . Output speed change rate
B60W 2710/105	. . Output torque
B60W 2710/1055	. . . Output torque change rate
B60W 2710/1061	. . Output power
B60W 2710/1066	. . . Transmission of zero torque
B60W 2710/1072	. . Temperature
B60W 2710/1077	. . fluid pressure, e.g. oil pressure
B60W 2710/1083	. . . pressure of control fluid
B60W 2710/1088	. . . pressure of working fluid
B60W 2710/1094	. . Direction of power flow
B60W 2710/12	. Differentials
B60W 2710/125	. . Locking status
B60W 2710/18	. Braking system
B60W 2710/182	. . Brake pressure e.g. of fluid or between pad and disc
B60W 2710/184	. . Brake temperature, e.g. of fluid, pads or discs
B60W 2710/186	. . Status of parking brakes
B60W 2710/188	. . Parking lock mechanisms
B60W 2710/20	. Steering systems
B60W 2710/202	. . Steering torque
B60W 2710/205	. . Steering speed
B60W 2710/207	. . Steering angle of wheels
B60W 2710/22	. Suspension systems
B60W 2710/223	. . Stiffness
B60W 2710/226	. . Damping
B60W 2710/24	. Energy storage means
B60W 2710/242	. . for electrical energy
B60W 2710/244	. . . Charge state
B60W 2710/246	. . . Temperature
B60W 2710/248	. . . Current for loading or unloading
B60W 2710/28	. Fuel cells
B60W 2710/285	. . Temperature
B60W 2710/30	. Auxiliary equipments
B60W 2710/305	. . target power to auxiliaries
<b>B60W 2720/00</b>	<b>Output or target parameters relating to overall vehicle dynamics</b>

<a href="#">B60W 2720/10</a>	<ul style="list-style-type: none"> <li>Longitudinal speed</li> </ul>
<a href="#">B60W 2720/103</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Speed profile</li> </ul> </li> </ul>
<a href="#">B60W 2720/106</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Longitudinal acceleration</li> </ul> </li> </ul>
<a href="#">B60W 2720/12</a>	<ul style="list-style-type: none"> <li>Lateral speed</li> </ul>
<a href="#">B60W 2720/125</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Lateral acceleration</li> </ul> </li> </ul>
<a href="#">B60W 2720/14</a>	<ul style="list-style-type: none"> <li>Yaw</li> </ul>
<a href="#">B60W 2720/16</a>	<ul style="list-style-type: none"> <li>Pitch</li> </ul>
<a href="#">B60W 2720/18</a>	<ul style="list-style-type: none"> <li>Roll</li> </ul>
<a href="#">B60W 2720/20</a>	<ul style="list-style-type: none"> <li>Sideslip angle</li> </ul>
<a href="#">B60W 2720/22</a>	<ul style="list-style-type: none"> <li>Articulation angle, e.g. between tractor and trailer</li> </ul>
<a href="#">B60W 2720/24</a>	<ul style="list-style-type: none"> <li>Direction of travel</li> </ul>
<a href="#">B60W 2720/26</a>	<ul style="list-style-type: none"> <li>Wheel slip</li> </ul>
<a href="#">B60W 2720/263</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Slip values between front and rear axle</li> </ul> </li> </ul>
<a href="#">B60W 2720/266</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Slip values between left and right wheel</li> </ul> </li> </ul>
<a href="#">B60W 2720/28</a>	<ul style="list-style-type: none"> <li>Wheel speed</li> </ul>
<a href="#">B60W 2720/30</a>	<ul style="list-style-type: none"> <li>Wheel torque</li> </ul>
<a href="#">B60W 2720/40</a>	<ul style="list-style-type: none"> <li>Torque distribution</li> </ul>
<a href="#">B60W 2720/403</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>between front and rear axle</li> </ul> </li> </ul>
<a href="#">B60W 2720/406</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>between left and right wheel</li> </ul> </li> </ul>

**B60W 2750/00**      **Output or target parameters relating to exterior, e.g. between vehicles**

<a href="#">B60W 2750/30</a>	<ul style="list-style-type: none"> <li>Distance or speed in relation to other vehicles</li> </ul>
<a href="#">B60W 2750/302</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>the longitudinal speed of preceding vehicle</li> </ul> </li> </ul>
<a href="#">B60W 2750/304</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>the lateral speed of preceding vehicle</li> </ul> </li> </ul>
<a href="#">B60W 2750/306</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>the position of preceding vehicle</li> </ul> </li> </ul>
<a href="#">B60W 2750/308</a>	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>the distance between vehicles</li> </ul> </li> </ul>
<a href="#">B60W 2750/40</a>	<ul style="list-style-type: none"> <li>Involving external transmission of data to or from the vehicle</li> </ul>

**B60W 2900/00**      **Indexing codes relating to the purpose of, or problem solved of road vehicle drive control systems not otherwise provided for in groups [B60W 30/00](#)**