

# CPC COOPERATIVE PATENT CLASSIFICATION

## G PHYSICS (NOTES omitted)

### INSTRUMENTS

## G05 CONTROLLING; REGULATING (NOTES omitted)

## G05D SYSTEMS FOR CONTROLLING OR REGULATING NON-ELECTRIC VARIABLES

### NOTES

1. This subclass does not cover features of general applicability to regulating systems, e.g. anti-hunting arrangements, which are covered by subclass [G05B](#).
2. In this subclass, the following term is used with the meaning indicated:
  - "systems" includes self-contained devices such as speed governors, pressure regulators.
3. Control systems specially adapted for particular apparatus, machines or processes are classified in the subclasses for the apparatus, machines or processes, provided that there is specific provision for control or regulation relevant to the special adaptation, either at a detailed level, e.g. [A21B 1/40](#): "for regulating temperature in bakers' ovens", or at a general level, e.g. [B23K 9/095](#): "for automatic control of welding parameters in arc welding". Otherwise, classification is made in the most appropriate place in this subclass.

### 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** **Control of position, course, altitude or attitude of land, water, air or space vehicles, e.g. using automatic pilots** (drive control systems specially adapted for autonomous road vehicles [B60W 60/00](#))

### NOTE

In this main group, it is desirable to add the indexing codes of groups {[G05D 2101/00](#) - [G05D 2111/00](#)}.

### WARNING

Group [G05D 1/00](#) is incomplete pending reclassification of documents from groups [G05D 1/0005](#) - [G05D 1/12](#).

Group [G05D 1/00](#) is also impacted by reclassification into groups [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

[1/0005](#) . {with arrangements to save energy}  
(Frozen)

### WARNING

Group [G05D 1/0005](#) is no longer used for the classification of documents as of January 1, 2024.

The content of this group is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/0011 . {associated with a remote control arrangement}  
(Frozen)

**WARNING**

Groups [G05D 1/0011](#) – [G05D 1/005](#) are no longer used for the classification of documents as of January 1, 2024.

The content of these groups is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/0016 . . {characterised by the operator's input device  
(Frozen) (input arrangements for computing systems in general [G06F 3/00](#))}
- 1/0022 . . {characterised by the communication link (data  
(Frozen) switching networks in general [H04L 12/00](#))}
- 1/0027 . . {involving a plurality of vehicles, e.g. fleet or  
(Frozen) convoy travelling (fleet control of land vehicles from a control room [G05D 1/0297](#); traffic control systems for road vehicles [G08G 1/00](#); for marine craft [G08G 3/00](#); for aircraft [G08G 5/00](#))}
- 1/0033 . . {by having the operator tracking the vehicle  
(Frozen) either by direct line of sight or via one or more cameras located remotely from the vehicle}
- 1/0038 . . {by providing the operator with simple or  
(Frozen) augmented images from one or more cameras located onboard the vehicle, e.g. tele-operation (images analyzed by a computer and used for automatic navigation [G05D 1/0246](#))}
- 1/0044 . . {by providing the operator with a computer  
(Frozen) generated representation of the environment of the vehicle, e.g. virtual reality, maps (maps used for automatic navigation [G05D 1/0274](#); flight directors [G01C 23/005](#))}
- 1/005 . . {by providing the operator with signals other than  
(Frozen) visual, e.g. acoustic, haptic}

- 1/0055 . {with safety arrangements}  
(Frozen)

**WARNING**

Groups [G05D 1/0055](#) – [G05D 1/0077](#) are no longer used for the classification of documents as of January 1, 2024.

The content of these groups is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/0061 . . {for transition from automatic pilot to manual  
(Frozen) pilot and vice versa}

**WARNING**

Group [G05D 1/0061](#) is impacted by reclassification into groups [B60W 10/00](#) - [B60W 50/16](#), [B60W 60/005](#) - [B60W 60/0061](#), [B60W 2300/00](#) - [B60W 2530/213](#), [B60W 2540/041](#) - [B60W 2540/049](#), [B60W 2552/00](#) - [B60W 2556/65](#), [B60W 2710/00](#) - [B60W 2720/406](#), and [B60W 2754/00](#) - [B60W 2900/00](#).

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

- 1/0066 . . {for limitation of acceleration or stress}  
(Frozen)
- 1/0072 . . {to counteract a motor failure}  
(Frozen)
- 1/0077 . . {using redundant signals or controls}  
(Frozen)
- 1/0083 . {to help an aircraft pilot in the rolling phase}  
(Frozen)

**WARNING**

Group [G05D 1/0083](#) is no longer used for the classification of documents as of January 1, 2024.

The content of this group is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/0088 . {characterized by the autonomous decision making  
(Frozen) process, e.g. artificial intelligence, predefined  
behaviours (using knowledge based models  
G06N 5/00)}

**WARNING**

Group [G05D 1/0088](#) is no longer used for the classification of documents as of January 1, 2024.

The content of this group is being reclassified into groups  
[G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#),  
[G05D 1/40](#) - [G05D 1/498](#),  
[G05D 1/60](#) - [G05D 1/6987](#),  
[G05D 1/80](#) - [G05D 1/87](#),  
[G05D 2101/00](#) - [G05D 2101/26](#),  
[G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#),  
[G05D 2107/00](#) - [G05D 2107/95](#),  
[G05D 2109/00](#) - [G05D 2109/50](#) and  
[G05D 2111/00](#) - [G05D 2111/67](#).

Group [G05D 1/0088](#) is impacted by reclassification into groups  
[B60W 10/00](#) - [B60W 60/00276](#),  
[B60W 2300/00](#) - [B60W 2530/213](#),  
[B60W 2540/041](#) - [B60W 2540/049](#),  
[B60W 2552/00](#) - [B60W 2556/65](#),  
[B60W 2710/00](#) - [B60W 2720/406](#) and  
[B60W 2754/00](#) - [B60W 2900/00](#).

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

- 1/0094 . {involving pointing a payload, e.g. camera, weapon,  
(Frozen) sensor, towards a fixed or moving target}

**WARNING**

Group [G05D 1/0094](#) is no longer used for the classification of documents as of January 1, 2024.

The content of this group is being reclassified into groups  
[G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#),  
[G05D 1/40](#) - [G05D 1/498](#),  
[G05D 1/60](#) - [G05D 1/6987](#),  
[G05D 1/80](#) - [G05D 1/87](#),  
[G05D 2101/00](#) - [G05D 2101/26](#),  
[G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#),  
[G05D 2107/00](#) - [G05D 2107/95](#),  
[G05D 2109/00](#) - [G05D 2109/50](#) and  
[G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/02 . Control of position or course in two dimensions  
(Frozen)

**WARNING**

Groups [G05D 1/02](#) – [G05D 1/03](#) are no longer used for the classification of documents as of January 1, 2024.

The content of these groups is being reclassified into groups  
[G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#),  
[G05D 1/40](#) - [G05D 1/498](#),  
[G05D 1/60](#) - [G05D 1/6987](#),  
[G05D 1/80](#) - [G05D 1/87](#),  
[G05D 2101/00](#) - [G05D 2101/26](#),  
[G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#),  
[G05D 2107/00](#) - [G05D 2107/95](#),  
[G05D 2109/00](#) - [G05D 2109/50](#) and  
[G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/0202 . . {specially adapted to aircraft}  
(Frozen)  
1/0204 . . . {to counteract a sudden perturbation, e.g. cross-  
(Frozen) wind, gust}  
1/0206 . . {specially adapted to water vehicles}  
(Frozen)  
1/0208 . . . {dynamic anchoring}  
(Frozen)  
1/021 . . {specially adapted to land vehicles}  
(Frozen)

**WARNING**

Group [G05D 1/021](#) is impacted by reclassification into groups  
[B60W 10/00](#) - [B60W 60/00276](#),  
[B60W 2300/00](#) - [B60W 2530/213](#),  
[B60W 2540/041](#) - [B60W 2540/049](#),  
[B60W 2552/00](#) - [B60W 2556/65](#),  
[B60W 2710/00](#) - [B60W 2720/406](#), and  
[B60W 2754/00](#) - [B60W 2900/00](#).

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

- 1/0212 . . . {with means for defining a desired trajectory  
(Frozen) (involving a plurality of land vehicles  
[G05D 1/0287](#))}

1/0214 . . . . {in accordance with safety or protection  
(Frozen) criteria, e.g. avoiding hazardous areas  
(monitoring the location of vehicles within a  
certain area, e.g. forbidden or allowed areas,  
in traffic control systems for road vehicles  
[G08G 1/13](#))}

#### **WARNING**

Group [G05D 1/0214](#) is impacted  
by reclassification into groups  
[B60W 10/00](#) - [B60W 60/00276](#),  
[B60W 2300/00](#) - [B60W 2530/213](#),  
[B60W 2540/041](#) - [B60W 2540/049](#),  
[B60W 2552/00](#) - [B60W 2556/65](#),  
[B60W 2710/00](#) - [B60W 2720/406](#), and  
[B60W 2754/00](#) - [B60W 2900/00](#).

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

1/0217 . . . . {in accordance with energy consumption,  
(Frozen) time reduction or distance reduction criteria}  
1/0219 . . . . {ensuring the processing of the whole  
(Frozen) working surface}  
1/0221 . . . . {involving a learning process}  
(Frozen)

#### **WARNING**

Group [G05D 1/0221](#) is impacted  
by reclassification into groups  
[B60W 10/00](#) - [B60W 60/00276](#),  
[B60W 2300/00](#) - [B60W 2530/213](#),  
[B60W 2540/041](#) - [B60W 2540/049](#),  
[B60W 2552/00](#) - [B60W 2556/65](#),  
[B60W 2710/00](#) - [B60W 2720/406](#), and  
[B60W 2754/00](#) - [B60W 2900/00](#).

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

1/0223 . . . . {involving speed control of the vehicle  
(Frozen) (vehicle fittings for automatically  
controlling, i.e. preventing speed from  
exceeding an arbitrarily established  
velocity or maintaining speed at a particular  
velocity, as selected by the vehicle operator  
[B60K 31/00](#))}

#### **WARNING**

Group [G05D 1/0223](#) is impacted  
by reclassification into groups  
[B60W 10/00](#) - [B60W 60/00276](#),  
[B60W 2300/00](#) - [B60W 2530/213](#),  
[B60W 2540/041](#) - [B60W 2540/049](#),  
[B60W 2552/00](#) - [B60W 2556/65](#),  
[B60W 2710/00](#) - [B60W 2720/406](#), and  
[B60W 2754/00](#) - [B60W 2900/00](#).

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

1/0225 . . . . {involving docking at a fixed facility, e.g.  
(Frozen) base station or loading bay ([parking aids](#)  
[B62D 15/027](#))}

1/0227 . . . . {using mechanical sensing means, e.g. for  
(Frozen) sensing treated area}

1/0229 . . . . {in combination with fixed guiding means}  
(Frozen)

1/0231 . . . . {using optical position detecting means  
(Frozen) (position-fixing by using electromagnetic  
waves other than radio waves, e.g. optical  
position detecting means [G01S 5/16](#))}

1/0234 . . . . {using optical markers or beacons (optical  
(Frozen) beacons *per se* [G01S 1/70](#))}

1/0236 . . . . {in combination with a laser ([lasers per se](#)  
(Frozen) [H01S](#))}

1/0238 . . . . {using obstacle or wall sensors  
(Frozen) ([G05D 1/0246](#) and [G05D 1/0289](#) take  
precedence; lidar systems designed for anti-  
collision purposes [G01S 17/93](#))}

1/024 . . . . {in combination with a laser ([lasers per se](#)  
(Frozen) [H01S](#))}

1/0242 . . . . {using non-visible light signals, e.g. IR or  
(Frozen) UV signals}

1/0244 . . . . {using reflecting strips}  
(Frozen)

1/0246 . . . . {using a video camera in combination with  
(Frozen) image processing means}

1/0248 . . . . {in combination with a laser ([lasers per se](#)  
(Frozen) [H01S](#))}

1/0251 . . . . {extracting 3D information from a  
(Frozen) plurality of images taken from different  
locations, e.g. stereo vision (stereoscopic  
image analysis [H04N 13/00](#); depth  
recovery from images [G06T 7/593](#))}

1/0253 . . . . {extracting relative motion information  
(Frozen) from a plurality of images taken  
successively, e.g. visual odometry, optical  
flow (determining position or orientation  
from images [G06T 7/70](#))}

1/0255 . . . . {using acoustic signals, e.g. ultra-sonic signals  
(Frozen) (sonar systems designed for anti-collision  
purposes [G01S 15/93](#))}

1/0257 . . . . {using a radar (radar systems designed for  
(Frozen) anti-collision purposes between land vehicles  
or between land vehicle and fixed obstacles  
[G01S 13/931](#))}

1/0259 . . . . {using magnetic or electromagnetic means}  
(Frozen)

1/0261 . . . . {using magnetic plots}  
(Frozen)

1/0263 . . . . {using magnetic strips}  
(Frozen)

1/0265 . . . . {using buried wires}  
(Frozen)

1/0268 . . . . {using internal positioning means}  
(Frozen)

1/027 . . . . {comprising inertial navigation means,  
(Frozen) e.g. azimuth detector (inertial navigation  
[G01C 21/16](#); inertial navigation combined  
with non-inertial navigation instruments  
[G01C 21/165](#))}

1/0272 . . . . {comprising means for registering the  
(Frozen) travel distance, e.g. revolutions of wheels  
(measuring distance traversed on the  
ground by vehicles, e.g. using odometers  
[G01C 22/00](#))}

1/0274 . . . . {using mapping information stored in a  
(Frozen) memory device (navigation using map-  
matching [G01C 21/30](#))}

- 1/0276 . . . {using signals provided by a source external to the vehicle (involving a plurality of vehicles [G05D 1/0287](#); automatically controlling vehicle speed responsive to externally generated signals [B60K 31/0058](#))}  
(Frozen)
- 1/0278 . . . . {using satellite positioning signals, e.g. GPS}  
(Frozen)
- 1/028 . . . . {using a RF signal}  
(Frozen)
- 1/0282 . . . . . {generated in a local control room}  
(Frozen)
- 1/0285 . . . . . {using signals transmitted via a public communication network, e.g. GSM network}  
(Frozen)
- 1/0287 . . . {involving a plurality of land vehicles, e.g. fleet or convoy travelling (traffic control systems for road vehicles [G08G 1/00](#), particularly anticollision systems [G08G 1/16](#))}  
(Frozen)
- 1/0289 . . . . {with means for avoiding collisions between vehicles (vehicle fittings for automatically controlling speed including means for detecting potential obstacles [B60K 31/0008](#); avoiding obstacles by action on the steering system [B62D](#); radar, sonar, lidar systems designed for anti-collision purposes [G01S 13/93](#), [G01S 15/93](#), [G01S 17/93](#))}  
(Frozen)
- 1/0291 . . . . {Fleet control (monitoring fleets in traffic control systems for road vehicles [G08G 1/127](#), [G08G 1/127](#))}  
(Frozen)
- 1/0293 . . . . . {Convoy travelling}  
(Frozen)
- 1/0295 . . . . . {by at least one leading vehicle of the fleet}  
(Frozen)
- 1/0297 . . . . . {by controlling means in a control room}  
(Frozen)
- 1/03 . . using near-field transmission systems, e.g. inductive-loop type ({[G05D 1/021](#) and subgroups take precedence})  
(Frozen)
- 1/04 . . Control of altitude or depth  
(Frozen)

**WARNING**

Groups [G05D 1/04](#) – [G05D 1/0692](#) are no longer used for the classification of documents as of January 1, 2024.

The content of these groups is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/042 . . . {specially adapted for aircraft}  
(Frozen)
- 1/044 . . . . {during banks}  
(Frozen)
- 1/046 . . . . {to counteract a perturbation, e.g. gust of wind}  
(Frozen)

- 1/048 . . . {specially adapted for water vehicles}  
(Frozen)
- 1/06 . . Rate of change of altitude or depth  
(Frozen)
- 1/0607 . . . . {specially adapted for aircraft}  
(Frozen)
- 1/0615 . . . . . {to counteract a perturbation, e.g. gust of wind}  
(Frozen)
- 1/0623 . . . . . {by acting on the pitch}  
(Frozen)
- 1/063 . . . . . {by acting on the motors}  
(Frozen)
- 1/0638 . . . . . {by combined action on the pitch and on the motors}  
(Frozen)
- 1/0646 . . . . . {to follow the profile of undulating ground}  
(Frozen)
- 1/0653 . . . . . {during a phase of take-off or landing}  
(Frozen)
- 1/0661 . . . . . {specially adapted for take-off}  
(Frozen)
- 1/0669 . . . . . . {specially adapted for vertical take-off}  
(Frozen)
- 1/0676 . . . . . {specially adapted for landing}  
(Frozen)
- 1/0684 . . . . . . {on a moving platform, e.g. aircraft carrier}  
(Frozen)
- 1/0688 . . . . . {Emergency descent}  
(Frozen)
- 1/0692 . . . . {specially adapted for under-water vehicles}  
(Frozen)
- 1/08 . . Control of attitude, i.e. control of roll, pitch, or yaw  
(Frozen)

**WARNING**

Groups [G05D 1/08](#) – [G05D 1/0891](#) are no longer used for the classification of documents as of January 1, 2024.

The content of these groups is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/0808 . . . {specially adapted for aircraft}  
(Frozen)
- 1/0816 . . . . {to ensure stability}  
(Frozen)
- 1/0825 . . . . . {using mathematical models}  
(Frozen)
- 1/0833 . . . . . {using limited authority control}  
(Frozen)
- 1/0841 . . . . . {to prevent a coupling between different modes}  
(Frozen)
- 1/085 . . . . . {to ensure coordination between different movements}  
(Frozen)
- 1/0858 . . . . {specially adapted for vertical take-off of aircraft}  
(Frozen)

- 1/0866 . . . {specially adapted to captive aircraft}  
(Frozen)
- 1/0875 . . . {specially adapted to water vehicles}  
(Frozen)
- 1/0891 . . . {specially adapted for land vehicles}  
(Frozen)
- 1/10 . Simultaneous control of position or course in three  
(Frozen) dimensions ([G05D 1/12](#) takes precedence)

**WARNING**

Groups [G05D 1/10](#) – [G05D 1/108](#) are no longer used for the classification of documents as of January 1, 2024.

The content of these groups is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/101 . . . {specially adapted for aircraft}  
(Frozen)
- 1/102 . . . {specially adapted for vertical take-off of  
(Frozen) aircraft}
- 1/104 . . . {involving a plurality of aircrafts, e.g.  
(Frozen) formation flying (traffic control systems for aircraft [G08G 5/00](#))}
- 1/105 . . . {specially adapted for unpowered flight, e.g.  
(Frozen) glider, parachuting, forced landing ([parachutes per se B64D 17/00](#))}
- 1/106 . . . {Change initiated in response to external  
(Frozen) conditions, e.g. avoidance of elevated terrain or of no-fly zones}
- 1/1062 . . . . {specially adapted for avoiding bad weather  
(Frozen) conditions}
- 1/1064 . . . . {specially adapted for avoiding collisions  
(Frozen) with other aircraft}
- 1/107 . . . {specially adapted for missiles}  
(Frozen)
- 1/108 . . . {animated with a rolling movement}  
(Frozen)

- 1/12 . Target-seeking control  
(Frozen)

**WARNING**

Group [G05D 1/12](#) is no longer used for the classification of documents as of January 1, 2024.

The content of this group is being reclassified into groups [G05D 1/00](#), [G05D 1/20](#) - [G05D 1/249](#), [G05D 1/40](#) - [G05D 1/498](#), [G05D 1/60](#) - [G05D 1/6987](#), [G05D 1/80](#) - [G05D 1/87](#), [G05D 2101/00](#) - [G05D 2101/26](#), [G05D 2103/00](#), [G05D 2105/00](#) - [G05D 2105/93](#), [G05D 2107/00](#) - [G05D 2107/95](#), [G05D 2109/00](#) - [G05D 2109/50](#) and [G05D 2111/00](#) - [G05D 2111/67](#).

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

- 1/20 . Control system inputs

**WARNING**

Groups [G05D 1/20](#) - [G05D 1/249](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) - [G05D 1/12](#).

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

- 1/22 . . Command input arrangements
- 1/221 . . . Remote-control arrangements
- 1/222 . . . . operated by humans
- 1/223 . . . . . Command input arrangements on the remote controller, e.g. joysticks or touch screens
- 1/2232 . . . . . {Touch screens}
- 1/2234 . . . . . {Neurological interfaces}
- 1/2235 . . . . . {involving the operator tracking the vehicle by direct line of sight}
- 1/224 . . . . . Output arrangements on the remote controller, e.g. displays, haptics or speakers
- 1/2242 . . . . . {Haptics}
- 1/2243 . . . . . {Acoustic}
- 1/2244 . . . . . {Optic}
- 1/2245 . . . . . {providing the operator with a purely computer-generated representation of the environment of the vehicle, e.g. virtual reality}
- 1/2246 . . . . . {displaying a map of the environment}
- 1/2247 . . . . . {providing the operator with simple or augmented images from one or more cameras}
- 1/2248 . . . . . {the one or more cameras located remotely from the vehicle}
- 1/2249 . . . . . {using augmented reality}
- 1/225 . . . . operated by off-board computers
- 1/226 . . . . Communication links with the remote-control arrangements
- 1/2265 . . . . . {involving protocol translation}



- 1/227 . . . . Handing over between remote control and on-board control; Handing over between remote control arrangements
- 1/2272 . . . . . {in response to remote override by external entities, e.g. authorities}
- 1/2274 . . . . . {in response to the communication link being lost, degraded or compromised, e.g. anti-spoofing}
- 1/2276 . . . . . {for keeping or re-establishing line of sight}
- 1/2278 . . . . . {for returning to designated location}
- 1/2279 . . . . . {involving allocation of control between two or more remote operators, e.g. tele-assistance}
- 1/228 . . . Command input arrangements located on-board unmanned vehicles
- 1/2285 . . . . using voice or gesture commands
- 1/2287 . . . . {using an external force applied to the vehicle}
- 1/229 . . . Command input data, e.g. waypoints
- 1/2295 . . . . {defining restricted zones, e.g. no-flight zones or geofences}
- 1/2297 . . . . {positional data taught by the user, e.g. paths (G05D 1/2295 takes precedence)}
- 1/24 . . Arrangements for determining position or orientation
- 1/241 . . . Means for detecting physical contact, e.g. touch sensors or bump sensors
- 1/242 . . . Means based on the reflection of waves generated by the vehicle (using passive navigation aids external to the vehicle G05D 1/244; using signals provided by artificial sources external to the vehicle G05D 1/247)
- 1/2424 . . . . {for monitoring a plurality of zones}
- 1/2427 . . . . {for monitoring a zone of adjustable size or form}
- 1/243 . . . Means capturing signals occurring naturally from the environment, e.g. ambient optical, acoustic, gravitational or magnetic signals (using passive navigation aids external to the vehicle G05D 1/244; using signals from positioning sensors located off-board the vehicle G05D 1/249)
- 1/2435 . . . . {Extracting 3D information}
- 1/2437 . . . . {Extracting relative motion information}
- 1/244 . . . using passive navigation aids external to the vehicle, e.g. markers, reflectors or magnetic means
- 1/2446 . . . . {the passive navigation aids having encoded information, e.g. QR codes or ground control points}
- 1/245 . . . using dead reckoning
- 1/246 . . . using environment maps, e.g. simultaneous localisation and mapping [SLAM]
- 1/2462 . . . . {using feature-based mapping}
- 1/2464 . . . . {using an occupancy grid}
- 1/2465 . . . . {using a 3D model of the environment}
- 1/2467 . . . . {using a semantic description of the environment}
- 1/2469 . . . . {using a topologic or simplified map}
- 1/247 . . . using signals provided by artificial sources external to the vehicle, e.g. navigation beacons
- 1/248 . . . . generated by satellites, e.g. GPS
- 1/249 . . . . from positioning sensors located off-board the vehicle, e.g. from cameras
- 1/40 . Control within particular dimensions
- WARNING**
- Groups G05D 1/40 - G05D 1/498 are incomplete pending reclassification of documents from groups G05D 1/00 – G05D 1/12.
- All groups listed in this Warning should be considered in order to perform a complete search.
- 1/43 . . Control of position or course in two dimensions
- 1/435 . . . resulting in a change of level, e.g. negotiating lifts or stairs
- 1/437 . . . for aircraft during their ground movement {, e.g. taxiing}
- 1/439 . . . . {on the runway during take-off or landing}
- 1/46 . . Control of position or course in three dimensions
- 1/461 . . . for unpowered vehicles, e.g. gliders or parachutes
- 1/467 . . . for movement inside a confined volume, e.g. indoor flying
- 1/48 . . Control of altitude or depth
- 1/482 . . . {utilising or compensating for ground effect}
- 1/484 . . . {during banking manoeuvres}
- 1/485 . . . Control of rate of change of altitude or depth
- 1/49 . . Control of attitude, i.e. control of roll, pitch or yaw
- 1/495 . . . to ensure stability
- 1/496 . . . . {compensating for coupling between different axes of movement}
- 1/498 . . . {involving adjustment of the relative position of the centre of gravity of the vehicle}
- 1/60 . Intended control result
- WARNING**
- Groups G05D 1/60 - G05D 1/6987 are incomplete pending reclassification of documents from groups G05D 1/00 – G05D 1/12.
- All groups listed in this Warning should be considered in order to perform a complete search.
- 1/606 . . Compensating for or utilising external environmental conditions, e.g. wind or water currents (station keeping G05D 1/611)
- 1/611 . . Station keeping, e.g. for hovering or dynamic anchoring
- 1/617 . . Safety or protection, e.g. defining protection zones around obstacles or avoiding hazards (arrangements for controlling the position or course of two or more vehicles for avoiding collisions therebetween G05D 1/693; arrangements for reacting to or preventing system or operator failure G05D 1/80)
- 1/618 . . . {for cargo or occupants}
- 1/619 . . . {Minimising the exposure of a vehicle to threats, e.g. avoiding interceptors}
- 1/621 . . . {responding to weather conditions, e.g. storms or wind shear}
- 1/622 . . . Obstacle avoidance (predicting or avoiding probable or impending collision of road vehicles B60W 30/08)

- 1/628 . . . . following the obstacle profile, e.g. a wall or undulated terrain
  - 1/633 . . . . Dynamic obstacles
  - 1/637 . . . . {using safety zones of adjustable size or shape}
  - 1/639 . . . . Resolving or avoiding being stuck or obstructed
  - 1/642 . . . . {involving obstacle removal, e.g. opening doors or pushing furniture}
  - 1/644 . . Optimisation of travel parameters, e.g. of energy consumption, journey time or distance
  - 1/6445 . . . {for optimising payload operation, e.g. camera or spray coverage}
  - 1/645 . . . {Vehicle-induced nuisance abatement, e.g. minimising noise or visual impact}
  - 1/646 . . Following a predefined trajectory, e.g. a line marked on the floor or a flight path
  - 1/648 . . Performing a task within a working area or space, e.g. cleaning
  - 1/6482 . . . {by dividing the whole area or space in sectors to be processed separately}
  - 1/6484 . . . {by taking into account parameters or characteristics of the working area or space, e.g. size or shape}
  - 1/6485 . . . . {by taking into account surface type, e.g. carpeting}
  - 1/6486 . . . . {by taking into account surface condition, e.g. soiled}
  - 1/65 . . Following a desired speed profile
  - 1/651 . . . {with controlled time of arrival at target points, e.g. 4D navigation}
  - 1/652 . . Take-off (delivering or retrieving payloads [G05D 1/667](#))
  - 1/654 . . Landing (docking at a base station [G05D 1/661](#))
  - 1/6542 . . . {on a moving platform, e.g. aircraft carrier}
  - 1/6545 . . . {during descent or approach phase}
  - 1/6546 . . . {Emergency landing}
  - 1/6548 . . . {Aborted landing, e.g. go-around}
  - 1/656 . . Interaction with payloads or external entities
  - 1/661 . . . Docking at a base station (delivering or retrieving payloads [G05D 1/667](#))
  - 1/663 . . . . {docking at a moving base station}
  - 1/665 . . . {Releasing payloads, e.g. parachutes}
  - 1/667 . . . Delivering or retrieving payloads
  - 1/672 . . . Positioning of towed, pushed or suspended implements, e.g. ploughs
  - 1/678 . . . for tethered vehicles (positioning towed, pushed or suspended implements [G05D 1/672](#))
  - 1/683 . . . Intercepting moving targets (docking at a base station [G05D 1/661](#))
  - 1/686 . . . Maintaining a relative position with respect to moving targets, e.g. following animals or humans (for pointing payloads towards targets [G05D 1/689](#); involving controlling the position or course of two or more vehicles [G05D 1/69](#))
  - 1/689 . . . Pointing payloads towards fixed or moving targets (positioning towed, pushed or suspended implements [G05D 1/672](#))
  - 1/6895 . . . . {the payload being a manipulator arm}
  - 1/69 . . Coordinated control of the position or course of two or more vehicles
  - 1/692 . . . involving a plurality of disparate vehicles
  - 1/693 . . . for avoiding collisions between vehicles
  - 1/695 . . . for maintaining a fixed relative position of the vehicles, e.g. for convoy travelling or formation flight
  - 1/696 . . . . {involving a plurality of vehicles coupled together}
  - 1/697 . . . for rendezvous of two or more vehicles, e.g. for in-flight refuelling (docking at a base station [G05D 1/661](#))
  - 1/698 . . . Control allocation
  - 1/6983 . . . . {by distributed or sequential control}
  - 1/6985 . . . . {using a lead vehicle, e.g. primary-secondary arrangements}
  - 1/6987 . . . . {by centralised control off-board any of the vehicles}
  - 1/80 . . Arrangements for reacting to or preventing system or operator failure (handing over between remote control and on-board control, or handing over between remote control arrangements [G05D 1/227](#))
- WARNING**
- Groups [G05D 1/80](#) – [G05D 1/87](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) – [G05D 1/12](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 1/81 . . Handing over between on-board automatic and on-board manual control
  - 1/815 . . . {to recover from unusual attitude conditions}
  - 1/817 . . . {to recover from pilot incapacitation}
  - 1/82 . . Limited authority control, e.g. enforcing a flight envelope (limitation of acceleration or structural stress [G05D 1/83](#))
  - 1/83 . . Limitation of acceleration or structural stress
  - 1/85 . . Fail-safe operations, e.g. limp home mode
  - 1/852 . . . {in response to low power or low fuel conditions}
  - 1/854 . . . {in response to motor or actuator failures}
  - 1/857 . . . {in response to sensor failures}
  - 1/86 . . Monitoring the performance of the system, e.g. alarm or diagnosis modules
  - 1/87 . . using redundant control arrangements
- 3/00 Control of position or direction ([G05D 1/00](#) takes precedence; numerical control to execute positioning [G05B 19/18](#))**
- 3/10 . . without using feedback
  - 3/105 . . . {Solar tracker}
  - 3/12 . . using feedback
  - 3/121 . . . {using synchroscopes (selsyns)}
  - 3/122 . . . {without modulation}
  - 3/124 . . . {with modulation}
  - 3/125 . . . {using discrete position sensor}
  - 3/127 . . . {with electrical contact}
  - 3/128 . . . {using clutch or brake}
  - 3/14 . . using an analogue comparing device
  - 3/1409 . . . {with dc amplifier chain}
  - 3/1418 . . . {with ac amplifier chain}
  - 3/1427 . . . {with non-linear amplifier chain}
  - 3/1436 . . . {with fine or coarse devices}
  - 3/1445 . . . {with a plurality of loops}
  - 3/1454 . . . . {using models or predicting devices}
  - 3/1463 . . . . {using PID devices}



- 3/1472 . . . {with potentiometer}
- 3/1481 . . . {with discrete position sensor}
- 3/149 . . . {with clutch or brake}
- 3/16 . . . whose output amplitude can only take a number of discrete values ([G05D 3/18](#) takes precedence)
- 3/165 . . . . {using clutch or brake}
- 3/18 . . . delivering a series of pulses
- 3/183 . . . . {using stepping motor}
- 3/186 . . . . {using clutch or brake}
- 3/20 . . using a digital comparing device
- 3/203 . . . {using fine or coarse devices}
- 3/206 . . . {using clutch or brakes}

#### 5/00 Control of dimensions of material

- 5/02 . of thickness, e.g. of rolled material (of specific materials [B21B](#), [B29C](#), [B32B](#), [C03B](#), [D21F](#))
- 5/03 . . characterised by the use of electric means
- 5/04 . of the size of items, e.g. of particles
- 5/06 . . characterised by the use of electric means

#### 7/00 Control of flow (level control [G05D 9/00](#); control of flow ratio [G05D 11/00](#))

##### NOTE

In groups [G05D 7/0629](#) - [G05D 7/0694](#), the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.

- 7/005 . {characterised by the use of auxiliary non-electric power combined with the use of electric means}
- 7/01 . without auxiliary power
- 7/0106 . . {the sensing element being a flexible member, e.g. bellows, diaphragm, capsule}
- 7/0113 . . . {the sensing element acting as a valve}
- 7/012 . . . {the sensing element being deformable and acting as a valve}
- 7/0126 . . {the sensing element being a piston or plunger associated with one or more springs}
- 7/0133 . . . {within the flow-path}
- 7/014 . . . . {using sliding elements}
- 7/0146 . . {the in-line sensing element being a piston or float without flexible member or spring}
- 7/0153 . . . {using slidable elements}
- 7/016 . . . {the sensing element being a ball}
- 7/0166 . . {the sensing element being a float or a ball placed outside the flow path to be controlled}
- 7/0173 . . {using pivoting sensing element acting as a valve mounted within the flow-path}
- 7/018 . . {using rotary sensing element}
- 7/0186 . . {without moving parts}
- 7/0193 . . {using hydraulic or pneumatic amplifiers, relays or transmitters}
- 7/03 . with auxiliary non-electric power {([G05D 7/005](#) takes precedence)}
- 7/06 . characterised by the use of electric means {([G05D 7/005](#) takes precedence)}
- 7/0605 . . {specially adapted for solid materials}
- 7/0611 . . . {characterised by the set value given to the control element}
- 7/0617 . . {specially adapted for fluid materials}
- 7/0623 . . . {characterised by the set value given to the control element}

- 7/0629 . . . {characterised by the type of regulator means}
- 7/0635 . . . . {by action on throttling means ([G05D 7/0688](#), [G05D 7/0694](#) take precedence)}
- 7/0641 . . . . . {using a plurality of throttling means ([G05D 7/067](#) takes precedence)}
- 7/0647 . . . . . {the plurality of throttling means being arranged in series}
- 7/0652 . . . . . {the plurality of throttling means being arranged in parallel}
- 7/0658 . . . . . {the plurality of throttling means being arranged for the control of a single flow from a plurality of converging flows ([G05D 7/0652](#) takes precedence; ratio control [G05D 11/13](#))}
- 7/0664 . . . . . {the plurality of throttling means being arranged for the control of a plurality of diverging flows from a single flow ([G05D 7/0652](#) takes precedence; ratio control [G05D 11/13](#))}
- 7/067 . . . . . {characterised by free surface flow (open channel water distribution systems [E02B 13/00](#))}
- 7/0676 . . . . {by action on flow sources ([G05D 7/0688](#), [G05D 7/0694](#) take precedence)}
- 7/0682 . . . . . {using a plurality of flow sources}
- 7/0688 . . . . {by combined action on throttling means and flow sources ([G05D 7/0694](#) takes precedence)}
- 7/0694 . . . . {by action on throttling means or flow sources of very small size, e.g. microfluidics (microvalves [F16K 99/0001](#); microstructural devices [per se](#) [B81B](#))}

#### 9/00 Level control, e.g. controlling quantity of material stored in vessel

- 9/02 . without auxiliary power
- 9/04 . with auxiliary non-electric power
- 9/12 . characterised by the use of electric means

#### 11/00 Control of flow ratio (control of chemical or physico-chemical variables, e.g. pH-value, [G05D 21/00](#); control of humidity [G05D 22/00](#); control of temperature by varying the mixing ratio of two fluids having different temperatures [G05D 23/13](#); control of viscosity [G05D 24/00](#))

- 11/001 . {with discontinuous action}
- 11/003 . {using interconnected flow control elements}
- 11/005 . {using synchronised pumps}
- 11/006 . {involving a first fluid acting on the feeding of a second fluid}
- 11/008 . {involving a fluid operating a pump motor}
- 11/02 . Controlling ratio of two or more flows of fluid or fluent material
- 11/03 . . without auxiliary power
- 11/035 . . with auxiliary non-electric power
- 11/04 . . . by sensing weight of individual components, e.g. gravimetric procedure
- 11/06 . . . by sensing density of mixture, e.g. using aerometer
- 11/08 . . . by sensing concentration of mixture, e.g. measuring pH value
- 11/10 . . . . by sensing moisture of non-aqueous liquids
- 11/12 . . . by sensing viscosity of mixture
- 11/13 . . characterised by the use of electric means

- 11/131 . . . {by measuring the values related to the quantity of the individual components ([G05D 11/139 takes precedence](#))}
- 11/132 . . . . {by controlling the flow of the individual components ([G05D 11/133 takes precedence](#))}
- 11/133 . . . . {with discontinuous action}
- 11/134 . . . . {by sensing the weight of the individual components}
- 11/135 . . . {by sensing at least one property of the mixture ([G05D 11/139 takes precedence](#))}
- 11/136 . . . . {by sensing the viscosity}
- 11/137 . . . . {by sensing the density of the mixture}
- 11/138 . . . . {by sensing the concentration of the mixture, e.g. measuring pH value}
- 11/139 . . . {by measuring a value related to the quantity of the individual components and sensing at least one property of the mixture}
- 11/16 . Controlling mixing ratio of fluids having different temperatures, e.g. by sensing the temperature of a mixture of fluids having different viscosities
- 13/00 Control of linear speed; Control of angular speed; Control of acceleration or deceleration, e.g. of a prime mover**
- 13/02 . Details
- 13/04 . . providing for emergency tripping of an engine in case of exceeding maximum speed
- 13/06 . . providing for damping of erratic vibrations in governors
- 13/08 . without auxiliary power
- 13/10 . . Centrifugal governors with fly-weights
- 13/12 . . . Details
- 13/14 . . . . Fly weights; Mountings thereof; Adjusting equipment for limits, e.g. temporarily
- 13/16 . . . . Risers; Transmission gear therefor; Restoring mechanisms therefor
- 13/18 . . . counterbalanced by spider springs acting immediately upon the fly-weights
- 13/20 . . . counterbalanced by spider springs acting upon the articulated riser
- 13/22 . . . counterbalanced by fluid pressure acting upon the articulated riser
- 13/24 . . . counterbalanced by two or more different appliances acting simultaneously upon the riser, e.g. with both spring force and fluid pressure or with both spring force and electromagnetic force
- 13/26 . . . with provision for modulating the degree of non-uniformity of speed
- 13/28 . . . with provision for performing braking effects in case of increased speed
- 13/30 . . Governors characterised by fluid features in which the speed of a shaft is converted into fluid pressure
- 13/32 . . . using a pump
- 13/34 . with auxiliary non-electric power
- 13/36 . . using regulating devices with proportional band, i.e. P regulating devices
- 13/38 . . . involving centrifugal governors of fly-weight type
- 13/40 . . . involving fluid governors of pump type
- 13/42 . . . involving fluid governors of flow-controller type, i.e. the width of liquid flow being controlled by fly-weights
- 13/44 . . . involving fluid governors of jet type
- 13/46 . . using regulating devices with proportional band and integral action, i.e. PI regulating devices
- 13/48 . . . involving resilient restoring mechanisms
- 13/50 . . . involving connecting means or superimposing a proportional regulating device and an integral regulating device
- 13/52 . . using regulating devices with proportional band and derivative action, i.e. PD regulating devices
- 13/54 . . . involving centrifugal governors of fly-weight type exerting an acceleratory effect
- 13/56 . . . involving restoring mechanisms exerting a delay effect
- 13/58 . . . involving means for connecting a speed regulating device and an acceleration regulating device
- 13/60 . . using regulating devices with proportional band, derivative and integral action, i.e. PID regulating devices
- 13/62 . characterised by the use of electric means, e.g. use of a tachometric dynamo, use of a transducer converting an electric value into a displacement [{\(electric motor control H02P\)}](#)
- 13/64 . Compensating the speed difference between engines meshing by a differential gearing or the speed difference between a controlling shaft and a controlled shaft [{\(G05D 13/62 takes precedence\)}](#)
- 13/66 . Governor units providing for co-operation with control dependent upon a variable other than speed
- 15/00 Control of mechanical force or stress; Control of mechanical pressure**
- 15/01 . characterised by the use of electric means
- 16/00 Control of fluid pressure**
- 16/02 . Modifications to reduce the effects of instability, e.g. due to vibrations, friction, abnormal temperature, overloading or imbalance
- 16/024 . [{Controlling the inlet pressure, e.g. back-pressure regulator}](#)
- 16/028 . [{Controlling a pressure difference \(control of flow G05D 7/00\)}](#)
- 16/04 . without auxiliary power
- 16/0402 . . [{with two or more controllers mounted in series}](#)
- 16/0404 . . [{with two or more controllers mounted in parallel}](#)
- 16/06 . . the sensing element being a flexible membrane, yielding to pressure, e.g. diaphragm, bellows, capsule
- 16/0608 . . . [{the controller being mounted within the flow path and having slidable elements}](#)
- 16/0611 . . . [{the sensing element being deformable, e.g. Bourdon tube}](#)
- 16/0613 . . . . [{the deformable sensing element acting as a throttling member}](#)
- 16/0616 . . . [{the sensing element being a bellow}](#)
- 16/0619 . . . . [{acting directly on the obturator}](#)
- 16/0622 . . . . . [{characterised by the form of the obturator}](#)
- 16/0625 . . . . [{acting indirectly on the obturator, e.g. by a lever}](#)

16/0627	. . . . . {characterised by the form of the obturator}	16/18	. . . derived from an external source
16/063	. . . {the sensing element being a membrane}	16/185	. . . {using membranes within the main valve}
16/0633	. . . . {characterised by the properties of the membrane}	16/187	. . . {using pistons within the main valve}
16/0636	. . . . {characterised by the loading device of the membrane, e.g. spring}	16/20	. characterised by the use of electric means
16/0638	. . . . {characterised by the form of the obturator}	16/2006	. . {with direct action of electric energy on controlling means ( <a href="#">combination of electric and non-electric auxiliary G05D 16/2093</a> )}
16/0641	. . . . . {the obturator is a membrane}	16/2013	. . . {using throttling means as controlling means}
16/0644	. . . . {the membrane acting directly on the obturator}	16/202	. . . . {actuated by an electric motor}
16/0647	. . . . . {using one membrane without spring}	16/2022	. . . . {actuated by a proportional solenoid ( <a href="#">throttling means G05D 16/2024</a> )}
16/065	. . . . . {characterised by the form of the obturator}	16/2024	. . . . {the throttling means being a multiple-way valve}
16/0652	. . . . . {using several membranes without spring}	16/2026	. . . . {with a plurality of throttling means}
16/0655	. . . . . {using one spring-loaded membrane}	16/2033	. . . . {the plurality of throttling means being arranged in series}
16/0658	. . . . . {characterised by the form of the obturator}	16/204	. . . . {the plurality of throttling means being arranged in parallel}
16/0661	. . . . . {characterised by the loading mechanisms of the membrane}	16/2046	. . . . {the plurality of throttling means being arranged for the control of a single pressure from a plurality of converging pressures ( <a href="#">G05D 16/204 takes precedence</a> )}
16/0663	. . . . . {using a spring-loaded membrane with a spring-loaded slideable obturator}	16/2053	. . . . . {the plurality of throttling means comprising only a first throttling means acting on a higher pressure and a second throttling means acting on a lower pressure, e.g. the atmosphere}
16/0666	. . . . . {characterised by the form of the obturator}	16/206	. . . . {the plurality of throttling means being arranged for the control of a plurality of diverging pressures from a single pressure ( <a href="#">G05D 16/204 takes precedence</a> )}
16/0669	. . . . . {characterised by the loading mechanisms of the membrane}	16/2066	. . . {using controlling means acting on the pressure source}
16/0672	. . . . . {using several spring-loaded membranes}	16/2073	. . . . {with a plurality of pressure sources}
16/0675	. . . . {the membrane acting on the obturator through a lever}	16/208	. . . {using a combination of controlling means as defined in <a href="#">G05D 16/2013</a> and <a href="#">G05D 16/2066</a> ( <a href="#">G05D 16/2073 takes precedence</a> )}
16/0677	. . . . . {using one membrane without spring}	16/2086	. . {without direct action of electric energy on the controlling means ( <a href="#">combination of electric and non-electric auxiliary G05D 16/2093</a> )}
16/068	. . . . . {characterised by the form of the obturator}	16/2093	. . {with combination of electric and non-electric auxiliary power}
16/0683	. . . . . {using a spring-loaded membrane}	16/2095	. . . {using membranes within the main valve}
16/0686	. . . . . {characterised by the form of the lever}	16/2097	. . . {using pistons within the main valve}
16/0688	. . . . . {characterised by the form of the obturator}	<b>17/00</b>	<b>Control of torque; Control of mechanical power</b>
16/0691	. . . . . {characterised by the loading mechanisms of the membrane}	17/02	. characterised by the use of electric means
16/0694	. . . . . {using a spring-loaded membrane with a spring-loaded slideable obturator}	<b>19/00</b>	<b>Control of mechanical oscillations, e.g. of amplitude, of frequency, of phase</b>
16/0697	. . . . . {using several membranes}	19/02	. characterised by the use of electric means
16/08	. . . Control of liquid pressure	<b>21/00</b>	<b>Control of chemical or physico-chemical variables, e.g. pH value</b>
16/10	. . the sensing element being a piston or plunger	21/02	. characterised by the use of electric means
16/101	. . . {the controller being arranged as a multiple-way valve}	<b>22/00</b>	<b>Control of humidity</b>
16/103	. . . {the sensing element placed between the inlet and outlet ( <a href="#">multiple-way valve G05D 16/101</a> )}	22/02	. characterised by the use of electric means
16/106	. . . . {Sleeve-like sensing elements; Sensing elements surrounded by the flow path}	<b>23/00</b>	<b>Control of temperature</b>
16/107	. . . {with a spring-loaded piston in combination with a spring-loaded slideable obturator that move together over range of motion during normal operation}	<b>NOTE</b>	
16/109	. . . {with two or more pistons acting as a single pressure controller that move together over range of motion during normal operations ( <a href="#">controllers mounted in series G05D 16/0402, controller mounted in parallel G05D 16/0404</a> )}		In groups <a href="#">G05D 23/01</a> - <a href="#">G05D 23/32</a> , the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication
16/12	. . the sensing element being a float		
16/14	. . with auxiliary non-electric power		
16/16	. . derived from the controlled fluid		
16/163	. . . {using membranes within the main valve}		
16/166	. . . {using pistons within the main valve}		

## G05D

G05D 23/00

(continued)

to the contrary, classification is made in the last appropriate place.

- 23/01 . without auxiliary power
- 23/015 . . {with mechanical sensing element not covered by groups [G05D 23/02](#) and [G05D 23/12](#)}
- 23/02 . . with sensing element expanding and contracting in response to changes of temperature ([G05D 23/13](#) takes precedence)
- 23/021 . . . {the sensing element being a non-metallic solid, e.g. elastomer, paste}
- 23/022 . . . . {the sensing element being placed within a regulating fluid flow}
- 23/023 . . . . {the sensing element being placed outside a regulating fluid flow}
- 23/024 . . . {the sensing element being of the rod type, tube type, or of a similar type}
- 23/025 . . . . {the sensing element being placed within a regulating fluid flow}
- 23/026 . . . . {the sensing element being placed outside a regulating fluid flow}
- 23/027 . . . . . {for combustible fluid}
- 23/028 . . . {with fusing sensing element}
- 23/08 . . . with bimetallic element
- 23/10 . . . . with snap-action elements
- 23/12 . . with sensing element responsive to pressure or volume changes in a confined fluid
- 23/121 . . . {characterised by the sensing element}
- 23/122 . . . . {using a plurality of sensing elements}
- 23/123 . . . {the sensing element being placed within a regulating fluid flow}
- 23/125 . . . {the sensing element being placed outside a regulating fluid flow}
- 23/126 . . . . {using a capillary tube}
- 23/127 . . . . . {to control a gaseous fluid circulation}
- 23/128 . . . . . {the fluid being combustible}
- 23/13 . . by varying the mixing ratio of two fluids having different temperatures
- 23/1306 . . . {for liquids ([G05D 23/1393](#) takes precedence)}
- 23/1313 . . . . {without temperature sensing element}
- 23/132 . . . . {with temperature sensing element}
- 23/1326 . . . . . {details of the sensor}
- 23/1333 . . . . . {measuring the temperature of incoming fluid}
- 23/134 . . . . . {measuring the temperature of mixed fluid}
- 23/1346 . . . . . {with manual temperature setting means}
- 23/1353 . . . . . . {combined with flow controlling means}
- 23/136 . . . . . . {with pressure equalizing means}
- 23/1366 . . . . . {using a plurality of sensing elements}
- 23/1373 . . . . . {measuring the temperature of mixed fluid}
- 23/138 . . . {for gases ([G05D 23/1393](#) takes precedence)}
- 23/1386 . . . {for steam and liquid ([G05D 23/1393](#) takes precedence)}
- 23/1393 . . . {characterised by the use of electric means}
- 23/185 . with auxiliary non-electric power
- 23/1852 . . {with sensing element expanding and contracting in response to change of temperature}
- 23/1854 . . {with bimetallic element}
- 23/1856 . . {with sensing element responsive to pressure or volume change in a confined fluid}
- 23/1858 . . {by varying the mixing ratio of fluids having different temperatures}
- 23/19 . characterised by the use of electric means ([G05D 23/1393](#) takes precedence)}
- 23/1902 . . {characterised by the use of a variable reference value}
- 23/1904 . . . {variable in time}
- 23/1905 . . . {associated with tele control}
- 23/1906 . . {using an analogue comparing device}
- 23/1909 . . . {whose output amplitude can only take two discrete values}
- 23/1912 . . . {whose output amplitude can take more than two discrete values}
- 23/1913 . . . {delivering a series of pulses}
- 23/1917 . . {using digital means}
- 23/1919 . . {characterised by the type of controller}
- 23/192 . . . {using a modification of the thermal impedance between a source and the load}
- 23/1921 . . . {using a thermal motor}
- 23/1923 . . . {using thermal energy, the cost of which varies in function of time}
- 23/1924 . . . {using thermal energy, the availability of which is aleatory}
- 23/1925 . . {using a combination of auxiliary electric and non-electric power}
- 23/1927 . . {using a plurality of sensors ([G05D 23/1902](#), [G05D 23/1917](#), and [G05D 23/1919](#) take precedence)}
- 23/1928 . . . {sensing the temperature of one space}
- 23/193 . . . {sensing the temperature in different places in thermal relationship with one or more spaces}
- 23/1931 . . . . {to control the temperature of one space}
- 23/1932 . . . . {to control the temperature of a plurality of spaces}
- 23/1934 . . . . . {each space being provided with one sensor acting on one or more control means}
- 23/1935 . . . . {using sequential control}
- 23/1951 . . {with control of the working time of a temperature controlling device}
- 23/20 . . with sensing elements having variation of electric or magnetic properties with change of temperature ([G05D 23/13](#) takes precedence)
- 23/2033 . . . {details of the sensing element}
- 23/2034 . . . . {the sensing element being a semiconductor}
- 23/2035 . . . . {the sensing element being a ionized gas}
- 23/2036 . . . . {the sensing element being a dielectric of a capacitor}
- 23/2037 . . . {details of the regulator}
- 23/2039 . . . . {using mechanical means}
- 23/22 . . . the sensing element being a thermocouple
- 23/2236 . . . . {details of the regulator}
- 23/2237 . . . . . {using discharge tubes}
- 23/2239 . . . . . {using photoelectric elements}
- 23/224 . . . . . {using selfs or transformers}
- 23/24 . . . the sensing element having a resistance varying with temperature, e.g. a thermistor
- 23/2401 . . . . {using a heating element as a sensing element}
- 23/2451 . . . . {Details of the regulator}
- 23/2453 . . . . . {using discharge tubes}
- 23/2454 . . . . . {using photoelectric elements}
- 23/2456 . . . . . {using selfs or transformers}



- 23/26 . . . the sensing element having a permeability varying with temperature
- 23/27 . . with sensing element responsive to radiation
- 23/275 . . with sensing element expanding, contracting, or fusing in response to changes of temperature
- 23/27535 . . . {Details of the sensing element}
- 23/27536 . . . . {using fusible material}
- 23/27537 . . . . {using expansible fluid}
- 23/27539 . . . . {using conductible expansible fluid}
- 23/2754 . . . . {using bimetallic element}
- 23/27541 . . . . {using expansible solid}
- 23/27543 . . . . {using the controlled element as sensing element}
- 23/30 . . Automatic controllers with an auxiliary heating device affecting the sensing element, e.g. for anticipating change of temperature
- 23/303 . . . {using a sensing element having a resistance varying with temperature, e.g. thermistor}
- 23/306 . . . . {using semiconductor devices}
- 23/32 . . . with provision for adjustment of the effect of the auxiliary heating device, e.g. a function of time
- 24/00 Control of viscosity**
- 24/02 . characterised by the use of electric means
- 25/00 Control of light, e.g. intensity, colour or phase (optical devices or arrangements using movable or deformable elements for controlling light independent of the light source G02B 26/00; devices or arrangements, the optical operation of which is modified by changing the optical properties of the medium of the devices or arrangements for the control of light, circuit arrangements specially adapted therefor, control of light by electro-magnetic waves, electrons or other elementary particles G02F 1/00)**
- 25/02 . characterised by the use of electric means
- 27/00 Simultaneous control of variables covered by two or more of main groups G05D 1/00 - G05D 25/00**
- 27/02 . characterised by the use of electric means
- 29/00 Simultaneous control of electric and non-electric variables**
- 99/00 Subject matter not provided for in other groups of this subclass**

#### Indexing scheme associated with group G05D 1/00

- 2101/00 Details of software or hardware architectures used for the control of position**
- WARNING**
- Groups [G05D 2101/00](#) - [G05D 2101/26](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) - [G05D 1/12](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 2101/10 . using artificial intelligence [AI] techniques
- 2101/15 . . using machine learning, e.g. neural networks
- 2101/20 . using external object recognition
- 2101/22 . {using off-board distributed computer resources for performing calculations, e.g. cloud-based}
- 2101/24 . {decentralised arrangement of the on-board controllers}

- 2101/26 . {retrofitting existing legacy systems}

#### **2103/00 Adaptations for complying with regulatory restraints on the operations of the controlled vehicles, e.g. compliance with airspace or traffic regulations**

##### **WARNING**

Group [G05D 2103/00](#) is incomplete pending reclassification of documents from groups [G05D 1/00](#) - [G05D 1/12](#).

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

#### **2105/00 Specific applications of the controlled vehicles**

##### **WARNING**

Groups [G05D 2105/00](#) - [G05D 2105/93](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) - [G05D 1/12](#).

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

- 2105/05 . for soil shifting, building, civil engineering or mining, e.g. excavators
- 2105/10 . for cleaning, vacuuming or polishing
- 2105/12 . {for removing ice or snow}
- 2105/14 . {for collecting waste or trash}
- 2105/15 . for harvesting, sowing or mowing in agriculture or forestry
- 2105/17 . {for printing, painting or marking}
- 2105/20 . for transportation
- 2105/22 . . of humans
- 2105/24 . . . {personal mobility devices}
- 2105/28 . . of freight
- 2105/285 . . . {postal packages}
- 2105/29 . . . {garbage}
- 2105/30 . for social or care-giving applications
- 2105/31 . . {for attending to humans or animals, e.g. in health care environments}
- 2105/315 . . {for guiding or for guest attention}
- 2105/32 . . {for amusement, e.g. toys}
- 2105/34 . . {for telepresence or videoconferencing}
- 2105/345 . . {for photography}
- 2105/35 . for combat
- 2105/40 . for communications, e.g. wireless network relays
- 2105/45 . for manufacturing, maintenance or repairing
- 2105/47 . . {for maintenance or repairing, e.g. fuelling or battery replacement}
- 2105/50 . for animal husbandry or control, e.g. catching, trapping or scaring of animals
- 2105/55 . for emergency activities, e.g. search and rescue, traffic accidents or fire fighting
- 2105/57 . {for producing or harvesting energy}
- 2105/60 . for sport or gaming activities
- 2105/65 . for shows or performances
- 2105/70 . for displaying or announcing information
- 2105/80 . for information gathering, e.g. for academic research
- 2105/85 . . for patrolling or reconnaissance for police, security or military applications
- 2105/87 . . {for exploration, e.g. mapping of an area}
- 2105/89 . . {for inspecting structures, e.g. wind mills, bridges, buildings or vehicles}



2105/93 . . {for inventory}

## 2107/00 Specific environments of the controlled vehicles

### WARNING

Groups [G05D 2107/00](#) - [G05D 2107/95](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) – [G05D 1/12](#).

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

- 2107/10 . Outdoor regulated spaces
- 2107/13 . . Spaces reserved for vehicle traffic, e.g. roads, regulated airspace or regulated waters
- 2107/17 . . Spaces with priority for humans, e.g. populated areas, pedestrian ways, parks or beaches
- 2107/20 . Land use
- 2107/21 . . {Farming, e.g. fields, pastures or barns}
- 2107/22 . . {Forests}
- 2107/23 . . {Gardens or lawns}
- 2107/24 . . {Sports fields, e.g. golf courses}
- 2107/25 . {Aquatic environments}
- 2107/27 . . {Oceans}
- 2107/28 . . {Rivers}
- 2107/29 . . {Swimming pools}
- 2107/30 . Off-road
- 2107/34 . . {Battlefields}
- 2107/36 . . {Catastrophic areas}
- 2107/38 . {Extra-terrestrial environments, e.g. asteroids}
- 2107/40 . Indoor domestic environment
- 2107/50 . Confined spaces, e.g. tanks, pipelines, tunnels or containers
- 2107/60 . Open buildings, e.g. offices, hospitals, shopping areas or universities
- 2107/63 . . {Offices, universities or schools}
- 2107/65 . . {Hospitals}
- 2107/67 . . {Shopping areas}
- 2107/68 . {Research centers or laboratories}
- 2107/70 . Industrial sites, e.g. warehouses or factories
- 2107/73 . . {Mining}
- 2107/75 . . {Electric power generation plants}
- 2107/80 . Transportation hubs
- 2107/82 . . {Train or bus stations}
- 2107/84 . . {Harbours}
- 2107/85 . . {Airports}
- 2107/87 . {Recreational areas, e.g. amusement parks}
- 2107/90 . Building sites; Civil engineering
- 2107/95 . {Interior or surroundings of another vehicle}

## 2109/00 Types of controlled vehicles

### WARNING

Groups [G05D 2109/00](#) - [G05D 2109/50](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) – [G05D 1/12](#).

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

- 2109/10 . Land vehicles
- 2109/12 . . with legs
- 2109/13 . . {with only one or two wheels, e.g. motor bikes or inverted pendulums}
- 2109/135 . . {Spherical or cylindrical vehicles; Vehicles with spherical ground-engaging means}

- 2109/14 . . {moving on a grid}
- 2109/15 . . Climbing vehicles
- 2109/16 . . {Articulated vehicles, e.g. snake-like robots}
- 2109/18 . . Holonomic vehicles, e.g. with omni wheels
- 2109/20 . Aircraft, e.g. drones
- 2109/22 . . with fixed wings
- 2109/23 . . . {Vertical take-off and landing [VTOL] aircraft; Short take-off and landing [STOL, STOVL] aircraft}
- 2109/24 . . . . {Convertible aircraft, e.g. tiltrotor aircraft}
- 2109/25 . . Rotorcrafts
- 2109/254 . . . {Flying platforms, e.g. multicopters}
- 2109/26 . . {Lighter-than-air aircraft}
- 2109/265 . . {Ornithopters}
- 2109/27 . . {with flexible wings, e.g. paragliders, kites or hang gliders}
- 2109/28 . . Missiles
- 2109/285 . . {Projectiles}
- 2109/29 . . . {animated with rolling movements}
- 2109/30 . Water vehicles
- 2109/34 . . {operating on the water surface}
- 2109/36 . . . {wind powered, e.g. sailing boats}
- 2109/38 . . {operating under the water surface, e.g. submarines}
- 2109/40 . Space vehicles
- 2109/50 . Vehicles specially adapted for two or more of space, air, land or water environments, e.g. amphibious vehicles

## 2111/00 Details of signals used for control of position, course, altitude or attitude of land, water, air or space vehicles

### WARNING

Groups [G05D 2111/00](#) - [G05D 2111/67](#) are incomplete pending reclassification of documents from groups [G05D 1/00](#) – [G05D 1/12](#).

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

- 2111/10 . Optical signals
- 2111/14 . . {Non-visible signals, e.g. IR or UV signals}
- 2111/17 . . {Coherent light, e.g. laser signals}
- 2111/20 . Acoustic signals, e.g. ultrasonic signals
- 2111/30 . Radio signals
- 2111/32 . . {transmitted via communication networks, e.g. cellular networks or wireless local area networks [WLAN]}
- 2111/34 . . {generated by transmitters powered by energy received from an external transceiver, e.g. generated by passive radio-frequency identification [RFID] tags}
- 2111/36 . . {generated or reflected by cables or wires carrying current, e.g. boundary wires or leaky feeder cables}
- 2111/40 . Inductive-loop type signals
- 2111/50 . Internal signals, i.e. from sensors located in the vehicle, e.g. from compasses or angular sensors
- 2111/52 . . {generated by inertial navigation means, e.g. gyroscopes or accelerometers}
- 2111/54 . . {for measuring the travel distances, e.g. by counting the revolutions of wheels}

- 2111/56 . . {for sensing properties of the surrounding medium of the vehicle, e.g. using airspeed sensors}
- 2111/58 . . {for sensing the relative position of different elements of a vehicle, e.g. of a steering mechanism or of articulated trailers}
- 2111/60 . Combination of two or more signals
- 2111/63 . . of the same type, e.g. stereovision or optical flow
- 2111/64 . . . {taken simultaneously from spaced apart sensors, e.g. stereovision}
- 2111/65 . . . {taken successively, e.g. visual odometry or optical flow}
- 2111/67 . . Sensor fusion