

# International Patent Classification

2014.01

Section H

ELECTRICITY



World Intellectual Property Organization

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## SECTION H — ELECTRICITY

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## Section H

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## Note(s)

These Notes cover the basic principles and general instructions for use of section H.

- I. Section H covers:
  - a. basic electric elements, which cover all electric units and the general mechanical structure of apparatus and circuits, including the assembly of various basic elements into what are called printed circuits and also cover to a certain extent the manufacture of these elements (when not covered elsewhere);
  - b. generation of electricity, which covers the generation, conversion and distribution of electricity together with the controlling of the corresponding gear;
  - c. applied electricity, which covers:
    - i. general utilisation techniques, viz. those of electric heating and electric lighting circuits;
    - ii. some special utilisation techniques, either electric or electronic in the strict sense, which are not covered by other sections of the Classification, including:
      1. electric light sources, including lasers;
      2. electric X-ray technique;
      3. electric plasma technique and the generation and acceleration of electrically charged particles or neutrons;
  - d. basic electronic circuits and their control;
  - e. radio or electric communication technique;
  - f. the use of a specified material for the manufacture of the article or element described. In this connection, paragraphs 88 to 90 of the Guide should be referred to.
- II. In this section, the following general rules apply:
  - a. Subject to the exceptions stated in I(c), above, any electric aspect or part peculiar to a particular operation, process, apparatus, object or article, classified in one of the sections of the Classification other than section H, is always classified in the subclass for that operation, process, apparatus, object or article. Where common characteristics concerning technical subjects of similar nature have been brought out at class level, the electric aspect or part is classified, in conjunction with the operation, process, apparatus, object or article, in a subclass which covers entirely the general electrical applications for the technical subject in question;
  - b. The electrical applications referred to under (a), above, either general or particular, include:
    - i. the therapeutic processes and apparatus, in class A61;
    - ii. the electric processes and apparatus used in various laboratory or industrial operations, in classes B01 and B03 and in subclass B23K;
    - iii. the electricity supply, electric propulsion and electric lighting of vehicles in general and of particular vehicles, in the subsection "Transporting" of section B;
    - iv. the electric ignition systems of internal-combustion engines, in subclass F02P, and of combustion apparatus in general, in subclass F23Q;
    - v. the whole electrical part of section G, i.e. measuring devices including apparatus for measuring electric variables, checking, signalling and calculating. Electricity in that section is generally dealt with as a means and not as an end in itself;
  - c. All electrical applications, both general and particular, presuppose that the "basic electricity" aspect appears in section H (see I(a) above) as regards the electric "basic elements" which they comprise. This rule is also valid for applied electricity, referred to in I(c), above, which appears in section H itself.
- III. In this section, the following special cases occur:
  - a. Among the general applications covered by sections other than section H, it is worth noting that electric heating in general is covered by subclasses F24D or F24H or class F27, and that electric lighting in general is partly covered by class F21, since in section H (see I(c), above) there are places in H05B which cover the same technical subjects;
  - b. In the two cases referred to under (a), above, the subclasses of section F, which deal with the respective subjects, essentially cover in the first place the whole mechanical aspect of the apparatus or devices, whereas the electrical aspect, as such, is covered by subclass H05B;
  - c. In the case of lighting, this mechanical aspect should be taken to cover the material arrangement of the various electric elements, i.e., their geometrical or physical position in relation to one another; this aspect is covered by subclass F21V, the elements themselves and the primary circuits remaining in section H. The same applies to electric light sources, when combined with light sources of a different kind. These are covered by subclass H05B, whereas the physical arrangement which their combination constitutes is covered by the various subclasses of class F21;

- d. As regards heating, not only the electric elements and circuitry designs, as such, are covered by subclass H05B, but also the electric aspects of their arrangement, where these concern cases of general application; electric furnaces being considered as such. The physical disposition of the electric elements in furnaces is covered by section F. If a comparison is made with electric welding circuits, which are covered by subclass B23K in connection with welding, it can be seen that electric heating is not covered by the general rule stated in II, above.

## H01 BASIC ELECTRIC ELEMENTS

### Note(s)

- Processes involving only a single technical art, e.g. drying, coating, for which provision exists elsewhere are classified in the relevant class for that art.
- Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".

### **H01B CABLES; CONDUCTORS; INSULATORS; SELECTION OF MATERIALS FOR THEIR CONDUCTIVE, INSULATING OR DIELECTRIC PROPERTIES** (selection for magnetic properties H01F 1/00; waveguides H01P)

#### Subclass index

##### CONDUCTORS OR CABLES

Characterised by the material.....	1/00
Characterised by the construction.....	5/00, 7/00
Special types for: communication; power; superconductive cables.....	11/00, 9/00, 12/00
Manufacture; salvaging.....	13/00, 15/00

##### INSULATORS OR INSULATING BODIES

Characterised by the material.....	3/00
Characterised by the construction.....	17/00
Manufacture.....	19/00

**1/00 Conductors or conductive bodies characterised by the conductive materials; Selection of materials as conductors** (superconductive or hyperconductive conductors, cables or transmission lines characterised by the materials H01B 12/00) [4]

#### Note(s)

Groups H01B 1/14-H01B 1/24 take precedence over groups H01B 1/02-H01B 1/06.

- 1/02 • mainly consisting of metals or alloys
- 1/04 • mainly consisting of carbon-silicon compounds, carbon, or silicon
- 1/06 • mainly consisting of other non-metallic substances
- 1/08 • • oxides
- 1/10 • • sulfides
- 1/12 • • organic substances [3]
- 1/14 • Conductive material dispersed in non-conductive inorganic material [3]
- 1/16 • • the conductive material comprising metals or alloys [3]
- 1/18 • • the conductive material comprising carbon-silicon compounds, carbon, or silicon [3]
- 1/20 • Conductive material dispersed in non-conductive organic material [3]
- 1/22 • • the conductive material comprising metals or alloys [3]
- 1/24 • • the conductive material comprising carbon-silicon compounds, carbon, or silicon [3]

**3/00 Insulators or insulating bodies characterised by the insulating materials; Selection of materials for their insulating or dielectric properties**

- 3/02 • mainly consisting of inorganic substances

- 3/04 • • mica
- 3/06 • • asbestos
- 3/08 • • quartz; glass; glass wool; slag wool; vitreous enamels
- 3/10 • • metallic oxides (ceramics H01B 3/12)
- 3/12 • • ceramics
- 3/14 • • cements
- 3/16 • • gases
- 3/18 • mainly consisting of organic substances
- 3/20 • • liquids, e.g. oils (silicone oils H01B 3/46)
- 3/22 • • • hydrocarbons
- 3/24 • • • containing halogen in the molecules, e.g. halogenated oils
- 3/26 • • asphalts; bitumens; pitches
- 3/28 • • natural or synthetic rubbers
- 3/30 • • plastics; resins; waxes

#### Note(s) [2006.01]

Group H01B 3/47 takes precedence over groups H01B 3/32-H01B 3/46.

- 3/32 • • • natural resins
- 3/34 • • • waxes (silicone waxes H01B 3/46)
- 3/36 • • • condensation products of phenols with aldehydes or ketones
- 3/38 • • • condensation products of aldehydes with amines or amides
- 3/40 • • • epoxy resins
- 3/42 • • • polyesters; polyethers; polyacetals
- 3/44 • • • vinyl resins; acrylic resins (silicones H01B 3/46)
- 3/46 • • • silicones

## H01B

- 3/47 • • • fibre-reinforced plastics, e.g. glass-reinforced plastics [2006.01]
- 3/48 • • fibrous materials (fibre-reinforced plastics H01B 3/47) [1, 2006.01]
- 3/50 • • • fabric
- 3/52 • • • wood; paper; pressboard (insulating paper per se D21H 27/12)
- 3/54 • • • hard paper; hard fabrics
- 3/56 • • gases

### Note(s)

Group H01B 12/00 takes precedence over groups H01B 5/00-H01B 11/00.

### 5/00 Non-insulated conductors or conductive bodies characterised by their form

- 5/02 • Single bars, rods, wires or strips; Bus-bars [1, 7]
- 5/04 • • wound or coiled
- 5/06 • Single tubes
- 5/08 • Several wires or the like stranded in the form of a rope
- 5/10 • • stranded around a space, insulating material, or dissimilar conducting material
- 5/12 • Braided wires or the like
- 5/14 • comprising conductive layers or films on insulating-supports
- 5/16 • comprising conductive material in insulating or poorly conductive material, e.g. conductive rubber (H01B 1/14, H01B 1/20 take precedence; insulating bodies with conductive admixtures H01B 17/64; conductive paints C09D 5/24) [3]

### 7/00 Insulated conductors or cables characterised by their form

- 7/02 • Disposition of insulation
- 7/04 • Flexible cables, conductors, or cords, e.g. trailing cables
- 7/06 • Extensible conductors or cables, e.g. self-coiling cords
- 7/08 • Flat or ribbon cables
- 7/10 • Contact cables, i.e. having conductors which may be brought into contact by distortion of the cable
- 7/12 • Floating cables
- 7/14 • Submarine cables
- 7/16 • Rigid-tube cables
- 7/17 • Protection against damage caused by external factors, e.g. sheaths or armouring [7]
- 7/18 • • by wear, mechanical force or pressure [1, 7]
- 7/20 • • • Metal tubes, e.g. lead sheaths [1, 7]
- 7/22 • • • Metal wires or tapes, e.g. made of steel [1, 7]
- 7/24 • • • Devices affording localised protection against mechanical force or pressure [1, 7]
- 7/26 • • • Reduction of losses in sheaths or armouring [1, 7]
- 7/28 • • by moisture, corrosion, chemical attack or weather [1, 7]
- 7/282 • • • Preventing penetration of fluid into conductor or cable [7]
- 7/285 • • • • by completely or partially filling interstices in the cable [7]
- 7/288 • • • • using hygroscopic material or material swelling in the presence of liquid [7]
- 7/29 • • by extremes of temperature or by flame (H01B 7/42 takes precedence) [7]
- 7/295 • • • using material resistant to flame [7]

- 7/30 • with arrangements for reducing conductor losses when carrying ac, e.g. due to skin effect
- 7/32 • with arrangements for indicating defects, e.g. breaks or leaks
- 7/36 • with distinguishing or length marks
- 7/38 • with arrangements for facilitating removal of insulation [7]
- 7/40 • with arrangements for facilitating mounting or securing [7]
- 7/42 • with arrangements for heat dissipation or conduction [7]

### 9/00 Power cables

- 9/02 • with screens or conductive layers, e.g. for avoiding large potential gradients
- 9/04 • Concentric cables
- 9/06 • Gas-pressure cables; Oil-pressure cables; Cables for use in conduits under fluid pressure

### 11/00 Communication cables or conductors

- 11/02 • Cables with twisted pairs or quads
- 11/04 • • with pairs or quads mutually positioned to reduce cross-talk
- 11/06 • • with means for reducing effects of electromagnetic or electrostatic disturbances, e.g. screens
- 11/08 • • • Screens specially adapted for reducing cross-talk
- 11/10 • • • Screens specially adapted for reducing interference from external sources
- 11/12 • • Arrangements for exhibiting specific transmission characteristics
- 11/14 • • • Continuously inductively loaded cables, e.g. Krarup cables
- 11/16 • • • Cables, e.g. submarine cables, with coils or other devices incorporated during cable manufacture
- 11/18 • Coaxial cables; Analogous cables having more than one inner conductor within a common outer conductor
- 11/20 • • Cables having a multiplicity of coaxial lines [3]
- 11/22 • Cables including at least one electrical conductor together with optical fibres [4]

### 12/00 Superconductive or hyperconductive conductors, cables or transmission lines (superconductors characterised by the ceramic-forming technique or the ceramic composition C04B 35/00) [2, 4]

- 12/02 • characterised by their form [4]

### Note(s)

Group H01B 12/12 takes precedence over groups H01B 12/04-H01B 12/10.

- 12/04 • • Single wire [4]
- 12/06 • • Films or wires on bases or cores [4]
- 12/08 • • Stranded or braided wires [4]
- 12/10 • • Multi-filaments embedded in normal conductors [4]
- 12/12 • • Hollow conductors [4]
- 12/14 • characterised by the disposition of thermal insulation [4]
- 12/16 • characterised by cooling [4]

### 13/00 Apparatus or processes specially adapted for manufacturing conductors or cables

- 13/004 • for manufacturing rigid-tube cables [7]
- 13/008 • for manufacturing extensible conductors or cables [7]
- 13/012 • for manufacturing wire harnesses [7]

- 13/016 • for manufacturing co-axial cables (applying discontinuous insulation H01B 13/20) [7]
- 13/02 • Stranding-up
- 13/04 • • Mutually-positioning pairs or quads to reduce cross-talk
- 13/06 • Insulating conductors or cables (H01B 13/32 takes precedence) [4]
- 13/08 • • by winding
- 13/10 • • by longitudinal lapping
- 13/12 • • by applying loose fibres
- 13/14 • • by extrusion
- 13/16 • • by passing through, or dipping in, a liquid bath; by spraying
- 13/18 • • Applying discontinuous insulation, e.g. discs, beads
- 13/20 • • • for concentric or coaxial cables
- 13/22 • Sheathing; Armouring; Screening; Applying other protective layers (H01B 13/32 takes precedence) [4]
- 13/24 • • by extrusion
- 13/26 • • by winding, braiding or longitudinal lapping
- 13/28 • Applying continuous inductive loading, e.g. Krarup loading
- 13/30 • Drying; Impregnating (H01B 13/32 takes precedence) [4]
- 13/32 • Filling or coating with impervious material [4]
- 13/34 • for marking conductors or cables [7]
- 15/00 Apparatus or processes for salvaging material from cables** (insulated conductors or cables with arrangements for facilitating removal of insulation H01B 7/38; methods or apparatus specially adapted for removing insulation from conductors H02G 1/12)
- 17/00 Insulators or insulating bodies characterised by their form**
- 17/02 • Suspension insulators; Strain insulators
- 17/04 • • Chains; Multiple chains
- 17/06 • • Fastening of insulator to support, to conductor, or to adjoining insulator
- 17/08 • • • by cap-and-bolt
- 17/10 • • • by intermediate link
- 17/12 • • Special features of strain insulators
- 17/14 • Supporting insulators (pin insulators H01B 17/20; apertured insulators H01B 17/24)
- 17/16 • • Fastening of insulators to support, to conductor, or to adjoining insulator
- 17/18 • • for very heavy conductors, e.g. bus-bars, rails
- 17/20 • Pin insulators
- 17/22 • • Fastening of conductors to insulator
- 17/24 • Insulators apertured for fixing by nail, screw, wire, or bar, e.g. diabolito, bobbin
- 17/26 • Lead-in insulators; Lead-through insulators
- 17/28 • • Capacitor type
- 17/30 • • Sealing
- 17/32 • Single insulators consisting of two or more dissimilar insulating bodies
- 17/34 • Insulators containing liquid, e.g. oil
- 17/36 • Insulators having evacuated or gas-filled spaces
- 17/38 • Fittings, e.g. caps; Fastenings therefor
- 17/40 • • Cementless fittings
- 17/42 • Means for obtaining improved distribution of voltage (capacitor-type lead-through insulators H01B 17/28); Protection against arc discharges
- 17/44 • • Structural association of insulators with corona rings
- 17/46 • • Means for providing an external arc-discharge path
- 17/48 • • over chains or other serially-arranged insulators
- 17/50 • with surfaces specially treated for preserving insulating properties, e.g. for protection against moisture, dirt, or the like
- 17/52 • having cleaning devices (H01B 17/54 takes precedence)
- 17/54 • having heating or cooling devices
- 17/56 • Insulating bodies
- 17/58 • • Tubes, sleeves, beads or bobbins through which the conductor passes
- 17/60 • • Composite insulating bodies
- 17/62 • • Insulating-layers or insulating-films on metal bodies
- 17/64 • • with conductive admixtures inserts or layers
- 17/66 • • Joining insulating bodies together, e.g. by bonding
- 19/00 Apparatus or processes specially adapted for manufacturing insulators or insulating bodies**
- 19/02 • Drying; Impregnating
- 19/04 • Treating the surfaces, e.g. applying coatings

## H01C RESISTORS

### Note(s)

1. In this subclass, the following term is used with the meaning indicated:
  - "adjustable" means mechanically adjustable.
2. Variable resistors, the value of which is changed non-mechanically, e.g. by voltage or temperature, are classified in group H01C 7/00.

### Subclass index

NON-ADJUSTABLE RESISTORS.....	3/00, 7/00, 8/00, 11/00
ADJUSTABLE RESISTORS.....	10/00
OTHER RESISTORS.....	13/00
DETAILS.....	1/00
MANUFACTURE.....	17/00

#### 1/00 Details

- 1/01 • Mounting; Supporting [2]

- 1/012 • • the base extending along, and imparting rigidity or reinforcement to, the resistive element (H01C 1/016 takes precedence; the resistive

- element being formed in two or more coils or loops as a spiral, helical, or toroidal winding (H01C 3/18, H01C 3/20; the resistive element being formed as one or more layers or coatings on a base H01C 7/00) [2]
- 1/014 • • the resistor being suspended between, and being supported by, two supporting sections (H01C 1/016 takes precedence) [2]
- 1/016 • • with compensation for resistor expansion or contraction [2]
- 1/02 • Housing; Enclosing; Embedding; Filling the housing or enclosure [2]
- 1/022 • • the housing or enclosure being openable or separable from the resistive element [2]
- 1/024 • • the housing or enclosure being hermetically sealed (H01C 1/028, H01C 1/032, H01C 1/034 take precedence) [2]
- 1/026 • • • with gaseous or vacuum spacing between the resistive element and the housing or casing [2]
- 1/028 • • the resistive element being embedded in insulation with outer enclosing sheath [2]
- 1/03 • • • with powdered insulation [2]
- 1/032 • • plural layers surrounding the resistive element (H01C 1/028 takes precedence) [2]
- 1/034 • • the housing or enclosure being formed as coating or mould without outer sheath (H01C 1/032 takes precedence) [2]
- 1/036 • • • on wound resistive element [2]
- 1/04 • Arrangements of distinguishing marks, e.g. colour coding
- 1/06 • Electrostatic or electromagnetic shielding arrangements
- 1/08 • Cooling, heating, or ventilating arrangements
- 1/082 • • using forced fluid flow [2]
- 1/084 • • using self-cooling, e.g. fins, heat sinks [2]
- 1/12 • Arrangements of current collectors
- 1/125 • • of fluid contacts [2]
- 1/14 • Terminals or tapping points specially adapted for resistors; Arrangements of terminals or tapping points on resistors
- 1/142 • • the terminals or tapping points being coated on the resistive element [2]
- 1/144 • • the terminals or tapping points being welded or soldered [2]
- 1/146 • • the resistive element surrounding the terminal [2]
- 1/148 • • the terminals embracing or surrounding the resistive element (H01C 1/142 takes precedence) [2]
- 1/16 • Resistor networks not otherwise provided for
- 3/00 Non-adjustable metal resistors made of wire or ribbon, e.g. coiled, woven, or formed as grids**
- 3/02 • arranged or constructed for reducing self-induction, capacitance, or variation with frequency
- 3/04 • Iron-filament ballast resistors; Other resistors having variable temperature coefficient
- 3/06 • Flexible or folding resistors, whereby such a resistor can be looped or collapsed upon itself [2]
- 3/08 • Dimension or characteristic of resistive element changing gradually or in discrete steps from one terminal to another [2]
- 3/10 • the resistive element having zig-zag or sinusoidal configuration [2]
- 3/12 • • lying in one plane [2]
- 3/14 • the resistive element being formed in two or more coils or loops continuously wound as a spiral, helical, or toroidal winding (H01C 3/02-H01C 3/12 take precedence) [2]
- 3/16 • • including two or more distinct wound elements, or two or more winding patterns [2]
- 3/18 • • wound on a flat or ribbon base (H01C 3/16 takes precedence) [2]
- 3/20 • • wound on cylindrical or prismatic base (H01C 3/16 takes precedence) [2]
- 7/00 Non-adjustable resistors formed as one or more layers or coatings; Non-adjustable resistors made from powdered conducting material or powdered semi-conducting material with or without insulating material** (consisting of loose powdered or granular material H01C 8/00; resistors with a potential-jump barrier or surface barrier, e.g. field effect resistors, H01L 29/00; semiconductor devices sensitive to electromagnetic or corpuscular radiation, e.g. photoresistors, H01L 31/00; magnetic field controlled resistors H01L 43/08; bulk negative resistance effect devices H01L 47/00) [2]
- 7/02 • having positive temperature coefficient
- 7/04 • having negative temperature coefficient
- 7/06 • including means to minimise changes in resistance with changes in temperature
- 7/10 • voltage responsive, i.e. varistors [6]
- 7/102 • • Varistor boundary, e.g. surface layers (H01C 7/12 takes precedence) [6]
- 7/105 • • Varistor cores (H01C 7/12 takes precedence) [6]
- 7/108 • • • Metal oxide [6]
- 7/112 • • • • ZnO type [6]
- 7/115 • • • • Titanium dioxide- or titanate type [6]
- 7/118 • • • Carbide, e.g. SiC type [6]
- 7/12 • • Overvoltage protection resistors; Arresters [3]
- 7/13 • current-responsive [2]
- Note(s)**
- Groups H01C 7/02-H01C 7/13 take precedence over groups H01C 7/18-H01C 7/22.
- 7/18 • comprising a plurality of layers stacked between terminals [2]
- 7/20 • the resistive layer or coating being tapered [2]
- 7/22 • Elongated resistive element being bent or curved, e.g. sinusoidal, helical [2]
- 8/00 Non-adjustable resistors consisting of loose powdered or granular conducting, or powdered or granular semi-conducting material [2]**
- 8/02 • Coherers or like imperfect resistors for detecting electromagnetic waves [2]
- 8/04 • Overvoltage protection resistors; Arresters [2, 3]
- 10/00 Adjustable resistors [2]**
- 10/02 • Liquid resistors [2]
- 10/04 • with specified mathematical relationship between movement of resistor actuating means and value of resistance, other than direct proportional relationship [2]
- 10/06 • adjustable by short-circuiting different amounts of the resistive element [2]
- 10/08 • • with intervening conducting structure between the resistive element and the short-circuiting means, e.g. taps [2]
- 10/10 • adjustable by mechanical pressure or force [2]



- 10/12 • • by changing surface pressure between resistive masses or resistive and conductive masses, e.g. pile type [2]
- 10/14 • adjustable by auxiliary driving means [2]
- 10/16 • including plural resistive elements [2]
- 10/18 • • including coarse and fine resistive elements [2]
- 10/20 • • Contact structure or movable resistive elements being ganged [2]
- 10/22 • resistive-element dimensions changing gradually in one direction, e.g. tapered resistive element (H01C 10/04 takes precedence) [2]
- 10/23 • resistive-element dimensions changing in a series of discrete, progressive steps [2]
- 10/24 • the contact moving along turns of a helical resistive element, or *vice versa* [2]
- 10/26 • resistive element moving (H01C 10/16, H01C 10/24 take precedence) [2]
- Note(s)**  
Groups H01C 10/02-H01C 10/26 take precedence over groups H01C 10/28-H01C 10/50.
- 10/28 • the contact rocking or rolling along resistive element or taps [2]
- 10/30 • the contact sliding along resistive element [2]
- 10/32 • • the contact moving in an arcuate path [2]
- 10/34 • • • the contact or the associated conducting structure riding on collector formed as a ring or portion thereof [2]
- 10/36 • • • structurally combined with switching arrangements [2]
- 10/38 • • the contact moving along a straight path [2]
- 10/40 • • • screw-operated [2]
- 10/42 • • • • the contact bridging and sliding along resistive element and parallel conducting bar or collector [2]
- 10/44 • • • the contact bridging and sliding along resistive element and parallel conducting bar or collector (H01C 10/42 takes precedence) [2]
- 10/46 • Arrangements of fixed resistors with intervening connectors, e.g. taps (H01C 10/28, H01C 10/30 take precedence) [2]
- 10/48 • • including contact movable in an arcuate path [2]
- 10/50 • structurally combined with switching arrangement (H01C 10/36 takes precedence) [2]

**11/00 Non-adjustable liquid resistors [2]****13/00 Resistors not provided for elsewhere**

- 13/02 • Structural combinations of resistors [2]

**17/00 Apparatus or processes specially adapted for manufacturing resistors** (providing fillings for housings or enclosures H01C 1/02; reducing insulation surrounding a resistor to powder H01C 1/03; manufacture of thermally variable resistors H01C 7/02, H01C 7/04) [2]

- 17/02 • adapted for manufacturing resistors with envelope or housing (apparatus or processes for filling or compressing insulating material in heating element tubes H05B 3/52) [2]
- 17/04 • adapted for winding the resistive element [2]
- 17/06 • adapted for coating resistive material on a base [2]
- 17/065 • • by thick-film techniques, e.g. serigraphy [6]
- 17/07 • • by resistor foil bonding, e.g. cladding [6]
- 17/075 • • by thin-film techniques [6]
- 17/08 • • • by vapour deposition [2]
- 17/10 • • • by flame spraying [2]
- 17/12 • • • by sputtering [2]
- 17/14 • • • by chemical deposition [2]
- 17/16 • • • • using electric current [2]
- 17/18 • • • • without using electric current [2]
- 17/20 • • by pyrolytic processes [2]
- 17/22 • adapted for trimming [2]
- 17/23 • • by opening or closing resistor tracks of predetermined resistive values [6]
- 17/232 • • Adjusting the temperature coefficient; Adjusting value of resistance by adjusting temperature coefficient [6]
- 17/235 • • Initial adjustment of potentiometer parts for calibration [6]
- 17/24 • • by removing or adding resistive material (H01C 17/23, H01C 17/232, H01C 17/235 take precedence) [2, 6]
- 17/242 • • • by laser [6]
- 17/245 • • • by mechanical means, e.g. sand-blasting, cutting, ultrasonic treatment [6]
- 17/26 • • by converting resistive material [2]
- 17/28 • adapted for applying terminals [2]
- 17/30 • adapted for baking [2]

**H01F MAGNETS; INDUCTANCES; TRANSFORMERS; SELECTION OF MATERIALS FOR THEIR MAGNETIC PROPERTIES [2]****Subclass index****MAGNETS, ELECTROMAGNETS**

Characterised by the magnetic material.....	1/00
Cores, yokes, armatures.....	3/00
Coils.....	5/00
Superconducting coils or magnets.....	6/00
Magnets.....	7/00
Magnetising, demagnetising.....	13/00
Manufacture.....	41/00

**THIN FILMS.....10/00****FIXED INDUCTANCES OR TRANSFORMERS**

Of the signal type.....	17/00, 19/00
Other than of the signal type.....	30/00, 37/00
Manufacture.....	41/00

**VARIABLE INDUCTANCES OR TRANSFORMERS**

Of the signal type.....	21/00
Other than of the signal type.....	29/00

Manufacture.....	41/00
DETAILS OF TRANSFORMERS OR INDUCTANCES, IN GENERAL.....	27/00
SUPERCONDUCTIVE OR CRYOGENIC TRANSFORMERS.....	36/00
ADAPTATIONS OF TRANSFORMERS OR INDUCTANCES FOR SPECIFIC APPLICATIONS OR FUNCTIONS.....	38/00

## 1/00 Magnets or magnetic bodies characterised by the magnetic materials therefor; Selection of materials for their magnetic properties

### Note(s) [2010.01]

Attention is drawn to Note (3) after the title of section C, which Note indicates to which version of the periodic table of chemical elements the IPC refers. In this group, the Periodic System used is the 8 group system indicated by Roman numerals in the Periodic Table thereunder.

- 1/01 • of inorganic materials (H01F 1/44 takes precedence) [6]
- 1/03 • • characterised by their coercivity [6]

### Note(s)

Group H01F 1/40 takes precedence over H01F 1/03

- 1/032 • • • of hard-magnetic materials [6]
- 1/04 • • • • metals or alloys [6]
- 1/047 • • • • • Alloys characterised by their composition [5, 6]
- 1/053 • • • • • containing rare earth metals [5, 6]
- 1/055 • • • • • • and magnetic transition metals, e.g.  $\text{SmCo}_5$  [6]
- 1/057 • • • • • • • and IIIa elements, e.g.  $\text{Nd}_2\text{Fe}_{14}\text{B}$  [6]
- 1/058 • • • • • • • and IVa elements, e.g.  $\text{Gd}_2\text{Fe}_{14}\text{C}$  [6]
- 1/059 • • • • • • • and Va elements, e.g.  $\text{Sm}_2\text{Fe}_{17}\text{N}_2$  [6]
- 1/06 • • • • • in the form of particles, e.g. powder (H01F 1/047 takes precedence) [5, 6]
- 1/08 • • • • • • pressed, sintered, or bound together [6]
- 1/09 • • • • • mixtures of metallic and non-metallic particles; metallic particles having oxide skin [6]
- 1/10 • • • • • non-metallic substances, e.g. ferrites [6]
- 1/11 • • • • • in the form of particles [6]
- 1/113 • • • • • in a bonding agent [6]
- 1/117 • • • • • • Flexible bodies [6]
- 1/12 • • • of soft-magnetic materials [6]
- 1/14 • • • • metals or alloys [6]
- 1/147 • • • • • Alloys characterised by their composition [5, 6]
- 1/153 • • • • • • Amorphous metallic alloys, e.g. glassy metals [5, 6]
- 1/16 • • • • • in the form of sheets (H01F 1/147 takes precedence) [5, 6]
- 1/18 • • • • • • with insulating coating [6]
- 1/20 • • • • • in the form of particles, e.g. powder (H01F 1/147 takes precedence) [5, 6]
- 1/22 • • • • • • pressed, sintered, or bound together [6]
- 1/24 • • • • • • • the particles being insulated [6]
- 1/26 • • • • • • • • by macromolecular organic substances [6]
- 1/28 • • • • • • dispersed or suspended in a bonding agent [6]

- 1/33 • • • • mixtures of metallic and non-metallic particles; metallic particles having oxide skin [6]
- 1/34 • • • • • non-metallic substances, e.g. ferrites [6]
- 1/36 • • • • • in the form of particles [6]
- 1/37 • • • • • • in a bonding agent [6]
- 1/375 • • • • • • • Flexible bodies [6]
- 1/38 • • • • • amorphous, e.g. amorphous oxides [6]
- 1/40 • • of magnetic semiconductor materials, e.g.  $\text{CdCr}_2\text{S}_4$  [6]
- 1/42 • of organic or organo-metallic materials (H01F 1/44 takes precedence) [6]
- 1/44 • of magnetic liquids, e.g. ferrofluids [6]

## 3/00 Cores, yokes or armatures

- 3/02 • made from sheets
- 3/04 • made from strips or ribbons
- 3/06 • made from wires
- 3/08 • made from powder
- 3/10 • Composite arrangements of magnetic circuits
- 3/12 • • Magnetic shunt paths
- 3/14 • • Constrictions; Gaps, e.g. air-gaps (in magnetic shunt paths H01F 3/12)

## 5/00 Coils (superconducting coils H01F 6/06; fixed inductances of the signal type H01F 17/00)

- 5/02 • wound on non-magnetic supports, e.g. formers
- 5/04 • Arrangements of electric connections to coils, e.g. leads
- 5/06 • Insulation of windings

## 6/00 Superconducting magnets; Superconducting coils [6]

- 6/02 • Quenching; Protection arrangements during quenching [6]
- 6/04 • Cooling [6]
- 6/06 • Coils, e.g. winding, insulating, terminating or casing arrangements therefor [6]

## 7/00 Magnets (superconducting magnets H01F 6/00)

- 7/02 • Permanent magnets
- 7/04 • • Means for releasing the attractive force
- 7/06 • Electromagnets; Actuators including electromagnets [6]
- 7/08 • • with armatures
- 7/10 • • • specially adapted for ac
- 7/11 • • • • reducing or eliminating the effects of eddy currents [6]
- 7/12 • • • • having anti-chattering arrangements
- 7/121 • • • Guiding or setting position of armatures, e.g. retaining armatures in their end position [6]
- 7/122 • • • • by permanent magnet [6]
- 7/123 • • • • by ancillary coil [6]
- 7/124 • • • • by mechanical latch, e.g. detent [6]
- 7/126 • • • Supporting or mounting [6]
- 7/127 • • • Assembling [6]
- 7/128 • • • Encapsulating, encasing or sealing [6]
- 7/129 • • • • of armatures [6]
- 7/13 • • • characterised by pulling-force characteristic

- 7/14 • • • Pivoting armatures (H01F 7/17 takes precedence) [6]
- 7/16 • • • Rectilinearly-movable armatures (H01F 7/17 takes precedence) [6]
- 7/17 • • • Pivoting and rectilinearly-movable armatures [6]
- 7/18 • • • Circuit arrangements for obtaining desired operating characteristics, e.g. for slow operation, for sequential energisation of windings, for high-speed energisation of windings
- 7/20 • • without armatures
- 10/00 Thin magnetic films, e.g. of one-domain structure**
- 10/06 • characterised by the coupling or physical contact with connecting or interacting conductors
- 10/08 • characterised by magnetic layers (applying magnetic films to substrates H01F 41/14) [3]
- 10/10 • • characterised by the composition [3]
- 10/12 • • • being metals or alloys [3]
- 10/13 • • • Amorphous metallic alloys, e.g. glassy metals [7]
- 10/14 • • • • containing iron or nickel (H01F 10/13, H01F 10/16 take precedence) [3, 7]
- 10/16 • • • • containing cobalt (H01F 10/13 takes precedence) [3, 7]
- 10/18 • • • • being compounds [3]
- 10/187 • • • • Amorphous compounds [7]
- 10/193 • • • • Magnetic semiconductor compounds [7]
- 10/20 • • • • Ferrites [3]
- 10/22 • • • • • Orthoferrites [3]
- 10/24 • • • • • Garnets [3]
- 10/26 • characterised by the substrate or intermediate layers (H01F 10/32 takes precedence) [3, 7]
- 10/28 • • characterised by the composition of the substrate [3]
- 10/30 • • characterised by the composition of intermediate layers [3]
- 10/32 • Spin-exchange-coupled multilayers, e.g. nanostructured superlattices [7]
- 13/00 Apparatus or processes for magnetising or demagnetising**
- Note(s)**
- Groups H01F 17/00-H01F 38/00, with the exception of groups H01F 27/42 and H01F 38/32, cover only structural or constructional aspects of transformers, inductive reactors, chokes or the like. These groups do not cover circuit arrangement of such devices, which are covered by the appropriate functional places.
- 17/00 Fixed inductances of the signal type**
- 17/02 • without magnetic core
- 17/03 • • with ceramic former
- 17/04 • with magnetic core
- 17/06 • • with core substantially closed in itself, e.g. toroid
- 17/08 • • • Loading coils for telecommunication circuits
- 19/00 Fixed transformers or mutual inductances of the signal type (H01F 36/00 takes precedence) [3]**
- 19/02 • Audio-frequency transformers or mutual inductances, i.e. not suitable for handling frequencies considerably beyond the audio range
- 19/04 • Transformers or mutual inductances suitable for handling frequencies considerably beyond the audio range
- 19/06 • • Broad-band transformers, e.g. suitable for handling frequencies well down into the audio range
- 19/08 • • Transformers having magnetic bias, e.g. for handling pulses
- 21/00 Variable inductances or transformers of the signal type (H01F 36/00 takes precedence) [3]**
- 21/02 • continuously variable, e.g. variometers
- 21/04 • • by relative movement of turns or parts of windings
- 21/06 • • by movement of core or part of core relative to the windings as a whole
- 21/08 • • by varying the permeability of the core, e.g. by varying magnetic bias
- 21/10 • • by means of a movable shield
- 21/12 • discontinuously variable, e.g. tapped
- 27/00 Details of transformers or inductances, in general [6]**
- 27/02 • Casings
- 27/04 • • Leading of conductors or axles through casings, e.g. for tap-changing arrangements
- 27/06 • Mounting, supporting, or suspending transformers, reactors, or choke coils
- 27/08 • Cooling; Ventilating
- 27/10 • • Liquid cooling
- 27/12 • • • Oil cooling
- 27/14 • • • • Expansion chambers; Oil conservators; Gas cushions; Arrangements for purifying, drying, or filling
- 27/16 • • • Water cooling
- 27/18 • • • by evaporating liquids
- 27/20 • • Cooling by special gases or non-ambient air
- 27/22 • • Cooling by heat conduction through solid or powdered fillings
- 27/23 • Corrosion protection [6]
- 27/24 • Magnetic cores
- 27/245 • • made from sheets, e.g. grain-oriented (H01F 27/26 takes precedence) [5]
- 27/25 • • made from strips or ribbons (H01F 27/26 takes precedence) [5]
- 27/255 • • made from particles (H01F 27/26 takes precedence) [5]
- 27/26 • • Fastening parts of the core together; Fastening or mounting the core on casing or support
- 27/28 • Coils; Windings; Conductive connections
- 27/29 • • Terminals; Tapping arrangements [6]
- 27/30 • • Fastening or clamping coils, windings, or parts thereof together; Fastening or mounting coils or windings on core, casing, or other support
- 27/32 • • Insulating of coils, windings, or parts thereof
- 27/33 • Arrangements for noise damping
- 27/34 • Special means for preventing or reducing unwanted electric or magnetic effects, e.g. no-load losses, reactive currents, harmonics, oscillations, leakage fields
- 27/36 • • Electric or magnetic shields or screens (movable for varying inductance H01F 21/10) [6]
- 27/38 • • Auxiliary core members; Auxiliary coils or windings
- 27/40 • Structural association with built-in electric component, e.g. fuse
- 27/42 • Circuits specially adapted for the purpose of modifying, or compensating for, electric characteristics of transformers, reactors or choke coils [6]

## H01F

- 29/00 Variable transformers or inductances not covered by group H01F 21/00**
- 29/02 • with tapplings on coil or winding; with provision for rearrangement or interconnection of windings
  - 29/04 • • having provision for tap-changing without interrupting the load current
  - 29/06 • with current collector gliding or rolling on or along winding
  - 29/08 • with core, coil, winding, or shield movable to offset variation of voltage or phase shift, e.g. induction regulators
  - 29/10 • • having movable part of magnetic circuit
  - 29/12 • • having movable coil, winding, or part thereof; having movable shield
  - 29/14 • with variable magnetic bias
- 30/00 Fixed transformers not covered by group H01F 19/00 [6]**
- 30/02 • Auto-transformers [6]
  - 30/04 • having two or more secondary windings, each supplying a separate load, e.g. for radio set power supplies [6]
  - 30/06 • characterised by the structure [6]
  - 30/08 • • without magnetic core [6]
  - 30/10 • • Single-phase transformers (H01F 30/16 takes precedence) [6]
  - 30/12 • • Two-phase, three-phase or polyphase transformers [6]
  - 30/14 • • • for changing the number of phases [6]
  - 30/16 • • Toroidal transformers [6]
- 36/00 Transformers with superconductive windings or with windings operating at cryogenic temperatures [3]**
- 37/00 Fixed inductances not covered by group H01F 17/00 [6]**
- 38/00 Adaptations of transformers or inductances for specific applications or functions [6]**
- 38/02 • for non-linear operation [6]
  - 38/04 • • for frequency changing [6]
  - 38/06 • • for changing the wave shape [6]
  - 38/08 • High-leakage transformers or inductances [6]
  - 38/10 • • Ballasts, e.g. for discharge lamps [6]
  - 38/12 • Ignition, e.g. for IC engines [6]
  - 38/14 • Inductive couplings [6]
  - 38/16 • Cascade transformers, e.g. for use with extra high tension [6]

- 38/18 • Rotary transformers [6]
- 38/20 • Instrument transformers [6]
- 38/22 • • for single phase ac [6]
- 38/24 • • • Voltage transformers [6]
- 38/26 • • • • Constructions [6]
- 38/28 • • • • Current transformers [6]
- 38/30 • • • • Constructions [6]
- 38/32 • • • • Circuit arrangements [6]
- 38/34 • • • Combined voltage and current transformers [6]
- 38/36 • • • • Constructions [6]
- 38/38 • • for polyphase ac [6]
- 38/40 • • for dc [6]
- 38/42 • Flyback transformers [6]

### **41/00 Apparatus or processes specially adapted for manufacturing or assembling the devices covered by this subclass**

- 41/02 • for manufacturing cores, coils or magnets (H01F 41/14 takes precedence) [3]
- 41/04 • • for manufacturing coils
- 41/06 • • • Winding
- 41/08 • • • • Winding conductors on to or threading conductors through cores or formers which are closed in themselves, e.g. toroids
- 41/10 • • • Connecting leads to windings
- 41/12 • • • Insulating of windings
- 41/14 • for applying magnetic films to substrates [3]

#### **Note(s)**

Group H01F 41/30 takes precedence over groups H01F 41/16-H01F 41/24.

- 41/16 • • the magnetic material being applied in the form of particles, e.g. by serigraphy (H01F 41/18 takes precedence) [3, 7]
- 41/18 • • by cathode sputtering [3]
- 41/20 • • by evaporation [3]
- 41/22 • • Heat treatment; Thermal decomposition; Chemical vapour deposition [3]
- 41/24 • • from liquids [3]
- 41/26 • • • using electric currents [3]
- 41/28 • • • by liquid phase epitaxy [3]
- 41/30 • • for applying nanostructures, e.g. by molecular beam epitaxy (MBE) [7]
- 41/32 • for applying conductive, insulating or magnetic material on a magnetic film [7]
- 41/34 • • in patterns, e.g. by lithography [7]

## **H01G CAPACITORS; CAPACITORS, RECTIFIERS, DETECTORS, SWITCHING DEVICES, LIGHT-SENSITIVE OR TEMPERATURE-SENSITIVE DEVICES OF THE ELECTROLYTIC TYPE** (selection of specified materials as dielectric H01B 3/00; capacitors with potential-jump or surface barrier H01L 29/00)

### **Note(s) [2013.01]**

In this subclass, group H01G 11/00 takes precedence over groups H01G 4/00 and H01G 9/00.

### **Subclass index**

#### **CAPACITORS**

- With fixed capacitance.....4/00
- With variable capacitance: by mechanical means; by non-mechanical means.....5/00, 7/00
- Details.....2/00

#### **ELECTROLYTIC APPARATUS.....9/00**

#### **STRUCTURAL COMBINATIONS.....15/00, 17/00**

#### **MANUFACTURE.....4/00, 5/00, 7/00, 9/00, 13/00**

**2/00 Details of capacitors not covered by a single one of groups H01G 4/00-H01G 11/00 [6]**

- 2/02 • Mountings [6]
- 2/04 • • specially adapted for mounting on a chassis [6]
- 2/06 • • specially adapted for mounting on a printed-circuit support [6]
- 2/08 • Cooling arrangements; Heating arrangements; Ventilating arrangements [6]
- 2/10 • Housing; Encapsulation [6]
- 2/12 • Protection against corrosion (H01G 2/10 takes precedence) [6]
- 2/14 • Protection against electric or thermal overload (by cooling H01G 2/08) [6]
- 2/16 • • with fusing elements [6]
- 2/18 • • with breakable contacts [6]
- 2/20 • Arrangements for preventing discharge from edges of electrodes [6]
- 2/22 • Electrostatic or magnetic shielding [6]
- 2/24 • Distinguishing marks, e.g. colour coding [6]

**4/00 Fixed capacitors; Processes of their manufacture (electrolytic capacitors H01G 9/00) [2]**

- 4/002 • Details [6]
- 4/005 • • Electrodes [6]
- 4/008 • • • Selection of materials [6]
- 4/01 • • • Form of self-supporting electrodes [6]
- 4/012 • • • Form of non-self-supporting electrodes [6]
- 4/015 • • • Special provisions for self-healing [6]
- 4/018 • • • Dielectrics [6]
- 4/02 • • • Gas or vapour dielectrics [2, 6]
- 4/04 • • • Liquid dielectrics [2, 6]
- 4/06 • • • Solid dielectrics [2, 6]
- 4/08 • • • • Inorganic dielectrics [2, 6]
- 4/10 • • • • • Metal-oxide dielectrics [2, 6]
- 4/12 • • • • • Ceramic dielectrics [2, 6]
- 4/14 • • • • • Organic dielectrics [2, 6]
- 4/16 • • • • • of fibrous material, e.g. paper [2, 6]
- 4/18 • • • • • of synthetic material, e.g. derivatives of cellulose (H01G 4/16 takes precedence) [2, 6]
- 4/20 • • • using combinations of dielectrics from more than one of groups H01G 4/02-H01G 4/06 (H01G 4/12 takes precedence) [2, 6]
- 4/22 • • • • impregnated [2, 6]
- 4/224 • • • Housing; Encapsulation [6]
- 4/228 • • • Terminals [6]
- 4/232 • • • electrically connecting two or more layers of a stacked or rolled capacitor [6]
- 4/236 • • • leading through the housing, i.e. lead-through [6]
- 4/242 • • • the capacitive element surrounding the terminal [6]
- 4/245 • • • • Tabs between the layers of a rolled electrode [6]
- 4/248 • • • the terminals embracing or surrounding the capacitive element, e.g. caps (H01G 4/252 takes precedence) [6]
- 4/252 • • • the terminals being coated on the capacitive element (H01G 4/232 takes precedence) [6]
- 4/255 • • • Means for correcting the capacitance value [6]
- 4/258 • • • Temperature compensation means [6]
- 4/26 • Folded capacitors [2]

- 4/28 • Tubular capacitors [2]
- 4/30 • Stacked capacitors (H01G 4/33 takes precedence) [2, 6]
- 4/32 • Wound capacitors [2]
- 4/33 • Thin- or thick-film capacitors [6]
- 4/35 • Feed-through capacitors or anti-noise capacitors [6]
- 4/38 • Multiple capacitors, i.e. structural combinations of fixed capacitors [2]
- 4/40 • Structural combinations of fixed capacitors with other electric elements not covered by this subclass, the structure mainly consisting of a capacitor, e.g. RC combinations [2]

**5/00 Capacitors in which the capacitance is varied by mechanical means, e.g. by turning a shaft; Processes of their manufacture [2]**

- 5/01 • Details
- 5/011 • • Electrodes [6]
- 5/012 • • • at least one of the electrodes being a displaceable liquid or powder [6]
- 5/013 • • Dielectrics [6]
- 5/014 • • Housing; Encapsulation [6]
- 5/015 • • Current collectors
- 5/017 • • Temperature compensation [6]
- 5/019 • • Means for correcting the capacitance characteristics [6]
- 5/04 • using variation of effective area of electrode [6]
- 5/06 • • due to rotation of flat or substantially flat electrodes [6]
- 5/08 • • • becoming active in succession [6]
- 5/10 • • due to rotation of helical electrodes [6]
- 5/12 • • due to rotation of part-cylindrical, conical, or spherical electrodes [6]
- 5/14 • • due to longitudinal movement of electrodes [6]
- 5/16 • using variation of distance between electrodes [6]
- 5/18 • • due to change in inclination, e.g. by flexing, by spiral wrapping [6]
- 5/38 • Multiple capacitors, e.g. ganged
- 5/40 • Structural combinations of variable capacitors with other electric elements not covered by this subclass, the structure mainly consisting of a capacitor, e.g. RC combinations [6]

**7/00 Capacitors in which the capacitance is varied by non-mechanical means; Processes of their manufacture [2]**

- 7/02 • Electrets, i.e. having a permanently-polarised dielectric
- 7/04 • having a dielectric selected for the variation of its permittivity with applied temperature
- 7/06 • having a dielectric selected for the variation of its permittivity with applied voltage, i.e. ferroelectric capacitors (electrets H01G 7/02)

**9/00 Electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices; Processes of their manufacture [2]**

- 9/004 • Details [6]
- 9/008 • • Terminals [6]
- 9/012 • • • specially adapted for solid capacitors [6]
- 9/02 • • Diaphragms; Separators [6]
- 9/022 • • Electrolytes; Absorbents [6]
- 9/025 • • • Solid electrolytes (H01G 11/54 takes precedence) [6]

## H01G

- 9/028 • • • Organic semiconducting electrolytes, e.g. TCNQ [6]
- 9/032 • • • Inorganic semiconducting electrolytes, e.g. MnO<sub>2</sub> [6]
- 9/035 • • Liquid electrolytes, e.g. impregnating materials (H01G 11/54 takes precedence) [6]
- 9/04 • • Electrodes [6]
- 9/042 • • characterised by the material (H01G 11/22 takes precedence) [6]
- 9/045 • • • based on aluminium [6]
- 9/048 • • characterised by their structure (H01G 11/22 takes precedence) [6]
- 9/052 • • • Sintered electrodes [6]
- 9/055 • • • Etched foil electrodes [6]
- 9/06 • • Mounting in containers [6]
- 9/07 • • Dielectric layers [6]
- 9/08 • • Housing; Encapsulation [6]
- 9/10 • • Sealing, e.g. of lead-in wires [6]
- 9/12 • • Vents or other means allowing expansion [6]
- 9/14 • • Structural combinations for modifying, or compensating for, electric characteristics of electrolytic capacitors
- 9/145 • Liquid electrolytic capacitors (H01G 11/00 takes precedence) [6]
- 9/15 • Solid electrolytic capacitors (H01G 11/00 takes precedence) [6]
- 9/16 • specially adapted for use as rectifiers or detectors (H01G 9/22 takes precedence)
- 9/18 • Self-interrupters
- 9/20 • Light-sensitive devices
- 9/21 • Temperature-sensitive devices [6]
- 9/22 • Devices using combined reduction and oxidation, e.g. redox arrangement or solion [1, 2013.01]
- 9/26 • Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices with each other [6]
- 9/28 • Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices with other electric components not covered by this subclass [6]
- 11/00 Hybrid capacitors, i.e. capacitors having different positive and negative electrodes; Electric double-layer [EDL] capacitors; Processes for the manufacture thereof or of parts thereof [2013.01]**
- Note(s) [2013.01]**
- Group H01G 11/02 takes precedence over groups H01G 11/04-H01G 11/14.
- 11/02 • using combined reduction-oxidation reactions, e.g. redox arrangement or solion [2013.01]
- 11/04 • Hybrid capacitors [2013.01]
- 11/06 • • with one of the electrodes allowing ions to be reversibly doped therein, e.g. lithium-ion capacitors [LICs] [2013.01]
- 11/08 • Structural combinations, e.g. assembly or connection, of hybrid or EDL capacitors with other electric components, at least one hybrid or EDL capacitor being the main component [2013.01]
- 11/10 • Multiple hybrid or EDL capacitors, e.g. arrays or modules ( housings, cases, encapsulations or mountings thereof H01G 11/78) [2013.01]
- 11/12 • • Stacked hybrid or EDL capacitors [2013.01]
- 11/14 • Arrangements or processes for adjusting or protecting hybrid or EDL capacitors (emergency protective circuit arrangements specially adapted for capacitors, and effecting automatic switching in the event of an undesired change from normal working conditions H02H 7/16; emergency protective circuit arrangements for limiting excess current or voltages without disconnection H02H 9/00) [2013.01]
- 11/16 • • against electric overloads, e.g. including fuses [2013.01]
- 11/18 • • against thermal overloads, e.g. heating, cooling or ventilating [2013.01]
- 11/20 • • Reformation or processes for removal of impurities, e.g. scavenging [2013.01]
- 11/22 • Electrodes [2013.01]
- 11/24 • • characterised by structural features of the materials making up or comprised in the electrodes, e.g. form, surface area or porosity; characterised by the structural features of powders or particles used therefor [2013.01]
- 11/26 • • characterised by their structure, e.g. multi-layered, porosity or surface features [2013.01]
- 11/28 • • arranged or disposed on a current collector; Layers or phases between electrodes and current collectors, e.g. adhesives [2013.01]
- 11/30 • • characterised by their material [2013.01]
- 11/32 • • Carbon-based [2013.01]
- 11/34 • • • characterised by carbonisation or activation of carbon [2013.01]
- 11/36 • • • Nanostructures, e.g. nanofibres, nanotubes or fullerenes [2013.01]
- 11/38 • • • Carbon pastes or blends; Binders or additives therein [2013.01]
- 11/40 • • • Fibres [2013.01]
- 11/42 • • • Powders or particles, e.g. composition thereof [2013.01]
- 11/44 • • • Raw materials therefor, e.g. resins or coal [2013.01]
- 11/46 • • • Metal oxides [2013.01]
- 11/48 • • • Conductive polymers [2013.01]
- 11/50 • • specially adapted for lithium-ion capacitors, e.g. for lithium-doping or for intercalation [2013.01]
- 11/52 • Separators [2013.01]
- 11/54 • Electrolytes [2013.01]
- 11/56 • • Solid electrolytes, e.g. gels; Additives therein [2013.01]
- 11/58 • • Liquid electrolytes [2013.01]
- 11/60 • • characterised by the solvent [2013.01]
- 11/62 • • characterised by the solute, e.g. salts, anions or cations therein [2013.01]
- 11/64 • • characterised by additives [2013.01]
- 11/66 • Current collectors [2013.01]
- 11/68 • • characterised by their material [2013.01]
- 11/70 • • characterised by their structure [2013.01]
- 11/72 • • specially adapted for integration in multiple or stacked hybrid or EDL capacitors [2013.01]
- 11/74 • Terminals, e.g. extensions of current collectors [2013.01]
- 11/76 • • specially adapted for integration in multiple or stacked hybrid or EDL capacitors [2013.01]
- 11/78 • Cases; Housings; Encapsulations; Mountings [2013.01]
- 11/80 • • Gaskets; Sealings [2013.01]

11/82	<ul style="list-style-type: none"> <li>Fixing or assembling a capacitive element in a housing, e.g. mounting electrodes, current collectors or terminals in containers or encapsulations [2013.01]</li> </ul>	13/02	<ul style="list-style-type: none"> <li>Machines for winding capacitors [2]</li> </ul>
11/84	<ul style="list-style-type: none"> <li>Processes for the manufacture of hybrid or EDL capacitors, or components thereof [2013.01]</li> </ul>	13/04	<ul style="list-style-type: none"> <li>Drying; Impregnating [2]</li> </ul>
11/86	<ul style="list-style-type: none"> <li>specialised adapted for electrodes (carbonisation or activation of carbon for the manufacture of electrodes H01G 11/34) [2013.01]</li> </ul>	13/06	<ul style="list-style-type: none"> <li>with provision for removing metal surfaces [2]</li> </ul>
13/00	<b>Apparatus specially adapted for manufacturing capacitors; Processes specially adapted for manufacturing capacitors not provided for in groups H01G 4/00-H01G 11/00 [2, 2013.01]</b>	15/00	<b>Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with each other</b> (involving at least one hybrid or electric double-layer [EDL] capacitor as the main component H01G 11/08) [6, 2013.01]
		17/00	<b>Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with other electric elements, not covered by this subclass, e.g. RC combinations [6]</b>
<b>H01H</b>	<b>ELECTRIC SWITCHES; RELAYS; SELECTORS; EMERGENCY PROTECTIVE DEVICES</b> (contact cables H01B 7/10; electrolytic self-interrupters H01G 9/18; emergency protective circuit arrangements H02H; switching by electronic means without contact-making H03K 17/00)		

**Note(s)**

- This subclass covers (in groups H01H 69/00-H01H 87/00) devices for the protection of electric lines or electric machines or apparatus in the event of undesired change from normal electric working conditions, the electrical condition serving directly as the input to the device.
- This subclass does not cover bases, casings, or covers accommodating two or more switching devices or for accommodating a switching device as well as another electric component, e.g. bus-bar, line connector. Those bases, casings or covers are covered by group H02B 1/26.
- In this subclass, the following terms or expressions are used with the meanings indicated:
  - "relay" means a switching device having contacts which are operated from electric inputs which supply, directly or indirectly, all the mechanical energy necessary to cause both the closure and the opening of the contacts;
  - "driving mechanism" refers to the means by which an operating force applied to the switch is transmitted to the moving contact or contacts;
  - "operating" is used in a broader sense than "actuating" which is reserved for those parts not touched by hand to effect switching;
  - "acting" or "action" means a self-induced movements of parts at one stage of the switching. These connotations apply to all parts of the verbs "to operate"; "to actuate", and "to act", and to words derived therefrom, e.g. to "actuation".
- In this subclass, details are classified as follows:
  - details of an unspecified type of switching device, or disclosed as applicable to two or more kinds of switching devices designated by the terms or expressions "switches", "relays", "selector switches", and "emergency protective devices", are classified in groups H01H 1/00-H01H 9/00;
  - details of an unspecified type of switch, or disclosed as applicable to two or more types of switches as defined by groups H01H 13/00-H01H 43/00 and subgroups H01H 35/02, H01H 35/06, H01H 35/14, H01H 35/18, H01H 35/24, and H01H 35/42, all hereinafter called basic types, are classified in groups H01H 1/00-H01H 9/00;
  - details of an unspecified type of relay, or disclosed as applicable to two or more types of relays as defined by groups H01H 51/00-H01H 61/00, hereinafter called basic types, are classified in group H01H 45/00;
  - details of an unspecified protective device, or applicable to two or more types of protective devices as defined by groups H01H 73/00-H01H 83/00, hereinafter called basic types, are classified in group H01H 71/00.
  - However, details only described with reference to, or clearly only applicable to, switching devices of a single basic type, are classified in the group appropriate to switching devices of that basic type, e.g. H01H 19/02, H01H 75/04;
  - mechanical structural details of control members of switches or of keyboards such as keys, push-buttons, levers or other mechanisms for transferring the force to the activated elements are classified in this subclass, even when they are used for controlling electronic switches.

However, mechanical details directly producing electronic effects are classified in group H03K 17/94.

**Subclass index****ELECTRIC SWITCHES**

Characterised by the principle of control

mechanical

rectilinearly movable: one direction; two directions.....	13/00, 15/00
with angular displacement: unlimited angle; limited angle.....	19/00, 21/00
by pulling; by tumbling.....	17/00, 23/00
with compound movements.....	25/00
by removable members.....	27/00

physical

general; electric or magnetic field; heat; explosion.....	35/00, 36/00, 37/00, 39/00
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Characterised by the contacts

liquid.....	29/00
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## H01H

Characterised by the voltage or the intensity	
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Manufacture.....	65/00
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Mechanisms	
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Other details.....	9/00

### Electric switches

#### 1/00 Contacts (liquid contacts H01H 29/04)

- 1/02 • characterised by the material thereof
- 1/021 • • Composite material [2006.01]

#### Note(s) [2006.01]

1. In this group, the following expression is used with the meaning indicated:
    - "composite material" is a material made of two or more different materials, e.g. coated material, layered materials or carbon fibres in a copper base or matrix.
  2. Subject matter classifiable in more than one of groups H01H 1/023-H01H 1/029 should be classified in all relevant groups.
- 1/023 • • • having a noble metal as the basic material [2006.01]
  - 1/0233 • • • • and containing carbides [2006.01]
  - 1/0237 • • • • and containing oxides [2006.01]
  - 1/025 • • • having copper as the basic material [2006.01]
  - 1/027 • • • containing carbon particles or fibres [2006.01]
  - 1/029 • • • comprising conducting material dispersed in an elastic support or binding material [2006.01]
  - 1/04 • • Co-operating contacts of different material
  - 1/06 • characterised by the shape or structure of the contact-making surface, e.g. grooved
  - 1/08 • • wetted with mercury
  - 1/10 • • Laminated contacts with divided contact surface

- 1/12 • characterised by the manner in which co-operating contacts engage
- 1/14 • • by abutting
- 1/16 • • • by rolling; by wrapping; Roller or ball contacts
- 1/18 • • • with subsequent sliding
- 1/20 • • • Bridging contacts
- 1/22 • • • with rigid pivoted member carrying the moving contact
- 1/24 • • • with resilient mounting
- 1/26 • • • • with spring blade support
- 1/28 • • • • Assembly of three or more contact-supporting spring blades
- 1/30 • • • • within supporting guides
- 1/32 • • • Self-aligning contacts
- 1/34 • • • with provision for adjusting position of contact relative to its co-operating contact
- 1/36 • • by sliding
- 1/38 • • • Plug-and-socket contacts
- 1/40 • • • Contact mounted so that its contact-making surface is flush with adjoining insulation
- 1/42 • • • Knife-and-clip contacts
- 1/44 • • • with resilient mounting
- 1/46 • • • self-aligning contacts
- 1/48 • • • with provision for adjusting position of contact relative to its co-operating contact
- 1/50 • Means for increasing contact pressure, preventing vibration of contacts, holding contacts together after engagement, or biasing contacts to the open position
- 1/52 • • Contacts adapted to act as latches



- 1/54 • • by magnetic force
- 1/56 • Contact arrangements for providing make-before-break operation, e.g. for on-load tap-changing
- 1/58 • Electric connections to or between contacts; Terminals
- 1/60 • Auxiliary means structurally associated with the switch for cleaning or lubricating contact-making surfaces (cleaning by normal sliding of contacts H01H 1/18, H01H 1/36)
- 1/62 • Heating or cooling of contacts
- 1/64 • Protective enclosures, baffle plates, or screens for contacts
- 1/66 • • Contacts sealed in an evacuated or gas-filled envelope, e.g. magnetic dry-reed contacts
- 3/00 Mechanisms for operating contacts** (thermal actuating or release means H01H 37/02)
- 3/02 • Operating parts, i.e. for operating driving mechanism by a mechanical force external to the switch
- 3/04 • • Levers (tumblers H01H 23/14)
- 3/06 • • • Means for securing to shaft of driving mechanism
- 3/08 • • Turn knobs
- 3/10 • • • Means for securing to shaft of driving mechanism
- 3/12 • • Push-buttons
- 3/14 • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 3/16 • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. for a door switch, a limit switch, a floor-levelling switch of a lift
- 3/18 • • • the movement in one direction being intentionally by hand, e.g. for setting automatically cancelled trafficators
- 3/20 • • wherein an auxiliary movement thereof, or of an attachment thereto, is necessary before the main movement is possible or effective, e.g. for unlatching, for coupling
- 3/22 • Power arrangements internal to the switch for operating the driving mechanism
- 3/24 • • using pneumatic or hydraulic actuator
- 3/26 • • using dynamo-electric motor (for storing energy in a spring motor H01H 3/30)
- 3/28 • • using electromagnet (for storing energy in a spring motor H01H 3/30; for operating relays H01H 45/00)
- 3/30 • • using spring motor
- 3/32 • Driving mechanisms, i.e. for transmitting driving force to the contacts (snap-action arrangements H01H 5/00; introducing a predetermined time delay H01H 7/00)
- 3/34 • • using ratchet
- 3/36 • • using belt, chain, or cord
- 3/38 • • using spring or other flexible shaft coupling
- 3/40 • • using friction, toothed, or screw-and-nut gearing
- 3/42 • • using cam or eccentric
- 3/44 • • using Geneva movement
- 3/46 • • using rod or lever linkage, e.g. toggle
- 3/48 • • using lost-motion device
- 3/50 • • with indexing or locating means, e.g. indexing by ball and spring
- 3/52 • • with means to ensure stopping at intermediate operative positions
- 3/54 • Mechanisms for coupling or uncoupling operating parts, driving mechanisms, or contacts
- 3/56 • • using electromagnetic clutch
- 3/58 • • using friction, toothed, or other mechanical clutch
- 3/60 • Mechanical arrangements for preventing or damping vibration or shock
- 3/62 • Lubricating means structurally associated with the switch (for lubricating contact-making surfaces H01H 1/60)
- 5/00 Snap-action arrangements, i.e. in which during a single opening operation or a single closing operation energy is first stored and then released to produce or assist the contact movement**
- 5/02 • Energy stored by the attraction or repulsion of magnetic parts
- 5/04 • Energy stored by deformation of elastic members (by deformation of bimetallic element in thermally-actuated switches H01H 37/54)
- 5/06 • • by compression or extension of coil springs
- 5/08 • • • one end of spring transmitting movement to the contact member when the other end is moved by the operating part
- 5/10 • • • one end of spring being fixedly connected to the stationary or movable part of the switch, and the other end reacting with a movable or stationary rigid member respectively through pins, cams, toothed, or other shaped surfaces
- 5/12 • • • having two or more snap-action motions in succession
- 5/14 • • by twisting of torsion members
- 5/16 • • • with auxiliary means for temporarily holding parts until torsion member is sufficiently strained
- 5/18 • • by flexing of blade springs
- 5/20 • • • single blade moved across dead-centre position
- 5/22 • • • blade spring with at least one snap-acting leg and at least one separate contact-carrying or contact-actuating leg
- 5/24 • • • • having three legs
- 5/26 • • • having two or more snap-action motions in succession
- 5/28 • • • two separate blade springs forming a toggle
- 5/30 • • by buckling of disc springs
- 7/00 Devices for introducing a predetermined time delay between the initiation of the switching operation and the opening or closing of the contacts** (time or time-programme switches H01H 43/00)
- 7/02 • with fluid timing means
- 7/03 • • with dash-pots
- 7/04 • • with flies, i.e. fan governors
- 7/06 • with thermal timing means
- 7/08 • with timing by mechanical speed-control devices
- 7/10 • • by escapement
- 7/12 • • • mechanical
- 7/14 • • • electromagnetic
- 7/16 • Devices for ensuring operation of the switch at a predetermined point in the ac cycle (circuit arrangements H01H 9/56)
- 9/00 Details of switching devices, not covered by groups H01H 1/00-H01H 7/00**
- 9/02 • Bases, casings, or covers (accommodating more than one switch or a switch and another electrical component H02B 1/26)

## H01H

- 9/04 • • Dustproof, splashproof, drip-proof, waterproof, or flameproof casings
- 9/06 • • Casing of switch constituted by a handle serving a purpose other than the actuation of the switch, e.g. by the handle of a vacuum cleaner
- 9/08 • Arrangements to facilitate replacement of switch, e.g. cartridge housing
- 9/10 • Adaptation for built-in fuses (mounting switch and fuse separately on, or in, common support H02B 1/18)
- 9/12 • Means for earthing parts of switch not normally conductively connected to the contacts
- 9/14 • Adaptation for built-in safety spark gaps
- 9/16 • Indicators for switching condition, e.g. "on" or "off"
- 9/18 • Distinguishing marks on switches, e.g. for indicating switch location in the dark; Adaptation of switches to receive distinguishing marks
- 9/20 • Interlocking, locking, or latching mechanisms
- 9/22 • • for interlocking between casing, cover, or protective shutter and mechanism for operating contacts
- 9/24 • • for interlocking two or more parts of the mechanism for operating contacts
- 9/26 • • for interlocking two or more switches (by a detachable member H01H 9/28)
- 9/28 • • for locking switch parts by a key or equivalent removable member (switches operated by a key H01H 27/00; locking by removable part of two-part coupling device H01R)
- 9/30 • Means for extinguishing or preventing arc between current-carrying parts
- 9/32 • • Insulating body insertable between contacts
- 9/34 • • Stationary parts for restricting or subdividing the arc, e.g. barrier plate
- 9/36 • • • Metal parts
- 9/38 • • Auxiliary contacts on to which the arc is transferred from the main contacts (using arcing-horns H01H 9/46)
- 9/40 • • Multiple main contacts for the purpose of dividing the current through, or potential drop along, the arc
- 9/42 • • Impedances connected with contacts
- 9/44 • • using blow-out magnet
- 9/46 • • using arcing horns (using blow-out magnet H01H 9/44)
- 9/48 • Means for preventing discharge to non-current-carrying parts, e.g. using corona ring
- 9/50 • Means for detecting the presence of an arc or discharge
- 9/52 • Cooling of switch parts (cooling of contacts H01H 1/62)
- 9/54 • Circuit arrangements not adapted to a particular application of the switching device and for which no provision exists elsewhere
- 9/56 • • for ensuring operation of the switch at a predetermined point in the ac cycle
- 11/00 Apparatus or processes specially adapted for the manufacture of electric switches** (processes specially adapted for manufacture of rectilinearly movable switches having a plurality of operating members associated with different sets of contacts, e.g. keyboards, H01H 13/88) **[1, 2006.01]**
- 11/02 • for mercury switches
- 11/04 • of switch contacts
- 11/06 • • Fixing of contacts to carrier

- 13/00 Switches having rectilinearly-movable operating part or parts adapted for pushing or pulling in one direction only, e.g. push-button switch** (wherein the operating part is flexible H01H 17/00)
- 13/02 • Details **[1, 2006.01]**
- 13/04 • • Cases; Covers
- 13/06 • • • Dustproof, splashproof, drip-proof, waterproof, or flameproof casings
- 13/08 • • • Casing of switch constituted by a handle serving a purpose other than the actuation of the switch
- 13/10 • • Bases; Stationary contacts mounted thereon
- 13/12 • • Movable parts; Contacts mounted thereon
- 13/14 • • • Operating parts, e.g. push-button
- 13/16 • • • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 13/18 • • • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift
- 13/20 • • • Driving mechanisms
- 13/22 • • • • acting with snap action (depending upon deformation of elastic members H01H 13/26)
- 13/24 • • • • with means for introducing a predetermined time delay
- 13/26 • • Snap-action arrangements depending upon deformation of elastic members
- 13/28 • • • using compression or extension of coil springs
- 13/30 • • • • one end of spring transmitting movement to the contact member when the other end is moved by the operating part
- 13/32 • • • • one end of spring being fixedly connected to the stationary or movable part of the switch and the other end reacting with a movable or stationary rigid member respectively through pins, cams, toothed, or other shaped surfaces
- 13/34 • • • • having two or more snap-action motions in succession
- 13/36 • • • using flexing of blade springs
- 13/38 • • • • Single blade moved across dead-centre position
- 13/40 • • • • Blade spring with at least one snap-acting leg and at least one separate contact-carrying or contact-actuating leg
- 13/42 • • • • • having three legs
- 13/44 • • • • • having two or more snap-action motions in succession
- 13/46 • • • • two separate blade springs forming a toggle
- 13/48 • • • using buckling of disc springs
- 13/50 • having a single operating member
- 13/52 • • the contact returning to its original state immediately upon removal of operating force, e.g. bell push switch
- 13/54 • • the contact returning to its original state a predetermined time interval after removal of operating force, e.g. for staircase lighting
- 13/56 • • the contact returning to its original state upon the next application of operating force
- 13/58 • • • with contact-driving member rotated step-wise in one direction
- 13/60 • • • with contact-driving member moved alternately in opposite directions

- 13/62 • • the contact returning to its original state upon manual release of a latch (latch released by second push-button H01H 13/68)
- 13/64 • • wherein the switch has more than two electrically distinguishable positions, e.g. multi-position push-button switches
- 13/66 • • • the operating member having only two positions
- 13/68 • having two operating members, one for opening and one for closing the same set of contacts (single operating member protruding from different sides of switch casing for alternate pushing upon opposite ends H01H 15/22)
- 13/70 • having a plurality of operating members associated with different sets of contacts, e.g. keyboard (mounting together a plurality of independent switches H02B)
- 13/702 • • with contacts carried by or formed from layers in a multilayer structure, e.g. membrane switches [7]
- 13/703 • • • characterised by spacers between contact carrying layers [2006.01]
- 13/704 • • • characterised by the layers, e.g. by their material or structure (H01H 13/703 takes precedence) [2006.01]
- 13/705 • • • characterised by construction, mounting or arrangement of operating parts, e.g. push-buttons or keys [7]
- 13/7057 • • • • characterised by the arrangement of operating parts in relation to each other, e.g. pre-assembled groups of keys [2006.01]
- 13/7065 • • • • characterised by the mechanism between keys and layered keyboards [2006.01]
- 13/7073 • • • • • characterised by springs, e.g. Euler springs [2006.01]
- 13/708 • • • in which all fixed and movable contacts are carried by insulating members (H01H 13/705 takes precedence) [7]
- 13/712 • • • • all of the insulating members being substantially flat [7]
- 13/715 • • • in which each contact set includes a contact which is not secured to or part of a supporting layer, e.g. a snap dome (H01H 13/705 takes precedence) [7]
- 13/718 • • • in which some or all of the movable contacts are formed in a single conductive plate, e.g. formed by punching sheet metal (H01H 13/705 takes precedence) [7]
- 13/72 • • wherein the switch has means for limiting the number of operating members that can concurrently be in the actuated position
- 13/74 • • • each contact set returning to its original state only upon actuation of another of the operating members
- 13/76 • • wherein some or all of the operating members actuate different combinations of the contact sets, e.g. ten operating members actuating different combinations of four contact sets
- 13/78 • • characterised by the contacts or the contact sites [2006.01]
- 13/785 • • • characterised by the material of the contacts, e.g. conductive polymers [2006.01]
- 13/79 • • • characterised by the form of the contacts, e.g. interspersed fingers or helical networks [2006.01]
- 13/80 • • • characterised by the manner of cooperation of the contacts, e.g. with both contacts movable or with bounceless contacts [2006.01]
- 13/803 • • • characterised by the switching function thereof, e.g. normally closed contacts or consecutive operation of contacts [2006.01]
- 13/807 • • • characterised by the spatial arrangement of the contact sites, e.g. superimposed sites [2006.01]
- 13/81 • • characterised by electrical connections to external devices [2006.01]
- 13/82 • • characterised by contact space venting means [2006.01]
- 13/83 • • characterised by legends, e.g. Braille, liquid crystal displays, light emitting or optical elements [2006.01]
- 13/84 • • characterised by ergonomic functions, e.g. for miniature keyboards; characterised by operational sensory functions, e.g. sound feedback (legends H01H 13/83) [2006.01]
- 13/85 • • • characterised by tactile feedback features [2006.01]
- 13/86 • • characterised by the casing, e.g. sealed casings or casings reducible in size [2006.01]
- 13/88 • • Processes specially adapted for manufacture of rectilinearly movable switches having a plurality of operating members associated with different sets of contacts, e.g. keyboards [2006.01]
- 15/00 Switches having rectilinearly-movable operating part or parts adapted for actuation in opposite directions, e.g. slide switch**
- 15/02 • Details
- 15/04 • • Stationary parts; Contacts mounted thereon
- 15/06 • • Movable parts; Contacts mounted thereon
- 15/08 • • • Contact arrangements for providing make-before-break operation, e.g. for on-load tap-changing
- 15/10 • • • Operating parts
- 15/12 • • • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 15/14 • • • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift
- 15/16 • • • Driving mechanisms
- 15/18 • • • • acting with snap action
- 15/20 • • • • with means for introducing a predetermined time delay
- 15/22 • having a single operating part protruding from different sides of switch casing for alternate actuation from opposite ends
- 15/24 • having a single operating part only protruding from one side of the switch casing for alternate pushing and pulling
- 17/00 Switches having flexible operating part adapted only for pulling, e.g. cord, chain**
- 17/02 • Details
- 17/04 • • Stationary parts (guides H01H 17/14)
- 17/06 • • Movable parts (guides H01H 17/14)
- 17/08 • • • Operating part, e.g. cord
- 17/10 • • • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 17/12 • • • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift

## H01H

- 17/14 • • Guiding means for flexible operating part
- 17/16 • having a single flexible operating part adapted for pulling at one end only
- 17/18 • • secured to a part of the switch driving mechanism that has only angular movement
- 17/20 • • • the contact returning to its original state immediately upon removal of operating force
- 17/22 • • • the contact returning to its original state upon the next application of operating force
- 17/24 • • secured to a part of the switch driving mechanism that has both angular and rectilinear motion
- 17/26 • having two flexible operating parts; having a single operating part adapted for pulling at both ends
- 17/28 • • secured to a part or parts of the switch driving mechanism having only rectilinear motion
- 17/30 • • secured to a part or parts of the switch driving mechanism having only angular motion
  
- 19/00 Switches operated by an operating part which is rotatable about a longitudinal axis thereof and which is acted upon directly by a solid body external to the switch, e.g. by a hand [1, 2006.01]**
- 19/02 • Details
- 19/03 • • Means for limiting the angle of rotation of the operating part **[2006.01]**
- 19/04 • • Cases; Covers
- 19/06 • • • Dustproof, splashproof, drip-proof, waterproof, or flameproof casings
- 19/08 • • Bases; Stationary contacts mounted thereon
- 19/10 • • Movable parts; Contacts mounted thereon
- 19/11 • • • with indexing means **[2006.01]**
- 19/12 • • • Contact arrangements for providing make-before-break operation, e.g. for on-load tap-changing
- 19/14 • • • Operating parts, e.g. turn knob
- 19/16 • • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 19/18 • • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift
- 19/20 • • • Driving mechanisms allowing angular displacement of the operating part to be effective in either direction
- 19/22 • • • • incorporating lost motion
- 19/24 • • • • acting with snap action
- 19/26 • • • • with means for introducing a predetermined time delay
- 19/28 • • • Driving mechanisms allowing angular displacement of the operating part to be effective or possible in only one direction
- 19/30 • • • • incorporating lost motion
- 19/32 • • • • acting with snap action
- 19/34 • • • • with means for introducing a predetermined time delay
- 19/36 • the operating part having only two operative positions, e.g. relatively displaced by 180°
- 19/38 • • Change-over switches
- 19/40 • • • having only axial contact pressure
- 19/42 • • providing more than two electrically-different conditions, e.g. for closing either or both of two circuits
- 19/44 • • • having only axial contact pressure
- 19/46 • the operating part having three operative positions, e.g. off/star/delta
  
- 19/48 • • having only axial contact pressure
- 19/50 • the operating part having four operative positions, e.g. off/two-in-series/one-only/two-in-parallel
- 19/52 • • having only axial contact pressure
- 19/54 • the operating part having at least five or an unspecified number of operative positions
- 19/56 • • Angularly-movable actuating part carrying contacts, e.g. drum switch
- 19/58 • • • having only axial contact pressure, e.g. disc switch, wafer switch
- 19/60 • • Angularly-movable actuating part carrying no contacts
- 19/62 • • • Contacts actuated by radial cams
- 19/63 • • • Contacts actuated by axial cams **[2]**
- 19/635 • • • Contacts actuated by rectilinearly-movable member linked to operating part, e.g. by pin and slot **[2006.01]**
- 19/64 • Encased switches adapted for ganged operation when assembled in a line with identical switches, e.g. stacked switches
  
- 21/00 Switches operated by an operating part in the form of a pivotable member acted upon directly by a solid body, e.g. by a hand (tumbler or rocker switches H01H 23/00; switches having an operating part movable angularly in more than one plane H01H 25/04) [1, 2006.01]**
- 21/02 • Details
- 21/04 • • Cases; Covers
- 21/06 • • • interlocked with operating mechanism
- 21/08 • • • Dustproof, splashproof, drip-proof, waterproof, or flameproof casings
- 21/10 • • • Casing of switch constituted by a handle serving a purpose other than the actuation of the switch
- 21/12 • • Bases; Stationary contacts mounted thereon
- 21/14 • • Means for increasing contact pressure
- 21/16 • • Adaptation for built-in fuse
- 21/18 • • Movable parts; Contacts mounted thereon
- 21/20 • • • Contact arrangements for providing make-before-break operation, e.g. for on-load tap-changing
- 21/22 • • • Operating parts, e.g. handle
- 21/24 • • • • biased to return to original position upon removal of operating force
- 21/26 • • • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 21/28 • • • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift
- 21/30 • • • • not biased to return to original position upon removal of operating force
- 21/32 • • • • adapted for operation by a part of the human body other than the hand, e.g. by foot
- 21/34 • • • • adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift

21/36	• • •	Driving mechanisms	27/00	<b>Switches operated by a removable member, e.g. key, plug or plate; Switches operated by setting members according to a single predetermined combination out of several possible settings</b> (combined with plug-and-socket connectors H01R 13/70; with current-carrying plug H01R 31/08)
21/38	• • • •	incorporating lost motion	27/04	• Insulating plug or plate inserted between normally-closed contacts
21/40	• • • •	having snap action	27/06	• Key inserted and then turned to effect operation of the switch
21/42	• • • • •	produced by compression or extension of coil spring	27/08	• • wherein the key cannot be removed until the switch is returned to its original position
21/44	• • • • •	produced by flexing blade springs	27/10	• Switch operated by setting members according to a single predetermined combination out of several possible settings
21/46	• • • • •	with two or more snap-action motions in succession		
21/48	• • • •	incorporating a ratchet mechanism		
21/50	• • • •	with indexing or latching means, e.g. indexing by ball and spring; with means to ensure stopping at intermediate operative positions		
21/52	• • • •	with means for introducing a predetermined time delay		
21/54	•	Lever switches with blade-type contact co-operating with one or two spring-clip contacts, e.g. knife switch, sectionalisers	29/00	<b>Switches having at least one liquid contact</b> (solid contacts wetted or soaked with mercury H01H 1/08)
21/56	• •	making contact in one position only	29/02	• Details
21/58	• •	Change-over switches without stable intermediate position	29/04	• • Contacts; Containers for liquid contacts
21/60	• •	Change-over switches with stable intermediate position	29/06	• • • Liquid contacts characterised by the material thereof
21/86	•	Switches with abutting contact carried by operating part, e.g. telegraph tapping key	29/08	• • Means for introducing a predetermined time delay
21/88	• •	with intermediate position of rest	29/10	• • • by constricting the flow of the contact liquid
23/00		<b>Tumbler or rocker switches, i.e. switches characterised by being operated by rocking an operating member in the form of a rocker button</b>	29/12	• • Operating mechanisms adapted for operation by a part of the human body other than the hand, e.g. by foot
		<b>Note(s) [2006.01]</b>	29/14	• • Operating mechanisms adapted for actuation at a limit or other predetermined position in the path of a body, the relative movement of switch and body being primarily for a purpose other than the actuation of the switch, e.g. door switch, limit switch, floor-levelling switch of a lift
		In this group, the term "rocking" is defined as pivotal motion in one plane about an axis parallel to the switch faceplate and located substantially centrally between the ends of the rocker button.	29/16	• operated by dipping solid contact into stationary contact liquid
23/02	•	Details	29/18	• with level of surface of contact liquid displaced by non-electrical contact-making plunger
23/04	• •	Cases; Covers	29/20	• operated by tilting contact-liquid container
23/06	• • •	Dustproof, splashproof, drip-proof, waterproof, or flameproof casings	29/22	• • wherein contact is made and broken between liquid and solid
23/08	• •	Bases; Stationary contacts mounted thereon	29/24	• • wherein contact is made and broken between liquid and liquid
23/10	• •	Adaptation for built-in fuse	29/26	• with level of surface of contact liquid displaced by centrifugal action
23/12	• •	Movable parts; Contacts mounted thereon	29/28	• with level of surface of contact liquid displaced by fluid pressure
23/14	• • •	Tumblers	29/30	• with level of surface of contact liquid displaced by expansion or evaporation thereof
23/16	• • •	Driving mechanisms	29/32	• with contact made by a liquid jet, e.g. earthing switch with contact made by jet of water
23/18	• • • •	incorporating lost motion		
23/20	• • • •	having snap action		
23/22	• • • •	with means for introducing a predetermined time delay		
23/24	•	with two operating positions		
23/26	• •	one of which positions is unstable		
23/28	•	with three operating positions		
23/30	• •	with stable centre position and one or both end positions unstable	31/00	<b>Air-break switches for high tension without arc-extinguishing or arc-preventing means</b> (in combination with high tension or heavy-current switches with arc-extinguishing or arc-preventing means H01H 33/00) [3]
25/00		<b>Switches with compound movement of handle or other operating part</b>	31/02	• Details
25/04	•	Operating part movable angularly in more than one plane, e.g. joystick	31/04	• • Interlocking mechanisms
25/06	•	Operating part movable both angularly and rectilinearly, the rectilinear movement being along the axis of angular movement	31/06	• • • for interlocking between casing, cover, or protective shutter and mechanism for operating contacts
			31/08	• • • for interlocking two or more parts of the mechanism for operating contacts
			31/10	• • • for interlocking two or more switches
			31/12	• • Adaptation for built-in fuse
			31/14	• with bridging contact that is not electrically connected to either line contact in open position of switch

## H01H

- 31/16 • • with angularly-movable bridging contact or contact-carrying member
- 31/18 • • • actuated through the movement of one or more insulators
- 31/20 • • • • at least one insulator being rotatable about its own geometrical axis
- 31/22 • • • wherein the contact or contacts are rectilinearly movable with respect to the carrying member
- 31/24 • • with rectilinearly-movable bridging contact
- 31/26 • with movable contact that remains electrically connected to one line in open position of switch
- 31/28 • • with angularly-movable contact
- 31/30 • • • actuated-through the movement of one or more insulators
- 31/32 • • with rectilinearly-movable contact
- 31/34 • with movable contact adapted to engage an overhead transmission line, e.g. for branching
- 31/36 • • Contact moved by pantograph
- 33/00 High-tension or heavy-current switches with arc-extinguishing or arc-preventing means**
- 33/02 • Details
- 33/04 • • Means for extinguishing or preventing arc between current-carrying parts
- 33/06 • • • Insulating body insertable between contacts
- 33/08 • • • Stationary parts for restricting or subdividing the arc, e.g. barrier plate
- 33/10 • • • • Metal parts
- 33/12 • • • Auxiliary contacts on to which the arc is transferred from the main contacts (using arcing horns H01H 33/20)
- 33/14 • • • Multiple main contacts for the purpose of dividing the current through, or potential drop along, the arc
- 33/16 • • • Impedances connected with contacts
- 33/18 • • • using blow-out magnet
- 33/20 • • • using arcing horns (using blow-out magnet H01H 33/18)
- 33/22 • • • Selection of fluids for arc-extinguishing
- 33/24 • • Means for preventing discharge to non-current-carrying parts, e.g. using corona ring
- 33/26 • • Means for detecting the presence of an arc or other discharge
- 33/28 • • Power arrangements internal to the switch for operating the driving mechanism
- 33/30 • • • using fluid actuator
- 33/32 • • • • pneumatic
- 33/34 • • • • hydraulic
- 33/36 • • • using dynamo-electric motor
- 33/38 • • • using electromagnet
- 33/40 • • • using spring motor
- 33/42 • • Driving mechanisms
- 33/44 • • Devices for ensuring operation of the switch at a predetermined point in the ac cycle (circuit arrangements H01H 33/59)
- 33/46 • • Interlocking mechanisms
- 33/48 • • • for interlocking between casing or cover and mechanism for operating contacts
- 33/50 • • • for interlocking two or more parts of the mechanism for operating contacts
- 33/52 • • • for interlocking two or more switches
- 33/53 • • Cases (for switchgear H02B 1/26); Reservoirs, tanks, piping or valves, for arc-extinguishing fluid; Accessories therefor, e.g. safety arrangements, pressure relief devices **[3]**
- 33/55 • • • Oil reservoirs or tanks; Lowering means therefor (associated with withdrawal mechanism for isolation of switch H02B 11/08)
- 33/56 • • • Gas reservoirs
- 33/57 • • • Recuperation of liquid or gas
- 33/575 • • • Pressure relief devices for normal or emergency use **[3]**
- 33/58 • • • Silencers for suppressing noise of switch operation **[3]**
- 33/59 • • Circuit arrangements not adapted to a particular application of the switch and not otherwise provided for, e.g. for ensuring operation of the switch at a predetermined point in the ac cycle
- 33/60 • Switches wherein the means for extinguishing or preventing the arc do not include separate means for obtaining or increasing flow of arc-extinguishing fluid
- 33/64 • • wherein the break is in gas (vacuum switches H01H 33/66)
- 33/65 • • • wherein the break is in air at atmospheric pressure, e.g. in open air **[2009.01]**
- 33/66 • • Vacuum switches
- 33/662 • • • Housings or protective screens **[7]**
- 33/664 • • • Contacts; Arc-extinguishing means, e.g. arcing rings **[7]**
- 33/666 • • • Operating arrangements **[7]**
- 33/668 • • • Means for obtaining or monitoring the vacuum **[7]**
- 33/68 • • Liquid-break switches, e.g. oil-break
- 33/70 • Switches with separate means for directing, obtaining, or increasing flow of arc-extinguishing fluid
- 33/72 • • having stationary parts for directing the flow of arc-extinguishing fluid, e.g. arc-extinguishing chamber
- 33/73 • • • wherein the break is in air at atmospheric pressure, e.g. in open air
- 33/74 • • • wherein the break is in gas (in air at atmospheric pressure H01H 33/73)
- 33/75 • • • Liquid-break switches, e.g. oil-break
- 33/76 • • wherein arc-extinguishing gas is evolved from stationary parts; Selection of material therefor
- 33/77 • • • wherein the break is in air at atmospheric pressure
- 33/78 • • • wherein the break is in gas (in air at atmospheric pressure H01H 33/77)
- 33/80 • • flow of arc-extinguishing fluid from a pressure source being controlled by a valve
- 33/82 • • • the fluid being air or gas
- 33/825 • • • • with closed circuit of air or gas (H01H 33/835 takes precedence) **[3]**
- 33/83 • • • • wherein the contacts are opened by the flow of air or gas
- 33/835 • • • • • with closed circuit of air or gas **[3]**
- 33/84 • • • the fluid being liquid, e.g. oil
- 33/85 • • • • wherein the contacts are opened by the flow of liquid
- 33/86 • • the flow of arc-extinguishing fluid under pressure from the contact space being controlled by a valve
- 33/867 • • • the fluid being air or gas **[3]**
- 33/873 • • • • with closed circuit of air or gas **[3]**
- 33/88 • • the flow of arc-extinguishing fluid being produced or increased by movement of pistons or other pressure-producing parts

33/90	• • • this movement being effected by, or in conjunction with, the contact-operating mechanism	36/00	<b>Switches actuated by change of magnetic field or of electric field, e.g. by change of relative position of magnet and switch, by shielding</b>
33/91	• • • • the arc-extinguishing fluid being air or gas	36/02	• actuated by movement of a float carrying a magnet
33/915	• • • • • with closed circuit of air or gas [3]	37/00	<b>Thermally-actuated switches</b>
33/92	• • • • the arc-extinguishing fluid being liquid, e.g. oil	37/02	• Details
33/94	• • • this movement being effected solely due to the pressure caused by the arc itself or by an auxiliary arc	37/04	• • Bases; Housings; Mountings
33/95	• • • • the arc-extinguishing fluid being air or gas	37/06	• • • to facilitate replacement, e.g. cartridge housing
33/96	• • • • the arc-extinguishing fluid being liquid, e.g. oil	37/08	• • Indicators; Distinguishing marks
33/98	• • the flow of arc-extinguishing fluid being initiated by an auxiliary arc or a section of the arc, without any moving parts for producing or increasing the flow	37/10	• • Compensation for variation of ambient temperature or pressure
33/985	• • • the fluid being air or gas [3]	37/12	• • Means for adjustment of "on" or "off" operating temperature
33/99	• • • the fluid being liquid [3]	37/14	• • • by anticipatory electric heater
35/00	<b>Switches operated by change of a physical condition</b> (operated by change of magnetic or electric field H01H 36/00; thermally-actuated switches H01H 37/00)	37/16	• • • by varying the proportion of input heat received by the thermal element, e.g. by displacement of a shield
	<b>Note(s)</b> A switching device is classified according to that physical condition which when changed acts as input to the device, e.g. external explosion causing pressure wave to act upon switch is classified in group H01H 35/24, an explosion produced within the switch in group H01H 37/00 if initiated by heat, in group H01H 39/00 if initiated electrically, and in group H01H 35/14 if initiated by an external blow.	37/18	• • • by varying bias on the thermal element due to a separate spring
35/02	• Switches operated by change of position, inclination, or orientation of the switch itself in relation to gravitational field (tilting mercury container H01H 29/20; change of position due to change of liquid level H01H 35/18)	37/20	• • • by varying the position of the thermal element in relation to switch base or casing
35/06	• Switches operated by change of speed (operated by change of fluid flow H01H 35/24)	37/22	• • • by adjustment of a member transmitting motion from the thermal element to contacts or latch
35/10	• • Centrifugal switches (level of mercury displaced by centrifugal action H01H 29/26)	37/24	• • • by adjustment of position of the movable contact on its driving member
35/12	• • operated by reversal of direction of movement	37/26	• • • by adjustment of abutment for "off" position of the movable contact
35/14	• Switches operated by change of acceleration, e.g. by shock or vibration, inertia switch	37/28	• • • by adjustment of the position of the fixed contact
35/18	• Switches operated by change of liquid level or of liquid density, e.g. float switch (by magnet carried on a float H01H 36/02)	37/30	• • • by varying the position of the contact unit in relation to switch base or casing
35/24	• Switches operated by change of fluid pressure, by fluid pressure waves, or by change of fluid flow (wherein the change of pressure is caused by change of temperature H01H 37/36)	37/32	• • Thermally-sensitive members
35/26	• • Details	37/34	• • • Means for transmitting heat thereto, e.g. capsule remote from contact member
35/28	• • • Compensation for variation of ambient pressure or temperature	37/36	• • • actuated due to expansion or contraction of a fluid with or without vaporisation (the fluid forming a contact of the switch H01H 29/04, H01H 29/30)
35/30	• • • Means for transmitting pressure to pressure-responsive operating part, e.g. by capsule and capillary tube	37/38	• • • • with bellows
35/32	• • actuated by bellows	37/40	• • • • with diaphragm
35/34	• • actuated by diaphragm	37/42	• • • • with curled flexible tube, e.g. Bourdon tube
35/36	• • actuated by curled flexible tube, e.g. Bourdon tube	37/44	• • • • with piston and cylinder
35/38	• • actuated by piston and cylinder	37/46	• • • actuated due to expansion or contraction of a solid (deflection of a bimetallic element H01H 37/52)
35/40	• • actuated by devices allowing continual flow of fluid, e.g. vane	37/48	• • • • with extensible rigid rods or tubes
35/42	• Switches operated by change of humidity	37/50	• • • • with extensible wires under tension
		37/52	• • • actuated due to deflection of bimetallic element
		37/54	• • • • wherein the bimetallic element is inherently snap acting
		37/56	• • • • having spirally wound or helically wound bimetallic element
		37/58	• • • actuated due to thermally controlled change of magnetic permeability
		37/60	• • Means for producing snap action (inherent in bimetallic element H01H 37/54; caused by a magnet H01H 37/66)
		37/62	• • Means other than thermal means for introducing a predetermined time delay
		37/64	• • Contacts
		37/66	• • • Magnetic reinforcement of contact pressure; Magnet causing snap action
		37/68	• • • sealed in evacuated or gas-filled tube
		37/70	• • • Resetting means

## H01H

- 37/72 • Switches in which the opening movement and the closing movement of a contact are effected respectively by heating and cooling or *vice versa*
- 37/74 • Switches in which only the opening movement or only the closing movement of a contact is effected by heating or cooling
- 37/76 • • Contact member actuated by melting of fusible material, actuated due to burning of combustible material or due to explosion of explosive material
- 39/00 Switching devices actuated by an explosion produced within the device and initiated by an electric current**
- 41/00 Switches providing a selected number of consecutive operations of the contacts by a single manual actuation of the operating part**
- 41/04 • Switches without means for setting or mechanically storing a multidigit number
- 41/06 • • dial or slide operated
- 41/08 • • keyboard operated
- 41/10 • Switches with means for setting or mechanically storing a multidigit number
- 41/12 • • dial or slide operated
- 41/14 • • keyboard operated
- 43/00 Time or time-programme switches providing a choice of time-intervals for executing one or more switching actions and automatically terminating their operation after the programme is completed**
- 43/02 • Details
- 43/04 • • Means for time setting
- 43/06 • • • comprising separately adjustable parts for each programme step, e.g. with tappets
- 43/08 • • • comprising an interchangeable programme part which is common for all programme steps, e.g. with a punched card
- 43/10 • with timing of actuation of contacts due to a part rotating at substantially constant speed
- 43/12 • • stopping automatically after a single cycle of operation
- 43/14 • • • wherein repetition of operation necessitates resetting of time intervals
- 43/16 • • stopping automatically after a predetermined plurality of cycles of operation
- 43/24 • with timing of actuation of contacts due to a non-rotatably moving part
- 43/26 • • the actuation being produced by a substance flowing due to gravity, e.g. sand, water
- 43/28 • • the actuation being produced by a part, the speed of which is controlled by fluid-pressure means, e.g. by piston and cylinder
- 43/30 • with timing of actuation of contacts due to thermal action
- 43/32 • with timing of actuation of contacts due to electrolytic processes; with timing of actuation of contacts due to chemical processes

## Relays

- 45/00 Details of relays** (electric circuit arrangements H01H 47/00; of electromagnetic relays H01H 50/00; details of electrically-operated selector switches H01H 63/00)
- 45/02 • Bases; Casings; Covers (frames for mounting two or more relays or for mounting a relay and another electric component H02B 1/01, H04Q 1/08, H05K)

- 45/04 • • Mounting complete relay or separate parts of relay on a base or inside a case
- 45/06 • • having windows; Transparent cases or covers
- 45/08 • Indicators; Distinguishing marks
- 45/10 • Electromagnetic or electrostatic shielding (casings H01H 45/02)
- 45/12 • Ventilating; Cooling; Heating (for operating electrothermal relays H01H 61/013)
- 45/14 • Terminal arrangements
- 47/00 Circuit arrangements not adapted to a particular application of the relay and designed to obtain desired operating characteristics or to provide energising current**
- 47/02 • for modifying the operation of the relay
- 47/04 • • for holding armature in attracted position, e.g. when initial energising circuit is interrupted; for maintaining armature in attracted position, e.g. with reduced energising current
- 47/06 • • • by changing number of serially-connected turns or winding
- 47/08 • • • by changing number of parallel-connected turns or windings
- 47/10 • • • by switching-in or -out impedance external to the relay winding
- 47/12 • • for biasing the electromagnet
- 47/14 • • for differential operation of the relay
- 47/16 • • for conjoint, e.g. additive, operation of the relay
- 47/18 • • for introducing delay in the operation of the relay (short-circuited conducting sleeves, bands, or discs H01H 50/46)
- 47/20 • • for producing frequency-selective operation of the relay
- 47/22 • for supplying energising current for relay coil
- 47/24 • • having light-sensitive input
- 47/26 • • having thermo-sensitive input
- 47/28 • • Energising current supplied by discharge tube
- 47/30 • • • by gas-filled discharge tube
- 47/32 • • Energising current supplied by semiconductor device
- 47/34 • • Energising current supplied by magnetic amplifier
- 47/36 • • Relay coil or coils forming part of a bridge circuit

## 49/00 Apparatus or processes specially adapted to the manufacture of relays or parts thereof

- 50/00 Details of electromagnetic relays** (electric circuit arrangements H01H 47/00; details of electrically-operated selector switches H01H 63/00)
- 50/02 • Bases; Casings; Covers (frames for mounting two or more relays or for mounting a relay and another electric component H02B 1/01, H04Q 1/08, H05K)
- 50/04 • • Mounting complete relay or separate parts of relay on a base or inside a case
- 50/06 • • having windows; Transparent cases or covers
- 50/08 • Indicators; Distinguishing marks
- 50/10 • Electromagnetic or electrostatic shielding (casings H01H 50/02)
- 50/12 • Ventilating; Cooling; Heating (for operating electrothermal relays H01H 61/013)
- 50/14 • Terminal arrangements
- 50/16 • Magnetic circuit arrangements
- 50/18 • • Movable parts of magnetic circuits, e.g. armature
- 50/20 • • • movable inside coil and substantially lengthwise with respect to axis thereof; movable coaxially with respect to coil



- 50/22 • • • wherein the magnetic circuit is substantially closed
- 50/24 • • • Parts rotatable or rockable outside coil
- 50/26 • • • Parts movable about a knife edge
- 50/28 • • • Parts movable due to bending of a blade spring or reed
- 50/30 • • • Mechanical arrangements for preventing or damping vibration or shock, e.g. by balancing of armature
- 50/32 • • • Latching movable parts mechanically
- 50/34 • • • Means for adjusting limits of movement; Mechanical means for adjusting returning force
- 50/36 • • Stationary parts of magnetic circuit, e.g. yoke
- 50/38 • • • Part of main magnetic circuit shaped to suppress arcing between the contacts of the relay
- 50/40 • • • Branched or multiple-limb main magnetic circuits
- 50/42 • • • Auxiliary magnetic circuits, e.g. for maintaining armature in, or returning armature to, position of rest, for damping or accelerating movement
- 50/44 • Magnetic coils or windings
- 50/46 • • Short-circuited conducting sleeves, bands, or discs
- 50/54 • Contact arrangements
- 50/56 • • Contact spring sets
- 50/58 • • • Driving arrangements structurally associated therewith; Mounting of driving arrangement on armature
- 50/60 • • moving contact being rigidly combined with movable part of magnetic circuit
- 50/62 • • Co-operating movable contacts operated by separate electrical actuating means
- 50/64 • Driving arrangements between movable part of magnetic circuit and contact (structurally associated with contact spring sets H01H 50/58)
- 50/66 • • with lost motion
- 50/68 • • with snap action
- 50/70 • • operating contact momentarily during stroke of armature
- 50/72 • • for mercury contact
- 50/74 • • Mechanical means for producing a desired natural frequency of operation of the contacts, e.g. for self-interrupter
- 50/76 • • • using reed or blade spring
- 50/78 • • • using diaphragm; using stretched wire or ribbon vibrating sideways
- 50/80 • • • using torsionally vibrating member, e.g. wire, strip
- 50/82 • • • using spring-loaded pivoted inertia member
- 50/84 • • • with means for adjustment of frequency or of make-to-break ratio
- 50/86 • Means for introducing a predetermined time delay between the initiation of the switching operation and the opening or closing of the contacts (circuit arrangements for introducing delay H01H 47/18; short-circuited conducting sleeves, bands, or discs H01H 50/46)
- 50/88 • • Mechanical means, e.g. dash-pot
- 50/90 • • • the delay being effective in both directions of operation
- 50/92 • • Thermal means (inherent in electrothermal relays H01H 61/00)
- 51/00 Electromagnetic relays (relays using the dynamo-electric effect H01H 53/00)**
- 51/01 • Relays in which the armature is maintained in one position by a permanent magnet and freed by energisation of a coil producing an opposing magnetic field [3]
- 51/02 • Non-polarised relays (H01H 51/01 takes precedence) [3]
- 51/04 • • with single armature; with single set of ganged armatures
- 51/06 • • • Armature is movable between two limit positions of rest and is moved in one direction due to energisation of an electromagnet and after the electromagnet is de-energised is returned by energy stored during the movement in the first direction, e.g. by using a spring, by using a permanent magnet, by gravity
- 51/08 • • • • Contacts alternately opened and closed by successive cycles of energisation and de-energisation of the electromagnet, e.g. by use of a ratchet
- 51/10 • • • • Contacts retained open or closed by a mechanical latch which is controlled by an electromagnet
- 51/12 • • • Armature is movable between two limit positions of rest and is moved in both directions due to the energisation of one or the other of two electromagnets without the storage of energy to effect the return movement
- 51/14 • • • • without intermediate neutral position of rest
- 51/16 • • • • with intermediate neutral position of rest
- 51/18 • • • Armature is rotatable through an unlimited number of revolutions
- 51/20 • • with two or more independent armatures
- 51/22 • Polarised relays
- 51/24 • • without intermediate neutral position of rest
- 51/26 • • with intermediate neutral position of rest
- 51/27 • Relays with armature having two stable magnetic states and operated by change from one state to the other
- 51/28 • Relays having both armature and contacts within a sealed casing outside which the operating coil is located, e.g. contact carried by a magnetic leaf spring or reed (H01H 51/27 takes precedence)
- 51/29 • Relays having armature, contacts, and operating coil within a sealed casing (H01H 51/27 takes precedence)
- 51/30 • specially adapted for actuation by ac
- 51/32 • • Frequency relays; Mechanically-tuned relays
- 51/34 • Self-interrupters, i.e. with periodic or other repetitive opening and closing of contacts
- 51/36 • • wherein the make-to-break ratio is varied by hand setting or current strength
- 53/00 Relays using the dynamo-electric effect, i.e. relays in which contacts are opened or closed due to relative movement of current-carrying conductor and magnetic field caused by force of interaction between them**
- 53/01 • Details
- 53/015 • • Moving coils; Contact-driving arrangements associated therewith
- 53/02 • Electrodynamic relays, i.e. relays in which the interaction is between two current-carrying conductors
- 53/04 • • Ferrodynamic relays, i.e. relays in which the magnetic field is concentrated in ferromagnetic parts
- 53/06 • Magnetodynamic relays, i.e. relays in which the magnetic field is produced by a permanent magnet

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- 53/08 • wherein a mercury contact constitutes the current-carrying conductor
- 53/10 • Induction relays, i.e. relays in which the interaction is between a magnetic field and current induced thereby in a conductor
- 53/12 • • Ferraris relays
- 53/14 • Contacts actuated by an electric motor through fluid-pressure transmission, e.g. using a motor-driven pump
- 55/00 **Magnetostrictive relays**
- 57/00 **Electrostrictive relays; Piezo-electric relays**
- 59/00 **Electrostatic relays; Electro-adhesion relays**
- 61/00 **Electrothermal relays** (thermal switches not operated by electrical input, thermal switches with anticipating electrical input H01H 37/00; thermally-sensitive members H01H 37/32)
  - 61/01 • Details
  - 61/013 • • Heating arrangements for operating relays
  - 61/017 • • • Heating by glow discharge or arc in confined space
  - 61/02 • wherein the thermally-sensitive member is heated indirectly, e.g. resistively, inductively
  - 61/04 • wherein the thermally-sensitive member is only heated directly
  - 61/06 • Self-interrupters, i.e. with periodic or other repetitive opening and closing of contacts
  - 61/08 • • wherein the make-to-break ratio is varied by hand setting or current strength

### Selectors [3]

- 63/00 **Details of electrically-operated selector switches**
- 63/02 • Contacts; Wipers; Connections thereto
- 63/04 • • Contact-making or contact-breaking wipers; Position indicators therefor
- 63/06 • • Contact banks
- 63/08 • • • cylindrical
- 63/10 • • • plane
- 63/12 • • Multiplying connections to contact banks, e.g. using ribbon cables
- 63/14 • • • without soldering
- 63/16 • Driving arrangements for multi-position wipers
- 63/18 • • with step-by-step motion of wiper to a selector position
- 63/20 • • • using stepping magnet and ratchet
- 63/22 • • • using step-by-step electromagnetic drive without ratchet, e.g. self-interrupting driving magnet
- 63/24 • • with continuous motion of wiper until a selected position is reached
- 63/26 • • • with an individual clutch-drive from a shaft common to more than one selector switch
- 63/28 • • • with an individual motor for each selector switch
- 63/30 • • • • Pneumatic motor for moving wiper to selected position
- 63/32 • • • • Spring motor for moving wiper to selected position
- 63/33 • Constructional details of co-ordinate-type selector switches not having relays at cross-points

- 63/34 • Bases; Cases; Covers; Mountings (racks for mounting selectors with or without other exchange equipment H04Q 1/04); Mounting of fuses on selector switch
- 63/36 • Circuit arrangements for ensuring correct or desired operation and not adapted to a particular application of the selector switch
- 63/38 • • for multi-position wiper switches
- 63/40 • • for multi-position switches without wipers
- 63/42 • • • for co-ordinate-type selector switches not having relays at cross-points
- 65/00 **Apparatus or processes specially adapted to the manufacture of selector switches or parts thereof**
- 67/00 **Electrically-operated selector switches**
- 67/02 • Multi-position wiper switches
- 67/04 • • having wipers movable only in one direction for purpose of selection
- 67/06 • • • Rotary switches, i.e. having angularly movable wipers
- 67/08 • • • • with wiper selection
- 67/10 • • • • with coarse and fine positioning of wipers
- 67/12 • • • Linear-motion switches
- 67/14 • • having wipers movable in two mutually perpendicular directions for purpose of selection
- 67/16 • • • one motion being rotary and the other being parallel to the axis of rotation, e.g. Strowger or "up and around" switches
- 67/18 • • • one motion being rotary and the other being perpendicular to the axis of rotation, e.g. "round and in" switches
- 67/20 • • • both motions being linear
- 67/22 • Switches without multi-position wipers
- 67/24 • • Co-ordinate-type relay switches having an individual electromagnet at each cross-point
- 67/26 • • Co-ordinate-type selector switches not having relays at cross-points but involving mechanical movement, e.g. cross-bar switch, code-bar switch
- 67/30 • • Co-ordinate-type selector switches with field of co-ordinate coil acting directly upon magnetic leaf spring or reed-type contact member
- 67/32 • • having a multiplicity of interdependent armatures operated in succession by a single coil and each controlling one contact or set of contacts, e.g. counting relay

### Emergency protective devices

- 69/00 **Apparatus or processes for the manufacture of emergency protective devices**
- 69/01 • for calibrating or setting of devices to function under predetermined conditions
- 69/02 • Manufacture of fuses
- 71/00 **Details of the protective switches or relays covered by groups H01H 73/00-H01H 83/00**
- 71/02 • Housings; Casings; Bases; Mountings
- 71/04 • Means for indicating condition of the switching device
- 71/06 • Distinguishing marks, e.g. colour coding
- 71/08 • Terminals; Connections
- 71/10 • Operating or release mechanisms
- 71/12 • • Automatic release mechanisms with or without manual release
- 71/14 • • • Electrothermal mechanisms

71/16	• • • •	with bimetal element	73/24	• •	reset by lever
71/18	• • • •	with expanding rod, strip, or wire	73/26	• •	reset by tumbler
71/20	• • • •	with fusible mass	73/28	• •	reset by rotatable knob or wheel
71/22	• • • •	with compensation for variation of ambient temperature	73/30	• •	reset by push-button, pull-knob, or slide
71/24	• • • •	Electromagnetic mechanisms	73/32	• •	reset by closure of switch casing
71/26	• • • •	with windings acting in opposition	73/34	• •	reset action requiring replacement or reconditioning of a fusible or explosive part
71/28	• • • •	with windings acting in conjunction	73/36	•	having electromagnetic release and no other automatic release (cartridge type H01H 73/64)
71/30	• • • •	having additional short-circuited winding	73/38	• •	reset by lever
71/32	• • • •	having permanently magnetised part	73/40	• •	reset by tumbler
71/34	• • • •	having two or more armatures controlled by a common winding	73/42	• •	reset by rotatable knob or wheel
71/36	• • • •	frequency selective	73/44	• •	reset by push-button, pull-knob, or slide
71/38	• • • •	wherein the magnet coil also acts as arc blow-out device	73/46	• •	reset by closure of switch casing
71/40	• • •	Combined electrothermal and electromagnetic mechanisms	73/48	•	having both electrothermal and electromagnetic automatic release (cartridge type H01H 73/66)
71/42	• • •	Induction-motor, induced-current, or electrodynamic release mechanisms	73/50	• •	reset by lever
71/43	• • • •	Electrodynamic release mechanisms	73/52	• •	reset by tumbler
71/44	• • •	having means for introducing a predetermined time delay (by short-circuited winding H01H 71/30; by additional armature H01H 71/34)	73/54	• •	reset by rotatable knob or wheel
71/46	• • •	having means for operating auxiliary contacts additional to the main contacts	73/56	• •	reset by push-button, pull-knob, or slide
71/48	• • • •	with provision for short-circuiting the electrical input to the release mechanism after release of the switch, e.g. for protection of heating wire	73/58	• •	reset by closure of switch casing
71/50	• •	Manual reset mechanisms	73/60	•	cartridge type, e.g. screw-in cartridge
71/52	• • •	actuated by lever	73/62	• •	having only electrothermal release
71/54	• • •	actuated by tumbler	73/64	• •	having only electromagnetic release
71/56	• • •	actuated by rotatable knob or wheel	73/66	• •	having combined electrothermal and electromagnetic release
71/58	• • •	actuated by push-button, pull-knob, or slide			
71/60	• • •	actuated by closure of switch casing			
71/62	• • •	with means for preventing resetting while abnormal condition persists, e.g. loose handle arrangement			
71/64	• • • •	incorporating toggle linkage			
71/66	• •	Power reset mechanisms			
71/68	• • •	actuated by electromagnet			
71/70	• • •	actuated by electric motor			
71/72	• • •	actuated automatically a limited number of times			
71/74	•	Means for adjusting the conditions under which the device will function to provide protection			
<b>73/00</b>		<b>Protective overload circuit-breaking switches in which excess current opens the contacts by automatic release of mechanical energy stored by previous operation of a hand reset mechanism</b>	<b>75/00</b>		<b>Protective overload circuit-breaking switches in which excess current opens the contacts by automatic release of mechanical energy stored by previous operation of power reset mechanism</b>
73/02	•	Details	75/02	•	Details
73/04	• •	Contacts	75/04	• •	Reset mechanisms for automatically reclosing a limited number of times (circuit arrangements H02H 3/06)
73/06	• •	Housings; Casings; Bases; Mountings	75/06	• • •	effecting one reclosing action only
73/08	• • •	Plug-in housings	75/08	•	having only electrothermal release
73/10	• • •	Cartridge housings, e.g. screw-in housing	75/10	•	having only electromagnetic release
73/12	• •	Means for indicating condition of the switch	75/12	•	having combined electrothermal and electromagnetic release
73/14	• •	Indicating lamp structurally associated with the switch			
73/16	• •	Distinguishing marks, e.g. colour coding	<b>77/00</b>		<b>Protective overload circuit-breaking switches operated by excess current and requiring separate action for resetting (H01H 73/00, H01H 75/00 take precedence)</b>
73/18	• •	Means for extinguishing or suppressing arc	77/02	•	in which the excess current itself provides the energy for opening the contacts, and having a separate reset mechanism
73/20	• •	Terminals; Connections	77/04	• •	with electrothermal opening
73/22	•	having electrothermal release and no other automatic release (cartridge type H01H 73/62)	77/06	• •	with electromagnetic opening
			77/08	• • •	retained closed by permanent or remanent magnetism and opened by windings acting in opposition
			77/10	• •	with electrodynamic opening
			<b>79/00</b>		<b>Protective switches in which excess current causes the closing of contacts, e.g. for short-circuiting the apparatus to be protected</b>
			<b>81/00</b>		<b>Protective switches in which contacts are normally closed but are repeatedly opened and reclosed as long as a condition causing excess current persists, e.g. for current limiting</b>
			81/02	•	electrothermally-operated
			81/04	•	electromagnetically-operated

**83/00 Protective switches, e.g. circuit-breaking switches, or protective relays operated by abnormal electrical conditions otherwise than solely by excess current**

- 83/02 • operated by earth fault currents (H01H 83/14 takes precedence)
- 83/04 • • with testing means for indicating the ability of the switch or relay to function properly
- 83/06 • operated by current falling below a predetermined value
- 83/08 • operated by reversal of dc
- 83/10 • operated by excess voltage, e.g. for lightning protection
- 83/12 • operated by voltage falling below a predetermined value, e.g. for no-volt protection
- 83/14 • operated by unbalance of two or more currents or voltages, e.g. for differential protection
- 83/16 • operated by abnormal ratio of voltage and current, e.g. distance relay
- 83/18 • operated by abnormal product of, or abnormal phase angle between, voltage and current, e.g. directional relay
- 83/20 • operated by excess current as well as by some other abnormal electrical condition
- 83/22 • • the other condition being unbalance of two or more currents or voltages

**85/00 Protective devices in which the current flows through a part of fusible material and this current is interrupted by displacement of the fusible material when this current becomes excessive** (switches actuated by melting of fusible material H01H 37/76; disposition or arrangement of fuses on boards H02B 1/18)

- 85/02 • Details
- 85/04 • • Fuses, i.e. expendable parts of the protective device, e.g. cartridges
- 85/041 • • • characterised by the type [5]
- 85/042 • • • • General constructions or structure of high voltage fuses, i.e. above 1,000 V [5]
- 85/044 • • • • General constructions or structure of low voltage fuses, i.e. below 1,000 V, or of fuses where the applicable voltage is not specified (H01H 85/046-H01H 85/048 take precedence) [5]
- 85/0445 • • • • • fast or slow type (H01H 85/045-H01H 85/048 take precedence) [5]
- 85/045 • • • • • cartridge type [5]
- 85/046 • • • • Fuses formed as printed circuits [5]
- 85/047 • • • • Vacuum fuses [5]
- 85/048 • • • • Fuse resistors [5]
- 85/05 • • • Component parts thereof [5]
- 85/055 • • • • Fusible members [5]
- 85/06 • • • • • characterised by the fusible material (H01H 85/11 takes precedence) [5]
- 85/08 • • • • • characterised by the shape or form of the fusible member [5]
- 85/10 • • • • • • with constriction for localised fusing (H01H 85/11 takes precedence) [5]
- 85/11 • • • • • • with applied local area of a metal which, on melting, forms a eutectic with the main material of the fusible member, i.e. M-effect devices [5]
- 85/12 • • • • • Two or more separate fusible members in parallel [5]
- 85/143 • • • • Electrical contacts; Fastening fusible members to such contacts [5]
- 85/147 • • • • • Parallel-side contacts [5]

- 85/15 • • • • • Screw-in contacts [5]
- 85/153 • • • • • Knife-blade-end contacts [5]
- 85/157 • • • • • Ferrule-end contacts [5]
- 85/165 • • • • Casings [5]
- 85/17 • • • • • characterised by the casing material [5]
- 85/175 • • • • • characterised by the casing shape or form [5]
- 85/18 • • • • Casing fillings, e.g. powder
- 85/20 • • Bases for supporting the fuse; Separate parts thereof
- 85/22 • • Intermediate or auxiliary parts for carrying, holding, or retaining fuse, co-operating with base or fixed holder, and removable therefrom for renewing the fuse
- 85/24 • • Means for preventing insertion of incorrect fuse
- 85/25 • • Safety arrangements preventing or inhibiting contact with live parts, including operation of isolation on removal of cover [5]
- 85/26 • • Magazine arrangements
- 85/28 • • • effecting automatic replacement
- 85/30 • • Means for indicating condition of fuse structurally associated with the fuse
- 85/32 • • • Indicating lamp structurally associated with the protective device
- 85/34 • • Distinguishing marks, e.g. colour coding
- 85/36 • • Means for applying mechanical tension to fusible member
- 85/38 • • Means for extinguishing or suppressing arc (by powder filling H01H 85/18; by mechanical tension applied to fusible member H01H 85/36)
- 85/40 • • • using an arc-extinguishing liquid (characterised by the composition of the liquid H01H 33/22)
- 85/42 • • • using an arc-extinguishing gas (characterised by the composition of the gas H01H 33/22)
- 85/43 • • Means for exhausting or absorbing gases liberated by fusing arc, or for ventilating excess pressure generated by heating [5]
- 85/44 • • Structural association with spark-gap arrester
- 85/46 • • Circuit arrangements not adapted to a particular application of the protective device
- 85/47 • • Means for cooling [5]
- 85/48 • Protective devices wherein the fuse is carried or held directly by the base
- 85/50 • • the fuse having contacts at opposite ends for co-operation with the base
- 85/52 • • the fuse being adapted for screwing into the base
- 85/54 • Protective devices wherein the fuse is carried, held, or retained by an intermediate or auxiliary part removable from the base, or used as sectionalisers
- 85/56 • • the intermediate or auxiliary part having side contacts for plugging into the base, e.g. bridge-carrier type
- 85/58 • • • with intermediate auxiliary part and base shaped to interfit and thereby enclose the fuse
- 85/60 • • the intermediate or auxiliary part having contacts at opposite ends for co-operation with the base
- 85/62 • • the intermediate or auxiliary part being adapted for screwing into the base

**87/00 Protective devices in which a current flowing through a liquid or solid is interrupted by the evaporation of the liquid or by the melting and evaporation of the solid when the current becomes excessive, the circuit continuity being reestablished on cooling [3]**

89/00	<b>Combinations of two or more different basic types of electric switches, relays, selectors and emergency protective devices, not covered by any single one of the other main groups of this subclass [2006.01]</b>	89/06	• Combination of a manual reset circuit with a contactor, i.e. the same circuit controlled by both a protective and a remote control device [2006.01]
89/02	• Combination of a key operated switch with a manually operated switch, e.g. ignition and lighting switches [2006.01]	89/08	• • with both devices using the same contact pair [2006.01]
89/04	• Combination of a thermally actuated switch with a manually operated switch [2006.01]	89/10	• • • with each device controlling one of the two co-operating contacts [2006.01]
<b>H01J</b>	<b>ELECTRIC DISCHARGE TUBES OR DISCHARGE LAMPS</b> (spark-gaps H01T; arc lamps with consumable electrodes H05B; particle accelerators H05H)		

**Note(s)**

- This subclass covers only devices for producing, influencing, or using a flow of electrons or ions, e.g. for controlling, indicating, or switching of electric current, counting electric pulses, producing light or other electromagnetic oscillations, such as X-rays, or for separating or analysing radiation or particles, and having a closed or substantially closed casing containing a chosen gas, vapour, or vacuum, upon the pressure and nature of which the characteristics of the device depend.  
Light sources using a combination (other than covered by group H01J 61/96 of this subclass) of discharge and other kinds of light generation are covered by group H05B 35/00.
- In this subclass, groups H01J 1/00-H01J 7/00 relate only to:
  - details of an unspecified kind of discharge tube or lamp, or
  - details mentioned in a specification as applicable to two or more kinds of tubes or lamps as defined by groups H01J 11/00, H01J 13/00, H01J 15/00, H01J 17/00, H01J 21/00, H01J 25/00, H01J 27/00, H01J 31/00, H01J 33/00, H01J 35/00, H01J 37/00, H01J 40/00, H01J 41/00, H01J 47/00, H01J 49/00, H01J 61/00, H01J 63/00 or H01J 65/00, hereinafter called basic kinds. A detail only described with reference to, or clearly only applicable to, tubes or lamps of a single basic kind is classified in the detail group appropriate to tubes or lamps of that basic kind, e.g. H01J 17/04.
- In this subclass, the following term is used with the meaning indicated:
  - "lamp" includes tubes emitting ultra-violet or infra-red light.
- Attention is drawn to the definition of the expression "spark gaps" given in the Note following the title of subclass H01T.
- Apparatus or processes specially adapted for the manufacture of electric discharge tubes, discharge lamps, or parts thereof are classified in group H01J 9/00.

**Subclass index****GAS-FILLED TUBES**

Without electrode inside; liquid cathode; gaseous cathode; solid cathode.....11/00, 13/00, 15/00, 17/00

**VACUUM TUBES**

Classical tubes: tubes; details.....21/00, 19/00

Transit-time tubes: tubes; details.....25/00, 23/00

Ion beam tubes.....27/00

Cathode ray tubes: tubes; details.....31/00, 29/00

X-ray tubes.....35/00

**TUBES FOR PROCESSING OR EXAMINATION OF MATERIALS OR OBJECTS.....37/00****SPECIAL TUBES**

For emergence of electrons or ions; particle spectrometers or separator tubes.....33/00, 49/00

Vacuum gauges, evacuation by ion diffusion; secondary-emission tubes, electron multipliers; thermionic

generators.....41/00, 43/00, 45/00

Photoelectric; radiation and particle detectors.....40/00, 47/00

**DISCHARGE LAMPS**

Gas discharge lamps; cathode ray or electron stream lamps; without electrode inside.....61/00, 63/00, 65/00

**DETAILS**

Electrodes; electron optics; vessels; other details.....1/00, 3/00, 5/00, 7/00

**MANUFACTURE; REPAIR; REGENERATION; RECOVERY OF MATERIAL.....9/00****SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....99/00**

<b>1/00</b>	<b>Details of electrodes, of magnetic control means, of screens, or of the mounting or spacing thereof, common to two or more basic types of discharge tubes or lamps</b> (details of electron-optical arrangements or of ion traps H01J 3/00)	1/06	• • • Containers for liquid-pool electrodes; Arrangement or mounting thereof
1/02	• Main electrodes	1/08	• • • Positioning or moving the cathode spot on the surface of a liquid-pool cathode
1/04	• • Liquid electrodes, e.g. liquid cathode	1/10	• • • Cooling, heating, circulating, filtering, or controlling level of liquid in a liquid-pool electrode
1/05	• • • characterised by material		

- 1/12 • • Cathodes having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube
- 1/13 • • Solid thermionic cathodes
- 1/14 • • • characterised by the material
- 1/142 • • • • with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material [6]
- 1/144 • • • • with other metal oxides as an emissive material [6]
- 1/146 • • • • with metals or alloys as an emissive material [6]
- 1/148 • • • • with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material [6]
- 1/15 • • • Cathodes heated directly by an electric current
- 1/16 • • • • characterised by the shape
- 1/18 • • • • Supports; Vibration-damping arrangements
- 1/20 • • • Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
- 1/22 • • • • Heaters
- 1/24 • • • • Insulating layer or body located between heater and emissive material
- 1/26 • • • • Supports for the emissive material
- 1/28 • • • • Dispenser-type cathodes, e.g. L-cathode
- 1/30 • • Cold cathodes
- 1/304 • • • Field-emissive cathodes [7]
- 1/308 • • • Semiconductor cathodes, e.g. cathodes with PN junction layers [7]
- 1/312 • • • having an electric field perpendicular to the surface, e.g. tunnel-effect cathodes of Metal-Insulator-Metal (MIM) type [7]
- 1/316 • • • having an electric field parallel to the surface, e.g. thin film cathodes [7]
- 1/32 • • Secondary-electron emitting electrodes (H01J 1/35 takes precedence)
- 1/34 • • Photo-emissive cathodes (H01J 1/35 takes precedence)
- 1/35 • • Electrodes exhibiting both secondary emission and photo-emission
- 1/36 • • Solid anodes; Solid auxiliary anodes for maintaining a discharge
- 1/38 • • • characterised by the material
- 1/40 • • • forming part of the envelope of the tube or lamp
- 1/42 • • • Cooling of anodes (H01J 1/44 takes precedence); Heating of anodes
- 1/44 • • • Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
- 1/46 • • Control electrodes, e.g. grid (for igniting arrangements H01J 7/30); Auxiliary electrodes (auxiliary anodes for maintaining a discharge H01J 1/36)
- 1/48 • • characterised by the material
- 1/50 • • Magnetic means for controlling the discharge
- 1/52 • • Screens for shielding; Guides for influencing the discharge; Masks interposed in the electron stream
- 1/53 • • Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked-up, converted, or stored
- 1/54 • • Screens on or from which an image or pattern is formed, picked-up, converted, or stored; Luminescent coatings on vessels
- 1/56 • • acting as light valves by shutter operation, e.g. for eidophor
- 1/58 • • acting by discolouration, e.g. halide screen
- 1/60 • • Incandescent screens
- 1/62 • • Luminescent screens; Selection of materials for luminescent coatings on vessels
- 1/63 • • • characterised by the luminescent material
- 1/64 • • • characterised by the binder or adhesive for securing the luminescent material to its support
- 1/66 • • • Supports for luminescent material
- 1/68 • • • with superimposed luminescent layers
- 1/70 • • • with protective, conductive, or reflective layers
- 1/72 • • • with luminescent material discontinuously arranged, e.g. in dots or lines
- 1/74 • • • • with adjacent dots or lines of different luminescent material
- 1/76 • • • provided with permanent marks or references
- 1/78 • • Photoelectric screens; Charge-storage screens
- 1/88 • • Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
- 1/90 • • Insulation between electrodes or supports within the vacuum space
- 1/92 • • Mountings for the electrode assembly as a whole
- 1/94 • • Mountings for individual electrodes
- 1/96 • • Spacing members extending to the envelope
- 1/98 • • • without fixed connection between spacing member and envelope
- 3/00 Details of electron-optical or ion-optical arrangements or of ion traps common to two or more basic types of discharge tubes or lamps**
- 3/02 • • Electron guns
- 3/04 • • Ion guns
- 3/06 • • two or more guns being arranged in a single vacuum space, e.g. for plural-ray tubes (H01J 3/07 takes precedence) [2]
- 3/07 • • Arrangements for controlling convergence of a plurality of beams [2]
- 3/08 • • Arrangements for controlling intensity of ray or beam (H01J 3/02, H01J 3/04 take precedence)
- 3/10 • • Arrangements for centering ray or beam (H01J 3/02, H01J 3/04 take precedence)
- 3/12 • • Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses (H01J 3/02, H01J 3/04 take precedence)
- 3/14 • • Arrangements for focusing or reflecting ray or beam (H01J 3/02, H01J 3/04 take precedence)
- 3/16 • • Mirrors
- 3/18 • • Electrostatic lenses
- 3/20 • • Magnetic lenses
- 3/22 • • • using electromagnetic means only
- 3/24 • • • using permanent magnets only
- 3/26 • • Arrangements for deflecting ray or beam
- 3/28 • • along one straight line or along two perpendicular straight lines
- 3/30 • • • by electric fields only
- 3/32 • • • by magnetic fields only
- 3/34 • • along a circle, spiral, or rotating radial line
- 3/36 • • Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration
- 3/38 • • Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements
- 3/40 • • Traps for removing or diverting unwanted particles, e.g. negative ions, fringing electrons; Arrangements for velocity or mass selection

**5/00 Details relating to vessels or to leading-in conductors common to two or more basic types of discharge tubes or lamps**

- 5/02 • Vessels; Containers; Shields associated therewith; Vacuum locks
- 5/03 • • Arrangements for preventing or mitigating effects of implosion of vessels or containers [2]
- 5/04 • • Vessels or containers characterised by the material thereof
- 5/06 • • Vessels or containers specially adapted for operation at high tension, e.g. by improved potential distribution over surface of vessel
- 5/08 • • provided with coatings on the walls thereof; Selection of materials for the coatings (luminescent coatings H01J 1/62)
- 5/10 • • • on internal surfaces
- 5/12 • • Double-wall vessels or containers
- 5/14 • • Dismountable vessels or containers, e.g. for replacing cathode heater
- 5/16 • • Optical or photographic arrangements structurally combined with the vessel
- 5/18 • • Windows permeable to X-rays, gamma-rays, or particles
- 5/20 • Seals between parts of vessels
- 5/22 • • Vacuum-tight joints between parts of vessel
- 5/24 • • • between insulating parts of vessel
- 5/26 • • • between insulating and conductive parts of vessel
- 5/28 • • • between conductive parts of vessel
- 5/30 • • • using packing material, e.g. sealing liquid or elastic insert
- 5/32 • Seals for leading-in conductors
- 5/34 • • for an individual conductor (pinched-stem seals H01J 5/38; end-disc seals H01J 5/40; annular seals H01J 5/44)
- 5/36 • • • using intermediate part
- 5/38 • • Pinched-stem or analogous seals
- 5/40 • • End-disc seals, e.g. flat header
- 5/42 • • • using intermediate part
- 5/44 • • Annular seals disposed between the ends of the vessel
- 5/46 • Leading-in conductors
- 5/48 • Means forming part of the tube or lamp for the purpose of supporting it
- 5/50 • Means forming part of the tube or lamp for the purpose of providing electrical connection to it
- 5/52 • • directly applied to, or forming part of, the vessel
- 5/54 • • supported by a separate part, e.g. base
- 5/56 • • • Shape of the separate part
- 5/58 • • • Means for fastening the separate part to the vessel, e.g. by cement
- 5/60 • • • • for fastening by mechanical means
- 5/62 • • • Connection of wires protruding from the vessel to connectors carried by the separate part
- 7/00 Details not provided for in groups H01J 1/00-H01J 5/00 and common to two or more basic types of discharge tubes or lamps**
- 7/02 • Selection of substances for gas fillings; Specified operating pressure or temperature
- 7/04 • • having one or more carbon compounds as the principal constituent
- 7/06 • • having helium, argon, neon, krypton, or xenon as the principal constituent
- 7/08 • • having a metallic vapour as the principal constituent

- 7/10 • • • mercury vapour
- 7/12 • • • vapour of an alkali metal
- 7/14 • Means for obtaining or maintaining the desired pressure within the vessel
- 7/16 • • Means for permitting pumping during operation of the tube or lamp
- 7/18 • • Means for absorbing or adsorbing gas, e.g. by gettering
- 7/20 • • Means for producing, introducing, or replenishing gas or vapour during operation of the tube or lamp
- 7/22 • • Tubulations therefor, e.g. for exhausting; Closures therefor
- 7/24 • Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space
- 7/26 • • by flow of fluid through passages associated with tube or lamp
- 7/28 • • by latent heat or evaporation of cooling liquid
- 7/30 • Igniting arrangements
- 7/32 • • having resistive or capacitive igniter
- 7/34 • • • having resistive igniter only
- 7/36 • • Igniting by movement of a solid electrode
- 7/38 • • Igniting by movement of vessel as a whole, e.g. tilting
- 7/40 • • Igniting by associated radioactive materials or fillings
- 7/42 • Means structurally associated with the tube or lamp for indicating defects or previous use
- 7/44 • One or more circuit elements structurally associated with the tube or lamp
- 7/46 • • Structurally associated resonator having distributed inductance and capacitance

**9/00 Apparatus or processes specially adapted for the manufacture of electric discharge tubes, discharge lamps, or parts thereof; Recovery of material from discharge tubes or lamps [1, 7]**

- 9/02 • Manufacture of electrodes or electrode systems
- 9/04 • • of thermionic cathodes
- 9/06 • • • Machines therefor
- 9/08 • • Manufacture of heaters for indirectly-heated cathodes
- 9/10 • • • Machines therefor
- 9/12 • • of photo-emissive cathodes; of secondary-emission electrodes
- 9/14 • • of non-emitting electrodes
- 9/16 • • • Machines for making wire grids
- 9/18 • • Assembling together the component parts of electrode systems
- 9/20 • Manufacture of screens on or from which an image or pattern is formed, picked-up, converted or stored; Applying coatings to the vessel
- 9/22 • • Applying luminescent coatings
- 9/227 • • • with luminescent material discontinuously arranged, e.g. in dots or lines [2]
- 9/233 • • Manufacture of photoelectric screens or charge-storage screens [2]
- 9/236 • Manufacture of magnetic deflecting devices for cathode-ray tubes [3]
- 9/24 • Manufacture or joining of vessels, leading-in conductors, or bases
- 9/26 • • Sealing together parts of vessels
- 9/28 • • Manufacture of leading-in conductors
- 9/30 • • Manufacture of bases
- 9/32 • • Sealing leading-in conductors
- 9/34 • • Joining base to vessel

- 9/36 • • Joining connectors to internal electrode system
  - 9/38 • Exhausting, degassing, filling, or cleaning vessels
  - 9/385 • • Exhausting vessels [2]
  - 9/39 • • Degassing vessels [2]
  - 9/395 • • Filling vessels [2]
  - 9/40 • Closing vessels
  - 9/42 • Measurement or testing during manufacture
  - 9/44 • Factory adjustment of completed discharge tubes or lamps to comply with desired tolerances
  - 9/46 • Machines having sequentially-arranged operating stations
  - 9/48 • • with automatic transfer of workpieces between operating stations
  - 9/50 • Repairing or regenerating used or defective discharge tubes, lamps or their salvageable components
  - 9/52 • Recovery of material from discharge tubes or lamps (H01J 9/50 takes precedence) [7]
- 11/00 Gas-filled discharge tubes with alternating current induction of the discharge, e.g. AC-PDPs [Alternating Current Plasma Display Panels] (circuits or methods for driving PDPs G09G 3/28); Gas-filled discharge tubes without any main electrode inside the vessel; Gas-filled discharge tubes with at least one main electrode outside the vessel [1, 2012.01]**
- Note(s) [2012.01]**
1. When classifying in this group, classification is made in all appropriate places.
  2. In this group, the following term is used with the meaning indicated:
    - "main electrode" means any of a sustain electrode, scan electrode or address electrode.
- 11/10 • AC-PDPs with at least one main electrode being out of contact with the plasma [2012.01]
  - 11/12 • • with main electrodes provided on both sides of the discharge space [2012.01]
  - 11/14 • • with main electrodes provided only on one side of the discharge space [2012.01]
  - 11/16 • • with main electrodes provided inside or on the side face of the spacers [2012.01]
  - 11/18 • • containing a plurality of independent closed structures for containing the gas, e.g. plasma tube array [PTA] display panels [2012.01]
  - 11/20 • Constructional details [2012.01]
  - 11/22 • • Electrodes, e.g. special shape, material or configuration [2012.01]
  - 11/24 • • • Sustain electrodes or scan electrodes [2012.01]
  - 11/26 • • • Address electrodes [2012.01]
  - 11/28 • • • Auxiliary electrodes, e.g. priming electrodes or trigger electrodes [2012.01]
  - 11/30 • • • Floating electrodes [2012.01]
  - 11/32 • • • Disposition of the electrodes [2012.01]
  - 11/34 • • Vessels, containers or parts thereof, e.g. substrates [2012.01]
  - 11/36 • • • Spacers, barriers, ribs, partitions or the like [2012.01]
  - 11/38 • • • Dielectric or insulating layers [2012.01]
  - 11/40 • • • Layers for protecting or enhancing the electron emission, e.g. MgO layers [2012.01]
  - 11/42 • • • Fluorescent layers [2012.01]
  - 11/44 • • • Optical arrangements or shielding arrangements, e.g. filters, black matrices, light reflecting means or electromagnetic shielding means [2012.01]
  - 11/46 • • Connecting or feeding means, e.g. leading-in conductors [2012.01]
  - 11/48 • • Sealing, e.g. seals specially adapted for leading-in conductors [2012.01]
  - 11/50 • • Filling, e.g. selection of gas mixture [2012.01]
  - 11/52 • • Means for absorbing or adsorbing the gas mixture, e.g. by gettering [2012.01]
  - 11/54 • • Means for exhausting the gas [2012.01]
- 13/00 Discharge tubes with liquid-pool cathodes, e.g. metal-vapour rectifying tubes**
- 13/02 • Details
  - 13/04 • • Main electrodes; Auxiliary anodes
  - 13/06 • • • Cathodes
  - 13/08 • • • • characterised by the material
  - 13/10 • • • • Containers for the liquid pool; Arrangement or mounting thereof
  - 13/12 • • • • Positioning or moving the cathode spot on the surface of the pool
  - 13/14 • • • • Cooling, heating, circulating, filtering, or controlling level of the liquid
  - 13/16 • • • Anodes; Auxiliary anodes for maintaining the discharge
  - 13/18 • • • • Cooling or heating of anodes
  - 13/20 • • Control electrodes, e.g. grid (for igniting arrangements H01J 13/34)
  - 13/22 • • Screens, e.g. for preventing or eliminating arcing-back
  - 13/24 • • Vessels; Containers
  - 13/26 • • Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
  - 13/28 • • Selection of substances for gas filling; Means for obtaining or maintaining the desired pressure within the tube [2]
  - 13/30 • • • Means for permitting pumping during operation of the tube
  - 13/32 • • Cooling arrangements; Heating arrangements (for cathodes H01J 13/14; for anodes H01J 13/18)
  - 13/34 • • Igniting arrangements
  - 13/36 • • • having resistive or capacitive igniter
  - 13/38 • • • • having resistive igniter only
  - 13/40 • • • Igniting by movement of a solid electrode
  - 13/42 • • • Igniting by movement of vessel as a whole, e.g. tilting
  - 13/44 • • Devices for preventing or eliminating arcing-back
  - 13/46 • • One or more circuit elements structurally associated with the tube
  - 13/48 • • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
  - 13/50 • Tubes having a single main anode
  - 13/52 • • with control by one or more intermediate control electrodes
  - 13/54 • • with control by igniter, e.g. single-anode ignitron
  - 13/56 • Tubes having two or more main anodes
  - 13/58 • • with control by one or more intermediate control electrodes
- 15/00 Gas-filled discharge tubes with gaseous cathodes, e.g. plasma cathodes**
- 15/02 • Details, e.g. electrode, gas filling, shape of vessel
  - 15/04 • • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for



<b>17/00</b>	<b>Gas-filled discharge tubes with solid cathodes</b> (H01J 25/00, H01J 27/00, H01J 31/00-H01J 41/00 take precedence; gas filled spark gaps H01T; Marx converters H02M 7/26)	19/062	• • • •	with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material [6]
17/02	• Details	19/064	• • • •	with other metal oxides as an emissive material [6]
17/04	• • Electrodes; Screens [1, 2012.01]	19/066	• • • •	with metals or alloys as an emissive material [6]
17/06	• • • Cathodes	19/068	• • • •	with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material [6]
17/08	• • • • having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube	19/08	• • • •	Cathodes heated directly by an electric current
17/10	• • • • Anodes	19/10	• • • •	characterised by the shape
17/12	• • • • Control electrodes	19/12	• • • •	Supports; Vibration-damping arrangements
17/14	• • Magnetic means for controlling the discharge	19/14	• • • •	Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
17/16	• • Vessels; Containers [1, 2012.01]	19/16	• • • •	Heaters
17/18	• • Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors [1, 2012.01]	19/18	• • • •	Insulating layer or body located between heater and emissive material
17/20	• • Selection of substances for gas fillings; Specified operating pressures or temperatures [1, 2012.01]	19/20	• • • •	Supports for the emissive material
17/22	• • Means for obtaining or maintaining the desired pressure within the tube [1, 2012.01]	19/22	• • • •	Dispenser-type cathodes, e.g. L-cathode
17/24	• • • Means for absorbing or adsorbing gas, e.g. by gettering [1, 2012.01]	19/24	• • • •	Cold cathodes, e.g. field-emissive cathode
17/26	• • • Means for producing, introducing, or replenishing gas or vapour during operation of the tube [1, 2012.01]	19/28	• • • •	Non-electron-emitting electrodes; Screens
17/28	• • Cooling arrangements	19/30	• • • •	characterised by the material
17/30	• • Igniting arrangements	19/32	• • • •	Anodes
17/32	• • • Igniting by associated radioactive materials or fillings	19/34	• • • •	forming part of the envelope
17/34	• • One or more circuit elements structurally associated with the tube	19/36	• • • •	Cooling of anodes
17/36	• • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for	19/38	• • • •	Control electrodes, e.g. grid
17/38	• Cold-cathode tubes	19/40	• • • •	Screens for shielding
17/40	• • with one cathode and one anode, e.g. glow tubes, tuning-indicator glow tubes, voltage-stabiliser tubes or voltage-indicator tubes	19/42	• • • •	Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
17/42	• • • having one or more probe electrodes, e.g. for potential dividing	19/44	• • • •	Insulation between electrodes or supports within the vacuum space
17/44	• • • having one or more control electrodes	19/46	• • • •	Mountings for the electrode assembly as a whole
17/46	• • • • for preventing and then permitting ignition, but thereafter having no control	19/48	• • • •	Mountings for individual electrodes
17/48	• • with more than one cathode or anode, e.g. sequence-discharge tube, counting tube, dekatron	19/50	• • • •	Spacing members extending to the envelope
17/49	• • • Display panels, e.g. with crossed electrodes [3, 2012.01]	19/52	• • • •	without fixed connection between spacing member and envelope
17/50	• Thermionic-cathode tubes	19/54	• • • •	Vessels; Containers; Shields associated therewith
17/52	• • with one cathode and one anode	19/56	• • • •	characterised by the material of the vessel or container
17/54	• • • having one or more control electrodes	19/57	• • • •	provided with coatings on the walls thereof; Selection of materials for the coatings
17/56	• • • • for preventing and then permitting ignition, but thereafter having no control	19/58	• • • •	Seals between parts of vessels
17/58	• • with more than one cathode or anode	19/60	• • • •	Seals for leading-in conductors
17/60	• • • the discharge paths priming each other in a predetermined sequence, e.g. counting tube	19/62	• • • •	Leading-in conductors
17/62	• • • with independent discharge paths controlled by intermediate electrodes, e.g. polyphase rectifier	19/64	• • • •	Means forming part of the tube for the purpose of supporting it
17/64	• Tubes specially designed for switching or modulating in a waveguide, e.g. TR box	19/66	• • • •	Means forming part of the tube for the purpose of providing electrical connection to it
<b>19/00</b>	<b>Details of vacuum tubes of the types covered by group H01J 21/00</b>	19/68	• • • •	Specified gas introduced into the tube at low pressure, e.g. for reducing or influencing space charge
19/02	• Electron-emitting electrodes; Cathodes	19/70	• • • •	Means for obtaining or maintaining the vacuum, e.g. by gettering
19/04	• • Thermionic cathodes	19/72	• • • •	Tubulations therefor, e.g. for exhausting; Closures therefor
19/06	• • • characterised by the material	19/74	• • • •	Cooling arrangements (cooling of anodes H01J 19/36)
		19/76	• • • •	Means structurally associated with the tube for indicating defects or previous use
		19/78	• • • •	One or more circuit elements structurally associated with the tube
		19/80	• • • •	Structurally associated resonator having distributed inductance and capacitance

## H01J

- 19/82 • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 21/00 Vacuum tubes** (H01J 25/00, H01J 31/00-H01J 40/00, H01J 43/00, H01J 47/00, H01J 49/00 take precedence; details of vacuum tubes H01J 19/00)
  - 21/02 • Tubes with a single discharge path
  - 21/04 • • without control means, i.e. diodes
  - 21/06 • • having electrostatic control means only
  - 21/08 • • • with movable electrode or electrodes
  - 21/10 • • • with one or more immovable internal control electrodes, e.g. triode, pentode, octode
  - 21/12 • • • • Tubes with variable amplification factor
  - 21/14 • • • • Tubes with means for concentrating the electron stream, e.g. beam tetrode
  - 21/16 • • • with external electrostatic control means and with or without internal control electrodes
  - 21/18 • • having magnetic control means; having both magnetic and electrostatic control means
  - 21/20 • Tubes with more than one discharge path; Multiple tubes, e.g. double diode or triode-hexode
  - 21/22 • • with movable electrode or electrodes
  - 21/24 • • with variable amplification factor
  - 21/26 • • with means for concentrating the electron stream
  - 21/34 • Tubes with electrode system arranged or dimensioned so as to eliminate transit-time effect (with flat electrodes H01J 21/36)
  - 21/36 • Tubes with flat electrodes, e.g. disc electrode
- 23/00 Details of transit-time tubes of the types covered by group H01J 25/00**
  - 23/02 • Electrodes; Magnetic control means; Screens (associated with resonator or delay system H01J 23/16)
    - 23/027 • • Collectors [2]
    - 23/033 • • • Collector cooling devices [2]
    - 23/04 • • Cathodes
    - 23/05 • • • having a cylindrical emissive surface, e.g. cathodes for magnetrons [3]
    - 23/06 • • Electron or ion guns
    - 23/065 • • • producing a solid cylindrical beam (H01J 23/075 takes precedence) [3]
    - 23/07 • • • producing a hollow cylindrical beam (H01J 23/075 takes precedence) [3]
    - 23/075 • • • Magnetron injection guns [3]
    - 23/08 • • Focusing arrangements, e.g. for concentrating stream of electrons, for preventing spreading of stream
      - 23/083 • • • Electrostatic focusing arrangements [3]
      - 23/087 • • • Magnetic focusing arrangements [3]
    - 23/09 • • Electric systems for directing or deflecting the discharge along a desired path, e.g. E-type (focusing arrangements H01J 23/08)
    - 23/10 • • Magnet systems for directing or deflecting the discharge along a desired path, e.g. a spiral path (magnetic focusing arrangements H01J 23/08)
    - 23/11 • • Means for reducing noise (in electron or ion gun H01J 23/06)
    - 23/12 • Vessels; Containers
    - 23/14 • Leading-in arrangements; Seals therefor
    - 23/15 • • Means for preventing wave energy leakage structurally associated with tube leading-in arrangements, e.g. filters, chokes, attenuating devices [4]
    - 23/16 • Circuit elements, having distributed capacitance and inductance, structurally associated with the tube and interacting with the discharge
  - 23/18 • • Resonators
    - 23/20 • • • Cavity resonators; Adjustment or tuning thereof
    - 23/207 • • • • Tuning of single resonator [2]
    - 23/213 • • • • Simultaneous tuning of more than one resonator, e.g. resonant cavities of a magnetron [2]
    - 23/22 • • • Connections between resonators, e.g. strapping for connecting resonators of a magnetron
    - 23/24 • • Slow-wave structures
    - 23/26 • • • Helical slow-wave structures; Adjustment therefor
    - 23/27 • • • • Helix-derived slow-wave structures [3]
    - 23/28 • • • Interdigital slow-wave structures; Adjustment therefor
    - 23/30 • • • Damping arrangements associated with slow-wave structures, e.g. for suppression of unwanted oscillations
    - 23/34 • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
    - 23/36 • Coupling devices having distributed capacitance and inductance, structurally associated with the tube, for introducing or removing wave energy [4]
      - 23/38 • • to or from the discharge [4]
      - 23/40 • • to or from the interaction circuit [4]
      - 23/42 • • • the interaction circuit being a helix or a helix-derived slow-wave structure (H01J 23/44-H01J 23/48 take precedence) [4]
      - 23/44 • • • Rod-type coupling devices (H01J 23/46, H01J 23/48, H01J 23/54 take precedence) [4]
      - 23/46 • • • Loop coupling devices [4]
      - 23/48 • • • for linking interaction circuit with coaxial lines; Devices of the coupled helices type (H01J 23/46 takes precedence) [4]
        - 23/50 • • • • the interaction circuit being a helix or derived from a helix (H01J 23/52 takes precedence) [4]
        - 23/52 • • • • the coupled helices being disposed coaxially around one another [4]
      - 23/54 • • Filtering devices preventing unwanted frequencies or modes to be coupled to, or out of, the interaction circuit; Prevention of high frequency leakage in the environment [4]
  - 25/00 Transit-time tubes, e.g. klystrons, travelling-wave tubes, magnetrons** (details of transit-time tubes H01J 23/00; particle accelerators H05H)
    - 25/02 • Tubes with electron stream modulated in velocity or density in a modulator zone and thereafter giving-up energy in an inducing zone, the zones being associated with one or more resonators
    - 25/04 • • Tubes having one or more resonators, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly density modulation, e.g. Haefl tube
    - 25/06 • • Tubes having only one resonator, without reflection of the electron stream, and in which the modulation produced in the modulator zone is mainly velocity modulation, e.g. Lüdi klystron
      - 25/08 • • • with electron stream perpendicular to the axis of the resonator
    - 25/10 • • Klystrons, i.e. tubes having two or more resonators, without reflection of the electron stream, and in which the stream is modulated mainly by velocity in the zone of the input resonator
      - 25/11 • • • Extended interaction klystrons [2]

- 25/12 • • • with pencil-like electron stream in the axis of the resonators
- 25/14 • • • with tube-like electron stream coaxial with the axis of the resonators
- 25/16 • • • with pencil-like electron stream perpendicular to the axis of the resonators
- 25/18 • • • with radial or disc-like electron stream perpendicular to the axis of the resonators
- 25/20 • • • having special arrangements in the space between resonators, e.g. resistive-wall amplifier tube, space-charge amplifier tube, velocity-jump tube
- 25/22 • • Reflex klystrons, i.e. tubes having one or more resonators, with a single reflection of the electron stream, and in which the stream is modulated mainly by velocity in the modulator zone
- 25/24 • • • in which the electron stream is in the axis of the resonator or resonators and is pencil-like before reflection
- 25/26 • • • in which the electron stream is coaxial with the axis of the resonator or resonators and is tube-like before reflection
- 25/28 • • • in which the electron stream is perpendicular to the axis of the resonator or resonators and is pencil-like before reflection
- 25/30 • • • in which the electron stream is perpendicular to the axis of the resonator or resonators and is radial or disc-like before reflection
- 25/32 • • Tubes with plural reflection, e.g. Coeterier tube
- 25/34 • Travelling-wave tubes; Tubes in which a travelling wave is simulated at spaced gaps
- 25/36 • • Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and without magnet system producing an H-field crossing the E-field
- 25/38 • • • the forward-travelling wave being utilised
- 25/40 • • • the backward-travelling wave being utilised
- 25/42 • • Tubes in which an electron stream interacts with a wave travelling along a delay line or equivalent sequence of impedance elements, and with a magnet system producing an H-field crossing the E-field (with travelling wave moving completely around the electron space H01J 25/50)
- 25/44 • • • the forward-travelling wave being utilised
- 25/46 • • • the backward-travelling wave being utilised
- 25/48 • • Tubes in which two electron streams of different velocities interact with one another, e.g. electron-wave tube
- 25/49 • • Tubes using the parametric principle, e.g. for parametric amplification
- 25/50 • Magnetrons, i.e. tubes with a magnet system producing an H-field crossing the E-field (with travelling wave not moving completely around the electron space H01J 25/42; functioning with plural reflection or with reversed cyclotron action H01J 25/62, H01J 25/64)
- 25/52 • • with an electron space having a shape that does not prevent any electron from moving completely around the cathode or guide electrode
- 25/54 • • • having only one cavity or other resonator, e.g. neutrode tubes
- 25/55 • • • • Coaxial-cavity magnetrons [2]
- 25/56 • • • • with interdigital arrangement of anodes, e.g. turbator tube
- 25/58 • • • having a number of resonators; having a composite resonator, e.g. a helix
- 25/587 • • • • Multi-cavity magnetrons [2]
- 25/593 • • • • Rising-sun magnetrons [2]
- 25/60 • • with an electron space having a shape that prevents any electron from moving completely around the cathode or guide electrode; Linear magnetrons
- 25/61 • Hybrid tubes, i.e. tubes comprising a klystron section and a travelling-wave section [2]
- 25/62 • Strophotrons, i.e. tubes with H-field crossing the E-field and functioning with plural reflection
- 25/64 • Turbine tubes, i.e. tubes with H-field crossing the E-field and functioning with reversed cyclotron action
- 25/66 • Tubes with electron stream crossing itself and thereby interrupting, or interfering with, itself
- 25/68 • Tubes specially designed to act as oscillator with positive grid and retarding field, e.g. for Barkhausen-Kurz oscillators (with secondary emission H01J 25/76)
- 25/70 • • with resonator having distributed inductance and capacitance, e.g. Pintsch tube
- 25/72 • • in which a standing wave or a considerable part thereof is produced along an electrode, e.g. Clavier tube (with resonator having distributed inductance and capacitance H01J 25/70)
- 25/74 • Tubes specially designed to act as transit-time diode oscillators, e.g. monotrons
- 25/76 • Dynamic electron-multiplier tubes, e.g. Farnsworth multiplier tube, multipactor
- 25/78 • Tubes with electron stream modulated by deflection in a resonator
- 27/00 Ion beam tubes** (H01J 25/00, H01J 33/00, H01J 37/00 take precedence; particle accelerators H05H)
- 27/02 • Ion sources; Ion guns [3]
- 27/04 • • using reflex discharge, e.g. Penning ion sources [3]
- 27/06 • • • without applied magnetic field [3]
- 27/08 • • using arc discharge [3]
- 27/10 • • • Duoplasmatrons [3]
- 27/12 • • • • provided with an expansion cup [3]
- 27/14 • • • Other arc discharge ion sources using an applied magnetic field [3]
- 27/16 • • using high-frequency excitation, e.g. microwave excitation [3]
- 27/18 • • • with an applied axial magnetic field [3]
- 27/20 • • using particle bombardment, e.g. ionisers [3]
- 27/22 • • • Metal ion sources [3]
- 27/24 • • using photo-ionisation, e.g. using laser beam [3]
- 27/26 • • using surface ionisation, e.g. field effect ion sources, thermionic ion sources (H01J 27/20, H01J 27/24 take precedence) [3]
- 29/00 Details of cathode-ray tubes or of electron-beam tubes of the types covered by group H01J 31/00**
- 29/02 • Electrodes; Screens; Mounting, supporting, spacing, or insulating thereof
- 29/04 • • Cathodes
- 29/06 • • Screens for shielding; Masks interposed in the electron stream
- 29/07 • • • Shadow masks for colour-television tubes [2]
- 29/08 • • Electrodes intimately associated with a screen on or from which an image or pattern is formed, picked-up, converted or stored, e.g. backing-plates for storage tubes or electrodes for collecting secondary electrons
- 29/10 • • Screens on, or from, which an image or pattern is formed, picked-up, converted, or stored

- 29/12 • • • acting as light valves by shutter operation, e.g. for eidophor
- 29/14 • • • acting by discolouration, e.g. halide screen
- 29/16 • • • Incandescent screens
- 29/18 • • • Luminescent screens
- 29/20 • • • • characterised by the luminescent material
- 29/22 • • • • characterised by the binder or adhesive for securing the luminescent material to its support, e.g. vessel
- 29/24 • • • • Supports for luminescent material
- 29/26 • • • • with superimposed luminescent layers
- 29/28 • • • • with protective, conductive, or reflective layers
- 29/30 • • • • with luminescent material discontinuously arranged, e.g. in dots or lines
- 29/32 • • • • • with adjacent dots or lines of different luminescent material, e.g. for colour television
- 29/34 • • • • provided with permanent marks or references
- 29/36 • • • Photoelectric screens; Charge-storage screens
- 29/38 • • • • not using charge storage, e.g. photo-emissive screen, extended cathode
- 29/39 • • • • Charge-storage screens
- 29/41 • • • • • using secondary emission, e.g. for supericonoscope
- 29/43 • • • • • using photo-emissive mosaic, e.g. for orthicon, for iconoscope
- 29/44 • • • • • exhibiting internal electric effects caused by particle radiation, e.g. bombardment-induced conductivity
- 29/45 • • • • • exhibiting internal electric effects caused by electromagnetic radiation, e.g. photoconductive screen, photodielectric screen, photovoltaic screen
- 29/46 • Arrangements of electrodes and associated parts for generating or controlling the ray or beam, e.g. electron-optical arrangement
- 29/48 • • Electron guns
- 29/50 • • • two or more guns being arranged in a single vacuum space, e.g. for plural-ray tubes (H01J 29/51 takes precedence) [2]
- 29/51 • • • Arrangements for controlling convergence of a plurality of beams [2]

**Note(s)**

Group H01J 29/48 takes precedence over groups H01J 29/52-H01J 29/58.

- 29/52 • • Arrangements for controlling intensity of ray or beam, e.g. for modulation
- 29/54 • • Arrangements for centring ray or beam
- 29/56 • • Arrangements for controlling cross-section of ray or beam; Arrangements for correcting aberration of beam, e.g. due to lenses
- 29/58 • • Arrangements for focusing or reflecting ray or beam
- 29/60 • • • Mirrors
- 29/62 • • • Electrostatic lenses
- 29/64 • • • Magnetic lenses
- 29/66 • • • • using electromagnetic means only
- 29/68 • • • • using permanent magnets only
- 29/70 • • Arrangements for deflecting ray or beam
- 29/72 • • • along one straight line or along two perpendicular straight lines
- 29/74 • • • • Deflecting by electric fields only
- 29/76 • • • • Deflecting by magnetic fields only

- 29/78 • • • along a circle, spiral, or rotating radial line, e.g. for radar display
- 29/80 • • Arrangements for controlling the ray or beam after passing the main deflection system, e.g. for post-acceleration or post-concentration, for colour switching
- 29/81 • • • using shadow masks [3]
- 29/82 • • Mounting, supporting, spacing, or insulating electron-optical or ion-optical arrangements
- 29/84 • Traps for removing or diverting unwanted particles, e.g. negative ions or fringing electrons; Arrangements for velocity or mass selection
- 29/86 • Vessels; Containers; Vacuum locks
- 29/87 • • Arrangements for preventing or mitigating effects of implosion of vessels or containers [2]
- 29/88 • • provided with coatings on the walls thereof; Selection of materials for the coatings
- 29/89 • • Optical or photographic arrangements structurally combined with the vessel
- 29/90 • Leading-in arrangements; Seals therefor
- 29/92 • Means forming part of the tube for the purpose of providing electrical connection to it
- 29/94 • Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering
- 29/96 • One or more circuit elements structurally associated with the tube
- 29/98 • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

**31/00 Cathode-ray tubes; Electron-beam tubes**

(H01J 25/00, H01J 33/00, H01J 35/00, H01J 37/00 take precedence; details of cathode-ray tubes or of electron-beam tubes H01J 29/00)

- 31/02 • having one or more output electrodes which may be impacted selectively by the ray or beam, and onto, from, or over which the ray or beam may be deflected or de-focused
- 31/04 • • with only one or two output electrodes
- 31/06 • • with more than two output electrodes, e.g. for multiple switching or counting
- 31/08 • having a screen on or from which an image or pattern is formed, picked-up, converted, or stored
- 31/10 • • Image or pattern display tubes, i.e. having electrical input and optical output; Flying-spot tubes for scanning purposes
- 31/12 • • • with luminescent screen
- 31/14 • • • • Magic-eye or analogous tuning indicators
- 31/15 • • • • with ray or beam selectively directed to luminescent anode segments [3]
- 31/16 • • • • with mask carrying a number of selectively displayable signs, e.g. numeroscope
- 31/18 • • • • with image written by a ray or beam on a grid-like charge-accumulating screen, and with a ray or beam passing through, and influenced by, this screen before striking the luminescent screen, e.g. direct-view storage tube
- 31/20 • • • for displaying images or patterns in two or more colours
- 31/22 • • • for stereoscopic displays
- 31/24 • • • with screen acting as light valve by shutter operation, e.g. eidophor
- 31/26 • • Image pick-up tubes having an input of visible light and electric output (tubes without defined electron beams and having a light ray scanning a photo-emissive screen H01J 40/20)

31/28	• • •	with electron ray scanning the image screen	35/00	<b>X-ray tubes</b>
31/30	• • •	having regulation of screen potential at anode potential, e.g. iconoscope	35/02	• Details
31/32	• • • •	Tubes with image-amplification section, e.g. image-iconoscope, supericonoscope	35/04	• • Electrodes
31/34	• • •	having regulation of screen potential at cathode potential, e.g. orthicon	35/06	• • • Cathodes
31/36	• • • •	Tubes with image-amplification section, e.g. image-orthicon	35/08	• • • Anodes; Anticathodes
31/38	• • • •	Tubes with photoconductive screen, e.g. vidicon	35/10	• • • • Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
31/40	• • •	having grid-like image screen through which the electron ray passes and by which the ray is influenced before striking the output electrode, i.e. having "triode action"	35/12	• • • • Cooling non-rotary anodes
31/42	• • •	with image screen generating a composite electron beam which is deflected as a whole past a stationary probe to simulate a scanning effect, e.g. Farnsworth pick-up tube	35/14	• • Arrangements for concentrating, focusing, or directing the cathode ray
31/44	• • •	Tubes with image-amplification section	35/16	• • Vessels; Containers; Shields associated therewith
31/46	• • •	Tubes in which electrical output represents both intensity and colour of image	35/18	• • • Windows
31/48	• • •	Tubes with amplification of output effected by electron-multiplier arrangements within the vacuum space	35/20	• • Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering
31/49	• •	Pick-up tubes adapted for an input of electromagnetic radiation other than visible light and having an electric output, e.g. for an input of X-rays, for an input of infra-red radiation	35/22	• specially designed for passing a very high current for a very short time, e.g. for flash operation
31/495	• •	Pick-up tubes adapted for an input of sonic, ultrasonic, or mechanical vibrations and having an electric output	35/24	• Tubes wherein the point of impact of the cathode ray on the anode or anticathode is movable relative to the surface thereof
31/50	• •	Image-conversion or image-amplification tubes, i.e. having optical, X-ray, or analogous input, and optical output	35/26	• • by rotation of the anode or anticathode
31/52	• • •	having grid-like image screen through which the electron ray or beam passes and by which the ray or beam is influenced before striking the luminescent output screen, i.e. having "triode action"	35/28	• • by vibration, oscillation, reciprocation, or swash-plate motion of the anode or anticathode
31/54	• • •	in which the electron ray or beam is reflected by the image input screen on to the image output screen	35/30	• • by deflection of the cathode ray
31/56	• • •	for converting or amplifying images in two or more colours	35/32	• Tubes wherein the X-rays are produced at or near the end of the tube or a part thereof, which tube or part has a small cross-section to facilitate introduction into a small hole or cavity
31/58	• •	Tubes for storage of image or information pattern or for conversion of definition of television or like images, i.e. having electrical input and electrical output	37/00	<b>Discharge tubes with provision for introducing objects or material to be exposed to the discharge, e.g. for the purpose of examination or processing thereof (H01J 33/00, H01J 40/00, H01J 41/00, H01J 47/00, H01J 49/00 take precedence) [2, 5]</b>
31/60	• • •	having means for deflecting, either selectively or sequentially, an electron ray on to separate surface elements of the screen (by circuitry alone H01J 29/98)	37/02	• Details
31/62	• • • •	with separate reading and writing rays	37/04	• • Arrangements of electrodes and associated parts for generating or controlling the discharge, e.g. electron-optical arrangement, ion-optical arrangement
31/64	• • • •	on opposite sides of screen, e.g. for conversion of definition	37/05	• • • Electron- or ion-optical arrangements for separating electrons or ions according to their energy (particle separator tubes H01J 49/00) [3]
31/66	• • •	having means for allowing all but selected cross-section elements of a homogeneous electron beam to reach corresponding elements of the screen, e.g. selectron	37/06	• • • Electron sources; Electron guns
31/68	• • •	in which the information pattern represents two or more colours	37/063	• • • • Geometrical arrangement of electrodes for beam-forming [3]
33/00		<b>Discharge tubes with provision for emergence of electrons or ions from the vessel (particle accelerators H05H); Lenard tubes</b>	37/065	• • • • Construction of guns or parts thereof (H01J 37/067-H01J 37/077 take precedence) [3]
33/02	•	Details	37/067	• • • • Replacing parts of guns; Mutual adjustment of electrodes (H01J 37/073-H01J 37/077 take precedence; vacuum locks H01J 37/18) [3]
33/04	• •	Windows	37/07	• • • • Eliminating deleterious effects due to thermal effects or electric or magnetic fields (H01J 37/073-H01J 37/077 take precedence) [3]
			37/073	• • • • Electron guns using field emission, photo emission, or secondary emission electron sources [3]
			37/075	• • • • Electron guns using thermionic emission from cathodes heated by particle bombardment or by irradiation, e.g. by laser [3]
			37/077	• • • • Electron guns using discharge in gases or vapours as electron sources [3]
			37/08	• • • Ion sources; Ion guns

- 37/09 • • • Diaphragms; Shields associated with electron- or ion-optical arrangements; Compensation of disturbing fields [3]
- 37/10 • • • Lenses
- 37/12 • • • • electrostatic
- 37/14 • • • • magnetic
- 37/141 • • • • • Electromagnetic lenses [3]
- 37/143 • • • • • Permanent magnetic lenses [3]
- 37/145 • • • • • Combinations of electrostatic and magnetic lenses [3]
- 37/147 • • • Arrangements for directing or deflecting the discharge along a desired path (lenses H01J 37/10) [2]
- 37/15 • • • • External mechanical adjustment of electron- or ion-optical components (H01J 37/067, H01J 37/20 take precedence) [3]
- 37/153 • • • Electron-optical or ion-optical arrangements for the correction of image defects, e.g. stigmators [2]
- 37/16 • • Vessels; Containers
- 37/18 • • Vacuum locks
- 37/20 • • Means for supporting or positioning the object or the material; Means for adjusting diaphragms or lenses associated with the support
- 37/21 • • Means for adjusting the focus [2]
- 37/22 • • Optical or photographic arrangements associated with the tube
- 37/24 • • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
- 37/244 • • Detectors; Associated components or circuits therefor [3]
- 37/248 • • Components associated with high voltage supply [3]
- 37/252 • Tubes for spot-analysing by electron or ion beams; Microanalysers [3]
- 37/256 • • using scanning beams [3]
- 37/26 • Electron or ion microscopes; Electron- or ion-diffraction tubes [2]
- 37/27 • • Shadow microscopy [3]
- 37/28 • • with scanning beams
- 37/285 • • Emission microscopes, e.g. field-emission microscopes [2]
- 37/29 • • Reflection microscopes [2]
- 37/295 • • Electron- or ion-diffraction tubes [2]
- 37/30 • Electron-beam or ion-beam tubes for localised treatment of objects
- 37/301 • • Arrangements enabling beams to pass between regions of different pressure [3]
- 37/302 • • Controlling tubes by external information, e.g. programme control (H01J 37/304 takes precedence) [3]
- 37/304 • • Controlling tubes by information coming from the objects, e.g. correction signals [3]
- 37/305 • • for casting, melting, evaporating, or etching [2]
- 37/31 • • for cutting or drilling [2]
- 37/315 • • for welding [2]
- 37/317 • • for changing properties of the objects or for applying thin layers thereon, e.g. ion implantation (H01J 37/36 takes precedence) [3]
- 37/32 • Gas-filled discharge tubes (heating by discharge H05B)
- 37/34 • • operating with cathodic sputtering (H01J 37/36 takes precedence) [3]

- 37/36 • • for cleaning surfaces while plating with ions of materials introduced into the discharge, e.g. introduced by evaporation [3]
- 40/00 Photoelectric discharge tubes not involving the ionisation of a gas (H01J 49/00 takes precedence) [3]**
- 40/02 • Details [3]
- 40/04 • • Electrodes [3]
- 40/06 • • • Photo-emissive cathodes [3]
- 40/08 • • Magnetic means for controlling discharge [3]
- 40/10 • • Selection of substances for gas fillings [3]
- 40/12 • • One or more circuit elements structurally associated with the tube [3]
- 40/14 • • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for [3]
- 40/16 • having photo-emissive cathode, e.g. alkaline photoelectric cell (operating with secondary emission H01J 43/00) [3]
- 40/18 • • with luminescent coatings for influencing the sensitivity of the tube, e.g. by converting the input wavelength [3]
- 40/20 • • wherein a light-ray scans a photo-emissive screen [3]
- 41/00 Discharge tubes and means integral therewith for measuring gas pressure; Discharge tubes for evacuation by diffusion of ions**
- 41/02 • Discharge tubes and means integral therewith for measuring gas pressure [2]
- 41/04 • • with ionisation by means of thermionic cathodes [2]
- 41/06 • • with ionisation by means of cold cathodes [2]
- 41/08 • • with ionisation by means of radioactive substances, e.g. alphasources [2]
- 41/10 • • of particle-spectrometer type (particle spectrometers in general H01J 49/00) [2]
- 41/12 • Discharge tubes for evacuating by diffusion of ions, e.g. ion pumps, getter ion pumps [2]
- 41/14 • • with ionisation by means of thermionic cathodes [2]
- 41/16 • • • using gettering substances [2]
- 41/18 • • with ionisation by means of cold cathodes [2]
- 41/20 • • • using gettering substances [2]
- 43/00 Secondary-emission tubes; Electron-multiplier tubes (dynamic electron-multiplier tubes H01J 25/76)**
- 43/02 • Tubes in which one or a few electrodes are secondary-electron-emitting electrodes
- 43/04 • Electron multipliers
- 43/06 • • Electrode arrangements
- 43/08 • • • Cathode arrangements (construction of photo cathodes H01J 40/06, H01J 40/16, H01J 47/00, H01J 49/08)
- 43/10 • • • Dynodes (H01J 43/24, H01J 43/26 take precedence)
- 43/12 • • • Anode arrangements
- 43/14 • • • Control of electron beam by magnetic field
- 43/16 • • • Electrode arrangements using essentially one dynode
- 43/18 • • • Electrode arrangements using essentially more than one dynode
- 43/20 • • • • Dynodes consisting of sheet material, e.g. plane, bent
- 43/22 • • • • Dynodes consisting of electron-permeable material, e.g. foil, grid, tube, venetian blind

- 43/24 • • • Dynodes having potential gradient along their surfaces
- 43/26 • • • Box dynodes
- 43/28 • • Vessels; Windows; Screens; Suppressing undesired discharges or currents
- 43/30 • • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for

#### 45/00 Discharge tubes functioning as thermionic generators

#### 47/00 Tubes for determining the presence, intensity, density or energy of radiation or particles (photoelectric discharge tubes not involving the ionisation of a gas H01J 40/00) [3]

- 47/02 • Ionisation chambers [3]
- 47/04 • • Capacitive ionisation chambers, e.g. the electrodes of which are used as electrometers [3]
- 47/06 • Proportional counter tubes [3]
- 47/08 • Geiger-Müller counter tubes [3]
- 47/10 • Spark counters (H01J 47/14 takes precedence; spark gaps H01T) [3]
- 47/12 • Neutron detector tubes, e.g. BF<sub>3</sub> tubes [3]
- 47/14 • Parallel electrode spark or streamer chambers; Wire spark or streamer chambers [3]
- 47/16 • • characterised by readout of each individual wire [3]
- 47/18 • • • the readout being electrical (H01J 47/20 takes precedence) [3]
- 47/20 • • • the readout employing electrical or mechanical delay lines, e.g. magnetostrictive delay lines [3]
- 47/22 • • characterised by another type of readout [3]
- 47/24 • • • the readout being acoustical [3]
- 47/26 • • • the readout being optical [3]

#### 49/00 Particle spectrometers or separator tubes [3]

##### Note(s)

In classifying particle separators, no distinction is made between spectrometry and spectrography, the difference being only in the manner of detection which in the first case is electrical and in the second case is by means of a photographic film.

- 49/02 • Details [3]
- 49/04 • • Arrangements for introducing or extracting samples to be analysed, e.g. vacuum locks; Arrangements for external adjustment of electron- or ion-optical components [3]
- 49/06 • • Electron- or ion-optical arrangements (H01J 49/04 takes precedence) [3]
- 49/08 • • Electron sources, e.g. for generating photo-electrons, secondary electrons or Auger electrons [3]
- 49/10 • • Ion sources; Ion guns [3]
- 49/12 • • • using an arc discharge, e.g. of the duoplasmatron type [3]
- 49/14 • • • using particle bombardment, e.g. ionisation chambers [3]
- 49/16 • • • using surface ionisation, e.g. field-, thermionic- or photo-emission [3]
- 49/18 • • • using spark ionisation [3]
- 49/20 • • Magnetic deflection [3]
- 49/22 • • Electrostatic deflection [3]
- 49/24 • • Vacuum systems, e.g. maintaining desired pressures [3]
- 49/26 • Mass spectrometers or separator tubes [3]

- 49/28 • • Static spectrometers [3]
- 49/30 • • • using magnetic analysers [3]
- 49/32 • • • using double focusing [3]
- 49/34 • • Dynamic spectrometers [3]
- 49/36 • • • Radio frequency spectrometers, e.g. Bennett-type spectrometers, Redhead-type spectrometers [3]
- 49/38 • • • • Omegatrons [3]
- 49/40 • • • Time-of-flight spectrometers (H01J 49/36 takes precedence) [3]
- 49/42 • • • Stability-of-path spectrometers, e.g. monopole, quadrupole, multipole, farvitrons [3]
- 49/44 • Energy spectrometers, e.g. alpha-, beta-spectrometers [3]
- 49/46 • • Static spectrometers [3]
- 49/48 • • • using electrostatic analysers, e.g. cylindrical sector, Wien filter [3]

#### Discharge lamps

- 61/00 **Gas-discharge or vapour-discharge lamps** (arc lamps with consumable electrodes H05B; electroluminescent lamps H05B)
- 61/02 • Details
- 61/04 • • Electrodes (for igniting H01J 61/54); Screens; Shields
- 61/06 • • • Main electrodes
- 61/067 • • • • for low-pressure discharge lamps [2]
- 61/073 • • • • for high-pressure discharge lamps [2]
- 61/09 • • • • Hollow cathodes [2]
- 61/10 • • • Shield, screens, or guides for influencing the discharge
- 61/12 • • Selection of substances for gas fillings; Specified operating pressure or temperature
- 61/14 • • • having one or more carbon compounds as the principal constituents
- 61/16 • • • having helium, argon, neon, krypton, or xenon as the principle constituent
- 61/18 • • • having a metallic vapour as the principal constituent
- 61/20 • • • • mercury vapour
- 61/22 • • • • vapour of an alkali metal
- 61/24 • • Means for obtaining or maintaining the desired pressure within the vessel
- 61/26 • • • Means for absorbing or adsorbing gas, e.g. by gettering; Means for preventing blackening of the envelope
- 61/28 • • • Means for producing, introducing, or replenishing gas or vapour during operation of the lamp
- 61/30 • • Vessels; Containers
- 61/32 • • • Special longitudinal shape, e.g. for advertising purposes
- 61/33 • • • Special shape of cross-section, e.g. for producing cool spot
- 61/34 • • • Double-wall vessels or containers
- 61/35 • • • provided with coatings on the walls thereof; Selection of materials for the coatings (using coloured coatings H01J 61/40; using luminescent coatings H01J 61/42)
- 61/36 • • Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors
- 61/38 • • Devices for influencing the colour or wavelength of the light

H01J

61/40	<ul style="list-style-type: none"><li>• by light-filters; by coloured coatings in or on the envelope</li></ul>	61/84	<ul style="list-style-type: none"><li>• Lamps with discharge constricted by high pressure</li></ul>
61/42	<ul style="list-style-type: none"><li>• by transforming the wavelength of the light by luminescence</li></ul>	61/86	<ul style="list-style-type: none"><li>• with discharge additionally constricted by close spacing of electrodes, e.g. for optical projection</li></ul>
61/44	<ul style="list-style-type: none"><li>• Devices characterised by the luminescent material</li></ul>	61/88	<ul style="list-style-type: none"><li>• with discharge additionally constricted by envelope</li></ul>
61/46	<ul style="list-style-type: none"><li>• Devices characterised by the binder or other non-luminescent constituent of the luminescent material, e.g. for obtaining desired pouring or drying properties</li></ul>	61/90	<ul style="list-style-type: none"><li>• Lamps suitable only for intermittent operation, e.g. flash lamp</li></ul>
61/48	<ul style="list-style-type: none"><li>• Separate coatings of different luminous materials</li></ul>	61/92	<ul style="list-style-type: none"><li>• Lamps with more than one main discharge path</li></ul>
61/50	<ul style="list-style-type: none"><li>• Auxiliary parts or solid material within the envelope for reducing risk of explosion upon breakage of the envelope, e.g. for use in mines</li></ul>	61/94	<ul style="list-style-type: none"><li>• Paths producing light of different wavelengths, e.g. for simulating daylight</li></ul>
61/52	<ul style="list-style-type: none"><li>• Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space</li></ul>	61/95	<ul style="list-style-type: none"><li>• Lamps with control electrode for varying intensity or wavelength of the light, e.g. for producing modulated light</li></ul>
61/54	<ul style="list-style-type: none"><li>• Igniting arrangements, e.g. promoting ionisation for starting</li></ul>	61/96	<ul style="list-style-type: none"><li>• Lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope, e.g. for simulating daylight</li></ul>
61/56	<ul style="list-style-type: none"><li>• One or more circuit elements structurally associated with the lamp</li></ul>	61/98	<ul style="list-style-type: none"><li>• Lamps with closely spaced electrodes heated to incandescence by light-emitting discharge, e.g. tungsten arc lamp</li></ul>
61/58	<ul style="list-style-type: none"><li>• Lamps with both liquid anode and liquid cathode</li></ul>	<b>63/00</b>	<b>Cathode-ray or electron-stream lamps</b>
61/60	<ul style="list-style-type: none"><li>• Lamps in which the discharge space is substantially filled with mercury before ignition</li></ul>	63/02	<ul style="list-style-type: none"><li>• Details, e.g. electrode, gas filling, shape of vessel</li></ul>
61/62	<ul style="list-style-type: none"><li>• Lamps with gaseous, e.g. plasma cathode</li></ul>	63/04	<ul style="list-style-type: none"><li>• Vessels provided with luminescent coatings; Selection of materials for the coatings</li></ul>
61/64	<ul style="list-style-type: none"><li>• Cathode glow lamps</li></ul>	63/06	<ul style="list-style-type: none"><li>• Lamps with luminescent screen excited by the ray or stream</li></ul>
61/66	<ul style="list-style-type: none"><li>• having one or more specially shaped cathodes, e.g. for advertising purposes</li></ul>	63/08	<ul style="list-style-type: none"><li>• Lamps with gas plasma excited by the ray or stream</li></ul>
61/68	<ul style="list-style-type: none"><li>• Lamps in which the main discharge is between parts of a current-carrying guide, e.g. halo lamp</li></ul>	<b>65/00</b>	<b>Lamps without any electrode inside the vessel; Lamps with at least one main electrode outside the vessel</b>
61/70	<ul style="list-style-type: none"><li>• Lamps with low-pressure unconfined discharge</li></ul>	65/04	<ul style="list-style-type: none"><li>• Lamps in which a gas filling is excited to luminesce by an external electromagnetic field or by external corpuscular radiation, e.g. for indicating</li></ul>
61/72	<ul style="list-style-type: none"><li>• having a main light-emitting filling of easily vaporisable metal vapour, e.g. mercury</li></ul>	65/06	<ul style="list-style-type: none"><li>• Lamps in which a gas filling is excited to luminesce by radioactive material structurally associated with the lamp, e.g. inside the vessel</li></ul>
61/74	<ul style="list-style-type: none"><li>• having a main light-emitting filling of difficult vaporisable metal vapour, e.g. sodium</li></ul>	65/08	<ul style="list-style-type: none"><li>• Lamps in which a screen or coating is excited to luminesce by radioactive material located inside the vessel</li></ul>
61/76	<ul style="list-style-type: none"><li>• having a filling of permanent gas or gases only</li></ul>		
61/78	<ul style="list-style-type: none"><li>• with cold cathode; with cathode heated only by discharge, e.g. high-tension lamp for advertising</li></ul>		
61/80	<ul style="list-style-type: none"><li>• Lamps suitable only for intermittent operation, e.g. flash lamp</li></ul>		
61/82	<ul style="list-style-type: none"><li>• Lamps with high-pressure unconfined discharge</li></ul>	<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass [2006.01]</b>

**H01K** **ELECTRIC INCANDESCENT LAMPS** (details or apparatus or processes for manufacture applicable to both discharge devices and incandescent lamps H01J; light sources using a combination of incandescent and other types of light generation H01J 61/96, H05B 35/00)

**Note(s)**

In this subclass, the following term is used with the meaning indicated:

- "lamp" includes tubes emitting ultra-violet or infra-red light.

**Subclass index**

CHARACTERISED BY UTILISATION	
General lighting; other lighting.....	5/00, 7/00
CHARACTERISED BY THE INCANDESCENT BODY	
Non-conductive; non-conductive in the cold state; multiple.....	11/00, 13/00, 9/00
DETAILS.....	1/00
MANUFACTURE.....	3/00

1/00	Details	1/02	<ul style="list-style-type: none"><li>• Incandescent bodies</li></ul>
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- 1/04 • • characterised by the material thereof
- 1/06 • • • Carbon bodies
- 1/08 • • • Metallic bodies
- 1/10 • • • Bodies of metal or carbon combined with other substance
- 1/12 • • • Bodies which are non-conductive when cold, e.g. for Nernst lamp
- 1/14 • • characterised by the shape
- 1/16 • • Electric connection thereto
- 1/18 • Mountings or supports for the incandescent body
- 1/20 • • characterised by the material thereof
- 1/22 • • Lamp stems
- 1/24 • • Mounts for lamps with connections at opposite ends, e.g. for tubular lamp
- 1/26 • Screens; Filters (associated with envelope H01K 1/28)
- 1/28 • Envelopes; Vessels
- 1/30 • • incorporating lenses
- 1/32 • • provided with coatings on the walls; Vessels or coatings thereon characterised by the material thereof
- 1/34 • • Double-wall vessels
- 1/36 • Seals between parts of vessel, e.g. between stem and envelope
- 1/38 • Seals for leading-in conductors
- 1/40 • Leading-in conductors
- 1/42 • Means forming part of the lamp for the purpose of providing electrical connection to, or support for, the lamp
- 1/44 • • directly applied to, or forming part of, the vessel
- 1/46 • • supported by a separate part, e.g. base, cap
- 1/48 • • • Removable caps
- 1/50 • Selection of substances for gas fillings; Specified pressure thereof
- 1/52 • Means for obtaining or maintaining the desired pressure within the vessel
- 1/54 • • Means for adsorbing or absorbing gas, or for preventing or removing efflorescence, e.g. by gettering
- 1/56 • • • characterised by the material of the getter
- 1/58 • Cooling arrangements
- 1/60 • Means structurally associated with the lamp for indicating defects or previous use
- 1/62 • One or more circuit elements structurally associated with the lamp
- 1/64 • • with built-in switch
- 1/66 • • with built-in fuse
- 1/68 • • with built-in spark gap
- 1/70 • • with built-in short-circuiting device, e.g. for serially-connected lamps
- 3/00 Apparatus or processes adapted to the manufacture, installing, removal or maintenance of incandescent lamps or parts thereof**
- 3/02 • Manufacture of incandescent bodies
- 3/04 • • Machines therefor
- 3/06 • Attaching of incandescent bodies to mount
- 3/08 • Manufacture of mounts or stems
- 3/10 • • Machines therefor
- 3/12 • Joining of mount or stem to vessel; Joining parts of the vessel, e.g. by butt sealing
- 3/14 • • Machines therefor
- 3/16 • Joining of caps to vessel
- 3/18 • • Machines therefor
- 3/20 • Sealing-in wires directly into the envelope
- 3/22 • Exhausting, degassing, filling, or cleaning vessels
- 3/24 • • Machines therefor
- 3/26 • Closing of vessels
- 3/28 • Machines having sequentially arranged operating stations
- 3/30 • Repairing or regenerating used or defective lamps
- 3/32 • Auxiliary devices for cleaning, placing, or removing incandescent lamps
- 5/00 Lamps for general lighting (H01K 9/00-H01K 13/00 take precedence)**
- 5/02 • with connections made at opposite ends, e.g. tubular lamp with axially arranged filament
- 7/00 Lamps for purposes other than general lighting (H01K 9/00-H01K 13/00 take precedence)**
- 7/02 • for producing a narrow beam of light; for approximating a point-like source of light, e.g. for searchlight, for cinematographic projector (producing narrow beams by optical means external to lamp F21V)
- 7/04 • for indicating
- 7/06 • for decorative purposes
- 9/00 Lamps having two or more incandescent bodies separately heated (H01K 11/00, H01K 13/00 take precedence)**
- 9/02 • to provide substitution in the event of failure of one of the bodies
- 9/04 • • with built-in manually-operated switch
- 9/06 • • with built-in device, e.g. switch, for automatically completing circuit of reserve body
- 9/08 • to provide selectively different light effects, e.g. for automobile headlamp
- 11/00 Lamps having an incandescent body which is not conductively heated, e.g. heated inductively, heated by electronic discharge (H01K 13/00 takes precedence; heated by light-emitting discharge H01J 61/98)**
- 13/00 Lamps having an incandescent body which is substantially non-conductive until heated, e.g. Nernst lamp**
- 13/02 • Heating arrangements
- 13/04 • • using electric discharge
- 13/06 • • using induction heating; using high-frequency field

**H01L SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR** (use of semiconductor devices for measuring G01; resistors in general H01C; magnets, inductors, transformers H01F; capacitors in general H01G; electrolytic devices H01G 9/00; batteries, accumulators H01M; waveguides, resonators, or lines of the waveguide type H01P; line connectors, current collectors H01R; stimulated-emission devices H01S; electromechanical resonators H03H; loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers H04R; electric light sources in general H05B; printed circuits, hybrid circuits, casings or constructional details of electrical apparatus, manufacture of assemblages of electrical components H05K; use of semiconductor devices in circuits having a particular application, see the subclass for the application) [2]

### Note(s)

1. This subclass covers :
  - electric solid state devices which are not covered by any other subclass and details thereof, and includes: semiconductor devices adapted for rectifying, amplifying, oscillating or switching; semiconductor devices sensitive to radiation; electric solid state devices using thermoelectric, superconductive, piezo-electric, electrostrictive, magnetostrictive, galvano-magnetic or bulk negative resistance effects and integrated circuit devices;
  - photoresistors, magnetic field dependent resistors, field effect resistors, capacitors with potential-jump barrier, resistors with potential-jump barrier or surface barrier, incoherent light emitting diodes and thin-film or thick-film circuits;
  - processes and apparatus adapted for the manufacture or treatment of such devices, except where such processes relate to single-step processes for which provision exists elsewhere.
2. In this subclass, the following terms or expressions are used with the meaning indicated:
  - "wafer" means a slice of semiconductor or crystalline substrate material, which can be modified by impurity diffusion (doping), ion implantation or epitaxy, and whose active surface can be processed into arrays of discrete components or integrated circuits;
  - "solid state body" means the body of material within which, or at the surface of which, the physical effects characteristic of the device occur. In thermoelectric devices, it includes all materials in the current path.

Regions in or on the body of the device (other than the solid state body itself), which exert an influence on the solid state body electrically, are considered to be "electrodes" whether or not an external electrical connection is made thereto. An electrode may include several portions and the term includes metallic regions which exert influence on the solid state body through an insulating region (e.g. capacitive coupling) and inductive coupling arrangements to the body. The dielectric region in a capacitive arrangement is regarded as part of the electrode. In arrangements including several portions, only those portions which exert an influence on the solid state body by virtue of their shape, size, or disposition or the material of which they are formed are considered to be part of the electrode. The other portions are considered to be "arrangements for conducting electric current to or from the solid state body" or "interconnections between solid state components formed in or on a common substrate", i.e. leads;

  - "device" means an electric circuit element; where an electric circuit element is one of a plurality of elements formed in or on a common substrate it is referred to as a "component";
  - "complete device" is a device in its fully assembled state which may or may not require further treatment, e.g. electroforming, before it is ready for use but which does not require the addition of further structural units;
  - "parts" includes all structural units which are included in a complete device;
  - "container" is an enclosure forming part of the complete device and is essentially a solid construction in which the body of the device is placed, or which is formed around the body without forming an intimate layer thereon. An enclosure which consists of one or more layers formed on the body and in intimate contact therewith is referred to as an "encapsulation";
  - "integrated circuit" is a device where all components, e.g. diodes, resistors, are built up on a common substrate and form the device including interconnections between the components;
  - "assembly" of a device is the building up of the device from its component constructional units and includes the provision of fillings in containers.
3. In this subclass, both the process or apparatus for the manufacture or treatment of a device and the device itself are classified, whenever both of these are described sufficiently to be of interest.
4. Attention is drawn to Note (3) after the title of section C, which Note indicates to which version of the periodic table of chemical elements the IPC refers. In this subclass, the Periodic System used is the 8 group system indicated by Roman numerals in the Periodic Table thereunder.

### Subclass index

<b>SEMICONDUCTOR DEVICES</b>	
Devices adapted for rectifying, amplifying, oscillating, or switching.....	29/00
Devices sensitive to, or emitting, radiation.....	31/00, 33/00
<b>SOLID STATE DEVICES USING ORGANIC MATERIALS.....</b>	<b>51/00</b>
<b>OTHER SOLID STATE DEVICES</b>	
Thermoelectric or thermomagnetic devices.....	35/00, 37/00
Superconductive or hyperconductive devices.....	39/00
Piezo-electric, electrostrictive or magnetostrictive elements in general.....	41/00
Galvano-magnetic devices.....	43/00
Devices without a potential-jump or a surface barrier; bulk negative resistance effect devices; devices not otherwise provided for.....	45/00, 47/00, 49/00
<b>ASSEMBLIES OF SEMICONDUCTOR OR OTHER SOLID STATE DEVICES</b>	
Assemblies of individual devices.....	25/00
Integrated circuits.....	27/00
<b>DETAILS.....</b>	<b>23/00</b>
<b>MANUFACTURE.....</b>	<b>21/00</b>

## 21/00 Processes or apparatus specially adapted for the manufacture or treatment of semiconductor or solid state devices or of parts thereof [2, 2006.01]

### Note(s)

Group H01L 21/70 takes precedence over groups H01L 21/02-H01L 21/67.

- 21/02 • Manufacture or treatment of semiconductor devices or of parts thereof [2, 2006.01]
- 21/027 • Making masks on semiconductor bodies for further photolithographic processing, not provided for in group H01L 21/18 or H01L 21/34 [5]
- 21/033 • comprising inorganic layers [5]
- 21/04 • the devices having at least one potential-jump barrier or surface barrier, e.g. PN junction, depletion layer, carrier concentration layer [2]
- 21/06 • the devices having semiconductor bodies comprising selenium or tellurium in uncombined form other than as impurities in semiconductor bodies of other materials [2]
- 21/08 • Preparation of the foundation plate [2]
- 21/10 • Preliminary treatment of the selenium or tellurium, its application to the foundation plate, or the subsequent treatment of the combination [2]
- 21/103 • Conversion of the selenium or tellurium to the conductive state [2]
- 21/105 • Treatment of the surface of the selenium or tellurium layer after having been made conductive [2]
- 21/108 • Provision of discrete insulating layers, i.e. non-genetic barrier layers [2]
- 21/12 • Application of an electrode to the exposed surface of the selenium or tellurium after the selenium or tellurium has been applied to the foundation plate [2]
- 21/14 • Treatment of the complete device, e.g. by electroforming to form a barrier [2]
- 21/145 • Ageing [2]
- 21/16 • the devices having semiconductor bodies comprising cuprous oxide or cuprous iodide [2]
- 21/18 • the devices having semiconductor bodies comprising elements of group IV of the Periodic System or  $A_{III}B_V$  compounds with or without impurities, e.g. doping materials [2, 6, 7]

### Note(s)

This group covers also processes and apparatus which, by using the appropriate technology, are clearly suitable for manufacture or treatment of devices whose bodies comprise elements of Group IV of the Periodic System or  $A_{III}B_V$  compounds, even if the material used is not explicitly specified.

- 21/20 • Deposition of semiconductor materials on a substrate, e.g. epitaxial growth [2]
- 21/203 • using physical deposition, e.g. vacuum deposition, sputtering [2]
- 21/205 • using reduction or decomposition of a gaseous compound yielding a solid condensate, i.e. chemical deposition [2]
- 21/208 • using liquid deposition [2]

- 21/22 • Diffusion of impurity materials, e.g. doping materials, electrode materials, into, or out of, a semiconductor body, or between semiconductor regions; Redistribution of impurity materials, e.g. without introduction or removal of further dopant [2]
- 21/223 • using diffusion into, or out of, a solid from or into a gaseous phase [2]
- 21/225 • using diffusion into, or out of, a solid from or into a solid phase, e.g. a doped oxide layer [2]
- 21/228 • using diffusion into, or out of, a solid from or into a liquid phase, e.g. alloy diffusion processes [2]
- 21/24 • Alloying of impurity materials, e.g. doping materials, electrode materials, with a semiconductor body [2]
- 21/26 • Bombardment with wave or particle radiation [2]
- 21/261 • to produce a nuclear reaction transmuting chemical elements [6]
- 21/263 • with high-energy radiation (H01L 21/261 takes precedence) [2, 6]
- 21/265 • producing ion implantation [2]
- 21/266 • using masks [5]
- 21/268 • using electromagnetic radiation, e.g. laser radiation [2]
- 21/28 • Manufacture of electrodes on semiconductor bodies using processes or apparatus not provided for in groups H01L 21/20-H01L 21/268 [2]
- 21/283 • Deposition of conductive or insulating materials for electrodes [2]
- 21/285 • from a gas or vapour, e.g. condensation [2]
- 21/288 • from a liquid, e.g. electrolytic deposition [2]
- 21/30 • Treatment of semiconductor bodies using processes or apparatus not provided for in groups H01L 21/20-H01L 21/26 (manufacture of electrodes thereon H01L 21/28) [2]
- 21/301 • to subdivide a semiconductor body into separate parts, e.g. making partitions (cutting H01L 21/304) [6]
- 21/302 • to change the physical characteristics of their surfaces, or to change their shape, e.g. etching, polishing, cutting [2]
- 21/304 • Mechanical treatment, e.g. grinding, polishing, cutting [2]
- 21/306 • Chemical or electrical treatment, e.g. electrolytic etching (to form insulating layers H01L 21/31; after-treatment of insulating layers H01L 21/3105) [2]
- 21/3063 • Electrolytic etching [6]
- 21/3065 • Plasma etching; Reactive-ion etching [6]
- 21/308 • using masks (H01L 21/3063, H01L 21/3065, take precedence) [2, 6]

## H01L

- 21/31 • • • • • to form insulating layers thereon, e.g. for masking or by using photolithographic techniques (encapsulating layers H01L 21/56); After-treatment of these layers; Selection of materials for these layers [2, 5]
- 21/3105 • • • • • • After-treatment [5]
- 21/311 • • • • • • • Etching the insulating layers [5]
- 21/3115 • • • • • • • Doping the insulating layers [5]
- 21/312 • • • • • • • Organic layers, e.g. photoresist (H01L 21/3105, H01L 21/32 take precedence) [2, 5]
- 21/314 • • • • • • • Inorganic layers (H01L 21/3105, H01L 21/32 take precedence) [2, 5]
- 21/316 • • • • • • • composed of oxides or glassy oxides or oxide-based glass [2]
- 21/318 • • • • • • • composed of nitrides [2]
- 21/32 • • • • • • • using masks [2, 5]
- 21/3205 • • • • • • • Deposition of non-insulating-, e.g. conductive- or resistive-, layers, on insulating layers; After-treatment of these layers (manufacture of electrodes H01L 21/28) [5]
- 21/321 • • • • • • • After-treatment [5]
- 21/3213 • • • • • • • Physical or chemical etching of the layers, e.g. to produce a patterned layer from a pre-deposited extensive layer [6]
- 21/3215 • • • • • • • • Doping the layers [5]
- 21/322 • • • • • • • to modify their internal properties, e.g. to produce internal imperfections [2]
- 21/324 • • • • • • • Thermal treatment for modifying the properties of semiconductor bodies, e.g. annealing, sintering (H01L 21/20-H01L 21/288, H01L 21/302-H01L 21/322 take precedence) [2]
- 21/326 • • • • • • • Application of electric currents or fields, e.g. for electroforming (H01L 21/20-H01L 21/288, H01L 21/302-H01L 21/324 take precedence) [2]
- 21/328 • • • • • • • Multistep processes for the manufacture of devices of the bipolar type, e.g. diodes, transistors, thyristors [5]
- 21/329 • • • • • • • the devices comprising one or two electrodes, e.g. diodes [5]
- 21/33 • • • • • • • the devices comprising three or more electrodes [5]
- 21/331 • • • • • • • Transistors [5]
- 21/332 • • • • • • • Thyristors [5]
- 21/334 • • • • • • • Multistep processes for the manufacture of devices of the unipolar type [5]
- 21/335 • • • • • • • Field-effect transistors [5]
- 21/336 • • • • • • • with an insulated gate [5]
- 21/337 • • • • • • • with a PN junction gate [5]
- 21/338 • • • • • • • with a Schottky gate [5]
- 21/339 • • • • • • • Charge transfer devices [5, 6]
- 21/34 • • • • • • • the devices having semiconductor bodies not provided for in groups H01L 21/06, H01L 21/16, and H01L 21/18 with or without impurities, e.g. doping materials [2]
- 21/36 • • • • • • • Deposition of semiconductor materials on a substrate, e.g. epitaxial growth [2]
- 21/363 • • • • • • • using physical deposition, e.g. vacuum deposition, sputtering [2]
- 21/365 • • • • • • • using reduction or decomposition of a gaseous compound yielding a solid condensate, i.e. chemical deposition [2]
- 21/368 • • • • • • • using liquid deposition [2]
- 21/38 • • • • • • • Diffusion of impurity materials, e.g. doping materials, electrode materials, into, or out of, a semiconductor body, or between semiconductor regions [2]
- 21/383 • • • • • • • using diffusion into, or out of, a solid from or into a gaseous phase [2]
- 21/385 • • • • • • • using diffusion into, or out of, a solid from or into a solid phase, e.g. a doped oxide layer [2]
- 21/388 • • • • • • • using diffusion into, or out of, a solid from or into a liquid phase, e.g. alloy diffusion processes [2]
- 21/40 • • • • • • • Alloying of impurity materials, e.g. doping materials, electrode materials, with a semiconductor body [2]
- 21/42 • • • • • • • Bombardment with radiation [2]
- 21/423 • • • • • • • with high-energy radiation [2]
- 21/425 • • • • • • • • producing ion implantation [2]
- 21/426 • • • • • • • • using masks [5]
- 21/428 • • • • • • • • using electromagnetic radiation, e.g. laser radiation [2]
- 21/44 • • • • • • • Manufacture of electrodes on semiconductor bodies using processes or apparatus not provided for in groups H01L 21/36-H01L 21/428 [2]
- 21/441 • • • • • • • Deposition of conductive or insulating materials for electrodes [2]
- 21/443 • • • • • • • from a gas or vapour, e.g. condensation [2]
- 21/445 • • • • • • • from a liquid, e.g. electrolytic deposition [2]
- 21/447 • • • • • • • involving the application of pressure, e.g. thermo-compression bonding (H01L 21/607 takes precedence) [2]
- 21/449 • • • • • • • involving the application of mechanical vibrations, e.g. ultrasonic vibrations [2]
- 21/46 • • • • • • • Treatment of semiconductor bodies using processes or apparatus not provided for in groups H01L 21/36-H01L 21/428 (manufacture of electrodes thereon H01L 21/44) [2]
- 21/461 • • • • • • • to change their surface-physical characteristics or shape, e.g. etching, polishing, cutting [2]
- 21/463 • • • • • • • Mechanical treatment, e.g. grinding, ultrasonic treatment [2]
- 21/465 • • • • • • • Chemical or electrical treatment, e.g. electrolytic etching (to form insulating layers H01L 21/469) [2]
- 21/467 • • • • • • • • using masks [2]
- 21/469 • • • • • • • to form insulating layers thereon, e.g. for masking or by using photolithographic techniques (encapsulating layers H01L 21/56); After-treatment of these layers [2, 5]
- 21/47 • • • • • • • Organic layers, e.g. photoresist (H01L 21/475, H01L 21/4757 take precedence) [2, 5]
- 21/471 • • • • • • • Inorganic layers (H01L 21/475, H01L 21/4757 take precedence) [2, 5]
- 21/473 • • • • • • • • composed of oxides or glassy oxides or oxide-based glass [2]
- 21/475 • • • • • • • • using masks [2, 5]
- 21/4757 • • • • • • • • After-treatment [5]

- 21/4763 • • • • • Deposition of non-insulating-, e.g. conductive-, resistive-, layers on insulating layers; After-treatment of these layers (manufacture of electrodes H01L 21/28) [5]
- 21/477 • • • • • Thermal treatment for modifying the properties of semiconductor bodies, e.g. annealing, sintering (H01L 21/36-H01L 21/449, H01L 21/461-H01L 21/475 take precedence) [2]
- 21/479 • • • • • Application of electric currents or fields, e.g. for electroforming (H01L 21/36-H01L 21/449, H01L 21/461-H01L 21/477 take precedence) [2]
- 21/48 • • • Manufacture or treatment of parts, e.g. containers, prior to assembly of the devices, using processes not provided for in a single one of the groups H01L 21/06-H01L 21/326 [2]
- 21/50 • • • Assembly of semiconductor devices using processes or apparatus not provided for in a single one of the groups H01L 21/06-H01L 21/326 [2]
- 21/52 • • • Mounting semiconductor bodies in containers [2]
- 21/54 • • • Providing fillings in containers, e.g. gas fillings [2]
- 21/56 • • • Encapsulations, e.g. encapsulating layers, coatings [2]
- 21/58 • • • Mounting semiconductor devices on supports [2]
- 21/60 • • • Attaching leads or other conductive members, to be used for carrying current to or from the device in operation [2]
- 21/603 • • • • • involving the application of pressure, e.g. thermo-compression bonding (H01L 21/607 takes precedence) [2]
- 21/607 • • • • • involving the application of mechanical vibrations, e.g. ultrasonic vibrations [2]
- 21/62 • • the devices having no potential-jump barriers or surface barriers [2]
- 21/64 • Manufacture or treatment of solid state devices other than semiconductor devices, or of parts thereof, not specially adapted for a single type of device provided for in groups H01L 31/00-H01L 51/00 [2, 2006.01]
- 21/66 • Testing or measuring during manufacture or treatment [2]
- 21/67 • Apparatus specially adapted for handling semiconductor or electric solid state devices during manufacture or treatment thereof; Apparatus specially adapted for handling wafers during manufacture or treatment of semiconductor or electric solid state devices or components [2006.01]
- 21/673 • • using specially adapted carriers [2006.01]
- 21/677 • • for conveying, e.g. between different work stations [2006.01]
- 21/68 • • for positioning, orientation or alignment [2, 2006.01]
- 21/683 • • for supporting or gripping (for positioning, orientation or alignment H01L 21/68) [2006.01]
- 21/687 • • • using mechanical means, e.g. chucks, clamps or pinches [2006.01]
- 21/70 • Manufacture or treatment of devices consisting of a plurality of solid state components or integrated circuits formed in or on a common substrate or of specific parts thereof; Manufacture of integrated circuit devices or of specific parts thereof (manufacture of assemblies consisting of preformed electrical components H05K 3/00, H05K 13/00) [2]
- 21/71 • • Manufacture of specific parts of devices defined in group H01L 21/70 (H01L 21/28, H01L 21/44, H01L 21/48 take precedence) [6]
- 21/74 • • • Making of buried regions of high impurity concentration, e.g. buried collector layers, internal connections [2]
- 21/76 • • • Making of isolation regions between components [2]
- 21/761 • • • • PN junctions [6]
- 21/762 • • • • Dielectric regions [6]
- 21/763 • • • • Polycrystalline semiconductor regions [6]
- 21/764 • • • • Air gaps [6]
- 21/765 • • • • by field-effect [6]
- 21/768 • • • Applying interconnections to be used for carrying current between separate components within a device [6]
- 21/77 • • Manufacture or treatment of devices consisting of a plurality of solid state components or integrated circuits formed in, or on, a common substrate [6]
- 21/78 • • • with subsequent division of the substrate into plural individual devices (cutting to change the surface-physical characteristics or shape of semiconductor bodies H01L 21/304) [2, 6]
- 21/782 • • • • to produce devices, each consisting of a single circuit element (H01L 21/82 takes precedence) [6]
- 21/784 • • • • • the substrate being a semiconductor body [6]
- 21/786 • • • • • the substrate being other than a semiconductor body, e.g. insulating body [6]
- 21/82 • • • • to produce devices, e.g. integrated circuits, each consisting of a plurality of components [2]
- 21/822 • • • • • the substrate being a semiconductor, using silicon technology (H01L 21/8258 takes precedence) [6]
- 21/8222 • • • • • • Bipolar technology [6]
- 21/8224 • • • • • • comprising a combination of vertical and lateral transistors [6]
- 21/8226 • • • • • • comprising merged transistor logic or integrated injection logic [6]
- 21/8228 • • • • • • Complementary devices, e.g. complementary transistors [6]
- 21/8229 • • • • • • Memory structures [6]
- 21/8232 • • • • • • Field-effect technology [6]
- 21/8234 • • • • • • MIS technology [6]
- 21/8236 • • • • • • • Combination of enhancement and depletion transistors [6]
- 21/8238 • • • • • • • Complementary field-effect transistors, e.g. CMOS [6]
- 21/8239 • • • • • • • Memory structures [6]
- 21/8242 • • • • • • • Dynamic random access memory structures (DRAM) [6]
- 21/8244 • • • • • • • Static random access memory structures (SRAM) [6]
- 21/8246 • • • • • • • Read-only memory structures (ROM) [6]
- 21/8247 • • • • • • • electrically-programmable (EPROM) [6]
- 21/8248 • • • • • • • Combination of bipolar and field-effect technology [6]
- 21/8249 • • • • • • • Bipolar and MOS technology [6]
- 21/8252 • • • • • • the substrate being a semiconductor, using III-V technology (H01L 21/8258 takes precedence) [6]

- 21/8254 • • • • • the substrate being a semiconductor, using II-VI technology (H01L 21/8258 takes precedence) [6]
- 21/8256 • • • • • the substrate being a semiconductor, using technologies not covered by one of groups H01L 21/822, H01L 21/8252 or H01L 21/8254 (H01L 21/8258 takes precedence) [6]
- 21/8258 • • • • • the substrate being a semiconductor, using a combination of technologies covered by H01L 21/822, H01L 21/8252, H01L 21/8254 or H01L 21/8256 [6]
- 21/84 • • • • • the substrate being other than a semiconductor body, e.g. being an insulating body [2, 6]
- 21/86 • • • • • the insulating body being sapphire, e.g. silicon on sapphire structure, i.e. SOS [2, 6]
- 21/98 • • Assembly of devices consisting of solid state components formed in or on a common substrate; Assembly of integrated circuit devices (H01L 21/50 takes precedence) [2, 5]

**23/00 Details of semiconductor or other solid state devices**  
(H01L 25/00 takes precedence) [2, 5]

**Note(s)**

This group does not cover:

- details of semiconductor bodies or of electrodes of devices provided for in group H01L 29/00, which details are covered by that group;
- details peculiar to devices provided for in a single main group of groups H01L 31/00-H01L 51/00, which details are covered by those groups.
- 23/02 • Containers; Seals (H01L 23/12, H01L 23/34, H01L 23/48, H01L 23/552 take precedence) [2, 5]
- 23/04 • • characterised by the shape [2]
- 23/043 • • • the container being a hollow construction and having a conductive base as a mounting as well as a lead for the semiconductor body [5]
- 23/045 • • • • the other leads having an insulating passage through the base [5]
- 23/047 • • • • the other leads being parallel to the base [5]
- 23/049 • • • • the other leads being perpendicular to the base [5]
- 23/051 • • • • another lead being formed by a cover plate parallel to the base plate, e.g. sandwich type [5]
- 23/053 • • • the container being a hollow construction and having an insulating base as a mounting for the semiconductor body [5]
- 23/055 • • • • the leads having a passage through the base [5]
- 23/057 • • • • the leads being parallel to the base [5]
- 23/06 • • characterised by the material of the container or its electrical properties [2]
- 23/08 • • • the material being an electrical insulator, e.g. glass [2]
- 23/10 • • characterised by the material or arrangement of seals between parts, e.g. between cap and base of the container or between leads and walls of the container [2]
- 23/12 • Mountings, e.g. non-detachable insulating substrates [2]
- 23/13 • • characterised by the shape [5]

- 23/14 • • characterised by the material or its electrical properties [2]
- 23/15 • • • Ceramic or glass substrates [5]
- 23/16 • Fillings or auxiliary members in containers, e.g. centering rings (H01L 23/42, H01L 23/552 take precedence) [2, 5]
- 23/18 • • Fillings characterised by the material, its physical or chemical properties, or its arrangement within the complete device [2]

**Note(s)**

Group H01L 23/26 takes precedence over groups H01L 23/20-H01L 23/24.

- 23/20 • • • gaseous at the normal operating temperature of the device [2]
- 23/22 • • • liquid at the normal operating temperature of the device [2]
- 23/24 • • • solid or gel, at the normal operating temperature of the device [2]
- 23/26 • • • including materials for absorbing or reacting with moisture or other undesired substances [2]
- 23/28 • Encapsulation, e.g. encapsulating layers, coatings (H01L 23/552 takes precedence) [2, 5]
- 23/29 • • characterised by the material [5]
- 23/31 • • characterised by the arrangement [5]
- 23/32 • Holders for supporting the complete device in operation, i.e. detachable fixtures (H01L 23/40 takes precedence) [2, 5]
- 23/34 • Arrangements for cooling, heating, ventilating or temperature compensation [2, 5]
- 23/36 • • Selection of materials, or shaping, to facilitate cooling or heating, e.g. heat sinks [2]
- 23/367 • • • Cooling facilitated by shape of device [5]
- 23/373 • • • Cooling facilitated by selection of materials for the device [5]
- 23/38 • • Cooling arrangements using the Peltier effect [2]
- 23/40 • • Mountings or securing means for detachable cooling or heating arrangements [2]
- 23/42 • • Fillings or auxiliary members in containers selected or arranged to facilitate heating or cooling [2, 5]
- 23/427 • • • Cooling by change of state, e.g. use of heat pipes [5]
- 23/433 • • • Auxiliary members characterised by their shape, e.g. pistons [5]
- 23/44 • • the complete device being wholly immersed in a fluid other than air (H01L 23/427 takes precedence) [2, 5]
- 23/46 • • involving the transfer of heat by flowing fluids (H01L 23/42, H01L 23/44 take precedence) [2]
- 23/467 • • • by flowing gases, e.g. air [5]
- 23/473 • • • by flowing liquids [5]
- 23/48 • Arrangements for conducting electric current to or from the solid state body in operation, e.g. leads or terminal arrangements [2]
- 23/482 • • consisting of lead-in layers inseparably applied to the semiconductor body [5]
- 23/485 • • • consisting of layered constructions comprising conductive layers and insulating layers, e.g. planar contacts [5]
- 23/488 • • consisting of soldered or bonded constructions [5, 2006.01]
- 23/49 • • • wire-like [5]
- 23/492 • • • Bases or plates [5]
- 23/495 • • • Lead-frames [5]
- 23/498 • • • Leads on insulating substrates [5]

23/50	• • for integrated circuit devices (H01L 23/482-H01L 23/498 take precedence) [2, 5]	
23/52	• Arrangements for conducting electric current within the device in operation from one component to another [2]	
23/522	• • including external interconnections consisting of a multilayer structure of conductive and insulating layers inseparably formed on the semiconductor body [5]	
23/525	• • • with adaptable interconnections [5]	
23/528	• • • Layout of the interconnection structure [5]	
23/532	• • • characterised by the materials [5]	
23/535	• • including internal interconnections, e.g. cross-under constructions [5]	
23/538	• • the interconnection structure between a plurality of semiconductor chips being formed on, or in, insulating substrates [5]	
23/544	• Marks applied to semiconductor devices, e.g. registration marks, test patterns [5]	
23/552	• Protection against radiation, e.g. light [5]	
23/556	• • against alpha rays [5]	
23/58	• Structural electrical arrangements for semiconductor devices not otherwise provided for [5]	
23/60	• • Protection against electrostatic charges or discharges, e.g. Faraday shields [5]	
23/62	• • Protection against overcurrent or overload, e.g. fuses, shunts [5]	
23/64	• • Impedance arrangements [5]	
23/66	• • • High-frequency adaptations [5]	
25/00	<b>Assemblies consisting of a plurality of individual semiconductor or other solid state devices</b> (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00; photovoltaic modules or arrays of photovoltaic cells H01L 31/042) [2, 5]	
25/03	• all the devices being of a type provided for in the same subgroup of groups H01L 27/00-H01L 51/00, e.g. assemblies of rectifier diodes [5, 2006.01]	
25/04	• • <i>the devices not having separate containers</i> [2, 2014.01]	
25/065	• • • the devices being of a type provided for in group H01L 27/00 [5]	
25/07	• • • the devices being of a type provided for in group H01L 29/00 [5]	
25/075	• • • the devices being of a type provided for in group H01L 33/00 [5]	
25/10	• • the devices having separate containers [2]	
25/11	• • • the devices being of a type provided for in group H01L 29/00 [5]	
25/13	• • • the devices being of a type provided for in group H01L 33/00 [5]	
25/16	• the devices being of types provided for in two or more different main groups of groups H01L 27/00-H01L 51/00, e.g. forming hybrid circuits [2, 2006.01]	
25/18	• the devices being of types provided for in two or more different subgroups of the same main group of groups H01L 27/00-H01L 51/00 [5, 2006.01]	
27/00	<b>Devices consisting of a plurality of semiconductor or other solid-state components formed in or on a common substrate</b> (details thereof H01L 23/00, H01L 29/00-H01L 51/00; assemblies consisting of a plurality of individual solid state devices H01L 25/00) [2, 2006.01]	
		<b>Note(s)</b>
		In groups H01L 27/01-H01L 27/28, in the absence of an indication to the contrary, classification is made in the last appropriate place.
27/01	• comprising only passive thin-film or thick-film elements formed on a common insulating substrate [3]	
27/02	• including semiconductor components specially adapted for rectifying, oscillating, amplifying or switching and having at least one potential-jump barrier or surface barrier; including integrated passive circuit elements with at least one potential-jump barrier or surface barrier [2]	
27/04	• • the substrate being a semiconductor body [2]	
27/06	• • • including a plurality of individual components in a non-repetitive configuration [2]	
27/07	• • • • the components having an active region in common [5]	
27/08	• • • including only semiconductor components of a single kind [2]	
27/082	• • • • including bipolar components only [5]	
27/085	• • • • including field-effect components only [5]	
27/088	• • • • • the components being field-effect transistors with insulated gate [5]	
27/092	• • • • • • complementary MIS field-effect transistors [5]	
27/095	• • • • • the components being Schottky barrier gate field-effect transistors [5]	
27/098	• • • • • the components being PN junction gate field-effect transistors [5]	
27/10	• • • including a plurality of individual components in a repetitive configuration [2]	
27/102	• • • • including bipolar components [5]	
27/105	• • • • including field-effect components [5]	
27/108	• • • • • Dynamic random access memory structures [5]	
27/11	• • • • • Static random access memory structures [5]	
27/112	• • • • • Read-only memory structures [5]	
27/115	• • • • • • Electrically programmable read-only memories [5]	
27/118	• • • • Masterslice integrated circuits [5]	
27/12	• • the substrate being other than a semiconductor body, e.g. an insulating body [2]	
27/13	• • • combined with thin-film or thick-film passive components [3]	
27/14	• including semiconductor components sensitive to infra-red radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation and specially adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation (radiation-sensitive components structurally associated with one or more electric light sources only H01L 31/14; couplings of light guides with optoelectronic elements G02B 6/42) [2]	
27/142	• • <i>Energy conversion devices (photovoltaic modules or arrays of single photovoltaic cells comprising bypass diodes integrated or directly associated with the devices H01L 31/0443; photovoltaic modules composed of a plurality of thin film solar cells deposited on the same substrate H01L 31/046) [5, 2014.01]</i>	
27/144	• • Devices controlled by radiation [5]	
27/146	• • • Imager structures [5]	
27/148	• • • • Charge coupled imagers [5]	

## H01L

- 27/15 • including semiconductor components with at least one potential-jump barrier or surface barrier, specially adapted for light emission [2]
- 27/16 • including thermoelectric components with or without a junction of dissimilar materials; including thermomagnetic components (using the Peltier effect only for cooling of semiconductor or other solid state devices H01L 23/38) [2]
- 27/18 • including components exhibiting superconductivity [2]
- 27/20 • including piezo-electric components; including electrostrictive components; including magnetostrictive components [2, 7]
- 27/22 • including components using galvano-magnetic effects, e.g. Hall effect; using similar magnetic field effects [2]
- 27/24 • including solid state components for rectifying, amplifying, or switching without a potential-jump barrier or surface barrier [2]
- 27/26 • including bulk negative resistance effect components [2]
- 27/28 • including components using organic materials as the active part, or using a combination of organic materials with other materials as the active part [2006.01]
- 27/30 • • with components specially adapted for sensing infra-red radiation, light, electromagnetic radiation of shorter wavelength, or corpuscular radiation; with components specially adapted for either the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation [2006.01]
- 27/32 • • with components specially adapted for light emission, e.g. flat-panel displays using organic light-emitting diodes [2006.01]

**29/00 Semiconductor devices specially adapted for rectifying, amplifying, oscillating or switching and having at least one potential-jump barrier or surface barrier; Capacitors or resistors with at least one potential-jump barrier or surface barrier, e.g. PN-junction depletion layer or carrier concentration layer; Details of semiconductor bodies or of electrodes thereof** (H01L 31/00-H01L 47/00, H01L 51/05 take precedence; details other than of semiconductor bodies or of electrodes thereof H01L 23/00; devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00) [2, 6]

### Note(s)

In this main group, classification is made in all of groups H01L 29/02, H01L 29/40 and H01L 29/66 if all of these groups are relevant.

- 29/02 • Semiconductor bodies [2]
- 29/04 • • characterised by their crystalline structure, e.g. polycrystalline, cubic or particular orientation of crystalline planes (characterised by physical imperfections H01L 29/30) [2]
- 29/06 • • characterised by their shape; characterised by the shapes, relative sizes, or dispositions of the semiconductor regions [2]
- 29/08 • • • with semiconductor regions connected to an electrode carrying current to be rectified, amplified, or switched and such electrode being part of a semiconductor device which comprises three or more electrodes [2]

- 29/10 • • • with semiconductor regions connected to an electrode not carrying current to be rectified, amplified, or switched and such electrode being part of a semiconductor device which comprises three or more electrodes [2]
- 29/12 • • characterised by the materials of which they are formed [2]
- 29/15 • • • Structures with periodic or quasi periodic potential variation, e.g. multiple quantum wells, superlattices (such structures applied for the control of light G02F 1/017, applied in semiconductor lasers H01S 5/34) [6]

### Note(s)

Group H01L 29/15 takes precedence over groups H01L 29/16-H01L 29/26.

- 29/16 • • • including, apart from doping materials or other impurities, only elements of Group IV of the Periodic System in uncombined form [2]
- 29/161 • • • including two or more of the elements provided for in group H01L 29/16 [2]
- 29/165 • • • • in different semiconductor regions [2]
- 29/167 • • • • further characterised by the doping material [2]
- 29/18 • • • Selenium or tellurium only, apart from doping materials or other impurities [2]
- 29/20 • • • including, apart from doping materials or other impurities, only A<sub>m</sub>B<sub>v</sub> compounds [2, 6]
- 29/201 • • • • including two or more compounds [2]
- 29/205 • • • • • in different semiconductor regions [2]
- 29/207 • • • • further characterised by the doping material [2]
- 29/22 • • • including, apart from doping materials or other impurities, only A<sub>m</sub>B<sub>v1</sub> compounds [2]
- 29/221 • • • • including two or more compounds [2]
- 29/225 • • • • • in different semiconductor regions [2]
- 29/227 • • • • further characterised by the doping material [2]
- 29/24 • • • including, apart from doping materials or other impurities, only inorganic semiconductor materials not provided for in groups H01L 29/16, H01L 29/18, H01L 29/20 or H01L 29/22 [2]
- 29/26 • • • including, apart from doping materials or other impurities, elements provided for in two or more of the groups H01L 29/16, H01L 29/18, H01L 29/20, H01L 29/22, H01L 29/24 [2]
- 29/267 • • • • in different semiconductor regions [2]
- 29/30 • • characterised by physical imperfections; having polished or roughened surface [2]
- 29/32 • • • the imperfections being within the semiconductor body [2]
- 29/34 • • • the imperfections being on the surface [2]
- 29/36 • • characterised by the concentration or distribution of impurities [2]
- 29/38 • • characterised by combination of features provided for in two or more of the groups H01L 29/04, H01L 29/06, H01L 29/12, H01L 29/30, H01L 29/36 [2]
- 29/40 • Electrodes [2]
- 29/41 • • characterised by their shape, relative sizes or dispositions [6]
- 29/417 • • • carrying the current to be rectified, amplified or switched [6]
- 29/423 • • • not carrying the current to be rectified, amplified or switched [6]



- 29/43 • • characterised by the materials of which they are formed [6]
- 29/45 • • • Ohmic electrodes [6]
- 29/47 • • • Schottky barrier electrodes [6]
- 29/49 • • • Metal-insulator semiconductor electrodes [6]
- 29/51 • • • • Insulating materials associated therewith [6]
- 29/66 • Types of semiconductor device [2]
- 29/68 • • controllable by only the electric current supplied, or only the electric potential applied, to an electrode which does not carry the current to be rectified, amplified, or switched (H01L 29/96 takes precedence) [2]
- 29/70 • • • Bipolar devices [2]
- 29/72 • • • Transistor-type devices, i.e. able to continuously respond to applied control signals [2]
- 29/73 • • • • Bipolar junction transistors [5]
- 29/732 • • • • • Vertical transistors [6]
- 29/735 • • • • • Lateral transistors [6]
- 29/737 • • • • • Hetero-junction transistors [6]
- 29/739 • • • • • controlled by field effect [6]
- 29/74 • • • • Thyristor-type devices, e.g. having four-zone regenerative action [2]
- 29/744 • • • • • Gate-turn-off devices [6]
- 29/745 • • • • • with turn-off by field effect [6]
- 29/747 • • • • • Bidirectional devices, e.g. triacs [2]
- 29/749 • • • • • with turn-on by field effect [6]
- 29/76 • • • Unipolar devices [2]
- 29/762 • • • • Charge transfer devices [6]
- 29/765 • • • • • Charge-coupled devices [6]
- 29/768 • • • • • with field effect produced by an insulated gate [6]
- 29/772 • • • • Field-effect transistors [6]
- 29/775 • • • • • with one-dimensional charge carrier gas channel, e.g. quantum wire FET [6]
- 29/778 • • • • • with two-dimensional charge carrier gas channel, e.g. HEMT [6]
- 29/78 • • • • • with field effect produced by an insulated gate [2]
- 29/786 • • • • • Thin-film transistors [6]
- 29/788 • • • • • with floating gate [5]
- 29/792 • • • • • with charge trapping gate insulator, e.g. MNOS-memory transistor [5]
- 29/80 • • • • • with field effect produced by a PN or other rectifying junction gate [2]
- 29/808 • • • • • with a PN junction gate [5]
- 29/812 • • • • • with a Schottky gate [5]
- 29/82 • • controllable by variation of the magnetic field applied to the device (H01L 29/96 takes precedence) [2, 6]
- 29/84 • • controllable by variation of applied mechanical force, e.g. of pressure (H01L 29/96 takes precedence) [2, 6]
- 29/86 • • controllable only by variation of the electric current supplied, or only the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated, or switched (H01L 29/96 takes precedence) [2]
- 29/8605 • • • Resistors with PN junction [6]
- 29/861 • • • Diodes [6]
- 29/862 • • • • Point contact diodes [6]
- 29/864 • • • • Transit-time diodes, e.g. IMPATT, TRAPATT diodes [6]
- 29/866 • • • • Zener diodes [6]
- 29/868 • • • • PIN diodes [6]
- 29/87 • • • • Thyristor diodes, e.g. Shockley diodes, break-over diodes [6]
- 29/872 • • • • Schottky diodes [6]
- 29/88 • • • • Tunnel-effect diodes [2]
- 29/885 • • • • • Esaki diodes [6]
- 29/92 • • • Capacitors with potential-jump barrier or surface barrier [2]
- 29/93 • • • • Variable-capacitance diodes, e.g. varactors [2]
- 29/94 • • • • Metal-insulator-semiconductors, e.g. MOS [2]
- 29/96 • • of a type covered by more than one of groups H01L 29/68, H01L 29/82, H01L 29/84 or H01L 29/86 [2]
- 31/00 **Semiconductor devices sensitive to infra-red radiation, light, electromagnetic radiation of shorter wavelength, or corpuscular radiation and specially adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof** (H01L 51/42 takes precedence; devices consisting of a plurality of solid state components formed in, or on, a common substrate, other than combinations of radiation-sensitive components with one or more electric light sources, H01L 27/00) [2, 6, 2006.01]
- 31/02 • Details [2]
- 31/0203 • • Containers; Encapsulations (for photovoltaic devices H01L 31/048; for organic photosensitive devices H01L 51/44) [5, 2014.01]
- 31/0216 • • Coatings (H01L 31/041 takes precedence) [5, 2014.01]
- 31/0224 • • Electrodes [5]
- 31/0232 • • Optical elements or arrangements associated with the device (H01L 31/0236 takes precedence; for photovoltaic cells H01L 31/054; for photovoltaic modules H02S 40/20) [5, 2014.01]
- 31/0236 • • Special surface textures [5]
- 31/024 • • Arrangements for cooling, heating, ventilating or temperature compensation (for photovoltaic devices H01L 31/052) [5, 2014.01]
- 31/0248 • characterised by their semiconductor bodies [5]
- 31/0256 • • characterised by the material [5]
- 31/0264 • • • Inorganic materials [5]
- 31/0272 • • • Selenium or tellurium [5]
- 31/028 • • • including, apart from doping material or other impurities, only elements of Group IV of the Periodic System [5]
- 31/0288 • • • • characterised by the doping material [5]
- 31/0296 • • • • including, apart from doping material or other impurities, only  $A_{II}B_{VI}$  compounds, e.g. CdS, ZnS, HgCdTe [5]
- 31/0304 • • • • including, apart from doping materials or other impurities, only  $A_{III}B_{V}$  compounds [5]
- 31/0312 • • • • including, apart from doping materials or other impurities, only  $A_{IV}B_{IV}$  compounds, e.g. SiC [5]
- 31/032 • • • • including, apart from doping materials or other impurities, only compounds not provided for in groups H01L 31/0272-H01L 31/0312 [5]
- 31/0328 • • • • including, apart from doping materials or other impurities, semiconductor materials provided for in two or more of groups H01L 31/0272-H01L 31/032 [5]

- 31/0336 • • • • in different semiconductor regions, e.g. Cu<sub>2</sub>X/CdX hetero-junctions, X being an element of Group VI of the Periodic System [5]
- 31/0352 • • characterised by their shape or by the shapes, relative sizes or disposition of the semiconductor regions [5]
- 31/036 • • characterised by their crystalline structure or particular orientation of the crystalline planes [5]
- 31/0368 • • • including polycrystalline semiconductors (H01L 31/0392 takes precedence) [5]
- 31/0376 • • • including amorphous semiconductors (H01L 31/0392 takes precedence) [5]
- 31/0384 • • • including other non-monocrystalline materials, e.g. semiconductor particles embedded in an insulating material (H01L 31/0392 takes precedence) [5]
- 31/0392 • • • including thin films deposited on metallic or insulating substrates [5]
- 31/04 • • adapted as photovoltaic [PV] conversion devices (testing thereof during manufacture H01L 21/66; testing thereof after manufacture H02S 50/10) [2, 2014.01]
- 31/041 • • Provisions for preventing damage caused by corpuscular radiation, e.g. for space applications [2014.01]
- 31/042 • • PV modules or arrays of single PV cells (supporting structures for PV modules H02S 20/00) [5, 2014.01]
- 31/043 • • • Mechanically stacked PV cells [2014.01]
- 31/044 • • • including bypass diodes (bypass diodes in the junction box H02S 40/34) [2014.01]
- 31/0443 • • • • comprising bypass diodes integrated or directly associated with the devices, e.g. bypass diodes integrated or formed in or on the same substrate as the photovoltaic cells [2014.01]
- 31/0445 • • • including thin film solar cells, e.g. single thin film a-Si, CIS or CdTe solar cells [2014.01]
- 31/046 • • • • PV modules composed of a plurality of thin film solar cells deposited on the same substrate [2014.01]
- 31/0463 • • • • • characterised by special patterning methods to connect the PV cells in a module, e.g. laser cutting of the conductive or active layers [2014.01]
- 31/0465 • • • • • comprising particular structures for the electrical interconnection of adjacent PV cells in the module (H01L 31/0463 takes precedence) [2014.01]
- 31/0468 • • • • • comprising specific means for obtaining partial light transmission through the module, e.g. partially transparent thin film solar modules for windows [2014.01]
- 31/047 • • • PV cell arrays including PV cells having multiple vertical junctions or multiple V-groove junctions formed in a semiconductor substrate [2014.01]
- 31/0475 • • • PV cell arrays made by cells in a planar, e.g. repetitive, configuration on a single semiconductor substrate; PV cell microarrays (PV modules composed of a plurality of thin film solar cells deposited on the same substrate H01L 31/046) [2014.01]
- 31/048 • • • Encapsulation of modules [5, 2014.01]
- 31/049 • • • • Protective back sheets [2014.01]
- 31/05 • • • Electrical interconnection means between PV cells inside the PV module, e.g. series connection of PV cells (electrodes H01L 31/0224; electrical interconnection of thin film solar cells formed on a common substrate H01L 31/046; particular structures for electrical interconnecting of adjacent thin film solar cells in the module H01L 31/0465; electrical interconnection means specially adapted for electrically connecting two or more PV modules H02S 40/36) [5, 2014.01]
- 31/052 • • • Cooling means directly associated or integrated with the PV cell, e.g. integrated Peltier elements for active cooling or heat sinks directly associated with the PV cells (cooling means in combination with the PV module H02S 40/42) [5, 2014.01]
- 31/0525 • • • including means to utilise heat energy directly associated with the PV cell, e.g. integrated Seebeck elements [2014.01]
- 31/053 • • • Energy storage means directly associated or integrated with the PV cell, e.g. a capacitor integrated with a PV cell (energy storage means associated with the PV module H02S 40/38) [2014.01]
- 31/054 • • • Optical elements directly associated or integrated with the PV cell, e.g. light-reflecting means or light-concentrating means [2014.01]
- 31/055 • • • • where light is absorbed and re-emitted at a different wavelength by the optical element directly associated or integrated with the PV cell, e.g. by using luminescent material, fluorescent concentrators or up-conversion arrangements [5, 2014.01]
- 31/056 • • • • the light-reflecting means being of the back surface reflector [BSR] type [2014.01]
- 31/06 • • • characterised by at least one potential-jump barrier or surface barrier [2, 2012.01]
- 31/061 • • • • the potential barriers being of the point-contact type (H01L 31/07 takes precedence) [2012.01]
- 31/062 • • • • the potential barriers being only of the metal-insulator-semiconductor type [5, 2012.01]
- 31/065 • • • • the potential barriers being only of the graded gap type [5, 2012.01]
- 31/068 • • • • the potential barriers being only of the PN homojunction type, e.g. bulk silicon PN homojunction solar cells or thin film polycrystalline silicon PN homojunction solar cells [5, 2012.01]
- 31/0687 • • • • Multiple junction or tandem solar cells [2012.01]
- 31/0693 • • • • the devices including, apart from doping material or other impurities, only A<sub>III</sub>B<sub>V</sub> compounds, e.g. GaAs or InP solar cells [2012.01]
- 31/07 • • • • the potential barriers being only of the Schottky type [5, 2012.01]
- 31/072 • • • • the potential barriers being only of the PN heterojunction type [5, 2012.01]
- 31/0725 • • • • Multiple junction or tandem solar cells [2012.01]
- 31/073 • • • • comprising only A<sub>III</sub>B<sub>VI</sub> compound semiconductors, e.g. CdS/CdTe solar cells [2012.01]
- 31/0735 • • • • comprising only A<sub>III</sub>B<sub>V</sub> compound semiconductors, e.g. GaAs/AlGaAs or InP/GaInAs solar cells [2012.01]

- 31/074 • • • • comprising a heterojunction with an element of Group IV of the Periodic System, e.g. ITO/Si, GaAs/Si or CdTe/Si solar cells [2012.01]
- 31/0745 • • • • comprising a A<sub>IV</sub>B<sub>IV</sub> heterojunction, e.g. Si/Ge, SiGe/Si or Si/SiC solar cells [2012.01]
- 31/0747 • • • • • comprising a heterojunction of crystalline and amorphous materials, e.g. heterojunction with intrinsic thin layer or HIT® solar cells [2012.01]
- 31/0749 • • • • including a A<sub>IV</sub>B<sub>III</sub>C<sub>VI</sub> compound, e.g. CdS/CuInSe<sub>2</sub> [CIS] heterojunction solar cells [2012.01]
- 31/075 • • • • the potential barriers being only of the PIN type, e.g. amorphous silicon PIN solar cells [5, 2012.01]
- 31/076 • • • • • Multiple junction or tandem solar cells [2012.01]
- 31/077 • • • • the devices comprising monocrystalline or polycrystalline materials [2012.01]
- 31/078 • • • • including different types of potential barriers provided for in two or more of groups H01L 31/061-H01L 31/075 [5, 2012.01]
- 31/08 • • in which radiation controls flow of current through the device, e.g. photoresistors [2]
- 31/09 • • • Devices sensitive to infra-red, visible or ultra-violet radiation (H01L 31/101 takes precedence) [5]
- 31/10 • • • characterised by at least one potential-jump barrier or surface barrier, e.g. phototransistors [2]
- 31/101 • • • • Devices sensitive to infra-red, visible or ultra-violet radiation [5]
- 31/102 • • • • • characterised by only one potential barrier or surface barrier [5]
- 31/103 • • • • • the potential barrier being of the PN homojunction type [5]
- 31/105 • • • • • the potential barrier being of the PIN type [5]
- 31/107 • • • • • the potential barrier working in avalanche mode, e.g. avalanche photodiode [5]
- 31/108 • • • • • the potential barrier being of the Schottky type [5]
- 31/109 • • • • • the potential barrier being of the PN heterojunction type [5]
- 31/11 • • • • • characterised by two potential barriers or surface barriers, e.g. bipolar phototransistor [5]
- 31/111 • • • • • characterised by at least three potential barriers, e.g. photothyristor [5]
- 31/112 • • • • • characterised by field-effect operation, e.g. junction field-effect photo-transistor [5]
- 31/113 • • • • • being of the conductor-insulator-semiconductor field-effect transistor [5]
- 31/115 • • • • Devices sensitive to very short wavelength, e.g. X-rays, gamma-rays or corpuscular radiation [5]
- 31/117 • • • • • of the bulk effect radiation detector type, e.g. Ge-Li compensated PIN gamma-ray detectors [5]
- 31/118 • • • • • of the surface barrier or shallow PN junction detector type, e.g. surface barrier alpha-particle detectors [5]
- 31/119 • • • • • characterised by field-effect operation, e.g. MIS type detectors [5]
- 31/12 • • • • • structurally associated with, e.g. formed in or on a common substrate with, one or more electric light sources, e.g. electroluminescent light sources, and electrically or optically coupled thereto (electroluminescent light sources per se H05B 33/00) [2, 5]
- 31/14 • • • • the light source or sources being controlled by the semiconductor device sensitive to radiation, e.g. image converters, image amplifiers, image storage devices [2]
- 31/147 • • • • the light sources and the devices sensitive to radiation all being semiconductor devices characterised by at least one potential or surface barrier [5]
- 31/153 • • • • • formed in, or on, a common substrate [5]
- 31/16 • • • the semiconductor device sensitive to radiation being controlled by the light source or sources [2]
- 31/167 • • • • the light sources and the devices sensitive to radiation all being semiconductor devices characterised by at least one potential or surface barrier [5]
- 31/173 • • • • • formed in, or on, a common substrate [5]
- 31/18 • • Processes or apparatus specially adapted for the manufacture or treatment of these devices or of parts thereof [2]
- 31/20 • • • such devices or parts thereof comprising amorphous semiconductor material [5]
- 33/00 Semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof** (H01L 51/50 takes precedence; devices consisting of a plurality of semiconductor components formed in or on a common substrate and including semiconductor components with at least one potential-jump barrier or surface barrier, specially adapted for light emission H01L 27/15; semiconductor lasers H01S 5/00) [2, 2006.01, 2010.01]
- Note(s) [2010.01]**
1. This group covers light emitting diodes [LEDs] or superluminescent diodes [SLDs], including LEDs or SLDs emitting infra-red [IR] light or ultra-violet [UV] light.
  2. In this group, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
- 33/02 • • characterised by the semiconductor bodies [2010.01]
- 33/04 • • • with a quantum effect structure or superlattice, e.g. tunnel junction [2010.01]
- 33/06 • • • • within the light emitting region, e.g. quantum confinement structure or tunnel barrier [2010.01]
- 33/08 • • • with a plurality of light emitting regions, e.g. laterally discontinuous light emitting layer or photoluminescent region integrated within the semiconductor body (H01L 27/15 takes precedence) [2010.01]
- 33/10 • • • with a light reflecting structure, e.g. semiconductor Bragg reflector [2010.01]
- 33/12 • • • with a stress relaxation structure, e.g. buffer layer [2010.01]
- 33/14 • • • with a carrier transport control structure, e.g. highly-doped semiconductor layer or current-blocking structure [2010.01]

## H01L

- 33/16 • • with a particular crystal structure or orientation, e.g. polycrystalline, amorphous or porous [2010.01]
- 33/18 • • • within the light emitting region [2010.01]

### Note(s) [2010.01]

When classifying in this group, classification is also made in group H01L 33/26 or one of its subgroups in order to identify the chemical composition of the light emitting region.

- 33/20 • • with a particular shape, e.g. curved or truncated substrate [2010.01]
- 33/22 • • • Roughened surfaces, e.g. at the interface between epitaxial layers [2010.01]
- 33/24 • • • of the light emitting region, e.g. non-planar junction [2010.01]
- 33/26 • • Materials of the light emitting region [2010.01]
- 33/28 • • • containing only elements of group II and group VI of the periodic system [2010.01]
- 33/30 • • • containing only elements of group III and group V of the periodic system [2010.01]
- 33/32 • • • • containing nitrogen [2010.01]
- 33/34 • • • containing only elements of group IV of the periodic system [2010.01]
- 33/36 • characterised by the electrodes [2010.01]
- 33/38 • • with a particular shape [2010.01]
- 33/40 • • Materials therefor [2010.01]
- 33/42 • • • Transparent materials [2010.01]
- 33/44 • characterised by the coatings, e.g. passivation layer or anti-reflective coating [2010.01]
- 33/46 • • Reflective coating, e.g. dielectric Bragg reflector [2010.01]
- 33/48 • characterised by the semiconductor body packages [2010.01]

### Note(s) [2010.01]

This group covers elements in intimate contact with the semiconductor body or integrated with the package.

- 33/50 • • Wavelength conversion elements [2010.01]
- 33/52 • • Encapsulations [2010.01]
- 33/54 • • • having a particular shape [2010.01]
- 33/56 • • • Materials, e.g. epoxy or silicone resin [2010.01]
- 33/58 • • Optical field-shaping elements [2010.01]
- 33/60 • • • Reflective elements [2010.01]
- 33/62 • • Arrangements for conducting electric current to or from the semiconductor body, e.g. leadframe, wire-bond or solder balls [2010.01]
- 33/64 • • Heat extraction or cooling elements [2010.01]
- 35/00 **Thermoelectric devices comprising a junction of dissimilar materials, i.e. exhibiting Seebeck or Peltier effect with or without other thermoelectric effects or thermomagnetic effects; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof** (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00) [2]
- 35/02 • Details [2]
- 35/04 • • Structural details of the junction; Connections of leads [2]
- 35/06 • • • detachable, e.g. using a spring [2]
- 35/08 • • • non-detachable, e.g. cemented, sintered, soldered [2]
- 35/10 • • • Connections of leads [2]
- 35/12 • Selection of the material for the legs of the junction [2]
- 35/14 • • using inorganic compositions [2]

- 35/16 • • • comprising tellurium or selenium or sulfur [2]
- 35/18 • • • comprising arsenic or antimony or bismuth (H01L 35/16 takes precedence) [2]
- 35/20 • • • comprising metals only (H01L 35/16, H01L 35/18 take precedence) [2]
- 35/22 • • • comprising compounds containing boron, carbon, oxygen, or nitrogen [2]
- 35/24 • • using organic compositions [2]
- 35/26 • • using compositions changing continuously or discontinuously inside the material [2]
- 35/28 • operating with Peltier or Seebeck effect only [2]
- 35/30 • • characterised by the heat-exchanging means at the junction [2]
- 35/32 • • characterised by the structure or configuration of the cell or thermo-couple forming the device [2]
- 35/34 • Processes or apparatus specially adapted for the manufacture or treatment of these devices or of parts thereof [2]

**37/00 Thermoelectric devices without a junction of dissimilar materials; Thermomagnetic devices, e.g. using Nernst-Ettinghausen effect; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof** (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00) [2]

- 37/02 • using thermal change of dielectric constant, e.g. working above and below the Curie point [2]
- 37/04 • using thermal change of magnetic permeability, e.g. working above and below the Curie point [2]

**39/00 Devices using superconductivity or hyperconductivity; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof** (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00; superconductors characterised by the ceramic-forming technique or the ceramic composition C04B 35/00; superconductive or hyperconductive conductors, cables, or transmission lines H01B 12/00; superconductive coils or windings H01F; amplifiers using superconductivity H03F 19/00) [2, 4]

- 39/02 • Details [2]
- 39/04 • • Containers; Mountings [2]
- 39/06 • • characterised by the current path [2]
- 39/08 • • characterised by the shape of the element [2]
- 39/10 • • characterised by the means for switching [2]
- 39/12 • • characterised by the material [2]
- 39/14 • Permanent superconductor devices [2]
- 39/16 • Devices switchable between superconductive and normal states [2]
- 39/18 • • Cryotrons [2]
- 39/20 • • • Power cryotrons [2]
- 39/22 • Devices comprising a junction of dissimilar materials, e.g. Josephson-effect devices [2]
- 39/24 • Processes or apparatus specially adapted for the manufacture or treatment of devices provided for in group H01L 39/00 or of parts thereof [2]

**41/00 Piezo-electric devices in general; Electrostrictive devices in general; Magnetostrictive devices in general; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof** (devices consisting of a plurality of solid-state components formed in or on a common substrate H01L 27/00) [2, 2013.01]

**Note(s)**

1. This group does not cover adaptations for particular purposes, which are covered by the relevant places.
  2. Attention is drawn to the following such places:
- B06B.....for adaptations for  
generating or  
transmitting mechanical  
vibrations
- G01.....for transducers as  
sensing elements for  
measuring
- G04C, G04F.....for transducers adapted  
for use in time-pieces
- G10K.....for adaptations for  
generating or  
transmitting sound
- H02N.....for arrangements of  
elements in electric  
machines
- H03H 9/00.....for networks comprising  
electro-mechanical or  
electro-acoustic  
elements, e.g. resonant  
circuits
- H04R.....for loudspeakers,  
microphones,  
gramophone pick-ups or  
like transducers.

- 41/02 • Details [2]
- 41/04 • • of piezo-electric or electrostrictive elements [2]
- 41/047 • • • Electrodes [6]
- 41/053 • • • Mounts, supports, enclosures or casings [6]
- 41/06 • • of magnetostrictive elements [2]
- 41/08 • Piezo-electric or electrostrictive elements [2]
- 41/083 • • having a stacked or multilayer structure [6]
- 41/087 • • formed as coaxial cables [6]

**Note(s)**

Groups H01L 41/083 and H01L 41/087 take precedence over groups H01L 41/09-H01L 41/113.

- 41/09 • • with electrical input and mechanical output [5]
- 41/107 • • with electrical input and electrical output [5]
- 41/113 • • with mechanical input and electrical output [5]
- 41/12 • Magnetostrictive elements [2]
- 41/16 • Selection of materials [2]
- 41/18 • • for piezo-electric or electrostrictive elements [2]
- 41/187 • • • Ceramic compositions [5]
- 41/193 • • • Macromolecular compositions [5]
- 41/20 • • for magnetostrictive elements [2]
- 41/22 • Processes or apparatus specially adapted for the assembly, manufacture or treatment of piezo-electric or electrostrictive devices or of parts thereof [2, 2013.01]
- 41/23 • • Forming enclosures or casings [2013.01]
- 41/25 • • Assembling devices that include piezo-electric or electrostrictive parts [2013.01]
- 41/253 • • Treating devices or parts thereof to modify a piezo-electric or electrostrictive property, e.g. polarisation characteristics, vibration characteristics or mode tuning [2013.01]
- 41/257 • • • by polarising [2013.01]
- 41/27 • • Manufacturing multilayered piezo-electric or electrostrictive devices or parts thereof, e.g. by stacking piezo-electric bodies and electrodes [2013.01]

- 41/273 • • • by integrally sintering piezo-electric or electrostrictive bodies and electrodes [2013.01]
- 41/277 • • • by stacking bulk piezo-electric or electrostrictive bodies and electrodes [2013.01]
- 41/29 • • Forming electrodes, leads or terminal arrangements [2013.01]

**Note(s) [2013.01]**

The integral arrangement of individual layer electrodes and connection electrodes is classified in both groups H01L 41/293 and H01L 41/297.

- 41/293 • • • Connection electrodes of multilayered piezo-electric or electrostrictive parts [2013.01]
- 41/297 • • • Individual layer electrodes of multilayered piezo-electric or electrostrictive parts [2013.01]
- 41/31 • • Applying piezo-electric or electrostrictive parts or bodies onto an electrical element or another base [2013.01]
- 41/311 • • • Mounting of piezo-electric or electrostrictive parts together with semiconductor elements, or other circuit elements, on a common substrate [2013.01]
- 41/312 • • • by laminating or bonding of piezo-electric or electrostrictive bodies [2013.01]
- 41/313 • • • • by metal fusing or with adhesives [2013.01]
- 41/314 • • • by depositing piezo-electric or electrostrictive layers, e.g. aerosol or screen printing [2013.01]
- 41/316 • • • • by vapour phase deposition [2013.01]
- 41/317 • • • • by liquid phase deposition [2013.01]
- 41/318 • • • • by sol-gel deposition [2013.01]
- 41/319 • • • • using intermediate layers, e.g. for growth control [2013.01]
- 41/33 • • Shaping or machining of piezo-electric or electrostrictive bodies [2013.01]
- 41/331 • • • by coating or depositing using masks, e.g. lift-off [2013.01]
- 41/332 • • • by etching, e.g. lithography [2013.01]
- 41/333 • • • by moulding or extrusion [2013.01]
- 41/335 • • • by machining [2013.01]
- 41/337 • • • • by polishing or grinding [2013.01]
- 41/338 • • • • by cutting or dicing [2013.01]
- 41/339 • • • • by punching [2013.01]
- 41/35 • • Forming piezo-electric or electrostrictive materials [2013.01]
- 41/37 • • • Composite materials [2013.01]
- 41/39 • • • Inorganic materials [2013.01]
- 41/41 • • • • by melting [2013.01]
- 41/43 • • • • by sintering [2013.01]
- 41/45 • • • Organic materials [2013.01]
- 41/47 • Processes or apparatus specially adapted for the assembly, manufacture or treatment of magnetostrictive devices or of parts thereof [2013.01]

**43/00 Devices using galvano-magnetic or similar magnetic effects; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof** (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00) [2]

- 43/02 • Details [2]
- 43/04 • • of Hall-effect devices [2]
- 43/06 • Hall-effect devices [2]
- 43/08 • Magnetic-field-controlled resistors [2]
- 43/10 • Selection of materials [2]

## H01L

- 43/12 • Processes or apparatus specially adapted for the manufacture or treatment of these devices or of parts thereof [2]
- 43/14 • • for Hall-effect devices [2]
- 45/00 **Solid state devices specially adapted for rectifying, amplifying, oscillating, or switching without a potential-jump barrier or surface barrier, e.g. dielectric triodes; Ovshinsky-effect devices; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof** (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00; devices using superconductivity or hyperconductivity H01L 39/00; piezo-electric elements H01L 41/00; bulk negative resistance effect devices H01L 47/00) [2]
- 45/02 • Solid state travelling-wave devices [2]
- 47/00 **Bulk negative resistance effect devices, e.g. Gunn-effect devices; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof** (devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00) [2]
- 47/02 • Gunn-effect devices [2]
- 49/00 **Solid state devices not provided for in groups H01L 27/00-H01L 47/00 and H01L 51/00 and not provided for in any other subclass; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof** [2, 2006.01]
- 49/02 • Thin-film or thick-film devices [2]

- 51/00 **Solid state devices using organic materials as the active part, or using a combination of organic materials with other materials as the active part; Processes or apparatus specially adapted for the manufacture or treatment of such devices, or of parts thereof** (devices consisting of a plurality of components formed in or on a common substrate H01L 27/28; thermoelectric devices using organic material H01L 35/00, H01L 37/00; piezo-electric, electrostrictive or magnetostrictive elements using organic material H01L 41/00) [6, 2006.01]
- 51/05 • specially adapted for rectifying, amplifying, oscillating or switching and having at least one potential-jump barrier or surface barrier; Capacitors or resistors with at least one potential-jump barrier or surface barrier [2006.01]
- 51/10 • • Details of devices [6]
- 51/30 • • Selection of materials [6]
- 51/40 • • Processes or apparatus specially adapted for the manufacture or treatment of such devices or of parts thereof [6, 2006.01]
- 51/42 • specially adapted for sensing infra-red radiation, light, electromagnetic radiation of shorter wavelength, or corpuscular radiation; specially adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation [2006.01]
- 51/44 • • Details of devices [2006.01]
- 51/46 • • Selection of materials [2006.01]
- 51/48 • • Processes or apparatus specially adapted for the manufacture or treatment of such devices or of parts thereof [2006.01]
- 51/50 • specially adapted for light emission, e.g. organic light emitting diodes (OLED) or polymer light emitting devices (PLED) (organic semiconductor lasers H01S 5/36) [2006.01]
- 51/52 • • Details of devices [2006.01]
- 51/54 • • Selection of materials [2006.01]
- 51/56 • • Processes or apparatus specially adapted for the manufacture or treatment of such devices or of parts thereof [2006.01]

**H01M PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL ENERGY INTO ELECTRICAL ENERGY** (electrochemical processes or apparatus in general C25; semiconductor or other solid state devices for converting light or heat into electrical energy H01L, e.g. H01L 31/00, H01L 35/00, H01L 37/00) [2]

### Note(s)

This subclass covers galvanic primary or secondary cells or batteries, fuel cells or batteries.

### Subclass index

#### CELLS ACCORDING TO TYPE

Primary cells.....	6/00
Fuel cells.....	8/00
Secondary cells.....	10/00
Hybrid cells; electrochemical generators not provided for otherwise; combinations of different types of electrochemical generators.....	12/00, 14/00, 16/00

#### DETAILS COMMON TO DIFFERENT TYPES OF CELLS

Details, processes of manufacture of the non-active parts.....	2/00
Electrodes.....	4/00

**2/00 Constructional details, or processes of manufacture, of the non-active parts** [2]

- 2/02 • Cases, jackets, or wrappings (working of plastics or substances in a plastic state B29) [2]
- 2/04 • • Lids or covers [2]

- 2/06 • • Arrangements for introducing electric connectors into or through cases [2]
- 2/08 • • Sealing materials [2]
- 2/10 • Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders (structural combination of accumulators with charging apparatus H01M 10/46) [2]
- 2/12 • Vent plugs or other mechanical arrangements for facilitating escape of gases [2]
- 2/14 • Separators; Membranes; Diaphragms; Spacing elements [2]
- 2/16 • • characterised by the material [2]
- 2/18 • • characterised by the shape [2]
- 2/20 • Current-conducting connections for cells [2]
- 2/22 • • Fixed connections, i.e. not intended for disconnection [2]
- 2/24 • • • Intercell connections through partitions, e.g. in a battery case [2]
- 2/26 • • • Electrode connections [2]
- 2/28 • • • • for lead-acid accumulators [2]
- 2/30 • • Terminals [2]
- 2/32 • • Methods or arrangements for affording protection against corrosion; Selection of materials therefor [2]
- 2/34 • • with provision for preventing undesired use or discharge [2]
- 2/36 • Arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out [2]
- 2/38 • Arrangements for moving electrolytes [2]
- 2/40 • • with external circulating path (H01M 8/04 takes precedence) [2]
- 4/00 Electrodes** (electrodes for electrolytic processes C25) [2]  
**Note(s)**  
 In classifying electrodes of hybrid cells, the individual half-cells of the hybrid cell are considered separately, e.g. an electrode in the primary half of a primary/fuel type hybrid cell is considered to be a primary-cell electrode covered by H01M 4/06.
- 4/02 • Electrodes composed of, or comprising, active material [2]
- 4/04 • • Processes of manufacture in general [2]
- 4/06 • • Electrodes for primary cells [2]
- 4/08 • • • Processes of manufacture [2]
- 4/10 • • • • of pressed electrodes with central core, i.e. dollies [2]
- 4/12 • • • • of consumable metal or alloy electrodes (use of alloy compositions as active materials H01M 4/38) [2]
- 4/13 • • Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators; Processes of manufacture thereof [2010.01]  
**Note(s) [2010.01]**  
 This group does not cover electrodes for accumulators working at high temperatures, e.g. molten sodium electrodes, which subject matter is classified in group H01M 10/39.
- 4/131 • • • Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx [2010.01]
- 4/1315 • • • • containing halogen atoms, e.g. LiCoOxFy [2010.01]
- 4/133 • • • Electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx [2010.01]
- 4/134 • • • Electrodes based on metals, Si or alloys [2010.01]
- 4/136 • • • Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy [2010.01]
- 4/137 • • • Electrodes based on electro-active polymers [2010.01]
- 4/139 • • • Processes of manufacture [2010.01]
- 4/1391 • • • • of electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx [2010.01]
- 4/13915 • • • • • containing halogen atoms, e.g. LiCoOxFy [2010.01]
- 4/1393 • • • • of electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx [2010.01]
- 4/1395 • • • • of electrodes based on metals, Si or alloys [2010.01]
- 4/1397 • • • • of electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy [2010.01]
- 4/1399 • • • • of electrodes based on electro-active polymers [2010.01]
- 4/14 • • Electrodes for lead-acid accumulators [2]
- 4/16 • • • Processes of manufacture [2]
- 4/18 • • • • of Plante electrodes [2]
- 4/20 • • • • of pasted electrodes [2]
- 4/21 • • • • • Drying of pasted electrodes [2]
- 4/22 • • • • Forming of electrodes [2]
- 4/23 • • • • • Drying or preserving electrodes after forming [2]
- 4/24 • • Electrodes for alkaline accumulators [2]
- 4/26 • • • Processes of manufacture [2]
- 4/28 • • • • Precipitating active material on the carrier [2]
- 4/29 • • • • • by electrochemical methods [2]
- 4/30 • • • • Pressing [2]
- 4/32 • • • Nickel oxide or hydroxide electrodes [2]
- 4/34 • • • Silver oxide or hydroxide electrodes [2]
- 4/36 • • Selection of substances as active materials, active masses, active liquids [2]
- 4/38 • • • of elements or alloys [2]
- 4/40 • • • • Alloys based on alkali metals [2]
- 4/42 • • • • Alloys based on zinc [2]
- 4/44 • • • • Alloys based on cadmium [2]
- 4/46 • • • • Alloys based on magnesium or aluminium [2]
- 4/48 • • • of inorganic oxides or hydroxides [2, 2010.01]
- 4/485 • • • • of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi<sub>2</sub>O<sub>4</sub> or LiTi<sub>2</sub>OxFy (H01M 4/505, H01M 4/525 take precedence) [2010.01]
- 4/50 • • • • of manganese [2, 2010.01]
- 4/505 • • • • • of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn<sub>2</sub>O<sub>4</sub> or LiMn<sub>2</sub>OxFy [2010.01]
- 4/52 • • • • of nickel, cobalt or iron [2, 2010.01]

- 4/525 • • • • of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. LiNiO<sub>2</sub>, LiCoO<sub>2</sub> or LiCoOxFy [2010.01]
- 4/54 • • • • of silver [2]
- 4/56 • • • • of lead [2]
- 4/57 • • • • of "grey lead", i.e. powders containing lead and lead oxide [2]
- 4/58 • • • of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy [2, 2010.01]
- 4/583 • • • Carbonaceous material, e.g. graphite-intercalation compounds or CFx [2010.01]
- 4/587 • • • • for inserting or intercalating light metals [2010.01]
- 4/60 • • • of organic compounds [2]
- 4/62 • • Selection of inactive substances as ingredients for active masses, e.g. binders, fillers [2]
- 4/64 • • Carriers or collectors [2]
- 4/66 • • • Selection of materials [2]
- 4/68 • • • • for use in lead-acid accumulators [2]
- 4/70 • • • characterised by shape or form [2]
- 4/72 • • • • Grids [2]
- 4/73 • • • • for lead-acid accumulators, e.g. frame plates [2]
- 4/74 • • • • Meshes or woven material; Expanded metal [2]
- 4/75 • • • • Wires, rods, or strips [2]
- 4/76 • • • • Containers for holding the active material, e.g. tubes, capsules [2]
- 4/78 • • • • Shapes other than plane or cylindrical, e.g. helical [2]
- 4/80 • • • • Porous plates, e.g. sintered carriers [2]
- 4/82 • • • Multi-step processes for manufacturing carriers for lead-acid accumulators (single-step processes, see the relevant subclasses, e.g. B21D, B22D) [2]
- 4/84 • • • • involving casting [2]
- 4/86 • Inert electrodes with catalytic activity, e.g. for fuel cells [2]
- 4/88 • • Processes of manufacture [2]
- 4/90 • • Selection of catalytic material [2]
- 4/92 • • • Metals of platinum group (H01M 4/94 takes precedence) [2]
- 4/94 • • Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes [2]
- 4/96 • • Carbon-based electrodes [2]
- 4/98 • • Raney-type electrodes [2]

#### 6/00 Primary cells; Manufacture thereof [2]

##### Note(s)

In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.

- 6/02 • Details (of non-active parts H01M 2/00, of electrodes H01M 4/00) [2]
- 6/04 • Cells with aqueous electrolyte [2]
- 6/06 • • Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid [2]
- 6/08 • • • with cup-shaped electrodes [2]
- 6/10 • • • with wound or folded electrodes [2]
- 6/12 • • • with flat electrodes [2]
- 6/14 • Cells with non-aqueous electrolyte [2]
- 6/16 • • with organic electrolyte (H01M 6/18 takes precedence) [2]

- 6/18 • • with solid electrolyte [2]
- 6/20 • • • working at high temperature (deferred-action thermal cells H01M 6/36) [2]
- 6/22 • Immobilising of electrolyte [2]
- 6/24 • Cells comprising two different electrolytes [2]
- 6/26 • Cells without oxidising active material, e.g. Volta cells [2]
- 6/28 • Standard cells, e.g. Weston cells [2]
- 6/30 • Deferred-action cells [2]
- 6/32 • • activated through external addition of electrolyte or of electrolyte components [2]
- 6/34 • • • Immersion cells, e.g. sea-water cells [2]
- 6/36 • • containing electrolyte and made operational by physical means, e.g. thermal cells (thermoelectric solid state devices H01L 35/00, H01L 37/00) [2]
- 6/38 • • • by mechanical means [2]
- 6/40 • Printed batteries [2]
- 6/42 • Grouping of primary cells into batteries (H01M 6/40 takes precedence) [2]
- 6/44 • • of tubular or cup-shaped cells [2]
- 6/46 • • of flat cells [2]
- 6/48 • • • with bipolar electrodes [2]
- 6/50 • Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature [2]
- 6/52 • Reclaiming serviceable parts of waste cells or batteries [2]

#### 8/00 Fuel cells; Manufacture thereof [2]

##### Note(s)

In this group, fuel cells are electrochemical generators wherein the reactants are supplied from outside.

- 8/02 • Details (of non-active parts H01M 2/00, of electrodes H01M 4/00) [2]
- 8/04 • Auxiliary arrangements or processes, e.g. for control of pressure, for circulation of fluids [2]
- 8/06 • Combination of fuel cell with means for production of reactants or for treatment of residues (regenerative fuel cells H01M 8/18; production of reactants per se, see sections B or C) [2]
- 8/08 • Fuel cells with aqueous electrolytes [2]
- 8/10 • Fuel cells with solid electrolytes [2]
- 8/12 • • operating at high temperature, e.g. with stabilised ZrO<sub>2</sub> electrolyte [2]
- 8/14 • Fuel cells with fused electrolytes [2]
- 8/16 • Biochemical fuel cells, i.e. cells in which micro-organisms function as catalysts [2]
- 8/18 • Regenerative fuel cells [2]
- 8/20 • Indirect fuel cells, e.g. redox cells (H01M 8/18 takes precedence) [2]
- 8/22 • Fuel cells in which the fuel is based on materials comprising carbon or oxygen or hydrogen and other elements; Fuel cells in which the fuel is based on materials comprising only elements other than carbon, oxygen, or hydrogen [2]
- 8/24 • Grouping of fuel cells into batteries, e.g. modules [2]

#### 10/00 Secondary cells; Manufacture thereof [2]

##### Note(s)

In this group, secondary cells are accumulators receiving and supplying electrical energy by means of reversible electrochemical reactions.

- 10/02 • Details (of non-active parts H01M 2/00, of electrodes H01M 4/00) [2]



- 10/04 • Construction or manufacture in general (H01M 10/12, H01M 10/28, H01M 10/38 take precedence) [2]
- 10/05 • Accumulators with non-aqueous electrolyte (H01M 10/39 takes precedence) [2010.01]
- 10/052 • • Li-accumulators [2010.01]
- 10/0525 • • • Rocking-chair batteries, i.e. batteries with lithium insertion or intercalation in both electrodes; Lithium-ion batteries [2010.01]
- 10/054 • • Accumulators with insertion or intercalation of metals other than lithium, e.g. with magnesium or aluminium [2010.01]
- 10/056 • • characterised by the materials used as electrolytes, e.g. mixed inorganic/organic electrolytes [2010.01]
- 10/0561 • • • the electrolyte being constituted of inorganic materials only [2010.01]
- 10/0562 • • • • Solid materials [2010.01]
- 10/0563 • • • • Liquid materials, e.g. for Li-SOCl<sub>2</sub> cells [2010.01]
- 10/0564 • • • the electrolyte being constituted of organic materials only [2010.01]
- 10/0565 • • • • Polymeric materials, e.g. gel-type or solid-type [2010.01]
- 10/0566 • • • • Liquid materials [2010.01]
- 10/0567 • • • • • characterised by the additives [2010.01]
- 10/0568 • • • • • characterised by the solutes [2010.01]
- 10/0569 • • • • • characterised by the solvents [2010.01]
- 10/058 • • Construction or manufacture [2010.01]
- 10/0583 • • • of accumulators with folded construction elements except wound ones, i.e. folded positive or negative electrodes or separators, e.g. with "Z"-shaped electrodes or separators [2010.01]
- 10/0585 • • • of accumulators having only flat construction elements, i.e. flat positive electrodes, flat negative electrodes and flat separators [2010.01]
- 10/0587 • • • of accumulators having only wound construction elements, i.e. wound positive electrodes, wound negative electrodes and wound separators [2010.01]
- 10/06 • Lead-acid accumulators (semi-lead accumulators H01M 10/20) [2]
- 10/08 • • Selection of materials as electrolytes [2]
- 10/10 • • Immobilising of electrolyte [2]
- 10/12 • • Construction or manufacture [2]
- 10/14 • • • Assembling a group of electrodes or separators [2]
- 10/16 • • • Suspending or supporting electrodes or groups of electrodes in the case [2]
- 10/18 • • with bipolar electrodes [2]
- 10/20 • Semi-lead accumulators, i.e. accumulators in which only one electrode contains lead [2]
- 10/22 • • Selection of materials as electrolytes [2]
- 10/24 • Alkaline accumulators [2]
- 10/26 • • Selection of materials as electrolytes [2]
- 10/28 • • Construction or manufacture [2]
- 10/30 • • Nickel accumulators (H01M 10/34 takes precedence) [2]
- 10/32 • • Silver accumulators (H01M 10/34 takes precedence) [2]
- 10/34 • Gastight accumulators [2]
- 10/36 • Accumulators not provided for in groups H01M 10/05-H01M 10/34 [2, 2010.01]
- 10/38 • • Construction or manufacture [2]
- 10/39 • • working at high temperature [2]
- 10/42 • Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells (H01M 10/60 takes precedence) [2]
- 10/44 • • Methods for charging or discharging (circuits for charging H02J 7/00) [2]
- 10/46 • • Accumulators structurally combined with charging apparatus (circuits for charging H02J 7/00) [2]
- 10/48 • • Accumulators combined with arrangements for measuring, testing, or indicating condition, e.g. level or density of the electrolyte (indicating or measuring level of liquid in general G01F 23/00; measuring density G01N, e.g. G01N 9/00; measuring electric variables G01R) [2]
- 10/52 • • Removing gases inside the secondary cell, e.g. by absorption (vent plugs or other mechanical arrangements for facilitating escape of gases H01M 2/12) [2]
- 10/54 • Reclaiming serviceable parts of waste accumulators [2]
- 10/60 • Heating or cooling; Temperature control [2014.01]
- 10/61 • • Types of temperature control [2014.01]
- 10/613 • • • Cooling or keeping cold [2014.01]
- 10/615 • • • Heating or keeping warm [2014.01]
- 10/617 • • • for achieving uniformity or desired distribution of temperature [2014.01]
- 10/62 • • specially adapted for specific applications [2014.01]
- 10/623 • • • Portable devices, e.g. mobile telephones, cameras or pacemakers [2014.01]
- 10/6235 • • • • Power tools [2014.01]
- 10/625 • • • Vehicles [2014.01]
- 10/627 • • • Stationary installations, e.g. power plant buffering or backup power supplies [2014.01]
- 10/63 • • Control systems (measurement of temperature H01M 10/48; charging or discharging in response to temperature H01M 10/44) [2014.01]
- 10/633 • • • characterised by algorithms, flow charts, software details or the like [2014.01]
- 10/635 • • • based on ambient temperature [2014.01]
- 10/637 • • • characterised by the use of reversible temperature-sensitive devices, e.g. NTC, PTC or bimetal devices; characterised by control of the internal current flowing through the cells, e.g. by switching (H01M 2/34 takes precedence) [2014.01]
- 10/64 • • characterised by the shape of the cells [2014.01]
- 10/643 • • • Cylindrical cells [2014.01]
- 10/647 • • • Prismatic or flat cells, e.g. pouch cells [2014.01]
- 10/65 • • Means for temperature control structurally associated with the cells [2014.01]
- 10/651 • • • characterised by parameters specified by a numeric value or mathematical formula, e.g. ratios, sizes or concentrations [2014.01]
- 10/652 • • • • characterised by gradients (for achieving a desired temperature gradient H01M 10/617) [2014.01]
- 10/653 • • • characterised by electrically insulating or thermally conductive materials [2014.01]
- 10/654 • • • located inside the innermost case of the cells, e.g. mandrels, electrodes or electrolytes [2014.01]
- 10/655 • • • Solid structures for heat exchange or heat conduction [2014.01]

## H01M

- 10/6551 • • • • Surfaces specially adapted for heat dissipation or radiation, e.g. fins or coatings [2014.01]
- 10/6552 • • • • Closed pipes transferring heat by thermal conductivity or phase transition, e.g. heat pipes [2014.01]
- 10/6553 • • • • Terminals or leads [2014.01]
- 10/6554 • • • • Rods or plates [2014.01]
- 10/6555 • • • • • arranged between the cells [2014.01]
- 10/6556 • • • • Solid parts with flow channel passages or pipes for heat exchange (closed pipes H01M 10/6552) [2014.01]
- 10/6557 • • • • • arranged between the cells [2014.01]
- 10/656 • • • characterised by the type of heat-exchange fluid [2014.01]
- 10/6561 • • • • Gases [2014.01]
- 10/6562 • • • • • with free flow by convection only [2014.01]
- 10/6563 • • • • • with forced flow, e.g. by blowers [2014.01]
- 10/6564 • • • • • using compressed gas [2014.01]
- 10/6565 • • • • • with recirculation or U-turn in the flow path, i.e. back and forth [2014.01]
- 10/6566 • • • • • Means within the gas flow to guide the flow around one or more cells, e.g. manifolds, baffles or other barriers (H01M 10/6565 takes precedence) [2014.01]
- 10/6567 • • • • Liquids [2014.01]
- 10/6568 • • • • • characterised by flow circuits, e.g. loops, located externally to the cells or cell casings [2014.01]
- 10/6569 • • • • Fluids undergoing a liquid-gas phase change or transition, e.g. evaporation or condensation (heat pipes H01M 10/6552) [2014.01]
- 10/657 • • • • by electric or electromagnetic means [2014.01]
- 10/6571 • • • • Resistive heaters (arrangements for heating the battery by its resistance to the internal current H01M 10/637) [2014.01]
- 10/6572 • • • • Peltier elements or thermoelectric devices [2014.01]
- 10/658 • • • • by thermal insulation or shielding [2014.01]
- 10/659 • • • • by heat storage or buffering, e.g. heat capacity or liquid-solid phase changes or transition [2014.01]
- 10/6595 • • • • by chemical reactions other than electrochemical reactions of the cells, e.g. catalytic heaters or burners [2014.01]
- 10/66 • • Heat-exchange relationships between the cells and other systems, e.g. central heating systems or fuel cells [2014.01]
- 10/663 • • • the system being an air-conditioner or an engine [2014.01]
- 10/667 • • • the system being an electronic component, e.g. a CPU, an inverter or a capacitor [2014.01]
- 12/00 Hybrid cells; Manufacture thereof [2]**
- Note(s)**  
In this group, hybrid cells are electrochemical generators having two different types of half-cells, the half-cell being an electrode-electrolyte combination of either a primary, a secondary, or a fuel cell.
- 12/02 • Details (of non-active parts H01M 2/00, of electrodes H01M 4/00) [2]
- 12/04 • composed of a half-cell of the fuel-cell type and of a half-cell of the primary-cell type (methods or arrangements for servicing or maintenance H01M 6/50) [2]
- 12/06 • • with one metallic and one gaseous electrode [2]
- 12/08 • composed of a half-cell of a fuel-cell type and a half-cell of the secondary-cell type (methods or arrangements for servicing or maintenance, e.g. for charging, H01M 10/42) [2]
- 14/00 Electrochemical current or voltage generators not provided for in groups H01M 6/00-H01M 12/00; Manufacture thereof [2]**
- 16/00 Structural combinations of different types of electrochemical generators [2]**

## H01P WAVEGUIDES; RESONATORS, LINES OR OTHER DEVICES OF THE WAVEGUIDE TYPE (operating at optical frequencies G02B)

### Note(s)

In this subclass, the following expression is used with the meaning indicated:

- "waveguide type" as applied to transmission lines includes only high-frequency coaxial cables or Lecher lines, and as applied to resonators, delay lines, or other devices includes all devices having distributed inductance and capacitance.

### Subclass index

WAVEGUIDES, TRANSMISSION LINES..... 3/00  
 DEVICES OF THE WAVEGUIDE TYPE  
   Auxiliary devices; coupling devices; resonators; delay lines..... 1/00, 5/00, 7/00, 9/00  
 MANUFACTURE..... 11/00

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li><b>1/00 Auxiliary devices</b> (coupling devices of the waveguide type H01P 5/00)</li> <li>1/02 • Bends; Corners; Twists</li> <li>1/04 • Fixed joints</li> <li>1/06 • Movable joints, e.g. rotating joints</li> <li>1/08 • Dielectric windows</li> </ul> | <ul style="list-style-type: none"> <li>1/10 • for switching or interrupting</li> <li>1/11 • • by ferromagnetic devices [3]</li> <li>1/12 • • by mechanical chopper</li> <li>1/14 • • by electric discharge devices (discharge devices H01J 17/64)</li> <li>1/15 • • by semiconductor devices [2]</li> </ul> |
|--|---|

- 1/16 • for mode selection, e.g. mode suppression or mode promotion; for mode conversion [3]
- 1/161 • • sustaining two independent orthogonal modes, e.g. orthomode transducer [3]
- 1/162 • • absorbing spurious or unwanted modes of propagation [3]
- 1/163 • • specifically adapted for selection or promotion of the  $TE_{01}$  circular-electric mode [3]
- 1/165 • for rotating the plane of polarisation [2]
- 1/17 • • for producing a continuously rotating polarisation, e.g. circular polarisation [2]
- 1/175 • • using Faraday rotators [3]
- 1/18 • Phase-shifters (H01P 1/165 takes precedence) [2]
- 1/185 • • using a diode or a gas filled discharge tube [3]
- 1/19 • • using a ferromagnetic device [3]
- 1/195 • • • having a toroidal shape [3]
- 1/20 • Frequency-selective devices, e.g. filters
- 1/201 • • Filters for transverse electromagnetic waves (H01P 1/212, H01P 1/213, H01P 1/215, H01P 1/219 take precedence) [3]
- 1/202 • • • Coaxial filters (cascaded coaxial cavities H01P 1/205) [3]
- 1/203 • • • Strip line filters [3]
- 1/205 • • • Comb or interdigital filters; Cascaded coaxial cavities (H01P 1/203 takes precedence) [3]
- 1/207 • • Hollow waveguide filters (H01P 1/212, H01P 1/213, H01P 1/215, H01P 1/219 take precedence) [3]
- 1/208 • • • Cascaded cavities; Cascaded resonators inside a hollow waveguide structure (H01P 1/205 takes precedence) [3]
- 1/209 • • • comprising one or more branching arms or cavities wholly outside the main waveguide [3]
- 1/211 • • • Waffle-iron filters; Corrugated structures [3]
- 1/212 • • suppressing or attenuating harmonic frequencies (H01P 1/215 takes precedence) [3]
- 1/213 • • combining or separating two or more different frequencies (H01P 1/215 takes precedence) [3]
- 1/215 • • using ferromagnetic material [3]
- 1/217 • • • the ferromagnetic material acting as a tuning element in resonators [3]
- 1/218 • • • the ferromagnetic material acting as a frequency selective coupling element, e.g. YIG-filters [3]
- 1/219 • • Evanescent mode filters [3]
- 1/22 • Attenuating devices (dissipative terminating devices H01P 1/26)
- 1/23 • • using ferromagnetic material [3]
- 1/24 • Terminating devices
- 1/26 • • Dissipative terminations
- 1/28 • • Short-circuiting plungers
- 1/30 • for compensation of, or protection against, temperature or moisture effects
- 1/32 • Non-reciprocal transmission devices (H01P 1/02-H01P 1/30 take precedence) [3]
- 1/36 • • Isolators [2, 3]
- 1/365 • • • Resonance absorption isolators [3]
- 1/37 • • • Field displacement isolators [3]
- 1/375 • • • using Faraday rotators [3]
- 1/38 • • Circulators [2, 3]
- 1/383 • • • Junction circulators, e.g. Y-circulators [3]
- 1/387 • • • • Strip line circulators [3]
- 1/39 • • • • Hollow waveguide circulators [3]
- 1/393 • • • using Faraday rotators [3]
- 1/397 • • • using non-reciprocal phase shifters (H01P 1/393 takes precedence) [3]
- 3/00 Waveguides; Transmission lines of the waveguide type**
- 3/02 • with two longitudinal conductors
- 3/04 • • Lines formed as Lecher wire pairs
- 3/06 • • Coaxial lines
- 3/08 • • Microstrips; Strip lines
- 3/10 • Wire waveguides, i.e. with a single solid longitudinal conductor
- 3/12 • Hollow waveguides (H01P 3/20 takes precedence)
- 3/123 • • with a complex or stepped cross-section, e.g. ridged or grooved waveguides (H01P 3/14 takes precedence) [3]
- 3/127 • • with a circular, elliptic, or parabolic cross-section [3]
- 3/13 • • specially adapted for transmission of the  $TE_{01}$  circular-electric mode [2]
- 3/14 • • flexible
- 3/16 • Dielectric waveguides, i.e. without a longitudinal conductor
- 3/18 • built-up from several layers to increase operating surface, i.e. alternately conductive and dielectric layers
- 3/20 • Quasi-optical arrangements for guiding a wave, e.g. focusing by dielectric lenses
- 5/00 Coupling devices of the waveguide type**
- 5/02 • with invariable factor of coupling (H01P 5/12 takes precedence) [3]
- 5/04 • with variable factor of coupling
- 5/08 • for linking lines or devices of different kinds (H01P 1/16, H01P 5/04 take precedence; linking lines of the same kind but with different dimensions H01P 5/02) [3]
- 5/10 • • for coupling balanced with unbalanced lines or devices
- 5/103 • • • Hollow-waveguide/coaxial-line transitions [3]
- 5/107 • • • Hollow-waveguide/strip-line transitions [3]
- 5/12 • Coupling devices having more than two ports (H01P 5/04 takes precedence) [3]
- 5/16 • • Conjugate devices, i.e. devices having at least one port decoupled from one other port [2]
- 5/18 • • • consisting of two coupled guides, e.g. directional couplers [2]
- 5/19 • • • of the junction type [3]
- 5/20 • • • • Magic-T junctions [2, 3]
- 5/22 • • • • Hybrid ring junctions [2, 3]
- 7/00 Resonators of the waveguide type**
- 7/02 • Lecher resonators
- 7/04 • Coaxial resonators
- 7/06 • Cavity resonators
- 7/08 • Strip line resonators [3]
- 7/10 • Dielectric resonators [3]
- 9/00 Delay lines of the waveguide type**
- 9/02 • Helical lines
- 9/04 • Interdigital lines
- 11/00 Apparatus or processes specially adapted for manufacturing waveguides or resonators, lines, or other devices of the waveguide type**

## H01P

**H01Q** **AERIALS** (microwave radiators for near-field therapeutic treatment A61N 5/04; apparatus for testing aerials or for measuring aerial characteristics G01R; waveguides H01P; radiators or aerials for microwave heating H05B 6/72)

### Note(s)

1. This subclass covers:
  - in addition to the primary active radiating elements,
    - i. secondary devices for absorbing or for modifying the direction or polarisation of waves radiated from aerials, and
    - ii. combinations with auxiliary devices such as earthing switches, lead-in devices, and lightning protectors;
  - both transmitting and receiving aerials.
2. This subclass does not cover devices of the waveguide type, such as resonators or lines, not designed as radiating elements, which are covered by subclass H01P.
3. In this subclass, the following expression is used with the meaning indicated:
  - "active radiating element" covers corresponding parts of a receiving aerial.

### Subclass index

#### TYPES OF AERIALS

Loop type.....	7/00
Waveguide type.....	13/00
Other type: short; long.....	9/00, 11/00

#### DEVICES FOR INFLUENCING RADIATED WAVES

Quasi-optical; absorbing.....	15/00, 17/00
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COMBINATIONS OF PRIMARY ACTIVE ELEMENTS WITH SECONDARY DEVICES.....19/00

COMBINATIONS OF AERIALS WITH ACTIVE CIRCUITS OR CIRCUIT ELEMENTS.....23/00

ARRANGEMENTS PROVIDING MORE THAN ONE RADIATION PATTERN.....25/00

AERIAL ARRAYS OR SYSTEMS.....21/00

#### SPECIAL ARRANGEMENTS

Details; orientation; simultaneity.....	1/00, 3/00, 5/00
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**1/00** **Details of, or arrangements associated with, aerials**  
(arrangements for varying orientation of directional pattern H01Q 3/00)

### Note(s)

1. This group covers only:
    - structural details or features of aerials not dependent on electric operation;
    - structural details or features applicable to more than one type of aerial or aerial element.
  2. Structural details or features described with reference to, or clearly applicable only to, aerials or aerial elements of a particular type are classified in the group appropriate to that type.
- |      |  |      |  |
|------|--|------|--|
| 1/02 | • Arrangements for de-icing; Arrangements for drying-out   | 1/27 | • Adaptation for use in or on movable bodies (H01Q 1/08, H01Q 1/12, H01Q 1/18 take precedence) [3]   |
| 1/04 | • Adaptation for subterranean or subaqueous use  | 1/28 | • • Adaptation for use in or on aircraft, missiles, satellites, or balloons [3]  |
| 1/06 | • Means for the lighting or illuminating of aerials, e.g. for purpose of warning   | 1/30 | • • • Means for trailing aerials [3]   |
| 1/08 | • Means for collapsing aerials or parts thereof (collapsible loop aerials H01Q 7/02; collapsible H-aerials or Yagi aerials H01Q 19/04) | 1/32 | • • Adaptation for use in or on road or rail vehicles (telescopic elements H01Q 1/10; resilient mountings for aerials H01Q 1/20) [3]                             |
| 1/10 | • • Telescopic elements  | 1/34 | • • Adaptation for use in or on ships, submarines, buoys, or torpedoes (for subaqueous use H01Q 1/04; retractable loop aerials H01Q 7/02) [3]                    |
| 1/12 | • Supports; Mounting means (supporting conductors in general H02G 7/00)  | 1/36 | • Structural form of radiating elements, e.g. cone, spiral, umbrella (H01Q 1/08, H01Q 1/14 take precedence)  |
| 1/14 | • • for wire or other non-rigid radiating elements   | 1/38 | • • formed by a conductive layer on an insulating support (conductors in general H01B 5/14)  |
| 1/16 | • • • Strainers, spreaders, or spacers   | 1/40 | • Radiating elements coated with, or embedded in, protective material  |
| 1/18 | • • Means for stabilising aerials on an unstable platform  | 1/42 | • Housings not intimately mechanically associated with radiating elements, e.g. radome   |
| 1/20 | • • Resilient mountings  | 1/44 | • using equipment having another main function to serve additionally as an aerial (H01Q 1/28-H01Q 1/34 take precedence)  |
| 1/22 | • • by structural association with other equipment or articles   | 1/46 | • • Electric supply lines or communication lines   |
| 1/24 | • • • with receiving set   | 1/48 | • Earthing means; Earth screens; Counterpoises (earthing pins H01R 4/66)   |
| 1/26 | • • • with electric discharge tube   | 1/50 | • Structural association of aerials with earthing switches, lead-in devices, or lightning protectors (lead-in devices H01B; lightning protectors, switches H01H) |
|      |  | 1/52 | • Means for reducing coupling between aerials; Means for reducing coupling between an aerial and another structure (absorbing means H01Q 17/00)                  |

- 3/00 Arrangements for changing or varying the orientation or the shape of the directional pattern of the waves radiated from an aerial or aerial system**
- 3/01 • varying the shape of the aerial or aerial system [3]
  - 3/02 • using mechanical movement of aerial or aerial system as a whole
  - 3/04 • • for varying one co-ordinate of the orientation
  - 3/06 • • • over a restricted angle
  - 3/08 • • for varying two co-ordinates of the orientation
  - 3/10 • • • to produce a conical or spiral scan
  - 3/12 • using mechanical relative movement between primary active elements and secondary devices of aerials or aerial systems
  - 3/14 • • for varying the relative position of primary active element and a refracting or diffracting device
  - 3/16 • • for varying relative position of primary active element and a reflecting device
  - 3/18 • • • wherein the primary active element is movable and the reflecting device is fixed
  - 3/20 • • • wherein the primary active element is fixed and the reflecting device is movable
  - 3/22 • varying the orientation in accordance with variation of frequency of radiated wave
  - 3/24 • varying the orientation by switching energy from one active radiating element to another, e.g. for beam switching
  - 3/26 • varying the relative phase or relative amplitude of energisation between two or more active radiating elements; varying the distribution of energy across a radiating aperture (H01Q 3/22, H01Q 3/24 take precedence)
  - 3/28 • • varying the amplitude [3]
  - 3/30 • • varying the phase [3]
  - 3/32 • • • by mechanical means [3]
  - 3/34 • • • by electrical means (active lenses or reflecting arrays H01Q 3/46) [3]
  - 3/36 • • • • with variable phase-shifters [3]
  - 3/38 • • • • the phase-shifters being digital [3]
  - 3/40 • • • • with phasing matrix [3]
  - 3/42 • • • • using frequency-mixing [3]
  - 3/44 • varying the electric or magnetic characteristics of reflecting, refracting, or diffracting devices associated with the radiating element [3]
  - 3/46 • • Active lenses or reflecting arrays [3]
- 5/00 Arrangements for simultaneous operation of aerials on two or more different wavebands** (length of elements adjustable H01Q 9/14; combinations of separate active aerial units operating in different wavebands and connected to a common feeder system H01Q 21/30) [3]
- 5/01 • Resonant aerials [3]
  - 5/02 • • for operation of centre-fed aerials which comprise a single, or two or more collinear, substantially straight elongated active elements [3]
- 7/00 Loop aerials with a substantially uniform current distribution around the loop and having a directional radiation pattern in a plane perpendicular to the plane of the loop**
- 7/02 • Collapsible aerials; Retractable aerials
  - 7/04 • Screened aerials (H01Q 7/02, H01Q 7/06 take precedence)
  - 7/06 • with core of ferromagnetic material (H01Q 7/02 takes precedence)
  - 7/08 • • Ferrite rod or like elongated core
- 9/00 Electrically-short aerials having dimensions not more than twice the operating wavelength and consisting of conductive active radiating elements** (loop aerials H01Q 7/00; waveguide horns or mouths H01Q 13/00; slot aerials H01Q 13/00; combinations of active elements with secondary devices to give desired directional characteristic H01Q 19/00; combinations of two or more active elements H01Q 21/00)
- 9/02 • Non-resonant aerials
  - 9/04 • Resonant aerials
  - 9/06 • • Details
  - 9/08 • • • Junction boxes specially adapted for supporting adjacent ends of collinear rigid elements
  - 9/10 • • • Junction boxes specially adapted for supporting adjacent ends of divergent elements
  - 9/12 • • • • adapted for adjustment of angle between elements
  - 9/14 • • • Length of element or elements adjustable (telescopic elements H01Q 1/10)
  - 9/16 • • with feed intermediate between the extremities of the aerial, e.g. centre-fed dipole (H01Q 9/44 takes precedence)
  - 9/18 • • • Vertical disposition of the aerial
  - 9/20 • • • Two collinear substantially straight active elements; Substantially straight single active elements (H01Q 9/28 takes precedence)
  - 9/22 • • • • Rigid rod or equivalent tubular element or elements
  - 9/24 • • • • Shunt feed arrangements to single active elements, e.g. for delta matching
  - 9/26 • • • with folded element or elements, the folded parts being spaced apart a small fraction of operating wavelength (resonant loop aerials H01Q 7/00)
  - 9/27 • • • • Spiral aerials [3]
  - 9/28 • • • Conical, cylindrical, cage, strip, gauze, or like elements having an extended radiating surface; Elements comprising two conical surfaces having collinear axes and adjacent apices and fed by two-conductor transmission lines (biconical horns H01Q 13/04)
  - 9/30 • • with feed to end of elongated active element, e.g. unipole (H01Q 9/44 takes precedence)
  - 9/32 • • • Vertical arrangement of element (H01Q 9/40 takes precedence)
  - 9/34 • • • • Mast, tower, or like self-supporting or stay-supported aerials
  - 9/36 • • • • with top loading
  - 9/38 • • • • with counterpoise (with counterpoise comprising elongated elements coplanar with the active element H01Q 9/44)
  - 9/40 • • • Element having extended radiating surface
  - 9/42 • • • with folded element, the folded parts being spaced apart a small fraction of the operating wavelength
  - 9/43 • • • • Scimitar aerials [3]
  - 9/44 • • with plurality of divergent straight elements, e.g. V-dipole, X-aerial; with plurality of elements having mutually inclined substantially straight portions (turnstile aerials H01Q 21/26)
  - 9/46 • • • with rigid elements diverging from single point

- 11/00 Electrically-long aerials having dimensions more than twice the shortest operating wavelength and consisting of conductive active radiating elements** (leaky-waveguide aerials, slot aerials H01Q 13/00; combinations of active elements with secondary devices to give desired directional characteristic H01Q 19/00; aerial arrays or systems H01Q 21/00)
- 11/02 • Non-resonant aerials, e.g. travelling-wave aerial
- 11/04 • • with parts bent, folded, shaped, screened, or electrically loaded to obtain desired phase relation of radiation from selected sections of the aerial (rhombic aerials, V-aerials H01Q 11/06)
- 11/06 • • Rhombic aerials; V-aerials
- 11/08 • • Helical aerials
- 11/10 • • Log-periodic aerials (H01Q 11/08 takes precedence) [3]
- 11/12 • Resonant aerials
- 11/14 • • with parts bent, folded, shaped, or screened, or with phasing impedances, to obtain desired phase relation of radiation from selected sections of the aerial or to obtain desired polarisation effects
- 11/16 • • • in which the selected sections are collinear
- 11/18 • • • in which the selected sections are parallelly spaced [3]
- 11/20 • • V-aerials
- 13/00 Waveguide horns or mouths; Slot aerials; Leaky-waveguide aerials; Equivalent structures causing radiation along the transmission path of a guided wave** (multimode aerials H01Q 25/04)
- 13/02 • Waveguide horns
- 13/04 • • Biconical horns (biconical dipoles comprising two conical surfaces having collinear axes and adjacent apices and fed by a two-conductor transmission line H01Q 9/28)
- 13/06 • Waveguide mouths (horns H01Q 13/02)
- 13/08 • Radiating ends of two-conductor microwave transmission lines, e.g. of coaxial lines, of microstrip lines
- 13/10 • Resonant slot aerials
- 13/12 • • Longitudinally slotted cylinder aerials; Equivalent structures
- 13/14 • • • Skeleton cylinder aerials
- 13/16 • • Folded slot aerials
- 13/18 • • the slot being backed by, or formed in boundary wall of, a resonant cavity (longitudinally slotted cylinder H01Q 13/12)
- 13/20 • Non-resonant leaky-waveguide or transmission-line aerials; Equivalent structures causing radiation along the transmission path of a guided wave
- 13/22 • • Longitudinal slot in boundary wall of waveguide or transmission line
- 13/24 • • constituted by a dielectric or ferromagnetic rod or pipe (H01Q 13/28 takes precedence)
- 13/26 • • Surface waveguide constituted by a single conductor, e.g. strip conductor
- 13/28 • • comprising elements constituting electric discontinuities and spaced in direction of wave propagation, e.g. dielectric elements, conductive elements forming artificial dielectric (Yagi aerials H01Q 19/30)
- 15/00 Devices for reflection, refraction, diffraction, or polarisation of waves radiated from an aerial, e.g. quasi-optical devices** (variable for purpose of altering directivity H01Q 3/00; arrangements of such devices for guiding waves H01P 3/20; variable for purpose of modulation H03C 7/02)
- 15/02 • Refracting or diffracting devices, e.g. lens, prism
- 15/04 • • comprising wave-guiding channel or channels bounded by effective conductive surfaces substantially perpendicular to the electric vector of the wave, e.g. parallel-plate waveguide lens
- 15/06 • • comprising plurality of wave-guiding channels of different length
- 15/08 • • formed of solid dielectric material
- 15/10 • • comprising three-dimensional array of impedance discontinuities, e.g. holes in conductive surfaces or conductive discs forming artificial dielectric (leaky-waveguide aerials H01Q 13/28)
- 15/12 • • functioning also as polarisation filter
- 15/14 • Reflecting surfaces; Equivalent structures
- 15/16 • • curved in two dimensions, e.g. paraboloidal
- 15/18 • • comprising plurality of mutually inclined plane surfaces, e.g. corner reflector
- 15/20 • • • Collapsible reflectors
- 15/22 • • functioning also as polarisation filter
- 15/23 • Combinations of reflecting surfaces with refracting or diffracting devices [3]
- 15/24 • Polarising devices; Polarisation filters (devices functioning simultaneously both as polarisation filters and as refracting or diffracting devices or as reflectors H01Q 15/12, H01Q 15/22)
- 17/00 Devices for absorbing waves radiated from an aerial; Combinations of such devices with active aerial elements or systems**
- 19/00 Combinations of primary active aerial elements and units with secondary devices, e.g. with quasi-optical devices, for giving the aerial a desired directional characteristic**
- 19/02 • Details
- 19/04 • • Means for collapsing H-aerials or Yagi aerials
- 19/06 • using refracting or diffracting devices, e.g. lens
- 19/08 • • for modifying the radiation pattern of a radiating horn in which it is located
- 19/09 • • wherein the primary active element is coated with or embedded in a dielectric or magnetic material (protective material H01Q 1/40; with variable characteristics H01Q 3/44) [3]
- 19/10 • using reflecting surfaces
- 19/12 • • wherein the surfaces are concave (H01Q 19/18 takes precedence) [3]
- 19/13 • • • the primary radiating source being a single radiating element, e.g. a dipole, a slot, a waveguide termination (H01Q 19/15 takes precedence) [3]
- 19/15 • • • the primary radiating source being a line source, e.g. leaky waveguide aerials [3]
- 19/17 • • • the primary radiating source comprising two or more radiating elements (H01Q 19/15, H01Q 25/00 take precedence) [3]
- 19/18 • • having two or more spaced reflecting surfaces (producing pencil beam by two cylindrical reflectors with their focal lines orthogonally disposed H01Q 19/20)
- 19/185 • • • wherein the surfaces are plane [3]
- 19/19 • • • comprising one main concave reflecting surface associated with an auxiliary reflecting surface [3]
- 19/195 • • • wherein a reflecting surface acts also as a polarisation filter or a polarising device [3]
- 19/20 • Producing pencil beam by two cylindrical focusing devices with their focal lines orthogonally disposed

- 19/22 • using a secondary device in the form of a single substantially straight conductive element
- 19/24 • • the primary active element being centre-fed and substantially straight, e.g. H-aerial
- 19/26 • • the primary active element being end-fed and elongated
- 19/28 • using a secondary device in the form of two or more substantially straight conductive elements (log-periodic aerials H01Q 11/10; constituting a reflecting surface H01Q 19/10)
- 19/30 • • the primary active element being centre-fed and substantially straight, e.g. Yagi aerial
- 19/32 • • the primary active element being end-fed and elongated
- 21/00 Aerial arrays or systems** (producing a beam the orientation or the shape of the directional pattern of which can be changed or varied H01Q 3/00; electrically-long aerials H01Q 11/00)
- 21/06 • Arrays of individually energised aerial units similarly polarised and spaced apart
- 21/08 • • the units being spaced along, or adjacent to, a rectilinear path
- 21/10 • • • Collinear arrangements of substantially straight elongated conductive units
- 21/12 • • • Parallel arrangements of substantially straight elongated conductive units (travelling-wave aerials comprising transmission line loaded with transverse elements, e.g. "fishbone" aerial, H01Q 11/04)
- 21/14 • • • • Adcock aerials
- 21/16 • • • • U-type
- 21/18 • • • • H-type
- 21/20 • • the units being spaced along, or adjacent to, a curvilinear path
- 21/22 • • Aerial units of the array energised non-uniformly in amplitude or phase, e.g. tapered array, binomial array
- 21/24 • Combinations of aerial units polarised in different directions for transmitting or receiving circularly and elliptically polarised waves or waves linearly polarised in any direction
- 21/26 • • Turnstile or like aerials comprising arrangements of three or more elongated elements disposed radially and symmetrically in a horizontal plane about a common centre
- 21/28 • Combinations of substantially independent non-interacting aerial units or systems
- 21/29 • Combinations of different interacting aerial units for giving a desired directional characteristic (H01Q 25/00 takes precedence) [3]
- 21/30 • Combinations of separate aerial units operating in different wavebands and connected to a common feeder system
- 23/00 Aerials with active circuits or circuit elements integrated within them or attached to them [3]**
- Note(s)**
1. This group covers only such combinations in which the type of aerial or aerial element is immaterial.
  2. Combinations with a particular type of aerial are classified in the group appropriate to that type.
- 25/00 Aerials or aerial systems providing at least two radiating patterns** (arrangements for changing or varying the orientation or the shape of the directional pattern H01Q 3/00) [3]
- 25/02 • providing sum and difference patterns (multimode aerials H01Q 25/04) [3]
- 25/04 • Multimode aerials [3]

**H01R ELECTRICALLY-CONDUCTIVE CONNECTIONS; STRUCTURAL ASSOCIATIONS OF A PLURALITY OF MUTUALLY-INSULATED ELECTRICAL CONNECTING ELEMENTS; COUPLING DEVICES; CURRENT COLLECTORS** (switches, fuses H01H; coupling devices of the waveguide type H01P 5/00; switching arrangements for the supply or distribution of electric power H02B; installations of electric cables or lines, or of combined optical and electric cables or lines, or of auxiliary apparatus H02G; printed means for providing electric connections to or between printed circuits H05K)

#### Note(s)

1. This subclass covers:
  - all kinds of contact-making disconnectable and non-disconnectable electric line connecting devices, coupling devices, lamp or similar holders or current collectors for all kinds of electric lines, cables or apparatus;
  - non-printed means for electric connections to or between printed circuits.
2. This subclass does not cover mounting of connections in or on specified apparatus. Such mounting is covered by the relevant subclass for such apparatus, e.g. mounting in junction or distribution boxes is covered by subclass H02B or H02G, high-temperature connections for heating elements is covered by group H05B 3/08. Structural association of one part of a coupling device with specific electric apparatus is classified with the apparatus, e.g. association of cap with incandescent lamp is covered by subclass H01K.
3. In this subclass, the following expressions are used with the meaning indicated:
  - "pin" is a rigid or flexible conductor for engagement with an appropriately shaped socket to establish contact therewith;
  - "socket" is a rigid or flexible conductor for receiving an appropriate pin to establish electrical contact therewith;
  - "coupling devices" are devices having two or more parts specially adapted so as to be capable of ready and repeated physical engagement or disengagement, without the use of a tool, for the purpose of establishing or breaking an electrical path. Examples of such devices having more than two parts are: a) adapters for linking two coupling parts; and b) rails or bus-bars provided with a plurality of discrete connecting locations for counterparts.
4. General details are classified in groups H01R 4/00, H01R 9/00, H01R 11/00, H01R 12/00.

#### Subclass index

CONNECTIONS; CONNECTING ELEMENTS

Direct; Insulation-penetrating.....4/00

## Structural associations:

of a plurality of mutually-insulated connecting elements.....	9/00
for printed circuits, flat or ribbon cables.....	12/00
Individual connecting elements providing two or more spaced connecting locations.....	11/00
Terminals.....	9/00, 12/00
Other connections.....	3/00
<b>COUPLINGS</b>	
Direct connections between conductors and conductive members of coupling.....	4/00
Other details.....	13/00
Overall structure of two-part couplings.....	24/00
Coupling parts for multiple or alternative co-operation with counterparts.....	25/00, 27/00, 29/00
Coupling parts supported by counterpart.....	31/00
Couplings having holders for supporting apparatus.....	33/00
FLEXIBLE OR TURNABLE LINE CONNECTORS.....	35/00
<b>CURRENT COLLECTORS</b>	
Rotary; non-rotary.....	39/00, 41/00
MANUFACTURE.....	43/00

- 3/00 Electrically-conductive connections not otherwise provided for**
- 3/08 • for making connection to a liquid (electrodes for batteries or accumulators H01M)
- 4/00 Electrically-conductive connections between two or more conductive members in direct contact, i.e. touching one another; Means for effecting or maintaining such contact; Electrically-conductive connections having two or more spaced connecting locations for conductors and using contact members penetrating insulation** (details of contacts of coupling devices H01R 13/00; coupling devices H01R 12/70, H01R 24/00-H01R 33/00; flexible or turnable line connectors H01R 35/00 non-rotary current collectors H01R 41/00) [3]
- 4/01 • Connections using shape memory materials, e.g. shape memory metal [7]
- 4/02 • Soldered or welded connections (H01R 4/62, H01R 12/59, H01R 12/65 take precedence) [3, 7]
- 4/04 • using electrically conductive adhesives [3]
- 4/06 • Riveted connections (by explosion H01R 4/08) [3]
- 4/08 • effected by an explosion [3]
- 4/10 • effected solely by twisting, wrapping, bending, crimping, or other permanent deformation [3]
- 4/12 • • by twisting [3]
- 4/14 • • by wrapping [3]
- 4/16 • • by bending [3]
- 4/18 • • by crimping (H01R 4/01, H01R 4/24 take precedence) [3, 7]
- 4/20 • • • using a crimping sleeve [3]
- 4/22 • End caps, i.e. caps of insulating or conductive material for covering or maintaining connections between wires entering the cap from the same end [3]
- 4/24 • Connections using needle-point, slotted-plate, or analogous contact members penetrating insulation or cable strands [3]
- 4/26 • Connections in which at least one of the connecting parts has projections which bite into or engage the other connecting part in order to improve the contact (using shape memory materials H01R 4/01) [3]
- 4/28 • Clamped connections; Spring connections (made by means of terminals specially adapted for contact with, or insertion into, printed circuits H01R 12/00) [3, 7]
- 4/30 • • using a screw or nut clamping member (H01R 4/50 takes precedence; using a clamping member acted on by screw or nut H01R 4/38) [3]

- 4/32 • • • Conductive members located in slot or hole in screw [3]
- 4/34 • • • Conductive members located under head of screw [3]
- 4/36 • • • Conductive members located under tip of screw [3]
- 4/38 • • using a clamping member acted on by screw or nut (H01R 4/50 takes precedence) [3]
- 4/40 • • • Pivotal clamping member [3]
- 4/42 • • • Clamping area to one side of screw only [3]
- 4/44 • • • Clamping areas on both sides of screw [3]
- 4/46 • • • Clamping area between two screws placed side by side [3]
- 4/48 • • using a spring, clip or other resilient member (H01R 4/52 takes precedence) [3]
- 4/50 • • using a cam, wedge, cone or ball [3]
- 4/52 • • • which is spring loaded [3]
- 4/56 • one conductor screwing into another [3]
- 4/58 • characterised by the form or material of the contacting members (H01R 4/01 takes precedence) [3, 7]
- 4/60 • • Connections between or with tubular conductors (H01R 4/56 takes precedence) [3]
- 4/62 • • Connections between conductors of different materials; Connections between or with aluminium or steel-core aluminium conductors (H01R 4/68 takes precedence) [3]
- 4/64 • • Connections between or with conductive parts having primarily a non-electric function, e.g. frame, casing, rail [3]
- 4/66 • • Connections with the terrestrial mass, e.g. earth plate, earth pin [3]
- 4/68 • • Connections to or between superconductive conductors [3]
- 4/70 • Insulation of connections (end caps H01R 4/22) [3]
- 4/72 • • using a heat shrinking insulating sleeve [4]
- 9/00 Structural associations of a plurality of mutually-insulated electrical connecting elements, e.g. terminal strips, terminal blocks; Terminals or binding posts mounted upon a base or in a case; Bases therefor** (details of direct connections or connections using contact members penetrating insulation H01R 4/00; specially adapted for printed circuits, flat or ribbon cables, or like generally planar structures H01R 12/00; coupling devices H01R 12/70, H01R 24/00-H01R 33/00; flexible or turnable line connectors H01R 35/00) [3]



9/03	• Connectors arranged to contact a plurality of the conductors of a multiconductor cable [3]	11/30	• • End pieces held in contact by a magnet [3]
9/05	• • for coaxial cables [3]	11/32	• • End pieces with two or more terminations [3]
9/053	• • • using contact members penetrating insulation [7]	12/00	<b>Structural associations of a plurality of mutually-insulated electrical connecting elements, specially adapted for printed circuits, e.g. printed circuit boards (PCBs), flat or ribbon cables, or like generally planar structures, e.g. terminal strips, terminal blocks; Coupling devices specially adapted for printed circuits, flat or ribbon cables, or like generally planar structures; Terminals specially adapted for contact with, or insertion into, printed circuits, flat or ribbon cables, or like generally planar structures</b> (printed connections to, or between, printed circuits H05K 1/11) [7]
9/11	• End pieces for multiconductor cables supported by the cable and for facilitating connections to other conductive members [3]	12/50	• Fixed connections [2011.01]
9/15	• Connectors for wire wrapping [3]	12/51	• • for rigid printed circuits or like structures [2011.01]
9/16	• Fastening of connecting parts to base or case; Insulating connecting parts from base or case (lead-through insulators H01B 17/26) [3]	12/52	• • • connecting to other rigid printed circuits or like structures [2011.01]
9/18	• • Fastening by means of screw or nut [3]	12/53	• • • connecting to cables except for flat or ribbon cables [2011.01]
9/20	• • Fastening by means of rivet or eyelet [3]	12/55	• • • characterised by the terminals [2011.01]
9/22	• Bases, e.g. strip, block, panel [3]	12/57	• • • • surface mounting terminals [2011.01]
9/24	• • Terminal blocks [3]	12/58	• • • • terminals for insertion into holes [2011.01]
9/26	• • • Clip-on terminal blocks for side-by-side rail or strip-mounting [3]	12/59	• • for flexible printed circuits, flat or ribbon cables or like structures [2011.01]
9/28	• • Terminal boards [3]	12/61	• • • connecting to flexible printed circuits, flat or ribbon cables or like structures [2011.01]
11/00	<b>Individual connecting elements providing two or more spaced connecting locations for conductive members which are, or may be, thereby interconnected, e.g. end pieces for wires or cables supported by the wire or cable and having means for facilitating electrical connection to some other wire, terminal, or conductive member; blocks of binding posts</b> (connections between members in direct contact H01R 4/00; structural associations of a plurality of mutually-insulated electrical connecting elements H01R 9/00; coupling devices H01R 12/70, H01R 24/00-H01R 29/00, H01R 33/00; flexible or turnable line connectors H01R 35/00) [3]	12/62	• • • connecting to rigid printed circuits or like structures [2011.01]
11/01	• characterised by the form or arrangement of the conductive interconnection between their connecting locations [3]	12/63	• • • connecting to another shape cable [2011.01]
11/03	• characterised by the type of the connecting locations on the individual element or by the type of the connections between the connecting locations and the conductive members (H01R 11/11 takes precedence) [3]	12/65	• • • characterised by the terminal [2011.01]
11/05	• • the connecting locations having different types of direct connections [3]	12/67	• • • • insulation penetrating terminals [2011.01]
11/07	• • the connecting locations being of the same type but different sizes [3]	12/68	• • • • • comprising deformable portions [2011.01]
11/09	• • the connecting locations being identical [3]	12/69	• • • • deformable terminals e.g. crimping terminals [2011.01]
11/11	• End pieces or tapping pieces for wires or cables, supported by the wire or cable and having means for facilitating electrical connection to some other wire, terminal, or conductive member (H01R 11/01 takes precedence) [3]	12/70	• Coupling devices [2011.01]
11/12	• • End pieces terminating in an eye, hook, or fork [3]	12/71	• • for rigid printing circuits or like structures [2011.01]
11/14	• • • the hook being adapted for hanging on overhead or other suspended lines, e.g. hot line clamp [3]	12/72	• • • coupling with the edge of the rigid printed circuits or like structures [2011.01]
11/15	• • • • Hook in the form of a screw clamp [3]	12/73	• • • • connecting to other rigid printed circuits or like structures [2011.01]
11/16	• • End pieces terminating in a soldering tip or socket [3]	12/75	• • • connecting to cables except for flat or ribbon cables [2011.01]
11/18	• • End pieces terminating in a probe [3]	12/77	• • for flexible printed circuits, flat or ribbon cables or like structures [2011.01]
11/20	• • End pieces terminating in a needle point or analogous contact for penetrating insulation or cable strands [3]	12/78	• • • connecting to other flexible printed circuits, flat or ribbon cables or like structures [2011.01]
11/22	• • End pieces terminating in a spring clip [3]	12/79	• • • connecting to rigid printed circuits or like structures [2011.01]
11/24	• • • with gripping jaws, e.g. crocodile clip [3]	12/81	• • • connecting to another cable except for flat or ribbon cable [2011.01]
11/26	• • End pieces terminating in a screw clamp, screw or nut [3]	12/82	• • connected with low or zero insertion force [2011.01]
11/28	• • End pieces consisting of a ferrule or sleeve [3]	12/83	• • • connected with pivoting of printed circuits or like after insertion [2011.01]
		12/85	• • • contact pressure producing means, contacts activated after insertion of printed circuits or like structures [2011.01]
		12/87	• • • • acting automatically by insertion of rigid printed or like structures [2011.01]
		12/88	• • • • acting manually by rotating or pivoting connector housing parts [2011.01]

## H01R

- 12/89 • • • acting manually by moving connector housing parts linearly e.g. slider **[2011.01]**
- 12/91 • • allowing relative movement between coupling parts e.g. floating or self aligning **[2011.01]**
- 13/00 Details of coupling devices of the kinds covered by groups H01R 12/70 or H01R 24/00-H01R 33/00 [1, 7]**
- 13/02 • Contact members
- 13/03 • characterised by the material, e.g. plating or coating materials **[4]**
- 13/04 • • Pins or blades for co-operation with sockets
- 13/05 • • • Resilient pins or blades (carrying separate resilient parts H01R 13/15) **[3]**
- 13/08 • • • Resiliently-mounted rigid pins or blades
- 13/10 • • Sockets for co-operation with pins or blades
- 13/11 • • • Resilient sockets (carrying separate resilient parts H01R 13/15) **[3]**
- 13/115 • • • U-shaped sockets having inwardly-bent legs **[3]**
- 13/14 • • • Resiliently-mounted rigid sockets
- 13/15 • • Pins, blades or sockets having separate spring member for producing or increasing contact pressure **[3]**
- 13/17 • • • the spring member being on the pin **[3]**
- 13/18 • • • with the spring member surrounding the socket
- 13/187 • • • the spring member being in the socket **[3]**
- 13/193 • • Means for increasing contact pressure at the end of engagement of coupling part **[3]**
- 13/20 • • Pins, blades, or sockets shaped, or provided with separate member, to retain co-operating parts together
- 13/207 • • • by screw-in connection **[3]**
- 13/213 • • • by bayonet connection **[3]**
- 13/22 • • Contacts for co-operating by abutting
- 13/24 • • • resilient; resiliently mounted
- 13/26 • • Pin or blade contacts for sliding co-operation on one side only
- 13/28 • • Contacts for sliding co-operation with identically-shaped contact, e.g. for hermaphroditic coupling devices
- 13/33 • • Contact members made of resilient wire **[3]**
- 13/35 • • for non-simultaneous co-operation with different types of contact member, e.g. socket co-operating with either round or flat pin **[3]**
- 13/40 • Securing contact members in or to a base or case; Insulating of contact members
- 13/405 • • Securing in non-demountable manner, e.g. moulding, riveting **[3]**
- 13/41 • • • by frictional grip in grommet, panel or base **[3]**
- 13/415 • • • by permanent deformation of contact member **[3]**
- 13/42 • • Securing in a demountable manner
- 13/422 • • • in resilient one-piece base or case; One-piece base or case formed with resilient locking means **[3]**
- 13/424 • • • in base or case composed of a plurality of insulating parts having at least one resilient insulating part **[3]**
- 13/426 • • • by separate resilient retaining piece supported by base or case, e.g. collar **[3]**
- 13/428 • • • by resilient locking means on the contact members; by locking means on resilient contact members **[3]**
- 13/432 • • • by stamped-out resilient tongue snapping behind shoulder in base or case **[3]**
- 13/434 • • • by separate resilient locking means on contact member, e.g. retainer collar or ring around contact member **[3]**
- 13/436 • • • Securing a plurality of contact members by one locking piece **[3]**
- 13/44 • Means for preventing access to live contacts
- 13/443 • • Dummy plugs **[7]**
- 13/447 • • Shutter or cover plate **[3]**
- 13/453 • • • Shutter or cover plate opened by engagement of counterpart **[3]**
- 13/46 • Bases; Cases
- 13/50 • • formed as an integral body (H01R 13/514 takes precedence) **[3]**
- 13/502 • • composed of different pieces (H01R 13/514 takes precedence) **[3]**
- 13/504 • • • different pieces being moulded, cemented, welded, e.g. ultrasonic, or swaged together **[3]**
- 13/506 • • • assembled by snap action of the parts **[3]**
- 13/508 • • • assembled by clip or spring **[3]**
- 13/512 • • • assembled by screw or screws **[3]**
- 13/514 • • formed as a modular block or assembly, i.e. composed of co-operating parts provided with contact members or holding contact members between them **[3]**
- 13/516 • • Means for holding or embracing insulating body, e.g. casing **[3]**
- 13/518 • • • for holding or embracing several coupling parts, e.g. frames **[3]**
- 13/52 • • Dustproof, splashproof, drip-proof, waterproof, or flameproof cases
- 13/523 • • • for use under water **[3]**
- 13/527 • • • Flameproof cases (H01R 13/70 takes precedence) **[3]**
- 13/53 • • Bases or cases for heavy duty; Bases or cases with means for preventing corona or arcing **[3]**
- 13/533 • • Bases or cases made for use in extreme conditions, e.g. high temperature, radiation, vibration, corrosive environment, pressure (H01R 13/52 takes precedence) **[3]**
- 13/56 • Means for preventing chafing or fracture of flexible leads at outlet from coupling part
- 13/58 • Means for relieving strain on wire connection, e.g. cord grip
- 13/585 • • Grip increasing with strain force **[3]**
- 13/59 • • Threaded ferrule or bolt operating in a direction parallel to the cable or wire **[3]**
- 13/595 • • Bolts operating in a direction transverse to the cable or wire **[3]**
- 13/60 • Means for supporting coupling part when not engaged
- 13/62 • Means for facilitating engagement or disengagement of coupling parts or for holding them in engagement **[3]**
- 13/621 • • Bolt, set screw or screw clamp **[3, 5]**
- 13/622 • • Screw-ring or screw-casing (H01R 13/623 takes precedence) **[5]**
- 13/623 • • Casing or ring with helicoidal groove **[3, 5]**
- 13/625 • • Casing or ring with bayonet engagement **[3, 5]**
- 13/627 • • Snap-action fastening **[3]**
- 13/629 • • Additional means for facilitating engagement or disengagement of coupling parts, e.g. aligning or guiding means, levers, gas pressure **[3]**
- 13/631 • • • for engagement only **[3]**
- 13/633 • • • for disengagement only **[3]**
- 13/635 • • • by mechanical pressure, e.g. spring force **[3]**
- 13/637 • • • by fluid pressure, e.g. explosion **[3]**

- 13/639 • • Additional means for holding or locking coupling parts together after engagement [3]
  - 13/64 • Means for preventing, inhibiting or avoiding incorrect coupling
  - 13/641 • • by indicating incorrect coupling; by indicating correct or full engagement [7]
  - 13/642 • • by position or shape of contact members [3]
  - 13/645 • • by exchangeable elements on case or base [3]
  - 13/646 • specially adapted for high-frequency, e.g. structures providing an impedance match or phase match (non-coaxed protective earth or shield arrangements H01R 13/648-H01R 13/6599; coaxial connectors specifically adapted for high frequency H01R 24/40-H01R 24/56) [7, 2011.01]
  - 13/6461 • • Means for preventing cross-talk [2011.01]
  - 13/6463 • • • using twisted pairs of wires [2011.01]
  - 13/6464 • • • by adding capacitive elements [2011.01]
  - 13/6466 • • • • on substrates, e.g. PCBs [Printed Circuit Boards] [2011.01]
  - 13/6467 • • • by cross-over of signal conductors [2011.01]
  - 13/6469 • • • • on substrates [2011.01]
  - 13/6471 • • • by special arrangement of ground and signal conductors, e.g. GSGS [Ground-Signal-Ground-Signal] [2011.01]
  - 13/6473 • • Impedance matching [2011.01]
  - 13/6474 • • • by variation of conductive properties, e.g. by variation of dimensions [2011.01]
  - 13/6476 • • • • by making an aperture, e.g. a hole [2011.01]
  - 13/6477 • • • by variation of dielectric properties [2011.01]
  - 13/648 • Protective earth or shield arrangements on coupling devices (coaxially arranged shields H01R 24/38) [3]
  - 13/652 • • with earth pin, blade or socket [3]
  - 13/655 • • with earth brace [3]
  - 13/658 • • High frequency shielding arrangements, e.g. against EMI [Electro-Magnetic Interference] or EMP [Electro-Magnetic Pulse] [3, 2011.01]
  - 13/6581 • • • Shield structure [2011.01]
  - 13/6582 • • • • with resilient means for engaging mating connector [2011.01]
  - 13/6583 • • • • • with separate conductive resilient members between mating shield members [2011.01]
  - 13/6584 • • • • • formed by conductive elastomeric members, e.g. flat gaskets or O-rings [2011.01]
  - 13/6585 • • • • Shielding material individually surrounding or interposed between mutually spaced contacts [2011.01]
  - 13/6586 • • • • • for separating multiple connector modules [2011.01]
  - 13/6587 • • • • • for mounting on PCBs [2011.01]
  - 13/6588 • • • • • with through openings for individual contacts [2011.01]
  - 13/6589 • • • • • with wires separated by conductive housing parts [2011.01]
  - 13/659 • • • • with plural ports for distinct connectors [2011.01]
  - 13/6591 • • • Specific features or arrangements of connection of shield to conductive members [2011.01]
  - 13/6592 • • • • the conductive member being a shielded cable [2011.01]
  - 13/6593 • • • • • the shield being composed of different pieces [2011.01]
  - 13/6594 • • • • the shield being mounted on a PCB and connected to conductive members [2011.01]
  - 13/6595 • • • • • with separate members fixing the shield to the PCB [2011.01]
  - 13/6596 • • • • the conductive member being a metal grounding panel [2011.01]
  - 13/6597 • • • • the conductive member being a contact of the connector [2011.01]
  - 13/6598 • • • Shield material [2011.01]
  - 13/6599 • • • • Dielectric material made conductive, e.g. plastic material coated with metal [2011.01]
  - 13/66 • Structural association with built-in electrical component (coupling devices having concentrically or coaxially-arranged contacts H01R 24/38-H01R 24/56)
  - 13/68 • • with built-in fuse [1, 2011.01]
  - 13/684 • • • the fuse being removable [2011.01]
  - 13/688 • • • • with housing part adapted for accessing the fuse [2011.01]
  - 13/692 • • • • • Turnable housing part [2011.01]
  - 13/696 • • • the fuse being integral with the terminal, e.g. pin or socket [2011.01]
  - 13/70 • • with built-in switch
  - 13/703 • • • operated by engagement or disengagement of coupling parts (H01R 13/71 takes precedence) [3]
  - 13/707 • • • interlocked with contact members or counterpart [3]
  - 13/71 • • • Contact members of coupling parts operating as switch [3]
  - 13/713 • • • the switch being a safety switch [3]
  - 13/717 • • with built-in light source [3]
  - 13/719 • • specially adapted for high frequency, e.g. with filters [4, 2011.01]
  - 13/7193 • • • with ferrite filters [2011.01]
  - 13/7195 • • • with planar filters with openings for contacts [2011.01]
  - 13/7197 • • • with filters integral with or fitted onto contacts, e.g. tubular filters [2011.01]
  - 13/72 • Means for accommodating flexible lead within the holder
  - 13/73 • Means for mounting coupling parts to apparatus or structures, e.g. to a wall [4]
  - 13/74 • • for mounting coupling parts in openings of a panel [3]
  - 24/00 **Two-part coupling devices, or either of their cooperating parts, characterised by their overall structure** (specially adapted for printed circuits, flat or ribbon cables, or like structures H01R 12/00; specially adapted for supporting apparatus H01R 33/00) [7, 2011.01]
- Note(s)**
- In this group, it is desirable to add the indexing codes of groups H01R 101/00-H01R 107/00.
- 24/20 • Coupling parts carrying sockets, clips or analogous contacts and secured only to wire or cable [2011.01]
  - 24/22 • • with additional earth or shield contacts [2011.01]
  - 24/28 • Coupling parts carrying pins, blades or analogous contacts and secured only to wire or cable [2011.01]
  - 24/30 • • with additional earth or shield contacts [2011.01]
  - 24/38 • having concentrically or coaxially arranged contacts [2011.01]
  - 24/40 • • specially adapted for high frequency [2011.01]
  - 24/42 • • • comprising impedance matching means or electrical components, e.g. filters or switches [2011.01]

## H01R

- 24/44 • • • • comprising impedance matching means **[2011.01]**
- 24/46 • • • • comprising switches **[2011.01]**
- 24/48 • • • • comprising protection devices, e.g. overvoltage protection **[2011.01]**
- 24/50 • • • mounted on a PCB [Printed Circuit Board] **[2011.01]**
- 24/52 • • • mounted in or to a panel or structure **[2011.01]**
- 24/54 • • • Intermediate parts, e.g. adapters, splitters or elbows **[2011.01]**
- 24/56 • • • specially adapted for specific shapes of cables, e.g. corrugated cables, twisted pair cables, cables with two screens or hollow cables **[2011.01]**
- 24/58 • Contacts spaced along longitudinal axis of engagement **[2011.01]**
- 24/60 • Contacts spaced along planar side wall transverse to longitudinal axis of engagement **[2011.01]**
- 24/62 • • Sliding engagements with one side only, e.g. modular jack coupling devices **[2011.01]**
- 24/64 • • • for high frequency, e.g. RJ 45 **[2011.01]**
- 24/66 • with pins, blades or analogous contacts and secured to apparatus or structure, e.g. to a wall **[2011.01]**
- 24/68 • • mounted on directly pluggable apparatus **[2011.01]**
- 24/70 • • with additional earth or shield contacts **[2011.01]**
- 24/76 • with sockets, clips or analogous contacts and secured to apparatus or structure, e.g. to a wall **[2011.01]**
- 24/78 • • with additional earth or shield contacts **[2011.01]**
- 24/84 • Hermaphroditic coupling devices **[2011.01]**
- 24/86 • Parallel contacts arranged about a common axis **[2011.01]**
- 25/00 Coupling parts adapted for simultaneous co-operation with two or more identical counterparts, e.g. for distributing energy to two or more circuits** (supported only by co-operation with a counterpart H01R 31/00; with a holder adapted for supporting apparatus to which its counterpart is attached H01R 33/88)
- 25/14 • Rails or bus-bars constructed so that the counterparts can be connected thereto at any point along their length (supporting elements for lighting devices, displaceable along guiding elements and making electrical contact with conductors running along the guiding elements F21V 21/35; installations of bus-bars H02G 5/00) **[3]**
- 25/16 • Rails or bus-bars provided with a plurality of discrete connecting locations for counterparts (installations of bus-bars H02G 5/00) **[3]**
- 27/00 Coupling parts adapted for co-operation with two or more dissimilar counterparts** (supported only by co-operation with a counterpart H01R 31/00; with a holder adapted for supporting apparatus to which its counterpart is attached H01R 33/90)
- 27/02 • for simultaneous co-operation with two or more counterparts
- 29/00 Coupling parts for selective co-operation with a counterpart in different ways to establish different circuits, e.g. for voltage selection, for series/parallel selection**
- 31/00 Coupling parts supported only by co-operation with counterpart**
- 31/02 • Intermediate parts for distributing energy to two or more circuits in parallel, e.g. splitter (for linking two coupling parts H01R 31/06; with a holder adapted for supporting apparatus to which its counterpart is attached H01R 33/92)
- 31/06 • Intermediate parts for linking two coupling parts, e.g. adapter (with a holder adapted for supporting apparatus to which its counterpart is attached H01R 33/94) **[4]**
- 31/08 • Short-circuiting members for bridging contacts in a counterpart (insulating members inserted between normally-closed contacts H01H 27/04)
- 33/00 Coupling devices specially adapted for supporting apparatus and having one part acting as a holder providing support and electrical connection via a counterpart which is structurally associated with the apparatus, e.g. lamp holders; Separate parts thereof** (structural association of counterpart with specific apparatus, see the relevant subclass for the apparatus)
- 33/02 • Single-pole devices, e.g. holder for supporting one end of a tubular incandescent or neon lamp
- 33/05 • Two-pole devices **[4]**
- 33/06 • • with two current-carrying pins, blades, or analogous contacts, having their axes parallel to each other **[4]**
- 33/08 • • • for supporting tubular fluorescent lamp **[4]**
- 33/09 • • • for baseless lamp bulb **[4]**
- 33/18 • • having only abutting contacts
- 33/20 • • having concentrically or coaxially arranged contacts
- 33/22 • • for screw type base, e.g. for lamp **[4]**
- 33/46 • • for bayonet type base **[4]**
- 33/72 • Three-pole devices
- 33/74 • Devices having four or more poles
- 33/76 • • Holders with sockets, clips or analogous contacts, adapted for axially-sliding engagement with parallelly-arranged pins, blades, or analogous contacts on counterpart, e.g. electronic tube socket
- 33/88 • adapted for simultaneous co-operation with two or more identical counterparts
- 33/90 • adapted for co-operation with two or more dissimilar counterparts
- 33/92 • Holders formed as intermediate parts for distributing energy in parallel through two or more counterparts at least one of which is attached to apparatus to be held
- 33/94 • Holders formed as intermediate parts for linking a counter-part to a coupling part
- 33/945 • Holders with built-in electrical component **[4]**
- 33/95 • • with fuse; with thermal switch **[4]**
- 33/955 • • with switch operated manually and independent of engagement or disengagement of coupling **[4]**
- 33/96 • • with switch operated by engagement or disengagement of coupling **[4]**
- 33/965 • Dustproof, splashproof, drip-proof, waterproof, or flameproof holders **[4]**
- 33/97 • Holders with separate means to prevent loosening of the coupling or unauthorised removal of apparatus held **[4]**
- 33/975 • Holders with resilient means for protecting apparatus against vibrations or shocks **[4]**
- 35/00 Flexible or turnable line connectors** (rotary current collectors, distributors H01R 39/00)
- 35/02 • Flexible line connectors **[4]**
- 35/04 • Turnable line connectors with limited rotation angle **[4]**

<b>39/00</b>	<b>Rotary current collectors, distributors, or interrupters</b> (cam-operated switches H01H 19/00; structural associations of current collectors with, or disposition of current collectors in, dynamo-electric motors or generators H02K 13/00)	<b>39/64</b>	• Devices for uninterrupted current collection
39/02	• Details	<b>41/00</b>	<b>Non-rotary current collectors for maintaining contact between moving and stationary parts of an electric circuit</b> (end pieces terminating in a hook or the like H01R 11/12; current collectors for power supply lines of electrically-propelled vehicles B60L 5/00)
39/04	• • Commutators (wherein the segments are formed by extensions of dynamo-electric machine winding H02K)	41/02	• Devices for interrupted current collection, e.g. distributor (electrically-operated selector switches H01H 67/00)
39/06	• • • other than with external cylindrical contact surface, e.g. flat commutators	<b>43/00</b>	<b>Apparatus or processes specially adapted for manufacturing, assembling, maintaining, or repairing of line connectors or current collectors or for joining electric conductors</b> (of trolley lines B60M 1/28; joining cables H02G 1/14)
39/08	• • Slip-rings	43/01	• for connecting unstripped conductors to contact members having insulation cutting edges [4]
39/10	• • • other than with external cylindrical contact surface, e.g. flat slip-rings	43/02	• for soldered or welded connections (soldering or welding in general B23K)
39/12	• • • using bearing or shaft surface as contact surface	43/027	• for connecting conductors by clips [4]
39/14	• • Fastenings of commutators or slip-rings to shafts	43/033	• for wrapping or unwrapping wire connections [4]
39/16	• • • by means of moulded or cast material applied during or after assembly	43/04	• for forming connections by deformation, e.g. crimping tool
39/18	• • Contacts for co-operation with commutator or slip-ring, e.g. contact brush	43/042	• • Hand tools for crimping [4]
39/20	• • • characterised by the material thereof	43/045	• • • with contact member feeding mechanism [4]
39/22	• • • • incorporating lubricating or polishing ingredient	43/048	• • Crimping apparatus or processes (H01R 43/042 takes precedence) [4]
39/24	• • • Laminated contacts; Wire contacts, e.g. metallic brush, carbon fibres	43/05	• • • with wire-insulation stripping [4]
39/26	• • • Solid sliding contacts, e.g. carbon brush	43/052	• • • with wire-feeding mechanism [4]
39/27	• • • • End caps on carbon brushes to transmit spring pressure	43/055	• • • with contact member feeding mechanism [4]
39/28	• • • Roller contacts; Ball contacts	43/058	• • Crimping mandrels [4]
39/30	• • • Liquid contacts	43/06	• Manufacture of commutators
39/32	• • Connections of conductor to commutator segment	43/08	• • in which segments are not separated until after assembly
39/34	• • Connections of conductor to slip-ring	43/10	• Manufacture of slip-rings
39/36	• • Connections of cable or wire to brush	43/12	• Manufacture of brushes
39/38	• • Brush holders	43/14	• Maintenance of current collectors, e.g. reshaping of brushes, cleaning of commutators
39/39	• • • wherein the brush is fixedly mounted in the holder	43/16	• for manufacturing contact members, e.g. by punching and by bending [4]
39/40	• • • enabling brush movement within holder during current collection	43/18	• for manufacturing bases or cases for contact members [4]
39/41	• • • cartridge type	43/20	• for assembling or disassembling contact members with insulating base, case or sleeve [4]
39/415	• • • • with self-recoiling spring [4]	43/22	• • Hand tools [4]
39/42	• • Devices for lifting brushes	43/24	• • Assembling by moulding on contact members [4]
39/44	• • Devices for shifting brushes	43/26	• for engaging or disengaging the two parts of a coupling device (structural association with coupling device H01R 13/629) [4]
39/46	• • Auxiliary means for improving current transfer, or for reducing or preventing sparking or arcing	43/28	• for wire processing before connecting to contact members (H01R 43/02-H01R 43/26 take precedence) [4]
39/48	• • • by air blast; by surrounding collector with non-conducting liquid or gas		
39/50	• • • Barriers placed between brushes		
39/52	• • • by use of magnets		
39/54	• • • by use of impedance between brushes or segments		
39/56	• • Devices for lubricating or polishing slip-rings or commutators during operation of the collector		
39/58	• • Means structurally associated with the current collector for indicating condition thereof, e.g. for indicating brush wear		
39/59	• • Means structurally associated with the brushes for interrupting current (H01R 39/58 takes precedence) [4]		
39/60	• Devices for interrupted current collection, e.g. commutating device, distributor, interrupter (self-interrupters H01H, e.g. H01H 51/34)		
39/62	• • with more than one brush co-operating with the same set of segments		

**Indexing scheme associated with group H01R 24/00, relating to the number of poles in a two-part coupling device. [7]**

<b>101/00</b>	<b>One pole [7]</b>
<b>103/00</b>	<b>Two poles [7]</b>
<b>105/00</b>	<b>Three poles [7]</b>
<b>107/00</b>	<b>Four or more poles [7]</b>

**Note(s)**

This subclass covers:

- devices for the generation or amplification, by using stimulated emission, of coherent electromagnetic waves or other forms of wave energy;
- such functions as modulating, demodulating, controlling, or stabilising such waves.

**Subclass index**

MASERS.....	1/00
SEMICONDUCTOR LASERS.....	5/00
LASERS OTHER THAN SEMICONDUCTOR LASERS.....	3/00
OTHER DEVICES USING STIMULATED EMISSION.....	4/00

**1/00 Masers, i.e. devices for generation, amplification, modulation, demodulation, or frequency-changing, using stimulated emission, of electromagnetic waves of wavelength longer than that of infra-red waves**

- 1/02 • solid
- 1/04 • liquid
- 1/06 • gaseous

**3/00 Lasers, i.e. devices for generation, amplification, modulation, demodulation, or frequency-changing, using stimulated emission, of infra-red, visible, or ultra-violet waves (semiconductor lasers H01S 5/00)**

- 3/02 • Constructional details
- 3/03 • • of gas laser discharge tubes [2]
- 3/032 • • • for confinement of the discharge, e.g. by special features of the discharge constricting tube [5]
- 3/034 • • • Optical devices within, or forming part of, the tube, e.g. windows, mirrors (reflectors having variable properties or positions for initial adjustment of the resonator H01S 3/086) [5]
- 3/036 • • • Means for obtaining or maintaining the desired gas pressure within the tube, e.g. by gettering or replenishing; Means for circulating the gas, e.g. for equalising the pressure within the tube [5]
- 3/038 • • • Electrodes, e.g. special shape, configuration or composition [5]
- 3/04 • • Cooling arrangements
- 3/041 • • • for gas lasers [5]
- 3/042 • • • for solid state lasers [5]
- 3/05 • Construction or shape of optical resonators; Accommodation of active medium therein; Shape of active medium
- 3/06 • • Construction or shape of active medium
- 3/063 • • • Waveguide lasers, e.g. laser amplifiers [7]
- 3/067 • • • • Fibre lasers [7]
- 3/07 • • • consisting of a plurality of parts, e.g. segments (H01S 3/067 takes precedence) [2, 7]
- 3/08 • • Construction or shape of optical resonators or components thereof [2]
- 3/081 • • • comprising more than two reflectors [2]
- 3/082 • • • • defining a plurality of resonators, e.g. for mode selection [2]
- 3/083 • • • • Ring lasers [2]
- 3/086 • • • One or more reflectors having variable properties or positions for initial adjustment of the resonator (varying a parameter of the laser output during operation H01S 3/10; stabilisation of the laser output H01S 3/13) [2]

- 3/09 • Processes or apparatus for excitation, e.g. pumping
- 3/091 • • using optical pumping [2]
- 3/0915 • • • by incoherent light [5]
- 3/092 • • • • of flash lamp (H01S 3/0937 takes precedence) [2, 5]
- 3/093 • • • • • focusing or directing the excitation energy into the active medium [2, 5]
- 3/0933 • • • • of a semiconductor, e.g. light emitting diode [5]
- 3/0937 • • • • produced by exploding or combustible material [5]
- 3/094 • • • by coherent light [2]
- 3/0941 • • • • of a semiconductor laser, e.g. of a laser diode [6]
- 3/0943 • • • • of a gas laser [5]
- 3/0947 • • • • of an organic dye laser [5]
- 3/095 • • using chemical or thermal pumping [2]
- 3/0951 • • • by increasing the pressure in the laser gas medium [5]
- 3/0953 • • • • Gas dynamic lasers, i.e. with expansion of the laser gas medium to supersonic flow speeds [5]
- 3/0955 • • using pumping by high energy particles [5]
- 3/0957 • • • by high energy nuclear particles [5]
- 3/0959 • • • by an electron beam [5]
- 3/097 • • by gas discharge of a gas laser [2]
- 3/0971 • • • transversely excited (H01S 3/0975 takes precedence) [5]
- 3/0973 • • • • having a travelling wave passing through the active medium [5]
- 3/0975 • • • using inductive or capacitive excitation [5]
- 3/0977 • • • having auxiliary ionisation means [5]
- 3/0979 • • • Gas dynamic lasers, i.e. with expansion of the laser gas medium to supersonic flow speeds [5]
- 3/098 • Mode locking; Mode suppression (mode suppression using a plurality of resonators H01S 3/082) [2]
- 3/10 • Controlling the intensity, frequency, phase, polarisation or direction of the emitted radiation, e.g. switching, gating, modulating or demodulating (mode locking H01S 3/098) [2]
- 3/101 • • Lasers provided with means to change the location from which, or the direction in which, laser radiation is emitted [2]
- 3/102 • • by controlling the active medium, e.g. by controlling the processes or apparatus for excitation (H01S 3/13 takes precedence) [4]
- 3/104 • • • in gas lasers [4]

- 3/105 • • by controlling the mutual position or the reflecting properties of the reflectors of the cavity (H01S 3/13 takes precedence) [4]
- 3/1055 • • • one of the reflectors being constituted by a diffraction grating [4]
- 3/106 • • by controlling a device placed within the cavity (H01S 3/13 takes precedence) [4]
- 3/107 • • • using an electro-optical device, e.g. exhibiting Pockels- or Kerr-effect [4]
- 3/108 • • • using a non-linear optical device, e.g. exhibiting Brillouin- or Raman-scattering [4]
- 3/109 • • • • Frequency multiplying, e.g. harmonic generation [4]
- 3/11 • • in which the quality factor of the optical resonator is rapidly changed, i.e. giant-pulse technique
- 3/113 • • • using bleachable or solarising media [2]
- 3/115 • • • using an electro-optical device [4]
- 3/117 • • • using an acousto-optical device [4]
- 3/121 • • • using a mechanical device [4]
- 3/123 • • • • Rotating mirror [4]
- 3/125 • • • • Rotating prism [4]
- 3/127 • • • Plural Q-switches [4]
- 3/13 • • Stabilisation of laser output parameters, e.g. frequency, amplitude [2]
- 3/131 • • • by controlling the active medium, e.g. by controlling the processes or apparatus for excitation [4]
- 3/134 • • • • in gas lasers [4]
- 3/136 • • • by controlling a device placed within the cavity [4]
- 3/137 • • • • for stabilising of frequency [4]
- 3/139 • • • by controlling the mutual position or the reflecting properties of the reflectors of the cavity [4]
- 3/14 • characterised by the material used as the active medium
- 3/16 • • Solid materials
- 3/17 • • • amorphous, e.g. glass [2]
- 3/20 • • Liquids
- 3/207 • • • including a chelate [5]
- 3/213 • • • including an organic dye [5]
- 3/22 • • Gases
- 3/223 • • • the active gas being polyatomic, i.e. containing more than one atom (H01S 3/227 takes precedence) [2, 5]
- 3/225 • • • • comprising an excimer or exciplex [5]
- 3/227 • • • Metal vapour [5]
- 3/23 • Arrangement of two or more lasers not provided for in groups H01S 3/02-H01S 3/14, e.g. tandem arrangement of separate active media (involving only semiconductor lasers H01S 5/40) [2, 7]
- 3/30 • using scattering effects, e.g. stimulated Brillouin or Raman effects [2]
- 4/00 Devices using stimulated emission of wave energy other than those covered by groups H01S 1/00, H01S 3/00 or H01S 5/00, e.g. phonon maser, gamma maser**
- 5/00 Semiconductor lasers [7]**

**Note(s) [2010.01]**

Attention is drawn to Note (3) after the title of section C, which Note indicates to which version of the periodic table of chemical elements the IPC refers. In this group, the Periodic System used is the 8 group system indicated by Roman numerals in the Periodic Table thereunder.

- 5/02 • Structural details or components not essential to laser action [7]
- 5/022 • • Mountings; Housings [7]
- 5/024 • • Cooling arrangements [7]
- 5/026 • • Monolithically integrated components, e.g. waveguides, monitoring photo-detectors or drivers (stabilisation of output H01S 5/06) [7]
- 5/028 • • Coatings [7]
- 5/04 • Processes or apparatus for excitation, e.g. pumping (H01S 5/06 takes precedence) [7]
- 5/042 • • Electrical excitation [7]
- 5/06 • Arrangements for controlling the laser output parameters, e.g. by operating on the active medium [7]
- 5/062 • • by varying the potential of the electrodes (H01S 5/065 takes precedence) [7]
- 5/0625 • • • in multi-section lasers [7]
- 5/065 • • Mode locking; Mode suppression; Mode selection [7]
- 5/068 • • Stabilisation of laser output parameters (H01S 5/0625 takes precedence) [7]
- 5/0683 • • • by monitoring the optical output parameters [7]
- 5/0687 • • • • Stabilising the frequency of the laser [7]
- 5/10 • Construction or shape of the optical resonator [7]
- 5/12 • • the resonator having a periodic structure, e.g. in distributed feed-back lasers (DFB-lasers) (H01S 5/18 takes precedence) [7]
- 5/125 • • • Distributed Bragg reflector lasers (DBR-lasers) [7]
- 5/14 • • External cavity lasers (H01S 5/18 takes precedence; mode locking H01S 5/065) [7]
- 5/16 • • Window-type lasers, i.e. with a region of non-absorbing material between the active region and the reflecting surface (H01S 5/14 takes precedence) [7]
- 5/18 • • Surface-emitting lasers (SE-lasers) [7]
- 5/183 • • • having a vertical cavity (VCSE-lasers) [7]
- 5/187 • • • using a distributed Bragg reflector (SE-DBR-lasers) (H01S 5/183 takes precedence) [7]
- 5/20 • Structure or shape of the semiconductor body to guide the optical wave [7]
- 5/22 • • having a ridge or a stripe structure [7]
- 5/223 • • • Buried stripe structure (H01S 5/227 takes precedence) [7]
- 5/227 • • • Buried mesa structure [7]
- 5/24 • • having a grooved structure, e.g. V-grooved [7]
- 5/30 • Structure or shape of the active region; Materials used for the active region [7]
- 5/32 • • comprising PN junctions, e.g. hetero- or double-hetero-structures (H01S 5/34, H01S 5/36 take precedence) [7]
- 5/323 • • • in  $A_{III}B_V$  compounds, e.g. AlGaAs-laser [7]
- 5/327 • • • in  $A_{II}B_{VI}$  compounds, e.g. ZnCdSe-laser [7]
- 5/34 • • comprising quantum well or superlattice structures, e.g. single quantum well lasers (SQW-lasers), multiple quantum well lasers (MQW-lasers), graded index separate confinement heterostructure lasers (GRINSCHE-lasers) (H01S 5/36 takes precedence) [7]

## H01S

- |       |   |      |  |
|-------|---|------|--|
| 5/343 | • • • in A <sub>III</sub> B <sub>V</sub> compounds, e.g. AlGaAs-laser [7] | 5/40 | • Arrangement of two or more semiconductor lasers, not provided for in groups H01S 5/02-H01S 5/30 (H01S 5/50 takes precedence) [7] |
| 5/347 | • • • in A <sub>II</sub> B <sub>VI</sub> compounds, e.g. ZnCdSe-laser [7] | 5/42 | • • Arrays of surface emitting lasers [7]  |
| 5/36  | • • comprising organic materials [2006.01]                                | 5/50 | • Amplifier structures not provided for in groups H01S 5/02-H01S 5/30 [7]  |

**H01T SPARK GAPS; OVERVOLTAGE ARRESTERS USING SPARK GAPS; SPARKING PLUGS; CORONA DEVICES; GENERATING IONS TO BE INTRODUCED INTO NON-ENCLOSED GASES** (working of metal by the action of a high concentration of electric current B23H; welding, e.g. arc welding, electron beam welding or electrolytic welding, B23K; gas-filled discharge tubes with solid cathode H01J 17/00; electric arc lamps H05B 31/00)

### Note(s)

In this subclass, the following expression is used with the meaning indicated:

- "spark gaps" means enclosed or non-enclosed discharge device having cold electrodes and used exclusively to discharge a quantity of electrical energy in a small time duration.

### Subclass index

#### SPARK GAPS

Rotary.....	7/00
Comprising auxiliary triggering means.....	2/00
Special adaptations: for oscillations; for rectifiers.....	9/00, 11/00
Overvoltage arresters; arcing horns.....	4/00
Other spark gaps.....	14/00
Details.....	1/00

SPARKING PLUGS..... 13/00

CIRCUITS..... 15/00

DEVICES FOR CORONA DISCHARGE..... 19/00

MANUFACTURE, MAINTENANCE..... 21/00

APPARATUS FOR GENERATING IONS..... 23/00

#### 1/00 Details of spark gaps

- |      |  |  |   |
|------|--|--|---|
| 1/02 | • Means for extinguishing arc  | 4/02   | • Details (of spark gaps H01T 1/00) [4]   |
| 1/04 | • • using magnetic blow-out  | 4/04   | • Housings (H01T 4/06 takes precedence) [4]   |
| 1/06 | • • • with permanent magnet  | 4/06   | • Mounting arrangements for a plurality of overvoltage arresters [4]                                    |
| 1/08 | • • using flow of arc-extinguishing fluid  | 4/08   | • structurally associated with protected apparatus (with switches H01H 9/14; with fuses H01H 85/44) [4] |
| 1/10 | • • • with extinguishing fluid evolved from solid material by heat of arc  | 4/10   | • having a single gap or a plurality of gaps in parallel (sparking plugs H01T 13/00) [4]                |
| 1/12 | • Means structurally associated with spark gap for recording operation thereof   | 4/12   | • • hermetically sealed [4]   |
| 1/14 | • Means structurally associated with spark gap for protecting it against overload or for disconnecting it in case of failure (H01T 1/15, H01T 1/16, H01T 1/18 take precedence) [4] | 4/14   | • • Arcing horns (associated with insulators H01B 17/46) [4]  |
| 1/15 | • for protection against excessive pressure [4]  | 4/16   | • having a plurality of gaps arranged in series [4]   |
| 1/16 | • Series resistor structurally associated with spark gap   | 4/18   | • • Arrangements for reducing height of stacked spark gaps [4]  |
| 1/18 | • Electrolytic device structurally associated with spark gap   | 4/20   | • • Arrangements for improving potential distribution [4]   |
| 1/20 | • Means for starting arc or facilitating ignition of spark gap [3]   | <b>7/00 Rotary spark gaps, i.e. devices having one or more rotating electrodes</b> |   |
| 1/22 | • • by the shape or the composition of the electrodes [4]  | <b>9/00 Spark gaps specially adapted for generating oscillations</b>               |   |
| 1/24 | • Selection of materials for electrodes (H01T 1/22 takes precedence) [4]   | <b>11/00 Spark gaps specially adapted as rectifiers</b>                            |   |

#### 2/00 Spark gaps comprising auxiliary triggering means (triggering circuits H01T 15/00) [4]

- |      |  |                             |
|------|--|-----------------------------|
| 2/02 | • comprising a trigger electrode or an auxiliary spark gap [4] | <b>13/00 Sparking plugs</b> |
|------|--|-----------------------------|

#### 4/00 Overvoltage arresters using spark gaps (H01T 2/00 takes precedence; overvoltage protection circuits using spark gaps H02H 9/06) [4]

- |       |   |
|-------|---|
| 13/02 | • Details   |
| 13/04 | • • Means providing electrical connection to sparking plug (electric connections in general H01R) |
| 13/05 | • • • combined with interference suppressing or shielding means [4]                               |



- 13/06 • • Covers forming a part of the plug and protecting it against adverse environment
- 13/08 • • Mounting, fixing, or sealing of sparking plugs, e.g. in combustion chamber
- 13/10 • • • by bayonet-type connection
- 13/12 • • Means on sparking plugs for facilitating engagement by tool or by hand
- 13/14 • • Means for self-cleaning
- 13/16 • • Means for dissipating heat
- 13/18 • • Means for heating, e.g. for drying
- 13/20 • characterised by features of the electrodes or insulation
- 13/22 • • having two or more electrodes embedded in insulation (for two or more sparks H01T 13/46)
- 13/24 • • having movable electrodes (H01T 13/28 takes precedence)
- 13/26 • • • for adjusting spark gap otherwise than by bending of electrode
- 13/28 • • having spherically shaped electrodes, e.g. ball-shaped
- 13/30 • • • mounted so as to permit free movement
- 13/32 • • characterised by features of the earthed electrode
- 13/34 • • characterised by the mounting of electrodes in insulation, e.g. by embedding
- 13/36 • • characterised by the joint between insulation and body, e.g. using cement
- 13/38 • • Selection of materials for insulation (in general H01B 3/00)
- 13/39 • • Selection of materials for electrodes [4]
- 13/40 • structurally combined with other devices (combined or associated with fuel injectors F02M 57/06; structurally combined with other parts of internal-combustion engines F02P 13/00)
- 13/41 • • with interference suppressing or shielding means [4]
- 13/42 • • with magnetic spark generators
- 13/44 • • with transformers, e.g. for high-frequency ignition
- 13/46 • having two or more spark gaps
- 13/48 • having means for rendering sparks visible
- 13/50 • • having means for ionisation of gap (H01T 13/52 takes precedence) [4]
- 13/52 • characterised by a discharge along a surface
- 13/54 • having electrodes arranged in a partly-enclosed ignition chamber
- 13/56 • characterised by having component parts which are easily assembled or disassembled
- 13/58 • Testing (testing characteristics of the spark in internal-combustion engine ignition F02P 17/12) [2011.01]
- 13/60 • • of electrical properties [2011.01]
- 14/00 Spark gaps not provided for in groups H01T 2/00-H01T 13/00** (devices providing for corona discharge H01T 19/00) [4]
- 15/00 Circuits specially adapted for spark gaps, e.g. ignition circuits** (ignition circuits for internal-combustion engines F02P; electric spark ignition for combustion apparatus F23Q; protection circuits using spark gaps H02H 9/06) [4]
- 19/00 Devices providing for corona discharge** (for charging electrographic elements G03G 15/02) [4]
- 19/02 • Corona rings
- 19/04 • having pointed electrodes
- 21/00 Apparatus or processes specially adapted for the manufacture or maintenance of spark gaps or sparking plugs**
- 21/02 • of sparking plugs
- 21/04 • • Cleaning (means for self-cleaning H01T 13/14; abrasive blasting devices for cleaning sparking plugs B24C 3/34)
- 21/06 • Adjustment of spark gaps (sparking plugs having movable electrodes for adjusting the gap H01T 13/26) [4]
- 23/00 Apparatus for generating ions to be introduced into non-enclosed gases, e.g. into the atmosphere** (discharge tubes with provision for emergence of ions from the vessel H01J 33/00; generating plasma H05H) [4]

## H02 GENERATION, CONVERSION, OR DISTRIBUTION OF ELECTRIC POWER

**H02B BOARDS, SUBSTATIONS, OR SWITCHING ARRANGEMENTS FOR THE SUPPLY OR DISTRIBUTION OF ELECTRIC POWER** (basic electric elements, their assembly, including the mounting in enclosures or on bases, or the mounting of covers thereon, see the subclasses for such elements, e.g. transformers H01F, switches, fuses H01H, line connectors H01R; installation of electric cables or lines, or of combined optical and electric cables or lines, or other conductors for supply or distribution H02G)

### Note(s)

This subclass covers boards, switchyards, switchgear or their installation, or the association of switching devices with each other or with other devices, e.g. transformers, fuses, meters or distribution boards; such associations constitute substations or distribution points.

### Subclass index

BOARDS, OR DETAILS OF SUBSTATIONS OR SWITCHING ARRANGEMENTS.....	1/00
SUBSTATIONS.....	5/00, 7/00
SWITCHGEAR.....	11/00, 13/00
SUPERVISORY DESKS OR PANELS.....	15/00
MANUFACTURE.....	3/00

**1/00 Frameworks, boards, panels, desks, casings; Details of substations or switching arrangements [5]**

- 1/01 • Frameworks [5]
- 1/015 • Boards, panels, desks; Parts thereof or accessories therefor [5]
- 1/03 • • for energy meters [5]
- 1/04 • • Mounting thereon of switches or of other devices in general, the switch or device having, or being without, casing
- 1/044 • • • Mounting through openings [5]
- 1/048 • • • • Snap mounting [5]
- 1/052 • • • Mounting on rails [5]
- 1/056 • • • Mounting on plugboards [5]
- 1/06 • • having associated enclosures, e.g. for preventing access to live parts (shutters or guards for contacts H02B 1/14)
- 1/14 • Shutters or guards for preventing access to contacts (shielding of isolating-contacts in withdrawable switchgear H02B 11/24)
- 1/16 • Earthing arrangements (earthing arrangements for substations H02B 5/01, for switchgear H02B 11/28, H02B 13/075; earth plates, pins, or other contacts H01R 4/66) [5]
- 1/18 • Disposition or arrangement of fuses (for switchgear having a withdrawable carriage H02B 11/26) [5]
- 1/20 • Bus-bar or other wiring layouts, e.g. in cubicles, in switchyards (installations of bus-bars H02G 5/00)
- 1/21 • • Bus-bar arrangements for rack-mounted devices with withdrawable units [5]
- 1/22 • • Layouts for duplicate bus-bar selection
- 1/24 • Circuit arrangements for boards or switchyards (devices for displaying diagrams H02B 15/00; service supply H02J 11/00)

**Note(s)**

In groups H02B 1/26-H02B 1/56, in the absence of an indication to the contrary, classification is made in the last appropriate place.

- 1/26 • Casings; Parts thereof or accessories therefor (adapted for a single switch H01H; enclosures for cables, lines or bus-bars H02G; distribution, connection or junction boxes H02G 3/08; casings in general H05K) [5]
- 1/28 • • dustproof, splashproof, drip-proof, waterproof or flameproof [5]
- 1/30 • • Cabinet-type casings; Parts thereof or accessories therefor [5]
- 1/32 • • • Mounting of devices therein [5]
- 1/34 • • • • Racks [5]
- 1/36 • • • • • with withdrawable units [5]
- 1/38 • • • Hinged covers or doors [5]
- 1/40 • • Wall-mounted casings; Parts thereof or accessories therefor [5]
- 1/42 • • • Mounting of devices therein [5]
- 1/44 • • • Hinged covers or doors [5]
- 1/46 • • Boxes; Parts thereof or accessories therefor [5]
- 1/48 • • • Mounting of devices therein [5]
- 1/50 • • Pedestal- or pad-mounted casings; Parts thereof or accessories therefor [5]
- 1/52 • • Mobile units, e.g. for work sites [5]
- 1/54 • Anti-seismic devices or installations (for buildings in general E04B 1/98) [5]
- 1/56 • Cooling; Ventilation [5]

**3/00 Apparatus specially adapted for the manufacture, assembly, or maintenance of boards or switchgear****5/00 Non-enclosed substations; Substations with enclosed and non-enclosed equipment**

- 5/01 • Earthing arrangements, e.g. earthing rods [5]
- 5/02 • mounted on pole, e.g. pole transformer substation
- 5/06 • gas-insulated [5]

**7/00 Enclosed substations, e.g. compact substations [5]**

- 7/01 • gas-insulated [5]
- 7/06 • Distribution substations, e.g. for urban network (H02B 7/01 takes precedence) [5]
- 7/08 • • Underground substations

**11/00 Switchgear having carriage withdrawable for isolation**

- 11/02 • Details
- 11/04 • • Isolating-contacts, e.g. mountings, shieldings (shutters or guards for isolating contacts H02B 1/14, H02B 11/24; switch contacts H01H; line connectors in general H01R) [5]
- 11/06 • • Means for duplicate bus-bar selection (layouts for duplicate bus-bar selection H02B 1/22)
- 11/08 • • Oil-tank lowering means associated with withdrawal mechanism
- 11/10 • • Indicating electrical condition of gear; Arrangement of test sockets
- 11/12 • with isolation by horizontal withdrawal
- 11/127 • • Withdrawal mechanism [5]
- 11/133 • • • with interlock (interlock for switches in general H01H) [5]
- 11/167 • • truck type (H02B 11/127 takes precedence) [5]
- 11/173 • • drawer type (H02B 11/127 takes precedence) [5]
- 11/18 • with isolation by vertical withdrawal
- 11/20 • • having an enclosure
- 11/22 • • • wherein front of enclosure moves with carriage upon horizontal withdrawal subsequent to isolation
- 11/24 • Shutters or guards [5]
- 11/26 • Arrangement of fuses, resistors, voltage arresters or the like [5]
- 11/28 • Earthing arrangements [5]

**13/00 Arrangement of switchgear in which switches are enclosed in, or structurally associated with, a casing, e.g. cubicle (in association with main transformer H02B 5/00, H02B 7/00; switchgear having carriage withdrawable for isolation H02B 11/00) [5]**

- 13/01 • with resin casing [5]
- 13/02 • with metal casing
- 13/025 • • Safety arrangements, e.g. in case of excessive pressure or fire due to electrical defect (for buildings in general E04B 1/94; devices for opening or closing safety wings E05F 1/00; emergency protective circuit arrangements for distribution gear, e.g. bus-bar systems, or for switching devices H02H 7/22) [5]
- 13/035 • • Gas-insulated switchgear [5]
- 13/045 • • • Details of casing, e.g. gas tightness (gas reservoirs for switches H01H 33/56) [5]
- 13/055 • • • Features relating to the gas (selection of fluids for switches H01H 33/22) [5]
- 13/065 • • • Means for detecting or reacting to mechanical or electrical defects (for switches H01H 9/50, H01H 33/26, H01H 33/53) [5]
- 13/075 • • • Earthing arrangements [5]
- 13/08 • with stone, brick, or concrete casing

**15/00 Supervisory desks or panels for centralised control or display** (desks in general A47B)

- with mimic diagrams

15/04 • • consisting of building blocks

**99/00 Subject matter not provided for in other groups of this subclass [2009.01]**

**H02G INSTALLATION OF ELECTRIC CABLES OR LINES, OR OF COMBINED OPTICAL AND ELECTRIC CABLES OR LINES** (insulated conductors or cables with arrangements for facilitating mounting or securing H01B 7/40; distribution points incorporating switches H02B; guiding telephone cords H04M 1/15; cable ducts or mountings for telephone or telegraph exchange installations H04Q 1/06)

#### Note(s)

1. This subclass covers installation of communication cables or lines, including those comprising a combination of optical and electrical conductors, or of lightning conductors as well as installation of power cables or lines.
2. This subclass does not cover installation of purely optical cables, which is covered by group G02B 6/46.
3. In this subclass, the following expression is used with the meaning indicated:
  - "electric cable" includes cables comprising optical conductors, e.g. fibres, in combination with electrical conductors.

#### Subclass index

##### PRINCIPAL TYPES OF INSTALLATIONS

Inside; overhead; underground or underwater.....3/00, 7/00, 9/00

##### SPECIAL INSTALLATIONS

Of bus-bars; of lightning conductors; of movable parts.....5/00, 13/00, 11/00

CABLE FITTINGS.....15/00

INSTALLING, MAINTAINING, REPAIRING.....1/00

**1/00 Methods or apparatus specially adapted for installing, maintaining, repairing, or dismantling electric cables or lines**

1/02 • for overhead lines or cables

1/04 • • for mounting or stretching (wire stretchers in general B25B 25/00)

1/06 • for laying cables, e.g. laying apparatus on vehicle (combined with trench digging or back-filling machines or dredgers E02F 5/00)

1/08 • • through tubing or conduit, e.g. rod or draw wire for pushing or pulling

1/10 • • in or under water

1/12 • for removing insulation or armouring from cables, e.g. from the end thereof (pliers in general B25B; cutters in general B26B; insulated conductors or cables with arrangements for facilitating removal of insulation H01B 7/38)

1/14 • for joining or terminating cables (joining electric conductors H01R 43/00)

1/16 • for repairing insulation or armouring of cables

**3/00 Installations of electric cables or lines or protective tubing therefor in or on buildings, equivalent structures or vehicles** (installations of bus-bars H02G 5/00; overhead installations H02G 7/00; installations in or on the ground H02G 9/00; channels or vertical ducts for receiving utility lines E04F 17/08; wiring of electric apparatus in general H05K)

3/02 • Details

3/03 • • Cooling [2]

3/04 • • Protective tubing or conduits, e.g. cable ladders, cable troughs (pipes or tubing in general F16L)

3/06 • • Joints for connecting lengths of protective tubing to each other or to casings, e.g. to distribution box; Ensuring electrical continuity in the joint

3/08 • • Distribution boxes; Connection or junction boxes (cable terminations H02G 15/02)

3/10 • • • for surface mounting on a wall

3/12 • • • for flush mounting

3/14 • • • Fastening of cover or lid to box

3/16 • • • structurally associated with support for line-connecting terminals within the box (terminals H01R 9/00)

3/18 • • • providing line outlets

3/20 • • • • Ceiling roses

3/22 • Installations of cables or lines through walls, floors, or ceilings, e.g. into buildings (devices for use where pipes or cables pass through walls or partitions F16L 5/00; lead-in or lead-through insulators H01B 17/26; insulating tubes or sleeves H01B 17/58)

3/30 • Installations of cables or lines on walls, floors or ceilings (supports for pipes, cables or protective tubing F16L 3/00; hose-clips F16L 33/02) [7]

3/32 • • using mounting clamps [7]

3/34 • • using separate protective tubing [7]

3/36 • Installations of cables or lines in walls, floors or ceilings (H02G 3/22 takes precedence) [7]

3/38 • • the cables or lines being installed in preestablished conduits or ducts [7]

3/40 • • • using separate protective tubing in the conduits or ducts [7]

**5/00 Installations of bus-bars**

5/02 • Open installations

5/04 • Partially-enclosed installations, e.g. in ducts and adapted for sliding or rolling current collection (non-rotary current collectors H01R 41/00)

5/06 • Totally-enclosed installations, e.g. in metal casings

5/08 • • Connection boxes therefor

5/10 • Cooling [2]

- 7/00 Overhead installations of electric lines or cables** (installations of bus-bars H02G 5/00; trolley wires or contact lines for electric railways B60M; fastening conductors to insulators H01B 17/00, e.g. H01B 17/06, H01B 17/16, H01B 17/22; protection against abnormal electric conditions H01H; hook contacts for temporary connections to overhead lines H01R 11/14)
- 7/02 • Devices for adjusting or maintaining mechanical tension, e.g. take-up device
- 7/04 • Arrangements or devices for relieving mechanical tension
- 7/05 • Suspension arrangements or devices for electric cables or lines [3]
- 7/06 • • Suspensions for lines or cables along a separate supporting wire, e.g. S-hook [3]
- 7/08 • • • Members clamped to the supporting wire or to the line or cable [3]
- 7/10 • • • Flexible members or lashings wrapped around both the supporting wire and the line or cable [3]
- 7/12 • Devices for maintaining distance between parallel conductors, e.g. spacer
- 7/14 • Arrangements or devices for damping mechanical oscillations of lines, e.g. for reducing production of sound
- 7/16 • Devices for removing snow or ice from lines or cables (from insulators H01B 17/52)
- 7/18 • Devices affording mechanical protection in the event of breakage of a line or cable, e.g. net for catching broken lines
- 7/20 • Spatial arrangements or dispositions of lines or cables on poles, posts, or towers (construction of poles, posts, or towers E04H 12/22)
- 7/22 • Arrangements of earthing wires suspended between mastheads
- 9/00 Installations of electric cables or lines in or on the ground or water** (cathodic protection C23F 13/02; detection of buried cables G01V)
- 9/02 • laid directly in or on the ground, river-bed or sea-bottom; Coverings therefor, e.g. tile
- 9/04 • in surface ducts; Ducts or covers therefor
- 9/06 • in underground tubes or conduits; Tubes or conduits therefor
- 9/08 • in tunnels
- 9/10 • in cable chambers, e.g. in manhole, in handhole (building aspects of cable chambers section E, e.g. E04H 5/06)
- 9/12 • supported on or from floats, e.g. in water (floating cables H01B 7/12)
- 11/00 Arrangements of electric cables or lines between relatively-movable parts** (current collectors H01R)
- 11/02 • using take-up reel or drum
- 13/00 Installations of lightning conductors; Fastening thereof to supporting structure** (indicating, counting or recording lightning strokes G01; lightning arrestors H01C 7/12, H01C 8/04, H01G 9/18, H01T; earth plates, pins or other contacts H01R)
- 15/00 Cable fittings**
- 15/007 • Devices for relieving mechanical stress [3]
- 15/013 • Sealing means for cable inlets (inlets for cables filled with, or surrounded by, gas or oil H02G 15/32) [3]
- 15/02 • Cable terminations (for gas- or oil-filled cables H02G 15/22)
- 15/04 • • Cable-end sealings
- 15/06 • • Cable terminating boxes, frames, or other structures (terminal blocks H01R 9/00)
- 15/064 • • • with devices for relieving electrical stress [3]
- 15/068 • • • • connected to the cable shield only (H02G 15/072 takes precedence) [3]
- 15/072 • • • • of the condenser type [3]
- 15/076 • • • for multi-conductor cables [3]
- 15/08 • Cable junctions (for gas or oil filled cables H02G 15/24; disconnectable junctions, electrical connections H01R)
- 15/10 • • protected by boxes, e.g. by distribution, connection or junction boxes (terminal blocks H01R 9/00)
- 15/103 • • • with devices for relieving electrical stress [3]
- 15/105 • • • • connected to the cable shield only (H02G 15/107 takes precedence) [3]
- 15/107 • • • • of the condenser type [3]
- 15/113 • • • Boxes split longitudinally in main cable direction [3]
- 15/115 • • • Boxes split perpendicularly to main cable direction [3]
- 15/117 • • • for multiconductor cables [3]
- 15/12 • • • for incorporating transformers, loading coils or amplifiers
- 15/14 • • • • specially adapted for submarine cables
- 15/16 • • • structurally associated with support for line-connecting terminals within the box
- 15/18 • • protected by sleeves, e.g. for communication cable (two-part covers H02G 15/10)
- 15/184 • • • with devices for relieving electrical stress [3]
- 15/188 • • • • connected to cable shield only [3]
- 15/192 • • • with support means for ends of the sleeves [3]
- 15/196 • • • having lapped insulation [3]
- 15/20 • Cable fittings for cables filled with or surrounded by gas or oil (H02G 15/34 takes precedence) [3]
- 15/22 • Cable terminations
- 15/23 • • Cable-end sealings [3]
- 15/24 • Cable junctions
- 15/25 • • Stop junctions [3]
- 15/26 • Expansion vessels; Locking heads; Auxiliary pipe-lines
- 15/28 • • structurally associated with devices for indicating the presence or location of non-electric faults (combined with electric protective means H02H)
- 15/30 • • with devices for relieving electrical stress [3]
- 15/32 • • Cable inlets [3]
- 15/34 • Cable fittings for cryogenic cables [3]

**H02H EMERGENCY PROTECTIVE CIRCUIT ARRANGEMENTS** (indicating or signalling undesired working conditions G01R, e.g. G01R 31/00, G08B; locating faults along lines G01R 31/08; emergency protective devices H01H)

### Note(s)

This subclass covers only circuit arrangements for the automatic protection of electric lines or electric machines or apparatus in the event of an undesired change from normal working conditions.

### Subclass index

#### EMERGENCY PROTECTIVE CIRCUIT ARRANGEMENTS

For automatic disconnection or switching responsive to variation of conditions:

electric; sensed non-electric; simulated non-electric.....3/00, 5/00, 6/00

adapted for specific machines or for sectionalised protection of cables or lines.....7/00

For limiting excess current or voltage.....9/00

For preventing switching-on in case of undesired conditions.....11/00

DETAILS.....1/00

<b>1/00</b>	<b>Details of emergency protective circuit arrangements</b>	3/22	• • of short duration, e.g. lightning
1/04	• Arrangements for preventing response to transient abnormal conditions, e.g. to lightning	3/24	• responsive to undervoltage or no-voltage
1/06	• Arrangements for supplying operative power [3]	3/247	• • having timing means [3]
<b>3/00</b>	<b>Emergency protective circuit arrangements for automatic disconnection directly responsive to an undesired change from normal electric working condition, with or without subsequent reconnection</b> (specially adapted for specific types of electric machines or apparatus or for sectionalised protection of cable or line systems H02H 7/00; systems for change-over to standby supply H02J 9/00)	3/253	• • for multiphase applications, e.g. phase interruption [3]
3/02	• Details	3/26	• responsive to difference between voltages or between currents; responsive to phase angle between voltages or between currents
3/027	• • with automatic disconnection after a predetermined time (H02H 3/033, H02H 3/06 take precedence) [3]	3/28	• • involving comparison of the voltage or current values at two spaced portions of a single system, e.g. at opposite ends of one line, at input and output of apparatus
3/033	• • with several disconnections in a preferential order (H02H 3/06 takes precedence) [3]	3/30	• • using pilot wires or other signalling channel
3/04	• • with warning or supervision in addition to disconnection, e.g. for indicating that protective apparatus has functioned	3/32	• • involving comparison of the voltage or current values at corresponding points in different conductors of a single system, e.g. of currents in go and return conductors
3/05	• • with means for increasing reliability, e.g. redundancy arrangements [3]	3/33	• • • using summation current transformers (H02H 3/347 takes precedence) [3]
3/06	• • with automatic reconnection	3/34	• • • of a three-phase system
3/07	• • • and with permanent disconnection after a predetermined number of reconnection cycles [3]	3/347	• • • • using summation current transformers [3]
3/08	• responsive to excess current (responsive to abnormal temperature caused by excess current H02H 5/04)	3/353	• • • • involving comparison of phase voltages [3]
3/087	• • for dc applications [3]	3/36	• • involving comparison of the voltage or current values at corresponding points of different systems, e.g. of parallel feeder systems
3/093	• • with timing means [3]	3/38	• responsive to both voltage and current; responsive to phase angle between voltage and current
3/10	• • additionally responsive to some other abnormal electrical conditions	3/40	• responsive to ratio of voltage and current
3/12	• responsive to underload or no-load	3/42	• responsive to product of voltage and current
3/13	• • for multiphase applications, e.g. phase interruption [3]	3/44	• responsive to the rate of change of electrical quantities [3]
3/14	• responsive to occurrence of voltage on parts normally at earth potential	3/46	• responsive to frequency deviations [3]
3/16	• responsive to fault current to earth, frame or mass (with balanced or differential arrangement H02H 3/26)	3/48	• responsive to loss of synchronism [3]
3/17	• • by means of an auxiliary voltage injected into the installation to be protected [3]	3/50	• responsive to the appearance of abnormal wave forms, e.g. ac in dc installations [3]
3/18	• responsive to reversal of direct current	3/52	• • responsive to the appearance of harmonics [3]
3/20	• responsive to excess voltage	<b>5/00</b>	<b>Emergency protective circuit arrangements for automatic disconnection directly responsive to an undesired change from normal non-electric working conditions with or without subsequent reconnection</b> (using simulators of the apparatus being protected H02H 6/00; specially adapted for specific types of electric machines or apparatus or for sectionalised protection of cable or line systems H02H 7/00) [3]
		5/04	• responsive to abnormal temperature

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- 5/06 • • in oil-filled electric apparatus
- 5/08 • responsive to abnormal fluid pressure, liquid level or liquid displacement, e.g. Buchholz relays
- 5/10 • responsive to mechanical injury, e.g. rupture of line, breakage of earth connection
- 5/12 • responsive to undesired approach to, or touching of, live parts by living beings
- 6/00 Emergency protective circuit arrangements responsive to undesired changes from normal non-electric working conditions using simulators of the apparatus being protected, e.g. using thermal images [3]**
- 7/00 Emergency protective circuit arrangements specially adapted for specific types of electric machines or apparatus or for sectionalised protection of cable or line systems, and effecting automatic switching in the event of an undesired change from normal working conditions** (structural association of protective devices with specific machines or apparatus and their protection without automatic disconnection, see the relevant subclass for the machine or apparatus)
  - 7/04 • for transformers
  - 7/045 • • Differential protection of transformers [3]
  - 7/05 • • for capacitive voltage transformers, e.g. against resonant conditions [3]
  - 7/055 • • for tapped transformers or tap-changing means thereof [3]
  - 7/06 • for dynamo-electric generators; for synchronous capacitors
  - 7/08 • for dynamo-electric motors
  - 7/085 • • against excessive load
  - 7/09 • • against over-voltage; against reduction of voltage; against phase interruption
  - 7/093 • • against increase beyond, or decrease below, a predetermined level of rotational speed (centrifugal switches H01H 35/10)
  - 7/097 • • against wrong direction of rotation
  - 7/10 • for converters; for rectifiers
  - 7/12 • • for static converters or rectifiers
  - 7/122 • • • for inverters, i.e. dc/ac converters [2]
  - 7/125 • • • for rectifiers [2]
  - 7/127 • • • having auxiliary control electrode to which blocking control voltages or currents are applied in case of emergency [2]
  - 7/16 • for capacitors (for synchronous capacitors H02H 7/06)
  - 7/18 • for batteries; for accumulators
  - 7/20 • for electronic equipment (for converters H02H 7/10; for electric measuring instruments G01R 1/36; for dc voltage or current semiconductor regulators G05F 1/569; for amplifiers H03F 1/52; for electronic switching circuits H03K 17/08)
  - 7/22 • for distribution gear, e.g. bus-bar systems; for switching devices
  - 7/24 • for spark-gap arresters
  - 7/26 • Sectionalised protection of cable or line systems, e.g. for disconnecting a section on which a short-circuit, earth fault, or arc discharge has occurred (locating faults in cables G01R 31/08)
  - 7/28 • • for meshed systems
  - 7/30 • • Staggered disconnection [3]
- 9/00 Emergency protective circuit arrangements for limiting excess current or voltage without disconnection** (structural association of protective devices with specific machines or apparatus, see the relevant subclass for the machine or apparatus)
  - 9/02 • responsive to excess current
  - 9/04 • responsive to excess voltage (lightning arrestors H01C 7/12, H01C 8/04, H01G 9/18, H01T)
  - 9/06 • • using spark-gap arresters
  - 9/08 • Limitation or suppression of earth fault currents, e.g. Petersen coil [3]
- 11/00 Emergency protective circuit arrangements for preventing the switching-on in case an undesired electric working condition might result**
- 99/00 Subject matter not provided for in other groups of this subclass [2009.01]**

**H02J CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS FOR STORING ELECTRIC ENERGY** (power supply circuits for apparatus for measuring X-radiation, gamma radiation, corpuscular radiation or cosmic radiation G01T 1/175; electric power supply circuits specially adapted for use in electronic time-pieces with no moving parts G04G 19/00; for digital computers G06F 1/18; for discharge tubes H01J 37/248; circuits or apparatus for the conversion of electric power, arrangements for control or regulation of such circuits or apparatus H02M; interrelated control of several motors, control of a prime-mover/generator combination H02P; control of high-frequency power H03L; additional use of power line or power network for transmission of information H04B)

### Note(s)

1. This subclass covers:
  - ac or dc mains or distribution networks;
  - circuit arrangements for battery supplies, including charging or control thereof, or co-ordinated supply from two or more sources of any kind;
  - systems for supplying or distributing electric power by electromagnetic waves.
2. This subclass does not cover:
  - control of a single motor, generator or dynamo-electric converter, of the types covered by subclass H01F or H02K, which is covered by subclass H02P;
  - control of a single motor or generator, of the types covered by subclass H02N, which is covered by that subclass.

### Subclass index

#### CIRCUIT ARRANGEMENTS

For distribution networks:

direct current; alternative current..... 1/00, 3/00

combined; not specified.....	5/00, 4/00
For batteries.....	7/00
For emergency or stand-by power supply.....	9/00
For power supply to auxiliaries of stations.....	11/00
For providing remote indication of network conditions.....	13/00
SYSTEMS FOR STORING ELECTRICAL ENERGY.....	15/00
SYSTEMS FOR POWER DISTRIBUTION BY ELECTROMAGNETIC WAVES.....	17/00

### 1/00 Circuit arrangements for dc mains or dc distribution networks

- 1/02 • Arrangements for reducing harmonics or ripples (in converters H02M 1/14)
- 1/04 • Constant-current supply systems
- 1/06 • Two-wire systems
- 1/08 • Three-wire systems; Systems having more than three wires
- 1/10 • Parallel operation of dc sources (involving batteries H02J 7/34)
- 1/12 • • Parallel operation of dc generators with converters, e.g. with mercury-arc rectifier
- 1/14 • Balancing the load in a network (by batteries H02J 7/34)
- 1/16 • • using dynamo-electric machines coupled to flywheels

### 3/00 Circuit arrangements for ac mains or ac distribution networks

- 3/01 • Arrangements for reducing harmonics or ripples (in converters H02M 1/12) [3]
- 3/02 • using a single network for simultaneous distribution of power at different frequencies; using a single network for simultaneous distribution of ac power and of dc power
- 3/04 • for connecting networks of the same frequency but supplied from different sources
- 3/06 • • Controlling transfer of power between connected networks; Controlling sharing of load between connected networks
- 3/08 • • Synchronising of networks
- 3/10 • Constant-current supply systems
- 3/12 • for adjusting voltage in ac networks by changing a characteristic of the network load
- 3/14 • • by switching loads on to, or off from, network, e.g. progressively balanced loading
- 3/16 • • by adjustment of reactive power
- 3/18 • Arrangements for adjusting, eliminating, or compensating reactive power in networks (for adjustment of voltage H02J 3/12; use of Petersen coils H02H 9/08)
- 3/20 • • in long overhead lines
- 3/22 • • in cables
- 3/24 • Arrangements for preventing or reducing oscillations of power in networks (by control effected upon a single generator H02P 9/00)
- 3/26 • Arrangements for eliminating or reducing asymmetry in polyphase networks
- 3/28 • Arrangements for balancing the load in a network by storage of energy
- 3/30 • • using dynamo-electric machines coupled to flywheels
- 3/32 • • using batteries with converting means
- 3/34 • Arrangements for transfer of electric power between networks of substantially different frequency (frequency converters H02M)

- 3/36 • Arrangements for transfer of electric power between ac networks via a high-tension dc link
- 3/38 • Arrangements for parallelly feeding a single network by two or more generators, converters, or transformers
- 3/40 • • Synchronising a generator for connection to a network or to another generator
- 3/42 • • • with automatic parallel connection when synchronism is achieved
- 3/44 • • • with means for ensuring correct phase sequence
- 3/46 • • Controlling the sharing of output between the generators, converters, or transformers
- 3/48 • • • Controlling the sharing of the in-phase component
- 3/50 • • • Controlling the sharing of the out-of-phase component

### 4/00 Circuit arrangements for mains or distribution networks not specified as ac or dc [2]

### 5/00 Circuit arrangements for transfer of electric power between ac networks and dc networks (H02J 3/36 takes precedence)

### 7/00 Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries

- 7/02 • for charging batteries from ac mains by converters
- 7/04 • • Regulation of the charging current or voltage
- 7/06 • • • using discharge tubes or semiconductor devices
- 7/08 • • • • using discharge tubes only
- 7/10 • • • • using semiconductor devices only
- 7/12 • • • using magnetic devices having controllable degree of saturation, i.e. transductors
- 7/14 • for charging batteries from dynamo-electric generators driven at varying speed, e.g. on vehicle
- 7/16 • • Regulation of the charging current or voltage by variation of field
- 7/18 • • • due to variation of ohmic resistance in field circuit, using resistance switching in or out of circuit step by step
- 7/20 • • • due to variation of continuously-variable ohmic resistor
- 7/22 • • • due to variation of make-to-break ratio of intermittently-operating contacts, e.g. using Tirrill regulator
- 7/24 • • • using discharge tubes or semiconductor devices
- 7/26 • • • using magnetic devices with controllable degree of saturation
- 7/28 • • • using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device
- 7/30 • • • using armature-reaction-excited machines
- 7/32 • for charging batteries from a charging set comprising a non-electric prime mover

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- 7/34 • Parallel operation in networks using both storage and other dc sources, e.g. providing buffering (H02J 7/14 takes precedence) [4]
- 7/35 • • with light sensitive cells [4]
- 7/36 • Arrangements using end-cell switching
- 9/00 Circuit arrangements for emergency or stand-by power supply, e.g. for emergency lighting** (with provision for charging standby battery H02J 7/00)
- 9/02 • in which an auxiliary distribution system and its associated lamps are brought into service
- 9/04 • in which the distribution system is disconnected from the normal source and connected to a standby source
- 9/06 • • with automatic change-over
- 9/08 • • • requiring starting of a prime-mover

- 11/00 Circuit arrangements for providing service supply to auxiliaries of stations in which electric power is generated, distributed, or converted** (emergency or standby arrangements H02J 9/00)
- 13/00 Circuit arrangements for providing remote indication of network conditions, e.g. an instantaneous record of the open or closed condition of each circuitbreaker in the network; Circuit arrangements for providing remote control of switching means in a power distribution network, e.g. switching in and out of current consumers by using a pulse code signal carried by the network**
- 15/00 Systems for storing electric energy** (mechanical systems therefor F01-F04; in chemical form H01M) [2]
- 17/00 Systems for supplying or distributing electric power by electromagnetic waves** [3]

**H02K DYNAMO-ELECTRIC MACHINES** (dynamo-electric relays H01H 53/00; conversion of DC or AC input power into surge output power H02M 9/00)

### Note(s)

1. This subclass covers the structural adaptation of dynamo-electric machines for the purpose of their control.
2. This subclass does not cover starting, regulating, electronically commutating, braking, or otherwise controlling motors, generators or dynamo-electric converters, in general, which is covered by subclass H02P.
3. Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".

### Subclass index

#### GENERATORS OR MOTORS

##### Continuously rotating

- AC machines: asynchronous; synchronous; with mechanical commutators.....17/00, 19/00, 21/00, 27/00
- DC machines or universal AC/DC motors: with mechanical commutators; with interrupters.....23/00, 25/00
- with non-mechanical commutating devices.....29/00
- Acyclic machines; oscillating machines; motors rotating step by step.....31/00, 33/00, 35/00, 37/00
- Generators producing a non-sinusoidal waveform.....39/00
- Machines with more than one rotor or stator.....16/00

#### SPECIAL DYNAMO-ELECTRIC APPARATUS

- Machines for transmitting angular displacements; torque motors.....24/00, 26/00
- Machines involving dynamo-electric interaction with a plasma or a flow of conductive liquid or of fluid-borne conductive or magnetic particles.....44/00
- Systems for propulsing a rigid body along a path.....41/00
- Converters.....47/00
- Dynamo-electric clutches or brakes; dynamo-electric gears.....49/00, 51/00
- Alleged perpetua mobilia.....53/00
- Machines operating at cryogenic temperatures.....55/00
- Other machines.....99/00

#### DETAILS

- Magnetic circuits; windings; casings.....1/00, 3/00, 5/00
- Arrangements structurally associated with the machine for handling mechanical energy; cooling; measuring or protective devices; current collection or commutation.....7/00, 9/00, 11/00, 13/00

MANUFACTURE.....15/00

- 
- 1/00 Details of the magnetic circuit** (magnetic circuits for relays H01H 50/16)
  - 1/02 • characterised by the magnetic material
  - 1/04 • characterised by the material used for insulating the magnetic circuit or parts thereof
  - 1/06 • characterised by the shape, form or construction
  - 1/08 • • Salient poles
  - 1/10 • • • Commutating poles
  - 1/12 • • Stationary parts of the magnetic circuit
  - 1/14 • • • Stator cores with salient poles
  - 1/16 • • • Stator cores with slots for windings
  - 1/17 • • • Stator cores with permanent magnets [5]
  - 1/18 • • • Means for mounting or fastening magnetic stationary parts on to, or to, the stator structures
  - 1/20 • • • with channels or ducts for flow of cooling medium
  - 1/22 • • Rotating parts of the magnetic circuit
  - 1/24 • • • Rotor cores with salient poles



- 1/26 • • • Rotor cores with slots for windings
- 1/27 • • • Rotor cores with permanent magnets [5]
- 1/28 • • • Means for mounting or fastening rotating magnetic parts on to, or to, the rotor structures
- 1/30 • • • • using intermediate parts, e.g. spiders
- 1/32 • • • with channels or ducts for flow of cooling medium
- 1/34 • • Reciprocating, oscillating or vibrating parts of the magnetic circuit
- 3/00 Details of windings**
- 3/02 • Windings characterised by the conductor material
- 3/04 • Windings characterised by the conductor shape, form or construction, e.g. with bar conductors
- 3/12 • • arranged in slots
- 3/14 • • • with transposed conductors, e.g. twisted conductors
- 3/16 • • • for auxiliary purposes, e.g. damping or commutating
- 3/18 • • Windings for salient poles
- 3/20 • • • for auxiliary purposes, e.g. damping or commutating
- 3/22 • • consisting of hollow conductors
- 3/24 • • with channels or ducts for cooling medium between the conductors
- 3/26 • • consisting of printed conductors
- 3/28 • • Layout of windings or of connections between windings (windings for pole-changing H02K 17/06, H02K 17/14, H02K 19/12, H02K 19/32)
- 3/30 • Windings characterised by the insulating material
- 3/32 • Windings characterised by the shape, form or construction of the insulation
- 3/34 • • between conductors or between conductor and core, e.g. slot insulation [3]
- 3/38 • • around winding heads, equalising connectors, or connections thereto
- 3/40 • • for high voltage, e.g. affording protection against corona discharges
- 3/42 • Means for preventing or reducing eddy-current losses in the winding heads, e.g. by shielding [2]
- 3/44 • Protection against moisture or chemical attack; Windings specially adapted for operation in liquid or gas
- 3/46 • Fastening of windings on the stator or rotor structure
- 3/47 • • Air-gap windings, i.e. iron-free windings [3]
- 3/48 • • in slots
- 3/487 • • • Slot-closing devices [3]
- 3/493 • • • • magnetic [3]
- 3/50 • • Fastening of winding heads, equalising connectors, or connections thereto
- 3/51 • • • applicable to rotors only [3]
- 3/52 • • Fastening salient pole windings or connections thereto
- 5/00 Casings; Enclosures; Supports**
- 5/02 • Casings or enclosures characterised by the material thereof
- 5/04 • Casings or enclosures characterised by the shape, form or construction thereof
- 5/06 • • Cast metal casings
- 5/08 • • Insulating casings
- 5/10 • • with arrangements for protection from ingress, e.g. of water or fingers
- 5/12 • • specially adapted for operating in liquid or gas (combined with cooling arrangements H02K 9/00)
- 5/124 • • • Sealing of shafts [3]
- 5/128 • • • using air-gap sleeves or air-gap discs [3]
- 5/132 • • • Submersible electric motors (H02K 5/128 takes precedence) [3]
- 5/136 • • • explosion-proof [3]
- 5/14 • • Means for supporting or protecting brushes or brush holders [3]
- 5/15 • • Mounting arrangements for bearing-shields or end plates [3]
- 5/16 • • Means for supporting bearings, e.g. insulating supports or means for fitting bearings in the bearing-shields (magnetic bearings H02K 7/09)
- 5/167 • • • using sliding-contact or spherical cap bearings [3]
- 5/173 • • • using bearings with rolling contact, e.g. ball bearings [3]
- 5/18 • • with ribs or fins for improving heat transfer
- 5/20 • • with channels or ducts for flow of cooling medium
- 5/22 • • Auxiliary parts of casings not covered by groups H02K 5/06-H02K 5/20, e.g. shaped to form connection boxes or terminal boxes
- 5/24 • specially adapted for suppression or reduction of noise or vibrations
- 5/26 • Means for adjusting casings relative to their supports
- 7/00 Arrangements for handling mechanical energy structurally associated with dynamo-electric machines, e.g. structural association with mechanical driving motors or auxiliary dynamo-electric machines**
- 7/02 • Additional mass for increasing inertia, e.g. flywheels
- 7/04 • Balancing means
- 7/06 • Means for converting reciprocating motion into rotary motion or vice versa
- 7/065 • • Electromechanical oscillators; Vibrating magnetic drives [3]
- 7/07 • • using pawls and ratchet wheels [3]
- 7/075 • • using crankshafts or eccentrics [3]
- 7/08 • Structural association with bearings
- 7/09 • • with magnetic bearings [3]
- 7/10 • Structural association with clutches, brakes, gears, pulleys or mechanical starters
- 7/102 • • with friction brakes
- 7/104 • • with eddy-current brakes
- 7/106 • • with dynamo-electric brakes
- 7/108 • • with friction clutches
- 7/11 • • with dynamo-electric clutches
- 7/112 • • with friction clutches in combination with brakes
- 7/114 • • with dynamo-electric clutches in combination with brakes
- 7/116 • • with gears
- 7/118 • • with starting devices
- 7/12 • • with auxiliary limited movement of stators, rotors or core parts, e.g. rotors axially movable for the purpose of clutching or braking
- 7/14 • Structural association with mechanical loads, e.g. with hand-held machine tools or fans (with fan or impeller for cooling the machine H02K 9/06)
- 7/16 • • for operation above the critical speed of vibration of the rotating parts
- 7/18 • Structural association of electric generators with mechanical driving motors, e.g. with turbines
- 7/20 • Structural association with auxiliary dynamo-electric machines, e.g. with electric starter motors or exciters

<b>9/00</b>	<b>Arrangements for cooling or ventilating</b> (channels or ducts in parts of the magnetic circuit H02K 1/20, H02K 1/32; channels or ducts in or between conductors H02K 3/22, H02K 3/24)	13/14	• Circuit arrangements for improvement of commutation, e.g. by use of unidirectionally conductive elements
9/02	• by ambient air flowing through the machine	<b>15/00</b>	<b>Methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing of dynamo-electric machines</b>
9/04	• • having means for generating a flow of cooling medium	15/02	• of stator or rotor bodies
9/06	• • • with fans or impellers driven by the machine shaft	15/03	• • having permanent magnets [5]
9/08	• by gaseous cooling medium circulating wholly within the machine casing (H02K 9/10 takes precedence)	15/04	• of windings, prior to mounting into machines (insulating windings H02K 15/10, H02K 15/12)
9/10	• by gaseous cooling medium flowing in closed circuit, a part of which is external to the machine casing	15/06	• Embedding prefabricated windings in machines
9/12	• • wherein the cooling medium circulates freely within the casing	15/08	• Forming windings by laying conductors into or around core parts
9/14	• wherein gaseous cooling medium circulates between the machine casing and a surrounding mantle	15/085	• • by laying conductors into slotted stators
9/16	• • wherein the cooling medium circulates through ducts or tubes within the casing	15/09	• • by laying conductors into slotted rotors
9/18	• • wherein the external part of the closed circuit comprises a heat exchanger structurally associated with the machine casing	15/095	• • by laying conductors around salient poles
9/19	• for machines with closed casing and closed-circuit cooling using a liquid cooling medium, e.g. oil	15/10	• Applying solid insulation to windings, stators or rotors
9/193	• • with provision for replenishing the cooling medium; with means for preventing leakage of the cooling medium	15/12	• Impregnating, heating or drying of windings, stators, rotors or machines
9/197	• • in which the rotor or stator space is fluid-tight, e.g. to provide for different cooling media for rotor and stator	15/14	• Casings; Enclosures; Supports
9/20	• • wherein the cooling medium vaporises within the machine casing	15/16	• Centering rotors within the stator; Balancing rotors
9/22	• by solid heat conducting material embedded in, or arranged in contact with, the stator or rotor, e.g. heat bridges	<b>16/00</b>	<b>Machines with more than one rotor or stator [2]</b>
9/24	• Protection against failure of cooling arrangements, e.g. due to loss of cooling medium or due to interruption of the circulation of cooling medium	16/02	• Machines with one stator and two rotors [2]
9/26	• Structural association of machines with devices for cleaning or drying cooling medium, e.g. with filters	16/04	• Machines with one rotor and two stators [2]
9/28	• Cooling of commutators, slip-rings or brushes, e.g. by ventilating		<b>Note(s)</b>
<b>11/00</b>	<b>Structural association of dynamo-electric machines with measuring or protective devices or electric components, e.g. with resistors or switches</b>		Group H02K 16/00 takes precedence over groups H02K 17/00-H02K 53/00.
11/02	• for suppression of radio interference [6]	<b>17/00</b>	<b>Asynchronous induction motors; Asynchronous induction generators</b>
11/04	• for rectification [6]	17/02	• Asynchronous induction motors
<b>13/00</b>	<b>Structural associations of current collectors with motors or generators, e.g. brush mounting plates or connections to windings</b> (supporting or protecting brushes or brush holders in motor casings or enclosures H02K 5/14); <b>Disposition of current collectors in motors or generators; Arrangements for improving commutation</b>	17/04	• • for single phase current
13/02	• Connections between slip-rings and windings	17/06	• • • having windings arranged for permitting pole-changing
13/04	• Connections between commutator segments and windings	17/08	• • • Motors with auxiliary phase obtained by externally fed auxiliary windings, e.g. capacitor motors
13/06	• • Resistive connections, e.g. by high-resistance chokes or by transistors	17/10	• • • Motors with auxiliary phase obtained by split-pole carrying short-circuited windings
13/08	• • Segments formed by extensions of the winding	17/12	• • for multi-phase current
13/10	• Arrangements of brushes or commutators specially adapted for improving commutation	17/14	• • • having windings arranged for permitting pole-changing
13/12	• Arrangements for producing an axial reciprocation of the rotor and its associated current collector part, e.g. for polishing commutator surfaces	17/16	• • having rotors with internally short-circuited windings, e.g. cage rotors
		17/18	• • • having double-cage or multiple-cage rotors
		17/20	• • • having deep-bar rotors
		17/22	• • having rotors with windings connected to slip-rings
		17/24	• • • in which both stator and rotor are fed with AC
		17/26	• • having rotors or stators designed to permit synchronous operation
		17/28	• • having compensating winding for improving phase angle
		17/30	• • Structural association of asynchronous induction motors with auxiliary electric devices influencing the characteristics of the motor or controlling the motor, e.g. with impedances or switches
		17/32	• • Structural association of asynchronous induction motors with auxiliary mechanical devices, e.g. with clutches or brakes
		17/34	• • Cascade arrangement of an asynchronous motor with another dynamo-electric motor or converter
		17/36	• • • with another asynchronous induction motor

17/38	• • • with a commutator machine	21/30	• • • having annular armature cores with salient poles (with homopolar co-operation H02K 21/36)
17/40	• • • with a rotary AC/DC converter	21/32	• • • having horse-shoe magnets (with homopolar co-operation H02K 21/36)
17/42	• Asynchronous induction generators (H02K 17/02 takes precedence) [4]	21/34	• • • having bell-shaped or bar-shaped magnets, e.g. for cycle lighting (with homopolar co-operation H02K 21/36)
17/44	• • Structural association with exciting machines	21/36	• • • with homopolar co-operation
<b>19/00</b>	<b>Synchronous motors or generators</b> (having permanent magnets H02K 21/00)	21/38	• with rotating flux distributors, and armatures and magnets both stationary
19/02	• Synchronous motors	21/40	• • with flux distributors rotating around the magnets and within the armatures
19/04	• • for single-phase current	21/42	• • with flux distributors rotating around the armatures and within the magnets
19/06	• • • Motors having windings on the stator and a variable-reluctance soft-iron rotor without windings, e.g. inductor motors	21/44	• • with armature windings wound upon the magnets
19/08	• • • Motors having windings on the stator and a smooth rotor without windings of material with large hysteresis, e.g. hysteresis motors	21/46	• Motors having additional short-circuited winding for starting as an asynchronous motor
19/10	• • for multi-phase current	21/48	• Generators with two or more outputs
19/12	• • • characterised by the arrangement of exciting windings, e.g. for self-excitation, compounding or pole-changing	<b>23/00</b>	<b>DC commutator motors or generators having mechanical commutator; Universal AC/DC commutator motors</b>
19/14	• • having additional short-circuited windings for starting as asynchronous motors	23/02	• characterised by arrangement for exciting
19/16	• Synchronous generators	23/04	• • having permanent magnet excitation
19/18	• • having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar generators	23/06	• • having shunt connection of excitation windings
19/20	• • • with variable-reluctance soft-iron rotors without winding	23/08	• • having series connection of excitation windings
19/22	• • having windings each turn of which co-operates alternately with poles of opposite polarity, e.g. heteropolar generators	23/10	• • having compound connection of excitation windings
19/24	• • • with variable-reluctance soft-iron rotors without winding	23/12	• • having excitation produced by current sources independent of the armature circuit
19/26	• • characterised by the arrangement of exciting windings	23/14	• • having high-speed excitation or de-excitation, e.g. by neutralising the remanent excitation field
19/28	• • • for self-excitation	23/16	• • having angularly adjustable excitation field, e.g. by pole reversing or pole switching
19/30	• • • for compounding	23/18	• • having displaceable main or auxiliary brushes
19/32	• • • for pole-changing	23/20	• • having additional brushes spaced immediately of the main brushes on the commutator, e.g. cross-field machines, metadynes, amplidynes or other armature-reaction excited machines
19/34	• • Generators with two or more outputs	23/22	• • having compensating or damping windings
19/36	• • Structural association of synchronous generators with auxiliary electric devices influencing the characteristic of the generator or controlling the generator, e.g. with impedances or switches	23/24	• • having commutating-pole windings
19/38	• • Structural association of synchronous generators with exciting machines	23/26	• characterised by the armature windings
<b>21/00</b>	<b>Synchronous motors having permanent magnets; Synchronous generators having permanent magnets</b>	23/28	• • having open windings, i.e. not closed within the armatures
21/02	• Details	23/30	• • having lap windings; having loop windings
21/04	• • Windings on magnets for additional excitation	23/32	• • having wave winding; having undulating winding
21/10	• • Rotating armatures	23/34	• • having mixed windings
21/12	• with stationary armatures and rotating magnets	23/36	• • having two or more windings; having two or more commutators; having two or more stators
21/14	• • with magnets rotating within the armatures	23/38	• • having winding or connection for improving commutation, e.g. equipotential connection
21/16	• • • having annular armature cores with salient poles (with homopolar co-operation H02K 21/20)	23/40	• characterised by the arrangement of the magnet circuits
21/18	• • • having horse-shoe armature cores (with homopolar co-operation H02K 21/20)	23/42	• • having split poles, i.e. zones for varying reluctance by gaps in poles or by poles with different spacing of the air gap
21/20	• • • having windings each turn of which co-operates only with poles of one polarity, e.g. homopolar machine	23/44	• • having movable, e.g. turnable, iron parts
21/22	• • with magnets rotating around the armatures, e.g. flywheel magnetos	23/46	• • having stationary shunts, i.e. magnetic cross flux
21/24	• • with magnets axially facing the armatures, e.g. hub-type cycle dynamos	23/48	• • having adjustable armatures
21/26	• with rotating armatures and stationary magnets	23/50	• Generators with two or more outputs
21/28	• • with armatures rotating within the magnets	23/52	• Motors acting also as generators, e.g. starting motors used as generators for ignition or lighting
		23/54	• Disc armature motors or generators
		23/56	• Motors or generators having iron cores separated from armature winding

- 23/58 • Motors or generators without iron cores
- 23/60 • Motors or generators having rotating armatures and rotating excitation field
- 23/62 • Motors or generators with stationary armatures and rotating excitation field
- 23/64 • Motors specially adapted for running on DC or AC by choice
- 23/66 • Structural association with auxiliary electric devices influencing the characteristic of, or controlling, the machine, e.g. with impedances or switches
- 23/68 • Structural association with auxiliary mechanical devices, e.g. with clutches or brakes
- 24/00 Machines adapted for the instantaneous transmission or reception of the angular displacement of rotating parts, e.g. synchro, selsyn**
- 25/00 DC interrupter motors or generators**
- 26/00 Machines adapted to function as torque motors, i.e. to exert a torque when stalled**
- 27/00 AC commutator motors or generators having mechanical commutator**
  - 27/02 • characterised by the armature winding
  - 27/04 • having single-phase operation in series or shunt connection
  - 27/06 • • with a single or multiple short-circuited commutator, e.g. repulsion motor
  - 27/08 • • with multiple-fed armature
  - 27/10 • • with switching devices for different modes of operation, e.g. repulsion-induction motor
  - 27/12 • having multi-phase operation
  - 27/14 • • in series connection
  - 27/16 • • in shunt connection with stator feeding
  - 27/18 • • in shunt connection with rotor feeding
  - 27/20 • Structural association with a speed regulating device
  - 27/22 • having means for improving commutation, e.g. auxiliary fields, double windings, double brushes
  - 27/24 • having two or more commutators
  - 27/26 • having disc armature
  - 27/28 • Structural association with auxiliary electric devices influencing the characteristic of the machine or controlling the machine
  - 27/30 • Structural association with auxiliary mechanical devices, e.g. with clutches or brakes
- 29/00 Motors or generators having non-mechanical commutating devices, e.g. discharge tubes or semiconductor devices**
  - 29/03 • with a magnetic circuit specially adapted for avoiding torque ripples or self-starting problems [6]
  - 29/06 • with position sensing devices (H02K 29/03 takes precedence) [4, 6]
  - 29/08 • • using magnetic effect devices, e.g. Hall-plates or magneto-resistors (H02K 29/12 takes precedence) [4]
  - 29/10 • • using light effect devices [4]
  - 29/12 • • using detecting coils [4]
  - 29/14 • with speed sensing devices (H02K 29/03 takes precedence) [4, 6]
- 31/00 Acyclic motors or generators, i.e. DC machines having drum or disc armatures with continuous current collectors**
  - 31/02 • with solid-contact collectors
  - 31/04 • with at least one liquid-contact collector
- 33/00 Motors with reciprocating, oscillating or vibrating magnet, armature or coil system** (arrangements for handling mechanical energy structurally associated with motors H02K 7/00, e.g. H02K 7/06)
  - 33/02 • with armatures moved one way by energisation of a single coil system and returned by mechanical force, e.g. by springs
  - 33/04 • • wherein the frequency of operation is determined by the frequency of uninterrupted AC energisation
  - 33/06 • • • with polarised armatures
  - 33/08 • • • with DC energisation superimposed on AC energisation
  - 33/10 • • wherein the alternate energisation and de-energisation of the single coil system is effected or controlled by movement of the armatures
  - 33/12 • with armatures moving in alternate directions by alternate energisation of two coil systems
  - 33/14 • • wherein the alternate energisation and de-energisation of the two coil systems are effected or controlled by movement of the armatures
  - 33/16 • with polarised armatures moving in alternate directions by reversal or energisation of a single coil system
  - 33/18 • with coil systems moving upon intermittent or reversed energisation thereof by interaction with a fixed field system, e.g. permanent magnets
- 35/00 Generators with reciprocating, oscillating or vibrating coil system, magnet, armature or other part of the magnetic circuit** (arrangements for handling mechanical energy structurally associated with generators H02K 7/00, e.g. H02K 7/06)
  - 35/02 • with moving magnets and stationary coil systems
  - 35/04 • with moving coil systems and stationary magnets
  - 35/06 • with moving flux distributors, and both coil systems and magnets stationary
- 37/00 Motors with rotor rotating step by step and without interrupter or commutator driven by the rotor, e.g. stepping motors**
  - 37/02 • of variable reluctance type [4]
  - 37/04 • • with rotors situated within the stators [4]
  - 37/06 • • with rotors situated around the stators [4]
  - 37/08 • • with rotors axially facing the stators [4]
  - 37/10 • of permanent magnet type (H02K 37/02 takes precedence) [4]
  - 37/12 • • with stationary armatures and rotating magnets [4]
  - 37/14 • • • with magnets rotating within the armatures [4]
  - 37/16 • • • • having horseshoe armature cores [4]
  - 37/18 • • • • of homopolar type [4]
  - 37/20 • • with rotating flux distributors, the armatures and magnets both being stationary [4]
  - 37/22 • Damping units [4]
  - 37/24 • Structural association with auxiliary mechanical devices [4]
- 39/00 Generators specially adapted for producing a desired non-sinusoidal waveform**
- 41/00 Propulsion systems in which a rigid body is moved along a path due to dynamo-electric interaction between the body and a magnetic field travelling along the path**
  - 41/02 • Linear motors; Sectional motors [3]
  - 41/025 • • Asynchronous motors [3]
  - 41/03 • • Synchronous motors; Motors moving step by step; Reluctance motors (H02K 41/035 takes precedence) [3]

- 41/035 • • DC motors; Unipolar motors [3]
- 41/06 • Rolling motors, i.e. motors having the rotor axis parallel to the stator axis and following a circular path as the rotor rolls around the inside or outside of the stator
- 44/00 Machines in which the dynamo-electric interaction between a plasma or flow of conductive liquid or of fluid-borne conductive or magnetic particles and a coil system or magnetic field converts energy of mass flow into electrical energy or vice versa [3]**
- 44/02 • Electrodynamic pumps [3]
- 44/04 • • Conduction pumps [3]
- 44/06 • • Induction pumps [3]
- 44/08 • Magnetohydrodynamic [MHD] generators [3]
- 44/10 • • Constructional details of electrodes [3]
- 44/12 • • Constructional details of fluid channels [3]
- 44/14 • • • Circular or screw-shaped channels [3]
- 44/16 • • Constructional details of the magnetic circuits [3]
- 44/18 • • for generating AC power [3]
- 44/20 • • • by changing the polarity of the magnetic field [3]
- 44/22 • • • by changing the conductivity of the fluid [3]
- 44/24 • • • by reversing the direction of fluid [3]
- 44/26 • • • by creating a travelling magnetic field [3]
- 44/28 • Association of MHD generators with conventional generators (nuclear power plants including a MHD generator G21D 7/02) [3]
- 47/00 Dynamo-electric converters**
- 47/02 • AC/DC converters or vice versa
- 47/04 • • Motor/generators
- 47/06 • • Cascade converters
- 47/08 • • Single-armature converters
- 47/10 • • • with booster machines on the AC side
- 47/12 • DC/DC converters
- 47/14 • • Motor/generators
- 47/16 • • Single-armature converters, e.g. metadyne
- 47/18 • AC/AC converters
- 47/20 • • Motor/generators
- 47/22 • • Single-armature frequency converters with or without phase-number conversion
- 47/24 • • • having windings for different numbers of poles
- 47/26 • • • operating as under- or over-synchronously running asynchronous induction machines, e.g. cascade arrangement of asynchronous and synchronous machines
- 47/28 • • • operating as commutator machines with added slip-rings
- 47/30 • • Single-armature phase-number converters without frequency conversion
- 49/00 Dynamo-electric clutches; Dynamo-electric brakes**
- 49/02 • of the asynchronous induction type
- 49/04 • • of the eddy-current hysteresis type
- 49/06 • of the synchronous type
- 49/08 • of the collector armature type
- 49/10 • of the permanent-magnet type
- 49/12 • of the acyclic type
- 51/00 Dynamo-electric gears, i.e. dynamo-electric means for transmitting mechanical power from a driving shaft to a driven shaft and comprising structurally interrelated motor and generator parts**
- 53/00 Alleged dynamo-electric perpetua mobilia**
- 55/00 Dynamo-electric machines having windings operating at cryogenic temperatures [3]**
- 55/02 • of the synchronous type [3]
- 55/04 • • with rotating field windings [3]
- 55/06 • of the homopolar type [3]
- 99/00 Subject matter not provided for in other groups of this subclass [2014.01]**

**H02M APPARATUS FOR CONVERSION BETWEEN AC AND AC, BETWEEN AC AND DC, OR BETWEEN DC AND DC, AND FOR USE WITH MAINS OR SIMILAR POWER SUPPLY SYSTEMS; CONVERSION OF DC OR AC INPUT POWER INTO SURGE OUTPUT POWER; CONTROL OR REGULATION THEREOF** (conversion of current or voltage specially adapted for use in electronic time-pieces with no moving parts G04G 19/02; systems for regulating electric or magnetic variables in general, e.g. using transformers, reactors or choke coils, combination of such systems with static converters G05F; for digital computers G06F 1/00; transformers H01F; connection or control of one converter with regard to conjoint operation with a similar or other source of supply H02J; dynamo-electric converters H02K 47/00; controlling transformers, reactors or choke coils, control or regulation of electric motors, generators or dynamo-electric converters H02P; pulse generators H03K) [4, 5]

### Note(s)

1. This subclass covers only circuits or apparatus for the conversion of electric power, or arrangements for control or regulation of such circuits or apparatus.
2. This subclass does not cover the individual electro-technical devices employed when converting electric power. Such devices are covered by the relevant subclasses, e.g. inductors, transformers H01F, capacitors, electrolytic rectifiers H01G, mercury-vapour rectifying or other discharge tubes H01J, semiconductor devices H01L, impedance networks or resonant circuits not primarily concerned with the transfer of electric power H03H.
3. In this subclass, the following term is used with the meaning indicated:
  - "conversion", in respect of an electric variable, e.g. voltage or current, means the change of one or more of the parameters of the variable, e.g. amplitude, frequency, phase, polarity.

### Subclass index

DETAILS.....	1/00
TYPES OF CONVERSION	
dc to dc.....	3/00
ac to ac.....	5/00
ac to dc and <u>vice versa</u> .....	7/00
dc or ac to surge output power.....	9/00

**1/00 Details of apparatus for conversion [1, 2007.01]**

- 1/02 • Circuits specially adapted for the generation of grid-control or igniter-control voltages for discharge tubes incorporated in static converters
- 1/04 • • for tubes with grid control
- 1/06 • Circuits specially adapted for rendering non-conductive gas discharge tubes or equivalent semiconductor devices, e.g. thyratrons, thyristors [2]
- 1/08 • Circuits specially adapted for the generation of control voltages for semiconductor devices incorporated in static converters
- 1/084 • • using a control circuit common to several phases of a multi-phase system [4]
- 1/088 • • for the simultaneous control of series or parallel connected semiconductor devices [4]
- 1/092 • • • the control signals being transmitted optically [4]
- 1/096 • • • the power supply of the control circuit being connected in parallel to the main switching element (H02M 1/092 takes precedence) [4]
- 1/10 • Arrangements incorporating converting means for enabling loads to be operated at will from different kinds of power supplies, e.g. from ac or dc
- 1/12 • Arrangements for reducing harmonics from ac input or output
- 1/14 • Arrangements for reducing ripples from dc input or output
- 1/15 • • using active elements [4]
- 1/16 • Means for providing current step on switching, e.g. with saturable reactor
- 1/20 • Contact mechanisms of dynamic converters
- 1/22 • • incorporating collectors and brushes
- 1/24 • • incorporating rolling or tumbling contacts
- 1/26 • • incorporating cam-operated contacts
- 1/28 • • incorporating electromagnetically-operated vibrating contacts
- 1/30 • • incorporating liquid contacts
- 1/32 • Means for protecting converters other than by automatic disconnection (emergency protective circuit arrangements specially adapted for converters with automatic disconnection H02H 7/10) [2007.01]
- 1/34 • • Snubber circuits [2007.01]
- 1/36 • Means for starting or stopping converters [2007.01]
- 1/38 • Means for preventing simultaneous conduction of switches [2007.01]
- 1/40 • Means for preventing magnetic saturation [2007.01]
- 1/42 • Circuits or arrangements for compensating for or adjusting power factor in converters or inverters [2007.01]
- 1/44 • Circuits or arrangements for compensating for electromagnetic interference in converters or inverters [2007.01]
- 3/00 Conversion of dc power input into dc power output**
- 3/02 • without intermediate conversion into ac
- 3/04 • • by static converters
- 3/06 • • • using resistors or capacitors, e.g. potential divider
- 3/07 • • • using capacitors charged and discharged alternately by semiconductor devices with control electrode [4]

- 3/08 • • • using discharge tubes without control electrode or semiconductor devices without control electrode
- 3/10 • • • using discharge tubes with control electrode or semiconductor devices with control electrode (H02M 3/07 takes precedence) [4]
- 3/125 • • • • using devices of a thyatron or thyristor type requiring extinguishing means [2]
- 3/13 • • • • using discharge tubes only [2]
- 3/135 • • • • using semiconductor devices only [2]
- 3/137 • • • • • with automatic control of output voltage or current, e.g. switching regulators [4]
- 3/139 • • • • • with digital control [4]
- 3/142 • • • • • including plural semiconductor devices as final control devices for a single load [4]
- 3/145 • • • • using devices of a triode or transistor type requiring continuous application of a control signal [2]
- 3/15 • • • • • using discharge tubes only [2]
- 3/155 • • • • • using semiconductor devices only [2]
- 3/156 • • • • • with automatic control of output voltage or current, e.g. switching regulators [4]
- 3/157 • • • • • with digital control [4]
- 3/158 • • • • • including plural semiconductor devices as final control devices for a single load [4]
- 3/16 • • by dynamic converters
- 3/18 • • • using capacitors or batteries which are alternately charged and discharged, e.g. charged in parallel and discharged in series
- 3/20 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 3/22 • with intermediate conversion into ac
- 3/24 • • by static converters
- 3/26 • • • using discharge tubes without control electrode or semiconductor devices without control electrode to produce the intermediate ac
- 3/28 • • • using discharge tubes with control electrode or semiconductor devices with control electrode to produce the intermediate ac
- 3/305 • • • • using devices of a thyatron or thyristor type requiring extinguishing means [2]
- 3/31 • • • • • using discharge tubes only [2]
- 3/315 • • • • • using semiconductor devices only [2]
- 3/325 • • • • • using devices of a triode or a transistor type requiring continuous application of a control signal [2]
- 3/33 • • • • • using discharge tubes only [2]
- 3/335 • • • • • using semiconductor devices only [2]
- 3/337 • • • • • in push-pull configuration [4]
- 3/338 • • • • • in a self-oscillating arrangement (H02M 3/337 takes precedence) [4]
- 3/34 • • by dynamic converters
- 3/36 • • • using mechanical parts to select progressively or to vary continuously the input potential
- 3/38 • • • using mechanical contact-making and -breaking parts to interrupt a single potential

- 3/40 • • • • wherein the parts are rotating and collectors co-operate with brushes or rollers
- 3/42 • • • • with electromagnetically-operated vibrating contacts, e.g. chopper (self-interrupters in general H01H 51/34)
- 3/44 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 5/00 Conversion of ac power input into ac power output, e.g. for change of voltage, for change of frequency, for change of number of phases**
- 5/02 • without intermediate conversion into dc
- 5/04 • • by static converters (controlling transformers, reactors or choke coils, e.g. by tap changing, H02P 13/00) [4]
- 5/06 • • • using impedances
- 5/08 • • • • using capacitors only
- 5/10 • • • using transformers
- 5/12 • • • • for conversion of voltage or current amplitude only
- 5/14 • • • • for conversion between circuits of different phase number
- 5/16 • • • • for conversion of frequency
- 5/18 • • • • for conversion of waveform
- 5/20 • • • using discharge tubes without control electrode or semiconductor devices without control electrode
- 5/22 • • • using discharge tubes with control electrode or semiconductor devices with control electrode
- 5/25 • • • • using devices of a thyatron or thyristor type requiring extinguishing means (H02M 5/27 takes precedence) [2]
- 5/253 • • • • • using discharge tubes only [2]
- 5/257 • • • • • using semiconductor devices only [2]
- 5/27 • • • • • for conversion of frequency [2]
- 5/275 • • • • • using devices of a triode or transistor type requiring continuous application of a control signal (H02M 5/297 takes precedence) [2]
- 5/29 • • • • • using discharge tubes only [2]
- 5/293 • • • • • using semiconductor devices only [2]
- 5/297 • • • • • for conversion of frequency [2]
- 5/32 • • by dynamic converters
- 5/34 • • • using mechanical contact-making and -breaking parts
- 5/36 • • • • wherein the parts are rotating and collectors co-operate with brushes or rollers
- 5/38 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 5/40 • with intermediate conversion into dc
- 5/42 • • by static converters
- 5/44 • • • using discharge tubes or semiconductor devices to convert the intermediate dc into ac
- 5/443 • • • • using devices of a thyatron or thyristor type requiring extinguishing means [2]
- 5/447 • • • • • using discharge tubes only [2]
- 5/45 • • • • • using semiconductor devices only [2]
- 5/451 • • • • • • with automatic control of output voltage or frequency [4]
- 5/452 • • • • • • with automatic control of output waveform [4]
- 5/453 • • • • using devices of a triode or transistor type requiring continuous application of a control signal [2]
- 5/456 • • • • • using discharge tubes only [2]
- 5/458 • • • • • using semiconductor devices only [2]
- 5/46 • • by dynamic converters
- 5/48 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 7/00 Conversion of ac power input into dc power output; Conversion of dc power input into ac power output**
- 7/02 • Conversion of ac power input into dc power output without possibility of reversal
- 7/04 • • by static converters
- 7/06 • • • using discharge tubes without control electrode or semiconductor devices without control electrode
- 7/08 • • • • arranged for operation in parallel
- 7/10 • • • • arranged for operation in series, e.g. for multiplication of voltage
- 7/12 • • • using discharge tubes with control electrode or semiconductor devices with control electrode
- 7/145 • • • • using devices of a thyatron or thyristor type requiring extinguishing means [2, 4]
- 7/15 • • • • • using discharge tubes only [2]
- 7/155 • • • • • using semiconductor devices only [2]
- 7/162 • • • • • • in a bridge configuration [4]
- 7/17 • • • • • • arranged for operation in parallel [2, 4]
- 7/19 • • • • • • arranged for operation in series, e.g. for voltage multiplication [2, 4]
- 7/21 • • • • • using devices of a triode or transistor type requiring continuous application of a control signal [2, 4]
- 7/213 • • • • • using discharge tubes only [2]
- 7/217 • • • • • using semiconductor devices only [2]
- 7/219 • • • • • • in a bridge configuration [4]
- 7/23 • • • • • • arranged for operation in parallel [2, 4]
- 7/25 • • • • • • arranged for operation in series, e.g. for multiplication of voltage [2, 4]
- 7/26 • • • using open-spark devices, e.g. Marx rectifier
- 7/28 • • • using electrolytic rectifiers
- 7/30 • • by dynamic converters
- 7/32 • • • using mechanical contact-making and -breaking parts
- 7/34 • • • • wherein the parts are rotating and collectors co-operate with brushes or rollers
- 7/36 • • • • with electromagnetically-operated vibrating contacts, e.g. chopper (self-interrupters in general H01H 51/34)
- 7/38 • • • using one or more sparking electrodes rotating over counterelectrodes
- 7/40 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 7/42 • Conversion of dc power input into ac power output without possibility of reversal
- 7/44 • • by static converters
- 7/46 • • • using discharge tubes without control electrode or semiconductor devices without control electrode
- 7/48 • • • using discharge tubes with control electrode or semiconductor devices with control electrode [1, 2007.01]
- 7/483 • • • • Converters with outputs that each can have more than two voltage levels [2007.01]
- 7/487 • • • • • Neutral point clamped inverters [2007.01]
- 7/49 • • • • • Combination of the output voltage waveforms of a plurality of converters [2007.01]

## H02M

- 7/493 • • • • the static converters being arranged for operation in parallel **[2007.01]**
- 7/497 • • • • sinusoidal output voltages being obtained by combination of several voltages being out of phase **[2007.01]**
- 7/501 • • • • sinusoidal output voltages being obtained by the combination of several pulse-voltages having different amplitude and width **[2007.01]**
- 7/505 • • • • using devices of a thyatron or thyristor type requiring extinguishing means **[2]**
- 7/51 • • • • using discharge tubes only **[2]**
- 7/515 • • • • using semiconductor devices only **[2, 2007.01]**
- 7/516 • • • • • Self-oscillating arrangements **[2007.01]**
- 7/517 • • • • • with special starting equipment **[4]**
- 7/519 • • • • • in a push-pull configuration (H02M 7/517 takes precedence) **[4]**
- 7/521 • • • • • in a bridge configuration **[4]**
- 7/523 • • • • • with LC-resonance circuit in the main circuit **[4]**
- 7/525 • • • • • with automatic control of output waveform or frequency (H02M 7/517-H02M 7/523 take precedence) **[4]**
- 7/527 • • • • • • by pulse width modulation **[4]**
- 7/529 • • • • • • using digital control **[4]**
- 7/53 • • • • using devices of a triode or transistor type requiring continuous application of a control signal **[2]**
- 7/533 • • • • • using discharge tubes only **[2]**
- 7/537 • • • • • using semiconductor devices only, e.g. single switched pulse inverters **[2]**
- 7/5375 • • • • • with special starting equipment **[4]**
- 7/538 • • • • • in a push-pull configuration (H02M 7/5375 takes precedence) **[4, 2007.01]**
- 7/5381 • • • • • • Parallel type **[2007.01]**
- 7/5383 • • • • • in a self-oscillating arrangement (H02M 7/538 takes precedence) **[4, 2007.01]**
- 7/53838• • • • • • using a single commutation path **[2007.01]**
- 7/53846• • • • • • Control circuits **[2007.01]**
- 7/53854• • • • • • using thyristor type converters **[2007.01]**
- 7/53862• • • • • • using transistor type converters **[2007.01]**
- 7/5387 • • • • • in a bridge configuration **[4, 2007.01]**
- 7/5388 • • • • • with asymmetrical configuration of switches **[2007.01]**
- 7/539 • • • • • with automatic control of output wave form or frequency (H02M 7/5375-H02M 7/5387 take precedence) **[4]**
- 7/5395 • • • • • • by pulse-width modulation **[4]**
- 7/54 • • • by dynamic converters
- 7/56 • • • using mechanical parts to select progressively, or to vary continuously, the input potential
- 7/58 • • • using mechanical contact-making and -breaking parts to interrupt a single potential
- 7/60 • • • • wherein the parts are rotating and collectors co-operate with brushes or rollers
- 7/62 • • • • with electromagnetically-operated vibrating contacts, e.g. chopper (self-interrupters in general H01H 51/34)
- 7/64 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 7/66 • with possibility of reversal
- 7/68 • • by static converters
- 7/70 • • • using discharge tubes without control electrode or semiconductor devices without control electrode
- 7/72 • • • using discharge tubes with control electrode or semiconductor devices with control electrode
- 7/75 • • • • using devices of a thyatron or thyristor type requiring extinguishing means (H02M 7/77 takes precedence) **[2]**
- 7/753 • • • • • using discharge tubes only **[2]**
- 7/757 • • • • • using semiconductor devices only **[2]**
- 7/758 • • • • • with automatic control of output waveform or frequency **[4]**
- 7/77 • • • • • arranged for operation in parallel **[2]**
- 7/79 • • • • using devices of a triode or transistor type requiring continuous application of a control signal (H02M 7/81 takes precedence) **[2]**
- 7/793 • • • • • using discharge tubes only **[2]**
- 7/797 • • • • • using semiconductor devices only **[2]**
- 7/81 • • • • • arranged for operation in parallel **[2]**
- 7/82 • • • using open-spark devices, e.g. Marx rectifier
- 7/84 • • • using electrolytic rectifiers
- 7/86 • • by dynamic converters
- 7/88 • • • using mechanical parts to select progressively or to vary continuously the input potential
- 7/90 • • • using mechanical contact-making and -breaking parts to interrupt a single potential
- 7/92 • • • • wherein the parts are rotating and collectors co-operate with brushes or rollers
- 7/94 • • • • wherein the parts are operated by rotating cams or cam-like devices
- 7/95 • • • • with electromagnetically-operated vibrating contacts, e.g. chopper (self-interrupters in general H01H 51/34)
- 7/96 • • • • with moving liquid contacts
- 7/98 • • by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 9/00 Conversion of dc or ac input power into surge output power [2]**
- 9/02 • with dc input power **[2]**
- 9/04 • • using capacitive stores **[2]**
- 9/06 • with ac input power **[2]**
- 11/00 Power conversion systems not covered by the other groups of this subclass [4]**

## H02N ELECTRIC MACHINES NOT OTHERWISE PROVIDED FOR

### Note(s)

1. This subclass covers:



- electrostatic generators, motors, clutches, or holding devices;
  - other non-dynamo-electric generators or motors;
  - holding or levitation devices using magnetic attraction or repulsion;
  - arrangements for starting, regulating, braking, or otherwise controlling such machines unless in conjoint operation with a second machine.
2. Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".
  3. Specific provision for generators, motors, or other means for converting between electric and other forms of energy also exists in other subclasses, e.g. in subclasses H01L, H01M, H02K, H04R.

#### **Subclass index**

##### **GENERATORS, MOTORS**

With electrostatic effect.....	1/00
Generators using thermal ionisation and removal of charge; electric motors using thermal effects.....	3/00, 10/00
Others.....	11/00

##### **ELECTRIC MACHINES IN GENERAL USING PIEZO-ELECTRIC EFFECT, ELECTROSTRICTION**

**OR MAGNETOSTRICTION**.....2/00

**ELECTROSTATIC CLUTCHES OR HOLDING DEVICES**.....13/00

**MAGNETIC HOLDING OR LEVITATING DEVICES**.....15/00

**SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS**.....99/00

<b>1/00</b>	<b>Electrostatic generators or motors using a solid moving electrostatic charge carrier</b>	<b>10/00</b>	<b>Electric motors using thermal effects [3]</b>
1/04	• Friction generators	<b>11/00</b>	<b>Generators or motors not provided for elsewhere; Alleged <u>perpetua mobilia</u> obtained by electric or magnetic means</b> (by hydrostatic pressure F03B 17/04; by dynamo-electric means H02K 53/00)
1/06	• Influence generators		
1/08	• • with conductive charge carrier, i.e. capacitor machines	<b>13/00</b>	<b>Clutches or holding devices using electrostatic attraction, e.g. using Johnson-Rahbek effect</b>
1/10	• • with non-conductive charge carrier	<b>15/00</b>	<b>Holding or levitation devices using magnetic attraction or repulsion, not otherwise provided for</b> (electric or magnetic devices for holding work on machine tools B23Q 3/15; sliding or levitation devices for railway systems B61B 13/08; material handling devices associated with conveyors incorporating devices with electrostatic or magnetic grippers B65G 47/92; separating thin or filamentary articles from piles using magnetic force B65H 3/16; delivering thin or filamentary articles from magnetic holders by air blast or suction B65H 29/24; bearings using magnetic or electric supporting means F16C 32/04; relieving bearing loads using magnetic means F16C 39/06; magnets H01F 7/00; dynamo-electric clutches or brakes H02K 49/00) [3]
1/12	• • • in the form of a conveyor belt, e.g. van de Graaff machine	15/02	• by Foucault currents [3]
		15/04	• Repulsion by the Meissner effect (superconductors or hyperconductors in general H01L 39/00) [3]
<b>2/00</b>	<b>Electric machines in general using piezo-electric effect, electrostriction or magnetostriction</b> (generating mechanical vibrations in general B06B; piezo-electric, electrostrictive or magnetostrictive elements in general H01L 41/00) [4]	<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass [2006.01]</b>
2/02	• producing linear motion, e.g. actuators; Linear positioners [6]		
2/04	• • Constructional details [6]		
2/06	• • Drive circuits; Control arrangements [6]		
2/08	• • using travelling waves, e.g. linear motors [6]		
2/10	• producing rotary motion, e.g. rotary motors [6]		
2/12	• • Constructional details [6]		
2/14	• • Drive circuits; Control arrangements [6]		
2/16	• • using travelling waves [6]		
2/18	• producing electrical output from mechanical input, e.g. generators (for measurement devices G01) [6]		
<b>3/00</b>	<b>Generators in which thermal or kinetic energy is converted into electrical energy by ionisation of a fluid and removal of the charge therefrom</b> (discharge tubes functioning as thermionic generators H01J 45/00) [3]		
<b>H02P</b>	<b>CONTROL OR REGULATION OF ELECTRIC MOTORS, GENERATORS, OR DYNAMO-ELECTRIC CONVERTERS; CONTROLLING TRANSFORMERS OR REACTORS OR CHOKE COILS [4]</b>		

#### **Note(s)**

1. This subclass covers arrangements for starting, regulating, electronically commutating, braking, or otherwise controlling motors, generators, dynamo-electric converters, clutches, brakes, gears, transformers, reactors or choke coils, of the types classified in the relevant subclasses, e.g. H01F, H02K.
2. This subclass does not cover similar arrangements for the apparatus of the types classified in subclass H02N, which arrangements are covered by that subclass.

3. In this subclass, the following terms or expressions are used with the meanings indicated:
- "control" means influencing a variable in any way, e.g. changing its direction or its value (including changing it to or from zero), maintaining it constant, limiting its range of variation;
  - "regulation" means maintaining a variable at a desired value, or within a desired range of values, by comparison of the actual value with the desired value.

#### Subclass index

ARRANGEMENTS FOR STARTING; FOR SLOWING, STOPPING.....	1/00, 3/00
ARRANGEMENTS FOR CONTROLLING ELECTRIC MOTORS THAT CAN BE CONNECTED TO DIFFERENT POWER SUPPLIES.....	4/00
ARRANGEMENTS FOR CONTROLLING TWO OR MORE ELECTRIC MOTORS.....	5/00
ARRANGEMENTS FOR CONTROLLING SYNCHRONOUS MOTORS OR OTHER DYNAMO- ELECTRIC MOTORS WITH ELECTRONIC COMMUTATORS IN DEPENDENCE ON THE ROTOR POSITION.....	6/00
ARRANGEMENTS FOR CONTROLLING DC MOTORS.....	7/00
ARRANGEMENTS FOR CONTROLLING DYNAMO-ELECTRIC MOTORS ROTATING STEP BY STEP.....	8/00
ARRANGEMENTS FOR OBTAINING DESIRED OUTPUT OF GENERATOR.....	9/00
ARRANGEMENTS FOR OBTAINING DESIRED OUTPUT OF CONVERTERS: DYNAMO- ELECTRIC; STATIC.....	11/00, 13/00
ARRANGEMENTS FOR CONTROLLING BRAKES OR CLUTCHES.....	15/00
ARRANGEMENTS FOR CONTROLLING DYNAMO-ELECTRIC GEARS.....	17/00
ARRANGEMENTS FOR CONTROLLING ELECTRIC MACHINES BY VECTOR CONTROL.....	21/00
ARRANGEMENTS FOR CONTROLLING AC MOTORS BY METHODS OTHER THAN VECTOR CONTROL.....	23/00
CHARACTERISED BY THE KIND OF AC MOTORS OR BY STRUCTURAL DETAILS.....	25/00
CHARACTERISED BY THE KIND OF SUPPLY VOLTAGE.....	27/00
ARRANGEMENTS FOR CONTROLLING APPROPRIATE FOR BOTH AC AND DC MOTORS.....	29/00
ARRANGEMENTS FOR CONTROLLING NOT OTHERWISE PROVIDED FOR.....	31/00

<b>1/00</b>	<b>Arrangements for starting electric motors or dynamo-electric converters</b> (starting of synchronous motors with electronic commutators H02P 6/20, H02P 6/22; starting dynamo-electric motors rotating step by step H02P 8/04; vector control H02P 21/00) <b>[4, 2006.01]</b>	1/34	• • • by progressive reduction of impedance in secondary circuit
1/02	• Details	1/36	• • • the impedance being a liquid resistance
1/04	• • Means for controlling progress of starting sequence in dependence upon time or upon current, speed, or other motor parameter	1/38	• • • by pole-changing
1/06	• • • Manually-operated multi-position starters	1/40	• • • in either direction of rotation
1/08	• • • Manually-operated on/off switch controlling power-operated multi-position switch or impedances for starting a motor	1/42	• • for starting an individual single-phase induction motor
1/10	• • • Manually-operated on/off switch controlling relays or contactors operating sequentially for starting a motor	1/44	• • • by phase-splitting with a capacitor
1/12	• • • Switching devices centrifugally operated by the motor	1/46	• • for starting an individual synchronous motor
1/14	• • • Pressure-sensitive resistors centrifugally operated by the motor	1/48	• • • by pole-changing
1/16	• for starting dynamo-electric motors or dynamo-electric converters	1/50	• • • by changing over from asynchronous to synchronous operation (H02P 1/48 takes precedence)
1/18	• • for starting an individual dc motor	1/52	• • • by progressive increase of frequency of supply to motor
1/20	• • • by progressive reduction of resistance in series with armature winding	1/54	• • for starting two or more dynamo-electric motors
1/22	• • • in either direction of rotation	1/56	• • • simultaneously
1/24	• • for starting an individual ac commutator motor (starting of ac/dc commutator motors H02P 1/18)	1/58	• • • sequentially
1/26	• • for starting an individual polyphase induction motor	<b>3/00</b>	<b>Arrangements for stopping or slowing electric motors, generators, or dynamo-electric converters</b> (stopping of synchronous motors with electronic commutators H02P 6/24; stopping dynamo-electric motors rotating step by step H02P 8/24; vector control H02P 21/00) <b>[2, 4, 2006.01]</b>
1/28	• • • by progressive increase of voltage applied to primary circuit of motor	3/02	• Details
1/30	• • • by progressive increase of frequency of supply to primary circuit of motor	3/04	• • Means for stopping or slowing by a separate brake, e.g. friction brake or eddy-current brake <b>[2]</b>
1/32	• • • by star/delta switching	3/06	• for stopping or slowing an individual dynamo-electric motor or dynamo-electric converter <b>[2]</b>
		3/08	• • for stopping or slowing a dc motor <b>[2]</b>
		3/10	• • • by reversal of supply connections
		3/12	• • • by short-circuit or resistive braking
		3/14	• • • by regenerative braking
		3/16	• • • by combined electrical and mechanical braking
		3/18	• • for stopping or slowing an ac motor <b>[2]</b>

- 3/20 • • • by reversal of phase sequence of connections to the motor
- 3/22 • • • by short-circuit or resistive braking
- 3/24 • • • by applying dc to the motor
- 3/26 • • • by combined electrical and mechanical braking
- 4/00 Arrangements specially adapted for regulating or controlling the speed or torque of electric motors that can be connected to two or more different voltage or current supplies (vector control H02P 21/00) [2006.01]**
- 5/00 Arrangements specially adapted for regulating or controlling the speed or torque of two or more electric motors [1, 2006.01]**
- 5/46 • for speed regulation of two or more dynamo-electric motors in relation to one another
- 5/48 • • by comparing mechanical values representing the speeds
- 5/50 • • by comparing electrical values representing the speeds
- 5/52 • • additionally providing control of relative angular displacement
- 5/60 • controlling combinations of dc and ac dynamo-electric motors (H02P 5/46 takes precedence) [2006.01]
- 5/68 • controlling two or more dc dynamo-electric motors (H02P 5/46, H02P 5/60 take precedence) [2006.01]
- 5/685 • • electrically connected in series, i.e. carrying the same current [2006.01]
- 5/69 • • mechanically coupled by gearing [2006.01]
- 5/695 • • • Differential gearing [2006.01]
- 5/74 • controlling two or more ac dynamo-electric motors (H02P 5/46, H02P 5/60 take precedence) [2006.01]
- 5/747 • • mechanically coupled by gearing [2006.01]
- 5/753 • • • Differential gearing [2006.01]
- 6/00 Arrangements for controlling synchronous motors or other dynamo-electric motors with electronic commutators in dependence on the rotor position; Electronic commutators therefor (vector control H02P 21/00) [3, 4, 6]**
- 6/04 • Arrangements for controlling or regulating speed or torque of more than one motor [6]
- 6/06 • Arrangements for speed regulation of a single motor wherein the motor speed is measured and compared with a given physical value so as to adjust the motor speed [6]
- 6/08 • Arrangements for controlling the speed or torque of a single motor [6]
- 6/10 • • providing reduced torque ripple; controlling torque ripple [6]
- 6/12 • Monitoring commutation; Providing indication of commutation failure [6]
- 6/14 • Electronic commutators [6]
- 6/16 • • Circuit arrangements for detecting position [6]
- 6/18 • • • without separate position detecting element, e.g. using back-emf in windings [6]
- 6/20 • Arrangements for starting (H02P 6/08, H02P 6/22 take precedence) [6]
- 6/22 • Arrangements for starting in a selected direction of rotation [6]
- 6/24 • Arrangements for stopping [6]
- 7/00 Arrangements for regulating or controlling the speed or torque of electric dc-motors [2, 2006.01]**
- 7/06 • for regulating or controlling an individual dc dynamo-electric motor by varying field or armature current
- 7/08 • • by manual control without auxiliary power
- 7/10 • • • of motor field only
- 7/12 • • • • Switching field from series to shunt excitation or *vice versa*
- 7/14 • • • of voltage applied to the armature with or without control of field
- 7/18 • • by master control with auxiliary power
- 7/20 • • • using multi-position switch, e.g. drum, controlling motor circuit by means of relays (H02P 7/24, H02P 7/30 take precedence)
- 7/22 • • • using multi-position switch, e.g. drum, controlling motor circuit by means of pilot-motor-operated multi-position switch or pilot-motor-operated variable resistance (H02P 7/24, H02P 7/30 take precedence)
- 7/24 • • • using discharge tubes or semiconductor devices
- 7/26 • • • • using discharge tubes
- 7/28 • • • • using semiconductor devices
- 7/282 • • • • • controlling field supply only [4]
- 7/285 • • • • • controlling armature supply only [4]
- 7/288 • • • • • using variable impedance [4]
- 7/29 • • • • • using pulse modulation [4]
- 7/292 • • • • • using static converters, e.g. ac to dc [4]
- 7/295 • • • • • of the kind having one thyristor or the like in series with the power supply and the motor [4]
- 7/298 • • • • • controlling armature and field supply [4]
- 7/30 • • • using magnetic devices with controllable degree of saturation, i.e. transductors
- 7/32 • • • using armature-reaction-excited machines, e.g. metadyne, amplidyne, rototrol
- 7/34 • • • using Ward-Leonard arrangements
- 8/00 Arrangements for controlling dynamo-electric motors rotating step by step [2, 6, 2006.01]**
- 8/02 • specially adapted for single-phase or bi-pole stepper motors, e.g. watch-motors, clock-motors [6]
- 8/04 • Arrangements for starting [6]
- 8/06 • • in selected direction of rotation [6]
- 8/08 • • Determining position before starting [6]
- 8/10 • • Shaping pulses for starting; Boosting current during starting [6]
- 8/12 • Control or stabilisation of current [6]
- 8/14 • Arrangements for controlling speed or speed and torque (H02P 8/12, H02P 8/22 take precedence) [6]
- 8/16 • • Reducing energy dissipated or supplied [6]
- 8/18 • • Shaping of pulses, e.g. to reduce torque ripple [6]
- 8/20 • • characterised by bidirectional operation [6]
- 8/22 • Control of step size; Intermediate stepping, e.g. micro-stepping [6]
- 8/24 • Arrangements for stopping (H02P 8/32 take precedence) [6]
- 8/26 • • Memorising final pulse when stopping [6]
- 8/28 • • Disconnecting power source when stopping [6]
- 8/30 • • Holding position when stopped [6]
- 8/32 • Reducing overshoot or oscillation, e.g. damping [6]
- 8/34 • Monitoring operation (H02P 8/36 takes precedence) [6]
- 8/36 • Protection against faults, e.g. against overheating or step-out; Indicating faults [6]
- 8/38 • • the fault being step-out [6]
- 8/40 • Special adaptations for controlling two or more stepping motors [6]

- 8/42 • characterised by non-stepper motors being operated step by step [6]
- 9/00 Arrangements for controlling electric generators for the purpose of obtaining a desired output [1, 2006.01]**
- 9/02 • Details
- 9/04 • Control effected upon non-electric prime mover and dependent upon electric output value of the generator (effecting control of the prime mover in general, see the relevant class for such prime mover) [2]
- 9/06 • Control effected upon clutch or other mechanical power transmission means and dependent upon electric output value of the generator (effecting control of the power transmission means, see the relevant class for such means) [2]
- 9/08 • Control of generator circuit during starting or stopping of driving means, e.g. for initiating excitation [2]
- 9/10 • Control effected upon generator excitation circuit to reduce harmful effects of overloads or transients, e.g. sudden application of load, sudden removal of load, sudden change of load [2]
- 9/12 • • for demagnetising; for reducing effects of remanence; for preventing pole reversal [2]
- 9/14 • by variation of field (H02P 9/08, H02P 9/10 take precedence) [2]
- 9/16 • • due to variation of ohmic resistance in field circuit, using resistances switched in or out of circuit step by step
- 9/18 • • • the switching being caused by a servomotor, measuring instrument, or relay
- 9/20 • • due to variation of continuously-variable ohmic resistance
- 9/22 • • • comprising carbon pile resistance
- 9/24 • • due to variation of make-to-break ratio of intermittently-operating contacts, e.g. using Tirrill regulator
- 9/26 • • using discharge tubes or semiconductor devices (H02P 9/34 takes precedence) [2]
- 9/28 • • • using discharge tubes
- 9/30 • • • using semiconductor devices
- 9/32 • • using magnetic devices with controllable degree of saturation (H02P 9/34 takes precedence) [2]
- 9/34 • • using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device
- 9/36 • • using armature-reaction-excited machines
- 9/38 • • Self-excitation by current derived from rectification of both output voltage and output current of generator
- 9/40 • by variation of reluctance of magnetic circuit of generator
- 9/42 • to obtain desired frequency without varying speed of the generator
- 9/44 • Control of frequency and voltage in predetermined relation, e.g. constant ratio
- 9/46 • Control of asynchronous generator by variation of capacitor
- 9/48 • Arrangements for obtaining a constant output value at varying speed of the generator, e.g. on vehicle (H02P 9/04-H02P 9/46 take precedence) [3]
- 11/00 Arrangements for controlling dynamo-electric converters [4, 2006.01]**
- 11/04 • for controlling dynamo-electric converters having a dc output
- 11/06 • for controlling dynamo-electric converters having an ac output
- 13/00 Arrangements for controlling transformers, reactors or choke coils, for the purpose of obtaining a desired output [4]**
- 13/06 • by tap-changing; by rearranging interconnections of windings
- 13/08 • by sliding current collector along winding
- 13/10 • by moving core, coil winding, or shield, e.g. by induction regulator
- 13/12 • by varying magnetic bias
- 15/00 Arrangements for controlling dynamo-electric brakes or clutches (vector control H02P 21/00) [1, 2006.01]**
- 15/02 • Conjoint control of brakes and clutches [3]
- 17/00 Arrangements for controlling dynamo-electric gears (vector control H02P 21/00) [3, 2006.01]**
- 21/00 Arrangements or methods for the control of electric machines by vector control, e.g. by control of field orientation [6, 2006.01]**
- Note(s) [2006.01]
- When classifying in this group, it is desirable to also classify in groups H02P 25/00-H02P 27/00 if the kind of ac-motor, structural details, or the kind of supply voltage are of interest.
- 21/02 • specially adapted for optimising the efficiency at low load [2006.01]
- 21/04 • specially adapted for very low speeds [2006.01]
- 21/05 • specially adapted for damping motor oscillations, e.g. for reducing hunting [2006.01]
- 21/06 • Rotor flux based control [2006.01]
- 21/08 • • Indirect field-oriented control, e.g. field phase angle calculation based on rotor voltage equation by adding slip frequency and speed proportional frequency [2006.01]
- 21/10 • • Direct field-oriented control [2006.01]
- 21/12 • Stator flux based control [2006.01]
- 21/13 • Observer control, e.g. using Luenberger observers or Kalman filters [2006.01]
- 21/14 • Estimation or adaptation of machine parameters, e.g. rotor time constant, flux, speed, current or voltage [2006.01]
- 23/00 Arrangements or methods for the control of ac-motors characterised by a control method other than vector control [2006.01]**
- Note(s) [2006.01]
- When classifying in this group, it is desirable to also classify in groups H02P 25/00-H02P 27/00 if the kind of ac-motor, structural details, or the kind of supply voltage are of interest.
- 23/02 • specially adapted for optimising the efficiency at low load [2006.01]
- 23/03 • specially adapted for very low speeds [2006.01]
- 23/04 • specially adapted for damping motor oscillations, e.g. for reducing hunting [2006.01]
- 23/06 • Controlling the motor in four quadrants [2006.01]
- 23/08 • Controlling based on slip frequency, e.g. adding slip frequency and speed proportional frequency [2006.01]
- 23/10 • Controlling by adding a dc current [2006.01]

23/12	• Observer control, e.g. using Luenberger observers or Kalman filters [2006.01]		
23/14	• Estimation or adaptation of motor parameters, e.g. rotor time constant, flux, speed, current or voltage [2006.01]		
<b>25/00</b>	<b>Arrangements or methods for the control of ac-motors characterised by the kind of ac-motor or by structural details [2006.01]</b>	<b>27/00</b>	<b>Arrangements or methods for the control of ac-motors characterised by the kind of supply voltage</b> (of two or more motors H02P 5/00; of synchronous motors with electronic commutators H02P 6/00; of dc-motors H02P 7/00; of stepping motors H02P 8/00) [2006.01]
	<b>Note(s) [2006.01]</b> When classifying in this group, it is desirable to also classify in groups H02P 21/00, H02P 23/00 or H02P 27/00 if the control method or the kind of supply voltage are of interest.		<b>Note(s) [2006.01]</b> When classifying in this group, it is desirable to also classify in groups H02P 21/00, H02P 23/00 or H02P 25/00 if the control method, the kind of the ac-motor or structural details are of interest.
25/02	• characterised by the kind of motor [2006.01]	27/02	• using supply voltage with constant frequency and variable amplitude [2006.01]
25/04	• • Single phase motors, e.g. capacitor motors [2006.01]	27/04	• using variable-frequency supply voltage, e.g. inverter or converter supply voltage [2006.01]
25/06	• • Linear motors [2006.01]	27/05	• • using ac supply for both rotor and stator circuits, the frequency of supply to at least one circuit being variable [2006.01]
25/08	• • Reluctance motors [2006.01]	27/06	• • using dc to ac converters or inverters (H02P 27/05 takes precedence) [2006.01]
25/10	• • Commutator motors, e.g. repulsion motors [2006.01]	27/08	• • • with pulse width modulation [2006.01]
25/12	• • • with shiftable brushes [2006.01]	27/10	• • • • using bang-bang controllers [2006.01]
25/14	• • • Universal motors (H02P 25/12 takes precedence) [2006.01]	27/12	• • • • pulsing by guiding the flux-, current-, or voltage-vector on a circle or a closed curve, e.g. direct torque control [2006.01]
25/16	• characterised by the circuit arrangement or by the kind of wiring [2006.01]	27/14	• • • • with three or more levels of voltage [2006.01]
25/18	• • with arrangements for switching the windings, e.g. with mechanical switches or relays [2006.01]	27/16	• • using ac to ac converters without intermediate conversion to dc (H02P 27/05 takes precedence) [2006.01]
25/20	• • • for pole-changing [2006.01]	27/18	• • • varying the frequency by omitting half waves [2006.01]
25/22	• • Multiple windings; Windings for more than three phases [2006.01]	<b>29/00</b>	<b>Arrangements for regulating or controlling electric motors, appropriate for both ac- and dc-motors</b> (control of motors that can be connected to two or more different voltage or current supplies H02P 4/00; vector control H02P 21/00) [2006.01]
25/24	• • Variable impedance in stator or rotor circuit [2006.01]	29/02	• Providing protection against overload without automatic interruption of supply, e.g. monitoring [2006.01]
25/26	• • • with arrangements for controlling secondary impedance [2006.01]	29/04	• by means of a separate brake [2006.01]
25/28	• • using magnetic devices with controllable degree of saturation, e.g. transducers [2006.01]	<b>31/00</b>	<b>Arrangements for regulating or controlling electric motors not provided for in groups H02P 1/00-H02P 5/00, H02P 7/00 or H02P 21/00-H02P 29/00 [2006.01]</b>
25/30	• • the motor being controlled by a control effected upon an ac generator supplying it [2006.01]		
25/32	• • using discharge tubes [2006.01]		
<b>H02S</b>	<b>Generation of electric power by conversion of infra-red radiation, visible light or ultraviolet light, e.g. using photovoltaic [PV] modules</b> (solar heat collectors F24J 2/00; obtaining electrical energy from radioactive sources G21H 1/12; light sensitive inorganic semiconductor devices H01L 31/00; thermoelectric devices H01L 35/00; pyroelectric devices H01L 37/00; light sensitive organic semiconductor devices H01L 51/42) [2014.01]		
<b>10/00</b>	<b>PV power plants; Combinations of PV energy systems with other systems for the generation of electric power [2014.01]</b>	<b>10/40</b>	• Mobile PV generator systems [2014.01]
10/10	• including a supplementary source of electric power, e.g. hybrid diesel-PV energy systems (combinations with gas-turbine plants F02C 6/00) [2014.01]	<b>20/00</b>	<b>Supporting structures for PV modules [2014.01]</b>
10/12	• • Hybrid wind-PV energy systems [2014.01]		<b>Note(s) [2014.01]</b> Supporting structures also intended for use with solar heat collectors should also be classified in groups F24J 2/38 or F24J 2/52.
10/20	• Systems characterised by their energy storage means (H02S 40/38 takes precedence) [2014.01]	20/10	• Supporting structures directly fixed to the ground (H02S 20/30 takes precedence) [2014.01]
10/30	• Thermophotovoltaic systems (photovoltaic cells specially adapted for conversion or sensing of infra-red [IR] radiation H01L 31/00; thermoelectric devices H01L 35/00) [2014.01]	20/20	• Supporting structures directly fixed to an immovable object (H02S 20/30 takes precedence) [2014.01]

## H02S

- 20/21 • • specially adapted for motorways, e.g. integrated with sound barriers [2014.01]
- 20/22 • • specially adapted for buildings [2014.01]
- 20/23 • • • specially adapted for roof structures (roof covering aspects of energy collecting devices E04D 13/18) [2014.01]
- 20/24 • • • • specially adapted for flat roofs [2014.01]
- 20/25 • • • • Roof tile elements [2014.01]
- 20/26 • • • Building materials integrated with PV modules, e.g. façade elements (H02S 20/25 takes precedence) [2014.01]
- 20/30 • Supporting structures being movable or adjustable, e.g. for angle adjustment [2014.01]
- 20/32 • • specially adapted for solar tracking [2014.01]
- 30/00 Structural details of PV modules other than those related to light conversion** (semiconductor device aspects of modules of electrolytic light sensitive devices H01G 9/20, of inorganic PV modules H01L 31/00, of organic PV modules H01L 51/42) [2014.01]
- 30/10 • Frame structures [2014.01]
- 30/20 • Collapsible or foldable PV modules [2014.01]
- 40/00 Components or accessories in combination with PV modules, not provided for in groups H02S 10/00-H02S 30/00 [2014.01]**
- 40/10 • Cleaning arrangements [2014.01]
- 40/12 • • Means for removing snow [2014.01]
- 40/20 • Optical components [2014.01]
- 40/22 • • Light-reflecting or light-concentrating means (directly associated with the PV cell or integrated with the PV cell H01L 31/054) [2014.01]
- 40/30 • Electrical components [2014.01]
- 40/32 • • comprising DC/AC inverter means associated with the PV module itself, e.g. AC modules [2014.01]
- 40/34 • • comprising specially adapted electrical connection means to be structurally associated with the PV module, e.g. junction boxes [2014.01]
- 40/36 • • characterised by special electrical interconnection means between two or more PV modules, e.g. electrical module-to-module connection [2014.01]
- 40/38 • • Energy storage means, e.g. batteries, structurally associated with PV modules [2014.01]
- 40/40 • Thermal components (H02S 10/30 takes precedence) [2014.01]
- 40/42 • • Cooling means (cooling means directly associated or integrated with the PV cell H01L 31/052) [2014.01]
- 40/44 • • Means to utilise heat energy, e.g. hybrid systems producing warm water and electricity at the same time (directly associated with the PV cell or integrated with the PV cell H01L 31/0525) [2014.01]
- 50/00 Monitoring or testing of PV systems, e.g. load balancing or fault identification [2014.01]**
- 50/10 • Testing of PV devices, e.g. of PV modules or single PV cells (testing of semiconductor devices during manufacturing H01L 21/66) [2014.01]
- 50/15 • • using optical means, e.g. using electroluminescence [2014.01]
- 99/00 Subject matter not provided for in other groups of this subclass [2014.01]**

## H03 BASIC ELECTRONIC CIRCUITRY

**H03B GENERATION OF OSCILLATIONS, DIRECTLY OR BY FREQUENCY-CHANGING, BY CIRCUITS EMPLOYING ACTIVE ELEMENTS WHICH OPERATE IN A NON-SWITCHING MANNER; GENERATION OF NOISE BY SUCH CIRCUITS** (generators specially adapted for electrophonic musical instruments G10H; masers or lasers H01S; generation of oscillations in plasma H05H)

### Subclass index

#### GENERATION WITHOUT FREQUENCY-CHANGING

- By means of amplification and feedback; negative resistance.....5/00, 7/00
- By means of transit-time tubes; electron-beam tubes.....9/00, 13/00
- By shock-exciting; Hall effect; radiation source and detectors.....11/00, 15/00, 17/00

#### GENERATION WITH FREQUENCY- CHANGING

- By multiplication or division of a signal.....19/00
- By combining unmodulated signals.....21/00

#### PARTICULARITIES OF GENERATED OSCILLATIONS

- Swept-over frequency range; multi-frequency; multiphase; noise.....23/00, 25/00, 27/00, 29/00

#### OTHER METHODS OF GENERATION.....28/00

#### DETAILS.....1/00

- 
- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li><b>1/00 Details</b></li> <li>1/02 • Structural details of power oscillators, e.g. for heating (generators for heating by electromagnetic fields H05B 6/00)</li> <li>1/04 • Reducing undesired oscillations, e.g. harmonics</li> <li><b>5/00 Generation of oscillations using amplifier with regenerative feedback from output to input</b> (H03B 9/00, H03B 15/00 take precedence)</li> </ul> | <ul style="list-style-type: none"> <li>5/02 • Details</li> <li>5/04 • • Modifications of generator to compensate for variations in physical values, e.g. power supply, load, temperature</li> <li>5/06 • • Modifications of generator to ensure starting of oscillations (starting of generators H03L 3/00)</li> <li>5/08 • with frequency-determining element comprising lumped inductance and capacitance</li> </ul> |
|--|--|

- 5/10 • • active element in amplifier being vacuum tube (H03B 5/14 takes precedence)
- 5/12 • • active element in amplifier being semiconductor device (H03B 5/14, H03B 7/06 take precedence)
- 5/14 • • the frequency-determining element being connected via a bridge circuit to a closed loop in which the signal is transmitted
- 5/16 • • • active element in amplifier being vacuum tube
- 5/18 • with frequency-determining element comprising distributed inductance and capacitance
- 5/20 • with frequency-determining element comprising resistance and either capacitance or inductance, e.g. phase-shift oscillator
- 5/22 • • active element in amplifier being vacuum tube (H03B 5/26 takes precedence)
- 5/24 • • active element in amplifier being semiconductor device (H03B 5/26 takes precedence)
- 5/26 • • the frequency-determining element being part of a bridge circuit in a closed loop in which the signal is transmitted; the frequency-determining element being connected via a bridge circuit to such a closed loop, e.g. Wien-Bridge oscillator, parallel-T oscillator
- 5/28 • • • active element in amplifier being vacuum tube
- 5/30 • with frequency-determining element being electromechanical resonator
- 5/32 • • being a piezo-electric resonator
- 5/34 • • • active element in amplifier being vacuum tube (H03B 5/38 takes precedence)
- 5/36 • • • active element in amplifier being semiconductor device (H03B 5/38 takes precedence)
- 5/38 • • • the frequency-determining element being connected via a bridge circuit to a closed loop in which the signal is transmitted
- 5/40 • • being a magnetostrictive resonator (H03B 5/42 takes precedence)
- 5/42 • • the frequency-determining element being connected via a bridge circuit to a closed loop in which the signal is transmitted
- 7/00 Generation of oscillations using active element having a negative resistance between two of its electrodes (H03B 9/00 takes precedence)**
- 7/02 • with frequency-determining element comprising lumped inductance and capacitance
- 7/04 • • active element being vacuum tube
- 7/06 • • active element being semiconductor device
- 7/08 • • • being a tunnel diode
- 7/10 • • active element being gas-discharge or arc-discharge tube
- 7/12 • with frequency-determining element comprising distributed inductance and capacitance
- 7/14 • • active element being semiconductor device
- 9/00 Generation of oscillations using transit-time effects [2]**
- 9/01 • using discharge tubes [2]
- 9/02 • • using a retarding-field tube (using klystrons H03B 9/04) [2]
- 9/04 • • using a klystron [2]
- 9/06 • • • using a reflex klystron [2]
- 9/08 • • using a travelling-wave tube [2]
- 9/10 • • using a magnetron [2]
- 9/12 • using solid state devices, e.g. Gunn-effect devices [2]
- 9/14 • • and elements comprising distributed inductance and capacitance [3]
- 11/00 Generation of oscillations using a shock-excited tuned circuit (with feedback H03B 5/00)**
- 11/02 • excited by spark
- 11/04 • excited by interrupter
- 11/06 • • by mechanical interrupter
- 11/08 • • interrupter being discharge tube
- 11/10 • • interrupter being semiconductor device
- 13/00 Generation of oscillations using deflection of electron beam in a cathode-ray tube**
- 15/00 Generation of oscillations using galvano-magnetic devices, e.g. Hall-effect devices, devices using spin transfer effects, devices using giant magnetoresistance, or using super-conductivity effects**
- 17/00 Generation of oscillations using a radiation source and a detector**
- 19/00 Generation of oscillations by non-regenerative frequency multiplication or division of a signal from a separate source**
- 19/03 • using non-linear inductance [3]
- 19/05 • using non-linear capacitance, e.g. varactor diodes [3]
- 19/06 • by means of discharge device or semiconductor device with more than two electrodes
- 19/08 • • by means of a discharge device
- 19/10 • • • using multiplication only
- 19/12 • • • using division only
- 19/14 • • by means of a semiconductor device
- 19/16 • using uncontrolled rectifying devices, e.g. rectifying diodes or Schottky diodes [3]
- 19/18 • • and elements comprising distributed inductance and capacitance [3]
- 19/20 • • being diodes exhibiting charge storage or enhancement effects [3]
- 21/00 Generation of oscillations by combining unmodulated signals of different frequencies (H03B 19/00 takes precedence) [3]**
- 21/01 • by beating unmodulated signals of different frequencies [3]
- 21/02 • • by plural beating, i.e. for frequency synthesis [3]
- 21/04 • • using several similar stages [3]
- 23/00 Generation of oscillations periodically swept over a predetermined frequency range**
- 25/00 Simultaneous generation by a free-running oscillator of oscillations having different frequencies**
- 27/00 Generation of oscillations providing a plurality of outputs of the same frequency but differing in phase, other than merely two anti-phase outputs**
- 28/00 Generation of oscillations by methods not covered by groups H03B 5/00-H03B 27/00, including modification of the waveform to produce sinusoidal oscillations (analogue function generators for performing computing operations G06G 7/26) [4]**
- 29/00 Generation of noise currents and voltages (gas-filled discharge tubes with solid cathode specially adapted as noise generators H01J 17/00)**

## H03B

## H03C MODULATION (masers or lasers H01S; coding, decoding or code conversion H03M)

### Note(s)

1. This subclass covers only modulation, keying, or interruption of sinusoidal oscillations or electromagnetic waves, the modulating signal having any desired waveform.
2. In this subclass, circuits usable both as modulator and demodulator are classified in the group dealing with the type of modulator involved.

- 1/00 Amplitude modulation** (H03C 5/00, H03C 7/00 take precedence)
- 1/02 • Details
- 1/04 • • Means in, or combined with, modulating stage for reducing angle modulation
- 1/06 • • Modifications of modulator to reduce distortion, e.g. by feedback, and clearly applicable to more than one type of modulator
- 1/08 • by means of variable impedance element (H03C 1/28-H03C 1/34, H03C 1/46-H03C 1/52, H03C 1/62 take precedence)
- 1/10 • • the element being a current-dependent inductor
- 1/12 • • the element being a voltage-dependent capacitor
- 1/14 • • the element being a diode
- 1/16 • by means of discharge device having at least three electrodes (H03C 1/28-H03C 1/34, H03C 1/50, H03C 1/52, H03C 1/62 take precedence)
- 1/18 • • carrier applied to control grid
- 1/20 • • • modulating signal applied to anode
- 1/22 • • • modulating signal applied to same grid
- 1/24 • • • modulating signal applied to different grid
- 1/26 • • • modulating signal applied to cathode
- 1/28 • by means of transit-time tube
- 1/30 • • by means of a magnetron
- 1/32 • by deflection of electron beam in discharge tube
- 1/34 • by means of light-sensitive element
- 1/36 • by means of semiconductor device having at least three electrodes (H03C 1/34, H03C 1/50, H03C 1/52, H03C 1/62 take precedence)
- 1/38 • • carrier applied to base of a transistor
- 1/40 • • • modulating signal applied to collector
- 1/42 • • • modulating signal applied to base
- 1/44 • • • modulating signal applied to emitter
- 1/46 • Modulators with mechanically-driven or acoustically-driven parts
- 1/48 • by means of Hall-effect devices
- 1/50 • by converting angle modulation to amplitude modulation (H03C 1/28-H03C 1/34, H03C 1/46, H03C 1/48 take precedence)
- 1/52 • Modulators in which carrier or one sideband is wholly or partially suppressed (H03C 1/28-H03C 1/34, H03C 1/46, H03C 1/48 take precedence)
- 1/54 • • Balanced modulators, e.g. bridge type, ring type or double balanced type
- 1/56 • • • comprising variable two-pole elements only
- 1/58 • • • • comprising diodes
- 1/60 • • with one sideband wholly or partially suppressed
- 1/62 • Modulators in which amplitude of carrier component in output is dependent upon strength of modulating signal, e.g. no carrier output when no modulating signal is present (H03C 1/28-H03C 1/34, H03C 1/46, H03C 1/48 take precedence)
- 3/00 Angle modulation** (H03C 5/00, H03C 7/00 take precedence)
- 3/02 • Details
- 3/04 • • Means in, or combined with, modulating stage for reducing amplitude modulation
- 3/06 • • Means for changing frequency deviation
- 3/08 • • Modifications of modulator to linearise modulation, e.g. by feedback, and clearly applicable to more than one type of modulator
- 3/09 • • Modifications of modulator for regulating the mean frequency [3]
- 3/10 • by means of variable impedance (H03C 3/30-H03C 3/38 take precedence)
- 3/12 • • by means of a variable reactive element
- 3/14 • • • simulated by circuit comprising active element with at least three electrodes, e.g. reactance-tube circuit
- 3/16 • • • • in which the active element simultaneously serves as the active element of an oscillator
- 3/18 • • • the element being a current-dependent inductor
- 3/20 • • • the element being a voltage-dependent capacitor
- 3/22 • • • the element being a semiconductor diode, e.g. varicap diode
- 3/24 • • by means of a variable resistive element, e.g. tube
- 3/26 • • • comprising two elements controlled in push-pull by modulating signal
- 3/28 • • using variable impedance driven mechanically or acoustically
- 3/30 • by means of transit-time tube
- 3/32 • • the tube being a magnetron
- 3/34 • by deflection of electron beam in discharge tube
- 3/36 • by means of light-sensitive element
- 3/38 • by converting amplitude modulation to angle modulation
- 3/40 • • using two signal paths the outputs of which have a predetermined phase difference and at least one output being amplitude-modulated
- 3/42 • by means of electromechanical devices (H03C 3/28 takes precedence) [3]
- 5/00 Amplitude modulation and angle modulation produced simultaneously or at will by the same modulating signal** (H03C 7/00 takes precedence)
- 5/02 • by means of transit-time tube
- 5/04 • • the tube being a magnetron
- 5/06 • by deflection of electron beam in discharge tube
- 7/00 Modulating electromagnetic waves** (devices or arrangements for the modulation of light G02F 1/00)
- 7/02 • in transmission line, waveguide, cavity resonator, or radiation field of aerial
- 7/04 • • Polarisation of transmitted wave being modulated
- 99/00 Subject matter not provided for in other groups of this subclass [2006.01]**



**H03D DEMODULATION OR TRANSFERENCE OF MODULATION FROM ONE CARRIER TO ANOTHER** (masers, lasers H01S; circuits capable of acting both as modulator and demodulator H03C, e.g. balanced modulators H03C 1/54; details applicable to both modulators and frequency-changers H03C; demodulating pulses which have been modulated with a continuously-variable signal H03K 9/00; transforming types of pulse modulation H03K 11/00; relay systems, e.g. repeater stations H04B 7/14; demodulators adapted for digitally modulated-carrier systems H04L 27/00; synchronous demodulators adapted for colour television H04N 9/66)

#### Note(s)

This subclass covers only:

- demodulation or transference of signals modulated on a sinusoidal carrier or on electromagnetic waves;
- comparing phase or frequency of two mutually-independent oscillations.

#### Subclass index

##### DEMODULATION

Amplitude; angle; combined; super-regenerative.....1/00, 3/00, 5/00, 9/00, 11/00

TRANSFERENCE.....7/00, 9/00

COMPARING PHASE OR FREQUENCY.....13/00

SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....99/00

- 
- |                    |   |             |  |
|--------------------|---|-------------|--|
| <p><b>1/00</b></p> | <p><b>Demodulation of amplitude-modulated oscillations</b><br/>(H03D 5/00, H03D 9/00, H03D 11/00 take precedence; amplitude demodulators adapted for digitally modulated carrier systems, e.g. using on-off keying, single sideband or vestigial sideband modulation H04L 27/06)</p>  | <p>3/08</p> | <ul style="list-style-type: none"> <li>• • • by means of diodes, e.g. Foster-Seeley discriminator</li> </ul>   |
|                    |   | 3/10        | <ul style="list-style-type: none"> <li>• • • • in which the diodes are simultaneously conducting during the same half period of the signal, e.g. ratio detector</li> </ul>   |
| 1/02               | <ul style="list-style-type: none"> <li>• Details</li> </ul>   | 3/12        | <ul style="list-style-type: none"> <li>• • • by means of discharge tubes having more than two electrodes</li> </ul>  |
| 1/04               | <ul style="list-style-type: none"> <li>• • Modifications of demodulators to reduce interference by undesired signals</li> </ul>   | 3/14        | <ul style="list-style-type: none"> <li>• • • by means of semiconductor devices having more than two electrodes</li> </ul>  |
| 1/06               | <ul style="list-style-type: none"> <li>• • Modifications of demodulators to reduce distortion, e.g. by negative feedback</li> </ul>   | 3/16        | <ul style="list-style-type: none"> <li>• • • by means of electromechanical resonators</li> </ul>   |
| 1/08               | <ul style="list-style-type: none"> <li>• by means of non-linear two-pole elements (H03D 1/22, H03D 1/26, H03D 1/28 take precedence)</li> </ul>  | 3/18        | <ul style="list-style-type: none"> <li>• • by means of synchronous gating arrangements</li> </ul>  |
| 1/10               | <ul style="list-style-type: none"> <li>• • of diodes</li> </ul>   | 3/20        | <ul style="list-style-type: none"> <li>• • • producing pulses whose amplitude or duration depends on the phase difference</li> </ul>   |
| 1/12               | <ul style="list-style-type: none"> <li>• • • with provision for equalising ac and dc loads</li> </ul>   | 3/22        | <ul style="list-style-type: none"> <li>• • by means of active elements with more than two electrodes to which two signals are applied derived from the signal to be demodulated and having a phase difference related to the frequency deviation, e.g. phase detector</li> </ul>   |
| 1/14               | <ul style="list-style-type: none"> <li>• by means of non-linear elements having more than two poles (H03D 1/22, H03D 1/26, H03D 1/28 take precedence)</li> </ul>  | 3/24        | <ul style="list-style-type: none"> <li>• • Modifications of demodulators to reject or remove amplitude variations by means of locked-in oscillator circuits</li> </ul>   |
| 1/16               | <ul style="list-style-type: none"> <li>• • of discharge tubes</li> </ul>  | 3/26        | <ul style="list-style-type: none"> <li>• by means of sloping amplitude/frequency characteristic of tuned or reactive circuit (H03D 3/28-H03D 3/32 take precedence)</li> </ul>  |
| 1/18               | <ul style="list-style-type: none"> <li>• • of semiconductor devices</li> </ul>  | 3/28        | <ul style="list-style-type: none"> <li>• Modifications of demodulators to reduce effect of temperature variations</li> </ul>   |
| 1/20               | <ul style="list-style-type: none"> <li>• • with provision for preventing undesired type of demodulation, e.g. preventing anode detection in a grid detection circuit</li> </ul>   | 3/30        | <ul style="list-style-type: none"> <li>• by means of transit-time tubes</li> </ul>   |
| 1/22               | <ul style="list-style-type: none"> <li>• Homodyne or synchrodyne circuits</li> </ul>  | 3/32        | <ul style="list-style-type: none"> <li>• by deflecting an electron beam in a discharge tube (H03D 3/30 takes precedence)</li> </ul>  |
| 1/24               | <ul style="list-style-type: none"> <li>• • for demodulation of signals wherein one sideband or the carrier has been wholly or partially suppressed</li> </ul>   | 3/34        | <ul style="list-style-type: none"> <li>• by means of electromechanical devices (H03D 3/16 takes precedence) [3]</li> </ul>   |
| 1/26               | <ul style="list-style-type: none"> <li>• by means of transit-time tubes</li> </ul>  |             |  |
| 1/28               | <ul style="list-style-type: none"> <li>• by deflecting an electron beam in a discharge tube (H03D 1/26 takes precedence)</li> </ul>   |             |  |
| <b>3/00</b>        | <p><b>Demodulation of angle-modulated oscillations</b><br/>(H03D 5/00, H03D 9/00, H03D 11/00 take precedence; frequency demodulators adapted for digitally modulated carrier systems, i.e. using frequency shift keying H04L 27/14; phase demodulators adapted for digitally modulated carrier systems, i.e. using phase shift keying H04L 27/22)</p> | <b>5/00</b> | <p><b>Circuits for demodulating amplitude-modulated or angle-modulated oscillations at will</b> (H03D 9/00, H03D 11/00 take precedence; demodulators adapted for digitally modulated carrier systems characterised by combinations of amplitude and angle modulation, e.g. quadrature amplitude modulation H04L 27/38)</p> |
| 3/02               | <ul style="list-style-type: none"> <li>• by detecting phase difference between two signals obtained from input signal (H03D 3/28-H03D 3/32 take precedence)</li> </ul>  | <b>7/00</b> | <p><b>Transference of modulation from one carrier to another, e.g. frequency-changing</b> (H03D 9/00, H03D 11/00 take precedence; dielectric amplifiers, magnetic amplifiers, parametric amplifiers used as frequency-changers H03F)</p>   |
| 3/04               | <ul style="list-style-type: none"> <li>• • by counting or integrating cycles of oscillations</li> </ul>   |             |  |
| 3/06               | <ul style="list-style-type: none"> <li>• • by combining signals additively or in product demodulators</li> </ul>  |             |  |

## H03D

- 7/02 • by means of diodes (H03D 7/14-H03D 7/22 take precedence)
- 7/04 • • having negative resistance characteristic, e.g. tunnel diode
- 7/06 • by means of discharge tubes having more than two electrodes (H03D 7/14-H03D 7/22 take precedence)
- 7/08 • • the signals to be mixed being applied between the same two electrodes
- 7/10 • • the signals to be mixed being applied between different pairs of electrodes
- 7/12 • by means of semiconductor devices having more than two electrodes (H03D 7/14-H03D 7/22 take precedence)
- 7/14 • Balanced arrangements
- 7/16 • Multiple frequency-changing (superheterodyne receivers H04B 1/26)
- 7/18 • Modifications of frequency-changers for eliminating image frequencies
- 7/20 • by means of transit-time tubes
- 7/22 • by deflecting an electron beam in a discharge tube (H03D 7/20 takes precedence)

- 9/00 **Demodulation or transference of modulation of modulated electromagnetic waves** (devices or arrangements for demodulating light, transferring the modulation of modulated light or for changing the frequency of light G02F 2/00)
- 9/02 • Demodulation using distributed inductance and capacitance, e.g. in feeder lines
- 9/04 • • for angle-modulated oscillations
- 9/06 • Transference of modulation using distributed inductance and capacitance
- 11/00 **Super-regenerative demodulator circuits**
- 11/02 • for amplitude-modulated oscillations
- 11/04 • • by means of semiconductor devices having more than two electrodes
- 11/06 • for angle-modulated oscillations
- 11/08 • • by means of semiconductor devices having more than two electrodes
- 13/00 **Circuits for comparing the phase or frequency of two mutually-independent oscillations** (arrangements for measuring phase angle between a voltage and a current or between voltages or currents G01R 25/00)
- 99/00 **Subject matter not provided for in other groups of this subclass [2006.01]**

**H03F** **AMPLIFIERS** (measuring, testing G01R; optical parametric amplifiers G02F; circuit arrangements with secondary emission tubes H01J 43/30; masers, lasers H01S; dynamo-electric amplifiers H02K; control of amplification H03G; coupling arrangements independent of the nature of the amplifier, voltage dividers H03H; amplifiers capable only of dealing with pulses H03K; repeater circuits in transmission lines H04B 3/36, H04B 3/58; application of speech amplifiers in telephonic communication H04M 1/60, H04M 3/40)

### Note(s)

This subclass covers:

- linear amplification, there being linear relationship between the amplitudes of input and output, and the output having substantially the same waveform as the input;
- dielectric amplifiers, magnetic amplifiers, and parametric amplifiers when used as oscillators or frequency-changers;
- constructions of active elements of dielectric amplifiers and parametric amplifiers if no provision exists elsewhere.

### Subclass index

AMPLIFIERS USING TUBES OR SEMICONDUCTORS; DETAILS.....	3/00, 5/00, 1/00
PARAMETRIC AMPLIFIERS.....	7/00
MAGNETIC; DIELECTRIC AMPLIFIERS.....	9/00, 11/00
AMPLIFIERS USING SPECIAL ELEMENTS	
Mechanical or acoustic; using Hall effect; electroluminescent; superconductive.....	13/00, 15/00, 17/00, 19/00
OTHER AMPLIFIERS.....	99/00

- 1/00 **Details of amplifiers with only discharge tubes, only semiconductor devices or only unspecified devices as amplifying elements**
- 1/02 • Modifications of amplifiers to raise the efficiency, e.g. gliding Class A stages, use of an auxiliary oscillation
- 1/04 • • in discharge-tube amplifiers
- 1/06 • • • to raise the efficiency of amplifying modulated radio frequency waves; to raise the efficiency of amplifiers acting also as modulators [2]
- 1/07 • • • • Doherty-type amplifiers [2]

- 1/08 • Modifications of amplifiers to reduce detrimental influences of internal impedances of amplifying elements (wide-band amplifiers with inter-stage coupling networks incorporating these impedances H03F 1/42; eliminating transit-time effects in vacuum tubes H01J 21/34)
- 1/10 • • by use of amplifying elements with multiple electrode connections
- 1/12 • • by use of attenuating means
- 1/13 • • • in discharge-tube amplifiers [2]
- 1/14 • • by use of neutralising means
- 1/16 • • • in discharge-tube amplifiers
- 1/18 • • by use of distributed coupling
- 1/20 • • • in discharge-tube amplifiers

- 1/22 • • by use of cascode coupling, i.e. earthed cathode or emitter stage followed by earthed grid or base stage respectively
- 1/24 • • • in discharge-tube amplifiers
- 1/26 • Modifications of amplifiers to reduce influence of noise generated by amplifying elements
- 1/28 • • in discharge-tube amplifiers
- 1/30 • Modifications of amplifiers to reduce influence of variations of temperature or supply voltage
- 1/32 • Modifications of amplifiers to reduce non-linear distortion (by negative feedback H03F 1/34)
- 1/33 • • in discharge-tube amplifiers [2]
- 1/34 • Negative-feedback-circuit arrangements with or without positive feedback (H03F 1/02-H03F 1/30, H03F 1/38-H03F 1/50, H03F 3/50 take precedence) [3]
- 1/36 • • in discharge-tube amplifiers
- 1/38 • Positive-feedback circuit arrangements without negative feedback
- 1/40 • • in discharge-tube amplifiers
- 1/42 • Modifications of amplifiers to extend the bandwidth
- 1/44 • • of tuned amplifiers
- 1/46 • • • with tubes only
- 1/48 • • of aperiodic amplifiers
- 1/50 • • • with tubes only
- 1/52 • Circuit arrangements for protecting such amplifiers [3]
- 1/54 • • with tubes only [3]
- 1/56 • Modifications of input or output impedances, not otherwise provided for [3]
- 3/00 Amplifiers with only discharge tubes or only semiconductor devices as amplifying elements**
- Note(s)**
- Groups H03F 3/20-H03F 3/72 take precedence over groups H03F 3/02-H03F 3/189.
- 3/02 • with tubes only (subsequent subgroups take precedence)
- 3/04 • with semiconductor devices only (subsequent subgroups take precedence)
- 3/06 • • using hole storage effect
- 3/08 • • controlled by light
- 3/10 • • with diodes
- 3/12 • • • with Esaki diodes
- 3/14 • • with amplifying devices having more than three electrodes or more than two PN junctions
- 3/16 • • with field-effect devices
- 3/18 • with semiconductor devices of complementary types (subsequent subgroups take precedence)
- 3/181 • Low-frequency amplifiers, e.g. audio preamplifiers [2]
- 3/183 • • with semiconductor devices only [2]
- 3/185 • • • with field-effect devices (H03F 3/187 takes precedence) [2]
- 3/187 • • • in integrated circuits [2]
- 3/189 • High-frequency amplifiers, e.g. radio frequency amplifiers [2]
- 3/19 • • with semiconductor devices only [2]
- 3/191 • • • Tuned amplifiers (H03F 3/193, H03F 3/195 take precedence) [2]
- 3/193 • • • with field-effect devices (H03F 3/195 takes precedence) [2]
- 3/195 • • • in integrated circuits [2]
- 3/20 • Power amplifiers, e.g. Class B amplifiers, Class C amplifiers (H03F 3/26-H03F 3/30 take precedence)
- 3/21 • • with semiconductor devices only [2]
- 3/213 • • • in integrated circuits [2]
- 3/217 • • • Class D power amplifiers; Switching amplifiers [2]
- 3/22 • • with tubes only (H03F 3/24 takes precedence)
- 3/24 • • of transmitter output stages
- 3/26 • Push-pull amplifiers; Phase-splitters therefor (duplicated single-ended push-pull arrangements or phase-splitters therefor H03F 3/30)
- 3/28 • • with tubes only
- 3/30 • Single-ended push-pull amplifiers; Phase-splitters therefor
- 3/32 • • with tubes only
- 3/34 • Dc amplifiers in which all stages are dc-coupled (H03F 3/45 takes precedence) [3]
- 3/343 • • with semiconductor devices only [2]
- 3/345 • • • with field-effect devices (H03F 3/347 takes precedence) [2]
- 3/347 • • • in integrated circuits [2]
- 3/36 • • with tubes only
- 3/38 • Dc amplifiers with modulator at input and demodulator at output; Modulators or demodulators specially adapted for use in such amplifiers (modulators in general H03C; demodulators in general H03D; amplitude modulation of pulses in general H03K 7/02; amplitude demodulation of pulses in general H03K 9/02)
- 3/387 • • with semiconductor devices only [2]
- 3/393 • • • with field-effect devices [2]
- 3/40 • • with tubes only
- 3/42 • Amplifiers with two or more amplifying elements having their dc paths in series with the load, the control electrode of each element being excited by at least part of the input signal, e.g. so-called totem-pole amplifiers
- 3/44 • • with tubes only
- 3/45 • Differential amplifiers [2]
- 3/46 • Reflex amplifiers
- 3/48 • • with tubes only
- 3/50 • Amplifiers in which input is applied to, or output is derived from, an impedance common to input and output circuits of the amplifying element, e.g. cathode follower
- 3/52 • • with tubes only
- 3/54 • Amplifiers using transit-time effect in tubes or semiconductor devices (parametric amplifiers H03F 7/00; solid state travelling-wave devices H01L 45/02)
- 3/55 • • with semiconductor devices only [2]
- 3/56 • • using klystrons
- 3/58 • • using travelling-wave tubes
- 3/60 • Amplifiers in which coupling networks have distributed constants, e.g. with waveguide resonators (H03F 3/54 takes precedence)
- 3/62 • Two-way amplifiers
- 3/64 • • with tubes only
- 3/66 • Amplifiers simultaneously generating oscillations of one frequency and amplifying signals of another frequency
- 3/68 • Combinations of amplifiers, e.g. multi-channel amplifiers for stereophonics
- 3/70 • Charge amplifiers [2]
- 3/72 • Gated amplifiers, i.e. amplifiers which are rendered operative or inoperative by means of a control signal [2]

## H03F

- 5/00 Amplifiers with both discharge tubes and semiconductor devices as amplifying elements**
- 7/00 Parametric amplifiers** (devices or arrangements for the parametric generation or amplification of light, infra-red or ultra-violet waves G02F 1/39)
- 7/02 • using variable-inductance element; using variable-permeability element
- 7/04 • using variable-capacitance element; using variable-permittivity element
- 7/06 • with electron beam tube
- 9/00 Magnetic amplifiers**
- 9/02 • current-controlled, i.e. the load current flowing in both directions through a main coil [2]
- 9/04 • voltage-controlled, i.e. the load current flowing in only one direction through a main coil, e.g. Logan circuits (H03F 9/06 takes precedence) [2]
- 9/06 • Control by voltage time integral, i.e. the load current flowing in only one direction through a main coil, whereby the main coil winding also can be used as a control winding, e.g. Ramey circuits [2]
- 11/00 Dielectric amplifiers**
- 13/00 Amplifiers using amplifying element consisting of two mechanically- or acoustically-coupled transducers, e.g. telephone-microphone amplifier**
- 15/00 Amplifiers using galvano-magnetic effects not involving mechanical movement, e.g. using Hall effect**
- 17/00 Amplifiers using electroluminescent element or photocell**
- 19/00 Amplifiers using superconductivity effects**
- 99/00 Subject matter not provided for in other groups of this subclass [2009.01]**

**H03G CONTROL OF AMPLIFICATION** (impedance networks, e.g. attenuators, H03H; control of transmission in lines H04B 3/04)

### Note(s)

- This subclass covers:
  - control of gain of amplifiers or frequency-changers;
  - control of frequency range of amplifiers;
  - limiting amplitude or rate of change of amplitude.
- Attention is drawn to the Note following the title of subclass H03F.

### Subclass index

GAIN CONTROL.....	3/00
tone control.....	5/00
COMPRESSORS OR EXPANDERS; LIMITERS.....	7/00, 11/00
COMBINATION OF TWO OR MORE TYPES OF CONTROL.....	9/00
DETAILS.....	1/00
SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....	99/00

- 1/00 Details of arrangements for controlling amplification**
- 1/02 • Remote control of amplification, tone, or bandwidth (remote control in general G05, G08; combined with remote tuning or selection of resonant circuits H03J)
- 1/04 • Modifications of control circuit to reduce distortion caused by control (modifications to reduce influence of variations of internal impedance of amplifying elements caused by control H03F 1/08)
- 3/00 Gain control in amplifiers or frequency changers** (gated amplifiers H03F 3/72; peculiar to television receivers H04N)
- 3/02 • Manually-operated control
- 3/04 • • in untuned amplifiers
- 3/06 • • • having discharge tubes
- 3/08 • • • • incorporating negative feedback
- 3/10 • • • • having semiconductor devices
- 3/12 • • • • incorporating negative feedback
- 3/14 • • in frequency-selective amplifiers
- 3/16 • • • having discharge tubes
- 3/18 • • • having semiconductor devices
- 3/20 • Automatic control (combined with volume compression or expansion H03G 7/00)
- 3/22 • • in amplifiers having discharge tubes
- 3/24 • • • Control dependent upon ambient noise level or sound level
- 3/26 • • • Muting amplifier when no signal is present
- 3/28 • • • • in frequency-modulation receivers
- 3/30 • • in amplifiers having semiconductor devices
- 3/32 • • • the control being dependent upon ambient noise level or sound level
- 3/34 • • • Muting amplifier when no signal is present
- 5/00 Tone control or bandwidth control in amplifiers**
- 5/02 • Manually-operated control (variable bandpass or bandstop filters H03H 7/12)
- 5/04 • • in untuned amplifiers
- 5/06 • • • having discharge tubes
- 5/08 • • • • incorporating negative feedback
- 5/10 • • • • having semiconductor devices
- 5/12 • • • • incorporating negative feedback
- 5/14 • • in frequency-selective amplifiers
- 5/16 • Automatic control
- 5/18 • • in untuned amplifiers
- 5/20 • • • having discharge tubes
- 5/22 • • • having semiconductor devices
- 5/24 • • in frequency-selective amplifiers

- |             |   |              |   |
|-------------|---|--------------|---|
| 5/26        | • • • having discharge tubes  | 9/22         | • • having discharge tubes  |
| 5/28        | • • • having semiconductor devices  | 9/24         | • • having semiconductor devices  |
| <b>7/00</b> | <b>Volume compression or expansion in amplifiers</b>                                    | 9/26         | • in untuned amplifying stages as well as in frequency-selective amplifying stages (gain control in both stages H03G 3/00; tone control or bandwidth control H03G 5/00) |
| 7/02        | • having discharge tubes  | 9/28         | • • all amplifying stages having discharge tubes  |
| 7/04        | • • incorporating negative feedback   | 9/30         | • • all amplifying stages having semiconductor devices  |
| 7/06        | • having semiconductor devices  |              |   |
| 7/08        | • • incorporating negative feedback   |              |   |
| <b>9/00</b> | <b>Combinations of two or more types of control, e.g. gain control and tone control</b> | <b>11/00</b> | <b>Limiting amplitude; Limiting rate of change of amplitude</b>   |
| 9/02        | • in untuned amplifiers (combined tone controls for low and high frequencies H03G 5/00) | 11/02        | • by means of diodes (H03G 11/04, H03G 11/06, H03G 11/08 take precedence)   |
| 9/04        | • • having discharge tubes  | 11/04        | • Limiting level dependent on strength of signal; Limiting level dependent on strength of carrier on which signal is modulated  |
| 9/06        | • • • for gain control and tone control   | 11/06        | • Limiters of angle-modulated signals; such limiters combined with discriminators (discriminators having an inherent limiting action H03D 3/00)                         |
| 9/08        | • • • • incorporating negative feedback   | 11/08        | • Limiting rate of change of amplitude  |
| 9/10        | • • • for tone control and volume expansion or compression                              |              |   |
| 9/12        | • • having semiconductor devices  | <b>99/00</b> | <b>Subject matter not provided for in other groups of this subclass [2006.01]</b>   |
| 9/14        | • • • for gain control and tone control   |              |   |
| 9/16        | • • • • incorporating negative feedback   |              |   |
| 9/18        | • • • for tone control and volume expansion or compression                              |              |   |
| 9/20        | • in frequency-selective amplifiers   |              |   |

**H03H IMPEDANCE NETWORKS, e.g. RESONANT CIRCUITS; RESONATORS** (measuring, testing G01R; arrangements for producing a reverberation or echo sound G10K 15/08; impedance networks or resonators consisting of distributed impedances, e.g. of the waveguide type, H01P; control of amplification, e.g. bandwidth control of amplifiers, H03G; tuning resonant circuits, e.g. tuning coupled resonant circuits, H03J; networks for modifying the frequency characteristics of communication systems H04B)

#### Note(s)

- This subclass covers:
  - networks comprising lumped impedance elements;
  - networks comprising distributed impedance elements together with lumped impedance elements;
  - networks comprising electromechanical or electro-acoustic elements;
  - networks simulating reactances and comprising discharge tubes or semiconductor devices;
  - constructions of electromechanical resonators.
- In this subclass, the following expression is used with the meaning indicated:
  - "passive elements" means resistors, capacitors, inductors, mutual inductors, or diodes.
- Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".
- In this subclass, main groups with a higher number take precedence.

#### Subclass index

##### NETWORKS

Adaptive.....	21/00
Using digital techniques.....	17/00
Transversal filters.....	15/00
Using passive elements only:	
one port; multi-port.....	5/00, 7/00
Using electromechanical or electro-acoustical elements.....	9/00
Using active elements.....	11/00
Using time varying elements.....	19/00
Using other elements or techniques.....	2/00

DETAILS.....1/00

MANUFACTURE.....3/00

- |             |   |             |   |
|-------------|---|-------------|---|
| <b>1/00</b> | <b>Constructional details of impedance networks whose electrical mode of operation is not specified or applicable to more than one type of network</b><br>(constructional details of electromechanical transducers H03H 9/00) | 1/02        | • RC networks, e.g. filters (structural combinations of capacitors with other electric elements H01G) [3] |
|             |   | <b>2/00</b> | <b>Networks using elements or techniques not provided for in groups H03H 3/00-H03H 21/00 [3]</b>          |

**3/00 Apparatus or processes specially adapted for the manufacture of impedance networks, resonating circuits, resonators**

- 3/007 • for the manufacture of electromechanical resonators or networks [3]
- 3/013 • • for obtaining desired frequency or temperature coefficient (H03H 3/04, H03H 3/10 take precedence) [3]
- 3/02 • • for the manufacture of piezo-electric or electrostrictive resonators or networks (H03H 3/08 takes precedence) [3]
- 3/04 • • • for obtaining desired frequency or temperature coefficient [3]
- 3/06 • • for the manufacture of magnetostrictive resonators or networks [3]
- 3/08 • • for the manufacture of resonators or networks using surface acoustic waves [3]
- 3/10 • • • for obtaining desired frequency or temperature coefficient [3]

**5/00 One-port networks comprising only passive electrical elements as network components [3]**

- 5/02 • without voltage- or current-dependent elements
- 5/10 • • comprising at least one element with prescribed temperature coefficient
- 5/12 • with at least one voltage- or current-dependent element

**7/00 Multiple-port networks comprising only passive electrical elements as network components (receiver input circuits H04B 1/18; networks simulating a length of communication cable H04B 3/40) [3]**

- 7/01 • Frequency selective two-port networks [3]
- 7/03 • • comprising means for compensation of loss [3]
- 7/06 • • including resistors (H03H 7/075, H03H 7/09, H03H 7/12, H03H 7/13 take precedence) [3]
- 7/065 • • • Parallel T-filters [3]
- 7/07 • • • Bridged T-filters [3]
- 7/075 • • Ladder networks, e.g. electric wave filters [3]
- 7/09 • • Filters comprising mutual inductance [3]
- 7/12 • • Bandpass or bandstop filters with adjustable bandwidth and fixed centre frequency (H03H 7/09 takes precedence; automatic control of bandwidth in amplifiers H03G 5/16)
- 7/13 • • using electro-optical elements [3]
- 7/18 • Networks for phase shifting
- 7/19 • • Two-port phase shifters providing a predetermined phase shift, e.g. "all-pass" filters [3]
- 7/20 • • Two-port phase shifters providing an adjustable phase shift [3]
- 7/21 • • providing two or more phase shifted output signals, e.g. n-phase output [3]
- 7/24 • Frequency-independent attenuators
- 7/25 • • comprising an element controlled by an electric or magnetic variable (H03H 7/27 takes precedence) [3]
- 7/27 • • comprising a photo-electric element [3]
- 7/30 • Time-delay networks
- 7/32 • • with lumped inductance and capacitance
- 7/34 • • with lumped and distributed reactance
- 7/38 • Impedance-matching networks
- 7/40 • • Automatic matching of load impedance to source impedance
- 7/42 • Balance/unbalance networks

- 7/46 • Networks for connecting several sources or loads, working on different frequencies or frequency bands, to a common load or source (for use in multiplex transmission systems H04J 1/00)
- 7/48 • Networks for connecting several sources or loads, working on the same frequency or frequency band, to a common load or source (phase shifters providing two or more output signals H03H 7/21) [3]
- 7/52 • One-way transmission networks, i.e. unilines
- 7/54 • Modifications of networks to reduce influence of variations of temperature [3]

**9/00 Networks comprising electromechanical or electro-acoustic elements; Electromechanical resonators (manufacture of piezo-electric or magnetostrictive elements H01L 41/00; loudspeakers, microphones, gramophone pick-ups or the like H04R)**

- 9/02 • Details [3]
- 9/05 • • Holders; Supports [3]
- 9/08 • • • Holders with means for regulating temperature
- 9/09 • • • Elastic or damping supports [3]
- 9/10 • • • Mounting in enclosures
- 9/12 • • • • for networks with interaction of optical and acoustic waves
- 9/125 • • Driving means, e.g. electrodes, coils [3]
- 9/13 • • • for networks consisting of piezo-electric or electrostrictive materials (H03H 9/145 takes precedence) [3]
- 9/135 • • • for networks consisting of magnetostrictive materials (H03H 9/145 takes precedence) [3]
- 9/145 • • • for networks using surface acoustic waves [3]
- 9/15 • Constructional features of resonators consisting of piezo-electric or electrostrictive material (H03H 9/25 takes precedence) [3]
- 9/17 • • having a single resonator (crystal tuning forks H03H 9/21) [3]
- 9/19 • • • consisting of quartz [3]
- 9/205 • • having multiple resonators (crystal tuning forks H03H 9/21) [3]
- 9/21 • • Crystal tuning forks [3]
- 9/215 • • • consisting of quartz [3]
- 9/22 • Constructional features of resonators consisting of magnetostrictive material
- 9/24 • Constructional features of resonators of material which is not piezo-electric, electrostrictive, or magnetostrictive
- 9/25 • Constructional features of resonators using surface acoustic waves [3]

**Note(s)**

Groups H03H 9/15-H03H 9/25 take precedence over groups H03H 9/30-H03H 9/74.

- 9/30 • Time-delay networks
- 9/36 • • with non-adjustable delay time (H03H 9/40, H03H 9/42 take precedence) [3]
- 9/38 • • with adjustable delay time (H03H 9/40, H03H 9/42 take precedence) [3]
- 9/40 • • Frequency-dependent delay lines, e.g. dispersive delay lines (H03H 9/42 takes precedence) [3]
- 9/42 • • using surface acoustic waves [3]
- 9/44 • • • Frequency-dependent delay lines, e.g. dispersive delay lines [3]
- 9/46 • Filters (multiple-port electromechanical filters H03H 9/70) [3]
- 9/48 • • Coupling means therefor [3]
- 9/50 • • • Mechanical coupling means [3]
- 9/52 • • • Electric coupling means [3]

9/54	• • comprising resonators of piezo-electric or electrostrictive material (H03H 9/64 takes precedence) [3]	11/28	• • Impedance matching networks [3]
9/56	• • • Monolithic crystal filters [3]	11/30	• • • Automatic matching of source impedance to load impedance [3]
9/58	• • • Multiple crystal filters [3]	11/32	• • Balance-unbalance networks [3]
9/60	• • • • Electric coupling means therefor [3]	11/34	• • Networks for connecting several sources or loads working on different frequencies or frequency bands, to a common load or source (for use in multiplex transmission systems H04J 1/00) [3]
9/62	• • comprising resonators of magnetostrictive material (H03H 9/64 takes precedence) [3]	11/36	• • Networks for connecting several sources or loads, working on the same frequency or frequency band, to a common load or source (phase shifters providing two or more output signals H03H 11/22) [3]
9/64	• • using surface acoustic waves [3]	11/38	• • One-way transmission networks, i.e. unilines [3]
9/66	• Phase shifters [3]	11/40	• • Impedance converters [3]
9/68	• • using surface acoustic waves [3]	11/42	• • • Gytrators (used in frequency selective networks H03H 11/08) [3]
9/70	• Multiple-port networks for connecting several sources or loads, working on different frequencies or frequency bands, to a common or source [3]	11/44	• • • Negative impedance converters (H03H 11/42 takes precedence; used in frequency-selective networks H03H 11/10) [3]
9/72	• • Networks using surface acoustic waves [3]	11/46	• One-port networks [3]
9/74	• Multiple-port networks for connecting several sources or loads, working on the same frequency or frequency band, to a common load or source (networks for phase shifting H03H 9/66) [3]	11/48	• • simulating reactances [3]
9/76	• • Networks using surface acoustic waves [3]	11/50	• • • using gyrators [3]
<b>11/00</b>	<b>Networks using active elements</b>	11/52	• • simulating negative resistances [3]
11/02	• Multiple-port networks [3]	11/54	• Modifications of networks to reduce influence of variations of temperature [3]
11/04	• • Frequency selective two-port networks [3]	<b>15/00</b>	<b>Transversal filters</b> (electromechanical filters H03H 9/46, H03H 9/70) [3]
11/06	• • • comprising means for compensation of loss [3]	15/02	• using analogue shift registers [3]
11/08	• • • using gyrators [3]	<b>17/00</b>	<b>Networks using digital techniques</b> [3]
11/10	• • • using negative impedance converters (H03H 11/08 takes precedence) [3]	17/02	• Frequency-selective networks [3]
11/12	• • • using amplifiers with feedback (H03H 11/08, H03H 11/10 take precedence) [3]	17/04	• • Recursive filters [3]
11/14	• • • using electro-optical devices [3]	17/06	• • Non-recursive filters [3]
11/16	• • Networks for phase shifting [3]	17/08	• Networks for phase-shifting [3]
11/18	• • • Two-port phase shifters providing a predetermined phase shift, e.g. "all-pass" filters [3]	<b>19/00</b>	<b>Networks using time-varying elements, e.g. N-path filters</b> [3]
11/20	• • • Two-port phase shifters providing an adjustable phase shift [3]	<b>21/00</b>	<b>Adaptive networks</b> [3]
11/22	• • • providing two or more phase shifted output signals, e.g. n-phase output [3]		
11/24	• • Frequency-independent attenuators [3]		
11/26	• • Time-delay networks (analogue shift registers G11C 27/04) [3]		
<b>H03J</b>	<b>TUNING RESONANT CIRCUITS; SELECTING RESONANT CIRCUITS</b> (indicating arrangements for measuring G01D; measuring, testing G01R; remote-control in general G05, G08; automatic control or stabilisation of generators H03L)		

**Note(s)**

This subclass covers also the control of tuning, including the combined control of tuning and other functions, e.g. combinations of tuning control and volume control, combinations of control of local oscillator and of supplementary resonant circuits.

**Subclass index****TUNING**

Continuous.....	3/00
Discontinuous.....	5/00
Automatic frequency control.....	7/00
Remote control.....	9/00
AUTOMATIC FREQUENCY SCANNING.....	7/00
DETAILS.....	1/00

**1/00 Details of adjusting, driving, indicating, or mechanical control arrangements for resonant**

**circuits in general** (machine elements in general F16; coupling of knobs to shafts F16D) [3]

- 1/02 • Indicating arrangements

## H03J

- 1/04 • • with optical indicating means
- 1/06 • Driving or adjusting arrangements; combined with other driving or adjusting arrangements, e.g. of gain control

### **Note(s)**

Groups H03J 1/14, H03J 1/16 take precedence over groups H03J 1/08-H03J 1/12.

- 1/08 • • Toothed-gear drive; Worm drive
- 1/10 • • Rope drive; Chain drive
- 1/12 • • Friction drive
- 1/14 • • Special arrangements for fine and coarse tuning
- 1/16 • • Single control means independently performing two or more functions
- 1/18 • Control by auxiliary power
- 1/20 • • the auxiliary power being switched on as long as controlling current is switched on
- 1/22 • • with stepping arrangements actuated by control pulses

**3/00 Continuous tuning** (H03J 7/00, H03J 9/00 take precedence; combination of continuous and discontinuous tuning other than for bandspreading H03J 5/00) [3]

- 3/02 • Details
- 3/04 • • Arrangements for compensating for variations of physical values, e.g. temperature (automatic control of ambient conditions G05D)
- 3/06 • • Arrangements for obtaining constant bandwidth or gain throughout tuning range or ranges (automatic gain control H03G)
- 3/08 • • • by varying a second parameter simultaneously with the tuning, e.g. coupling bandpass filter
- 3/10 • • Circuit arrangements for fine tuning, e.g. bandspreading
- 3/12 • • Electrically-operated arrangements for indicating correct tuning
- 3/14 • • • Visual indication, e.g. magic eye
- 3/16 • • Tuning without displacement of reactive element, e.g. by varying permeability
- 3/18 • • • by discharge tube or semiconductor device simulating variable reactance
- 3/20 • of single resonant circuit by varying inductance only or capacitance only
- 3/22 • of single resonant circuit by varying inductance and capacitance simultaneously
- 3/24 • of more than one resonant circuit simultaneously, the circuits being tuned to substantially the same frequency, e.g. for single-knob tuning
- 3/26 • • the circuits being coupled so as to form a bandpass filter
- 3/28 • of more than one resonant circuit simultaneously, the tuning frequencies of the circuits having a substantially constant difference throughout the tuning range
- 3/30 • • Arrangements for ensuring tracking with variable inductors
- 3/32 • • Arrangements for ensuring tracking with variable capacitors

**5/00 Discontinuous tuning; Selecting predetermined frequencies; Selecting frequency bands with or without continuous tuning in one or more of the bands, e.g. push-button tuning, turret tuner** (H03J 7/00, H03J 9/00 take precedence; for bandspreading H03J 3/10) [3]

- 5/02 • with variable tuning element having a number of predetermined settings and adjustable to a desired one of these settings
- 5/04 • • operated by hand
- 5/06 • • • Settings determined by single indexing means with snap action
- 5/08 • • • Settings determined by a number of separately-actuated positioning means
- 5/10 • • • Settings determined by a number of positioning means mounted on a common support, which is adjustable to desired positions, a different positioning means being in operation in each position
- 5/12 • • • Settings determined by a number of separately-actuated driving means which adjust the tuning element directly to desired settings
- 5/14 • • operated by auxiliary power
- 5/16 • • • Settings determined by a number of separate positioning means actuated by hand
- 5/18 • • • Settings determined by a number of separate positioning means actuated by electromagnets
- 5/20 • • • Settings determined by a number of positioning means actuated by a second means adjustable to different positions by the same or by a second auxiliary power
- 5/22 • • • Settings determined by a number of separately actuated driving means which adjust the tuning element directly to desired settings
- 5/24 • with a number of separate pretuned tuning circuits or separate tuning elements selectively brought into circuit, e.g. for waveband selection, for television channel selection (switches in general H01H)
- 5/26 • • operated by hand
- 5/28 • • • Tuning circuits or elements supported on a revolving member with contacts arranged in a plane perpendicular to the axis
- 5/30 • • • Tuning circuits or elements supported on a revolving member with contacts arranged in lines parallel to the axis
- 5/32 • • • Stationary tuning circuits or elements selected by push-button
- 7/00 Automatic frequency control; Automatic scanning over a band of frequencies** [3]
- 7/02 • Automatic frequency control (H03J 7/18 takes precedence; automatic tuning control for television receivers H04N 5/50) [3]
- 7/04 • • where the frequency control is accomplished by varying the electrical characteristics of a non-mechanically adjustable element or where the nature of the frequency controlling element is not significant [3]
- 7/06 • • • using counters or frequency dividers [3]
- 7/08 • • • using varactors, i.e. voltage variable reactive diodes (H03J 7/06 takes precedence) [3]
- 7/10 • • • • Modification of automatic frequency control sensitivity or linearising automatic frequency control operation [3]
- 7/12 • • • • Combination of automatic frequency control voltage with stabilised varactor supply voltage [3]
- 7/14 • • • Controlling the magnetic state of inductor cores (H03J 7/06 takes precedence) [3]
- 7/16 • • where the frequency control is accomplished by mechanical means, e.g. by a motor [3]
- 7/18 • Automatic scanning over a band of frequencies [3]



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|--|---|
| 7/20   • • where the scanning is accomplished by varying the electrical characteristics of a non-mechanically adjustable element [3]<br>7/22   • • • in which an automatic frequency control circuit is brought into action after the scanning action has been stopped (H03J 7/24 takes precedence) [3]<br>7/24   • • • using varactors, i.e. voltage variable reactive diodes (H03J 7/28 takes precedence) [3]<br>7/26   • • • in which an automatic frequency control circuit is brought into action after the scanning action has been stopped [3]<br>7/28   • • • using counters or frequency dividers [3] | 7/30   • • where the scanning is accomplished by mechanical means, e.g. by a motor [3]<br>7/32   • • with simultaneous display of received frequencies, e.g. panoramic receivers [3]<br><b>9/00   Remote-control of tuned circuits; Combined remote-control of tuning and other functions, e.g. brightness, amplification</b> (mechanical remote-control arrangements H03J 1/00) [3]<br>9/02   • using radio transmission; using near-field transmission [3]<br>9/04   • using ultrasonic, sonic or infrasonic waves [3]<br>9/06   • using electromagnetic waves other than radio waves, e.g. light [3] |
|--|---|

**H03K   PULSE TECHNIQUE** (measuring pulse characteristics G01R; modulating sinusoidal oscillations with pulses H03C; transmission of digital information H04L; discriminator circuits detecting phase difference between two signals by counting or integrating cycles of oscillation H03D 3/04; automatic control, starting, synchronisation or stabilisation of generators of electronic oscillations or pulses where the type of generator is irrelevant or unspecified H03L; coding, decoding or code conversion, in general H03M) [4]

#### Note(s)

1. This subclass covers:
  - methods, circuits, devices, or apparatus using active elements operating in a discontinuous or switching manner for generating, counting, amplifying, shaping, modulating, demodulating, or otherwise manipulating signals;
  - electronic switching not involving contact-making and breaking;
  - logic circuits handling electric pulses.
2. In this subclass, the following expression is used with the meaning indicated:
  - "active element" exercises control over the conversion of input energy into an oscillation or a discontinuous flow of energy.
3. In this subclass, where the claims of a patent document are not limited to a specific circuit element, the document is classified at least according to the elements used in the described embodiment.

#### Subclass index

##### GENERATING PULSES

Circuits; with finite slope or stepped portions.....3/00, 4/00

PRODUCING PULSES FROM SINEWAVES.....12/00

##### MANIPULATING PULSES OTHER THAN WHEN COUNTING

Modulating; demodulating; transfer.....7/00, 9/00, 11/00

Other.....5/00, 6/00

##### PULSE COUNTERS, FREQUENCY DIVIDERS

With counting chains; with integration; with a closed loop; with multistable elements.....23/00, 25/00, 27/00, 29/00

Details.....21/00

##### SPECIAL APPLICATIONS

Electronic switching; logic circuits.....17/00, 19/00

- |   |  |
|---|--|
| <b>3/00   Circuits for generating electric pulses; Monostable, bistable or multistable circuits</b> (H03K 4/00 takes precedence; for digital function generators in computers G06F 1/02) [5]<br>3/01   • Details [3]<br>3/011   • • Modifications of generator to compensate for variations in physical values, e.g. voltage, temperature [6]<br>3/012   • • Modifications of generator to improve response time or to decrease power consumption [6]<br>3/013   • • Modifications of generator to prevent operation by noise or interference [3]<br>3/014   • • Modifications of generator to ensure starting of oscillations [6]<br>3/015   • • Modifications of generator to maintain energy constant [6]<br>3/017   • • Adjustment of width or dutycycle of pulses (pulse width modulation H03K 7/08) [3] | 3/02   • Generators characterised by the type of circuit or by the means used for producing pulses (H03K 3/64-H03K 3/84 take precedence)<br>3/021   • • by the use, as active elements, of more than one type of element or means, e.g. BIMOS, composite devices such as IGBT [6]<br>3/023   • • by the use of differential amplifiers or comparators, with internal or external positive feedback [3]<br>3/0231   • • • Astable circuits [6]<br>3/0232   • • • Monostable circuits [6]<br>3/0233   • • • Bistable circuits [6]<br>3/0234   • • • Multistable circuits [6]<br>3/027   • • by the use of logic circuits, with internal or external positive feedback [3]<br>3/03   • • • Astable circuits [3]<br>3/033   • • • Monostable circuits [3]<br>3/037   • • • Bistable circuits [3]<br>3/038   • • • Multistable circuits [6] |
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- 3/04 • • by the use, as active elements, of vacuum tubes only, with positive feedback (H03K 3/023, H03K 3/027 take precedence) [3]
- 3/05 • • • using means other than a transformer for feedback
- 3/06 • • • • using at least two tubes so coupled that the input of one is derived from the output of another, e.g. multivibrator
- 3/08 • • • • • astable
- 3/09 • • • • • • Stabilisation of output [2]
- 3/10 • • • • • • monostable
- 3/12 • • • • • • bistable
- 3/13 • • • • • • Bistables with hysteresis, e.g. Schmitt trigger [6]
- 3/14 • • • • • • multistable
- 3/16 • • • using a transformer for feedback, e.g. blocking oscillator with saturable core
- 3/22 • • • • specially adapted for amplitude comparison, i.e. Multiar
- 3/26 • • by the use, as active elements, of bipolar transistors with internal or external positive feedback (H03K 3/023, H03K 3/027 take precedence) [2]
- 3/28 • • • using means other than a transformer for feedback
- 3/281 • • • • using at least two transistors so coupled that the input of one is derived from the output of another, e.g. multivibrator
- 3/282 • • • • • astable
- 3/283 • • • • • • Stabilisation of output [2]
- 3/284 • • • • • • monostable
- 3/286 • • • • • • bistable [3]
- 3/287 • • • • • • using additional transistors in the feedback circuit (H03K 3/289 takes precedence) [3]
- 3/288 • • • • • • using additional transistors in the input circuit (H03K 3/289 takes precedence) [3]
- 3/2885 • • • • • • • the input circuit having a differential configuration [5]
- 3/289 • • • • • • • of the master-slave type [3]
- 3/2893 • • • • • • • Bistables with hysteresis, e.g. Schmitt trigger [6]
- 3/2897 • • • • • • • with an input circuit of differential configuration [6]
- 3/29 • • • • • multistable
- 3/30 • • • using a transformer for feedback, e.g. blocking oscillator
- 3/313 • • by the use, as active elements, of semiconductor devices with two electrodes, one or two potential-jump barriers, and exhibiting a negative resistance characteristic [3]
- 3/315 • • • the devices being tunnel diodes
- 3/33 • • by the use, as active elements, of semiconductor devices exhibiting hole storage or enhancement effect
- 3/335 • • by the use, as active elements, of semiconductor devices with more than two electrodes and exhibiting avalanche effect
- 3/35 • • by the use, as active elements, of bipolar semiconductor devices with more than two PN junctions, or more than three electrodes, or more than one electrode connected to the same conductivity region (H03K 3/023, H03K 3/027 take precedence) [3]
- 3/351 • • • the devices being unijunction transistors (H03K 3/352 takes precedence) [3]
- 3/352 • • • the devices being thyristors [3]
- 3/3525 • • • • Anode gate thyristors or programmable unijunction transistors [6]
- 3/353 • • by the use, as active elements, of field-effect transistors with internal or external positive feedback (H03K 3/023, H03K 3/027 take precedence) [2, 3]
- 3/354 • • • Astable circuits [3]
- 3/355 • • • Monostable circuits [3]
- 3/356 • • • Bistable circuits [3]
- 3/3562 • • • • of the master-slave type [6]
- 3/3565 • • • • Bistables with hysteresis, e.g. Schmitt trigger [6]
- 3/3568 • • • Multistable circuits [6]
- 3/357 • • by the use, as active elements, of bulk negative resistance devices, e.g. Gunn-effect devices [2]
- 3/36 • • by the use, as active elements, of semiconductors, not otherwise provided for [2]
- 3/37 • • by the use, as active elements, of gas-filled tubes, e.g. astable trigger circuits (H03K 3/55 takes precedence)
- 3/38 • • by the use, as active elements, of superconductive devices [3]
- 3/40 • • by the use, as active elements, of electrochemical cells
- 3/42 • • by the use, as active elements, of opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled
- 3/43 • • by the use, as active elements, of beam deflection tubes
- 3/45 • • by the use, as active elements, of non-linear magnetic or dielectric devices
- 3/47 • • • the devices being parametrons
- 3/49 • • • the devices being ferro-resonant
- 3/51 • • • the devices being multi-aperture magnetic cores, e.g. transfluxors
- 3/53 • • by the use of an energy-accumulating element discharged through the load by a switching device controlled by an external signal and not incorporating positive feedback (H03K 3/335 takes precedence)
- 3/537 • • • the switching device being a spark gap [3]
- 3/543 • • • the switching device being a vacuum tube [3]
- 3/55 • • • the switching device being a gas-filled tube having a control electrode
- 3/57 • • • the switching device being a semiconductor device
- 3/59 • • by the use of galvano-magnetic devices, e.g. Hall-effect devices [2]
- 3/64 • Generators producing trains of pulses, i.e. finite sequences of pulses
- 3/66 • • by interrupting the output of a generator
- 3/70 • • • time intervals between all adjacent pulses of one train being equal
- 3/72 • • with means for varying repetition rate of trains
- 3/78 • Generating a single train of pulses having a predetermined pattern, e.g. a predetermined number
- 3/80 • Generating trains of sinusoidal oscillations (by keying or interruption of sinusoidal oscillations H03C; for transmission of digital information H04L)
- 3/84 • Generating pulses having a predetermined statistical distribution of a parameter, e.g. random pulse generators [2]
- 3/86 • Generating pulses by means of delay lines and not covered by the preceding subgroups [2]

**4/00 Generating pulses having essentially a finite slope or stepped portions**

- 4/02 • having stepped portions, e.g. staircase waveform
- 4/04 • having parabolic shape
- 4/06 • having triangular shape
- 4/08 • • having sawtooth shape
- 4/10 • • • using as active elements vacuum tubes only
- 4/12 • • • • in which a sawtooth voltage is produced across a capacitor
- 4/14 • • • • • using two tubes so coupled that the input of each one is derived from the output of the other, e.g. multivibrator
- 4/16 • • • • • using a single tube with positive feedback through transformer, e.g. blocking oscillator
- 4/18 • • • • • using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron
- 4/20 • • • • • using a tube with negative feedback by capacitor, e.g. Miller integrator
- 4/22 • • • • • • combined with transitron, e.g. phantastron, sanatron
- 4/24 • • • • • Boot-strap generators
- 4/26 • • • • • in which a sawtooth current is produced through an inductor
- 4/28 • • • • • using a tube operating as a switching device [3]
- 4/32 • • • • • • combined with means for generating the driving pulses
- 4/34 • • • • • • • using a single tube with positive feedback through a transformer
- 4/36 • • • • • • • using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron
- 4/38 • • • • • • • • combined with Miller integrator
- 4/39 • • • • • using a tube operating as an amplifier [3]
- 4/41 • • • • • • with negative feedback through a capacitor, e.g. Miller integrator [3]
- 4/43 • • • • • • • combined with means for generating the driving pulses [3]
- 4/48 • • • using as active elements semiconductor devices (H03K 4/787-H03K 4/84 take precedence)
- 4/50 • • • • in which a sawtooth voltage is produced across a capacitor
- 4/501 • • • • • the starting point of the flyback period being determined by the amplitude of the voltage across the capacitor, e.g. by a comparator [6]
- 4/502 • • • • • • the capacitor being charged from a constant-current source [6]
- 4/52 • • • • • using two semiconductor devices so coupled that the input of each one is derived from the output of the other, e.g. multivibrator
- 4/54 • • • • • using a single semiconductor device with positive feedback through a transformer, e.g. blocking oscillator
- 4/56 • • • • • using a semiconductor device with negative feedback through a capacitor, e.g. Miller integrator
- 4/58 • • • • • Boot-strap generators
- 4/60 • • • • • in which a sawtooth current is produced through an inductor
- 4/62 • • • • • using a semiconductor device operating as a switching device [3]

- 4/64 • • • • • • combined with means for generating the driving pulses
- 4/66 • • • • • • • using a single device with positive feedback, e.g. blocking oscillator
- 4/68 • • • • • • Generators in which the switching device is conducting during the fly-back part of the cycle
- 4/69 • • • • • using a semiconductor device operating as an amplifier [3]
- 4/71 • • • • • • with negative feedback through a capacitor, e.g. Miller integrator [3]
- 4/72 • • • • • • combined with means for generating the driving pulses
- 4/787 • • • using as active elements semiconductor devices with two electrodes and exhibiting a negative resistance characteristic [2]
- 4/793 • • • • using tunnel diodes [2]
- 4/80 • • • using as active elements multi-layer diodes
- 4/83 • • • using as active elements semiconductor devices with more than two PN junctions or with more than three electrodes or more than one electrode connected to the same conductivity region [2]
- 4/84 • • • • Generators in which the semiconductor device is conducting during the fly-back part of the cycle
- 4/86 • • • using as active elements gas-filled tubes
- 4/88 • • • using as active elements electrochemical cells
- 4/90 • • • Linearisation of ramp (modifying slopes of pulses H03K 6/04; scanning distortion correction for television receivers H04N 3/23); Synchronisation of pulses [2]
- 4/92 • having a waveform comprising a portion of a sinusoid (generating sinusoidal oscillations H03B) [2]
- 4/94 • having trapezoidal shape [2]

**5/00 Manipulation of pulses not covered by one of the other main groups of this subclass** (circuits with regenerative action H03K 3/00, H03K 4/00; by the use of non-linear magnetic or dielectric devices H03K 3/45)

**Note(s)**

In this group, the input signals are of the pulse type.

- 5/003 • Changing the DC level (reinsertion of dc component of a television signal H04N 5/16) [6]
- 5/007 • • Base line stabilisation (thresholding H03K 5/08) [6]
- 5/01 • Shaping pulses (discrimination against noise or interference H03K 5/125)
- 5/02 • • by amplifying (H03K 5/04 takes precedence)
- 5/04 • • by increasing duration; by decreasing duration
- 5/05 • • • by the use of clock signals or other time reference signals [3]
- 5/06 • • • by the use of delay lines or other analogue delay elements [3]
- 5/07 • • • by the use of resonant circuits [3]
- 5/08 • • by limiting, by thresholding, by slicing, i.e. combined limiting and thresholding (H03K 5/07 takes precedence; comparing one pulse with another H03K 5/22; providing a determined threshold for switching H03K 17/30) [3]
- 5/12 • • by steepening leading or trailing edges
- 5/125 • Discriminating pulses (measuring characteristics of individual pulses G01R 29/02; separation of synchronising signals in television systems H04N 5/08) [6]

- 5/1252 • • Suppression or limitation of noise or interference (specially adapted for transmission systems H04B 15/00, H04L 25/08) [6]
- 5/1254 • • • specially adapted for pulses generated by closure of switches, i.e. anti-bouncing devices (debouncing circuits for electronic time-pieces G04G 5/00) [6]
- 5/13 • *Arrangements having a single output and transforming input signals into pulses delivered at desired time intervals [1, 2014.01]*
- 5/131 • • Digitally controlled [2014.01]
- 5/133 • • using a chain of active-delay devices [2014.01]
- 5/134 • • • with field-effect transistors [2014.01]
- 5/135 • • by the use of time reference signals, e.g. clock signals [3]
- 5/14 • • by the use of delay lines (H03K 5/133 takes precedence) [3, 2014.01]
- 5/145 • • by the use of resonant circuits [3]
- 5/15 • Arrangements in which pulses are delivered at different times at several outputs, i.e. pulse distributors (distributing, switching, or gating arrangements H03K 17/00) [2]
- 5/151 • • with two complementary outputs [6]
- 5/153 • Arrangements in which a pulse is delivered at the instant when a predetermined characteristic of an input signal is present or at a fixed time interval after this instant (switching at zero crossing H03K 17/13)
- 5/1532 • • Peak detectors (measuring characteristics of individual pulses G01R 29/02) [6]
- 5/1534 • • Transition or edge detectors [6]
- 5/1536 • • Zero-crossing detectors (in measuring circuits G01R 19/175) [6]
- 5/156 • Arrangements in which a continuous pulse train is transformed into a train having a desired pattern
- 5/159 • Applications of delay lines not covered by the preceding subgroups
- 5/19 • Monitoring patterns of pulse trains (indicating amplitude G01R 19/00; indicating frequency G01R 23/00; measuring characteristics of individual pulses G01R 29/02) [3]
- 5/22 • Circuits having more than one input and one output for comparing pulses or pulse trains with each other according to input signal characteristics, e.g. slope, integral (indicating phase difference of two cyclic pulse trains G01R 25/00) [3]
- 5/24 • • the characteristic being amplitude [3]
- 5/26 • • the characteristic being duration, interval, position, frequency, or sequence [3]

**6/00 Manipulating pulses having a finite slope and not covered by one of the other main groups of this subclass** (circuits with regenerative action H03K 4/00)

**Note(s)**

In this group, the input signals are of the pulse type.

- 6/02 • Amplifying pulses
- 6/04 • Modifying slopes of pulses, e.g. S-correction (S-correction in television H04N 3/23)

**7/00 Modulating pulses with a continuously-variable modulating signal**

- 7/02 • Amplitude modulation, i.e. PAM
- 7/04 • Position modulation, i.e. PPM
- 7/06 • Frequency or rate modulation, i.e. PFM or PRM
- 7/08 • Duration or width modulation
- 7/10 • Combined modulation, e.g. rate modulation and amplitude modulation

**9/00 Demodulating pulses which have been modulated with a continuously-variable signal**

- 9/02 • of amplitude-modulated pulses
- 9/04 • of position-modulated pulses
- 9/06 • of frequency- or rate-modulated pulses
- 9/08 • of duration- or width-modulated pulses
- 9/10 • of pulses having combined modulation

**11/00 Transforming types of modulation, e.g. position-modulated pulses into duration-modulated pulses**

**12/00 Producing pulses by distorting or combining sinusoidal waveforms** (shaping pulses H03K 5/01; combining sinewaves using elements operating in a non-switching manner H03B 21/00) [3]

**17/00 Electronic switching or gating, i.e. not by contact-making and -breaking** (gated amplifiers H03F 3/72; switching arrangements for exchange systems using static devices H04Q 3/52)

- 17/04 • Modifications for accelerating switching [3]
- 17/041 • • without feedback from the output circuit to the control circuit [6]
- 17/0412 • • • by measures taken in the control circuit [6]
- 17/0414 • • • • Anti-saturation measures [6]
- 17/0416 • • • by measures taken in the output circuit [6]
- 17/042 • • by feedback from the output circuit to the control circuit [6]
- 17/0422 • • • Anti-saturation measures [6]
- 17/0424 • • • by the use of a transformer [6]
- 17/06 • Modifications for ensuring a fully conducting state [3]
- 17/08 • Modifications for protecting switching circuit against overcurrent or overvoltage [3]
- 17/081 • • without feedback from the output circuit to the control circuit [6]
- 17/0812 • • • by measures taken in the control circuit [6]
- 17/0814 • • • by measures taken in the output circuit [6]
- 17/082 • • by feedback from the output to the control circuit [6]
- 17/10 • Modifications for increasing the maximum permissible switched voltage [3]
- 17/12 • Modifications for increasing the maximum permissible switched current [3]
- 17/13 • Modifications for switching at zero crossing (generating an impulse at zero crossing H03K 5/1536) [3]
- 17/14 • Modifications for compensating variations of physical values, e.g. of temperature [3]
- 17/16 • Modifications for eliminating interference voltages or currents [3]
- 17/18 • Modifications for indicating state of switch [3]
- 17/20 • Modifications for resetting core switching units to a predetermined state [3]
- 17/22 • Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bi-stable generators H03K 3/12) [3]
- 17/24 • • Storing the actual state when the supply voltage fails [3]
- 17/26 • Modifications for temporary blocking after receipt of control pulses [3]
- 17/28 • Modifications for introducing a time delay before switching (modifications to provide a choice of time-intervals for executing more than one switching action H03K 17/296) [3]
- 17/284 • • in field-effect transistor switches [3]
- 17/288 • • in tube switches [3]

- 17/292 • • in thyristor, unijunction transistor or programmable unijunction transistor switches [3]
- 17/296 • Modifications to provide a choice of time-intervals for executing more than one switching action and automatically terminating their operation after the programme is completed (electronic clocks comprising means to be operated at preselected times or after preselected time-intervals G04G 15/00) [3]
- 17/30 • Modifications for providing a predetermined threshold before switching (shaping pulses by thresholding H03K 5/08) [3]
- 17/51 • characterised by the use of specified components (H03K 17/04-H03K 17/30, H03K 17/94 take precedence) [3]
- 17/52 • • by the use, as active elements, of gas-filled tubes [3]
- 17/54 • • by the use, as active elements, of vacuum tubes (using diodes H03K 17/74) [3]
- 17/56 • • by the use, as active elements, of semiconductor devices (using diodes H03K 17/74) [3]
- 17/567 • • • Circuits characterised by the use of more than one type of semiconductor device, e.g. BIMOS, composite devices such as IGBT [6]
- 17/58 • • • the devices being tunnel diodes [3]
- 17/60 • • • the devices being bipolar transistors (bipolar transistors having four or more electrodes H03K 17/72) [3]
- 17/605 • • • • with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) [5]
- 17/61 • • • • • using transformer coupling [5]
- 17/615 • • • • • in a Darlington configuration [5]
- 17/62 • • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) [3]
- 17/64 • • • • having inductive loads [3]
- 17/66 • • • • Switching arrangements for passing the current in either direction at will; Switching arrangements for reversing the current at will [3]
- 17/68 • • • • specially adapted for switching ac currents or voltages [3]
- 17/687 • • • the devices being field-effect transistors [3]
- 17/689 • • • • with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) [5]
- 17/691 • • • • • using transformer coupling [5]
- 17/693 • • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) [3]
- 17/695 • • • • having inductive loads (protecting switching circuit against inductive flyback voltage H03K 17/08) [6]
- 17/70 • • • the devices having only two electrodes and exhibiting negative resistance (the devices being tunnel diodes H03K 17/58) [3]
- 17/72 • • • Bipolar semiconductor devices with more than two PN junctions, e.g. thyristors, programmable unijunction transistors, or with more than three electrodes, e.g. silicon controlled switches, or with more than one electrode connected to the same conductivity region, e.g. unijunction transistors [3]
- 17/722 • • • • with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) [5]
- 17/723 • • • • • using transformer coupling [5]
- 17/725 • • • • for ac voltages or currents (H03K 17/722, H03K 17/735 take precedence) [3, 5]
- 17/73 • • • • for dc voltages or currents (H03K 17/722, H03K 17/735 take precedence) [3, 5]
- 17/732 • • • • • Measures for enabling turn-off [5]
- 17/735 • • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (H03K 17/722 takes precedence; logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) [3, 5]
- 17/74 • • by the use, as active elements, of diodes (by the use of more than one type of semiconductor device H03K 17/567; by the use of tunnel diodes H03K 17/58; by the use of negative resistance diodes H03K 17/70) [3]
- 17/76 • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) [3]
- 17/78 • • by the use, as active elements, of opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled [3]
- 17/785 • • • controlling field-effect transistor switches [5]
- 17/79 • • • controlling semiconductor switches with more than two PN-junctions, or more than three electrodes, or more than one electrode connected to the same conductivity region [5]
- 17/795 • • • controlling bipolar transistors [5]
- 17/80 • • by the use, as active elements, of non-linear magnetic or dielectric devices [3]
- 17/81 • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) [3]
- 17/82 • • • the devices being transfluxors [3]
- 17/84 • • • the devices being thin-film devices [3]
- 17/86 • • • the devices being twistors [3]
- 17/88 • • by the use, as active elements, of beam-deflection tubes [3]
- 17/90 • • by the use, as active elements, of galvanomagnetic devices, e.g. Hall-effect devices (H03K 17/95, H03K 17/97 take precedence) [2, 3]
- 17/92 • • by the use, as active elements, of superconductive devices [2, 3]
- 17/94 • characterised by the way in which the control signals are generated [3, 4]
- 17/945 • • Proximity switches (H03K 17/96 takes precedence) [3]
- 17/95 • • • using a magnetic detector [3]
- 17/955 • • • using a capacitive detector [3]
- 17/96 • • Touch switches (specially adapted for electronic time-pieces with no moving parts G04G 21/08) [3]
- 17/965 • • Switches controlled by moving an element forming part of the switch [3]
- 17/967 • • • having a plurality of control members, e.g. keyboard (H03K 17/969, H03K 17/972, H03K 17/98 take precedence) [4]
- 17/968 • • • using opto-electronic devices [4]
- 17/969 • • • • having a plurality of control members, e.g. keyboard [4]
- 17/97 • • • using a magnetic movable element [3]
- 17/972 • • • • having a plurality of control members, e.g. keyboard [4]
- 17/975 • • • using a capacitive movable element [3]
- 17/98 • • • • having a plurality of control members, e.g. keyboard [4]

- 19/00 Logic circuits, i.e. having at least two inputs acting on one output** (circuits for computer systems using fuzzy logic G06N 7/02); **Inverting circuits**
- 19/003 • Modifications for increasing the reliability [3]
  - 19/007 • Fail-safe circuits [3]
  - 19/01 • Modifications for accelerating switching [3]
  - 19/013 • • in bipolar transistor circuits [3]
  - 19/017 • • in field-effect transistor circuits [3]
  - 19/0175 • Coupling arrangements; Interface arrangements (interface arrangements for digital computers G06F 3/00, G06F 13/00) [5]
  - 19/018 • • using bipolar transistors only [5]
  - 19/0185 • • using field-effect transistors only [5]
  - 19/02 • using specified components (H03K 19/003-H03K 19/0175 take precedence) [3, 5]
  - 19/04 • • using gas-filled tubes
  - 19/06 • • using vacuum tubes (using diode rectifiers H03K 19/12)
  - 19/08 • • using semiconductor devices (H03K 19/173 takes precedence; wherein the semiconductor devices are only diode rectifiers H03K 19/12) [3]
  - 19/082 • • • using bipolar transistors [3]
  - 19/084 • • • • Diode-transistor logic [3]
  - 19/086 • • • • Emitter coupled logic [3]
  - 19/088 • • • • Transistor-transistor logic [3]
  - 19/09 • • • • Resistor-transistor logic [3]
  - 19/091 • • • • Integrated injection logic or merged transistor logic [3]
  - 19/094 • • • using field-effect transistors [3]
  - 19/0944 • • • • using MOSFET (H03K 19/096 takes precedence) [5]
  - 19/0948 • • • • • using CMOS [5]
  - 19/0952 • • • • using Schottky type FET (H03K 19/096 takes precedence) [5]
  - 19/0956 • • • • Schottky diode FET logic (H03K 19/096 takes precedence) [5]
  - 19/096 • • • • Synchronous circuits, i.e. using clock signals [3]
  - 19/098 • • • using thyristors [3]
  - 19/10 • • • using tunnel diodes [3]
  - 19/12 • • using diode rectifiers
  - 19/14 • • using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled (optical logic elements G02F 3/00)
  - 19/16 • • using saturable magnetic devices
  - 19/162 • • • using parametrons
  - 19/164 • • • using ferro-resonant devices
  - 19/166 • • • using transfluxors
  - 19/168 • • • using thin-film devices
  - 19/17 • • using twistors
  - 19/173 • • using elementary logic circuits as components [3]
  - 19/177 • • • arranged in matrix form [3]
  - 19/18 • • using galvano-magnetic devices, e.g. Hall-effect devices [2]
  - 19/185 • • using dielectric elements with variable dielectric constant, e.g. ferro-electric capacitors [2]
  - 19/19 • • • using ferro-resonant devices [2]
  - 19/195 • • using superconductive devices [2, 3]
  - 19/20 • characterised by logic function, e.g. AND, OR, NOR, NOT circuits (H03K 19/003-H03K 19/01 take precedence)
  - 19/21 • • EXCLUSIVE-OR circuits, i.e. giving output if input signal exists at only one input; COINCIDENCE circuits, i.e. giving output only if all input signals are identical [3]

- 19/23 • • Majority or minority circuits, i.e. giving output having the state of the majority or the minority of the inputs [3]
- 21/00 Details of pulse counters or frequency dividers**
- 21/02 • Input circuits [4]
  - 21/08 • Output circuits [4]
  - 21/10 • • comprising logic circuits
  - 21/12 • • with parallel read-out [4]
  - 21/14 • • with series read-out of number stored [4]
  - 21/16 • Circuits for carrying-over pulses between successive decades
  - 21/17 • • with field-effect transistors [4]
  - 21/18 • Circuits for visual indication of the result [4]
  - 21/20 • • using glow-discharge lamps
  - 21/38 • Starting, stopping, or resetting the counter (counters with a base other than a power of two H03K 23/48, H03K 23/66) [4]
  - 21/40 • Monitoring; Error detection; Preventing or correcting improper counter operation [4]
- 23/00 Pulse counters comprising counting chains; Frequency dividers comprising counting chains** (H03K 29/00 takes precedence)
- 23/40 • Gating or clocking signals applied to all stages, i.e. synchronous counters [4]
  - 23/42 • • Out-of-phase gating or clocking signals applied to counter stages [4]
  - 23/44 • • • using field-effect transistors [4]
  - 23/46 • • • using charge transfer devices, i.e. bucket brigade or charge coupled devices [4]
  - 23/48 • • with a base or radix other than a power of two (H03K 23/42 takes precedence) [4]
  - 23/50 • • using bi-stable regenerative trigger circuits (H03K 23/42-H03K 23/48 take precedence) [4]
  - 23/52 • • • using field-effect transistors [4]
  - 23/54 • • • Ring counters, i.e. feedback shift register counters (H03K 23/52 takes precedence) [4]
  - 23/56 • • • Reversible counters (H03K 23/52 takes precedence) [4]
  - 23/58 • Gating or clocking signals not applied to all stages, i.e. asynchronous counters (H03K 23/74-H03K 23/84 take precedence) [4]
  - 23/60 • • with field-effect transistors [4]
  - 23/62 • • reversible [4]
  - 23/64 • with a base or radix other than a power of two (H03K 23/40-H03K 23/62 take precedence) [4]
  - 23/66 • • with a variable counting base, e.g. by presetting or by adding or suppressing pulses [4]
  - 23/68 • • with a base which is a non-integer [4]
  - 23/70 • • with a base which is an odd number (H03K 23/66 takes precedence) [4]
  - 23/72 • • Decade counters (H03K 23/66 takes precedence) [4]
  - 23/74 • using relays [4]
  - 23/76 • using magnetic cores or ferro-electric capacitors [4]
  - 23/78 • using opto-electronic devices [4]
  - 23/80 • using semiconductor devices having only two electrodes, e.g. tunnel diode, multi-layer diode [4]
  - 23/82 • using gas-filled tubes [4]
  - 23/84 • using thyristors or unijunction transistors [4]
  - 23/86 • reversible (H03K 23/40-H03K 23/84 take precedence) [4]
- 25/00 Pulse counters with step-by-step integration and static storage; Analogous frequency dividers**

- 25/02 • comprising charge storage, e.g. capacitor without polarisation hysteresis
- 25/04 • • using auxiliary pulse generator triggered by the incoming pulses [4]
- 25/12 • comprising hysteresis storage
- 27/00 Pulse counters in which pulses are continuously circulated in a closed loop; Analogous frequency dividers** (feedback shift register counters H03K 23/54) [4]

- 29/00 Pulse counters comprising multi-stable elements, e.g. for ternary scale, for decimal scale; Analogous frequency dividers**
- 29/04 • using multi-cathode gas discharge tubes [4]
- 29/06 • using beam-type tubes, e.g. magnetrons, cathode-ray tubes [4]
- 99/00 Subject matter not provided for in other groups of this subclass [2013.01]**

### H03L AUTOMATIC CONTROL, STARTING, SYNCHRONISATION, OR STABILISATION OF GENERATORS OF ELECTRONIC OSCILLATIONS OR PULSES (of dynamo-electric generators H02P) [3]

#### Note(s)

- This subclass covers:
  - automatic control circuits for generators of electronic oscillations or pulses;
  - starting, synchronisation, or stabilisation circuits for generators where the type of generator is irrelevant or unspecified.
- This subclass does not cover stabilisation or starting circuits specially adapted to only one specific type of generator, which are covered by subclasses H03B, H03K.
- In this subclass, the following expression is used with the meaning indicated:
  - "automatic control" covers only closed loop systems.

**1/00 Stabilisation of generator output against variations of physical values, e.g. power supply** (automatic control H03L 5/00, H03L 7/00) [3]

- 1/02 • against variations of temperature only [3]
- 1/04 • • Constructional details for maintaining temperature constant [3]

**3/00 Starting of generators [3]**

**5/00 Automatic control of voltage, current, or power [3]**

- 5/02 • of power [3]

**7/00 Automatic control of frequency or phase; Synchronisation** (tuning of resonant circuits in general H03J; synchronising in digital communication systems, see the relevant groups in class H04) [3]

- 7/02 • using a frequency discriminator comprising a passive frequency-determining element [3]
- 7/04 • • wherein the frequency-determining element comprises distributed inductance and capacitance [3]
- 7/06 • using a reference signal applied to a frequency- or phase-locked loop [3]
- 7/07 • • using several loops, e.g. for redundant clock signal generation (for indirect frequency synthesis H03L 7/22) [5]
- 7/08 • • Details of the phase-locked loop [3]
- 7/081 • • • provided with an additional controlled phase shifter [5]
- 7/083 • • • the reference signal being additionally directly applied to the generator (direct frequency synchronisation without loop H03L 7/24) [5]
- 7/085 • • • concerning mainly the frequency- or phase-detection arrangement including the filtering or amplification of its output signal (H03L 7/10 takes precedence; frequency or phase detection comparison in general H03D 3/00, H03D 13/00) [5]
- 7/087 • • • • using at least two phase detectors or a frequency and phase detector in the loop [5]
- 7/089 • • • • the phase or frequency detector generating up-down pulses (H03L 7/087 takes precedence) [5]

- 7/091 • • • • the phase or frequency detector using a sampling device (H03L 7/087 takes precedence) [5]
- 7/093 • • • • using special filtering or amplification characteristics in the loop (H03L 7/087-H03L 7/091 take precedence) [5]
- 7/095 • • • • using a lock detector (H03L 7/087 takes precedence) [5]
- 7/097 • • • • using a comparator for comparing the voltages obtained from two frequency to voltage converters [5]
- 7/099 • • • • concerning mainly the controlled oscillator of the loop [5]
- 7/10 • • • • for assuring initial synchronisation or for broadening the capture range [3]
- 7/107 • • • • using a variable transfer function for the loop, e.g. low pass filter having a variable bandwidth [5]
- 7/113 • • • • using frequency discriminator [5]
- 7/12 • • • • using a scanning signal (tuning circuits with automatic scanning over a band of frequencies H03J 7/18) [3]
- 7/14 • • • • for assuring constant frequency when supply or correction voltages fail [3]
- 7/16 • • Indirect frequency synthesis, i.e. generating a desired one of a number of predetermined frequencies using a frequency- or phase-locked loop [3]
- 7/18 • • • • using a frequency divider or counter in the loop (H03L 7/20, H03L 7/22 take precedence) [3]
- 7/181 • • • • a numerical count result being used for locking the loop, the counter counting during fixed time intervals [5]
- 7/183 • • • • a time difference being used for locking the loop, the counter counting between fixed numbers or the frequency divider dividing by a fixed number [5]
- 7/185 • • • • • using a mixer in the loop (H03L 7/187-H03L 7/195 take precedence) [5]

## H03L

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| <p>7/187 • • • • • using means for coarse tuning the voltage controlled oscillator of the loop (H03L 7/191-H03L 7/195 take precedence) [5]</p> <p>7/189 • • • • • comprising a D/A converter for generating a coarse tuning voltage [5]</p> <p>7/191 • • • • • using at least two different signals from the frequency divider or the counter for determining the time difference (H03L 7/193, H03L 7/195 take precedence) [5]</p> <p>7/193 • • • • • the frequency divider/counter comprising a commutable pre-divider, e.g. a two modulus divider (pulse counters/frequency dividers H03K 21/00-H03K 29/00) [5]</p> <p>7/195 • • • • • in which the counter of the loop counts between two different non zero numbers, e.g. for generating an offset frequency (H03L 7/193 takes precedence; pulse counters for predetermined counting H03K 21/00-H03K 29/00) [5]</p> | <p>7/197 • • • • • a time difference being used for locking the loop, the counter counting between numbers which are variable in time or the frequency divider dividing by a factor variable in time, e.g. for obtaining fractional frequency division [5]</p> <p>7/199 • • • • • with reset of the frequency divider or the counter, e.g. for assuring initial synchronisation [5]</p> <p>7/20 • • • using a harmonic phase-locked loop, i.e. a loop which can be locked to one of a number of harmonically related frequencies applied to it (H03L 7/22 takes precedence) [3]</p> <p>7/22 • • • using more than one loop [3]</p> <p>7/23 • • • • with pulse counters or frequency dividers [5]</p> <p>7/24 • using a reference signal directly applied to the generator [3]</p> <p>7/26 • using energy levels of molecules, atoms, or subatomic particles as a frequency reference [3]</p> <p><b>9/00 Automatic control not provided for in other groups of this subclass [2006.01]</b></p> |
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**H03M CODING, DECODING OR CODE CONVERSION, IN GENERAL** (using fluidic means F15C 4/00; optical analogue/digital converters G02F 7/00; coding, decoding or code conversion, specially adapted for particular applications, see the relevant subclasses, e.g. G01D, G01R, G06F, G06T, G09G, G10L, G11B, G11C, H04B, H04L, H04M, H04N; ciphering or deciphering for cryptography or other purposes involving the need for secrecy G09C) [4]

### Subclass index

#### CODING AND DECODING

in general.....	1/00
to or from differential modulation.....	3/00
in connection with keyboards.....	11/00

#### CONVERSION

of the form of individual digits.....	5/00
of the sequence of digits.....	7/00
parallel/series or vice versa.....	9/00

ERROR DETECTION OR ERROR CORRECTION.....13/00

SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....99/00

- |   |  |
|---|--|
| <p><b>1/00 Analogue/digital conversion; Digital/analogue conversion</b> (conversion of analogue values to or from differential modulation H03M 3/00) [4]</p> <p>1/02 • Reversible analogue/digital converters [4]</p> <p>1/04 • using stochastic techniques [4]</p> <p>1/06 • Continuously compensating for, or preventing, undesired influence of physical parameters (periodically H03M 1/10) [4]</p> <p>1/08 • • of noise [4]</p> <p>1/10 • Calibration or testing [4]</p> <p>1/12 • Analogue/digital converters (H03M 1/02-H03M 1/10 take precedence) [4]</p> <p>1/14 • • Conversion in steps with each step involving the same or a different conversion means and delivering more than one bit [4]</p> <p>1/16 • • • with scale factor modification, i.e. by changing the amplification between the steps [4]</p> <p>1/18 • • Automatic control for modifying the range of signals the converter can handle, e.g. gain ranging [4]</p> <p>1/20 • • Increasing resolution using an n bit system to obtain n + m bits, e.g. by dithering [4]</p> <p>1/22 • • pattern-reading type [4]</p> | <p>1/24 • • • using relatively movable reader and disc or strip [4, 6]</p> <p>1/26 • • • • with weighted coding, i.e. the weight given to a digit depends on the position of the digit within the block or code word, e.g. there is a given radix and the weights are powers of this radix [4]</p> <p>1/28 • • • • with non-weighted coding [4]</p> <p>1/30 • • • • incremental [4]</p> <p>1/32 • • • using cathode-ray tubes [4]</p> <p>1/34 • • Analogue value compared with reference values (H03M 1/48 takes precedence) [4]</p> <p>1/36 • • • simultaneously only, i.e. parallel type [4]</p> <p>1/38 • • • sequentially only, e.g. successive approximation type (converting more than one bit per step H03M 1/14) [4]</p> <p>1/40 • • • • recirculation type [4]</p> <p>1/42 • • • • Sequential comparisons in series-connected stages with no change in value of analogue signal [4]</p> <p>1/44 • • • • Sequential comparisons in series-connected stages with change in value of analogue signal [4]</p> |
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- 1/46 • • • with digital/analogue converter for supplying reference values to converter [4]
- 1/48 • • Servo-type converters [4]
- 1/50 • • with intermediate conversion to time interval (H03M 1/64 takes precedence) [4]
- 1/52 • • • Input signal integrated with linear return to datum [4]
- 1/54 • • • Input signal sampled and held with linear return to datum [4]
- 1/56 • • • Input signal compared with linear ramp [4]
- 1/58 • • • Non-linear conversion [4]
- 1/60 • • with intermediate conversion to frequency of pulses [4]
- 1/62 • • • Non-linear conversion [4]
- 1/64 • • with intermediate conversion to phase of sinusoidal signals [4]
- 1/66 • Digital/analogue converters (H03M 1/02-H03M 1/10 take precedence) [4]
- 1/68 • • with conversions of different sensitivity, i.e. one conversion relating to the more significant digital bits and another conversion to the less significant bits [4]
- 1/70 • • Automatic control for modifying converter range [4]
- 1/72 • • Sequential conversion in series-connected stages (H03M 1/68 takes precedence) [4]
- 1/74 • • Simultaneous conversion [4]
- 1/76 • • • using switching tree [4]
- 1/78 • • • using ladder network [4]
- 1/80 • • • using weighted impedances (H03M 1/76 takes precedence) [4]
- 1/82 • • with intermediate conversion to time interval [4]
- 1/84 • • • Non-linear conversion [4]
- 1/86 • • with intermediate conversion to frequency of pulses [4]
- 1/88 • • • Non-linear conversion [4]
- 3/00 Conversion of analogue values to or from differential modulation [4]**
- 3/02 • Delta modulation, i.e. one-bit differential modulation [4]
- 3/04 • Differential modulation with several bits [4]
- 5/00 Conversion of the form of the representation of individual digits [4]**
- Note(s)**  
In groups H03M 5/02-H03M 5/22, in the absence of an indication to the contrary, classification is made in the last appropriate place.
- 5/02 • Conversion to or from representation by pulses [4]
- 5/04 • • the pulses having two levels [4]
- 5/06 • • • Code representation, e.g. transition, for a given bit cell depending only on the information in that bit cell [4]
- 5/08 • • • • Code representation by pulse width [4]
- 5/10 • • • • Code representation by pulse frequency [4]
- 5/12 • • • • Biphase level code, e.g. split phase code, Manchester code; Biphase space or mark code, e.g. double frequency code [4]
- 5/14 • • • Code representation, e.g. transition, for a given bit cell depending on the information in one or more adjacent bit cells, e.g. delay modulation code, double density code [4]
- 5/16 • • the pulses having three levels [4]
- 5/18 • • • two levels being symmetrical with respect to the third level, i.e. balanced bipolar ternary code [4]
- 5/20 • • the pulses having more than three levels [4]
- 5/22 • Conversion to or from representation by sinusoidal signals [4]
- 7/00 Conversion of a code where information is represented by a given sequence or number of digits to a code where the same information is represented by a different sequence or number of digits [4]**
- Note(s)**  
In groups H03M 7/02-H03M 7/30, in the absence of an indication to the contrary, classification is made in the last appropriate place.
- 7/02 • Conversion to or from weighted codes, i.e. the weight given to a digit depending on the position of the digit within the block or code word [4]
- 7/04 • • the radix thereof being two [4]
- 7/06 • • the radix thereof being a positive integer different from two [4]
- 7/08 • • • the radix being ten, i.e. pure decimal code [4]
- 7/10 • • the radix thereof being negative [4]
- 7/12 • • having two radices, e.g. binary-coded-decimal code [4]
- 7/14 • Conversion to or from non-weighted codes [4]
- 7/16 • • Conversion to or from unit-distance codes, e.g. Gray code, reflected binary code [4]
- 7/18 • • Conversion to or from residue codes [4]
- 7/20 • • Conversion to or from n-out-of-m codes [4]
- 7/22 • • • to or from one-out-of-m codes [4]
- 7/24 • • Conversion to or from floating-point codes [4]
- 7/26 • Conversion to or from stochastic codes [4]
- 7/28 • Programmable structures, i.e. where the code converter contains apparatus which is operator-changeable to modify the conversion process [4]
- 7/30 • Compression (speech analysis-synthesis for redundancy reduction G10L 19/00; for image communication H04N); Expansion; Suppression of unnecessary data, e.g. redundancy reduction [4]
- 7/32 • • Conversion to or from delta modulation, i.e. one-bit differential modulation [4]
- 7/34 • • • adaptive [4]
- 7/36 • • Conversion to or from differential modulation with several bits, i.e. the difference between successive samples being coded by more than one bit [4]
- 7/38 • • • adaptive [4]
- 7/40 • • Conversion to or from variable length codes, e.g. Shannon-Fano code, Huffman code, Morse code [4]
- 7/42 • • • using table look-up for the coding or decoding process, e.g. using read-only memory [4]
- 7/44 • • • Suppression of irrelevant zeroes [4]
- 7/46 • • Conversion to or from run-length codes, i.e. by representing the number of consecutive digits, or groups of digits, of the same kind by a code word and a digit indicative of that kind [4]
- 7/48 • • • alternating with other codes during the code conversion process, e.g. run-length coding being performed only as long as sufficiently long runs of digits of the same kind are present [4]
- 7/50 • • Conversion to or from non-linear codes, e.g. companding [4]

## H03M

9/00	<b>Parallel/series conversion or vice versa</b> (digital stores in which the information is moved stepwise G11C 19/00) [4]	13/11	• • • using multiple parity bits [7]
11/00	<b>Coding in connection with keyboards or like devices, i.e. coding of the position of operated keys</b> (keyboard switch arrangements, structural association of coders and keyboards H01H 13/70, H03K 17/94) [4]	13/13	• • • Linear codes [7]
11/02	• Details [5]	13/15	• • • • Cyclic codes, i.e. cyclic shifts of codewords produce other codewords, e.g. codes defined by a generator polynomial, Bose-Chaudhuri-Hocquenghem (BCH) codes (H03M 13/17 takes precedence) [7]
11/04	• • Coding of multifunction keys [5]	13/17	• • • • Burst error correction, e.g. error trapping, Fire codes [7]
11/06	• • • by operating the multifunction key itself in different ways [5]	13/19	• • • • Single error correction without using particular properties of the cyclic codes, e.g. Hamming codes, extended or generalised Hamming codes [7]
11/08	• • • • by operating selected combinations of multifunction keys [5]	13/21	• • • Non-linear codes, e.g. m-bit data word to n-bit code word (mBnB) conversion with error detection or error correction [7]
11/10	• • • • by methods based on duration or pressure detection of keystrokes [5]	13/23	• • using convolutional codes, e.g. unit memory codes [7]
11/12	• • • • by operating a key a selected number of consecutive times whereafter a separate enter key is used which marks the end of the series [5]	13/25	• Error detection or forward error correction by signal space coding, i.e. adding redundancy in the signal constellation, e.g. Trellis Coded Modulation (TCM) [7]
11/14	• • • by using additional keys, e.g. shift keys, which determine the function performed by the multifunction key [5]	13/27	• using interleaving techniques [7]
11/16	• • • • wherein the shift keys are operated after the operation of the multifunction keys [5]	13/29	• combining two or more codes or code structures, e.g. product codes, generalised product codes, concatenated codes, inner and outer codes [7]
11/18	• • • • wherein the shift keys are operated before the operation of the multifunction keys [5]	13/31	• combining coding for error detection or correction and efficient use of the spectrum (without error detection or correction H03M 5/14) [7]
11/20	• Dynamic coding, i.e. by key scanning (H03M 11/26 takes precedence) [5]	13/33	• Synchronisation based on error coding or decoding [7]
11/22	• Static coding (H03M 11/26 takes precedence) [5]	13/35	• Unequal or adaptive error protection, e.g. by providing a different level of protection according to significance of source information or by adapting the coding according to the change of transmission channel characteristics [7]
11/24	• • using analogue means [5]	13/37	• Decoding methods or techniques, not specific to the particular type of coding provided for in groups H03M 13/03-H03M 13/35 [7]
11/26	• using opto-electronic means [5]	13/39	• • Sequence estimation, i.e. using statistical methods for the reconstruction of the original codes [7]
13/00	<b>Coding, decoding or code conversion, for error detection or error correction; Coding theory basic assumptions; Coding bounds; Error probability evaluation methods; Channel models; Simulation or testing of codes</b> (error detection or error correction for analogue/digital, digital/analogue or code conversion H03M 1/00-H03M 11/00; specially adapted for digital computers G06F 11/08, for information storage based on relative movement between record carrier and transducer G11B, e.g. G11B 20/18, for static stores G11C) [4, 7]	13/41	• • • using the Viterbi algorithm or Viterbi processors [7]
13/01	• Coding theory basic assumptions; Coding bounds; Error probability evaluation methods; Channel models; Simulation or testing of codes [7]	13/43	• • Majority logic or threshold decoding [7]
13/03	• Error detection or forward error correction by redundancy in data representation, i.e. code words containing more digits than the source words [7]	13/45	• • Soft decoding, i.e. using symbol reliability information (H03M 13/41 takes precedence) [7]
13/05	• • using block codes, i.e. a predetermined number of check bits joined to a predetermined number of information bits [7]	13/47	• Error detection, forward error correction or error protection, not provided for in groups H03M 13/01-H03M 13/37 [7]
13/07	• • • Arithmetic codes [7]	13/49	• • Unidirectional error detection or correction [7]
13/09	• • • Error detection only, e.g. using cyclic redundancy check (CRC) codes or single parity bit [7]	13/51	• • Constant weight codes; n-out-of-m codes; Berger codes [7]
		13/53	• • Codes using Fibonacci numbers series [7]
		99/00	<b>Subject matter not provided for in other groups of this subclass [2006.01]</b>

## H04 ELECTRIC COMMUNICATION TECHNIQUE

### Note(s)

This class covers electrical communication systems with propagation paths employing beams of corpuscular radiation, acoustic waves or electromagnetic waves, e.g. radio or optical communication.

## H04B TRANSMISSION [4]

**Note(s)**

This subclass covers the transmission of information-carrying signals, the transmission being independent of the nature of the information, and includes monitoring and testing arrangements and the suppression and limitation of noise and interference.

**Subclass index**

DETAILS.....	1/00
SYSTEMS CHARACTERISED BY THE MEDIUM USED FOR TRANSMISSION	
Using conductors.....	3/00
Using free-space propagation.....	5/00-11/00
Others.....	13/00
SYSTEMS NOT CHARACTERISED BY THE MEDIUM USED FOR TRANSMISSION.....	14/00
SUPPRESSION OR LIMITATION OF NOISE OR INTERFERENCE.....	15/00
MONITORING, TESTING.....	17/00

**1/00 Details of transmission systems, not covered by a single one of groups H04B 3/00-H04B 13/00; Details of transmission systems not characterised by the medium used for transmission [4]**

- 1/02 • Transmitters
- 1/03 • • Constructional details, e.g. casings, housings [2]
- 1/034 • • • Portable transmitters [2]
- 1/036 • • • Cooling arrangements [2]
- 1/04 • • Circuits
- 1/06 • Receivers
- 1/08 • • Constructional details, e.g. cabinet
- 1/10 • • Means associated with receiver for limiting or suppressing noise or interference
- 1/12 • • • Neutralising, balancing, or compensation arrangements
- 1/14 • • • Automatic detuning arrangements
- 1/16 • • Circuits
- 1/18 • • • Input circuits, e.g. for coupling to an aerial or a transmission line (coupling networks between aerials or lines and receivers independent of the nature of the receiver H03H)
- 1/20 • • • for coupling gramophone pick-up, recorder output, or microphone to receiver
- 1/22 • • • for receivers in which no local oscillation is generated
- 1/24 • • • the receiver comprising at least one semiconductor device having three or more electrodes
- 1/26 • • • for superheterodyne receivers (multiple frequency-changing H03D 7/16)
- 1/28 • • • the receiver comprising at least one semiconductor device having three or more electrodes
- 1/30 • • • for homodyne or synchrodyne receivers (demodulator circuits H03D 1/22)
- 1/38 • Transceivers, i.e. devices in which transmitter and receiver form a structural unit and in which at least one part is used for functions of transmitting and receiving
- 1/40 • • Circuits
- 1/44 • • • Transmit/receive switching [2]
- 1/46 • • • • by voice-frequency signals; by pilot signals
- 1/48 • • • • in circuit for connecting transmitter and receiver to a common transmission path, e.g. by energy of transmitter

- 1/50 • • • using different frequencies for the two directions of communication
- 1/52 • • • • Hybrid arrangements, i.e. for transition from single-path two-way transmission to single transmission on each of two paths, or vice versa
- 1/54 • • • using the same frequency for both directions of communication (H04B 1/44 takes precedence)
- 1/56 • • • • with provision for simultaneous communication in both directions
- 1/58 • • • • Hybrid arrangements, i.e. for transition from single-path two-way transmission to single transmission on each of two paths, or vice versa
- 1/59 • Responders; Transponders
- 1/60 • Supervising unattended repeaters
- 1/62 • for providing a predistortion of the signal in the transmitter and corresponding correction in the receiver, e.g. for improving the signal/noise ratio
- 1/64 • • Volume compression or expansion arrangements
- 1/66 • for reducing bandwidth of signals; for improving efficiency of transmission (H04B 1/68 takes precedence)
- 1/68 • for wholly or partially suppressing the carrier or one side band [4]
- 1/69 • Spread spectrum techniques [6, 2011.01]

**Note(s) [2011.01]**

When classifying in this group, any aspect of code division multiplexing, which is considered to represent information of interest for search, may also be classified in group H04J 13/00.

- 1/692 • • Hybrid techniques using combinations of two or more spread spectrum techniques [2011.01]
- 1/707 • • using direct sequence modulation [6, 2011.01]
- 1/7073 • • • Synchronisation aspects [2011.01]
- 1/7075 • • • • with code phase acquisition [2011.01]
- 1/7077 • • • • • Multi-step acquisition, e.g. multi-dwell, coarse-fine or validation [2011.01]
- 1/708 • • • • • Parallel implementation [2011.01]
- 1/7083 • • • • Cell search, e.g. using a three-step approach [2011.01]
- 1/7085 • • • • using a code tracking loop, e.g. a delay-locked loop [2011.01]
- 1/7087 • • • • Carrier synchronisation aspects [2011.01]
- 1/709 • • • Correlator structure [2011.01]

- 1/7093 • • • • Matched filter type **[2011.01]**
- 1/7095 • • • • Sliding correlator type **[2011.01]**
- 1/7097 • • • • Interference-related aspects **[2011.01]**
- 1/71 • • • • the interference being narrowband interference **[2011.01]**
- 1/7103 • • • • the interference being multiple access interference **[2011.01]**
- 1/7105 • • • • • Joint detection techniques, e.g. linear detectors **[2011.01]**
- 1/7107 • • • • • Subtractive interference cancellation **[2011.01]**
- 1/711 • • • • the interference being multi-path interference **[2011.01]**
- 1/7113 • • • • • Determination of path profile **[2011.01]**
- 1/7115 • • • • • Constructive combining of multi-path signals, i.e. RAKE receivers **[2011.01]**
- 1/7117 • • • • • • Selection, re-selection, allocation or re-allocation of paths to fingers, e.g. timing offset control of allocated fingers **[2011.01]**
- 1/712 • • • • • • Weighting of fingers for combining, e.g. amplitude control or phase rotation using an inner loop **[2011.01]**
- 1/713 • • using frequency hopping **[6, 2011.01]**
- 1/7136 • • • Arrangements for generation of hop frequencies, e.g. using a bank of frequency sources, using continuous tuning or using a transform **[2011.01]**
- 1/7143 • • • Arrangements for generation of hop patterns **[2011.01]**
- 1/715 • • • Interference-related aspects **[2011.01]**
- 1/7156 • • • Arrangements for sequence synchronisation **[2011.01]**
- 1/7163 • • using impulse radio **[2011.01]**
- 1/717 • • • Pulse-related aspects **[2011.01]**
- 1/7176 • • • Data mapping, e.g. modulation **[2011.01]**
- 1/7183 • • • Synchronisation **[2011.01]**
- 1/719 • • • Interference-related aspects **[2011.01]**
- 1/72 • Circuits or components for simulating aerials, e.g. dummy aerials
- 1/74 • for increasing reliability, e.g. using redundant or spare channels or apparatus **[3]**
- 1/76 • Pilot transmitters or receivers for control of transmission or for equalising **[3]**
- 3/00 Line transmission systems** (combined with near-field transmission systems H04B 5/00)
  - 3/02 • Details
  - 3/03 • • Hybrid circuits (for transceivers H04B 1/52, H04B 1/58) **[3]**
  - 3/04 • • Control of transmission; Equalising
  - 3/06 • • • by the transmitted signal
  - 3/08 • • • • in negative-feedback path of line amplifier
  - 3/10 • • • by pilot signal
  - 3/11 • • • • using pilot wire (H04B 3/12 take precedence) **[3]**
  - 3/12 • • • • in negative-feedback path of line amplifier
  - 3/14 • • • characterised by the equalising network used
  - 3/16 • • • characterised by the negative-impedance network used
  - 3/18 • • • • wherein the network comprises semiconductor devices
  - 3/20 • • Reducing echo effects or singing; Opening or closing transmitting path; Conditioning for transmission in one direction or the other
  - 3/21 • • • using a set of bandfilters **[3]**
- 3/23 • • • using a replica of transmitted signal in the time domain, e.g. echo cancellers **[3]**
- 3/26 • • Improving frequency characteristic by the use of loading coils
- 3/28 • • Reducing interference caused by currents induced in cable sheathing or armouring
- 3/30 • • Reducing interference caused by unbalance current in a normally balanced line
- 3/32 • • Reducing cross-talk, e.g. by compensating
- 3/34 • • • by systematic interconnection of lengths of cable during laying; by addition of balancing components to cable during laying
- 3/36 • • Repeater circuits (H04B 3/58 takes precedence)
- 3/38 • • • for signals in two different frequency ranges transmitted in opposite directions over the same transmission path
- 3/40 • • Artificial lines; Networks simulating a line of certain length
- 3/42 • • Circuits for by-passing of ringing signals
- 3/44 • • Arrangements for feeding power to a repeater along the transmission line
- 3/46 • • Monitoring; Testing
- 3/48 • • • Testing attenuation
- 3/50 • Systems for transmission between fixed stations via two-conductor transmission lines (H04B 3/54 takes precedence)
- 3/52 • Systems for transmission between fixed stations via waveguides
- 3/54 • Systems for transmission via power distribution lines (in alarm signalling systems G08B 25/06)
- 3/56 • • Circuits for coupling, blocking, or by-passing of signals
- 3/58 • • Repeater circuits
- 3/60 • Systems for communication between relatively movable stations, e.g. for communication with lift (H04B 3/54 takes precedence)
- 5/00 Near-field transmission systems, e.g. inductive loop type**
  - 5/02 • using transceiver
  - 5/04 • Calling systems, e.g. paging system
  - 5/06 • using a portable transmitter associated with a microphone
- 7/00 Radio transmission systems, i.e. using radiation field** (H04B 10/00, H04B 15/00 take precedence)
  - 7/005 • Control of transmission; Equalising **[3]**
  - 7/01 • Reducing phase shift **[3]**
  - 7/015 • Reducing echo effects **[3]**
  - 7/02 • Diversity systems
  - 7/04 • • using a plurality of spaced independent aerials
  - 7/06 • • • at transmitting station
  - 7/08 • • • at receiving station
  - 7/10 • • using a single aerial system characterised by its polarisation or directive properties, e.g. polarisation diversity, direction diversity
  - 7/12 • • Frequency-diversity systems
  - 7/14 • Relay systems **[2]**
  - 7/145 • • Passive relay systems **[2]**
  - 7/15 • • Active relay systems **[2]**
  - 7/155 • • • Ground-based stations (H04B 7/204 takes precedence) **[2, 5]**
  - 7/165 • • • • employing angle modulation **[2]**
  - 7/17 • • • • employing pulse modulation, e.g. pulse code modulation **[2]**

- 7/185 • • • Space-based or airborne stations (H04B 7/204 takes precedence) [2, 5]
- 7/19 • • • • Earth-synchronous stations [2]
- 7/195 • • • • Non-synchronous stations [2]
- 7/204 • • • Multiple access [5]
- 7/208 • • • • Frequency-division multiple access [5]
- 7/212 • • • • Time-division multiple access [5]
- 7/216 • • • • Code-division or spread-spectrum multiple access [5]
- 7/22 • Scatter propagation systems
- 7/24 • for communication between two or more posts (wireless communication networks H04W) [2]
- 7/26 • • at least one of which is mobile [2]
- 10/00 Transmission systems employing electromagnetic waves other than radio-waves, e.g. infrared, visible or ultraviolet light, or employing corpuscular radiation, e.g. quantum communication [5, 2013.01]**
- Note(s) [2013.01]**
- In this group, non-optical transmission systems are classified in group H04B 10/90.
- 10/03 • Arrangements for fault recovery [2013.01]
- 10/032 • • using working and protection systems [2013.01]
- 10/035 • • using loopbacks [2013.01]
- 10/038 • • using bypasses [2013.01]
- 10/07 • Arrangements for monitoring or testing transmission systems; Arrangements for fault measurement of transmission systems [2013.01]
- 10/071 • • using a reflected signal, e.g. using optical time-domain reflectometers [OTDRs] [2013.01]
- 10/073 • • using an out-of-service signal (H04B 10/071 takes precedence) [2013.01]
- 10/075 • • using an in-service signal (H04B 10/071 takes precedence) [2013.01]
- 10/077 • • • using a supervisory or additional signal [2013.01]
- 10/079 • • • using measurements of the data signal [2013.01]
- 10/11 • Arrangements specific to free-space transmission, i.e. transmission through air or vacuum [2013.01]
- 10/112 • • Line-of-sight transmission over an extended range [2013.01]
- 10/114 • • Indoor or close-range type systems [2013.01]
- 10/116 • • • Visible light communication [2013.01]
- 10/118 • • specially adapted for satellite communication [2013.01]
- 10/25 • Arrangements specific to fibre transmission [2013.01]
- 10/2507 • • for the reduction or elimination of distortion or dispersion [2013.01]
- 10/2513 • • • due to chromatic dispersion [2013.01]
- 10/2519 • • • • using Bragg gratings [2013.01]
- 10/2525 • • • • using dispersion-compensating fibres [2013.01]
- 10/2531 • • • • using spectral inversion [2013.01]
- 10/2537 • • • due to scattering processes, e.g. Raman or Brillouin scattering [2013.01]
- 10/2543 • • • due to fibre non-linearities, e.g. Kerr effect [2013.01]
- 10/255 • • • • Self-phase modulation [SPM] [2013.01]
- 10/2557 • • • • Cross-phase modulation [XPM] [2013.01]
- 10/2563 • • • • Four-wave mixing [FWM] [2013.01]
- 10/2569 • • • due to polarisation mode dispersion [PMD] [2013.01]
- 10/2575 • • Radio-over-fibre, e.g. radio frequency signal modulated onto an optical carrier [2013.01]
- 10/2581 • • Multimode transmission [2013.01]
- 10/2587 • • using a single light source for multiple stations [2013.01]
- 10/27 • Arrangements for networking [2013.01]
- 10/272 • • Star-type networks [2013.01]
- 10/275 • • Ring-type networks [2013.01]
- 10/278 • • Bus-type networks [2013.01]
- 10/29 • Repeaters [2013.01]
- 10/291 • • in which processing or amplification is carried out without conversion of the main signal from optical form [2013.01]
- 10/293 • • • Signal power control [2013.01]
- 10/294 • • • • in a multiwavelength system, e.g. gain equalisation [2013.01]
- 10/296 • • • • • Transient power control, e.g. due to channel add/drop or rapid fluctuations in the input power [2013.01]
- 10/297 • • • Bidirectional amplification [2013.01]
- 10/299 • • • Signal waveform processing, e.g. reshaping or retiming [2013.01]
- 10/40 • Transceivers [2013.01]
- 10/43 • • using a single component as both light source and receiver, e.g. using a photoemitter as a photoreceiver [2013.01]
- 10/50 • Transmitters [2013.01]
- 10/508 • • Pulse generation, e.g. generation of solitons [2013.01]
- 10/516 • • Details of coding or modulation [2013.01]
- 10/524 • • • Pulse modulation [2013.01]
- 10/532 • • • Polarisation modulation [2013.01]
- 10/54 • • • Intensity modulation [2013.01]
- 10/548 • • • Phase or frequency modulation [2013.01]
- 10/556 • • • • Digital modulation, e.g. differential phase shift keying [DPSK] or frequency shift keying [FSK] [2013.01]
- 10/564 • • Power control [2013.01]
- 10/572 • • Wavelength control [2013.01]
- 10/58 • • Compensation for non-linear transmitter output [2013.01]
- 10/588 • • • in external modulation systems [2013.01]
- 10/60 • Receivers [2013.01]
- 10/61 • • Coherent receivers [2013.01]
- 10/63 • • • Homodyne [2013.01]
- 10/64 • • • Heterodyne [2013.01]
- 10/66 • • Non-coherent receivers, e.g. using direct detection [2013.01]
- 10/67 • • • Optical arrangements in the receiver [2013.01]
- 10/69 • • • Electrical arrangements in the receiver [2013.01]
- 10/70 • Photonic quantum communication [2013.01]
- 10/80 • Optical aspects relating to the use of optical transmission for specific applications, not provided for in groups H04B 10/03-H04B 10/70, e.g. optical power feeding or optical transmission through water [2013.01]
- 10/85 • • Protection from unauthorised access, e.g. eavesdrop protection [2013.01]
- 10/90 • Non-optical transmission systems, e.g. transmission systems employing non-photonics corpuscular radiation [2013.01]
- 11/00 Transmission systems employing ultrasonic, sonic or infrasonic waves**

## H04B

13/00	<b>Transmission systems characterised by the medium used for transmission, not provided for in groups H04B 3/00-H04B 11/00</b>	14/08	• characterised by the use of a sub-carrier [4]
13/02	• Transmission systems in which the medium consists of the earth or a large mass of water thereon, e.g. earth telegraphy	15/00	<b>Suppression or limitation of noise or interference</b> (by means associated with receiver H04B 1/10)
14/00	<b>Transmission systems not characterised by the medium used for transmission</b> (details thereof H04B 1/00) [4]	15/02	• Reducing interference from electric apparatus by means located at or near the interfering apparatus
14/02	• characterised by the use of pulse modulation (in radio transmission relays H04B 7/17) [4]	15/04	• • the interference being caused by substantially sinusoidal oscillations, e.g. in a receiver or in a tape-recorder
14/04	• • using pulse code modulation [4]	15/06	• • • by local oscillators of receivers
14/06	• • using differential modulation, e.g. delta modulation [4]	17/00	<b>Monitoring; Testing</b> [2]
		17/02	• of relay systems [2]

## H04H BROADCAST COMMUNICATION (multiplex communication H04J; pictorial communication aspects of broadcast systems H04N)

### Note(s)

- In this subclass, the following terms or expressions are used with the meaning indicated:
  - “broadcast” is simultaneous distribution of identical signals to plural receiving stations. The term “broadcast” does not include distribution to receiving stations which is controlled by requests or responses from the receiving stations;
  - “broadcast information” covers all kinds of information distributed by broadcast systems;
  - “broadcast-related information” is information required by services provided via broadcast systems, other than broadcast information;
  - “broadcast time” is a time when particular broadcast information exists and is available;
  - “broadcast channel” is a channel via which broadcast information is distributed, e.g. carrier waves, time slots, cables or wireless broadcast service areas;
  - “broadcast space” is either a set of broadcast channels in which particular broadcast information exists and is available or a geographical area determined by the set of broadcast channels;
  - “broadcast space-time” is space-time determined by broadcast space and broadcast time in which particular broadcast information exists and is available;
  - “broadcast system” is a system which consists of transmitter, transponder and receiver for broadcast;
  - “broadcast-related system” is a system which is directly affected by generation, broadcast, reception or use of broadcast information;
  - “broadcast service” is a service directly provided by a broadcast system, i.e. distribution service of broadcast information;
  - “broadcast-related service” is a service provided by broadcast-related systems;
  - “A with a direct linkage to B” means that A directly affects B or that A is directly affected by B.
- In this subclass, multi-aspect classification is applied, so that subject matter characterised by aspects covered by more than one of its groups, which is considered to represent information of interest for search, may also be classified in each of those groups.

20/00	<b>Arrangements for broadcast or for distribution combined with broadcast [2008.01]</b>	20/24	• • Arrangements for distribution of identical information via broadcast system and non-broadcast system [2008.01]
20/02	• Arrangements for relaying broadcast information [2008.01]	20/26	• Arrangements for switching distribution systems [2008.01]
20/04	• • from field pickup units [FPU] [2008.01]	20/28	• Arrangements for simultaneous broadcast of plural pieces of information [2008.01]
20/06	• • among broadcast stations [2008.01]	20/30	• • by a single channel [2008.01]
20/08	• • among terminal devices [2008.01]	20/31	• • • using in-band signals, e.g. subsonic or cue signal [2008.01]
20/10	• Arrangements for replacing or switching information during the broadcast or during the distribution [2008.01]	20/33	• • by plural channels [2008.01]
20/12	• Arrangements for monitoring, testing or troubleshooting [2008.01]	20/34	• • • using an out-of-band subcarrier signal [2008.01]
20/14	• • for monitoring programmes [2008.01]	20/36	• • for AM broadcasts [2008.01]
20/16	• Arrangements for broadcast or distribution of identical information repeatedly [2008.01]	20/38	• Arrangements for distribution where lower stations, e.g. receivers, interact with the broadcast [2008.01]
20/18	• Arrangements for synchronising broadcast or distribution via plural systems [2008.01]	20/40	• Arrangements for broadcast specially adapted for accumulation-type receivers [2008.01]
20/20	• Arrangements for broadcast or distribution of identical information via plural systems [2008.01]	20/42	• Arrangements for resource management [2008.01]
20/22	• • Arrangements for broadcast of identical information via plural broadcast systems [2008.01]	20/44	• Arrangements characterised by circuits or components specially adapted for broadcast [2008.01]

- 20/46 • • specially adapted for broadcast systems covered by groups H04H 20/53-H04H 20/86 **[2008.01]**
- 20/47 • • • specially adapted for stereophonic broadcast systems **[2008.01]**
- 20/48 • • • • for FM stereophonic broadcast systems **[2008.01]**
- 20/49 • • • • for AM stereophonic broadcast systems **[2008.01]**
- 20/51 • • • specially adapted for satellite broadcast systems **[2008.01]**
- 20/53 • Arrangements specially adapted for specific applications, e.g. for traffic information or for mobile receivers **[2008.01]**
- 20/55 • • for traffic information **[2008.01]**
- 20/57 • • for mobile receivers **[2008.01]**
- 20/59 • • for emergency or urgency **[2008.01]**
- 20/61 • • for local area broadcast, e.g. instore broadcast **[2008.01]**
- 20/62 • • • for transportation systems, e.g. in vehicles **[2008.01]**
- 20/63 • • • to plural spots in a confined site, e.g. MATV [Master Antenna Television] **[2008.01]**
- 20/65 • Arrangements characterised by transmission systems for broadcast **[2008.01]**
- 20/67 • • Common-wave systems, i.e. using separate transmitters operating on substantially the same frequency **[2008.01]**
- 20/69 • • Optical systems **[2008.01]**
- 20/71 • • Wireless systems **[2008.01]**
- 20/72 • • • of terrestrial networks **[2008.01]**
- 20/74 • • • of satellite networks **[2008.01]**
- 20/76 • • Wired systems **[2008.01]**
- 20/77 • • • using carrier waves **[2008.01]**
- 20/78 • • • • CATV [Community Antenna Television] systems **[2008.01]**
- 20/79 • • • • • using downlink of the CATV systems, e.g. audio broadcast via CATV network **[2008.01]**
- 20/80 • • • • having frequencies in two or more frequency bands, e.g. medium wave and VHF **[2008.01]**
- 20/81 • • • • combined with telephone network over which the broadcast is continuously available **[2008.01]**
- 20/82 • • • using signals not modulated onto a carrier **[2008.01]**
- 20/83 • • • • not sharing the network with any other service **[2008.01]**
- 20/84 • • • combined with power distribution network **[2008.01]**
- 20/86 • Arrangements characterised by special technical features of the broadcast information, e.g. signal form or information format **[2008.01]**
- 20/88 • • Stereophonic broadcast systems **[2008.01]**
- 20/89 • • • using three or more audio channels, e.g. triphonic or quadraphonic **[2008.01]**
- 20/91 • • broadcasting computer programmes **[2008.01]**
- 20/93 • • which locates resources of other pieces of information, e.g. URL [Uniform Resource Locator] **[2008.01]**
- 20/95 • • characterised by a specific format, e.g. MP3 [MPEG-1 Audio Layer 3] **[2008.01]**
- 40/00 Arrangements specially adapted for receiving broadcast information [2008.01]**
- 40/09 • Arrangements for receiving desired information automatically according to timetables **[2008.01]**
- 40/18 • Arrangements characterised by circuits or components specially adapted for receiving **[2008.01]**
- 40/27 • • specially adapted for broadcast systems covered by groups H04H 20/53-H04H 20/86 **[2008.01]**
- 40/36 • • • specially adapted for stereophonic broadcast receiving **[2008.01]**
- 40/45 • • • • for FM stereophonic broadcast receiving **[2008.01]**
- 40/54 • • • • • generating subcarriers **[2008.01]**
- 40/63 • • • • • for separation improvements or adjustments **[2008.01]**
- 40/72 • • • • • for noise suppression **[2008.01]**
- 40/81 • • • • • for stereo-monaural switching **[2008.01]**
- 40/90 • • • specially adapted for satellite broadcast receiving **[2008.01]**
- 60/00 Arrangements for broadcast applications with a direct linkage to broadcast information or to broadcast space-time; Broadcast-related systems [2008.01]**
- 60/02 • Arrangements for generating broadcast information; Arrangements for generating broadcast-related information with a direct linkage to broadcast information or to broadcast space-time; Arrangements for simultaneous generation of broadcast information and broadcast-related information **[2008.01]**
- 60/04 • • Studio equipment; Interconnection of studios **[2008.01]**
- 60/05 • • • Mobile studios **[2008.01]**
- 60/06 • • Arrangements for scheduling broadcast services or broadcast-related services **[2008.01]**
- 60/07 • • characterised by processes or methods for the generation **[2008.01]**
- 60/09 • Arrangements for device control with a direct linkage to broadcast information or to broadcast space-time; Arrangements for control of broadcast-related services **[2008.01]**
- 60/11 • • Arrangements for counter-measures when a portion of broadcast information is unavailable **[2008.01]**
- 60/12 • • • wherein another information is substituted for the portion of broadcast information **[2008.01]**
- 60/13 • • Arrangements for device control affected by the broadcast information **[2008.01]**
- 60/14 • • Arrangements for conditional access to broadcast information or to broadcast-related services **[2008.01]**
- 60/15 • • • on receiving information **[2008.01]**
- 60/16 • • • on playing information **[2008.01]**
- 60/17 • • • on recording information **[2008.01]**
- 60/18 • • • on copying information **[2008.01]**
- 60/19 • • • on transmission of information **[2008.01]**
- 60/20 • • • on secondary editing information **[2008.01]**
- 60/21 • • • Billing for the use of broadcast information or broadcast-related information **[2008.01]**
- 60/22 • • • • per use **[2008.01]**
- 60/23 • • • using cryptography, e.g. encryption, authentication or key distribution **[2008.01]**
- 60/25 • Arrangements for updating broadcast information or broadcast-related information **[2008.01]**
- 60/27 • Arrangements for recording or accumulating broadcast information or broadcast-related information **[2008.01]**
- 60/29 • Arrangements for monitoring broadcast services or broadcast-related services **[2008.01]**

## H04H

- 60/31 • • Arrangements for monitoring the use made of the broadcast services [2008.01]
- 60/32 • • Arrangements for monitoring conditions of receiving stations, e.g. malfunction or breakdown of receiving stations [2008.01]
- 60/33 • • Arrangements for monitoring the users' behaviour or opinions [2008.01]
- 60/35 • Arrangements for identifying or recognising characteristics with a direct linkage to broadcast information or to broadcast space-time, e.g. for identifying broadcast stations or for identifying users [2008.01]
- 60/37 • • for identifying segments of broadcast information, e.g. scenes or extracting programme ID [2008.01]
- 60/38 • • for identifying broadcast time or space [2008.01]
- 60/39 • • • for identifying broadcast space-time (use of Electronic Programme Guides H04H 60/72) [2008.01]
- 60/40 • • • for identifying broadcast time [2008.01]
- 60/41 • • • for identifying broadcast space, i.e. broadcast channels, broadcast stations or broadcast areas [2008.01]
- 60/42 • • • • for identifying broadcast areas [2008.01]
- 60/43 • • • • for identifying broadcast channels [2008.01]
- 60/44 • • • • for identifying broadcast stations [2008.01]
- 60/45 • • for identifying users [2008.01]
- 60/46 • • for recognising users' preferences [2008.01]
- 60/47 • • for recognising genres [2008.01]
- 60/48 • • for recognising items expressed in broadcast information [2008.01]
- 60/49 • • for identifying locations [2008.01]
- 60/50 • • • of broadcast or relay stations [2008.01]
- 60/51 • • • of receiving stations [2008.01]
- 60/52 • • • of users [2008.01]
- 60/53 • • • of destinations [2008.01]
- 60/54 • • • where broadcast information is generated [2008.01]
- 60/56 • Arrangements characterised by components specially adapted for monitoring, identification or recognition covered by groups H04H 60/29 or H04H 60/35 [2008.01]
- 60/58 • • of audio [2008.01]
- 60/59 • • of video [2008.01]
- 60/61 • Arrangements for services using the result of monitoring, identification or recognition covered by groups H04H 60/29 or H04H 60/35 [2008.01]
- 60/63 • • for services of sales [2008.01]
- 60/64 • • for providing detail information [2008.01]
- 60/65 • • for using the result on users' side [2008.01]
- 60/66 • • for using the result on distributors' side [2008.01]
- 60/68 • Systems specially adapted for using specific information, e.g. geographical or meteorological information [2008.01]
- 60/70 • • using geographical information, e.g. maps, charts or atlases [2008.01]
- 60/71 • • using meteorological information [2008.01]
- 60/72 • • using EPGs [Electronic Programme Guides] (focusing on identifying broadcast space-time H04H 60/39) [2008.01]
- 60/73 • • using meta-information [2008.01]
- 60/74 • • • using programme related information, e.g. title, composer or interpreter [2008.01]
- 60/76 • Arrangements characterised by transmission systems other than for broadcast, e.g. the Internet [2008.01]
- 60/78 • • characterised by source locations or destination locations [2008.01]
- 60/79 • • • characterised by transmission among broadcast stations [2008.01]
- 60/80 • • • characterised by transmission among terminal devices [2008.01]
- 60/81 • • characterised by the transmission system itself [2008.01]
- 60/82 • • • the transmission system being the Internet [2008.01]
- 60/83 • • • • accessed over telephonic networks [2008.01]
- 60/84 • • • • which are fixed telephone networks [2008.01]
- 60/85 • • • • which are mobile communication networks [2008.01]
- 60/86 • • • • accessed over CATV networks [2008.01]
- 60/87 • • • • accessed over computer networks [2008.01]
- 60/88 • • • • which are wireless networks [2008.01]
- 60/89 • • • • which are wired networks [2008.01]
- 60/90 • • • Wireless transmission systems [2008.01]
- 60/91 • • • • Mobile communication networks (for accessing the Internet H04H 60/85) [2008.01]
- 60/92 • • • • for local area [2008.01]
- 60/93 • • • Wired transmission systems [2008.01]
- 60/94 • • • • Telephonic networks (for accessing the Internet H04H 60/84) [2008.01]
- 60/95 • • • • for local area [2008.01]
- 60/96 • • • • CATV systems (for accessing the Internet H04H 60/86) [2008.01]
- 60/97 • • • • using uplink of the CATV systems [2008.01]
- 60/98 • • • Physical distribution of media, e.g. postcards, CDs or DVDs [2008.01]

**H04J MULTIPLEX COMMUNICATION** (peculiar to transmission of digital information H04L 5/00; systems for the simultaneous or sequential transmission of more than one television signal H04N 7/08; in exchanges H04Q 11/00)

### Note(s)

This subclass covers:

- circuits or apparatus for combining or dividing signals for the purpose of transmitting them simultaneously or sequentially over the same transmission path;
- monitoring arrangements therefor.

#### 1/00 Frequency-division multiplex systems (H04J 14/02 takes precedence) [5]

- 1/02 • Details
- 1/04 • • Frequency-transposition arrangements

- 1/05 • • • using digital techniques [3]
- 1/06 • • Arrangements for supplying the carrier waves
- 1/08 • • Arrangements for combining channels



- 1/10 • • Intermediate station arrangements, e.g. for branching, for tapping-off
- 1/12 • • Arrangements for reducing cross-talk between channels
- 1/14 • • Arrangements providing for calling or supervisory signals
- 1/16 • • Monitoring arrangements
- 1/18 • in which all the carriers are amplitude-modulated (H04J 1/02 takes precedence) [3]
- 1/20 • in which at least one carrier is angle-modulated (H04J 1/02 takes precedence) [3]
- 3/00 Time-division multiplex systems** (H04J 14/08 takes precedence) [4, 5]
  - 3/02 • Details
  - 3/04 • • Distributors combined with modulators or demodulators
  - 3/06 • • Synchronising arrangements
  - 3/07 • • • using pulse stuffing for systems with different or fluctuating information rates [3]
  - 3/08 • • Intermediate station arrangements, e.g. for branching, for tapping-off
  - 3/10 • • Arrangements for reducing cross-talk between channels
  - 3/12 • • Arrangements providing for calling or supervisory signals
  - 3/14 • • Monitoring arrangements
  - 3/16 • in which the time allocation to individual channels within a transmission cycle is variable, e.g. to accommodate varying complexity of signals, to vary number of channels transmitted (H04J 3/17, H04J 3/24 take precedence) [4]
  - 3/17 • in which the transmission channel allotted to a first user may be taken away and re-allotted to a second user if the first user becomes inactive, e.g. TASI [4]
  - 3/18 • using frequency compression and subsequent expansion of the individual signals
  - 3/20 • using resonant transfer [2]
  - 3/22 • in which the sources have different rates or codes [4]
  - 3/24 • in which the allocation is indicated by an address (H04J 3/17 takes precedence) [4]
  - 3/26 • • in which the information and the address are simultaneously transmitted [4]
- 4/00 Combined time-division and frequency-division multiplex systems** (H04J 13/00 takes precedence) [2]
- 7/00 Multiplex systems in which the amplitudes or durations of the signals in individual channels are characteristic of those channels**
  - 7/02 • in which the polarity of the amplitude is characteristic
- 9/00 Multiplex systems in which each channel is represented by a different type of modulation of the carrier**
- 11/00 Orthogonal multiplex systems** (H04J 13/00 takes precedence) [2]
- 13/00 Code division multiplex systems** (for frequency hopping H04B 1/713) [2, 2011.01]
 

**Note(s) [2011.01]**

When classifying in this group, any aspect of spread spectrum techniques not specific to frequency hopping, and which is considered to represent information of interest for search, may also be classified in group H04B 1/69.

  - 13/10 • Code generation [2011.01]
  - 13/12 • • Generation of orthogonal codes [2011.01]
  - 13/14 • • Generation of codes with a zero correlation zone [2011.01]
  - 13/16 • Code allocation [2011.01]
  - 13/18 • • Allocation of orthogonal codes [2011.01]
  - 13/20 • • • having an orthogonal variable spreading factor [OVSF] [2011.01]
  - 13/22 • • Allocation of codes with a zero correlation zone [2011.01]
- 14/00 Optical multiplex systems** [5]
  - 14/02 • Wavelength-division multiplex systems [5]
  - 14/04 • Mode multiplex systems [5]
  - 14/06 • Polarisation multiplex systems [5]
  - 14/08 • Time-division multiplex systems [5]
- 99/00 Subject matter not provided for in other groups of this subclass** [2009.01]

## H04K SECRET COMMUNICATION; JAMMING OF COMMUNICATION

### Note(s)

In this subclass, the following expression is used with the meaning indicated:

- "secret communication" includes secret line and radiation transmission systems, i.e. those in which apparatus at the transmitting station modifies the signal in such a way that the information cannot be intelligibly received without corresponding modifying apparatus at the receiving station.
- 1/00 Secret communication** (ciphering or deciphering apparatus *per se* G09C; systems with reduced bandwidth or suppressed carrier H04B 1/66; spread spectrum techniques H04B 1/69; by using a sub-carrier H04B 14/08; by multiplexing H04J; transmission systems for secret digital information H04L 9/00; secret or subscription television systems H04N 7/16, H04N 21/00)
  - 1/02 • by adding a second signal to make the desired signal unintelligible
  - 1/04 • by frequency scrambling, i.e. by transposing or inverting parts of the frequency band or by inverting the whole band
  - 1/06 • by transmitting the information or elements thereof at unnatural speeds or in jumbled order or backwards
  - 1/08 • by varying the polarisation of transmitted waves
  - 1/10 • by using two signals transmitted simultaneously or successively
  - 3/00 Jamming of communication; Counter-measures** (counter-measures used in radar or analogous systems G01S 7/00)

**H04L TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION** (arrangements common to telegraphic and telephonic communication H04M) [4]

**Note(s)**

This subclass covers transmission of signals having been supplied in digital form and includes data transmission, telegraphic communication, or methods or arrangements for monitoring.

**Subclass index**

**SYSTEMS CHARACTERISED BY:**

The code used: Morse; Baudot; details.....	15/00, 17/00, 13/00
Otherwise: step by step; mosaic printers; other systems.....	19/00, 21/00, 23/00
BASEBAND SYSTEMS.....	25/00
MODULATED-CARRIER SYSTEMS.....	27/00
DATA SWITCHING NETWORKS.....	12/00
ARRANGEMENTS OF GENERAL APPLICATION	
Security: errors; secret.....	1/00, 9/00
Multiple communications; synchronising.....	5/00, 7/00
OTHER ARRANGEMENTS, APPARATUS OR SYSTEMS.....	29/00

**1/00 Arrangements for detecting or preventing errors in the information received**

- 1/02 • by diversity reception
- 1/04 • • using frequency diversity
- 1/06 • • using space diversity
- 1/08 • by repeating transmission, e.g. Verdan system
- 1/12 • by using return channel
- 1/14 • • in which the signals are sent back to the transmitter to be checked
- 1/16 • • in which the return channel carries supervisory signals, e.g. repetition request signals
- 1/18 • • • Automatic repetition systems, e.g. van Duuren system
- 1/20 • using signal-quality detector [3]
- 1/22 • using redundant apparatus to increase reliability [3]
- 1/24 • Testing correct operation [3]

**5/00 Arrangements affording multiple use of the transmission path**

- 5/02 • Channels characterised by the type of signal
- 5/04 • • the signals being represented by different amplitudes or polarities, e.g. quadriplex
- 5/06 • • the signals being represented by different frequencies (combined with time-division multiplexing H04L 5/26)
- 5/08 • • • each combination of signals in different channels being represented by a fixed frequency
- 5/10 • • • with dynamo-electric generation of carriers; with mechanical filters or demodulators
- 5/12 • • the signals being represented by different phase modulations of a single carrier
- 5/14 • Two-way operation using the same type of signal, i.e. duplex
- 5/16 • • Half-duplex systems; Simplex/duplex switching; Transmission of break signals
- 5/18 • • Automatic changing of the traffic direction
- 5/20 • using different combinations of lines, e.g. phantom working
- 5/22 • using time-division multiplexing
- 5/24 • • with start-stop synchronous converters
- 5/26 • • combined with the use of different frequencies

**7/00 Arrangements for synchronising receiver with transmitter**

- 7/02 • Speed or phase control by the received code signals, the signals containing no special synchronisation information
- 7/027 • • extracting the synchronising or clock signal from the received signal spectrum, e.g. by using a resonant or bandpass circuit [5]
- 7/033 • • using the transitions of the received signal to control the phase of the synchronising-signal-generating means, e.g. using a phase-locked loop [5]
- 7/04 • Speed or phase control by synchronisation signals
- 7/06 • • the synchronisation signals differing from the information signals in amplitude, polarity, or frequency
- 7/08 • • the synchronisation signals recurring cyclically
- 7/10 • • Arrangements for initial synchronisation

**9/00 Arrangements for secret or secure communication**

**Note(s)**

In group H04L 9/06-H04L 9/32, in the absence of an indication to the contrary, classification is made in the last appropriate place.

- 9/06 • the encryption apparatus using shift registers or memories for blockwise coding, e.g. D.E.S. systems [5]
- 9/08 • Key distribution [5]
- 9/10 • with particular housing, physical features or manual controls [5]
- 9/12 • Transmitting and receiving encryption devices synchronised or initially set up in a particular manner [5]
- 9/14 • using a plurality of keys or algorithms [5]
- 9/16 • • the keys or algorithms being changed during operation [5]
- 9/18 • Encryption by serially and continuously modifying data stream elements, e.g. stream cipher systems [5]
- 9/20 • • Pseudorandom key sequence combined element-for-element with data sequence [5]
- 9/22 • • • with particular pseudorandom sequence generator [5]

- 9/24 • • • • sequence produced by more than one generator [5]
- 9/26 • • • • producing a nonlinear pseudorandom sequence [5]
- 9/28 • using particular encryption algorithm [5]
- 9/30 • • Public key, i.e. encryption algorithm being computationally infeasible to invert and users' encryption keys not requiring secrecy [5]
- 9/32 • including means for verifying the identity or authority of a user of the system [5]
- 9/34 • Bits, or blocks of bits, of the telegraphic message being interchanged in time [5]
- 9/36 • with means for detecting characters not meant for transmission [5]
- 9/38 • Encryption being effected by mechanical apparatus, e.g. rotating cams, switches, keytape punchers [5]
- 12/00 Data switching networks** (interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units G06F 13/00) [5]
- 12/02 • Details [5]
- 12/04 • • Switchboards [5]
- 12/06 • • Answer-back mechanisms or circuits [5]
- 12/08 • • Allotting numbers to messages; Counting characters, words or messages [5]
- 12/10 • • Current supply arrangements [5]
- 12/12 • • Arrangements for remote connection or disconnection of substations or of equipment thereof [5]
- 12/14 • • Charging arrangements [5]
- 12/16 • • Arrangements for providing special services to substations [5]
- 12/18 • • • for broadcast or conference [5]
- 12/20 • • • for converting transmission speed from the inherent speed of a substation to the inherent speed of other substations [5]
- 12/22 • • Arrangements for preventing the taking of data from a data transmission channel without authorisation (means for verifying the identity or the authority of a user of a secure or secret communication system H04L 9/32) [5]
- 12/24 • • Arrangements for maintenance or administration [5]
- 12/26 • • Monitoring arrangements; Testing arrangements [5]
- 12/28 • characterised by path configuration, e.g. LAN [Local Area Networks] or WAN [Wide Area Networks] (wireless communication networks H04W) [5, 6]
- 12/40 • • Bus networks [5, 6]
- 12/403 • • • with centralised control, e.g. polling [6]
- 12/407 • • • with decentralised control [6]
- 12/413 • • • • with random access, e.g. carrier-sense multiple-access with collision detection (CSMA-CD) [6]
- 12/417 • • • • with deterministic access, e.g. token passing [6]
- 12/42 • • Loop networks [5, 6]
- 12/423 • • • with centralised control, e.g. polling [6]
- 12/427 • • • with decentralised control [6]
- 12/43 • • • • with synchronous transmission, e.g. time division multiplex (TDM), slotted rings [6]
- 12/433 • • • • with asynchronous transmission, e.g. token ring, register insertion [6]
- 12/437 • • • Ring fault isolation or reconfiguration [6]
- 12/44 • • Star or tree networks [5, 6]
- 12/46 • • Interconnection of networks [5, 6]
- 12/50 • Circuit switching systems, i.e. systems in which the path is physically permanent during the communication [5, 6]
- 12/52 • • using time division techniques (in digital transmission systems H04L 5/22) [5, 6]
- 12/54 • Store-and-forward switching systems (packet switching systems H04L 12/70) [5, 6, 2013.01]
- 12/58 • • Message switching systems [5, 6]
- 12/60 • • • Manual relay systems, e.g. push-button switching [5, 6]
- 12/62 • • • • with perforated tape storage [5, 6]
- 12/64 • Hybrid switching systems [5, 6]
- 12/66 • Arrangements for connecting between networks having differing types of switching systems, e.g. gateways [5, 6]
- 12/70 • Packet switching systems [2013.01]
- 12/701 • • Routing or path finding [2013.01]
- 12/703 • • • Route fault prevention or recovery, e.g. rerouting, route redundancy, virtual router redundancy protocol [VRRP] or hot standby router protocol [HSRP] [2013.01]
- 12/705 • • • • Loop or livelock prevention, e.g. time to live [TTL] or spanning tree [2013.01]
- 12/707 • • • • using path redundancy [2013.01]
- 12/709 • • • • • using M+N parallel active paths [2013.01]
- 12/711 • • • • • using M:N active or standby paths [2013.01]
- 12/713 • • • • • using node redundancy, e.g. VRRP [2013.01]
- 12/715 • • • Hierarchical routing, e.g. clustered networks or inter-domain routing [2013.01]
- 12/717 • • • Centralised routing [2013.01]
- 12/721 • • • Routing procedures, e.g. shortest path routing, source routing, link state routing or distance vector routing [2013.01]
- 12/723 • • • • Label or tag based routing, e.g. multi-protocol label switching [MPLS] or generalised multi-protocol label switching [GMPLS] [2013.01]
- 12/725 • • • • Selecting a path with suitable quality of service [QoS] [2013.01]
- 12/727 • • • • • Selecting a path with minimum delay [2013.01]
- 12/729 • • • • • Selecting a path with suitable bandwidth or throughput [2013.01]
- 12/733 • • • • Selecting a path with minimum length or minimum hop count [2013.01]
- 12/735 • • • • Disjoint routing, e.g. path disjoint or node disjoint [2013.01]
- 12/741 • • • Header address processing for routing, e.g. table lookup [2013.01]
- 12/743 • • • • using hashing techniques [2013.01]
- 12/745 • • • • using longest matching prefix [2013.01]
- 12/747 • • • • Address caching [2013.01]
- 12/749 • • • • Address processing over inter-domain or inter-network, e.g. mapping different addresses between IPv6 and IPv4 networks for routing [2013.01]
- 12/751 • • • Topology update or discovery [2013.01]
- 12/753 • • • • Routing tree discovery, e.g. converting from mesh topology to tree topology [2013.01]
- 12/755 • • • • Topology update consistency, e.g. link state advertisement [LSA], time stamping or sequence numbers in the updates [2013.01]

- 12/757 • • • Synchronised activation of routing updates, e.g. delaying or holding routing table updates **[2013.01]**
- 12/759 • • • Dynamic adaptation of update interval, e.g. event-driven updates **[2013.01]**
- 12/761 • • • Broadcast or multicast routing **[2013.01]**
- 12/763 • • • Shortcut routing, e.g. next hop resolution protocol [NHRP] **[2013.01]**
- 12/771 • • • Router architecture **[2013.01]**
- 12/773 • • • • for supporting layer 3 switching, e.g. IP switching, cell switch relay [CSR] or tag switching **[2013.01]**
- 12/775 • • • • multiple routing entities, e.g. multiple software or hardware instances **[2013.01]**
- 12/781 • • • Multiprotocol routing, e.g. for protocol adaptation between IPv4 and IPv6 or dual stack **[2013.01]**
- 12/801 • • Flow control or congestion control **[2013.01]**
- 12/803 • • • Load balancing, e.g. traffic distribution over multiple links **[2013.01]**
- 12/805 • • • Determination of the optimum packet size, e.g. maximum transmission unit [MTU] **[2013.01]**
- 12/807 • • • Calculation or update of the congestion window **[2013.01]**
- 12/811 • • • Bitrate adaptation in active flows **[2013.01]**
- 12/813 • • • • Policy-based control, e.g. policing **[2013.01]**
- 12/815 • • • • Shaping **[2013.01]**
- 12/819 • • • • Leaky bucket **[2013.01]**
- 12/823 • • • • Packet dropping **[2013.01]**
- 12/825 • • • • Adaptive control, at the source or intermediate nodes, upon congestion feedback, e.g. X-on X-off **[2013.01]**
- 12/827 • • • • • sent by intermediate network nodes **[2013.01]**
- 12/829 • • • • • sent by the destination endpoint **[2013.01]**
- 12/833 • • • • Marking packets or altering packet priority upon congestion or for congestion prevention **[2013.01]**
- 12/835 • • • • using buffer capacity information at the endpoints or transit nodes **[2013.01]**
- 12/841 • • • Flow control actions using time consideration, e.g. round trip time [RTT] **[2013.01]**
- 12/851 • • • Traffic type related actions, e.g. QoS or priority **[2013.01]**
- 12/853 • • • • for real time traffic **[2013.01]**
- 12/855 • • • • for signalling traffic, e.g. operations, administration and maintenance [OAM] or acknowledge [ACK] packets **[2013.01]**
- 12/857 • • • • Mapping QoS constraints between layers or between different networks **[2013.01]**
- 12/859 • • • • Flow control actions based on the nature of the application, e.g. controlling web browsing or e-mail traffic **[2013.01]**
- 12/861 • • • Packet buffering or queuing arrangements; Queue scheduling **[2013.01]**
- 12/863 • • • • Queue scheduling, e.g. Round Robin **[2013.01]**
- 12/865 • • • • • Priority-based scheduling **[2013.01]**
- 12/867 • • • • • Fair share scheduling **[2013.01]**
- 12/869 • • • • • Multilevel scheduling; Hierarchical scheduling **[2013.01]**
- 12/873 • • • • • Bandwidth-aware scheduling **[2013.01]**
- 12/875 • • • • • Delay-aware scheduling **[2013.01]**
- 12/877 • • • • • Distribution of residual bandwidth, e.g. distribution of unused bandwidth to best effort traffic [BET] **[2013.01]**
- 12/879 • • • • Single buffer operations, e.g. buffer pointers or buffer descriptors **[2013.01]**
- 12/883 • • • • Packet storage using a linked list of buffers **[2013.01]**
- 12/885 • • • • Jitter compensation buffering **[2013.01]**
- 12/891 • • • Flow control of aggregated links or flows **[2013.01]**
- 12/893 • • • Connection splitting, e.g. IP splitting **[2013.01]**
- 12/901 • • Ingress point selection by the source endpoint, e.g. Internet service provider [ISP] or point of presence [POP] selection **[2013.01]**
- 12/903 • • • Selection among a plurality of different networks **[2013.01]**
- 12/905 • • • • Dynamic network selection or re-selection, e.g. after degradation of quality **[2013.01]**
- 12/911 • • Network admission control and resource allocation, e.g. bandwidth allocation or in-call renegotiation **[2013.01]**
- 12/913 • • • Reservation actions involving intermediate nodes, e.g. resource reservation protocol [RSVP] **[2013.01]**
- 12/915 • • • Reservation actions involving several network domains, e.g. multilateral agreements or mapping of resources **[2013.01]**
- 12/917 • • • Dynamic resource allocation, e.g. in-call renegotiation requested by the user or upon changing network conditions requested by the network **[2013.01]**
- 12/919 • • • • initiated by the source endpoint **[2013.01]**
- 12/923 • • • • initiated by the network **[2013.01]**
- 12/925 • • • Reservation of resources at the destination endpoint **[2013.01]**
- 12/927 • • • Allocation of resources based on type of traffic, QoS or priority **[2013.01]**
- 12/931 • • Switch fabric architecture **[2013.01]**
- 12/933 • • • Switch core, e.g. crossbar, shared memory or shared medium **[2013.01]**
- 12/935 • • • Switch interfaces, e.g. port details **[2013.01]**
- 12/937 • • • Switch control, e.g. arbitration **[2013.01]**
- 12/939 • • • Provisions for redundant switching, e.g. using parallel switching planes **[2013.01]**
- 12/943 • • • • Transferring a complete packet or cell from each plane **[2013.01]**
- 12/945 • • • • Transferring a part of the packet or cell from each plane, e.g. bit slice **[2013.01]**
- 12/947 • • • Address processing within a device, e.g. using internal ID or tags for routing within a switch **[2013.01]**
- 12/951 • • Assembling and disassembling of packets, e.g. segmentation and reassembly [SAR] in asynchronous transfer mode [ATM] **[2013.01]**
- 12/953 • • • Packet sequencing arrangements for supporting message reassembly, e.g. packet sequence number **[2013.01]**
- 12/955 • • • Padding or de-padding, e.g. inserting or removing dummy data in or from unused packet segments **[2013.01]**
- 13/00 Details of the apparatus or circuits covered by groups H04L 15/00 or H04L 17/00**
- 13/02 • Details not particular to receiver or transmitter
- 13/04 • • Driving mechanisms; Clutches
- 13/06 • • Tape or page guiding or feeding devices
- 13/08 • • Intermediate storage means
- 13/10 • • Distributors
- 13/12 • • • Non-mechanical distributors, e.g. relay distributors

13/14	• • • • Electronic distributors	25/02	• Details
13/16	• of transmitters, e.g. code-bars, code-discs	25/03	• • Shaping networks in transmitter or receiver, e.g. adaptive shaping networks [2]
13/18	• of receivers	25/04	• • • Passive shaping networks [2]
<b>15/00</b>	<b>Apparatus or local circuits for transmitting or receiving dot-and-dash codes, e.g. Morse code</b> (teaching apparatus therefor G09B; telegraph tapping keys H01H 21/86)	25/05	• • Electric or magnetic storage of signals before transmitting or retransmitting for changing the transmission rate [7]
15/03	• Keys structurally combined with sound generators [2]	25/06	• • Dc level restoring means; Bias distortion correction
15/04	• Apparatus or circuits at the transmitting end	25/08	• • Modifications for reducing interference; Modifications for reducing effects due to line faults
15/06	• • with a restricted number of keys, e.g. separate key for each type of code element	25/10	• • Compensating for variations in line balance
15/08	• • • with a single key which transmits dots in one position and dashes in a second position	25/12	• • Compensating for variations in line impedance
15/10	• • • combined with perforating apparatus	25/14	• • Channel dividing arrangements
15/12	• • with keyboard co-operating with code-bars	25/17	• • Interpolating arrangements [4]
15/14	• • • combined with perforating apparatus	25/18	• • Arrangements for inductively generating telegraphic signals
15/16	• • with keyboard co-operating with code discs	25/20	• • Repeater circuits; Relay circuits
15/18	• • Automatic transmitters, e.g. controlled by perforated tape	25/22	• • • Repeaters for converting two wires to four wires; Repeaters for converting single current to double current
15/20	• • • with optical sensing means	25/24	• • • Relay circuits using discharge tubes or semiconductor devices
15/22	• • Apparatus or circuits for sending one or a restricted number of signals, e.g. distress signals	25/26	• • • Circuits with optical sensing means
15/24	• Apparatus or circuits at the receiving end	25/28	• • • Repeaters using modulation and subsequent demodulation
15/26	• • operating only on reception of predetermined code signals, e.g. distress signals, party-line call signals	25/30	• Non-synchronous systems
15/28	• • Code reproducing apparatus	25/32	• • characterised by the code employed
15/30	• • • Writing recorders	25/34	• • • using three or more different amplitudes, e.g. cable code
15/32	• • • Perforating recorders	25/38	• Synchronous or start-stop systems, e.g. for Baudot code
15/34	• • Apparatus for recording received coded signals after translation, e.g. as type-characters	25/40	• • Transmitting circuits; Receiving circuits
<b>17/00</b>	<b>Apparatus or local circuits for transmitting or receiving codes wherein each character is represented by the same number of equal-length code elements, e.g. Baudot code</b>	25/42	• • • using mechanical distributors
17/02	• Apparatus or circuits at the transmitting end	25/44	• • • using relay distributors
17/04	• • with keyboard co-operating with code-bars	25/45	• • • using electronic distributors [2]
17/06	• • • Contact operating means	25/46	• • • using tuning forks or vibrating reeds
17/08	• • • combined with perforating apparatus	25/48	• • • characterised by the code employed (H04L 25/49 takes precedence) [2]
17/10	• • with keyboard co-operating with code-discs	25/49	• • • using code conversion at the transmitter; using predistortion; using insertion of idle bits for obtaining a desired frequency spectrum; using three or more amplitude levels [2]
17/12	• • Automatic transmitters, e.g. controlled by perforated tape	25/493	• • • • by transition coding, i.e. the time-position or direction of a transition being encoded before transmission [3]
17/14	• • • with optical sensing means	25/497	• • • • by correlative coding, e.g. partial response coding or echo modulation coding [3]
17/16	• Apparatus or circuits at the receiving end	25/52	• • Repeater circuits; Relay circuits
17/18	• • Code selection mechanisms	25/54	• • • using mechanical distributors
17/20	• • using perforating recorders	25/56	• • • Non-electrical regenerative repeaters
17/22	• • using mechanical translation and type-bar printing	25/58	• • • using relay distributors
17/24	• • using mechanical translation and type-head printing, e.g. type-wheel, type-cylinder	25/60	• • • Regenerative repeaters with electromagnetic switches
17/26	• • using aggregate motion translation	25/62	• • • using tuning forks or vibrating reeds
17/28	• • using pneumatic or hydraulic translation	25/64	• • • Start-stop regenerative repeaters using discharge tubes or semiconductor devices
17/30	• • using electric or electronic translation	25/66	• • • Synchronous repeaters using discharge tubes or semiconductor devices
<b>19/00</b>	<b>Apparatus or local circuits for step-by-step systems</b>	<b>27/00</b>	<b>Modulated-carrier systems</b>
<b>21/00</b>	<b>Apparatus or local circuits for mosaic printer telegraph systems</b>	27/01	• Equalisers [5]
21/02	• at the transmitting end	27/02	• Amplitude-modulated carrier systems, e.g. using on/off keying; Single sideband or vestigial sideband modulation (H04L 27/32 takes precedence) [2, 5]
21/04	• at the receiving end		
<b>23/00</b>	<b>Apparatus or local circuits for telegraphic systems other than those covered by groups H04L 15/00-H04L 21/00</b>		
23/02	• adapted for orthogonal signalling [2]		
<b>25/00</b>	<b>Baseband systems</b>		

## H04L

- 27/04 • • Modulator circuits; Transmitter circuits
- 27/06 • • Demodulator circuits; Receiver circuits
- 27/08 • • Amplitude regulation arrangements
- 27/10 • Frequency-modulated carrier systems, i.e. using frequency-shift keying (H04L 27/32 takes precedence) [5]
- 27/12 • • Modulator circuits; Transmitter circuits
- 27/14 • • Demodulator circuits; Receiver circuits
- 27/144 • • • with demodulation using spectral properties of the received signal, e.g. by using frequency selective- or frequency sensitive elements [6]
- 27/148 • • • • using filters, including PLL-type filters [6]
- 27/152 • • • • using controlled oscillators, e.g. PLL arrangements [6]
- 27/156 • • • with demodulation using temporal properties of the received signal, e.g. detecting pulse width [6]
- 27/16 • • Frequency regulation arrangements
- 27/18 • Phase-modulated carrier systems, i.e. using phase-shift keying (H04L 27/32 takes precedence) [5]
- 27/20 • • Modulator circuits; Transmitter circuits
- 27/22 • • Demodulator circuits; Receiver circuits
- 27/227 • • • using coherent demodulation [6]
- 27/233 • • • using non-coherent demodulation [6]
- 27/24 • • Half-wave signalling systems
- 27/26 • Systems using multi-frequency codes (H04L 27/32 takes precedence) [5]
- 27/28 • • • with simultaneous transmission of different frequencies each representing one code element
- 27/30 • • wherein each code element is represented by a combination of frequencies
- 27/32 • Carrier systems characterised by combinations of two or more of the types covered by groups H04L 27/02, H04L 27/10, H04L 27/18, or H04L 27/26 [5]
- 27/34 • • Amplitude- and phase-modulated carrier systems, e.g. quadrature-amplitude modulated carrier systems [5]
- 27/36 • • • Modulator circuits; Transmitter circuits [5]
- 27/38 • • • Demodulator circuits; Receiver circuits [5]
- 29/00 Arrangements, apparatus, circuits or systems, not covered by a single one of groups H04L 1/00-H04L 27/00 [5]**
- 29/02 • Communication control; Communication processing (H04L 29/12, H04L 29/14 take precedence) [5]
- 29/04 • • for plural communication lines [5]
- 29/06 • • characterised by a protocol [5]
- 29/08 • • • Transmission control procedure, e.g. data link level control procedure [5]
- 29/10 • • characterised by an interface, e.g. the interface between the data link level and the physical level [5]
- 29/12 • characterised by the data terminal [5]
- 29/14 • Counter-measures to a fault [5]

**H04M TELEPHONIC COMMUNICATION** (circuits for controlling other apparatus via a telephone cable and not involving telephone switching apparatus G08)

### Note(s)

1. This subclass covers :
  - telephonic communication systems combined with other electrical systems;
  - testing arrangements specially adapted for telephonic communication systems.
2. In this subclass, the following terms or expressions are used with the meanings indicated:
  - "subscriber" is a general term for terminal equipment, e.g. telephones for public use;
  - "substation" means subscriber or monitoring equipment which may connect a single subscriber to a line without choice as to subscriber;
  - "satellite" is a type of exchange the operation of which depends upon control signals received from a supervisory exchange;
  - "switching centres" includes exchanges and satellites.

### Subclass index

#### TELEPHONIC SYSTEMS

Combined; party-line systems; prepayment systems.....11/00, 13/00, 17/00

#### EQUIPMENT AND ARRANGEMENTS

Equipment.....1/00

Exchanges: automatic; manual.....3/00, 5/00

Interconnection arrangements: centralised; non-centralised.....7/00, 9/00

Monitoring and control; supply arrangements.....15/00, 19/00

SUBJECT MATTER NOT PROVIDED FOR IN OTHER GROUPS OF THIS SUBCLASS.....99/00

- 
- 1/00 Substation equipment, e.g. for use by subscribers**  
(subscriber services or facilities provided at exchanges  
H04M 3/00; prepayment telephone coin boxes  
H04M 17/00; current supply arrangements  
H04M 19/08) [1, 7]
  - 1/02 • Constructional features of telephone sets
  - 1/03 • • Constructional features of telephone transmitters or receivers, e.g. telephone hand-sets [2]
  - 1/04 • • Supports for telephone transmitters or receivers
  - 1/05 • • • specially adapted for use on head, throat or breast
  - 1/06 • • • Hooks; Cradles
  - 1/08 • • • • associated with switches operated by the weight of the receiver or hand-set
  - 1/10 • • • • associated with switches operated by magnetic effect due to proximity of receiver or hand-set
  - 1/11 • • Supports for sets, e.g. incorporating armrests
  - 1/12 • • • Adjustable supports, e.g. extensible

- 1/13 • • • • pantographic
- 1/14 • • • with resilient means to eliminate extraneous vibrations
- 1/15 • • Protecting or guiding telephone cords [5]
- 1/17 • • Hygienic or sanitary devices on telephone equipment (for mouthpieces or earpieces H04R 1/12) [2]
- 1/18 • • Telephone sets specially adapted for use in ships, mines, or other places exposed to adverse environment (H04M 1/19 takes precedence)
- 1/19 • • Arrangements of transmitters, receivers, or complete sets to prevent eavesdropping, to attenuate local noise or to prevent undesired transmission; Mouthpieces or receivers specially adapted therefor (circuit arrangements for preventing eavesdropping H04M 1/68; telephone cabinets E04H 1/14)
- 1/20 • • Arrangements for preventing acoustic feedback (H04M 1/62 takes precedence)
- 1/21 • • Combinations with auxiliary equipment, e.g. with clocks or memoranda pads
- 1/215 • • • by non-intrusive coupling means, e.g. acoustic couplers [7]
- 1/22 • • Illumination; Arrangements for improving the visibility of characters on dials
- 1/23 • • Construction or mounting of dials or of equivalent devices; Means for facilitating the use thereof (by improving visibility H04M 1/22)
- 1/24 • Arrangements for testing
- 1/247 • Telephone sets including user guidance or feature selection means facilitating their use [7]
- 1/253 • Telephone sets using digital voice transmission [7]
- 1/26 • Devices for calling a subscriber (H04M 1/66 takes precedence) [1, 7]
- 1/27 • • Devices whereby a plurality of signals may be stored simultaneously [2]
- 1/272 • • • with provision for storing only one subscriber number at a time, e.g. by keyboard or dial [2]
- 1/274 • • • with provision for storing more than one subscriber number at a time [2]
- 1/2745 • • • • using static electronic memories, i.e. memories whose operation does not require relative movement between storage means and a transducer, e.g. chips [7]
- 1/275 • • • • • implemented by means of portable electronic directories [7]
- 1/2755 • • • • • whose contents are provided by optical scanning [7]
- 1/276 • • • • using magnetic recording, e.g. on tape [2]
- 1/278 • • • • using punched cards or tapes [2]
- 1/30 • • Devices which can set up and transmit only one digit at a time
- 1/31 • • • by interrupting current to generate trains of pulses; by periodically opening and closing contacts to generate trains of pulses [2]
- 1/315 • • • • Clutches, spring assemblies, speed regulators, e.g. centrifugal brakes (H04M 1/32-H04M 1/40 take precedence) [3]
- 1/32 • • • • Locking setting devices during transmission to prevent interference by user
- 1/34 • • • • Lost-motion or other arrangements for ensuring a pause between successive digit transmissions
- 1/38 • • • • Pulses transmitted by a movement variably limited by the setting of a stop
- 1/40 • • • • wherein the setting-operation short-circuits or open-circuits the transmitting mechanism during a variable part of a cycle
- 1/50 • • • by generating or selecting currents of predetermined frequencies or combinations of frequencies [2]
- 1/515 • • by generating or selecting signals other than trains of pulses of similar shape, or signals other than currents of one or more different frequencies, e.g. generation of dc signals of alternating polarity, coded pulses or impedance dialling [2]
- 1/52 • • Arrangements wherein a dial or the like is mechanically coupled to a line selector
- 1/53 • • Generation of additional signals, e.g. additional pulses [2]
- 1/54 • • • Arrangements wherein a dial or the like generates identifying signals, e.g. in party-line systems [2]
- 1/56 • Arrangements for indicating or recording the called number at the calling subscriber's set
- 1/57 • Arrangements for indicating or recording the number of the calling subscriber at the called subscriber's set (at the operator set in a manual exchange H04M 5/20) [2]
- 1/58 • Anti-side-tone circuits
- 1/60 • including speech amplifiers
- 1/62 • • Constructional arrangements
- 1/64 • Automatic arrangements for answering calls; Automatic arrangements for recording messages for absent subscribers; Arrangements for recording conversations (centralised dictation systems H04M 11/10) [1, 7]
- 1/65 • • Recording arrangements [2, 7]
- 1/652 • • • Means for playing back the recorded messages by remote control over a telephone line (H04M 1/658 takes precedence) [7]
- 1/654 • • • Telephone line monitoring circuits therefor, e.g. ring detectors [7]
- 1/656 • • • for recording conversations [7]
- 1/658 • • • Means for redirecting recorded messages to other extensions or equipment [7]
- 1/66 • with means for preventing unauthorised or fraudulent calling (verifying user identity or authority in secret or secure digital communications H04L 9/32) [1, 7]
- 1/663 • • Preventing unauthorised calls to a telephone set [7]
- 1/665 • • • by checking the validity of a code [7]
- 1/667 • • Preventing unauthorised calls from a telephone set (H04M 1/677 takes precedence) [7]
- 1/67 • • • by electronic means [7]
- 1/673 • • • • the user being required to key in a code [7]
- 1/675 • • • • the user being required to insert a coded card, e.g. a smart card carrying an integrated circuit chip [7]
- 1/677 • • Preventing the dialling or sending of predetermined telephone numbers or selected types of telephone numbers, e.g. long distance numbers [7]
- 1/68 • Circuit arrangements for preventing eavesdropping
- 1/70 • • Lock-out or secrecy arrangements in party-line systems
- 1/72 • Substation extension arrangements; Cordless telephones, i.e. devices for establishing wireless links to base stations without route selecting [1, 7]
- 1/723 • • using two or more extensions per line (H04M 1/725 takes precedence) [7]
- 1/725 • • Cordless telephones [7]

- 1/727 • • • Identification code transfer arrangements [7]
- 1/73 • • • Battery saving arrangements [7]
- 1/733 • • • with a plurality of base stations connected to a plurality of lines [7]
- 1/737 • • • characterised by transmission of electromagnetic waves other than radio waves, e.g. infra-red waves [7]
- 1/738 • Interface circuits for coupling substations to external telephone lines (H04M 1/78 takes precedence) [7]
- 1/74 • • with means for reducing interference; with means for reducing effects due to line faults
- 1/76 • • Compensating for differences in line impedance
- 1/78 • Circuit arrangements in which low-frequency speech signals proceed in one direction on the line, while speech signals proceeding in the other direction on the line are modulated on a high-frequency carrier signal [2]
- 1/80 • Telephone line holding circuits [7]
- 1/82 • Line monitoring circuits for call progress or status discrimination [7]

### 3/00 Automatic or semi-automatic exchanges

- 3/02 • Calling substations, e.g. by ringing (selective calling H04Q)
- 3/04 • • the calling signal being supplied from the final selector
- 3/06 • • the calling signal being supplied from the subscriber's line circuit
- 3/08 • Indicating faults in circuits or apparatus
- 3/10 • • Providing fault- or trouble-signals
- 3/12 • • Marking faulty circuits "busy"; Enabling equipment to disengage itself from faulty circuits
- 3/14 • • Signalling existence of persistent "off-hook" condition
- 3/16 • with lock-out or secrecy provision in party-line systems
- 3/18 • with means for reducing interference; with means for reducing effects due to line faults
- 3/20 • with means for interrupting existing connections; with means for breaking-in on conversations
- 3/22 • Arrangements for supervision, monitoring or testing
- 3/24 • • with provision for checking the normal operation
- 3/26 • • with means for applying test signals
- 3/28 • • • Automatic routine testing
- 3/30 • • • • for subscribers' lines
- 3/32 • • • • for lines between exchanges
- 3/34 • • • Testing for cross-talk
- 3/36 • • Statistical metering, e.g. recording occasions when traffic exceeds capacity of trunks
- 3/38 • Graded-service arrangements, i.e. some subscribers prevented from establishing certain connections (queuing arrangements H04Q 3/64)
- 3/40 • Applications of speech amplifiers
- 3/42 • Systems providing special services or facilities to subscribers (specially adapted for wireless communication networks H04W 4/00)
- 3/424 • • Arrangements for automatic redialling (at the subscriber's set H04M 1/27) [7]
- 3/428 • • Arrangements for placing incoming calls on hold [7]
- 3/432 • • Arrangements for calling a subscriber at a specific time, e.g. morning call service [7]
- 3/436 • • Arrangements for screening incoming calls [7]

- 3/44 • • Additional connecting arrangements for providing access to frequently-wanted subscribers, e.g. abbreviated dialling (at the subscriber's set H04M 1/27; automatic redialling H04M 3/424) [1, 7]
- 3/46 • • Arrangements for calling a number of substations in a predetermined sequence until an answer is obtained
- 3/48 • • Arrangements for recalling a calling subscriber when the wanted subscriber ceases to be busy
- 3/487 • • Arrangements for providing information services, e.g. recorded voice services or time announcements [7]
- 3/493 • • • Interactive information services, e.g. directory enquiries [7]
- 3/50 • • Centralised arrangements for answering calls; Centralised arrangements for recording messages for absent or busy subscribers (H04M 3/487 takes precedence; centralised dictation systems H04M 11/10) [1, 7]
- 3/51 • • • Centralised call answering arrangements requiring operator intervention [7]
- 3/52 • • • • Arrangements for routing dead number calls to operators
- 3/523 • • • • with call distribution or queuing [7]
- 3/527 • • • Centralised call answering arrangements not requiring operator intervention [7]
- 3/53 • • • Centralised arrangements for recording incoming messages [7]
- 3/533 • • • • Voice mail systems [7]
- 3/537 • • • • Arrangements for indicating the presence of a recorded message [7]
- 3/54 • • Arrangements for diverting calls for one subscriber to another predetermined subscriber
- 3/56 • • Arrangements for connecting several subscribers to a common circuit, i.e. affording conference facilities (video conference systems H04N 7/15)
- 3/58 • • Arrangements for transferring received calls from one subscriber to another; Arrangements affording interim conversations between either the calling or the called party and a third party (substation line holding circuits H04M 1/80) [1, 7]
- 3/60 • Semi-automatic systems, i.e. systems in which the numerical selection of the outgoing line is under the control of an operator
- 3/62 • • Keyboard equipment
- 3/64 • • Arrangements for signalling the number or class of the calling line to the operator (between operators in inter-exchange working H04M 5/18)

### 5/00 Manual exchanges (substation equipment in general H04M 1/00)

- 5/02 • Constructional details (jacks, jack-plugs H01R 24/58)
- 5/04 • Arrangements for indicating calls or supervising connections for calling or clearing
- 5/06 • • affording automatic call distribution
- 5/08 • using connecting means other than cords
- 5/10 • using separate plug for each subscriber
- 5/12 • Calling substations, e.g. by ringing
- 5/14 • Applications of speech amplifiers
- 5/16 • with means for reducing interference; with means for reducing effects due to line faults
- 5/18 • Arrangements for signalling the class or number of called or calling line from one exchange to another
- 5/20 • • Arrangements for indicating the numbers of the incoming lines



<b>7/00</b>	<b>Arrangements for interconnection between switching centres</b>	15/02	• Severing connection after a predetermined time
7/02	• for compensating differences of ground potential	15/04	• Recording calls in printed, perforated, or other permanent form
7/04	• for compensating differences of line impedance	15/06	• • Recording class or number of calling party or called party
7/06	• using auxiliary connections for control or supervision	15/08	• Metering calls to called party
7/08	• for phantom working	15/10	• Metering calls from calling party
7/10	• for two-way working, i.e. calls may be set-up in either direction over the same connection	15/12	• • Discriminative metering
7/12	• for working between exchanges having different types of switching equipment, e.g. power-driven and step by step or decimal and non-decimal	15/14	• • • according to class of calling party
7/14	• in systems involving main and subordinate switching centres (current supply source at subordinate switching centre charged from main exchange H04M 19/06)	15/16	• • • according to connection obtained
7/16	• in systems employing carrier frequencies	15/18	• • • according to duration of call
<b>9/00</b>	<b>Arrangements for interconnection not involving centralised switching</b>	15/20	• • • • Operator's time recording or indicating arrangements
9/02	• involving a common line for all parties	15/22	• • • according to time of day
9/04	• involving a separate line for each pair of parties	15/24	• • • preventing metering of tax-free calls to certain lines, e.g. to fire or ambulance stations
9/06	• involving combinations of interconnecting lines	15/26	• • with a meter at the exchange controlled by an operator
9/08	• Two-way loud-speaking telephone systems with means for conditioning the signal, e.g. for suppressing echoes for one or both directions of traffic	15/28	• with meter at substation
9/10	• • with switching of direction of transmission by voice frequency	15/30	• • the meter not being controlled from an exchange
<b>11/00</b>	<b>Telephonic communication systems specially adapted for combination with other electrical systems</b>	15/32	• Metering arrangements for satellites or concentrators which connect one or more exchange lines with a group of local lines
11/02	• with bell or annunciator systems	15/34	• Metering arrangements for private branch exchanges
11/04	• with alarm systems, e.g. fire, police or burglar alarm systems	15/36	• Metering arrangements for party-lines
11/06	• Simultaneous speech and data transmission, e.g. telegraphic transmission over the same conductors	15/38	• Metering by apparatus other than mechanical step-by-step counter type
11/08	• specially adapted for optional reception of entertainment or informative matter	<b>17/00</b>	<b>Prepayment telephone systems</b> (using a coded card to authorise calls from a telephone set H04M 1/675) [1, 7]
11/10	• with dictation recording and playback systems	17/02	• Coin-freed or check-freed systems
<b>13/00</b>	<b>Party-line systems</b> (substation equipment H04M 1/00; exchange equipment H04M 3/00, H04M 5/00; metering arrangements H04M 15/36)	<b>19/00</b>	<b>Current supply arrangements for telephone systems</b> (for selecting equipment H04Q 1/28)
<b>15/00</b>	<b>Arrangements for metering, time-control or time-indication</b>	19/02	• providing ringing current or supervisory tones, e.g. dialling tone or busy tone
		19/04	• • the ringing-current being generated at the substations
		19/06	• in which current supply sources at subordinate switching centres are charged from the main exchange
		19/08	• with current supply sources at the substations (generating ringing current H04M 19/04) [1, 7]
		<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass [2006.01]</b>
<b>H04N</b>	<b>PICTORIAL COMMUNICATION, e.g. TELEVISION [4]</b>		

**Note(s)**

- This subclass covers:
  - transmission of pictures or their transient or permanent reproduction either locally or remotely, by methods involving both the following steps:
    - step (a): the scanning of a picture, i.e. resolving the whole picture-containing area into individual picture-elements and the derivation of picture-representative electric signals related thereto, simultaneously or in sequence;
    - step (b): the reproduction of the whole picture-containing area by the reproduction of individual picture-elements into which the picture is resolved by means of picture-representative electric signals derived therefrom, simultaneously or in sequence;
  - (in group H04N 1/00) systems for the transmission or the reproduction of arbitrarily composed pictures or patterns in which the local light variations composing a picture are not subject to variation with time, e.g. documents (both written and printed), maps, charts, photographs (other than cinematograph films);
  - circuits specially designed for dealing with pictorial communication signals, e.g. television signals, as distinct from merely signals of a particular frequency range.
- This subclass does not cover:
  - circuits or other parts of systems which form the subject of other subclasses, which are covered by the corresponding subclasses, e.g. H03C, H03F, H03J, H04B, H04H;

- systems in which legible alphanumeric or like character forms are analysed according to step (a) of Note (1) to derive an electric signal from which the character is recognised by comparison with stored information, which are covered by subclass G06K;
  - systems for the direct photographic copying of an original picture in which an electric signal representative of the picture is derived according to the said step (a) and employed to modify the operation of the system, e.g. to control exposure, which are covered by class G03;
  - systems for the reproduction according to step (b) of Note (1) of pictures comprising alphanumeric or like character forms but involving the production of the equivalent of a signal which would be derived according to the above-mentioned step (a), e.g. by cams, punched card or tape, coded control signal, or other means, which are covered by the subclass for the application, e.g. G01D, G06T, H04L;
  - systems for the reproduction according to the above-mentioned step (b) of pictures comprising alphanumeric or like character forms and involving the generation according to the above-mentioned step (a) of picture-representative electric signals from a pre-arranged assembly of such characters, or records thereof, forming an integral part of the systems, which are covered by the subclass for the application, e.g. B41B, G06K, subject to those applications which are covered by this subclass;
  - printing, duplication or marking processes, or materials therefor, which are covered by the relevant subclasses, e.g. B41C, B41J, B41M, G03C, G03F, G03G.
3. In this subclass, the following expression is used with the meaning indicated:
- "television systems" means those systems for the transmission and reproduction of arbitrarily composed pictures in which the local light variations composing a picture may change with time, e.g. natural "live" scenes, recordings of such scenes such as cinematograph films.

**Note(s)**

In groups H04N 1/00-H04N 17/00, it is desirable to add the indexing code of group H04N 101/00.

**1/00 Scanning, transmission or reproduction of documents or the like, e.g. facsimile transmission; Details thereof [3, 4]**

- |       |   |       |  |
|-------|---|-------|--|
| 1/024 | • Details of scanning heads [3, 4]  | 1/193 | • • • • • using electrically scanned linear arrays [6]   |
| 1/028 | • • for picture-information pick-up [3, 4]  | 1/195 | • • • the array comprising a two-dimensional array [6]   |
| 1/029 | • • • Heads optically focused on only one picture element at a time [6]   | 1/203 | • • Simultaneous scanning of two or more separate pictures [6]   |
| 1/03  | • • • with photodetectors arranged in a substantially linear array (scanning of linear arrays H04N 1/19) [6]  | 1/207 | • • Simultaneous scanning of the original picture and the reproduced picture with a common scanning device [6]                           |
| 1/031 | • • • • the photodetectors having a one-to-one and optically positive correspondence with the scanned picture elements, e.g. linear contact sensors [6] | 1/21  | • Intermediate information storage (H04N 1/387, H04N 1/41 take precedence) [4]   |
| 1/032 | • • for picture-information reproduction [3, 4]   | 1/23  | • Reproducing arrangements (details of scanning heads H04N 1/024; scanning arrangements therefor H04N 1/04) [4]                          |
| 1/034 | • • • using ink, e.g. ink-jet heads [5]   | 1/27  | • • involving production of a magnetic intermediate picture [4]  |
| 1/036 | • • • for optical reproduction [3, 4]   | 1/29  | • • involving production of an electrostatic intermediate picture [4]  |
| 1/04  | • Scanning arrangements (H04N 1/387 takes precedence) [4]   | 1/31  | • • Mechanical arrangements for picture transmission, e.g. adaptation of clutches, gearing, gear transmissions [4]                       |
| 1/047 | • • Detection, control or error compensation of scanning velocity or position (H04N 1/17 takes precedence) [6]  | 1/32  | • Circuits or arrangements for control or supervision between transmitter and receiver   |
| 1/053 | • • • in main scanning direction, e.g. synchronisation of line start or picture elements in a line [6]  | 1/327 | • • Initiating, continuing or ending a single-mode communication; Handshaking therefor [6]   |
| 1/06  | • • using cylindrical picture-bearing surfaces [4]  | 1/333 | • • Mode signalling or mode changing; Handshaking therefor [6]   |
| 1/08  | • • • Mechanisms for mounting or holding the sheet around the drum [4]  | 1/34  | • • for coin-freed systems   |
| 1/10  | • • using flat picture-bearing surfaces [4]   | 1/36  | • • for synchronising or phasing transmitter and receiver  |
| 1/107 | • • • with manual scanning [6]  | 1/38  | • Circuits or arrangements for blanking or otherwise eliminating unwanted parts of pictures (H04N 1/387 takes precedence) [4]            |
| 1/113 | • • using oscillating or rotating mirrors [6]   | 1/387 | • Composing, repositioning or otherwise modifying originals [4]  |
| 1/12  | • • using the sheet-feed movement as the slow scanning component (using multi-element arrays H04N 1/19) [4, 6]  | 1/393 | • • Enlarging or reducing [4]  |
| 1/14  | • • • using a rotating endless belt carrying the scanning heads [4]   | 1/40  | • Picture signal circuits (H04N 1/387 takes precedence) [4]  |
| 1/16  | • • • using a rotating helical element [4]  | 1/401 | • • Compensating positionally unequal response of the pick-up or reproducing head (H04N 1/403 takes precedence) [6]                      |
| 1/17  | • • the scanning speed being dependent on content of picture [3, 4]   | 1/403 | • • Discrimination between the two tones in the picture signal of a two-tone original [6]  |
| 1/19  | • • using multi-element arrays [6]  | 1/405 | • • Halftoning, i.e. converting the picture signal of a continuous-tone original into a corresponding signal showing only two levels [6] |
| 1/191 | • • • the array comprising a one-dimensional array [6]  | 1/407 | • • Control or modification of tonal gradation or of extreme levels, e.g. background level [6]   |
| 1/192 | • • • • Simultaneously scanning picture elements on one main scanning line [6]  |       |  |

- 1/409 • • Edge or detail enhancement; Noise or error suppression [6]
- 1/41 • Bandwidth or redundancy reduction (by scanning H04N 1/17) [3]
- 1/411 • • for the transmission or reproduction of two-tone pictures, e.g. black and white pictures [4]
- 1/413 • • • Systems or arrangements allowing the picture to be reproduced without loss or modification of picture-information [4]
- 1/415 • • • • in which the picture-elements are subdivided or grouped into fixed one-dimensional or two-dimensional blocks [4]
- 1/417 • • • • using predictive or differential encoding [4]
- 1/419 • • • • in which encoding of the length of a succession of picture-elements of the same value along a scanning line is the only encoding step [4]
- 1/42 • Systems for two-way working
- 1/44 • Secrecy systems
- 1/46 • Colour picture communication systems
- 1/48 • • Picture signal generators (for halftone screening H04N 1/52) [6]
- 1/50 • • Picture reproducers (for halftone screening H04N 1/52) [6]
- 1/52 • • Circuits or arrangements for halftone screening [6]
- 1/54 • • Conversion of colour picture signals to a plurality of signals some of which represent particular mixed colours, e.g. for textile printing [6]
- 1/56 • • Processing of colour picture signals (H04N 1/52 takes precedence) [6]
- 1/58 • • • Edge or detail enhancement; Noise or error suppression, e.g. colour misregistration correction (H04N 1/62 takes precedence) [6]
- 1/60 • • • Colour correction or control [6]
- 1/62 • • • • Retouching, i.e. modification of isolated colours only or in isolated picture areas only [6]
- 1/64 • • Systems for the transmission or the storage of the colour picture signal; Details therefor, e.g. coding or decoding means therefor [6]
- 3/00 Scanning details of television systems; Combination thereof with generation of supply voltages [4]**
- 3/02 • by optical-mechanical means only (H04N 3/36 takes precedence) [2]
- 3/04 • • having a moving aperture
- 3/06 • • having a moving lens or other refractor
- 3/08 • • having a moving reflector
- 3/09 • • • for electromagnetic radiation in the invisible region, e.g. infra-red [4]
- 3/10 • by means not exclusively optical-mechanical (H04N 3/36 takes precedence; devices or arrangements for the electro-, magneto- or acousto-optical modulation or deflection of light beams G02F) [2]
- 3/12 • • by switched stationary formation of lamps, photocells, or light relays
- 3/14 • • by means of electrically scanned solid-state devices (for picture generation H04N 5/335)
- 3/16 • • by deflecting electron beam in cathode-ray tube
- 3/18 • • • Generation of supply voltages, in combination with electron beam deflecting [4]
- 3/185 • • • • Maintaining dc voltage constant [4]
- 3/19 • • • • Arrangements or assemblies in supply circuits for the purpose of withstanding high voltages [3]
- 3/20 • • • Prevention of damage to cathode-ray tubes in event of failure of scanning
- 3/22 • • • Circuits for controlling dimensions, shape or centering of picture on screen
- 3/223 • • • • Controlling dimensions (by maintaining the cathode-ray tube high voltage constant H04N 3/185) [4]
- 3/227 • • • • Centering [4]
- 3/23 • • • • Distortion correction, e.g. for pincushion distortion correction, S-correction [4]
- 3/233 • • • • using active elements [4]
- 3/237 • • • • using passive elements [4]
- 3/24 • • • Blanking circuits
- 3/26 • • • Modifications of scanning arrangements to improve focusing
- 3/27 • • • Circuits special to multi-standard receivers [3, 4]
- 3/28 • • producing multiple scanning, i.e. using more than one spot at the same time
- 3/30 • • otherwise than with constant velocity or otherwise than in pattern formed by unidirectional, straight, substantially horizontal or vertical lines
- 3/32 • • • Velocity varied in dependence upon picture information
- 3/34 • • • Elemental scanning area oscillated rapidly in direction transverse to main scanning direction
- 3/36 • Scanning of motion picture films, e.g. for telecine [2]
- 3/38 • • with continuously moving film [4]
- 3/40 • • with intermittently moving film [4]
- 5/00 Details of television systems** (scanning details or combination thereof with generation of supply voltages H04N 3/00; specially adapted for colour television H04N 9/00; servers specially adapted for the distribution of content H04N 21/20; client devices specially adapted for the reception of or interaction with content H04N 21/40) [4, 2011.01]
- 5/04 • Synchronising (for television systems using pulse code modulation H04N 7/24) [4]
- 5/05 • • Synchronising circuits with arrangements for extending range of synchronisation, e.g. by using switching between several time constants [2]
- 5/06 • • Generation of synchronising signals
- 5/067 • • • Arrangements or circuits at the transmitter end [4]
- 5/073 • • • • for mutually locking plural sources of synchronising signals, e.g. studios or relay stations [4]
- 5/08 • • Separation of synchronising signals from picture signals
- 5/10 • • • Separation of line synchronising signal from frame synchronising signal
- 5/12 • • Devices in which the synchronising signals are only operative if a phase difference occurs between synchronising and synchronised scanning devices, e.g. flywheel synchronising [2]
- 5/14 • Picture signal circuitry for video frequency region (H04N 5/222 takes precedence) [2]
- 5/16 • • Circuitry for reinsertion of dc and slowly varying components of signal; Circuitry for preservation of black or white level
- 5/18 • • • by means of "clamp" circuit operated by switching circuit
- 5/20 • • Circuitry for controlling amplitude response
- 5/202 • • • Gamma control [4]
- 5/205 • • • for correcting amplitude versus frequency characteristic [4]

- 5/208 • • • • for compensating for attenuation of high frequency components, e.g. crispening, aperture distortion correction **[4]**
  - 5/21 • • Circuitry for suppressing or minimising disturbance, e.g. moire, halo (suppression of noise in television recording H04N 5/911)
  - 5/213 • • • Circuitry for suppressing or minimising impulsive noise (H04N 5/217 takes precedence) **[4]**
  - 5/217 • • • in picture signal generation (noise reduction or noise suppression involving solid-state image sensors H04N 5/357) **[4, 2011.01]**
  - 5/222 • Studio circuitry; Studio devices; Studio equipment **[4]**
  - 5/225 • • Television cameras **[4]**
  - 5/228 • • • Circuit details for pick-up tubes **[4]**
  - 5/232 • • • Devices for controlling television cameras, e.g. remote control (H04N 5/235 takes precedence) **[4]**
  - 5/235 • • • Circuitry for compensating for variation in the brightness of the object **[4]**
  - 5/238 • • • • by influencing optical part of the camera **[4]**
  - 5/243 • • • • by influencing the picture signal **[4]**
  - 5/247 • • • Arrangement of television cameras **[4]**
  - 5/253 • • Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine (scanning details therefor H04N 3/36) **[4]**
  - 5/257 • • Picture signal generators using flying-spot scanners (H04N 5/253 takes precedence) **[4]**
  - 5/262 • • Studio circuits, e.g. for mixing, switching-over, change of character of image, other special effects **[4]**
  - 5/265 • • • Mixing **[4]**
  - 5/268 • • • Signal distribution or switching (for broadcasting H04H 20/00) **[4]**
  - 5/272 • • • Means for inserting a foreground image in a background image, i.e. inlay, outlay **[4]**
  - 5/275 • • • • Generation of keying signals **[4]**
  - 5/278 • • • Subtitling **[4]**
  - 5/28 • • Mobile studios
  - 5/30 • Transforming light or analogous information into electric information (H04N 5/222 takes precedence; scanning details H04N 3/00) **[2, 4, 7]**
  - 5/32 • • Transforming X-rays
  - 5/321 • • • with video transmission of fluoroscopic images **[5]**
  - 5/325 • • • • Image enhancement, e.g. by subtraction techniques using polyenergetic X-rays **[5]**
  - 5/33 • • Transforming infra-red radiation **[2]**
  - 5/335 • • using solid-state image sensors [SSIS] (H04N 5/32, H04N 5/33 take precedence) **[4, 2011.01]**
- Note(s) [2011.01]**
- In this group, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
- 5/341 • • • Extracting pixel data from an image sensor by controlling scanning circuits, e.g. by modifying the number of pixels having been sampled or to be sampled **[2011.01]**
  - 5/343 • • • • by switching between different modes of operation using different resolutions or aspect ratios, e.g. between still and video mode or between interlaced and non-interlaced mode **[2011.01]**
  - 5/345 • • • • by partially reading an SSIS array **[2011.01]**
  - 5/347 • • • • by combining or binning pixels in SSIS **[2011.01]**
  - 5/349 • • • • for increasing resolution by shifting the sensor relative to the scene **[2011.01]**
  - 5/351 • • • Control of the SSIS depending on the scene, e.g. brightness or motion in the scene **[2011.01]**
  - 5/353 • • • • Control of the integration time **[2011.01]**
  - 5/355 • • • • Control of the dynamic range **[2011.01]**
  - 5/357 • • • Noise processing, e.g. detecting, correcting, reducing or removing noise **[2011.01]**
  - 5/359 • • • • applied to excess charges produced by the exposure, e.g. smear, blooming, ghost image, crosstalk or leakage between pixels **[2011.01]**
  - 5/361 • • • • applied to dark current **[2011.01]**
  - 5/363 • • • • applied to reset noise, e.g. KTC noise **[2011.01]**
  - 5/365 • • • • applied to fixed-pattern noise, e.g. non-uniformity of response **[2011.01]**
  - 5/367 • • • • • applied to defects, e.g. non-responsive pixels **[2011.01]**
  - 5/369 • • • SSIS architecture; Circuitry associated therewith **[2011.01]**
  - 5/372 • • • • Charge-coupled device [CCD] sensors; Time delay and integration [TDI] registers or shift registers specially adapted for SSIS **[2011.01]**
  - 5/3722 • • • • • using frame interline transfer [FIT] **[2011.01]**
  - 5/3725 • • • • • using frame transfer [FT] **[2011.01]**
  - 5/3728 • • • • • using interline transfer [IT] **[2011.01]**
  - 5/374 • • • • Addressed sensors, e.g. MOS or CMOS sensors **[2011.01]**
  - 5/3745 • • • • • having additional components embedded within a pixel or connected to a group of pixels within a sensor matrix, e.g. memories, A/D converters, pixel amplifiers, shared circuits or shared components **[2011.01]**
  - 5/376 • • • • Addressing circuits **[2011.01]**
  - 5/378 • • • • Readout circuits, e.g. correlated double sampling [CDS] circuits, output amplifiers or A/D converters **[2011.01]**
  - 5/38 • Transmitter circuitry (H04N 5/14 takes precedence) **[4]**
  - 5/40 • • Modulation circuits
  - 5/42 • • for transmitting at will black-and-white or colour signals
  - 5/44 • Receiver circuitry (H04N 5/14 takes precedence) **[4, 2011.01]**
  - 5/445 • • for displaying additional information (H04N 5/50 takes precedence) **[4, 2011.01]**
  - 5/45 • • • Picture in picture **[4, 2011.01]**
  - 5/455 • • Demodulation-circuits **[4]**
  - 5/46 • • for receiving on more than one standard at will (deflecting circuits of multi-standard receivers H04N 3/27) **[4]**
  - 5/50 • • Tuning indicators; Automatic tuning control **[4]**
  - 5/52 • • Automatic gain control **[4]**
  - 5/53 • • • Keyed automatic gain control **[4]**
  - 5/54 • • • for positively-modulated picture signals (H04N 5/53 takes precedence) **[4]**
  - 5/56 • • • for negatively-modulated picture signals (H04N 5/53 takes precedence) **[4]**
  - 5/57 • • Control of contrast or brightness **[4]**
  - 5/58 • • • in dependence upon ambient light **[4]**

- 5/59 • • • in dependence upon beam current of cathode ray tube [4]
- 5/60 • • for the sound signals
- 5/62 • • • Inter-carrier circuits, i.e. heterodyning sound and vision carriers
- 5/63 • Generation or supply of power specially adapted for television receivers (generation of supply voltages in combination with electron beam deflecting H04N 3/18) [4]
- 5/64 • Constructional details of receivers, e.g. cabinets, dust covers (furniture aspects A47B, e.g. A47B 81/06) [2]
- 5/645 • • Mounting of picture tube on chassis or in housing
- 5/65 • • Holding-devices for protective discs or for picture masks
- 5/655 • • Construction or mounting of chassis, e.g. for varying the elevation of the tube
- 5/66 • Transforming electric information into light information (scanning details H04N 3/00)
- 5/68 • • Circuit details for cathode-ray display tubes
- 5/70 • • Circuit details for electroluminescent devices
- 5/72 • Modifying the appearance of television pictures by optical filters or diffusing screens
- 5/74 • Projection arrangements for image reproduction, e.g. using eidophor
- 5/76 • Television signal recording [3, 4]
- 5/761 • • Systems for programming the time at which predetermined television channels will be selected for recording [7]
- 5/7613 • • • by using data entered by the user and a reference timing clock incorporated in the recorder [7]
- 5/7617 • • • by using data entered by the user and reference data transmitted by the broadcasting station [7]
- 5/765 • • Interface circuits between an apparatus for recording and another apparatus (associated working of recording or reproducing apparatus with a television camera or receiver in which the television signal is not significantly involved G11B 31/00) [6]
- 5/77 • • • between a recording apparatus and a television camera [6]
- 5/775 • • • between a recording apparatus and a television receiver [6]
- 5/78 • • using magnetic recording (H04N 5/91 takes precedence) [3]
- 5/781 • • • on discs or drums [3]
- 5/782 • • • on tape [3]
- 5/7822 • • • with stationary magnetic heads [6]
- 5/7824 • • • with rotating magnetic heads [6]
- 5/7826 • • • • involving helical scanning of the magnetic tape [6]
- 5/7828 • • • • involving transversal scanning of the magnetic tape [6]
- 5/783 • • • • Adaptations for reproducing at a rate different from the recording rate [3]
- 5/784 • • • on a sheet [6]
- 5/80 • • using electrostatic recording (H04N 5/91 takes precedence) [3]
- 5/82 • • • using deformable thermoplastic recording medium
- 5/83 • • • • on discs or drums [3]
- 5/84 • • using optical recording (H04N 5/80, H04N 5/89, H04N 5/91 take precedence) [3, 4]
- 5/85 • • • on discs or drums [3]
- 5/87 • • • Producing a motion picture film from a television signal [3, 4]
- 5/89 • • using holographic recording (H04N 5/91 take precedence) [3]
- 5/90 • • • on discs or drums [3]
- 5/903 • • using variable electrical capacitive recording (H04N 5/91 takes precedence) [4]
- 5/907 • • using static stores, e.g. storage tubes, semiconductor memories (H04N 5/91 takes precedence; based on relative movement between record carrier and transducer H04N 5/78-H04N 5/903) [4]
- 5/91 • • Television signal processing therefor (of colour signals H04N 9/79) [3]
- 5/911 • • • for the suppression of noise [6]
- 5/913 • • • for scrambling [6]
- 5/915 • • • for field- or frame-skip recording or reproducing [6]
- 5/917 • • • for bandwidth reduction (using pulse code modulation H04N 7/24) [6]
- 5/919 • • • • by dividing samples or signal segments, e.g. television lines, among a plurality of recording channels [6]
- 5/92 • • • Transformation of the television signal for recording, e.g. modulation, frequency changing; Inverse transformation for playback [3]
- 5/921 • • • • by recording or reproducing the baseband signal [6]
- 5/922 • • • • by modulation of the signal on a carrier wave, e.g. amplitude or frequency modulation [6]
- 5/923 • • • • using preemphasis of the signal before modulation and deemphasis of the signal after demodulation [6]
- 5/924 • • • • using duty cycle modulation [6]
- 5/926 • • • • by pulse code modulation (H04N 5/919 takes precedence) [6]
- 5/928 • • • • the sound signal being pulse code modulated and recorded in time division multiplex with the modulated video signal [6]
- 5/93 • • • Regeneration of the television signal or of selected parts thereof [3]
- 5/931 • • • • for restoring the level of the reproduced signal [6]
- 5/932 • • • • Regeneration of analogue synchronisation signals [6]
- 5/935 • • • • Regeneration of digital synchronisation signals [6]
- 5/937 • • • • by assembling picture element blocks in an intermediate store [6]
- 5/94 • • • • Signal drop-out compensation [3]
- 5/945 • • • • • for signals recorded by pulse code modulation [6]
- 5/95 • • • • Time-base error compensation [3]
- 5/953 • • • • • by using an analogue memory, e.g. a CCD-shift register, the delay of which is controlled by a voltage controlled oscillator [6]
- 5/956 • • • • • by using a digital memory with independent write-in and read-out clock generators [6]
- 7/00 • **Television systems** (details H04N 3/00, H04N 5/00; methods or arrangements, for coding, decoding, compressing or decompressing digital video signals H04N 19/00; selective content distribution H04N 21/00) [4, 2011.01]
- 7/01 • Conversion of standards [4]

- 7/015 • High-definition television systems [6]
- 7/025 • Systems for transmission of digital non-picture data, e.g. of text during the active part of a television frame [6]
- 7/03 • • Subscription systems therefor [6]
- 7/035 • • Circuits for the digital non-picture data signal, e.g. for slicing of the data signal, for regeneration of the data-clock signal, for error detection or correction of the data signal [6]
- 7/04 • Systems for the transmission of one television signal, i.e. both picture and sound, by a single carrier [4]
- 7/045 • • the carrier being frequency modulated [6]
- 7/06 • Systems for the simultaneous transmission of one television signal, i.e. both picture and sound, by more than one carrier [4]
- 7/08 • Systems for the simultaneous or sequential transmission of more than one television signal, e.g. additional information signals, the signals occupying wholly or partially the same frequency band [4, 6]
- 7/081 • • the additional information signals being transmitted by means of a subcarrier [6]
- 7/083 • • with signal insertion during the vertical and the horizontal blanking interval [6]
- 7/084 • • with signal insertion during the horizontal blanking interval [6]
- 7/085 • • • the inserted signal being digital [6]
- 7/087 • • with signal insertion during the vertical blanking interval [4]
- 7/088 • • • the inserted signal being digital [6]
- 7/10 • Adaptations for transmission by electrical cable (H04N 7/12 takes precedence) [4]
- 7/12 • Systems in which the television signal is transmitted via one channel or a plurality of parallel channels, the bandwidth of each channel being less than the bandwidth of the television signal (H04N 7/24 takes precedence; high-definition television systems H04N 7/015) [4]
- 7/14 • Systems for two-way working (H04N 7/173 takes precedence) [4]
- 7/15 • • Conference systems (telephonic conference arrangements H04M 3/56) [5]
- 7/16 • Analogue secrecy systems; Analogue subscription systems [1, 2011.01]
- 7/167 • • Systems rendering the television signal unintelligible and subsequently intelligible [4, 2011.01]
- 7/169 • • • Systems operating in the time domain of the television signal [6, 2011.01]
- 7/171 • • • Systems operating in the amplitude domain of the television signal [6, 2011.01]
- 7/173 • • with two-way working, e.g. subscriber sending a programme selection signal [4, 2011.01]
- 7/18 • Closed-circuit television systems, i.e. systems in which the signal is not broadcast
- 7/20 • Adaptations for transmission via a GHz frequency band, e.g. via satellite [4]
- 7/22 • Adaptations for optical transmission [4]
- 7/24 • Systems for the transmission of television signals using pulse code modulation (H04N 21/00 takes precedence) [6, 2011.01]
- 7/52 • • Systems for transmission of a pulse code modulated with one or more other pulse code modulated signals, e.g. an audio signal or a synchronizing signal (assembling of a multiplex stream by combining a video stream with other content or additional data, remultiplexing of multiplex streams, insertion of stuffing bits into the multiplex stream, assembling of a packetised elementary stream at server side H04N 21/236; disassembling of a multiplex stream, remultiplexing of multiplex streams, extraction or processing of Service Information, disassembling of packetised elementary stream at client side H04N 21/434) [6, 2011.01]
- 7/54 • • • the signals being synchronous [6]
- 7/56 • • • Synchronising systems therefor [6]
- 7/64 • • Systems for detection or correction of transmission errors (coding, decoding or code conversion for error detection or error correction in general H03M 13/00) [6]
- 7/66 • • • using redundant codes [6]
- 7/68 • • • using error concealment [6]
- 9/00 **Details of colour television systems [4]**
- 9/04 • Picture signal generators [4]
- 9/07 • • with one pick-up device only [2, 4]
- 9/077 • • • whereby the colour signals are characterised by their phase [4]
- 9/083 • • • whereby the colour signals are characterised by their frequency [4]
- 9/09 • • with more than one pick-up device [4]
- 9/093 • • • Systems for avoiding or correcting misregistration of video signals [4]
- 9/097 • • • Optical arrangements associated therewith, e.g. for beam-splitting, for colour correction [4]
- 9/10 • • using optical-mechanical scanning means only (H04N 9/11 takes precedence) [2, 4]
- 9/11 • • Scanning of colour motion picture films, e.g. for telecine [2, 4]
- 9/12 • Picture reproducers (H04N 9/11 takes precedence) [2, 4]
- 9/14 • • using optical-mechanical scanning means only [2, 4]
- 9/16 • • using cathode ray tubes (H04N 9/11 takes precedence) [2, 4]
- 9/18 • • • using separate electron beams for the primary colour signals (H04N 9/27 takes precedence) [2, 4]
- 9/20 • • • • with more than one beam in a tube [4]
- 9/22 • • • using the same beam for more than one primary colour information (H04N 9/27 takes precedence) [2, 4]
- 9/24 • • • • using means, integral with, or external to, the tube, for producing signal indicating instantaneous beam position [4]
- 9/26 • • • • using electron-optical colour selection means, e.g. line grid, deflection means in or near the gun or near the phosphor screen [4]
- 9/27 • • • with variable depth of penetration of electron beam into the luminescent layer, e.g. penetrates [2, 4]
- 9/28 • • • Arrangements for convergence or focusing [4]
- 9/285 • • • • using quadrupole lenses [4]
- 9/29 • • • using demagnetisation or compensation of external magnetic fields [2, 4]
- 9/30 • • using solid-state colour display devices [4]
- 9/31 • • Projection devices for colour picture display [2, 4]

- 9/43 • Conversion of monochrome picture signals to colour picture signals for colour picture display [4]
- 9/44 • Colour synchronisation [4]
- 9/45 • • Generation or recovery of colour sub-carriers [4]
- 9/455 • • Generation of colour burst signals; Insertion of colour burst signals in colour picture signals or separation of colour burst signals from colour picture signals (H04N 9/45 takes precedence) [4]
- 9/465 • • Synchronisation of the PAL-switch [4]
- 9/47 • • for sequential signals [2, 4]
- 9/475 • • for mutually locking different synchronisation sources [4]
- 9/64 • Circuits for processing colour signals (H04N 9/77 takes precedence) [4]
- 9/65 • • for synchronous modulators [4]
- 9/66 • • for synchronous demodulators [4]
- 9/67 • • for matrixing [4]
- 9/68 • • for controlling the amplitude of colour signals, e.g. automatic chroma control circuits (H04N 9/71, H04N 9/73 take precedence) [4]
- 9/69 • • • for modifying the colour signals by gamma correction [4]
- 9/70 • • for colour killing [4]
- 9/71 • • • combined with colour gain control [4]
- 9/72 • • for reinsertion of dc and slowly varying components of colour signals [4]
- 9/73 • • colour balance circuits, e.g. white balance circuits, colour temperature control [4]
- 9/74 • • for obtaining special effects (H04N 9/65-H04N 9/73 take precedence) [4]
- 9/75 • • • Chroma key [4]
- 9/76 • • • for mixing of colour signals (H04N 9/75 takes precedence) [4]
- 9/77 • Circuits for processing the brightness signal and the chrominance signal relative to each other, e.g. adjusting the phase of the brightness signal relative to the colour signal, correcting differential gain or differential phase (circuits for matrixing H04N 9/67) [4]
- 9/78 • • for separating the brightness signal or the chrominance signal from the colour television signal, e.g. using comb filter [4]
- 9/79 • Processing of colour television signals in connection with recording [4]
- 9/793 • • for controlling the level of the chrominance signal, e.g. by means of automatic chroma control circuits [6]
- 9/797 • • for recording the signal in a plurality of channels, the bandwidth of each channel being less than the bandwidth of the signal (H04N 9/804, H04N 9/81, H04N 9/82 take precedence) [6]
- 9/80 • • Transformation of the television signal for recording, e.g. modulation, frequency changing; Inverse transformation for playback [4]
- 9/802 • • • involving processing of the sound signal (H04N 9/806, H04N 9/835 take precedence) [6]
- 9/804 • • • involving pulse code modulation of the colour picture signal components [6]
- 9/806 • • • with processing of the sound signal [6]
- 9/808 • • • involving pulse code modulation of the composite colour video-signal [6]
- 9/81 • • • the individual colour picture signal components being recorded sequentially only [4]
- 9/815 • • • • the luminance signal and the sequential colour component signals being recorded in separate recording channels [6]
- 9/82 • • • the individual colour picture signal components being recorded simultaneously only [4]
- 9/825 • • • • the luminance and chrominance signals being recorded in separate channels [6]
- 9/83 • • • • the recorded chrominance signal occupying a frequency band under the frequency band of the recorded brightness signal [4]
- 9/835 • • • • • involving processing of the sound signal [6]
- 9/84 • • • • • the recorded signal showing a feature, which is different in adjacent track parts, e.g. different phase or frequency [4]
- 9/85 • • • • the recorded brightness signal occupying a frequency band totally overlapping the frequency band of the recorded chrominance signal, e.g. frequency interleaving [4]
- 9/86 • • • the individual colour picture signal components being recorded sequentially and simultaneously, e.g. corresponding to SECAM-system [4]
- 9/87 • • Regeneration of colour television signals (H04N 9/80 takes precedence) [4]
- 9/873 • • • for restoring the colour component sequence of the reproduced signal [6]
- 9/877 • • • by assembling picture element blocks in an intermediate memory [6]
- 9/88 • • • Signal drop-out compensation [4]
- 9/882 • • • • the signal being a composite colour television signal [6]
- 9/885 • • • • • using a digital intermediate memory [6]
- 9/888 • • • • for signals recorded by pulse code modulation [6]
- 9/89 • • • Time-base error compensation [4]
- 9/893 • • • • using an analogue memory, e.g. a CCD-shift register, the delay of which is controlled by a voltage controlled oscillator [6]
- 9/896 • • • • using a digital memory with independent write-in and read-out clock generators [6]
- 9/898 • • • using frequency multiplication of the reproduced colour signal with another auxiliary reproduced signal, e.g. a pilot signal carrier [6]
- 11/00 • **Colour television systems** (details H04N 9/00; stereoscopic H04N 15/00) [4]
- 11/02 • with bandwidth reduction (H04N 11/04 takes precedence) [4]
- 11/04 • using pulse code modulation [4]
- 11/06 • Transmission systems characterised by the manner in which the individual colour picture signal components are combined [4]
- 11/08 • • using sequential signals only (dot sequential systems H04N 11/12) [4]
- 11/10 • • • in which colour signals are inserted in the blanking interval of brightness signal [4]
- 11/12 • • using simultaneous signals only [4]
- 11/14 • • • in which one signal, modulated in phase and amplitude, conveys colour information and a second signal conveys brightness information, e.g. NTSC-system [4]
- 11/16 • • • • the chrominance signal alternating in phase, e.g. PAL-system [4]
- 11/18 • • using simultaneous and sequential signals, e.g. SECAM-system [4]
- 11/20 • • Conversion of the manner in which the individual colour picture signal components are combined, e.g. conversion of colour television standards [4]
- 11/22 • • • in which simultaneous signals are converted into sequential signals or *vice versa* [4]

- 11/24 • High-definition television systems [6]
- 13/00 Stereoscopic television systems; Details thereof**  
(specially adapted for colour television H04N 15/00) [4]
- 13/02 • Picture signal generators [4]
- 13/04 • Picture reproducers [4]
- 15/00 Stereoscopic colour television systems; Details thereof [4]**
- 17/00 Diagnosis, testing or measuring for television systems or their details [4]**
- 17/02 • for colour television signals [4]
- 17/04 • for receivers [4]
- 17/06 • for recorders [4]
- 19/00 Methods or arrangements for coding, decoding, compressing or decompressing digital video signals [2014.01]**
- 19/10 • using adaptive coding [2014.01]
- Note(s) [2014.01]**
- When classifying in this group, each aspect relating to adaptive coding should, inasmuch as possible, be classified in each one of subgroups H04N 19/102, H04N 19/134, H04N 19/169 and H04N 19/189.
- 19/102 • • characterised by the element, parameter or selection affected or controlled by the adaptive coding [2014.01]
- 19/103 • • • Selection of coding mode or of prediction mode [2014.01]
- 19/105 • • • • Selection of the reference unit for prediction within a chosen coding or prediction mode, e.g. adaptive choice of position and number of pixels used for prediction [2014.01]
- 19/107 • • • • between spatial and temporal predictive coding, e.g. picture refresh [2014.01]
- 19/109 • • • • among a plurality of temporal predictive coding modes [2014.01]
- 19/11 • • • • among a plurality of spatial predictive coding modes [2014.01]
- 19/112 • • • • according to a given display mode, e.g. for interlaced or progressive display mode [2014.01]
- 19/114 • • • • Adapting the group of pictures [GOP] structure, e.g. number of B-frames between two anchor frames (H04N 19/107 takes precedence) [2014.01]
- 19/115 • • • Selection of the code volume for a coding unit prior to coding [2014.01]
- 19/117 • • • Filters, e.g. for pre-processing or post-processing (sub-band filter banks H04N 19/635) [2014.01]
- 19/119 • • • Adaptive subdivision aspects e.g. subdivision of a picture into rectangular or non-rectangular coding blocks [2014.01]
- 19/12 • • • Selection from among a plurality of transforms or standards, e.g. selection between discrete cosine transform [DCT] and sub-band transform or selection between H.263 and H.264 [2014.01]
- Note(s) [2014.01]**
- When classifying in this group, each compression algorithm is further classified in the relevant subgroups of groups H04N 19/60 or H04N 19/90.
- 19/122 • • • • Selection of transform size, e.g. 8x8 or 2x4x8 DCT; Selection of sub-band transforms of varying structure or type [2014.01]
- 19/124 • • • Quantisation [2014.01]
- 19/126 • • • • Details of normalisation or weighting functions, e.g. normalisation matrices or variable uniform quantisers [2014.01]
- 19/127 • • • Prioritisation of hardware or computational resources [2014.01]
- 19/129 • • • Scanning of coding units, e.g. zig-zag scan of transform coefficients or flexible macroblock ordering [FMO] [2014.01]
- 19/13 • • • Adaptive entropy coding, e.g. adaptive variable length coding [AVLC] or context adaptive binary arithmetic coding [CABAC] [2014.01]
- 19/132 • • • Sampling, masking or truncation of coding units, e.g. adaptive resampling, frame skipping, frame interpolation or high-frequency transform coefficient masking [2014.01]
- 19/134 • • characterised by the element, parameter or criterion affecting or controlling the adaptive coding [2014.01]
- 19/136 • • • Incoming video signal characteristics or properties [2014.01]
- 19/137 • • • • Motion inside a coding unit, e.g. average field, frame or block difference [2014.01]
- 19/139 • • • • • Analysis of motion vectors, e.g. their magnitude, direction, variance or reliability [2014.01]
- 19/14 • • • • Coding unit complexity, e.g. amount of activity or edge presence estimation (H04N 19/146 takes precedence) [2014.01]
- 19/142 • • • Detection of scene cut or scene change [2014.01]
- 19/146 • • • Data rate or code amount at the encoder output [2014.01]
- 19/147 • • • • according to rate distortion criteria (rate-distortion as a criterion for motion estimation H04N 19/567) [2014.01]
- 19/149 • • • • by estimating the code amount by means of a model, e.g. mathematical model or statistical model [2014.01]
- 19/15 • • • • by monitoring actual compressed data size at the memory before deciding storage at the transmission buffer [2014.01]
- 19/152 • • • • by measuring the fullness of the transmission buffer [2014.01]
- 19/154 • • • Measured or subjectively estimated visual quality after decoding, e.g. measurement of distortion (use of rate-distortion criteria H04N 19/147) [2014.01]
- 19/156 • • • Availability of hardware or computational resources, e.g. encoding based on power-saving criteria [2014.01]
- 19/157 • • • Assigned coding mode, i.e. the coding mode being predefined or preselected to be further used for selection of another element or parameter [2014.01]
- 19/159 • • • • Prediction type, e.g. intra-frame, inter-frame or bidirectional frame prediction [2014.01]
- 19/16 • • • • for a given display mode, e.g. for interlaced or progressive display mode [2014.01]
- 19/162 • • • User input [2014.01]
- 19/164 • • • Feedback from the receiver or from the transmission channel [2014.01]
- 19/166 • • • • concerning the amount of transmission errors, e.g. bit error rate [BER] [2014.01]



- 19/167 • • • Position within a video image, e.g. region of interest [ROI] **[2014.01]**
- 19/169 • • characterised by the coding unit, i.e. the structural portion or semantic portion of the video signal being the object or the subject of the adaptive coding **[2014.01]**
- 19/17 • • • the unit being an image region, e.g. an object **[2014.01]**
- 19/172 • • • the region being a picture, frame or field **[2014.01]**
- 19/174 • • • the region being a slice, e.g. a line of blocks or a group of blocks **[2014.01]**
- 19/176 • • • the region being a block, e.g. a macroblock **[2014.01]**
- 19/177 • • • the unit being a group of pictures [GOP] **[2014.01]**
- 19/179 • • • the unit being a scene or a shot **[2014.01]**
- 19/18 • • • the unit being a set of transform coefficients **[2014.01]**
- 19/182 • • • the unit being a pixel **[2014.01]**
- 19/184 • • • the unit being bits, e.g. of the compressed video stream **[2014.01]**
- 19/186 • • • the unit being a colour or a chrominance component **[2014.01]**
- 19/187 • • • the unit being a scalable video layer **[2014.01]**
- 19/189 • • characterised by the adaptation method, adaptation tool or adaptation type used for the adaptive coding **[2014.01]**
- 19/19 • • • using optimisation based on Lagrange multipliers **[2014.01]**
- 19/192 • • • the adaptation method, adaptation tool or adaptation type being iterative or recursive **[2014.01]**
- 19/194 • • • involving only two passes **[2014.01]**
- 19/196 • • • being specially adapted for the computation of encoding parameters, e.g. by averaging previously computed encoding parameters (processing of motion vectors H04N 19/513) **[2014.01]**
- 19/20 • using video object coding **[2014.01]**
- 19/21 • • with binary alpha-plane coding for video objects, e.g. context-based arithmetic encoding [CAE] **[2014.01]**
- 19/23 • • with coding of regions that are present throughout a whole video segment, e.g. sprites, background or mosaic **[2014.01]**
- 19/25 • • with scene description coding, e.g. binary format for scenes [BIFS] compression **[2014.01]**
- 19/27 • • involving both synthetic and natural picture components, e.g. synthetic natural hybrid coding [SNHC] **[2014.01]**
- 19/29 • • involving scalability at the object level, e.g. video object layer [VOL] **[2014.01]**
- 19/30 • using hierarchical techniques, e.g. scalability (H04N 19/63 takes precedence) **[2014.01]**
- 19/31 • • in the temporal domain **[2014.01]**
- 19/33 • • in the spatial domain **[2014.01]**
- 19/34 • • Scalability techniques involving progressive bit-plane based encoding of the enhancement layer, e.g. fine granular scalability [FGS] **[2014.01]**
- 19/36 • • Scalability techniques involving formatting the layers as a function of picture distortion after decoding, e.g. signal-to-noise [SNR] scalability **[2014.01]**
- 19/37 • • with arrangements for assigning different transmission priorities to video input data or to video coded data **[2014.01]**
- 19/39 • • involving multiple description coding [MDC], i.e. with separate layers being structured as independently decodable descriptions of input picture data **[2014.01]**
- 19/40 • using video transcoding, i.e. partial or full decoding of a coded input stream followed by re-encoding of the decoded output stream **[2014.01]**
- 19/42 • characterised by implementation details or hardware specially adapted for video compression or decompression, e.g. dedicated software implementation (H04N 19/635 takes precedence) **[2014.01]**
- 19/423 • • characterised by memory arrangements (H04N 19/433 takes precedence) **[2014.01]**
- 19/426 • • • using memory downsizing methods **[2014.01]**
- 19/43 • • Hardware specially adapted for motion estimation or compensation **[2014.01]**
- 19/433 • • • characterised by techniques for memory access **[2014.01]**
- 19/436 • • using parallelised computational arrangements **[2014.01]**
- 19/44 • Decoders specially adapted therefor, e.g. video decoders which are asymmetric with respect to the encoder **[2014.01]**
- 19/46 • Embedding additional information in the video signal during the compression process (H04N 19/517, H04N 19/68, H04N 19/70 take precedence) **[2014.01]**
- 19/463 • • by compressing encoding parameters before transmission **[2014.01]**
- 19/467 • • characterised by the embedded information being invisible, e.g. watermarking **[2014.01]**
- 19/48 • using compressed domain processing techniques other than decoding, e.g. modification of transform coefficients, variable length coding [VLC] data or run-length data (motion estimation in a transform domain H04N 19/547; processing of decoded motion vectors H04N 19/513) **[2014.01]**
- 19/50 • using predictive coding (H04N 19/61 takes precedence) **[2014.01]**
- 19/503 • • involving temporal prediction (adaptive coding with adaptive selection between spatial and temporal predictive coding H04N 19/107; adaptive coding with adaptive selection among a plurality of temporal predictive coding modes H04N 19/109) **[2014.01]**
- 19/507 • • • using conditional replenishment **[2014.01]**
- 19/51 • • • Motion estimation or motion compensation **[2014.01]**
- 19/513 • • • • Processing of motion vectors **[2014.01]**
- 19/517 • • • • by encoding **[2014.01]**
- 19/52 • • • • by predictive encoding **[2014.01]**
- 19/523 • • • • with sub-pixel accuracy **[2014.01]**
- 19/527 • • • • Global motion vector estimation **[2014.01]**
- 19/53 • • • • Multi-resolution motion estimation; Hierarchical motion estimation **[2014.01]**
- 19/533 • • • • Motion estimation using multistep search, e.g. 2D-log search or one-at-a-time search [OTS] **[2014.01]**
- 19/537 • • • • Motion estimation other than block-based **[2014.01]**
- 19/54 • • • • using feature points or meshes **[2014.01]**
- 19/543 • • • • using regions **[2014.01]**
- 19/547 • • • • Motion estimation performed in a transform domain **[2014.01]**
- 19/55 • • • • Motion estimation with spatial constraints, e.g. at image or region borders **[2014.01]**

- 19/553 • • • • Motion estimation dealing with occlusions [2014.01]
  - 19/557 • • • • Motion estimation characterised by stopping computation or iteration based on certain criteria, e.g. error magnitude being too large or early exit [2014.01]
  - 19/56 • • • • Motion estimation with initialisation of the vector search, e.g. estimating a good candidate to initiate a search [2014.01]
  - 19/563 • • • • Motion estimation with padding, i.e. with filling of non-object values in an arbitrarily shaped picture block or region for estimation purposes [2014.01]
  - 19/567 • • • • Motion estimation based on rate distortion criteria [2014.01]
  - 19/57 • • • • Motion estimation characterised by a search window with variable size or shape [2014.01]
  - 19/573 • • • • Motion compensation with multiple frame prediction using two or more reference frames in a given prediction direction [2014.01]
  - 19/577 • • • • Motion compensation with bidirectional frame interpolation, i.e. using B-pictures [2014.01]
  - 19/58 • • • • Motion compensation with long-term prediction, i.e. the reference frame for a current frame not being the temporally closest one (H04N 19/23 takes precedence) [2014.01]
  - 19/583 • • • • Motion compensation with overlapping blocks [2014.01]
  - 19/587 • • involving temporal sub-sampling or interpolation, e.g. decimation or subsequent interpolation of pictures in a video sequence [2014.01]
  - 19/59 • • involving spatial sub-sampling or interpolation, e.g. alteration of picture size or resolution [2014.01]
  - 19/593 • • involving spatial prediction techniques [2014.01]
  - 19/597 • • specially adapted for multi-view video sequence encoding [2014.01]
  - 19/60 • • using transform coding [2014.01]
  - 19/61 • • in combination with predictive coding [2014.01]
  - 19/615 • • • • using motion compensated temporal filtering [MCTF] [2014.01]
  - 19/62 • • by frequency transforming in three dimensions (H04N 19/63 takes precedence) [2014.01]
  - 19/625 • • using discrete cosine transform [DCT] [2014.01]
  - 19/63 • • using sub-band based transform, e.g. wavelets [2014.01]
  - 19/635 • • • • characterised by filter definition or implementation details [2014.01]
  - 19/64 • • • • characterised by ordering of coefficients or of bits for transmission [2014.01]
  - 19/645 • • • • by grouping of coefficients into blocks after the transform [2014.01]
  - 19/65 • • using error resilience [2014.01]
  - 19/66 • • involving data partitioning, i.e. separation of data into packets or partitions according to importance [2014.01]
  - 19/67 • • involving unequal error protection [UEP], i.e. providing protection according to the importance of the data [2014.01]
  - 19/68 • • involving the insertion of resynchronisation markers into the bitstream [2014.01]
  - 19/69 • • involving reversible variable length codes [RVLC] [2014.01]
  - 19/70 • • characterised by syntax aspects related to video coding, e.g. related to compression standards [2014.01]
  - 19/80 • • Details of filtering operations specially adapted for video compression, e.g. for pixel interpolation (H04N 19/635, H04N 19/86 take precedence) [2014.01]
  - 19/82 • • involving filtering within a prediction loop [2014.01]
  - 19/85 • • using pre-processing or post-processing specially adapted for video compression [2014.01]
  - 19/86 • • involving reduction of coding artifacts, e.g. of blockiness [2014.01]
  - 19/87 • • involving scene cut or scene change detection in combination with video compression [2014.01]
  - 19/88 • • involving rearrangement of data among different coding units, e.g. shuffling, interleaving, scrambling or permutation of pixel data or permutation of transform coefficient data among different blocks [2014.01]
  - 19/89 • • involving methods or arrangements for detection of transmission errors at the decoder [2014.01]
  - 19/895 • • • • in combination with error concealment [2014.01]
  - 19/90 • • using coding techniques not provided for in groups H04N 19/10-H04N 19/85, e.g. fractals [2014.01]
  - 19/91 • • Entropy coding, e.g. variable length coding [VLC] or arithmetic coding [2014.01]
  - 19/93 • • Run-length coding [2014.01]
  - 19/94 • • Vector quantisation [2014.01]
  - 19/96 • • Tree coding, e.g. quad-tree coding [2014.01]
  - 19/97 • • Matching pursuit coding [2014.01]
  - 19/98 • • Adaptive-dynamic-range coding [ADRC] [2014.01]
  - 21/00 **Selective content distribution, e.g. interactive television, VOD [Video On Demand]** (broadcast communication H04H; arrangements, apparatus, circuits or systems for communication control or processing being characterised by a protocol H04L 29/06; real-time bi-directional transmission of motion video data H04N 7/14) [2011.01]
- Note(s) [2011.01]**
1. This group covers :
    - interactive video distribution processes, systems, or elements thereof, which are characterised by point-to-multipoint system configurations, and which are mainly used for motion video data unidirectional distribution or delivery resulting from interactions between systems operators, e.g. access or service providers, or users e.g. subscribers, and system elements.
    - such systems include dedicated communication systems, such as television distribution systems, which primarily distribute or deliver motion video data in the manner indicated, which may, in addition, provide a framework for further, diverse data communications or services in either unidirectional or bi-directional form. However, video will occupy most of the downlink bandwidth in the distribution process.

- typically, system operators interface with transmitter-side elements or users' interface with receiver-side elements in order to facilitate, through interaction with such elements, the dynamic control of data processing or data flow at various points in the system. This interaction is typically occasional or intermittent in nature.
  - processes, systems or elements thereof specially adapted to the generation, distribution and processing of data, which is either associated with video content, e.g. metadata, ratings, or related to the user or his environment and which has been actively or passively gathered. This data is either used to facilitate interaction or to alter or target the content.
2. In this main group, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
- 21/20 • Servers specifically adapted for the distribution of content, e.g. VOD servers; Operations thereof **[2011.01]**
- 21/21 • • Server components or server architectures **[2011.01]**
- 21/214 • • • Specialised server platform, e.g. server located in an airplane, hotel or hospital **[2011.01]**
- 21/218 • • • Source of audio or video content, e.g. local disk arrays **[2011.01]**
- 21/2183 • • • • Cache memory **[2011.01]**
- 21/2187 • • • • Live feed **[2011.01]**
- 21/222 • • • Secondary servers, e.g. proxy server or cable television Head-end **[2011.01]**
- 21/2225 • • • • Local VOD servers **[2011.01]**
- 21/226 • • • Internal components of the server **[2011.01]**
- 21/23 • • Processing of content or additional data; Elementary server operations; Server middleware **[2011.01]**
- 21/231 • • • Content storage operation, e.g. caching movies for short term storage, replicating data over plural servers or prioritizing data for deletion **[2011.01]**
- 21/2312 • • • • Data placement on disk arrays **[2011.01]**
- 21/2315 • • • • • using interleaving **[2011.01]**
- 21/2318 • • • • • using striping **[2011.01]**
- 21/232 • • • Content retrieval operation within server, e.g. reading video streams from disk arrays **[2011.01]**
- 21/233 • • • Processing of audio elementary streams **[2011.01]**
- 21/234 • • • Processing of video elementary streams, e.g. splicing of video streams or manipulating MPEG-4 scene graphs **[2011.01]**
- 21/2343 • • • • involving reformatting operations of video signals for distribution or compliance with end-user requests or end-user device requirements **[2011.01]**
- 21/2347 • • • • involving video stream encryption (arrangements for secret or secure communication H04L 9/00; analogue secrecy systems H04N 7/16) **[2011.01]**
- 21/235 • • • Processing of additional data, e.g. scrambling of additional data or processing content descriptors **[2011.01]**
- 21/236 • • • Assembling of a multiplex stream, e.g. transport stream, by combining a video stream with other content or additional data, e.g. inserting a URL [Uniform Resource Locator] into a video stream, multiplexing software data into a video stream; Remultiplexing of multiplex streams; Insertion of stuffing bits into the multiplex stream, e.g. to obtain a constant bit-rate; Assembling of a packetised elementary stream **[2011.01]**
- 21/2362 • • • • Generation or processing of SI [Service Information] **[2011.01]**
- 21/2365 • • • • Multiplexing of several video streams **[2011.01]**
- 21/2368 • • • • Multiplexing of audio and video streams **[2011.01]**
- 21/237 • • • Communication with additional data server **[2011.01]**
- 21/238 • • • Interfacing the downstream path of the transmission network, e.g. adapting the transmission rate of a video stream to network bandwidth; Processing of multiplex streams **[2011.01]**
- 21/2381 • • • • Adapting the multiplex stream to a specific network, e.g. an IP [Internet Protocol] network **[2011.01]**
- 21/2383 • • • • Channel coding of digital bit-stream, e.g. modulation **[2011.01]**
- 21/2385 • • • • Channel allocation (H04N 21/266 takes precedence); Bandwidth allocation (H04N 21/24 takes precedence) **[2011.01]**
- 21/2387 • • • • Stream processing in response to a playback request from an end-user, e.g. for trick-play **[2011.01]**
- 21/2389 • • • • Multiplex stream processing, e.g. multiplex stream encrypting **[2011.01]**
- 21/239 • • • Interfacing the upstream path of the transmission network, e.g. prioritizing client requests **[2011.01]**
- 21/24 • • • Monitoring of processes or resources, e.g. monitoring of server load, available bandwidth or upstream requests **[2011.01]**
- 21/241 • • • OS [Operating System] processes, e.g. server setup (arrangements for programme control G06F 9/00) **[2011.01]**
- 21/242 • • • Synchronization processes, e.g. processing of PCR [Program Clock References] **[2011.01]**
- 21/25 • • Management operations performed by the server for facilitating the content distribution or administrating data related to end-users or client devices, e.g. end-user or client device authentication or learning user preferences for recommending movies **[2011.01]**
- 21/254 • • • Management at additional data server, e.g. shopping server or rights management server **[2011.01]**
- 21/2543 • • • • Billing **[2011.01]**
- 21/2547 • • • • • Third party billing, e.g. billing of advertiser **[2011.01]**
- 21/258 • • • Client or end-user data management, e.g. managing client capabilities, user preferences or demographics or processing of multiple end-users preferences to derive collaborative data **[2011.01]**

- 21/262 • • • Content or additional data distribution scheduling, e.g. sending additional data at off-peak times, updating software modules, calculating the carousel transmission frequency, delaying a video stream transmission or generating play-lists **[2011.01]**
- 21/266 • • • Channel or content management, e.g. generation and management of keys and entitlement messages in a conditional access system or merging a VOD unicast channel into a multicast channel **[2011.01]**
- 21/2662 • • • Controlling the complexity of the video stream, e.g. by scaling the resolution or bitrate of the video stream based on the client capabilities **[2011.01]**
- 21/2665 • • • Gathering content from different sources, e.g. Internet and satellite **[2011.01]**
- 21/2668 • • • Creating a channel for a dedicated end-user group, e.g. by inserting targeted commercials into a video stream based on end-user profiles **[2011.01]**
- 21/27 • • Server based end-user applications **[2011.01]**
- 21/274 • • • Storing end-user specific content or additional data in response to end-user request **[2011.01]**
- 21/2743 • • • Video hosting of uploaded data from client **[2011.01]**
- 21/2747 • • • Remote storage of video programs received via the downstream path, e.g. from the server **[2011.01]**
- 21/278 • • • Content descriptor database or directory service for end-user access **[2011.01]**
- 21/40 • Client devices specifically adapted for the reception of, or interaction with, content, e.g. STB [set-top-box]; Operations thereof **[2011.01]**
- 21/41 • • Structure of client; Structure of client peripherals **[2011.01]**
- 21/414 • • • Specialised client platforms, e.g. receiver in car or embedded in a mobile appliance **[2011.01]**
- 21/4143 • • • PC [Personal Computer] **[2011.01]**
- 21/4147 • • • PVR [Personal Video Recorder] (H04N 5/76 takes precedence) **[2011.01]**
- 21/418 • • • External card to be used in combination with the client device, e.g. for conditional access **[2011.01]**
- 21/4185 • • • for payment **[2011.01]**
- 21/422 • • • Input-only peripherals, e.g. GPS [Global Positioning System] (input arrangements or combined input and output arrangements for interaction between user and computer G06F 3/01) **[2011.01]**
- 21/4223 • • • Cameras (H04N 5/225 takes precedence) **[2011.01]**
- 21/4227 • • • Remote input by a user located remotely from the client device, e.g. at work **[2011.01]**
- 21/426 • • • Internal components of the client (H04N 5/44 takes precedence) **[2011.01]**
- 21/43 • • Processing of content or additional data, e.g. demultiplexing additional data from a digital video stream; Elementary client operations, e.g. monitoring of home network or synchronizing decoder's clock; Client middleware **[2011.01]**
- 21/431 • • • Generation of visual interfaces; Content or additional data rendering (receiver circuitry for displaying additional information H04N 5/445) **[2011.01]**
- 21/432 • • • Content retrieval operation from a local storage medium, e.g. hard-disk **[2011.01]**
- 21/433 • • • Content storage operation, e.g. storage operation in response to a pause request or caching operations **[2011.01]**
- 21/4335 • • • Housekeeping operations, e.g. prioritizing content for deletion because of storage space restrictions **[2011.01]**
- 21/434 • • • Disassembling of a multiplex stream, e.g. demultiplexing audio and video streams or extraction of additional data from a video stream; Remultiplexing of multiplex streams; Extraction or processing of SI; Disassembling of packetised elementary stream **[2011.01]**
- 21/435 • • • Processing of additional data, e.g. decrypting of additional data or reconstructing software from modules extracted from the transport stream **[2011.01]**
- 21/436 • • • Interfacing a local distribution network, e.g. communicating with another STB or inside the home **[2011.01]**
- 21/4363 • • • Adapting the video stream to a specific local network, e.g. a IEEE 1394 or Bluetooth® network **[2011.01]**
- 21/4367 • • • Establishing a secure communication between the client and a peripheral device or smart card (arrangements for secret or secure communication H04L 9/00; security arrangements for protecting computers or computer systems against unauthorised activity G06F 21/00) **[2011.01]**
- 21/437 • • • Interfacing the upstream path of the transmission network, e.g. for transmitting client requests to a VOD server **[2011.01]**
- 21/438 • • • Interfacing the downstream path of the transmission network originating from a server, e.g. retrieving MPEG packets from an IP network **[2011.01]**
- 21/4385 • • • Multiplex stream processing, e.g. multiplex stream decrypting **[2011.01]**
- 21/439 • • • Processing of audio elementary streams **[2011.01]**
- 21/44 • • • Processing of video elementary streams, e.g. splicing a video clip retrieved from local storage with an incoming video stream or rendering scenes according to MPEG-4 scene graphs **[2011.01]**
- 21/4402 • • • involving reformatting operations of video signals for household redistribution, storage or real-time display **[2011.01]**
- 21/4405 • • • involving video stream decryption (arrangements for secret or secure communication H04L 9/00) **[2011.01]**
- 21/4408 • • • involving video stream encryption, e.g. re-encrypting a decrypted video stream for redistribution in a home network (arrangements for secret or secure communication H04L 9/00) **[2011.01]**
- 21/441 • • • Acquiring end-user identification **[2011.01]**
- 21/4415 • • • using biometric characteristics of the user, e.g. by voice recognition or fingerprint scanning **[2011.01]**
- 21/442 • • • Monitoring of processes or resources, e.g. detecting the failure of a recording device, monitoring the downstream bandwidth, the number of times a movie has been viewed or the storage space available from the internal hard disk **[2011.01]**

- 21/4425 • • • • Monitoring of client processing errors or hardware failure (monitoring in electrical digital data processing G06F 11/00) **[2011.01]**
- 21/443 • • • • OS processes, e.g. booting a STB, implementing a Java virtual machine in a STB or power management in a STB (arrangements for program loading or initiating G06F 9/445) **[2011.01]**
- 21/45 • • • Management operations performed by the client for facilitating the reception of or the interaction with the content or administrating data related to the end-user or to the client device itself, e.g. learning user preferences for recommending movies or resolving scheduling conflicts **[2011.01]**
- 21/454 • • • • Content filtering, e.g. blocking advertisements **[2011.01]**
- 21/4545 • • • • Input to filtering algorithms, e.g. filtering a region of the image **[2011.01]**
- 21/458 • • • • Scheduling content for creating a personalised stream, e.g. by combining a locally stored advertisement with an incoming stream; Updating operations, e.g. for OS modules **[2011.01]**
- 21/462 • • • • Content or additional data management e.g. creating a master electronic program guide from data received from the Internet and a Head-end or controlling the complexity of a video stream by scaling the resolution or bit-rate based on the client capabilities **[2011.01]**
- 21/4623 • • • • Processing of entitlement messages, e.g. ECM [Entitlement Control Message] or EMM [Entitlement Management Message] **[2011.01]**
- 21/4627 • • • • Rights management **[2011.01]**
- 21/466 • • • • Learning process for intelligent management, e.g. learning user preferences for recommending movies **[2011.01]**
- 21/47 • • • End-user applications (interaction techniques for graphical user interfaces G06F 3/048; receiver circuitry for displaying additional information H04N 5/445) **[2011.01]**
- 21/472 • • • • End-user interface for requesting content, additional data or services; End-user interface for interacting with content, e.g. for content reservation or setting reminders, for requesting event notification or for manipulating displayed content **[2011.01]**
- 21/4722 • • • • for requesting additional data associated with the content **[2011.01]**
- 21/4725 • • • • • using interactive regions of the image, e.g. hot spots **[2011.01]**
- 21/4728 • • • • • for selecting a ROI [Region Of Interest], e.g. for requesting a higher resolution version of a selected region **[2011.01]**
- 21/475 • • • • End-user interface for inputting end-user data, e.g. PIN [Personal Identification Number] or preference data **[2011.01]**
- 21/478 • • • • Supplemental services, e.g. displaying phone caller identification or shopping application **[2011.01]**
- 21/4782 • • • • • Web browsing **[2011.01]**
- 21/4784 • • • • • receiving rewards **[2011.01]**
- 21/4786 • • • • • e-mailing **[2011.01]**
- 21/4788 • • • • • communicating with other users, e.g. chatting **[2011.01]**
- 21/482 • • • • End-user interface for program selection **[2011.01]**
- 21/485 • • • • End-user interface for client configuration **[2011.01]**
- 21/488 • • • • Data services, e.g. news ticker **[2011.01]**
- 21/60 • • • Network structure or processes for video distribution between server and client or between remote clients (data switching networks H04L 12/00; wireless communication networks H04W); Control signaling between clients, server and network components; Transmission of management data between server and client; Communication details between server and client **[2011.01]**
- 21/61 • • • • Network physical structure; Signal processing (H04B takes precedence) **[2011.01]**
- 21/63 • • • • Control signaling between client, server and network components; Network processes for video distribution between server and clients, e.g. transmitting basic layer and enhancement layers over different transmission paths, setting up a peer-to-peer communication via Internet between remote STB's; Communication protocols; Addressing **[2011.01]**
- 21/633 • • • • Control signals issued by server directed to the network components or client **[2011.01]**
- 21/6332 • • • • • directed to client **[2011.01]**
- 21/6334 • • • • • • for authorization, e.g. by transmitting a key (arrangements for secret or secure communication H04L 9/00) **[2011.01]**
- 21/6336 • • • • • • directed to decoder **[2011.01]**
- 21/6338 • • • • • directed to network **[2011.01]**
- 21/637 • • • • Control signals issued by the client directed to the server or network components **[2011.01]**
- 21/6371 • • • • • directed to network **[2011.01]**
- 21/6373 • • • • • for rate control **[2011.01]**
- 21/6375 • • • • • for requesting retransmission **[2011.01]**
- 21/6377 • • • • • directed to server **[2011.01]**
- 21/6379 • • • • • • directed to encoder **[2011.01]**
- 21/64 • • • • Addressing **[2011.01]**
- 21/6402 • • • • • Address allocation for clients **[2011.01]**
- 21/6405 • • • • • Multicasting **[2011.01]**
- 21/6408 • • • • • Unicasting **[2011.01]**
- 21/643 • • • • • Communication protocols **[2011.01]**
- 21/6433 • • • • • DSM-CC [Digital Storage Media - Command and Control Protocol] **[2011.01]**
- 21/6437 • • • • • RTP [Real-time Transport Protocol] **[2011.01]**
- 21/647 • • • • Control signaling between network components and server or clients; Network processes for video distribution between server and clients, e.g. controlling the quality of the video stream, by dropping packets, protecting content from unauthorised alteration within the network, monitoring of network load or bridging between two different networks, e.g. between IP and wireless **[2011.01]**
- 21/65 • • • • Transmission of management data between client and server **[2011.01]**
- 21/654 • • • • • Transmission by server directed to the client **[2011.01]**
- 21/6543 • • • • • • for forcing some client operations, e.g. recording **[2011.01]**
- 21/6547 • • • • • • comprising parameters, e.g. for client setup **[2011.01]**
- 21/658 • • • • • Transmission by the client directed to the server **[2011.01]**
- 21/6583 • • • • • Acknowledgement **[2011.01]**
- 21/6587 • • • • • Control parameters, e.g. trick play commands or viewpoint selection **[2011.01]**

H04N

21/80	• Generation or processing of content or additional data by content creator independently of the distribution process; Content <u>per se</u> [2011.01]	21/854	• • • Content authoring [2011.01]
21/81	• • Monomedia components thereof [2011.01]	21/8541	• • • • involving branching, e.g. to different story endings [2011.01]
21/83	• • Generation or processing of protective or descriptive data associated with content; Content structuring [2011.01]	21/8543	• • • • using a description language, e.g. MHEG [Multimedia and Hypermedia information coding Expert Group] or XML [eXtensible Markup Language] [2011.01]
21/835	• • • Generation of protective data, e.g. certificates [2011.01]	21/8545	• • • • for generating interactive applications [2011.01]
21/8352	• • • • involving content or source identification data, e.g. UMID [Unique Material Identifier] [2011.01]	21/8547	• • • • involving timestamps for synchronizing content [2011.01]
21/8355	• • • • involving usage data, e.g. number of copies or viewings allowed [2011.01]	21/8549	• • • • Creating video summaries, e.g. movie trailer [2011.01]
21/8358	• • • • involving watermark [2011.01]	21/858	• • • Linking data to content, e.g. by linking an URL to a video object or by creating a hotspot [2011.01]
21/84	• • • Generation or processing of descriptive data, e.g. content descriptors [2011.01]		
21/8405	• • • • represented by keywords [2011.01]		
21/845	• • • Structuring of content, e.g. decomposing content into time segments [2011.01]		
21/85	• • Assembly of content; Generation of multimedia applications [2011.01]		

**Indexing scheme associated with groups H04N 1/00-H04N 17/00, relating to still video cameras. [6]**

**101/00 Still video cameras [6]**

**H04Q     SELECTING** (switches, relays, selectors H01H; wireless communication networks H04W) **[1, 2009.01]**

**Note(s) [1, 2009.01]**

1. This subclass covers :
  - methods, circuits, or apparatus for establishing selectively a connection between a desired number of stations (normally two), or between a main station and a desired number of substations (normally one) for the purpose of transferring information via this connection after it has been established;
  - selective calling arrangements over connections already established.
2. In this subclass, the following terms or expressions are used with the meanings indicated:
  - "subscriber" is a general term for terminal equipment, e.g. telephone for public use;
  - "substation" means a subscriber or monitoring equipment which may connect a single subscriber to a line without choice as to subscriber;
  - "satellite" is a kind of exchange the operation of which depends upon control signals received from a supervisory exchange;
  - "switching centres" includes exchanges and satellites.

**Subclass index**

**SELECTING ARRANGEMENTS**

General; by line; multiplex.....	3/00, 5/00, 11/00
DISPOSITIONS FOR TELECONTROL OR TELEMETRY .....	9/00
DETAILS.....	1/00

<b>1/00</b>	<b>Details of selecting apparatus or arrangements</b>		
1/02	• Constructional details	1/20	• • Testing circuits or apparatus; Circuits or apparatus for detecting, indicating, or signalling faults or troubles
1/04	• • Frames or mounting racks for selector switches; Accessories therefor, e.g. frame cover	1/22	• • • Automatic arrangements
1/06	• • Cable ducts or mountings specially adapted for exchange installations	1/24	• • • • for connection devices
1/08	• • Frames or mounting racks for relays; Accessories therefor	1/26	• • • • for signalling trouble in unoccupied sub-exchanges
1/10	• • Exchange station construction	1/28	• • Current-supply circuits or arrangements for selection equipment at exchanges
1/12	• • Arrangements of multiple bars with or without pivotable frames	1/30	• • Signalling arrangements; Manipulation of signalling currents (multiplex systems providing for calling or supervisory signals H04J 1/14, H04J 3/12)
1/14	• • Distribution frames	1/32	• • • using trains of dc pulses (H04Q 1/39 takes precedence) [3]
1/16	• • Wiring arrangements for selector switches or relays in frames	1/34	• • • • Impulse regenerators with mechanical or other non-electrical marking arrangements
1/18	• Electrical details		

- 1/36 • • • • Pulse-correcting arrangements, e.g. for reducing effects due to interference
- 1/38 • • • using combinations of direct currents of different amplitudes or polarities over line conductors or combination of line conductors
- 1/39 • • • using coded pulse groups [3]
- 1/40 • • • whereby duration of pulse or interval between two pulses is variable
- 1/42 • • • • involving the position of a pulse in a cycle
- 1/44 • • • using ac (H04Q 1/50 takes precedence) [3]
- 1/442 • • • • with out-of-voice band signalling frequencies [3]
- 1/444 • • • • with voice-band signalling frequencies [3]
- 1/446 • • • • • using one signalling frequency (H04Q 1/46 takes precedence) [3]
- 1/448 • • • • • • with conversion of a single frequency signal into a digital signal [3]
- 1/45 • • • • • using multi-frequency signalling (H04Q 1/46 takes precedence) [3]
- 1/453 • • • • • • in which m-out-of-n signalling frequencies are transmitted [3]
- 1/457 • • • • • • with conversion of multi-frequency signals into digital signals [3]
- 1/46 • • • • • comprising means for distinguishing between a signalling current of predetermined frequency and a complex current containing that frequency, e.g. speech current [3]
- 1/48 • • • Induced-current signalling arrangements
- 1/50 • • • Conversion between different kinds of signals
- 1/54 • • Amplifier switched-on automatically in dependence on automatically selected lines
- 1/56 • • Balancing circuitry switched-on automatically in dependence on automatically selected lines
- 3/00 Selecting arrangements (H04Q 5/00-H04Q 11/00 take precedence)**
- 3/02 • Circuit arrangements for selectors responsive to a permutation code
- 3/04 • Circuit arrangements for receivers of routing digits
- 3/06 • • for group or trunk group selectors
- 3/08 • • for local or long-distance selectors
- 3/10 • • for PBX selectors, i.e. private branch exchange selectors
- 3/12 • • for line selectors providing transfer of routing digits
- 3/14 • • for two-way operation selectors
- 3/16 • • for marking-switches
- 3/18 • Circuit arrangements for first stage of hunting switching
- 3/20 • • for preselectors
- 3/22 • • • comprising common calling and disconnecting circuit
- 3/24 • • for line finders
- 3/26 • • • comprising common calling and disconnecting circuit
- 3/28 • • • comprising main groups and subgroups
- 3/30 • • Selector finders, i.e. allotters
- 3/32 • Circuit arrangements for second or subsequent stages of hunting switching [2]
- 3/34 • • for the second preselection stage
- 3/36 • • for the second line-finder stage
- 3/38 • • for stages after the group-selector stage
- 3/40 • • for stages after the line selector, e.g. for extension selector
- 3/42 • Circuit arrangements for indirect selecting controlled by common circuits, e.g. register controller, marker
- 3/44 • • using revertive control
- 3/46 • • using signals other than revertive impulses
- 3/47 • • using translators
- 3/48 • • using markers
- 3/49 • • • for end-to-end marking
- 3/495 • • • for routing connecting paths
- 3/52 • • using static devices in switching stages, e.g. electronic switching arrangements [2]
- 3/54 • • in which the logic circuitry controlling the exchange is centralised
- 3/545 • • • using a stored programme [4]
- 3/55 • • • using wired logic circuitry [4]
- 3/555 • • • • being comprised by electro-magnetic devices [4]
- 3/56 • • in which the control signals are multiplexed [2]
- 3/58 • Arrangements providing connection between main exchange and sub-exchange or satellite
- 3/60 • • for connecting to satellites or concentrators which connect one or more exchange lines with a group of local lines
- 3/62 • • for connecting to private branch exchanges
- 3/64 • Distributing or queuing
- 3/66 • • Traffic distributors
- 3/68 • • Grouping or interlacing selector groups or stages
- 3/70 • Identification of class of calling subscriber
- 3/72 • Finding out and indicating number of calling subscriber
- 3/74 • • Identification of subscriber calling from a party-line
- 3/76 • Translation from the called subscriber's number to the outgoing or incoming control information [4]
- 3/78 • Temporary storage of information of calling or called subscriber (intermediate storage means for telegraphic communication H04L 13/08) [4]
- 5/00 Selecting arrangements wherein two or more subscriber stations are connected by the same line to the exchange**
- 5/02 • with direct connection for all subscribers, i.e. party-line system (H04Q 5/24 takes precedence)
- 5/04 • • Signalling by currents in one or other or both line wires or additional wires
- 5/06 • • Signalling by amplitude or polarity of dc
- 5/08 • • Signalling by continuous ac
- 5/10 • • • using single frequencies for different subscribers
- 5/12 • • • using combinations of frequencies
- 5/14 • • Signalling by pulses
- 5/16 • • • by predetermined number of pulses
- 5/18 • with indirect connection, i.e. through subordinate switching centre
- 5/20 • • the subordinate centre permitting interconnection of subscribers connected thereto
- 5/22 • • the subordinate centre not permitting interconnection of subscribers connected thereto
- 5/24 • for two-party-line systems
- 9/00 Arrangements in telecontrol or telemetry systems for selectively calling a substation from a main station, in which substation desired apparatus is selected for applying a control signal thereto or for obtaining measured values therefrom**
- 9/02 • Automatically-operated arrangements
- 9/04 • Arrangements for synchronous operation

## H04Q

- 9/06 • Calling by using amplitude or polarity of dc
- 9/08 • Calling by using continuous ac
- 9/10 • • using single different frequencies
- 9/12 • • using combinations of frequencies
- 9/14 • Calling by using pulses
- 9/16 • • by predetermined number of pulses

- 11/00 Selecting arrangements for multiplex systems**  
(multiplex systems H04J)
- 11/02 • for frequency-division multiplexing
- 11/04 • for time-division multiplexing
- 11/06 • • Time-space-time switching [5]
- 11/08 • • Time only switching [5]

## H04R LOUDSPEAKERS, MICROPHONES, GRAMOPHONE PICK-UPS OR LIKE ACOUSTIC ELECTROMECHANICAL TRANSDUCERS; DEAF-AID SETS; PUBLIC ADDRESS SYSTEMS (producing sounds with frequency not determined by supply frequency G10K) [6]

### Note(s)

1. This subclass covers:
  - loudspeakers, microphones, gramophone pick-ups or like transducers producing acoustic waves or variations of electric current or voltage;
  - arrangements actuated by variations of electric current or voltage for cutting grooves in records;
  - circuits for the above-mentioned arrangements;
  - monitoring or testing the above-mentioned equipment.
2. Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".

### Subclass index

#### TYPES OF TRANSDUCER

With magnetic circuit:

moving coil; moving armature; magnetisable diaphragm; magnetostriction.....9/00, 11/00, 13/00, 15/00

Without magnetic circuit:

piezo-electric; electrostatic; with variable resistance.....17/00, 19/00, 21/00

Other types.....23/00

Details

general; circuits; diaphragms and cones.....1/00, 3/00, 7/00

#### APPLICATIONS

Stereophonic arrangements; deaf-aid; public address systems.....5/00, 25/00, 27/00

MONITORING, TESTING; MANUFACTURE.....29/00, 31/00

- 
- 1/00 Details of transducers** (diaphragms H04R 7/00; characterised by the nature of the transducer, see the relevant group of main groups H04R 9/00-H04R 23/00; mountings specially adapted for telephone equipment H04M 1/02)
  - 1/02 • Casings; Cabinets; Mountings therein (H04R 1/28 takes precedence)
  - 1/04 • • Structural association of microphone with electric circuitry therefor (in deaf-aid sets H04R 25/00)
  - 1/06 • Arranging circuit leads; Relieving strain on circuit leads
  - 1/08 • Mouthpieces; Attachments therefor
  - 1/10 • Earpieces; Attachments therefor
  - 1/12 • Sanitary or hygienic devices for mouthpieces or earpieces, e.g. for protecting against infection
  - 1/14 • Throat mountings for microphones
  - 1/16 • Mounting or connecting stylus to transducer with or without damping means
  - 1/18 • • Holders for styli; Mounting holders on transducers
  - 1/20 • Arrangements for obtaining desired frequency or directional characteristics (for stereophonic purposes H04R 5/00)
  - 1/22 • • for obtaining desired frequency characteristic only
  - 1/24 • • • Structural combinations of separate transducers or of parts of the same transducer and responsive respectively to two or more frequency ranges
  - 1/26 • • • Spatial arrangement of separate transducers responsive to two or more frequency ranges
  - 1/28 • • • Transducer mountings or enclosures designed for specific frequency response; Transducer enclosures modified by provision of mechanical or acoustic impedances, e.g. resonator, damping means
  - 1/30 • • • Combinations of transducers with horns, e.g. with mechanical matching means
  - 1/32 • • for obtaining desired directional characteristic only
  - 1/34 • • • by using a single transducer with sound reflecting, diffracting, directing or guiding means
  - 1/36 • • • • by using a single aperture of dimensions not greater than the shortest operating wavelength
  - 1/38 • • • • in which sound waves act upon both sides of a diaphragm and incorporating acoustic phase-shifting means, e.g. pressure-gradient microphone
  - 1/40 • • • by combining a number of identical transducers
  - 1/42 • Combinations of transducers with fluid-pressure or other non-electrical amplifying means
  - 1/44 • Special adaptations for subaqueous use, e.g. for hydrophone



- 1/46 • Special adaptations for use as contact microphones, e.g. on musical instrument, on stethoscope (throat mountings H04R 1/14)
- 3/00 Circuits for transducers** (arrangements for producing a reverberation or echo sound G10K 15/08; amplifiers H03F)
- 3/02 • for preventing acoustic reaction
- 3/04 • for correcting frequency response
- 3/06 • • of electrostatic transducers
- 3/08 • • of electromagnetic transducers
- 3/10 • • of variable-resistance microphones
- 3/12 • for distributing signals to two or more loudspeakers
- 3/14 • • Cross-over networks
- 5/00 Stereophonic arrangements** (stereophonic pick-ups H04R 9/16, H04R 11/12, H04R 17/08, H04R 19/10)
- Note(s)**
- In this group, the following expression is used with the meaning indicated:
- "stereophonic arrangements" covers quadrasonic or similar arrangements.
- 5/02 • Spatial or constructional arrangements of loudspeakers
- 5/027 • Spatial or constructional arrangements of microphones, e.g. in dummy heads [3]
- 5/033 • Headphones for stereophonic communication [3]
- 5/04 • Circuit arrangements (stereophonic systems H04S)
- 7/00 Diaphragms for electromechanical transducers; Cones**
- 7/02 • characterised by the construction
- 7/04 • • Plane diaphragms
- 7/06 • • • comprising a plurality of sections or layers
- 7/08 • • • • comprising superposed layers separated by air or other fluid
- 7/10 • • • • comprising superposed layers in contact
- 7/12 • • Non-planar diaphragms or cones
- 7/14 • • • corrugated, pleated, or ribbed
- 7/16 • Mounting or tensioning of diaphragms or cones
- 7/18 • • at the periphery
- 7/20 • • • Securing diaphragm or cone resiliently to support by flexible material, springs, cords, or strands
- 7/22 • • • Clamping rim of diaphragm or cone against seating
- 7/24 • • Tensioning by means acting directly on free portion of diaphragm or cone
- 7/26 • Damping by means acting directly on free portion of diaphragm or cone
- 9/00 Transducers of moving-coil, moving-strip, or moving-wire type**
- 9/02 • Details
- 9/04 • • Construction, mounting, or centering of coil
- 9/06 • Loudspeakers
- 9/08 • Microphones
- 9/10 • Telephone receivers
- 9/12 • Gramophone pick-ups using a stylus; Recorders using a stylus
- 9/14 • • comprising two or more styli or transducers (H04R 9/16 takes precedence)
- 9/16 • • signals being recorded or played-back by vibration of a stylus in two orthogonal directions simultaneously
- 9/18 • Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency
- 11/00 Transducers of moving-armature or moving-core type**
- 11/02 • Loudspeakers
- 11/04 • Microphones
- 11/06 • Telephone receivers
- 11/08 • Gramophone pick-ups using a stylus; Recorders using a stylus
- 11/10 • • comprising two or more styli or transducers (H04R 11/12 takes precedence)
- 11/12 • • signals being recorded or played-back by vibration of a stylus in two orthogonal directions simultaneously
- 11/14 • Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency
- 13/00 Transducers having an acoustic diaphragm of magnetisable material directly co-acting with electromagnet**
- 13/02 • Telephone receivers
- 15/00 Magnetostrictive transducers**
- 15/02 • Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency
- 17/00 Piezo-electric transducers; Electrostrictive transducers**
- 17/02 • Microphones
- 17/04 • Gramophone pick-ups using a stylus; Recorders using a stylus
- 17/06 • • comprising two or more styli or transducers (H04R 17/08 takes precedence)
- 17/08 • • signals being recorded or played-back by vibration of a stylus in two orthogonal directions simultaneously
- 17/10 • Resonant transducers, i.e. adapted to produce maximum output at a predetermined frequency
- 19/00 Electrostatic transducers**
- 19/01 • characterised by the use of electrets [3]
- 19/02 • Loudspeakers (H04R 19/01 takes precedence) [3]
- 19/04 • Microphones (H04R 19/01 takes precedence) [3]
- 19/06 • Gramophone pick-ups using a stylus; Recorders using a stylus (H04R 19/01 takes precedence) [3]
- 19/08 • • comprising two or more styli or transducers (H04R 19/10 takes precedence)
- 19/10 • • signals being recorded or played-back by vibration of a stylus in two orthogonal directions simultaneously
- 21/00 Variable-resistance transducers** (gaseous-resistance transducers H04R 23/00; magneto-resistive transducers H04R 23/00)
- 21/02 • Microphones
- 21/04 • Gramophone pick-ups using a stylus; Recorders using a stylus
- 23/00 Transducers other than those covered by groups H04R 9/00-H04R 21/00**
- 23/02 • Transducers using more than one principle simultaneously
- 25/00 Deaf-aid sets**
- 25/02 • adapted to be supported entirely by ear
- 25/04 • comprising pocket amplifiers

## H04R

- 27/00** **Public address systems** (circuits for preventing acoustic reaction H04R 3/02)
- 27/02 • Amplifying systems for the deaf
- 27/04 • Electric megaphones

**29/00** **Monitoring arrangements; Testing arrangements**

**31/00** **Apparatus or processes specially adapted for the manufacture of transducers or diaphragms therefor**

**H04S** **STEREOPHONIC SYSTEMS** (information storage on discs or tapes G11B; broadcast systems for the distribution of stereophonic information H04H 20/88; multiplex systems in general H04J) [3]

### Note(s)

In this subclass, the following expression is used with the meaning indicated:

- "stereophonic systems" covers quadraphonic or similar systems.

**1/00** **Two-channel systems** (H04S 5/00, H04S 7/00 take precedence) [3]

**3/00** **Systems employing more than two channels, e.g. quadraphonic** (H04S 5/00, H04S 7/00 take precedence) [3]

- 3/02 • of the matrix type, i.e. in which input signals are combined algebraically, e.g. after having been phase shifted with respect to each other [3]

**5/00** **Pseudo-stereo systems, e.g. in which additional channel signals are derived from monophonic signals by means of phase shifting, time delay or reverberation** (arrangements for producing a reverberation or echo sound G10K 15/08) [3]

- 5/02 • of the pseudo four-channel type, e.g. in which rear channel signals are derived from two-channel stereo signals [3]

**7/00** **Indicating arrangements; Control arrangements, e.g. balance control** [3]

## H04W WIRELESS COMMUNICATION NETWORKS [2009.01]

### Note(s) [2009.01]

1. This subclass covers:
  - communication networks for selectively establishing one or a plurality of wireless communication links between a desired number of users or between users and network equipment, for the purpose of transferring information via these wireless communication links;
  - networks deploying an infrastructure for mobility management of wireless users connected thereto, e.g. cellular networks, WLAN [Wireless Local Area Network], wireless access networks, e.g. WLL [Wireless Local Loop] or self-organising wireless communication networks, e.g. ad hoc networks;
  - planning or deployment specially adapted for the above-mentioned wireless networks;
  - services or facilities specially adapted for the above-mentioned wireless networks;
  - arrangements or techniques specially adapted for the operation of the above-mentioned wireless networks.
2. This subclass does not cover:
  - communication systems using wireless extensions, i.e. wireless links without selective communication, e.g. cordless telephones, which are covered by group H04M 1/72;
  - broadcast communication, which is covered by subclass H04H.
3. In this subclass, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.

**4/00** **Services or facilities specially adapted for wireless communication networks** [2009.01]

4/02 • Services making use of the location of users or terminals [2009.01]

4/04 • • in a dedicated environment, e.g. buildings or vehicles [2009.01]

4/06 • Selective distribution of broadcast; Services to user groups; One-way selective calling services [2009.01]

4/08 • • User group management [2009.01]

4/10 • • Push-to-Talk or Push-on-Call services [2009.01]

4/12 • Messaging, e.g. SMS [Short Messaging Service]; Mailboxes; Announcements, e.g. informing users on the status or progress of a communication request [2009.01]

4/14 • • Short messaging services, e.g. SMS or USSD [Unstructured Supplementary Service Data] [2009.01]

4/16 • Communication-related supplementary services, e.g. call-transfer or call-hold [2009.01]

4/18 • Information format or content conversion, e.g. adaptation by the network of the transmitted or received information for the purpose of wireless delivery to users or terminals [2009.01]

4/20 • Auxiliary data signalling, i.e. transmitting data via a non-traffic channel [2009.01]

4/22 • Emergency connection handling [2009.01]

4/24 • Accounting or billing [2009.01]

4/26 • • Usage measurement [2009.01]

**8/00** **Network data management** [2009.01]

8/02 • Processing of mobility data, e.g. registration information at HLR [Home Location Register] or VLR [Visitor Location Register]; Transfer of mobility data, e.g. between HLR, VLR or external networks [2009.01]

8/04 • • Registration at HLR or HSS [Home Subscriber Server] [2009.01]

8/06	• • Registration at serving network Location Register, VLR or user mobility server [2009.01]	24/08	• Testing using real traffic [2009.01]
8/08	• • Mobility data transfer [2009.01]	24/10	• Scheduling measurement reports [2009.01]
8/10	• • • between location register and external networks [2009.01]	<b>28/00</b>	<b>Network traffic or resource management [2009.01]</b>
8/12	• • • between location registers or mobility servers [2009.01]	28/02	• Traffic management, e.g. flow control or congestion control [2009.01]
8/14	• • • between corresponding nodes [2009.01]	28/04	• • Error control [2009.01]
8/16	• • • selectively restricting mobility tracking [2009.01]	28/06	• • Optimising, e.g. header compression, information sizing [2009.01]
8/18	• Processing of user or subscriber data, e.g. subscribed services, user preferences or user profiles; Transfer of user or subscriber data [2009.01]	28/08	• • Load balancing or load distribution [2009.01]
8/20	• • Transfer of user or subscriber data [2009.01]	28/10	• • Flow control [2009.01]
8/22	• Processing or transfer of terminal data, e.g. status or physical capabilities [2009.01]	28/12	• • • using signalling between network elements [2009.01]
8/24	• • Transfer of terminal data [2009.01]	28/14	• • • using intermediate storage [2009.01]
8/26	• Network addressing or numbering for mobility support [2009.01]	28/16	• Central resource management; Negotiation of resources, e.g. negotiating bandwidth or QoS [Quality of Service] [2009.01]
8/28	• • Number portability [2009.01]	28/18	• • Negotiating wireless communication parameters [2009.01]
8/30	• Network data restoration [2009.01]	28/20	• • • Negotiating bandwidth [2009.01]
<b>12/00</b>	<b>Security arrangements, e.g. access security or fraud detection; Authentication, e.g. verifying user identity or authorisation; Protecting privacy or anonymity [2009.01]</b>	28/22	• • • Negotiating communication rate [2009.01]
12/02	• Protecting privacy or anonymity [2009.01]	28/24	• • Negotiating SLA [Service Level Agreement]; Negotiating QoS [Quality of Service] [2009.01]
12/04	• Key management [2009.01]	28/26	• • Resource reservation [2009.01]
12/06	• Authentication [2009.01]	<b>36/00</b>	<b>Handoff or reselecting arrangements [2009.01]</b>
12/08	• Access security [2009.01]	36/02	• Buffering or recovering information during reselection [2009.01]
12/10	• Integrity [2009.01]	36/04	• Reselecting a cell layer in multi-layered cells [2009.01]
12/12	• Fraud detection [2009.01]	36/06	• Reselecting a communication resource in the serving access point [2009.01]
<b>16/00</b>	<b>Network planning, e.g. coverage or traffic planning tools; Network deployment, e.g. resource partitioning or cell structures [2009.01]</b>	36/08	• Reselecting an access point [2009.01]
16/02	• Resource partitioning among network components, e.g. reuse partitioning [2009.01]	36/10	• Reselecting an access point controller [2009.01]
16/04	• • Traffic adaptive resource partitioning [2009.01]	36/12	• Reselecting a serving backbone network switching or routing node [2009.01]
16/06	• • Hybrid resource partitioning, e.g. channel borrowing [2009.01]	36/14	• Reselecting a network or an air interface [2009.01]
16/08	• • • Load shedding arrangements [2009.01]	36/16	• Performing reselection for specific purposes [2009.01]
16/10	• • Dynamic resource partitioning [2009.01]	36/18	• • for allowing seamless reselection, e.g. soft reselection [2009.01]
16/12	• • Fixed resource partitioning [2009.01]	36/20	• • for optimising the interference level [2009.01]
16/14	• Spectrum sharing arrangements [2009.01]	36/22	• • for handling the traffic [2009.01]
16/16	• • for PBS [Private Base Station] arrangements [2009.01]	36/24	• Reselection being triggered by specific parameters [2009.01]
16/18	• Network planning tools [2009.01]	36/26	• • by agreed or negotiated communication parameters [2009.01]
16/20	• • for indoor coverage or short range network deployment [2009.01]	36/28	• • • involving a plurality of connections, e.g. multi-call or multi-bearer connections [2009.01]
16/22	• Traffic simulation tools or models [2009.01]	36/30	• • by measured or perceived connection quality data [2009.01]
16/24	• Cell structures [2009.01]	36/32	• • by location or mobility data, e.g. speed data [2009.01]
16/26	• • Cell enhancers, e.g. for tunnels or building shadow [2009.01]	36/34	• Reselection control [2009.01]
16/28	• • using beam steering [2009.01]	36/36	• • by user or terminal equipment [2009.01]
16/30	• • Special cell shapes, e.g. doughnuts or ring cells [2009.01]	36/38	• • by fixed network equipment [2009.01]
16/32	• • Hierarchical cell structures [2009.01]	<b>40/00</b>	<b>Communication routing or communication path finding [2009.01]</b>
<b>24/00</b>	<b>Supervisory, monitoring or testing arrangements [2009.01]</b>	40/02	• Communication route or path selection, e.g. power-based or shortest path routing [2009.01]
24/02	• Arrangements for optimising operational condition [2009.01]	40/04	• • based on wireless node resources [2009.01]
24/04	• Arrangements for maintaining operational condition [2009.01]	40/06	• • • based on characteristics of available antennas [2009.01]
24/06	• Testing using simulated traffic [2009.01]	40/08	• • • based on transmission power [2009.01]
		40/10	• • • based on available power or energy [2009.01]

- 40/12 • • based on transmission quality or channel quality [2009.01]
- 40/14 • • • based on stability [2009.01]
- 40/16 • • • based on interference [2009.01]
- 40/18 • • based on predicted events [2009.01]
- 40/20 • • based on geographic position or location [2009.01]
- 40/22 • • using selective relaying for reaching a BTS [Base Transceiver Station] or an access point [2009.01]
- 40/24 • Connectivity information management, e.g. connectivity discovery or connectivity update [2009.01]
- 40/26 • • for hybrid routing by combining proactive and reactive routing [2009.01]
- 40/28 • • for reactive routing [2009.01]
- 40/30 • • for proactive routing [2009.01]
- 40/32 • • for defining a routing cluster membership [2009.01]
- 40/34 • Modification of an existing route [2009.01]
- 40/36 • • due to handover [2009.01]
- 40/38 • • adapting due to varying relative distances between nodes [2009.01]
  
- 48/00 Access restriction; Network selection; Access point selection [2009.01]**
- 48/02 • Access restriction performed under specific conditions [2009.01]
- 48/04 • • based on user or terminal location or mobility data, e.g. moving direction or speed [2009.01]
- 48/06 • • based on traffic conditions [2009.01]
- 48/08 • Access restriction or access information delivery, e.g. discovery data delivery [2009.01]
- 48/10 • • using broadcasted information [2009.01]
- 48/12 • • using downlink control channel [2009.01]
- 48/14 • • using user query [2009.01]
- 48/16 • Discovering; Processing access restriction or access information [2009.01]
- 48/18 • Selecting a network or a communication service [2009.01]
- 48/20 • Selecting an access point [2009.01]
  
- 52/00 Power management, e.g. TPC [Transmission Power Control], power saving or power classes [2009.01]**
- 52/02 • Power saving arrangements [2009.01]
- 52/04 • TPC [Transmission power control] [2009.01]
- 52/06 • • TPC algorithms [2009.01]
- 52/08 • • • Closed loop power control [2009.01]
- 52/10 • • • Open loop power control [2009.01]
- 52/12 • • • Outer and inner loops [2009.01]
- 52/14 • • • Separate analysis of uplink or downlink [2009.01]
- 52/16 • • • Deriving transmission power values from another channel [2009.01]
- 52/18 • TPC being performed according to specific parameters [2009.01]
- 52/20 • • • using error rate [2009.01]
- 52/22 • • • taking into account previous information or commands [2009.01]
- 52/24 • • • using SIR [Signal to Interference Ratio] or other wireless path parameters [2009.01]
- 52/26 • • • using transmission rate or quality of service QoS [Quality of Service] [2009.01]
- 52/28 • • • using user profile, e.g. mobile speed, priority or network state, e.g. standby, idle or non-transmission [2009.01]
- 52/30 • • using constraints in the total amount of available transmission power [2009.01]
  
- 52/32 • • • TPC of broadcast or control channels [2009.01]
- 52/34 • • • TPC management, i.e. sharing limited amount of power among users or channels or data types, e.g. cell loading [2009.01]
- 52/36 • • • with a discrete range or set of values, e.g. step size, ramping or offsets [2009.01]
- 52/38 • • TPC being performed in particular situations [2009.01]
- 52/40 • • • during macro-diversity or soft handoff [2009.01]
- 52/42 • • • in systems with time, space, frequency or polarisation diversity [2009.01]
- 52/44 • • • in connection with interruption of transmission [2009.01]
- 52/46 • • • in multi-hop networks, e.g. wireless relay networks [2009.01]
- 52/48 • • • during retransmission after error or non-acknowledgment [2009.01]
- 52/50 • • • at the moment of starting communication in a multiple access environment [2009.01]
- 52/52 • • using AGC [Automatic Gain Control] circuits or amplifiers [2009.01]
- 52/54 • • Signalisation aspects of the TPC commands, e.g. frame structure [2009.01]
- 52/56 • • • Detection of errors of TPC bits [2009.01]
- 52/58 • • • Format of the TPC bits [2009.01]
- 52/60 • • • using different transmission rates for TPC commands [2009.01]
  
- 56/00 Synchronisation arrangements [2009.01]**
  
- 60/00 Registration, e.g. affiliation to network; De-registration, e.g. terminating affiliation [2009.01]**
- 60/02 • by periodical registration [2009.01]
- 60/04 • using triggered events [2009.01]
- 60/06 • De-registration or detaching [2009.01]
  
- 64/00 Locating users or terminals for network management purposes, e.g. mobility management [2009.01]**
  
- 68/00 Notification of users, e.g. alerting for incoming communication or change of service [2009.01]**
- 68/02 • Arrangements for increasing efficiency of notification or paging channel [2009.01]
- 68/04 • multi-step notification using statistical or historical mobility data [2009.01]
- 68/06 • using multi-step notification by changing the notification area [2009.01]
- 68/08 • using multi-step notification by increasing the notification area [2009.01]
- 68/10 • using simulcast notification [2009.01]
- 68/12 • Inter-network notification [2009.01]
  
- 72/00 Local resource management, e.g. selection or allocation of wireless resources or wireless traffic scheduling [2009.01]**
- 72/02 • Selection of wireless resources by user or terminal [2009.01]
- 72/04 • Wireless resource allocation [2009.01]
- 72/06 • • based on ranking criteria of the wireless resources [2009.01]
- 72/08 • • based on quality criteria [2009.01]
- 72/10 • • based on priority criteria [2009.01]
- 72/12 • Wireless traffic scheduling [2009.01]
- 72/14 • • using a grant channel [2009.01]

<b>74/00</b>	<b>Wireless channel access, e.g. scheduled or random access [2009.01]</b>	84/18	• Self-organising networks, e.g. <u>ad hoc</u> networks or sensor networks [2009.01]
74/02	• Hybrid access techniques [2009.01]	84/20	• • Master-slave arrangements [2009.01]
74/04	• Scheduled access [2009.01]	84/22	• • with access to wired networks [2009.01]
74/06	• • using polling [2009.01]		
74/08	• Non-scheduled access, e.g. random access, ALOHA or CSMA [Carrier Sense Multiple Access] [2009.01]	<b>88/00</b>	<b>Devices specially adapted for wireless communication networks, e.g. terminals, base stations or access point devices [2009.01]</b>
<b>76/00</b>	<b>Connection management, e.g. connection set-up, manipulation or release [2009.01]</b>	88/02	• Terminal devices [2009.01]
76/02	• Connection set-up [2009.01]	88/04	• • adapted for relaying to or from another terminal or user [2009.01]
76/04	• Connection manipulation [2009.01]	88/06	• • adapted for operation in multiple networks, e.g. multi-mode terminals [2009.01]
76/06	• Connection release [2009.01]	88/08	• Access point devices [2009.01]
<b>80/00</b>	<b>Wireless network protocols or protocol adaptations to wireless operation, e.g. WAP [Wireless Application Protocol] [2009.01]</b>	88/10	• • adapted for operation in multiple networks, e.g. multi-mode access points [2009.01]
80/02	• Data link layer protocols [2009.01]	88/12	• Access point controller devices [2009.01]
80/04	• Network layer protocols, e.g. mobile IP [Internet Protocol] [2009.01]	88/14	• Backbone network devices [2009.01]
80/06	• Transport layer protocols, e.g. TCP [Transport Control Protocol] over wireless [2009.01]	88/16	• Gateway arrangements [2009.01]
80/08	• Upper layer protocols [2009.01]	88/18	• Service support; Network management devices [2009.01]
80/10	• • adapted for session management, e.g. SIP [Session Initiation Protocol] [2009.01]	<b>92/00</b>	<b>Interfaces specially adapted for wireless communication networks [2009.01]</b>
80/12	• • Application layer protocols, e.g. WAP [2009.01]	92/02	• Inter-networking arrangements [2009.01]
<b>84/00</b>	<b>Network topologies [2009.01]</b>	92/04	• Interfaces between hierarchically different network devices [2009.01]
84/02	• Hierarchically pre-organised networks, e.g. paging networks, cellular networks, WLAN [Wireless Local Area Network] or WLL [Wireless Local Loop] [2009.01]	92/06	• • between gateways and public network devices [2009.01]
84/04	• • Large scale networks; Deep hierarchical networks [2009.01]	92/08	• • between user and terminal device [2009.01]
84/06	• • • Airborne or Satellite Networks [2009.01]	92/10	• • between terminal device and access point, i.e. wireless air interface [2009.01]
84/08	• • • Trunked mobile radio systems [2009.01]	92/12	• • between access points and access point controllers [2009.01]
84/10	• • Small scale networks; Flat hierarchical networks [2009.01]	92/14	• • between access point controllers and backbone network device [2009.01]
84/12	• • • WLAN [Wireless Local Area Networks] [2009.01]	92/16	• Interfaces between hierarchically similar devices [2009.01]
84/14	• • • WLL [Wireless Local Loop]; RLL [Radio Local Loop] [2009.01]	92/18	• • between terminal devices [2009.01]
84/16	• • • WPBX [Wireless Private Branch Exchange] [2009.01]	92/20	• • between access points [2009.01]
		92/22	• • between access point controllers [2009.01]
		92/24	• • between backbone network devices [2009.01]
		<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass [2009.01]</b>

## H05 ELECTRIC TECHNIQUES NOT OTHERWISE PROVIDED FOR

### H05B ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR

#### Note(s)

Attention is drawn to Note III following the Contents of Section of section H.

#### Subclass index

##### HEATING

Produced by: resistance; electric, magnetic, or electromagnetic fields; discharge.....3/00, 6/00, 7/00  
 Combined types.....11/00  
 Details.....1/00

##### LIGHTING

Light sources: arc; electro- luminescent.....31/00, 33/00  
 Combined types.....35/00

## Circuit arrangements:

general.....	37/00
for incandescent lamps.....	39/00
for discharge lamps.....	41/00
other.....	43/00

**Heating****1/00 Details of electric heating devices**

- 1/02 • Automatic switching arrangements specially adapted to heating apparatus (thermally-actuated switches H01H 37/00)

**3/00 Ohmic-resistance heating**

- 3/02 • Details
- 3/03 • • Electrodes [2]
- 3/04 • • Waterproof or air-tight seals for heaters
- 3/06 • • Heater elements structurally combined with coupling elements or with holders
- 3/08 • • • having electric connections specially adapted for high temperatures
- 3/10 • Heating elements characterised by the composition or nature of the materials or by the arrangement of the conductor (compositions per se, see the relevant subclasses)
- 3/12 • • characterised by the composition or nature of the conductive material
- 3/14 • • • the material being non-metallic
- 3/16 • • the conductor being mounted on an insulating base
- 3/18 • • the conductor being embedded in an insulating material
- 3/20 • Heating elements having extended surface area substantially in a two-dimensional plane, e.g. plate-heater (H05B 3/62, H05B 3/68, H05B 3/78, H05B 3/84 take precedence) [5]
- 3/22 • • non-flexible
- 3/24 • • • heating conductor being self-supporting
- 3/26 • • • heating conductor mounted on insulating base
- 3/28 • • • heating conductor embedded in insulating material
- 3/30 • • • • on or between metallic plates
- 3/32 • • • heating conductor mounted on insulators on a metallic frame
- 3/34 • • flexible, e.g. heating nets or webs
- 3/36 • • • heating conductor embedded in insulating material
- 3/38 • • • • Powder conductors
- 3/40 • Heating elements having the shape of rods or tubes (H05B 3/62, H05B 3/68, H05B 3/78 take precedence)
- 3/42 • • non-flexible
- 3/44 • • • heating conductor arranged within rods or tubes of insulating material
- 3/46 • • • heating conductor mounted on insulating base
- 3/48 • • • heating conductor embedded in insulating material
- 3/50 • • • • heating conductor arranged in metal tubes, the radiating surface having heat-conducting fins
- 3/52 • • • • Apparatus or processes for filling or compressing insulating material in tubes
- 3/54 • • flexible
- 3/56 • • • Heating cables
- 3/58 • • • Heating hoses; Heating collars

- 3/60 • Heating arrangements wherein the heating current flows through granular, powdered or fluid material, e.g. for salt-bath furnace, electrolytic heating (H05B 3/38 takes precedence)
- 3/62 • Heating elements specially adapted for furnaces (H05B 3/60 takes precedence; arrangements of elements for electric heating in or on furnaces using ohmic resistance heating F27D 11/02)
- 3/64 • • using ribbon, rod, or wire heater
- 3/66 • • Supports or mountings for heaters on or in the wall or roof
- 3/68 • Heating arrangements specially adapted for cooking plates or analogous hot-plates

**Note(s)**

Group H05B 3/76 takes precedence over groups H05B 3/70-H05B 3/74.

- 3/70 • • Plates of cast metal
- 3/72 • • Plates of sheet metal
- 3/74 • • Non-metallic plates
- 3/76 • • Plates with spirally-wound heating tubes
- 3/78 • Heating arrangements specially adapted for immersion heating
- 3/80 • • Portable immersion heaters
- 3/82 • • Fixedly-mounted immersion heaters
- 3/84 • Heating arrangements specially adapted for transparent or reflecting areas, e.g. for demisting or de-icing windows, mirrors or vehicle windshields [5]
- 3/86 • • the heating conductors being embedded in the transparent or reflecting material [5]

**6/00 Heating by electric, magnetic, or electromagnetic fields** (radiation therapy using microwaves A61N 5/02) [3]

- 6/02 • Induction heating [3]
- 6/04 • • Sources of current [3]
- 6/06 • • Control, e.g. of temperature, of power [3]
- 6/08 • • • using compensating or balancing arrangements [3]
- 6/10 • • Induction heating apparatus, other than furnaces, for specific applications [3]
- 6/12 • • • Cooking devices [3]
- 6/14 • • • Tools, e.g. nozzles, rollers, calenders [3]
- 6/16 • • Furnaces having endless cores (H05B 6/34 takes precedence) [3]
- 6/18 • • • having melting basin [3]
- 6/20 • • • having melting channel only [3]
- 6/22 • • Furnaces without an endless core (H05B 6/34 takes precedence) [3]
- 6/24 • • • Crucible furnaces (H05B 6/30 takes precedence) [3]
- 6/26 • • • • using vacuum or particular gas atmosphere [3]
- 6/28 • • • • Protective systems [3]
- 6/30 • • • Arrangements for remelting or zone melting [3]
- 6/32 • • • Arrangements for simultaneous levitation and heating [3]

- 6/34 • • Arrangements for circulation of melts [3]
- 6/36 • • Coil arrangements [3]
- 6/38 • • • specially adapted for fitting into hollow spaces of workpieces [3]
- 6/40 • • • Establishing desired heat distribution, e.g. to heat particular parts of workpieces [3]
- 6/42 • • • Cooling of coils [3]
- 6/44 • • • having more than one coil or coil segment [3]
- 6/46 • Dielectric heating (H05B 6/64 take precedence) [3]
- 6/48 • • Circuits [3]
- 6/50 • • • for monitoring or control [3]
- 6/52 • • Feed lines [3]
- 6/54 • • Electrodes [3]
- 6/56 • • • Rolling electrodes [3]
- 6/58 • • • "sewing machine" type [3]
- 6/60 • • Arrangements for continuous movement of material [3]
- 6/62 • • Apparatus for specific applications [3]
- 6/64 • Heating using microwaves [3]
- 6/66 • • Circuits [3]
- 6/68 • • • for monitoring or control [3]
- 6/70 • • Feed lines [3]
- 6/72 • • Radiators or aerials [3]
- 6/74 • • Mode transformers or mode stirrers [3]
- 6/76 • • Prevention of microwave leakage, e.g. door sealings [3]
- 6/78 • • Arrangements for continuous movement of material [3]
- 6/80 • • Apparatus for specific applications (stoves or ranges heated using microwaves F24C 7/02) [3]

#### **7/00 Heating by electric discharge (plasma torches H05H 1/26)**

- 7/02 • Details
- 7/06 • • Electrodes
- 7/07 • • • designed to melt in use [2]
- 7/08 • • • non-consumable [2]
- 7/085 • • • • mainly consisting of carbon [2]
- 7/09 • • • • Self-baking electrodes [2]
- 7/10 • • Mountings, supports, terminals, or arrangements for feeding or guiding electrodes [2]
- 7/101 • • • Mountings, supports, or terminals at head of electrode, i.e. at the end remote from the arc [2]
- 7/102 • • • • specially adapted for consumable electrodes [2]
- 7/103 • • • Mountings, supports, or terminals with jaws (H05B 7/101 takes precedence) [2]
- 7/105 • • • • comprising more than two jaws equally spaced along circumference, e.g. ring holders [2]
- 7/107 • • • specially adapted for self-baking electrodes [2]
- 7/109 • • • Feeding arrangements (H05B 7/107 takes precedence; where the electrode movement is a part of a closed loop for automatic control of power H05B 7/148) [2]
- 7/11 • • Arrangements for conducting current to the electrode terminals [2]
- 7/12 • • Arrangements for cooling, sealing, or protecting electrodes [2]
- 7/14 • • Arrangements or methods for connecting successive electrode sections [2]
- 7/144 • • Power supplies specially adapted for heating by electric discharge; Automatic control of power, e.g. by positioning of electrodes [2]

- 7/148 • • • Automatic control of power (electrode feeding arrangements H05B 7/109; automatic feeding or moving of electrodes for spot or seam welding or cutting B23K 9/12; disposition of electrodes in or on furnaces F27D 11/10; regulating electric characteristics of arcs G05F 1/02) [2]
- 7/152 • • • • by electromechanical means for positioning of electrodes [2]
- 7/156 • • • • by hydraulic or pneumatic means for positioning of electrodes [2]
- 7/16 • Heating by glow discharge
- 7/18 • Heating by arc discharge
- 7/20 • • Direct heating by arc discharge, i.e. where at least one end of the arc directly acts on the material to be heated, including additional resistance heating by arc current flowing through the material to be heated [2]
- 7/22 • • Indirect heating by arc discharge [2]

#### **11/00 Heating by combined application of processes covered by two or more of groups H05B 3/00-H05B 7/00 (H05B 7/20 takes precedence)**

### **Lighting**

#### **31/00 Electric arc lamps (regulating electric characteristics of arcs G05F 1/02)**

- 31/02 • Details
- 31/04 • • Housings
- 31/06 • • Electrodes
- 31/08 • • • Carbon electrodes
- 31/10 • • • • Cored carbon electrodes
- 31/12 • • • • Beck-effect electrodes
- 31/14 • • • Metal electrodes
- 31/16 • • • Apparatus or processes specially adapted for manufacturing electrodes
- 31/18 • • Mountings for electrodes; Electrode feeding devices
- 31/20 • • • Mechanical arrangements for feeding electrodes
- 31/22 • • • Electromagnetic arrangements for feeding electrodes
- 31/24 • • Cooling arrangements
- 31/26 • • Influencing the shape of arc discharge by gas blowing devices
- 31/28 • • Influencing the shape of arc discharge by magnetic means
- 31/30 • • Starting; Igniting
- 31/32 • • Switching-off
- 31/34 • • Indicating consumption of electrodes
- 31/36 • having two electrodes in line
- 31/38 • • specially adapted for arc
- 31/40 • having two electrodes at an angle
- 31/42 • • specially adapted for arc
- 31/44 • having two parallel electrodes
- 31/46 • • specially adapted for arc
- 31/48 • having more than two electrodes
- 31/50 • • specially adapted for arc
- 31/52 • • • electrodes energised from different phases of the supply

#### **33/00 Electroluminescent light sources [1, 2006.01]**

- 33/02 • Details
- 33/04 • • Sealing arrangements
- 33/06 • • Electrode terminals

## H05B

- 33/08 • • Circuit arrangements not adapted to a particular application
- 33/10 • Apparatus or processes specially adapted to the manufacture of electroluminescent light sources
- 33/12 • Light sources with substantially two-dimensional radiating surfaces
- 33/14 • • characterised by the chemical or physical composition or the arrangement of the electroluminescent material
- 33/18 • • characterised by the nature or concentration of the activator
- 33/20 • • characterised by the chemical or physical composition or the arrangement of the material in which the electroluminescent material is embedded
- 33/22 • • characterised by the chemical or physical composition or the arrangement of auxiliary dielectric or reflective layers
- 33/24 • • • of metallic reflective layers (H05B 33/26 takes precedence)
- 33/26 • • characterised by the composition or arrangement of the conductive material used as an electrode
- 33/28 • • • of translucent electrodes
- 35/00 Electric light sources using a combination of different types of light generation**
- 37/00 Circuit arrangements for electric light sources in general**
- 37/02 • Controlling
- 37/03 • Detecting lamp failure
- 37/04 • • Circuits providing for substitution of the light source in case of its failure
- 39/00 Circuit arrangements or apparatus for operating incandescent light sources and not adapted to a particular application**
- 39/02 • Switching-on, e.g. with predetermined rate of increase of lighting current
- 39/04 • Controlling
- 39/06 • • Switching arrangements, e.g. from series operation to parallel operation
- 39/08 • • by shifting phase of trigger voltage applied to gas-filled controlling tubes
- 39/09 • in which the lamp is fed by pulses
- 39/10 • Circuits providing for substitution of the light source in case of its failure
- 41/00 Circuit arrangements or apparatus for igniting or operating discharge lamps**
- 41/02 • Details
- 41/04 • • Starting switches
- 41/06 • • • thermal only
- 41/08 • • • heated by glow discharge
- 41/10 • • • magnetic only
- 41/12 • • • combined thermal and magnetic
- 41/14 • Circuit arrangements
- 41/16 • • in which the lamp is fed by dc or by low-frequency ac, e.g. by 50 cycles/sec ac (H05B 41/26 takes precedence)
- 41/18 • • • having a starting switch
- 41/19 • • • • for lamps having an auxiliary starting electrode
- 41/20 • • • having no starting switch
- 41/22 • • • • for lamps having an auxiliary starting electrode
- 41/23 • • • • for lamps not having an auxiliary starting electrode
- 41/231 • • • • • for high-pressure lamps
- 41/232 • • • • • for low-pressure lamps
- 41/233 • • • • • using resonance circuitry
- 41/234 • • • • • to eliminate stroboscopic effects, e.g. feeding two lamps with different phases
- 41/24 • • in which the lamp is fed by high-frequency ac (H05B 41/26 takes precedence)
- 41/26 • • in which the lamp is fed by power derived from dc by means of a converter, e.g. by high-voltage dc
- 41/28 • • • using static converters
- 41/282 • • • • with semiconductor devices (H05B 41/288, H05B 41/295 take precedence) [7]
- 41/285 • • • • • Arrangements for protecting lamps or circuits against abnormal operating conditions [7]
- 41/288 • • • • with semiconductor devices and specially adapted for lamps without preheating electrodes, e.g. for high-intensity discharge lamps, high-pressure mercury or sodium lamps or low-pressure sodium lamps [7]
- 41/292 • • • • • Arrangements for protecting lamps or circuits against abnormal operating conditions [7]
- 41/295 • • • • with semiconductor devices and specially adapted for lamps with preheating electrodes, e.g. for fluorescent lamps [7]
- 41/298 • • • • • Arrangements for protecting lamps or circuits against abnormal operating conditions [7]
- 41/30 • • in which the lamp is fed by pulses, e.g. flash lamp
- 41/32 • • • for single flash operation
- 41/34 • • • to provide a sequence of flashes
- 41/36 • • Controlling
- 41/38 • • • Controlling the intensity of light
- 41/39 • • • • continuously
- 41/391 • • • • • using saturable magnetic devices
- 41/392 • • • • • using semiconductor devices, e.g. thyristor
- 41/40 • • • • discontinuously
- 41/42 • • • • • in two steps only
- 41/44 • • • for providing special optical effects, e.g. progressive motion of light
- 41/46 • • Circuits providing for substitution in case of failure of the lamp
- 43/00 Circuit arrangements for light sources, not otherwise provided for (H05B 37/00 takes precedence)**
- 43/02 • for light sources using a charge of combustible material



**H05C ELECTRIC CIRCUITS OR APPARATUS SPECIALLY DESIGNED FOR USE IN EQUIPMENT FOR KILLING, STUNNING, ENCLOSING OR GUIDING LIVING BEINGS** (stationary means for catching or killing insects by electric means A01M 1/22; apparatus for the destruction of noxious animals, other than insects, by electricity A01M 19/00; electric traps for animals A01M 23/38; slaughtering or stunning by electric current A22B 3/06)

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|--|---|
| <p><b>1/00</b>    <b>Circuits or apparatus for generating electric shock effects</b></p> <p>1/02    • providing continuous feeding of dc or ac voltage</p> | <p>1/04    • providing pulse voltages</p> <p>1/06    • • operating only when touched</p> <p><b>3/00</b>    <b>Other circuits or apparatus</b></p> |
|--|---|

**H05F STATIC ELECTRICITY; NATURALLY-OCCURRING ELECTRICITY**

**Note(s)**

1. This subclass covers methods or arrangements for preventing the formation of electrostatic charges on bodies or for carrying-off these charges after their formation.
2. This subclass does not cover specific applications of the above-mentioned methods or arrangements. Such arrangements are covered by the relevant subclasses, e.g. arrangements in large containers B65D 90/46.

- |   |  |
|---|--|
| <p><b>1/00</b>    <b>Preventing the formation of electrostatic charges</b></p> <p>1/02    • by surface treatment</p> <p><b>3/00</b>    <b>Carrying-off electrostatic charges</b> (from living beings A61N 1/14)</p> <p>3/02    • by means of earthing connections</p> | <p>3/04    • by means of spark gaps or other discharge devices (devices providing for corona discharge H01T 19/00) [2]</p> <p>3/06    • by means of ionising radiation</p> <p><b>7/00</b>    <b>Use of naturally-occurring electricity</b></p> |
|---|--|

**H05G X-RAY TECHNIQUE** (apparatus for radiation diagnosis A61B 6/00; X-ray therapy A61N; testing by X-rays G01N; apparatus for X-ray photography G03B; filters, conversion screens, microscopes G21K; X-ray tubes H01J 35/00; TV systems having X-ray input H04N 5/321)

- |   |  |
|---|--|
| <p><b>1/00</b>    <b>X-ray apparatus involving X-ray tubes; Circuits therefor</b></p> <p>1/02    • Constructional details</p> <p>1/04    • • Mounting the X-ray tube within a closed housing</p> <p>1/06    • • • X-ray tube and at least part of the power supply apparatus being mounted within the same housing</p> <p>1/08    • Electrical details</p> <p>1/10    • • Power supply arrangements for feeding the X-ray tube</p> <p>1/12    • • • with dc or rectified single-phase ac</p> <p>1/14    • • • with single-phase low-frequency ac</p> <p>1/16    • • • • Reducing the peak-inverse voltage</p> <p>1/18    • • • with polyphase ac of low frequency</p> <p>1/20    • • • with high-frequency ac; with pulse trains</p> <p>1/22    • • • with single pulses</p> <p>1/24    • • • • Obtaining pulses by using energy storage devices (pulse generators H03K)</p> <p>1/26    • • Measuring, controlling, protecting (measuring electric values G01R; measuring X-ray intensity G01T)</p> <p>1/28    • • • Measuring or recording actual exposure time; Counting number of exposures; Measuring required exposure time</p> <p>1/30    • • • Controlling</p> <p>1/32    • • • • Supply voltage of the X-ray apparatus or tube (regulating supply without reference to operating characteristics of the apparatus G05F)</p> | <p>1/34    • • • • Anode current, heater current, heater voltage of X-ray tube (regulating supply without reference to operating characteristics of the apparatus G05F)</p> <p>1/36    • • • • Temperature of anode; Brightness of image</p> <p>1/38    • • • • Exposure time</p> <p>1/40    • • • • • using adjustable time switch</p> <p>1/42    • • • • • using arrangements for switching when a predetermined dose of radiation has been applied, e.g. in which the switching instant is determined by measuring the electrical energy supplied to the tube</p> <p>1/44    • • • • • • in which the switching instant is determined by measuring the amount of radiation directly</p> <p>1/46    • • • • • Combined control of different quantities, e.g. exposure time as well as voltage or current</p> <p>1/48    • • • • • Compensating the voltage drop occurring at the instant of switching-on of the apparatus (regulating supply without reference to operating characteristics of the apparatus G05F)</p> <p>1/50    • • • • • Passing the tube current only during a restricted portion of the voltage waveform</p> <p>1/52    • • • • • Target size or shape; Direction of electron beam, e.g. in tubes with one anode and more than one cathode</p> <p>1/54    • • • • • Protecting (overload protection combined with control H05G 1/46)</p> <p>1/56    • • • Switching-on; Switching-off</p> |
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## H05G

- |   |   |
|---|---|
| <p>1/58 • • Switching arrangements for changing-over from one mode of operation to another, e.g. from radioscopy to radiography, from radioscopy to irradiation</p> <p>1/60 • • Circuit arrangements for obtaining a series of X-ray photographs or for X-ray cinematography</p> <p>1/61 • • • for obtaining stereoscopic photographs [5]</p> <p>1/62 • • Circuit arrangements for obtaining X-ray photography at predetermined instants in the movement of an object, e.g. X-ray stroboscopy</p> <p>1/64 • • Circuit arrangements for X-ray apparatus incorporating electronic image converters, e.g. image intensifiers [5]</p> | <p>1/66 • • Circuit arrangements for X-ray tubes with target movable relatively to the anode</p> <p>1/68 • • Circuit arrangements for Lilienfeld tubes; Circuit arrangements for gas-filled X-ray tubes</p> <p>1/70 • • Circuit arrangements for X-ray tubes with more than one anode; Circuit arrangements for apparatus comprising more than one X-ray tube</p> <p><b>2/00 Apparatus or processes specially adapted for producing X-rays, not involving X-ray tubes, e.g. involving generation of a plasma (X-ray lasers H01S 4/00; plasma technique in general H05H) [5]</b></p> |
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**H05H PLASMA TECHNIQUE** (ion-beam tubes H01J 27/00; magnetohydrodynamic generators H02K 44/08; producing X-rays involving plasma generation H05G 2/00); **PRODUCTION OF ACCELERATED ELECTRICALLY- CHARGED PARTICLES OR OF NEUTRONS** (obtaining neutrons from radioactive sources G21, e.g. G21B, G21C, G21G); **PRODUCTION OR ACCELERATION OF NEUTRAL MOLECULAR OR ATOMIC BEAMS** (atomic clocks G04F 5/14; devices using stimulated emission H01S; frequency regulation by comparison with a reference frequency determined by energy levels of molecules, atoms, or subatomic particles H03L 7/26)

### Note(s)

1. This subclass covers:
  - a. generating or handling plasma;
  - b. devices not covered by subclass H01J and in which electrons, ion beams, or neutral particles are accelerated to high energies;
  - c. devices for producing neutral particle beams;
  - d. targets for (a), (b), or (c).
2. Attention is drawn to subclass G21K.

### Subclass index

PLASMA TECHNIQUE.....	1/00
PRODUCTION OR ACCELERATION OF NEUTRAL PARTICLE BEAMS.....	3/00
TARGETS FOR NUCLEAR REACTIONS.....	6/00
PARTICLE ACCELERATORS	
Direct voltage accelerators, accelerators using single pulses.....	5/00
Linear; magnetic induction; magnetic resonance.....	9/00, 11/00, 13/00
Others.....	15/00
Details.....	7/00

- |  |  |
|--|--|
| <p><b>1/00 Generating plasma; Handling plasma</b> (application of plasma technique in thermonuclear fusion reactors G21B 1/00)</p> <p>1/02 • Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma (electron optics H01J)</p> <p>1/03 • • using electrostatic fields [3]</p> <p>1/04 • • using magnetic fields substantially generated by the discharge in the plasma</p> <p>1/06 • • • Longitudinal pinch devices</p> <p>1/08 • • • Theta pinch devices</p> <p>1/10 • • using applied magnetic fields only</p> <p>1/11 • • • using cusp configuration (H05H 1/14 takes precedence) [3]</p> <p>1/12 • • • wherein the containment vessel forms a closed loop, e.g. stellarator</p> <p>1/14 • • • wherein the containment vessel is straight and has magnetic mirrors</p> <p>1/16 • • using applied electric and magnetic fields</p> <p>1/18 • • • wherein the fields oscillate at a very high frequency, e.g. in the microwave range</p> <p>1/20 • • Ohmic heating</p> <p>1/22 • • for injection heating</p> | <p>1/24 • Generating plasma [2]</p> <p>1/26 • • Plasma torches [2]</p> <p>1/28 • • • Cooling arrangements [3]</p> <p>1/30 • • • using applied electromagnetic fields, e.g. high-frequency or microwave energy (H05H 1/28 takes precedence) [3]</p> <p>1/32 • • • using an arc (H05H 1/28 takes precedence) [3]</p> <p>1/34 • • • • Details, e.g. electrodes, nozzles [3]</p> <p>1/36 • • • • Circuit arrangements (H05H 1/38, H05H 1/40 take precedence) [3]</p> <p>1/38 • • • • Guiding or centering of electrodes [3]</p> <p>1/40 • • • • using applied magnetic fields, e.g. for focusing or rotating the arc [3]</p> <p>1/42 • • • • with provisions for introducing materials into the plasma, e.g. powder, liquid (electrostatic spraying, spraying apparatus with means for charging the spray electrically B05B 5/00) [3]</p> <p>1/44 • • • • using more than one torch [3]</p> <p>1/46 • • using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/26 takes precedence) [3]</p> <p>1/48 • • using an arc (H05H 1/26 takes precedence) [3]</p> |
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1/50	• • • and using applied magnetic fields, e.g. for focusing or rotating the arc [3]	7/02	• Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators H03B)
1/52	• • using exploding wires or spark gaps (H05H 1/26 takes precedence; spark gaps in general H01T) [3]	7/04	• Magnet systems; Energisation thereof
1/54	• Plasma accelerators [3]	7/06	• Two-beam arrangements; Multi-beam arrangements
3/00	<b>Production or acceleration of neutral particle beams, e.g. molecular or atomic beams [3]</b>	7/08	• Arrangements for injecting particles into orbits
3/02	• Molecular or atomic-beam generation, e.g. resonant beam generation (gas masers H01S 1/06) [3]	7/10	• Arrangements for ejecting particles from orbits
3/04	• Acceleration by electromagnetic wave pressure [3]	7/12	• Arrangements for varying final energy of beam
3/06	• Generating neutron beams (targets for producing nuclear reactions H05H 6/00; neutron sources G21G 4/02) [5]	7/14	• Vacuum chambers (H05H 5/03 takes precedence) [4]
5/00	<b>Direct voltage accelerators; Accelerators using single pulses (H05H 3/06 takes precedence) [5]</b>	7/16	• • of the waveguide type [4]
5/02	• Details (targets for producing nuclear reactions H05H 6/00) [3]	7/18	• • Cavities; Resonators [4]
5/03	• • Accelerating tubes (vessels or containers of electric discharge tubes with improved potential distribution over surface of vessel H01J 5/06; shields of X-ray tubes associated with vessels or containers H01J 35/16) [4]	7/20	• • • with superconductive walls [4]
5/04	• energised by electrostatic generators, e.g. by van de Graaff generator [4]	7/22	• Details of linear accelerators, e.g. drift tubes (H05H 7/02-H05H 7/20 take precedence) [4]
5/06	• Tandem accelerators; Multi-stage accelerators	9/00	<b>Linear accelerators (H05H 11/00 takes precedence)</b>
5/08	• Particle accelerators using step-up transformers, e.g. resonance transformers [4]	9/02	• Travelling-wave linear accelerators
6/00	<b>Targets for producing nuclear reactions (supports for targets or objects to be irradiated G21K 5/08) [3]</b>	9/04	• Standing-wave linear accelerators
7/00	<b>Details of devices of the types covered by groups H05H 9/00-H05H 13/00 (targets for producing nuclear reactions H05H 6/00) [3]</b>	11/00	<b>Magnetic induction accelerators, e.g. betatrons</b>
		11/02	• Air-cored betatrons
		11/04	• Biased betatrons
		13/00	<b>Magnetic resonance accelerators; Cyclotrons</b>
		13/02	• Synchrocyclotrons, i.e. frequency-modulated cyclotrons
		13/04	• Synchrotrons
		13/06	• Air-cored magnetic resonance accelerators
		13/08	• Alternating-gradient magnetic resonance accelerators
		13/10	• Accelerators comprising one or more linear accelerating sections and bending magnets or the like to return the charged particles in a trajectory parallel to the first accelerating section, e.g. microtrons [4]
		15/00	<b>Methods or devices for acceleration of charged particles not otherwise provided for [4]</b>
H05K	<b>PRINTED CIRCUITS; CASINGS OR CONSTRUCTIONAL DETAILS OF ELECTRIC APPARATUS; MANUFACTURE OF ASSEMBLAGES OF ELECTRICAL COMPONENTS</b> (details of instruments or comparable details of other apparatus not otherwise provided for G12B; thin-film or thick-film circuits H01L 27/01, H01L 27/13; non-printed means for electric connections to or between printed circuits H01R; casings for, or constructional details of, particular types of apparatus, <u>see</u> the relevant subclasses; processes involving only a single technical art, e.g. heating, spraying, for which provision exists elsewhere, <u>see</u> the relevant classes)		

**Note(s)**

- This subclass covers:
  - combinations of a radio or television receiver with apparatus having a different main function;
  - printed circuits structurally associated with non-printed electric components.
- In this subclass, the following expression is used with the meaning indicated:
  - "printed circuits" covers all kinds of mechanical constructions of circuits that consist of an insulating base or support carrying the conductor and are combined structurally with the conductor throughout their length, especially in a two-dimensional plane, the conductors of which are secured to the base in a non-dismountable manner, and also covers the processes or apparatus for manufacturing such constructions, e.g. forming the circuit by mechanical or chemical treatment of a conductive foil, paste, or film on an insulating support.

**Subclass index****PRINTED CIRCUITS ASSOCIATED OR NOT ASSOCIATED WITH NON-PRINTED ELECTRIC COMPONENTS**

Types; manufacture.....	1/00, 3/00
CASINGS, CABINETS OR DRAWERS; CONSTRUCTIONAL DETAILS.....	5/00, 7/00
SCREENING.....	9/00
COMBINATIONS OF A RADIO OR TELEVISION RECEIVER WITH OTHER APPARATUS.....	11/00
MANUFACTURE OF ELECTRONIC ASSEMBLAGES.....	13/00
ARRANGEMENTS FOR IMPROVING THE OPERATING RELIABILITY.....	10/00

**1/00 Printed circuits** (assemblies of a plurality of individual semiconductor or solid state devices H01L 25/00; devices consisting of a plurality of solid state components formed in or on a common substrate, e.g. integrated circuits, thin-film or thick-film circuits, H01L 27/00)

- 1/02 • Details
- 1/03 • • Use of materials for the substrate [3]
- 1/05 • • • Insulated metal substrate [3]
- 1/09 • • Use of materials for the metallic pattern [3]
- 1/11 • • Printed elements for providing electric connections to or between printed circuits [3]
- 1/14 • • Structural association of two or more printed circuits (providing electric connection to or between printed circuits H05K 1/11, H01R 12/00)
- 1/16 • incorporating printed electric components, e.g. printed resistor, capacitor, inductor
- 1/18 • Printed circuits structurally associated with non-printed electric components (H05K 1/16 takes precedence)

**3/00 Apparatus or processes for manufacturing printed circuits** (photomechanical production of textured or patterned surfaces, materials or originals therefor, apparatus specially adapted therefor, in general G03F; involving the manufacture of semiconductor devices H01L) [3]

- 3/02 • in which the conductive material is applied to the surface of the insulating support and is thereafter removed from such areas of the surface which are not intended for current conducting or shielding
- 3/04 • • the conductive material being removed mechanically, e.g. by punching
- 3/06 • • the conductive material being removed chemically or electrolytically, e.g. by photo-etch process
- 3/07 • • • being removed electrolytically [3]
- 3/08 • • the conductive material being removed by electric discharge, e.g. by spark erosion
- 3/10 • in which conductive material is applied to the insulating support in such a manner as to form the desired conductive pattern
- 3/12 • • using printing techniques to apply the conductive material
- 3/14 • • using spraying techniques to apply the conductive material
- 3/16 • • • by cathodic sputtering
- 3/18 • • using precipitation techniques to apply the conductive material
- 3/20 • • by affixing prefabricated conductor pattern
- 3/22 • Secondary treatment of printed circuits
- 3/24 • • Reinforcing of the conductive pattern
- 3/26 • • Cleaning or polishing of the conductive pattern
- 3/28 • • Applying non-metallic protective coatings
- 3/30 • Assembling printed circuits with electric components, e.g. with resistor
- 3/32 • • electrically connecting electric components or wires to printed circuits
- 3/34 • • • by soldering
- 3/36 • Assembling printed circuits with other printed circuits
- 3/38 • Improvement of the adhesion between the insulating substrate and the metal [3]
- 3/40 • Forming printed elements for providing electric connections to or between printed circuits [3]
- 3/42 • • Plated through-holes [3]
- 3/44 • Manufacturing insulated metal core circuits [3]
- 3/46 • Manufacturing multi-layer circuits [3]

**5/00 Casings, cabinets or drawers for electric apparatus** (in general A47B; radio receiver cabinets H04B 1/08; television receiver cabinets H04N 5/64)

- 5/02 • Details
- 5/03 • • Covers
- 5/04 • Metal casings
- 5/06 • Hermetically-sealed casings

**7/00 Constructional details common to different types of electric apparatus** (casings, cabinets, drawers H05K 5/00)

- 7/02 • Arrangements of circuit components or wiring on supporting structure
- 7/04 • • on conductive chassis
- 7/06 • • on insulating boards
- 7/08 • • • on perforated boards
- 7/10 • • Plug-in assemblages of components
- 7/12 • • Resilient or clamping means for holding component to structure (holding two-part couplings together H01R 13/00)
- 7/14 • Mounting supporting structure in casing or on frame or rack
- 7/16 • • on hinges or pivots
- 7/18 • Construction of rack or frame
- 7/20 • Modifications to facilitate cooling, ventilating, or heating

**9/00 Screening of apparatus or components against electric or magnetic fields** (devices for absorbing radiation from an aerial H01Q 17/00)

**10/00 Arrangements for improving the operating reliability of electronic equipment, e.g. by providing a similar stand-by unit**

#### Note(s)

Attention is drawn to the following appropriate places:

- G05B 9/03.....Electric redundant control systems
- G06F 11/16.....Error detection or correction of data by redundancy in digital computer hardware
- G08B 29/16.....Security signalling or alarm systems
- H02H 3/05.....Redundant emergency protective circuit arrangements
- H02J 3/38.....Arrangements for parallelly feeding a single network
- H02J 9/04.....Circuit arrangements with stand-by power supply
- H03K 19/003.....Modifications for increasing the reliability of logic circuits or inverting circuits
- H03K 19/007.....Fail-safe logic circuits or inverting circuits
- H03L 7/07.....Redundant clock signal generation in generators of electronic oscillations or pulses
- H04B 1/74.....Transmission systems using redundant channels or apparatus

H04L 1/22.....	Redundant apparatus for increasing reliability of arrangements used for the transmission of digital information.	<b>13/00</b>	<b>Apparatus or processes specially adapted for manufacturing or adjusting assemblages of electric components</b>
<b>11/00</b>	<b>Combinations of a radio or television receiver with apparatus having a different main function</b>	13/02	• Feeding of components (in general B65G)
11/02	• with vehicles	13/04	• Mounting of components
		13/06	• Wiring by machine
		13/08	• Monitoring manufacture of assemblages

## **H99      SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION**

### **H99Z      SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION [2006.01]**

#### **Note(s) [2006.01]**

This subclass covers subject matter that:

- a. is not provided for, but is most closely related to, the subject matter covered by the subclasses of this section, and
- b. is not explicitly covered by any subclass of another section.

#### **99/00      Subject matter not otherwise provided for in this section [2006.01]**