SECTION H — ELECTRICITY

H01 BASIC ELECTRIC ELEMENTS

Note(s)

1. 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.
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".

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

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
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. diabolo, 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

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

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. $SmCo_5$ **[6]**
1/057 • • • • • • • • and IIIa elements, e.g. $Nd_2Fe_{14}B$ **[6]**
1/058 • • • • • • • • and IVa elements, e.g. $Gd_2Fe_{14}C$ **[6]**
1/059 • • • • • • • • and Va elements, e.g. $Sm_2Fe_{17}N_2$ **[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. $CdCr_2S_4$ **[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]**

29/00 Variable transformers or inductances not covered by group H01F 21/00

29/02 • with tappings 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

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 permitivity with applied temperature
7/06 • having a dielectric selected for the variation of its permitivity 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]**

9/028 • • • • Organic semiconducting electrolytes, e.g. TCNQ **[6]**
9/032 • • • • Inorganic semiconducting electrolytes, e.g. MnO_2 **[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 thereinto, 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 • • Fixing or assembling a capacitive element in a housing, e.g. mounting electrodes, current collectors or terminals in containers or encapsulations **[2013.01]**

11/84 • Processes for the manufacture of hybrid or EDL capacitors, or components thereof **[2013.01]**

11/86 • • specially adapted for electrodes (carbonisation or activation of carbon for the manufacture of electrodes H01G 11/34) **[2013.01]**

13/00 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]

13/02 • Machines for winding capacitors **[2]**

13/04 • Drying; Impregnating **[2]**

13/06 • with provision for removing metal surfaces **[2]**

15/00 Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with each other (involving at least one hybrid or electric double-layer [EDL] capacitor as the main component H01G 11/08) **[6, 2013.01]**

17/00 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]

H01H ELECTRIC SWITCHES; RELAYS; SELECTORS; EMERGENCY PROTECTIVE DEVICES (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)

1. 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.
2. 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.
3. 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".
4. 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

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)

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 contactcarrying 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

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
21/38 • • • • incorporating lost motion
21/40 • • • • having snap action
21/42 • • • • • produced by compression or extension of coil spring
21/44 • • • • • produced by flexing blade springs
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
21/56 • • making contact in one position only
21/58 • • Change-over switches without stable intermediate position
21/60 • • Change-over switches with stable intermediate position
21/86 • Switches with abutting contact carried by operating part, e.g. telegraph tapping key
21/88 • • with intermediate position of rest

23/00 Tumbler or rocker switches, i.e. switches characterised by being operated by rocking an operating member in the form of a rocker button

Note(s) [2006.01]

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.

23/02 • Details
23/04 • • Cases; Covers
23/06 • • • Dustproof, splashproof, drip-proof, waterproof, or flameproof casings
23/08 • • Bases; Stationary contacts mounted thereon
23/10 • • Adaptation for built-in fuse
23/12 • • Movable parts; Contacts mounted thereon
23/14 • • • Tumblers
23/16 • • • Driving mechanisms
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

25/00 Switches with compound movement of handle or other operating part

25/04 • Operating part movable angularly in more than one plane, e.g. joystick
25/06 • Operating part movable both angularly and rectilinearly, the rectilinear movement being along the axis of angular movement

27/00 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 (combined with plug-and-socket connectors H01R 13/70; with current-carrying plug H01R 31/08)

27/04 • Insulating plug or plate inserted between normally-closed contacts
27/06 • Key inserted and then turned to effect operation of the switch
27/08 • • wherein the key cannot be removed until the switch is returned to its original position
27/10 • Switch operated by setting members according to a single predetermined combination out of several possible settings

29/00 Switches having at least one liquid contact (solid contacts wetted or soaked with mercury H01H 1/08)

29/02 • Details
29/04 • • Contacts; Containers for liquid contacts
29/06 • • • Liquid contacts characterised by the material thereof
29/08 • • Means for introducing a predetermined time delay
29/10 • • • by constricting the flow of the contact liquid
29/12 • • Operating mechanisms adapted for operation by a part of the human body other than the hand, e.g. by foot
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
29/16 • operated by dipping solid contact into stationary contact liquid
29/18 • with level of surface of contact liquid displaced by non-electrical contact-making plunger
29/20 • operated by tilting contact-liquid container
29/22 • • wherein contact is made and broken between liquid and solid
29/24 • • wherein contact is made and broken between liquid and liquid
29/26 • with level of surface of contact liquid displaced by centrifugal action
29/28 • with level of surface of contact liquid displaced by fluid pressure
29/30 • with level of surface of contact liquid displaced by expansion or evaporation thereof
29/32 • with contact made by a liquid jet, e.g. earthing switch with contact made by jet of water

31/00 Air-break switches for high tension without arc-extinguishing or arc-preventing means (in combination with high tension or heavy-current switches with arc-extinguishing or arc-preventing means H01H 33/00) **[3]**

31/02 • Details
31/04 • • Interlocking mechanisms
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

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
33/91 • • • • the arc-extinguishing fluid being air or gas
33/915 • • • • • with closed circuit of air or gas **[3]**
33/92 • • • • the arc-extinguishing fluid being liquid, e.g. oil
33/94 • • • this movement being effected solely due to the pressure caused by the arc itself or by an auxiliary arc
33/95 • • • • the arc-extinguishing fluid being air or gas
33/96 • • • • the arc-extinguishing fluid being liquid, e.g. oil
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
33/985 • • • the fluid being air or gas **[3]**
33/99 • • • the fluid being liquid **[3]**

35/00 Switches operated by change of a physical condition (operated by change of magnetic or electric field H01H 36/00; thermally-actuated switches H01H 37/00)

Note(s)

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.

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)
35/06 • Switches operated by change of speed (operated by change of fluid flow H01H 35/24)
35/10 • • Centrifugal switches (level of mercury displaced by centrifugal action H01H 29/26)
35/12 • • operated by reversal of direction of movement
35/14 • Switches operated by change of acceleration, e.g. by shock or vibration, inertia switch
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)
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)
35/26 • • Details
35/28 • • • Compensation for variation of ambient pressure or temperature
35/30 • • • Means for transmitting pressure to pressure-responsive operating part, e.g. by capsule and capillary tube
35/32 • • actuated by bellows
35/34 • • actuated by diaphragm
35/36 • • actuated by curled flexible tube, e.g. Bourdon tube
35/38 • • actuated by piston and cylinder
35/40 • • actuated by devices allowing continual flow of fluid, e.g. vane
35/42 • Switches operated by change of humidity

36/00 Switches actuated by change of magnetic field or of electric field, e.g. by change of relative position of magnet and switch, by shielding

36/02 • actuated by movement of a float carrying a magnet

37/00 Thermally-actuated switches

37/02 • Details
37/04 • • Bases; Housings; Mountings
37/06 • • • to facilitate replacement, e.g. cartridge housing
37/08 • • Indicators; Distinguishing marks
37/10 • • Compensation for variation of ambient temperature or pressure
37/12 • • Means for adjustment of "on" or "off" operating temperature
37/14 • • • by anticipatory electric heater
37/16 • • • by varying the proportion of input heat received by the thermal element, e.g. by displacement of a shield
37/18 • • • by varying bias on the thermal element due to a separate spring
37/20 • • • by varying the position of the thermal element in relation to switch base or casing
37/22 • • • by adjustment of a member transmitting motion from the thermal element to contacts or latch
37/24 • • • by adjustment of position of the movable contact on its driving member
37/26 • • • by adjustment of abutment for "off" position of the movable contact
37/28 • • • by adjustment of the position of the fixed contact
37/30 • • • by varying the position of the contact unit in relation to switch base or casing
37/32 • • Thermally-sensitive members
37/34 • • • Means for transmitting heat thereto, e.g. capsule remote from contact member
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)
37/38 • • • • with bellows
37/40 • • • • with diaphragm
37/42 • • • • with curled flexible tube, e.g. Bourdon tube
37/44 • • • • with piston and cylinder
37/46 • • • actuated due to expansion or contraction of a solid (deflection of a bimetallic element H01H 37/52)
37/48 • • • • with extensible rigid rods or tubes
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

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

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
71/18 • • • • with expanding rod, strip, or wire
71/20 • • • • with fusible mass
71/22 • • • • with compensation for variation of ambient temperature
71/24 • • • Electromagnetic mechanisms
71/26 • • • • with windings acting in opposition
71/28 • • • • with windings acting in conjunction
71/30 • • • • having additional short-circuited winding
71/32 • • • • having permanently magnetised part
71/34 • • • • having two or more armatures controlled by a common winding
71/36 • • • • frequency selective
71/38 • • • • wherein the magnet coil also acts as arc blow-out device
71/40 • • • Combined electrothermal and electromagnetic mechanisms
71/42 • • • Induction-motor, induced-current, or electrodynamic release mechanisms
71/43 • • • • Electrodynamic release mechanisms
71/44 • • • having means for introducing a predetermined time delay (by short-circuited winding H01H 71/30; by additional armature H01H 71/34)
71/46 • • • having means for operating auxiliary contacts additional to the main contacts
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
71/50 • • Manual reset mechanisms
71/52 • • • actuated by lever
71/54 • • • actuated by tumbler
71/56 • • • actuated by rotatable knob or wheel
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

73/00 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

73/02 • Details
73/04 • • Contacts
73/06 • • Housings; Casings; Bases; Mountings
73/08 • • • Plug-in housings
73/10 • • • Cartridge housings, e.g. screw-in housing
73/12 • • Means for indicating condition of the switch
73/14 • • • Indicating lamp structurally associated with the switch
73/16 • • Distinguishing marks, e.g. colour coding
73/18 • • Means for extinguishing or suppressing arc
73/20 • • Terminals; Connections
73/22 • having electrothermal release and no other automatic release (cartridge type H01H 73/62)
73/24 • • reset by lever
73/26 • • reset by tumbler
73/28 • • reset by rotatable knob or wheel
73/30 • • reset by push-button, pull-knob, or slide
73/32 • • reset by closure of switch casing
73/34 • • reset action requiring replacement or reconditioning of a fusible or explosive part
73/36 • having electromagnetic release and no other automatic release (cartridge type H01H 73/64)
73/38 • • reset by lever
73/40 • • reset by tumbler
73/42 • • reset by rotatable knob or wheel
73/44 • • reset by push-button, pull-knob, or slide
73/46 • • reset by closure of switch casing
73/48 • having both electrothermal and electromagnetic automatic release (cartridge type H01H 73/66)
73/50 • • reset by lever
73/52 • • reset by tumbler
73/54 • • reset by rotatable knob or wheel
73/56 • • reset by push-button, pull-knob, or slide
73/58 • • reset by closure of switch casing
73/60 • cartridge type, e.g. screw-in cartridge
73/62 • • having only electrothermal release
73/64 • • having only electromagnetic release
73/66 • • having combined electrothermal and electromagnetic release

75/00 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

75/02 • Details
75/04 • • Reset mechanisms for automatically reclosing a limited number of times (circuit arrangements H02H 3/06)
75/06 • • • effecting one reclosing action only
75/08 • having only electrothermal release
75/10 • having only electromagnetic release
75/12 • having combined electrothermal and electromagnetic release

77/00 Protective overload circuit-breaking switches operated by excess current and requiring separate action for resetting (H01H 73/00, H01H 75/00 take precedence)

77/02 • in which the excess current itself provides the energy for opening the contacts, and having a separate reset mechanism
77/04 • • with electrothermal opening
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

79/00 Protective switches in which excess current causes the closing of contacts, e.g. for short-circuiting the apparatus to be protected

81/00 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

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 **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]**

89/02 • Combination of a key operated switch with a manually operated switch, e.g. ignition and lighting switches **[2006.01]**

89/04 • Combination of a thermally actuated switch with a manually operated switch **[2006.01]**

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]**

89/08 • • with both devices using the same contact pair **[2006.01]**

89/10 • • • with each device controlling one of the two co-operating contacts **[2006.01]**

H01J **ELECTRIC DISCHARGE TUBES OR DISCHARGE LAMPS** (spark-gaps H01T; arc lamps with consumable electrodes H05B; particle accelerators H05H)

Note(s)

1. 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.
2. In this subclass, groups H01J 1/00-H01J 7/00 relate only to:
   i. details of an unspecified kind of discharge tube or lamp, or
   ii. 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.
3. In this subclass, the following term is used with the meaning indicated:
   • "lamp" includes tubes emitting ultra-violet or infra-red light.
4. Attention is drawn to the definition of the expression "spark gaps" given in the Note following the title of subclass H01T.
5. 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

1/00 **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** (details of electron-optical arrangements or of ion traps H01J 3/00)

1/02 • Main electrodes

1/04 • • Liquid electrodes, e.g. liquid cathode

1/05 • • • characterised by material

1/06 • • • Containers for liquid-pool electrodes; Arrangement or mounting thereof

1/08 • • • Positioning or moving the cathode spot on the surface of a liquid-pool cathode

1/10 • • • Cooling, heating, circulating, filtering, or controlling level of liquid in a liquid-pool electrode

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 capacitative 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 capacitative 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

17/00 Gas-filled discharge tubes with solid cathodes (H01J 25/00, H01J 27/00, H01J 31/00-H01J 41/00 take precedence; gas filled spark gaps H01T; Marx converters H02M 7/26)

17/02 • Details
17/04 • • Electrodes; Screens **[1, 2012.01]**
17/06 • • • Cathodes
17/08 • • • • having mercury or liquid alkali metal deposited on the cathode surface during operation of the tube
17/10 • • • Anodes
17/12 • • • Control electrodes
17/14 • • Magnetic means for controlling the discharge
17/16 • • Vessels; Containers **[1, 2012.01]**
17/18 • • Seals between parts of vessels; Seals for leading-in conductors; Leading-in conductors **[1, 2012.01]**
17/20 • • Selection of substances for gas fillings; Specified operating pressures or temperatures **[1, 2012.01]**
17/22 • • Means for obtaining or maintaining the desired pressure within the tube **[1, 2012.01]**
17/24 • • • Means for absorbing or adsorbing gas, e.g. by gettering **[1, 2012.01]**
17/26 • • • Means for producing, introducing, or replenishing gas or vapour during operation of the tube **[1, 2012.01]**
17/28 • • Cooling arrangements
17/30 • • Igniting arrangements
17/32 • • • Igniting by associated radioactive materials or fillings
17/34 • • One or more circuit elements structurally associated with the tube
17/36 • • Circuit arrangements not adapted to a particular application of the tube and not otherwise provided for
17/38 • Cold-cathode tubes
17/40 • • with one cathode and one anode, e.g. glow tubes, tuning-indicator glow tubes, voltage-stabiliser tubes or voltage-indicator tubes
17/42 • • • having one or more probe electrodes, e.g. for potential dividing
17/44 • • • having one or more control electrodes
17/46 • • • • for preventing and then permitting ignition, but thereafter having no control
17/48 • • with more than one cathode or anode, e.g. sequence-discharge tube, counting tube, dekatron
17/49 • • • Display panels, e.g. with crossed electrodes **[3, 2012.01]**
17/50 • Thermionic-cathode tubes
17/52 • • with one cathode and one anode
17/54 • • • having one or more control electrodes
17/56 • • • • for preventing and then permitting ignition, but thereafter having no control
17/58 • • with more than one cathode or anode
17/60 • • • the discharge paths priming each other in a predetermined sequence, e.g. counting tube
17/62 • • • with independent discharge paths controlled by intermediate electrodes, e.g. polyphase rectifier
17/64 • Tubes specially designed for switching or modulating in a waveguide, e.g. TR box

19/00 Details of vacuum tubes of the types covered by group H01J 21/00

19/02 • Electron-emitting electrodes; Cathodes
19/04 • • Thermionic cathodes
19/06 • • • characterised by the material
19/062 • • • • with alkaline-earth metal oxides, or such oxides used in conjunction with reducing agents, as an emissive material **[6]**
19/064 • • • • with other metal oxides as an emissive material **[6]**
19/066 • • • • with metals or alloys as an emissive material **[6]**
19/068 • • • • with compounds having metallic conductive properties, e.g. lanthanum boride, as an emissive material **[6]**
19/08 • • • Cathodes heated directly by an electric current
19/10 • • • characterised by the shape
19/12 • • • • Supports; Vibration-damping arrangements
19/14 • • • Cathodes heated indirectly by an electric current; Cathodes heated by electron or ion bombardment
19/16 • • • • Heaters
19/18 • • • • Insulating layer or body located between heater and emissive material
19/20 • • • • Supports for the emissive material
19/22 • • • • Dispenser-type cathodes, e.g. L-cathode
19/24 • • Cold cathodes, e.g. field-emissive cathode
19/28 • Non-electron-emitting electrodes; Screens
19/30 • • characterised by the material
19/32 • • Anodes
19/34 • • • forming part of the envelope
19/36 • • • Cooling of anodes
19/38 • • Control electrodes, e.g. grid
19/40 • • Screens for shielding
19/42 • Mounting, supporting, spacing, or insulating of electrodes or of electrode assemblies
19/44 • • Insulation between electrodes or supports within the vacuum space
19/46 • • Mountings for the electrode assembly as a whole
19/48 • • Mountings for individual electrodes
19/50 • • Spacing members extending to the envelope
19/52 • • • without fixed connection between spacing member and envelope
19/54 • Vessels; Containers; Shields associated therewith
19/56 • • characterised by the material of the vessel or container
19/57 • • provided with coatings on the walls thereof; Selection of materials for the coatings
19/58 • Seals between parts of vessels
19/60 • Seals for leading-in conductors
19/62 • Leading-in conductors
19/64 • Means forming part of the tube for the purpose of supporting it
19/66 • Means forming part of the tube for the purpose of providing electrical connection to it
19/68 • Specified gas introduced into the tube at low pressure, e.g. for reducing or influencing space charge
19/70 • Means for obtaining or maintaining the vacuum, e.g. by gettering
19/72 • • Tubulations therefor, e.g. for exhausting; Closures therefor
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

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. Haeff 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
31/30 • • • • having regulation of screen potential at anode potential, e.g. iconoscope
31/32 • • • • • Tubes with image-amplification section, e.g. image-iconoscope, supericonoscope
31/34 • • • • having regulation of screen potential at cathode potential, e.g. orthicon
31/36 • • • • • Tubes with image-amplification section, e.g. image-orthicon
31/38 • • • • • Tubes with photoconductive screen, e.g. vidicon
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"
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
31/44 • • • • Tubes with image-amplification section
31/46 • • • Tubes in which electrical output represents both intensity and colour of image
31/48 • • • Tubes with amplification of output effected by electron-multiplier arrangements within the vacuum space
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
31/495 • • Pick-up tubes adapted for an input of sonic, ultrasonic, or mechanical vibrations and having an electric output
31/50 • • Image-conversion or image-amplification tubes, i.e. having optical, X-ray, or analogous input, and optical output
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"
31/54 • • • in which the electron ray or beam is reflected by the image input screen on to the image output screen
31/56 • • • for converting or amplifying images in two or more colours
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
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)
31/62 • • • • with separate reading and writing rays
31/64 • • • • • on opposite sides of screen, e.g. for conversion of definition
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
31/68 • • • in which the information pattern represents two or more colours

33/00 Discharge tubes with provision for emergence of electrons or ions from the vessel (particle accelerators H05H)**; Lenard tubes**
33/02 • Details
33/04 • • Windows

35/00 X-ray tubes
35/02 • Details
35/04 • • Electrodes
35/06 • • • Cathodes
35/08 • • • Anodes; Anticathodes
35/10 • • • • Rotary anodes; Arrangements for rotating anodes; Cooling rotary anodes
35/12 • • • • Cooling non-rotary anodes
35/14 • • Arrangements for concentrating, focusing, or directing the cathode ray
35/16 • • Vessels; Containers; Shields associated therewith
35/18 • • • Windows
35/20 • • Selection of substances for gas fillings; Means for obtaining or maintaining the desired pressure within the tube, e.g. by gettering
35/22 • specially designed for passing a very high current for a very short time, e.g. for flash operation
35/24 • Tubes wherein the point of impact of the cathode ray on the anode or anticathode is movable relative to the surface thereof
35/26 • • by rotation of the anode or anticathode
35/28 • • by vibration, oscillation, reciprocation, or swash-plate motion of the anode or anticathode
35/30 • • by deflection of the cathode ray
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

37/00 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]**
37/02 • Details
37/04 • • Arrangements of electrodes and associated parts for generating or controlling the discharge, e.g. electron-optical arrangement, ion-optical arrangement
37/05 • • • Electron- or ion-optical arrangements for separating electrons or ions according to their energy (particle separator tubes H01J 49/00) **[3]**
37/06 • • • Electron sources; Electron guns
37/063 • • • • Geometrical arrangement of electrodes for beam-forming **[3]**
37/065 • • • • Construction of guns or parts thereof (H01J 37/067-H01J 37/077 take precedence) **[3]**
37/067 • • • • Replacing parts of guns; Mutual adjustment of electrodes (H01J 37/073-H01J 37/077 take precedence; vacuum locks H01J 37/18) **[3]**
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. alphatrons **[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_3 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

61/40 • • • by light-filters; by coloured coatings in or on the envelope
61/42 • • • by transforming the wavelength of the light by luminescence
61/44 • • • • Devices characterised by the luminescent material
61/46 • • • • Devices characterised by the binder or other non-luminescent constituent of the luminescent material, e.g. for obtaining desired pouring or drying properties
61/48 • • • • Separate coatings of different luminous materials
61/50 • • Auxiliary parts or solid material within the envelope for reducing risk of explosion upon breakage of the envelope, e.g. for use in mines
61/52 • • Cooling arrangements; Heating arrangements; Means for circulating gas or vapour within the discharge space
61/54 • • Igniting arrangements, e.g. promoting ionisation for starting
61/56 • • One or more circuit elements structurally associated with the lamp
61/58 • Lamps with both liquid anode and liquid cathode
61/60 • Lamps in which the discharge space is substantially filled with mercury before ignition
61/62 • Lamps with gaseous, e.g. plasma cathode
61/64 • Cathode glow lamps
61/66 • • having one or more specially shaped cathodes, e.g. for advertising purposes
61/68 • Lamps in which the main discharge is between parts of a current-carrying guide, e.g. halo lamp
61/70 • Lamps with low-pressure unconstricted discharge
61/72 • • having a main light-emitting filling of easily vaporisable metal vapour, e.g. mercury
61/74 • • having a main light-emitting filling of difficult vaporisable metal vapour, e.g. sodium
61/76 • • having a filling of permanent gas or gases only
61/78 • • • with cold cathode; with cathode heated only by discharge, e.g. high-tension lamp for advertising
61/80 • • Lamps suitable only for intermittent operation, e.g. flash lamp
61/82 • Lamps with high-pressure unconstricted discharge
61/84 • Lamps with discharge constricted by high pressure
61/86 • • with discharge additionally constricted by close spacing of electrodes, e.g. for optical projection
61/88 • • with discharge additionally constricted by envelope
61/90 • • Lamps suitable only for intermittent operation, e.g. flash lamp
61/92 • Lamps with more than one main discharge path
61/94 • • Paths producing light of different wavelengths, e.g. for simulating daylight
61/95 • Lamps with control electrode for varying intensity or wavelength of the light, e.g. for producing modulated light
61/96 • Lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope, e.g. for simulating daylight
61/98 • Lamps with closely spaced electrodes heated to incandescence by light-emitting discharge, e.g. tungsten arc lamp

63/00 Cathode-ray or electron-stream lamps
63/02 • Details, e.g. electrode, gas filling, shape of vessel
63/04 • • Vessels provided with luminescent coatings; Selection of materials for the coatings
63/06 • Lamps with luminescent screen excited by the ray or stream
63/08 • Lamps with gas plasma excited by the ray or stream

65/00 Lamps without any electrode inside the vessel; Lamps with at least one main electrode outside the vessel
65/04 • Lamps in which a gas filling is excited to luminesce by an external electromagnetic field or by external corpuscular radiation, e.g. for indicating
65/06 • Lamps in which a gas filling is excited to luminesce by radioactive material structurally associated with the lamp, e.g. inside the vessel
65/08 • Lamps in which a screen or coating is excited to luminesce by radioactive material located inside the vessel

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99/00 Subject matter not provided for in other groups of this subclass [2006.01]

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

1/00 Details
1/02 • Incandescent bodies

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

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]**

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 Assemblies consisting of a plurality of individual semiconductor or other solid state devices (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 • • *the devices not having separate containers **[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 Devices consisting of a plurality of semiconductor or other solid-state components formed in or on a common substrate (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]**

Note(s)

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 • • *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]***

27/144 • • Devices controlled by radiation **[5]**

27/146 • • • Imager structures **[5]**

27/148 • • • • Charge coupled imagers **[5]**

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 $A_{III}B_{V}$ 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 $A_{II}B_{VI}$ 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_2X/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 $A_{III}B_{V}$ 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 $A_{II}B_{VI}$ compound semiconductors, e.g. CdS/CdTe solar cells **[2012.01]**

31/0735 • • • • comprising only $A_{III}B_{V}$ 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 $A_{IV}B_{IV}$ 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 $A_IB_{III}C_{VI}$ compound, e.g. CdS/CuInSe2 [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 type, e.g. metal- 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]**

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]**

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

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. $LiTi_2O_4$ or $LiTi_2OxFy$ (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. $LiMn_2O_4$ or $LiMn_2OxFy$ **[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. $LiNiO_2$, $LiCoO_2$ 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_2 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-$SOCl_2$ 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]***

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

1/00 Auxiliary devices (coupling devices of the waveguide type H01P 5/00)

1/02 • Bends; Corners; Twists
1/04 • Fixed joints
1/06 • Movable joints, e.g. rotating joints
1/08 • Dielectric windows
1/10 • for switching or interrupting
1/11 • • by ferromagnetic devices **[3]**
1/12 • • by mechanical chopper
1/14 • • by electric discharge devices (discharge devices H01J 17/64)
1/15 • • by semiconductor devices **[2]**

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

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

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

1/04 • Adaptation for subterranean or subaqueous use

1/06 • Means for the lighting or illuminating of aerials, e.g. for purpose of warning

1/08 • Means for collapsing aerials or parts thereof (collapsible loop aerials H01Q 7/02; collapsible H-aerials or Yagi aerials H01Q 19/04)

1/10 • • Telescopic elements

1/12 • Supports; Mounting means (supporting conductors in general H02G 7/00)

1/14 • • for wire or other non-rigid radiating elements

1/16 • • • Strainers, spreaders, or spacers

1/18 • • Means for stabilising aerials on an unstable platform

1/20 • • Resilient mountings

1/22 • • by structural association with other equipment or articles

1/24 • • • with receiving set

1/26 • • • with electric discharge tube

1/27 • Adaptation for use in or on movable bodies (H01Q 1/08, H01Q 1/12, H01Q 1/18 take precedence) **[3]**

1/28 • • Adaptation for use in or on aircraft, missiles, satellites, or balloons **[3]**

1/30 • • • Means for trailing aerials **[3]**

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]**

1/34 • • Adaptation for use in or on ships, submarines, buoys, or torpedoes (for subaqueous use H01Q 1/04; retractable loop aerials H01Q 7/02) **[3]**

1/36 • Structural form of radiating elements, e.g. cone, spiral, umbrella (H01Q 1/08, H01Q 1/14 take precedence)

1/38 • • formed by a conductive layer on an insulating support (conductors in general H01B 5/14)

1/40 • Radiating elements coated with, or embedded in, protective material

1/42 • Housings not intimately mechanically associated with radiating elements, e.g. radome

1/44 • using equipment having another main function to serve additionally as an aerial (H01Q 1/28-H01Q 1/34 take precedence)

1/46 • • Electric supply lines or communication lines

1/48 • Earthing means; Earth screens; Counterpoises (earthing pins H01R 4/66)

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

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 • • • Pivotable 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]**
9/05 • • for coaxial cables **[3]**
9/053 • • • using contact members penetrating insulation **[7]**
9/11 • End pieces for multiconductor cables supported by the cable and for facilitating connections to other conductive members **[3]**
9/15 • Connectors for wire wrapping **[3]**
9/16 • Fastening of connecting parts to base or case; Insulating connecting parts from base or case (lead-through insulators H01B 17/26) **[3]**
9/18 • • Fastening by means of screw or nut **[3]**
9/20 • • Fastening by means of rivet or eyelet **[3]**
9/22 • Bases, e.g. strip, block, panel **[3]**
9/24 • • Terminal blocks **[3]**
9/26 • • • Clip-on terminal blocks for side-by-side rail or strip-mounting **[3]**
9/28 • • Terminal boards **[3]**

11/00 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 (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]**

11/01 • characterised by the form or arrangement of the conductive interconnection between their connecting locations **[3]**
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]**
11/05 • • the connecting locations having different types of direct connections **[3]**
11/07 • • the connecting locations being of the same type but different sizes **[3]**
11/09 • • the connecting locations being identical **[3]**
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]**
11/12 • • End pieces terminating in an eye, hook, or fork **[3]**
11/14 • • • the hook being adapted for hanging on overhead or other suspended lines, e.g. hot line clamp **[3]**
11/15 • • • • Hook in the form of a screw clamp **[3]**
11/16 • • End pieces terminating in a soldering tip or socket **[3]**
11/18 • • End pieces terminating in a probe **[3]**
11/20 • • End pieces terminating in a needle point or analogous contact for penetrating insulation or cable strands **[3]**
11/22 • • End pieces terminating in a spring clip **[3]**
11/24 • • • with gripping jaws, e.g. crocodile clip **[3]**
11/26 • • End pieces terminating in a screw clamp, screw or nut **[3]**
11/28 • • End pieces consisting of a ferrule or sleeve **[3]**
11/30 • • End pieces held in contact by a magnet **[3]**
11/32 • • End pieces with two or more terminations **[3]**

12/00 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 (printed connections to, or between, printed circuits H05K 1/11) **[7]**

12/50 • Fixed connections **[2011.01]**
12/51 • • for rigid printed circuits or like structures **[2011.01]**
12/52 • • • connecting to other rigid printed circuits or like structures **[2011.01]**
12/53 • • • connecting to cables except for flat or ribbon cables **[2011.01]**
12/55 • • • characterised by the terminals **[2011.01]**
12/57 • • • • surface mounting terminals **[2011.01]**
12/58 • • • • terminals for insertion into holes **[2011.01]**
12/59 • • for flexible printed circuits, flat or ribbon cables or like structures **[2011.01]**
12/61 • • • connecting to flexible printed circuits, flat or ribbon cables or like structures **[2011.01]**
12/62 • • • connecting to rigid printed circuits or like structures **[2011.01]**
12/63 • • • connecting to another shape cable **[2011.01]**
12/65 • • • characterised by the terminal **[2011.01]**
12/67 • • • • insulation penetrating terminals **[2011.01]**
12/68 • • • • • comprising deformable portions **[2011.01]**
12/69 • • • • deformable terminals e.g. crimping terminals **[2011.01]**
12/70 • Coupling devices **[2011.01]**
12/71 • • for rigid printing circuits or like structures **[2011.01]**
12/72 • • • coupling with the edge of the rigid printed circuits or like structures **[2011.01]**
12/73 • • • • connecting to other rigid printed circuits or like structures **[2011.01]**
12/75 • • • connecting to cables except for flat or ribbon cables **[2011.01]**
12/77 • • for flexible printed circuits, flat or ribbon cables or like structures **[2011.01]**
12/78 • • • connecting to other flexible printed circuits, flat or ribbon cables or like structures **[2011.01]**
12/79 • • • connecting to rigid printed circuits or like structures **[2011.01]**
12/81 • • • connecting to another cable except for flat or ribbon cable **[2011.01]**
12/82 • • connected with low or zero insertion force **[2011.01]**
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]**

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; coaxed 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]**

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 parallely-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]**

39/00 **Rotary current collectors, distributors, or interrupters** (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)
39/02 • Details
39/04 • • Commutators (wherein the segments are formed by extensions of dynamo-electric machine winding H02K)
39/06 • • • other than with external cylindrical contact surface, e.g. flat commutators
39/08 • • Slip-rings
39/10 • • • other than with external cylindrical contact surface, e.g. flat slip-rings
39/12 • • • using bearing or shaft surface as contact surface
39/14 • • Fastenings of commutators or slip-rings to shafts
39/16 • • • by means of moulded or cast material applied during or after assembly
39/18 • • Contacts for co-operation with commutator or slip-ring, e.g. contact brush
39/20 • • • characterised by the material thereof
39/22 • • • • incorporating lubricating or polishing ingredient
39/24 • • • Laminated contacts; Wire contacts, e.g. metallic brush, carbon fibres
39/26 • • • Solid sliding contacts, e.g. carbon brush
39/27 • • • • End caps on carbon brushes to transmit spring pressure
39/28 • • • Roller contacts; Ball contacts
39/30 • • • Liquid contacts
39/32 • • Connections of conductor to commutator segment
39/34 • • Connections of conductor to slip-ring
39/36 • • Connections of cable or wire to brush
39/38 • • Brush holders
39/39 • • • wherein the brush is fixedly mounted in the holder
39/40 • • • enabling brush movement within holder during current collection
39/41 • • • cartridge type
39/415 • • • • with self-recoiling spring **[4]**
39/42 • • Devices for lifting brushes
39/44 • • Devices for shifting brushes
39/46 • • Auxiliary means for improving current transfer, or for reducing or preventing sparking or arcing
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
39/64 • Devices for uninterrupted current collection

41/00 **Non-rotary current collectors for maintaining contact between moving and stationary parts of an electric circuit** (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)
41/02 • Devices for interrupted current collection, e.g. distributor (electrically-operated selector switches H01H 67/00)

43/00 **Apparatus or processes specially adapted for manufacturing, assembling, maintaining, or repairing of line connectors or current collectors or for joining electric conductors** (of trolley lines B60M 1/28; joining cables H02G 1/14)
43/01 • for connecting unstripped conductors to contact members having insulation cutting edges **[4]**
43/02 • for soldered or welded connections (soldering or welding in general B23K)
43/027 • for connecting conductors by clips **[4]**
43/033 • for wrapping or unwrapping wire connections **[4]**
43/04 • for forming connections by deformation, e.g. crimping tool
43/042 • • Hand tools for crimping **[4]**
43/045 • • • with contact member feeding mechanism **[4]**
43/048 • • Crimping apparatus or processes (H01R 43/042 takes precedence) **[4]**
43/05 • • • with wire-insulation stripping **[4]**
43/052 • • • with wire-feeding mechanism **[4]**
43/055 • • • with contact member feeding mechanism **[4]**
43/058 • • Crimping mandrels **[4]**
43/06 • Manufacture of commutators
43/08 • • in which segments are not separated until after assembly
43/10 • Manufacture of slip-rings
43/12 • Manufacture of brushes
43/14 • Maintenance of current collectors, e.g. reshaping of brushes, cleaning of commutators
43/16 • for manufacturing contact members, e.g. by punching and by bending **[4]**
43/18 • for manufacturing bases or cases for contact members **[4]**
43/20 • for assembling or disassembling contact members with insulating base, case or sleeve **[4]**
43/22 • • Hand tools **[4]**
43/24 • • Assembling by moulding on contact members **[4]**
43/26 • for engaging or disengaging the two parts of a coupling device (structural association with coupling device H01R 13/629) **[4]**
43/28 • for wire processing before connecting to contact members (H01R 43/02-H01R 43/26 take precedence) **[4]**

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

101/00 **One pole [7]**

103/00 **Two poles [7]**

105/00 **Three poles [7]**

107/00 **Four or more poles [7]**

H01S DEVICES USING STIMULATED EMISSION

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

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 (GRINSCH-lasers) (H01S 5/36 takes precedence) **[7]**

5/343 • • • in $A_{III}B_{V}$ compounds, e.g. AlGaAs-laser **[7]**
5/347 • • • in $A_{II}B_{VI}$ compounds, e.g. ZnCdSe-laser **[7]**
5/36 • • comprising organic materials **[2006.01]**
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]**
5/42 • • Arrays of surface emitting lasers **[7]**
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

1/00 Details of spark gaps
1/02 • Means for extinguishing arc
1/04 • • using magnetic blow-out
1/06 • • • with permanent magnet
1/08 • • using flow of arc-extinguishing fluid
1/10 • • • with extinguishing fluid evolved from solid material by heat of arc
1/12 • Means structurally associated with spark gap for recording operation thereof
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]**
1/15 • for protection against excessive pressure **[4]**
1/16 • Series resistor structurally associated with spark gap
1/18 • Electrolytic device structurally associated with spark gap
1/20 • Means for starting arc or facilitating ignition of spark gap **[3]**
1/22 • • by the shape or the composition of the electrodes **[4]**
1/24 • Selection of materials for electrodes (H01T 1/22 takes precedence) **[4]**

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]**

4/00 Overvoltage arresters using spark gaps (H01T 2/00 takes precedence; overvoltage protection circuits using spark gaps H02H 9/06) **[4]**
4/02 • Details (of spark gaps H01T 1/00) **[4]**
4/04 • Housings (H01T 4/06 takes precedence) **[4]**
4/06 • Mounting arrangements for a plurality of overvoltage arresters **[4]**
4/08 • structurally associated with protected apparatus (with switches H01H 9/14; with fuses H01H 85/44) **[4]**
4/10 • having a single gap or a plurality of gaps in parallel (sparking plugs H01T 13/00) **[4]**
4/12 • • hermetically sealed **[4]**
4/14 • • Arcing horns (associated with insulators H01B 17/46) **[4]**
4/16 • having a plurality of gaps arranged in series **[4]**
4/18 • • Arrangements for reducing height of stacked spark gaps **[4]**
4/20 • • Arrangements for improving potential distribution **[4]**

7/00 Rotary spark gaps, i.e. devices having one or more rotating electrodes

9/00 Spark gaps specially adapted for generating oscillations

11/00 Spark gaps specially adapted as rectifiers

13/00 Sparking plugs
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]**