

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 ELECTRIC ELEMENTS

(NOTES omitted)

H01C RESISTORS

NOTES

1. In this subclass, the term "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](#).

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00	Details	1/14	• Terminals or tapping points {or electrodes} specially adapted for resistors (in general H01R); Arrangements of terminals or tapping points {or electrodes} on resistors
1/01	• Mounting; Supporting	1/1406	• • {Terminals or electrodes formed on resistive elements having positive temperature coefficient}
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)	1/1413	• • {Terminals or electrodes formed on resistive elements having negative temperature coefficient}
1/014	• • the resistor being suspended between and being supported by two supporting sections (H01C 1/016 takes precedence)	1/142	• • the terminals or tapping points being coated on the resistive element
1/016	• • with compensation for resistor expansion or contraction	1/144	• • the terminals or tapping points being welded or soldered
1/02	• Housing; Enclosing; Embedding; Filling the housing or enclosure	1/146	• • the resistive element surrounding the terminal
1/022	• • the housing or enclosure being openable or separable from the resistive element	1/148	• • the terminals embracing or surrounding the resistive element (H01C 1/142 takes precedence)
1/024	• • the housing or enclosure being hermetically sealed (H01C 1/028 , H01C 1/032 , H01C 1/034 take precedence)	1/16	• Resistor networks not otherwise provided for
1/026	• • • with gaseous or vacuum spacing between the resistive element and the housing or casing	3/00	Non-adjustable metal resistors made of wire or ribbon, e.g. coiled, woven or formed as grids
1/028	• • the resistive element being embedded in insulation with outer enclosing sheath	3/005	• {Metallic glasses therefor}
1/03	• • • with powdered insulation	3/02	• arranged or constructed for reducing self-induction, capacitance or variation with frequency
1/032	• • plural layers surrounding the resistive element (H01C 1/028 takes precedence)	3/04	• Iron-filament ballast resistors; Other resistors having variable temperature coefficient
1/034	• • the housing or enclosure being formed as coating or mould without outer sheath (H01C 1/032 takes precedence)	3/06	• Flexible or folding resistors, whereby such a resistor can be looped or collapsed upon itself
1/036	• • • on wound resistive element	3/08	• Dimension or characteristic of resistive element changing gradually or in discrete steps from one terminal to another
1/04	• Arrangements of distinguishing marks, e.g. colour coding	3/10	• the resistive element having zig-zag or sinusoidal configuration
1/06	• Electrostatic or electromagnetic shielding arrangements	3/12	• • lying in one plane
1/08	• Cooling, heating or ventilating arrangements	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)
1/082	• • using forced fluid flow	3/16	• • including two or more distinct wound elements or two or more winding patterns
1/084	• • using self-cooling, e.g. fins, heat sinks	3/18	• • wound on a flat or ribbon base (H01C 3/16 takes precedence)
1/12	• Arrangements of current collectors		
1/125	• • of fluid contacts		

- 3/20 . . wound on cylindrical or prismatic base
([H01C 3/16](#) takes precedence)
- 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](#) ; measuring deformation in a solid state using the change in resistance formed by printed-circuit technique [G01B 7/20](#); insulating materials [H01B 3/00](#); passive thin-film or thick-film semiconductor or solid state devices [H01L 27/00](#); resistors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof, multistep manufacturing processes therefor [H01L 28/20](#)); 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](#) ; ohmic resistance heating [H05B 3/00](#); printed circuits [H05K](#)); devices using galvanomagnetic or similar magnetic effects, e.g. magnetic-field-controlled resistors, [H10N 50/00](#); devices using superconductivity [H10N 60/00](#); solid state devices for rectifying, amplifying, oscillating or switching without a potential-jump barrier or surface barrier [H10N 70/00](#); bulk negative resistance effect devices [H10N 80/00](#))
- 7/001 . {Mass resistors}
- 7/003 . {Thick film resistors}
- 7/005 . . {Polymer thick films}
- 7/006 . {Thin film resistors}
- 7/008 . {Thermistors ([H01C 7/02](#) - [H01C 7/06](#) take precedence)}
- 7/02 . having positive temperature coefficient {(ceramics [C04B](#))}
- 7/021 . . {formed as one or more layers or coatings}
- 7/022 . . {mainly consisting of non-metallic substances ([H01C 7/021](#) takes precedence)}
- 7/023 . . . {containing oxides or oxidic compounds, e.g. ferrites}
- 7/025 {Perovskites, e.g. titanates}
- 7/026 {Vanadium oxides or oxidic compounds, e.g. VOx}
- 7/027 . . {consisting of conducting or semi-conducting material dispersed in a non-conductive organic material}
- 7/028 . . {consisting of organic substances}
- 7/04 . having negative temperature coefficient {(thermometers using resistive elements [G01K 7/16](#))}
- NOTE**
- {In groups [H01C 7/043](#) - [H01C 7/049](#), the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.}
- 7/041 . . {formed as one or more layers or coatings}
- 7/042 . . {mainly consisting of inorganic non-metallic substances ([H01C 7/041](#) takes precedence)}
- 7/043 . . . {Oxides or oxidic compounds}
- 7/044 {Zinc or cadmium oxide}
- 7/045 {Perovskites, e.g. titanates}
- 7/046 {Iron oxides or ferrites}
- 7/047 {Vanadium oxides or oxidic compounds, e.g. VOx}
- 7/048 . . . {Carbon or carbides}
- 7/049 . . {mainly consisting of organic or organo-metal substances ([H01C 7/041](#) takes precedence)}
- 7/06 . including means to minimise changes in resistance with changes in temperature
- 7/10 . voltage responsive, i.e. varistors
- 7/1006 . . {Thick film varistors}
- 7/1013 . . {Thin film varistors}
- 7/102 . . Varistor boundary, e.g. surface layers ([H01C 7/12](#) takes precedence)
- 7/105 . . Varistor cores ([H01C 7/12](#) takes precedence)
- 7/108 . . . Metal oxide
- 7/112 ZnO type
- 7/115 Titanium dioxide- or titanate type
- 7/118 . . . Carbide, e.g. SiC type
- 7/12 . . Overvoltage protection resistors {(series resistors structurally associated with spark gaps [H01T 1/16](#))}
- 7/123 . . . {Arrangements for improving potential distribution}
- 7/126 . . . {Means for protecting against excessive pressure or for disconnecting in case of failure}
- 7/13 . current responsive
- NOTE**
- 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
- 7/20 . the resistive layer or coating being tapered
- 7/22 . Elongated resistive element being bent or curved, e.g. sinusoidal, helical
- 8/00 Non-adjustable resistors consisting of loose powdered or granular conducting, or powdered or granular semi-conducting material**
- 8/02 . Coherers or like imperfect resistors for detecting electromagnetic waves
- 8/04 . Overvoltage protection resistors; Arresters
- 10/00 Adjustable resistors**
- 10/005 . {Surface mountable, e.g. chip trimmer potentiometer}
- 10/02 . Liquid resistors
- 10/025 . . {Electrochemical variable resistors (trimming resistors by electrolytic treatment [H01C 17/2412](#), [H01C 17/262](#))}
- 10/04 . with specified mathematical relationship between movement of resistor actuating means and value of resistance, other than direct proportional relationship
- 10/06 . adjustable by short-circuiting different amounts of the resistive element
- 10/08 . . with intervening conducting structure between the resistive element and the short-circuiting means, e.g. taps
- 10/10 . adjustable by mechanical pressure or force

- 10/103 . . {by using means responding to magnetic or electric fields, e.g. by addition of magnetisable or piezoelectric particles to the resistive material, or by an electromagnetic actuator}
- 10/106 . . {on resistive material dispersed in an elastic material ([H01C 10/103](#) and [H01C 10/12](#) take precedence; for electric switches [H01H 1/029](#))}
- 10/12 . . by changing surface pressure between resistive masses or resistive and conductive masses, e.g. pile type
- 10/14 . adjustable by auxiliary driving means
- 10/16 . including plural resistive elements
- 10/18 . . including coarse and fine resistive elements
- 10/20 . . Contact structure or movable resistive elements being ganged
- 10/22 . resistive element dimensions changing gradually in one direction, e.g. tapered resistive element ([H01C 10/04](#) takes precedence)
- 10/23 . resistive element dimensions changing in a series of discrete, progressive steps
- 10/24 . the contact moving along turns of a helical resistive element, or vice versa
- 10/26 . resistive element moving ([H01C 10/16](#), [H01C 10/24](#) take precedence)

NOTE

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
- 10/30 . the contact sliding along resistive element
- 10/301 . . {consisting of a wire wound resistor}
- 10/303 . . . {the resistor being coated, e.g. lubricated, conductive plastic coated, i.e. hybrid potentiometer}
- 10/305 . . {consisting of a thick film}
- 10/306 . . . {Polymer thick film, i.e. PTF}
- 10/308 . . {consisting of a thin film}
- 10/32 . . the contact moving in an arcuate path
- 10/34 . . . the contact or the associated conducting structure riding on collector formed as a ring or portion thereof
- 10/345 {the collector and resistive track being situated in 2 parallel planes}
- 10/36 . . . structurally combined with switching arrangements
- 10/363 {by axial movement of the spindle, e.g. pull-push switch ([H01C 10/366](#) takes precedence)}
- 10/366 {using an electromagnetic actuator}
- 10/38 . . the contact moving along a straight path
- 10/40 . . . screw operated
- 10/42 the contact bridging and sliding along resistive element and parallel conducting bar or collector
- 10/44 . . . the contact bridging and sliding along resistive element and parallel conducting bar or collector ([H01C 10/42](#) takes precedence)
- 10/46 . Arrangements of fixed resistors with intervening connectors, e.g. taps ([H01C 10/28](#), [H01C 10/30](#) take precedence)
- 10/48 . . including contact movable in an arcuate path
- 10/50 . . structurally combined with switching arrangements ([H01C 10/36](#) takes precedence)
- 11/00 Non-adjustable liquid resistors**
- 13/00 Resistors not provided for elsewhere**
- 13/02 . Structural combinations of resistors ([impedance networks per se H03H](#))
- 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](#))**
- 17/003 . {using lithography, e.g. photolithography (lithographic compositions and processing in general [G03F](#))}
- 17/006 . {adapted for manufacturing resistor chips}
- 17/02 . adapted for manufacturing resistors with envelope or housing
- 17/04 . adapted for winding the resistive element
- 17/06 . adapted for coating resistive material on a base
- 17/065 . . by thick film techniques, e.g. serigraphy
- 17/06506 {Precursor compositions therefor, e.g. pastes, inks, glass frits}
- 17/06513 {characterised by the resistive component}
- 17/0652 {containing carbon or carbides}
- 17/06526 {composed of metals}
- 17/06533 {composed of oxides}
- 17/0654 {Oxides of the platinum group}
- 17/06546 {Oxides of zinc or cadmium}
- 17/06553 {composed of a combination of metals and oxides}
- 17/0656 {composed of silicides ([H01C 17/0652](#) takes precedence)}
- 17/06566 {composed of borides ([H01C 17/0652](#) takes precedence)}
- 17/06573 {characterised by the permanent binder}
- 17/0658 {composed of inorganic material}
- 17/06586 {composed of organic material}
- 17/06593 {characterised by the temporary binder}
- 17/07 . . by resistor foil bonding, e.g. cladding
- 17/075 . . by thin film techniques ([H01C 17/20](#) takes precedence)}
- 17/08 . . . by vapour deposition
- 17/10 . . . by flame spraying
- 17/12 . . . by sputtering
- 17/14 . . . by chemical deposition
- 17/16 using electric current
- 17/18 without using electric current
- 17/20 . . by pyrolytic processes
- 17/22 . adapted for trimming
- 17/23 . . by opening or closing resistor geometric tracks of predetermined resistive values, {e.g. snapistors}
- 17/232 . . Adjusting the temperature coefficient; Adjusting value of resistance by adjusting temperature coefficient of resistance
- 17/235 . . Initial adjustment of potentiometer parts for calibration
- 17/24 . . by removing or adding resistive material ([H01C 17/23](#), [H01C 17/232](#), [H01C 17/235](#) take precedence)
- 17/2404 . . . {by charged particle impact, e.g. by electron or ion beam milling, sputtering, plasma etching}

H01C

- 17/2408 . . . {by pulsed voltage erosion, e.g. spark erosion}
- 17/2412 . . . {by electrolytic treatment, e.g. electroplating
(for anodic oxydation [H01C 17/262](#))}
- 17/2416 . . . {by chemical etching}
- 17/242 . . . by laser {(trimming by laser in general
[B23K 26/351](#))}
- 17/245 . . . by mechanical means, e.g. sand blasting,
cutting, ultrasonic treatment
- 17/26 . . by converting resistive material
- 17/262 . . . {by electrolytic treatment, e.g. anodic
oxydation}
- 17/265 . . . {by chemical or thermal treatment, e.g.
oxydation, reduction, annealing ([etching
H01C 17/2416](#))}
- 17/267 {by passage of voltage pulses or electric
current}
- 17/28 . . adapted for applying terminals
- 17/281 . . {by thick film techniques}
- 17/283 . . . {Precursor compositions therefor, e.g. pastes,
inks, glass frits}
- 17/285 {applied to zinc or cadmium oxide resistors}
- 17/286 {applied to TiO_2 or titanate resistors}
- 17/288 . . {by thin film techniques}
- 17/30 . . adapted for baking