ECLA EUROPEAN CLASSIFICATION

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 H01C7/00.

H01C1/00 Details

H01C1/01 . Mounting; Supporting

H01C1/012 . . the base extending along and imparting rigidity or reinforcement to the resistive element (H01C1/016 takes precedence; the resistive element being formed in two or more coils or loops as a spiral, helical or toroidal winding H01C3/18, H01C3/20; the resistive element being formed as one or more layers or coatings on a base H01C7/00)

H01C1/014 . . the resistor being suspended between and being supported by two supporting sections (H01C1/016 takes precedence)

H01C1/016 . . with compensation for resistor expansion or contraction

H01C1/02 . Housing; Enclosing; Embedding; Filling the housing or enclosure

H01C1/022 . . the housing or enclosure being openable or separable from the resistive element

H01C1/024 . . the housing or enclosure being hermetically sealed (H01C1/028, H01C1/032, H01C1/034 take precedence)

H01C1/026 . . . with gaseous or vacuum spacing between the resistive element and the housing or casing

H01C1/028 . . the resistive element being embedded in insulation with outer enclosing sheath

H01C1/03 . . . with powdered insulation

H01C1/032 . . plural layers surrounding the resistive element (H01C1/028 takes precedence)

H01C1/034 . . the housing or enclosure being formed as coating or mold without outer sheath (H01C1/032 takes precedence)

H01C1/036 . . . on wound resistive element

H01C1/04 . Arrangements of distinguishing marks, e.g. colour coding

H01C1/06 . Electrostatic or electromagnetic shielding arrangements

H01C1/08 . Cooling, heating or ventilating arrangements

H01C1/082 . . using forced fluid flow

H01C1/084 . . using self-cooling, e.g. fins, heat sinks

H01C1/12 . Arrangements of current collectors

H01C1/125 . . of fluid contacts

H01C1/14 . Terminals or tapping points [N: or electrodes] specially adapted for resistors (in

general H01R); Arrangements of terminals or tapping points [N: or electrodes] on resistors

H01C1/14B . . [N: Terminals or electrodes formed on resistive elements having positive temperature coefficient]

H01C1/14C . . [N: Terminals or electrodes formed on resistive elements having negative temperature coefficient]

H01C1/142 . . the terminals or tapping points being coated on the resistive element

H01C1/144 . . the terminals or tapping points being welded or soldered

H01C1/146 . . the resistive element surrounding the terminal

H01C1/148 . . the terminals embracing or surrounding the resistive element (H01C1/142 takes precedence)

H01C1/16 . Resistor networks not otherwise provided for

H01C3/00 **Non-adjustable metal resistors made of wire or ribbon, e.g. coiled, woven or formed as grids**

H01C3/00B . [N: Metallic glasses therefor]

H01C3/02 . arranged or constructed for reducing self-induction, capacitance or variation with frequency

H01C3/04 . Iron-filament ballast resistors; Other resistors having variable temperature coefficient

H01C3/06 . Flexible or folding resistors, whereby such a resistor can be looped or collapsed upon itself

H01C3/08 . Dimension or characteristic of resistive element changing gradually or in discrete steps from one terminal to another

H01C3/10 . the resistive element having zig-zag or sinusoidal configuration

H01C3/12 . . Lying in one plane

H01C3/14 . the resistive element being formed in two or more coils or loops continuously wound as a spiral, helical or toroidal winding (H01C3/02 to H01C3/12 take precedence)

H01C3/16 . . including two or more distinct wound elements or two or more winding patterns

H01C3/18 . . wound on a flat or ribbon base (H01C3/16 takes precedence)

H01C3/20 . . wound on cylindrical or prismatic base (H01C3/16 takes precedence)

H01C7/00 **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 H01C8/00; [N: measuring deformation in a solid state using the change in resistance formed by printed-circuit technique G01B7/20; insulating materials H01B3/00; passive thin-film or thick-film semiconductor or solid state devices H01L27/00; resistors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof, multistep manufacturing processes therefor H01L28/20]; resistors with a potential-jump barrier or surface barrier, e.g. field effect resistors H01L29/00; semiconductor devices sensitive to electro-magnetic or corpuscular radiation, e.g. photoresistors, H01L31/00; devices using superconductivity H01L39/00; devices using galvanomagnetic or similar magnetic effects, e.g. magnetic-field-controlled resistors, H01L43/00; solid state devices for rectifying, amplifying, oscillating or switching without a

potential-jump barrier or surface barrier H01L45/00; bulk negative resistance effect devices H01L47/00; [N: ohmic resistance heating H05B3/00; printed circuits H05K])
[m1112]

H01C7/00B . [N: Mass resistors]

H01C7/00D . [N: Thick film resistors]
H01C7/00D2 . . [N: Polymer thick films]

H01C7/00E . [N: Thin film resistors]

H01C7/00F . [N: Thermistors (H01C7/02 to H01C7/06 take precedence)]

H01C7/02 . having positive temperature coefficient [N: (ceramics C04B)]
H01C7/02B . . [N: formed as one or more layers or coatings]
H01C7/02C . . [N: mainly consisting of non-metallic substances (H01C7/02B takes precedence)]
H01C7/02C2 . . . [N: containing oxides or oxidic compounds, e.g. ferrites]
H01C7/02C2D . . . . [N: Perowskites, e.g. titanates]
H01C7/02C2H . . . . [N: Vanadium oxides or oxidic compounds, e.g. VOx]
H01C7/02D . . [N: consisting of conducting or semi-conducting material dispersed in a non-conductive organic material]
H01C7/02E . . [N: consisting of organic substances]

H01C7/04 . having negative temperature coefficient [N: (thermometers using resistive elements G01K7/16)]
H01C7/04B . . [N: formed as one or more layers or coatings]
H01C7/04C . . [N: mainly consisting of inorganic non-metallic substances (H01C7/04B takes precedence)]

[N: **Note**
In groups H01C7/04C2 to H01C7/04E, in the absence of an indication to the contrary, classification is made in the last appropriate place
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H01C7/04C2 . . . [N: Oxides or oxidic compounds]
H01C7/04C2B . . . . [N: Zinc or cadmium oxide]
H01C7/04C2D . . . . [N: Perowskites, e.g. titanates]
H01C7/04C2F . . . . [N: Iron oxides or ferrites]
H01C7/04C2H . . . . [N: Vanadium oxides or oxidic compounds, e.g. VOx]
H01C7/04C4 . . . [N: Carbon or carbides]
H01C7/04E . . [N: mainly consisting of organic or organo-metal substances (H01C7/04B takes precedence)]

H01C7/06 . including means to minimise changes in resistance with changes in temperature

H01C7/10 . voltage responsive, i.e. varistors [C9702]
H01C7/10D . . [N: Thick film varistors]
H01C7/10E . . [N: Thin film varistors]

H01C7/102 . . Varistor boundary, e.g. surface layers (H01C7/12 takes precedence) [N9702]
H01C7/105 . . Varistor cores (H01C7/12 takes precedence) [N9702]
H01C7/108 . . . Metal oxide [N9702]
H01C7/112 . . . . ZnO type [N9702]
H01C7/115 . . . . Titanium dioxide- or titanate type [N9702]
H01C7/118 . . . Carbide, e.g. SiC type [N9702]
H01C7/12 . . Overvoltage protection resistors [N: (series resistors structurally associated with spark gaps H01T1/16)]
H01C7/12B . . . [N: Arrangements for improving potential distribution]
H01C7/12C . . . [N: Means for protecting against excessive pressure or for disconnecting in case of failure]

H01C7/13 . current responsive

Note
Groups H01C7/02 to H01C7/13 take precedence over groups H01C7/18 to H01C7/22.

H01C7/18 . comprising a plurality of layers stacked between terminals

H01C7/20 . the resistive layer or coating being tapered

H01C7/22 . Elongated resistive element being bent or curved, e.g. sinusoidal, helical

H01C8/00 Non-adjustable resistors consisting of loose powdered or granular conducting, or powdered or granular semi-conducting material

H01C8/02 . Coherers or like imperfect resistors for detecting electromagnetic waves

H01C8/04 . Overvoltage protection resistors; Arresters [C9702]

H01C10/00 Adjustable resistors

H01C10/00B . [N: Surface mountable, e.g. chip trimmer potentiometer]

H01C10/02 . Liquid resistors
H01C10/02B . . [N: Electrochemical variable resistors (trimming resistors by electrolytic treatment H01C17/24E, H01C17/26B)]

H01C10/04 . with specified mathematical relationship between movement of resistor actuating means and value of resistance, other than direct proportional relationship

H01C10/06 . adjustable by short-circuiting different amounts of the resistive element
H01C10/08 . . with intervening conducting structure between the resistive element and the short-circuiting means, e.g. taps

H01C10/10 . adjustable by mechanical pressure of force
H01C10/10B . . [N: 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]

H01C10/10C . . [N: on resistive material dispersed in an elastic material (H01C10/10B and H01C10/12 take precedence; for electric switches H01H1/02B)]

H01C10/12 . . by changing surface pressure between resistive masses or resistive and conductive masses, e.g. pile type

H01C10/14 . adjustable by auxiliary driving means

H01C10/16 . including plural resistive elements

H01C10/18 . . including coarse and fine resistive elements

H01C10/20 . . Contact structure or movable resistive elements being ganged

H01C10/22 . resistive element dimensions changing gradually in one direction, e.g. tapered resistive element (H01C10/04 takes precedence)

H01C10/23 . resistive element dimensions changing in a series of discrete, progressive steps

H01C10/24 . the contact moving along turns of a helical resistive element, or vica versa

H01C10/26 . resistive element moving (H01C10/16, H01C10/24 take precedence)

Note
Groups H01C10/02 to H01C10/26 take precedence over groups H01C10/28 to H01C10/50.

H01C10/28 . the contact rocking or rolling along resistive element or taps

H01C10/30 . the contact sliding along resistive element

H01C10/30B . . [N: consisting of a wire wound resistor]

H01C10/30B2 . . . [N: the resistor being coated, e.g. lubricated, conductive plastic coated, i.e. hybrid potentiometer]

H01C10/30D . . [N: consisting of a thick film]

H01C10/30D2 . . . [N: Polymer thick film, i.e. PTF]

H01C10/30E . . [N: consisting of a thin film]

H01C10/32 . . the contact moving in an arcuate path

H01C10/34 . . . the contact or the associated conducting structure riding on collector formed as a ring or portion thereof

H01C10/34B . . . . [N: the collector and resistive track being situated in 2 parallel planes]

H01C10/36 . . . structurally combined with switching arrangements

H01C10/36B . . . . [N: by axial movement of the spindle, e.g. pull-push switch (H01C10/36E takes precedence)]

H01C10/36E . . . . [N: using an electromagnetic actuator]

H01C10/38 . . the contact moving along a straight path

H01C10/40 . . . screw operated

H01C10/42 . . . . the contact bridging and sliding along resistive element and parallel conducting bar or collector

H01C10/44 . . . the contact bridging and sliding along resistive element and parallel conducting bar or collector (H01C10/42 takes precedence)

H01C10/46 . Arrangements of fixed resistors with intervening connectors, e.g. taps (H01C10/28, H01C10/30 take precedence)

H01C10/48 . . including contact movable in an arcuate path

H01C10/50 . structurally combined with switching arrangements (H01C10/36 takes precedence)

H01C11/00 Non-adjustable liquid resistors

H01C13/00 Resistors not provided for elsewhere

H01C13/02 . Structural combinations of resistors (impedance networks per se H03H)

H01C17/00 Apparatus or processes specially adapted for manufacturing resistors (providing fillings for housings or enclosures H01C1/02; reducing insulation surrounding a resistor to powder H01C1/03; manufacture of thermally variable resistors H01C7/02, H01C7/04)

H01C17/00B . [N: using lithography, e.g. photolithography (lithographic compositions and processing in general G03F)]

H01C17/00F . [N: adapted for manufacturing resistor chips]

H01C17/02 . adapted for manufacturing resistors with envelope or housing

H01C17/04 . adapted for winding the resistive element

H01C17/06 . adapted for coating resistive material on a base

H01C17/065 . . by thick film techniques, e.g. serigraphy [N9702]

H01C17/065B . . . [N: Precursor compositions therefor, e.g. pastes, inks, glass frits] [N9702]

H01C17/065B2 . . . . [N: characterised by the resistive component] [N9702]

H01C17/065B2B . . . . . [N: containing carbon or carbides] [N9702]

H01C17/065B2D . . . . . [N: composed of metals] [N9702]

H01C17/065B2F . . . . . [N: composed of oxides] [N9702]

H01C17/065B2F2 . . . . . [N: Oxides of the platinum group] [N9702]

H01C17/065B2F4 . . . . . [N: Oxides of zinc or cadmium] [N9702]

H01C17/065B2H . . . . . [N: composed of a combination of metals and oxides] [N9702]

H01C17/065B2J . . . . . [N: composed of silicides (H01C17/065B2B takes precedence)] [N9702]

H01C17/065B2L . . . . . [N: composed of borides (H01C17/065B2B takes precedence)] [N9702]

H01C17/065B4 . . . . [N: characterised by the permanent binder] [N9702]

H01C17/065B4B . . . . . [N: composed of inorganic material] [N9702]

H01C17/065B4D . . . . . [N: composed of organic material] [N9702]

H01C17/065B6 . . . . [N: characterised by the temporary binder] [N9702]

H01C17/07 . . by resistor foil bonding, e.g. cladding [N9702]

H01C17/075 . . by thin film techniques [N: (H01C17/20 takes precedence)] [N9702]

H01C17/08 . . . by vapour deposition [C9702]

H01C17/10 . . . by flame spraying [C9702]

H01C17/12 . . . by sputtering [C9702]

H01C17/14 . . . by chemical deposition [C9702]

H01C17/16 . . . . using electric current [C9702]
H01C17/18 . . . . without using electric current [C9702]
H01C17/20 . . by pyrolytic processes

H01C17/22 . adapted for trimming
H01C17/23 . . by opening or closing resistor geometric tracks of predetermined resistive values, [N: e.g. snapistors] [N9702]
H01C17/232 . . Adjusting the temperature coefficient; Adjusting value of resistance by adjusting temperature coefficient of resistance [N9702]
H01C17/235 . . Initial adjustment of potentiometer parts for calibration [N9702]
H01C17/24 . . by removing or adding resistive material (H01C17/23, H01C17/232, H01C17/235 take precedence) [C9702]
H01C17/24C . . . [N: by charged particle impact e.g. by electron or ion beam milling, sputtering, plasma etching]
H01C17/24D . . . [N: by pulsed voltage erosion, e.g. spark erosion]
H01C17/24E . . . [N: by electrolytic treatment e.g. electroplating (for anodic oxydation H01C17/26B)]
H01C17/24F . . . [N: by chemical etching]
H01C17/242 . . . by laser [N: (trimming by laser in general B23K26/00B)] [N9702]
H01C17/245 . . . by mechanical means, e.g. sand blasting, cutting, ultrasonic treatment [N9702]
H01C17/26 . . by converting resistive material
H01C17/26B . . . [N: by electrolytic treatment, e.g. anodic oxydation]
H01C17/26C . . . [N: by chemical or thermal treatment, e.g. oxydation, reduction, annealing (etching H01C17/24F)]
H01C17/26C2 . . . . [N: by passage of voltage pulses or electric current]

H01C17/28 . adapted for applying terminals
H01C17/28B . . [N: by thick film techniques]
H01C17/28B2 . . . [N: Precursor compositions therefor, e.g. pastes, inks, glass frits]
H01C17/28B2B . . . . [N: applied to zinc or cadmium oxide resistors]
H01C17/28B2C . . . . [N: applied to TiO2 or titanate resistors]
H01C17/28C . . [N: by thin film techniques]

H01C17/30 . adapted for baking