H01C

RESISTORS

Definition statement

This subclass/group covers:

- Passive two-terminal electrical components per se that implement electrical resistance as a circuit element, thereby enabling typically a direct proportion between the current and the voltage across the component's terminals.

- Non-adjustable metal resistors made of wire or ribbon, per se, e.g. iron-filament ballast resistors, or metallic glasses therefor, coiled, woven or formed as grids. Configurations thereof may include flexible or folding resistors, changes in dimensions or characteristics of the resistive element from one terminal to another, resistors having sinusoidal or zig-zag configurations or arranged for reducing self-induction, capacitance or variation with frequency.

- Non-adjustable resistors formed as one or more layers or coatings; Non-adjustable resistors made from powdered conducting material or powdered semi-conducting material (excluding loose powder or granular material) with or without insulating material. Resistors whose effective value is varied non-mechanically such as by temperature (thermistors, e.g. exhibiting positive or negative temperature coefficient), voltage (varistors and overvoltage protection resistors) or current (including over-current protection resistors) and having a non-linear behaviour, e.g. typically a sharp change in resistance values upon reaching critical or threshold values of non-mechanical parameters. Compositions and arrangements thereof.

- Non-adjustable resistors consisting of loose powdered or granular conducting, or powdered or granular semi-conducting material, e.g. coherers or like imperfect resistors for detecting electromagnetic waves; overvoltage protection resistors or arresters.

- Non-adjustable liquid resistors.

- Electrical resistors whose effective value is mechanically adjustable, including liquid resistors or adjustable resistors structurally comprising a plurality of resistors, with changing dimensions and/or forms of the resistors, arrangements of fixed resistors with intervening connector or structurally in combination with switching arrangements. Resistors whose resistance is adjustable by short-circuiting different amounts of the resistive element, by mechanical pressure or force, by auxiliary driving means, by resistor movement or by action of actuation means, e.g. contacts, said contacts rocking or rolling along resistive element or taps, sliding along resistive element, e.g. moving along a straight path, in an accurate path or along turns of a helical resistive element.

- Resistors not provided for elsewhere, e.g. structural combinations of resistors excluding impedance networks.

- Apparatus or processes specially adapted for manufacturing resistors adapted for manufacturing resistor chips, for manufacturing resistors with envelope or housing, for winding the resistive element or for coating resistive material on a base, e.g. by thick (including precursor compositions therefor) or thin film techniques (e.g. vapour or chemical deposition, sputtering or flame spraying) by pirolytic processes or by resistor foil bonding; adapted for trimming, for applying terminals or for baking.

- Details common to two or more main types of devices or processes covered by this subclass, e.g. special adaption for mounting; housings, encapsulations; Arrangements for distinguishing marks (e.g. colour coding), electrostatic or electromagnetic shielding, cooling, heating and ventilating or of current collectors; Terminals or tapping points.

- Variable resistors, the value of which is changed non-mechanically, e.g. by voltage, current or temperature.

References relevant to classification in this subclass

This subclass/group does not cover:

Selection of specified materials as dielectric	H01B 3/00
Trimming of resistors for integrated circuits	H01L 21/66
Passive two-terminal components without a potential-jump or surface barrier for integrated circuits	H01L 28/00
Resistors with a potential-jump or surface barrier	H01L 29/86
Photoresistors and similar semiconductor devices in which radiation controls flow of current through the device	H01L 31/08
Magnetic-field-controlled resistors and similar devices using galvano-magnetic or similar magnetic effects	H01L 43/08
Bulk negative resistance effect devices	H01L 47/00

Apparatus or processes for filling or compressing insulating material in heating element tubes	H05B 3/52

Examples of places where the subject matter of this subclass is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Resistance strain gauges for measuring linear expansion or contraction	G01B
Measuring temperature using resistive elements	G01K 7/16
Measuring force or stress by measuring variations in ohmic resistance of solid materials	G01L 1/20
Resistors used for electric measuring electrical or magnetic variables	G01R 1/203
Thin- or thick-film integrated circuits; Resistors as components of an integrated circuit	H01L 27/00
Impedance networks	H03H

Informative references

Attention is drawn to the following places, which may be of interest for search:

Powder metallurgy	B22F
Trimming by laser in general	B23K 26/0003
Layered products	B32B
Compositions of ceramic materials, e.g. for resistors, thermistors, and based on titanium oxide or titanates	C04B 35/46
Compositions of ceramic materials, e.g. for resistors, thermistors, and	C04B 35/48

based on zirconium oxides or zirconates	
Compositions of ceramic materials, e.g. for resistors, thermistors, and based on vanadium, niobium, tantalum, molybdenum or tungsten oxides or vanadates, niobates, tantalates, molybdates or tungstates	C04B 35/495
Compositions of ceramic materials, e.g. for resistors, varistors and based on zinc oxides	C04B 35/453
Polymeric films or sheets	C08J 5/18
Indicating or measuring liquid level, or level of fluent solid material by measuring variations of resistance of resistors due to contact with conductor fluid	G01F 23/24
Investigating or analyzing material by investigating resistance	G01N 27/04
Arrangements for measuring resistance	G01R 27/00
Measuring dielectric properties, e.g. dielectric constants	G01R 27/2617
Devices using superconductivity or hyperconductivity	H01L 39/00
Solid state devices for rectifying, amplifying, oscillating, or switching without a potential-jump barrier or surface barrier	H01L 45/00
Thin- or thick-film solid state devices	H01L 49/02
Terminals or tapping points in general	H01R
Overvoltage arresters using spark gaps	H01T 4/00
Emergency protective circuit	H02H 9/02

arrangements responsive to excess current	
Emergency protective circuit arrangements responsive to excess voltage	H02H 9/04
Ohmic-resistance heating	H05B 3/00
Printed circuits incorporating printed electric components, e.g. printed resistor, capacitor, inductor	H05K 1/16
Printed circuits structurally associated with non-printed electric components	H05K 1/18
Casings for electrical apparatus in general	H05K 5/00

Special rules of classification within this subclass

Variable resistors, the value of which is changed non-mechanically, e.g. by voltage or temperature, are classified in group H01C 7/00.

Electrodes and terminals for resistors in main group H01C 7/00 are covered by main group H01C 1/00, more specifically subgroups H01C 1/14 and lower.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Thermistor	Type of resistor whose resistance varies significantly with temperature, typically as sharp or sudden change, when a threshold temperature value is reached.
Varistor	Also referred as Voltage Dependent Resistor is a resistor that conducts significantly increased current when voltage is excessive.
Adjustable	Mechanically adjustable

Synonyms and Keywords

In patent documents the following expressions/words are often used as synonyms:

Varistor	Voltage dependent resistor

H01C 1/00

Details

Definition statement

This subclass/group covers:

- Mounting, Supporting
- Color coding
- Shielding arrangements
- Current collectors
- Terminals
- Resistor networks

H01C 1/012

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)

References relevant to classification in this group

This subclass/group does not cover:

Compensation for resistor expansion or contraction	H01C 1/016
Resistive elements being formed in two or more coils or loops as a spiral, helical or toroidal winding	H01C 3/18, H01C 3/20
Resistive elements being formed as	H01C 7/00

one or more layers or coatings on a base	

H01C 1/014

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

References relevant to classification in this group

This subclass/group does not cover:

Compensation for resistor expansion or contraction	H01C 1/016

H01C 1/024

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

References relevant to classification in this group

This subclass/group does not cover:

Resistive elements being embedded in insulation with outer enclosing sheath	H01C 1/028
Plural layers surrounding the resistive element	H01C 1/032
Housing or enclosure being formed as coating or mold without outer sheath	H01C 1/034

H01C 1/032

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

References relevant to classification in this group

This subclass/group does not cover:

Resistive elements being embedded in insulation with outer enclosing sheath	H01C 1/028

H01C 1/034

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

References relevant to classification in this group

This subclass/group does not cover:

Plural layers surrounding the resistive element	H01C 1/032

H01C 1/14

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

Informative references

Attention is drawn to the following places, which may be of interest for search:

Terminals or tapping points in general	H01R

H01C 1/148

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

References relevant to classification in this group

This subclass/group does not cover:

Terminals or tapping points being coated on the resistive element	H01C 1/142

H01C 3/00

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

H01C 3/14

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)

References relevant to classification in this group

This subclass/group does not cover:

Resistors arranged or constructed for reducing self-induction, capacitance or variation with frequency	H01C 3/02
Iron-filament ballast resistors; Other resistors having variable temperature coefficient	H01C 3/04
Flexible or folding resistors, whereby such a resistor can be looped or collapsed upon itself	H01C 3/06
Dimension or characteristic of resistive element changing gradually or in discrete steps from one terminal to another	H01C 3/08
Resistive element having zig-zag or sinusoidal configuration	H01C 3/10
Lying in one plane	H01C 3/12

H01C 3/18

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

References relevant to classification in this group

This subclass/group does not cover:

Resistive elements including two or more distinct wound elements or two or more winding patterns	H01C 3/16

H01C 3/20

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

References relevant to classification in this group

This subclass/group does not cover:

Resistive elements including two or more distinct wound elements or two or more winding patterns	H01C 3/16

H01C 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 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])

References relevant to classification in this group

This subclass/group does not cover:

Resistors consisting of loose powdered or granular material	H01C 8/00

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	H01L 28/20
Resistors with a potential-jump barrier or surface barrier, e.g. field effect resistors	H01L 29/00
Semiconductor devices sensitive to electro-magnetic or corpuscular radiation, e.g. photoresistors	H01L 31/00
Devices using galvanomagnetic or similar magnetic effects, e.g. magnetic-field-controlled resistors	H01L 43/00
Bulk negative resistance effect devices	H01L 47/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring deformation in a solid state using the change in resistance formed by printed-circuit technique	G01B 7/20
Insulating materials	H01B 3/00
Devices using superconductivity	H01L 39/00
Solid state devices for rectifying, amplifying, oscillating or switching without a potential-jump barrier or surface barrier	H01L 45/00
Ohmic resistance heating	H05B 3/00
Printed circuits	H05K

H01C 7/04

having negative temperature coefficient [N: (thermometers using resistive elements G01K7/16)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Thermometers using resistive elements	G01K 7/16

H01C 7/102

Varistor boundary, e.g. surface layers (H01C7/12 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Overvoltage protection resistors	H01C 7/12

H01C 7/105

Varistor cores (H01C7/12 takes precedence)

References relevant to classification in this group

This subclass/group does not cover:

Overvoltage protection resistors	H01C 7/12

H01C 7/12

Overvoltage protection resistors [N: (series resistors structurally associated with spark gaps H01T1/16)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Series resistors structurally associated with spark gaps	H01T 1/16

H01C 7/13

current responsive

Special rules of classification within this group

Groups H01C 7/02 to H01C 7/13 take precedence over groups H01C 7/18 to H01C 7/22.

H01C 8/00

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

H01C 10/00

Adjustable resistors

Special rules of classification within this group

Groups H01C 10/02 to H01C 10/26 take precedence over groups H01C 10/28 to H01C 10/50.

H01C 10/22

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

References relevant to classification in this group

This subclass/group does not cover:

With specified mathematical relationship between movement of resistor actuating means and value of resistance, other than direct proportional relationship	H01C 10/04

H01C 10/26

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

References relevant to classification in this group

This subclass/group does not cover:

Plural resistive elements	H01C 10/16
Contacts moving along turns of a helical resistive element, or vice versa	H01C 10/24

H01C 10/44

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

References relevant to classification in this group

This subclass/group does not cover:

Contact bridging and sliding along resistive element and parallel conducting bar or collector	H01C 10/42

H01C 10/46

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

References relevant to classification in this group

This subclass/group does not cover:

Contact rocking or rolling along resistive element or taps	H01C 10/28
Contact sliding along resistive element	H01C 10/30

H01C 10/50

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

References relevant to classification in this group

This subclass/group does not cover:

Contact moving in an arcuate path structurally combined with switching arrangements	H01C 10/36

H01C 11/00

Non-adjustable liquid resistors

H01C 13/00

Resistors not provided for elsewhere

H01C 13/02

Structural combinations of resistors (impedance networks per se H03H)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Impedance networks per se	H03H

H01C 17/00

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)

References relevant to classification in this group

This subclass/group does not cover:

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

H01C 17/24

by removing or adding resistive material (H01C17/23, H01C17/232, H01C17/235 take precedence)

References relevant to classification in this group

This subclass/group does not cover:

By opening or closing resistor geometric tracks of predetermined resistive values, e.g. snapistors	H01C 17/23
Adjusting the temperature coefficient; Adjusting value of resistance by adjusting temperature coefficient of resistance	H01C 17/232
Initial adjustment of potentiometer parts for calibration	H01C 17/235

H01C 17/242

by laser [N: (trimming by laser in general B23K26/0003)]

Informative references

Attention is drawn to the following places, which may be of interest for search:

Trimming by laser in general	B23K 26/0003