

# H01C

## RESISTORS

### Definition statement

*This place 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 pyrolytic 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 adaptation 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.
- Fixed resistors whose effective value is, or is presumed to be, non-variable.
- Details of, or for, resistors.

## References

### Limiting references

*This place does not cover:*

Selection of specified materials as dielectric	<a href="#">H01B 3/00</a>
Passive two-terminal components without a potential-jump or surface barrier for integrated circuits	<a href="#">H01L 28/00</a>
Resistors having potential barriers, e.g. field-effect resistors	<a href="#">H01L 29/00</a>
Photoresistors and similar semiconductor devices in which radiation controls flow of current through the device	<a href="#">H01L 31/08</a>
Apparatus or processes for filling or compressing insulating material in heating element tubes	<a href="#">H05B 3/52</a>
Magnetic-field-controlled resistors and similar devices using galvanomagnetic or similar magnetic effects	<a href="#">H10N 50/00</a> , <a href="#">H10N 52/00</a>
Bulk negative resistance effect devices	<a href="#">H10N 80/00</a>

### Application-oriented references

*Examples of places where the subject matter of this place 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	<a href="#">G01B</a>
Measuring temperature using resistive elements	<a href="#">G01K 7/16</a>
Measuring force or stress by measuring variations in ohmic resistance of solid materials	<a href="#">G01L 1/20</a>
Resistors used for electric measuring electrical or magnetic variables	<a href="#">G01R 1/203</a>
Thin- or thick-film integrated circuits; Resistors as components of an integrated circuit	<a href="#">H01L 27/00</a>
Impedance networks	<a href="#">H03H</a>

### Informative references

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

Powder metallurgy	<a href="#">B22F</a>
Trimming of electrical components	<a href="#">B23K 26/351</a>
Layered products	<a href="#">B32B</a>
Compositions of ceramic materials, e.g. for resistors, varistors and based on zinc oxides	<a href="#">C04B 35/453</a>
Compositions of ceramic materials, e.g. for resistors, thermistors, and based on titanium oxide or titanates	<a href="#">C04B 35/46</a>
Compositions of ceramic materials, e.g. for resistors, thermistors, and based on zirconium oxides or zirconates	<a href="#">C04B 35/48</a>
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	<a href="#">C04B 35/495</a>
Polymeric films or sheets	<a href="#">C08J 5/18</a>

Indicating or measuring liquid level, or level of fluent solid material by measuring variations of resistance of resistors due to contact with conductor fluid	<a href="#">G01F 23/24</a>
Investigating or analyzing material by investigating resistance	<a href="#">G01N 27/04</a>
Arrangements for measuring resistance	<a href="#">G01R 27/00</a>
Measuring dielectric properties, e.g. dielectric constants	<a href="#">G01R 27/2617</a>
Terminals or tapping points in general	<a href="#">H01R</a>
Overvoltage arresters using spark gaps	<a href="#">H01T 4/00</a>
Emergency protective circuit arrangements responsive to excess current	<a href="#">H02H 9/02</a>
Emergency protective circuit arrangements responsive to excess voltage	<a href="#">H02H 9/04</a>
Ohmic-resistance heating	<a href="#">H05B 3/00</a>
Printed circuits incorporating printed electric components, e.g. printed resistor, capacitor or inductor	<a href="#">H05K 1/16</a>
Printed circuits structurally associated with non-printed electric components	<a href="#">H05K 1/18</a>
Casings for electrical apparatus in general	<a href="#">H05K 5/00</a>
Devices using superconductivity or hyperconductivity	<a href="#">H10N 60/00</a>
Solid state devices for rectifying, amplifying, oscillating or switching having no potential barrier	<a href="#">H10N 70/00</a>
Thin- or thick-film solid state devices	<a href="#">H10N 97/00</a>

### Special rules of classification

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 place, 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
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## H01C 1/00

### Details

#### Definition statement

*This place 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 ([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](#))

#### References

##### Limiting references

*This place does not cover:*

Compensation for resistor expansion or contraction	<a href="#">H01C 1/016</a>
Resistive elements being formed in two or more coils or loops as a spiral, helical or toroidal winding	<a href="#">H01C 3/18</a> , <a href="#">H01C 3/20</a>
Resistive elements being formed as one or more layers or coatings on a base	<a href="#">H01C 7/00</a>

## H01C 1/014

the resistor being suspended between and being supported by two supporting sections ([H01C 1/016](#) takes precedence)

#### References

##### Limiting references

*This place does not cover:*

Compensation for resistor expansion or contraction	<a href="#">H01C 1/016</a>
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## H01C 1/024

the housing or enclosure being hermetically sealed ([H01C 1/028](#), [H01C 1/032](#), [H01C 1/034](#) take precedence)

### References

#### Limiting references

*This place does not cover:*

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

## H01C 1/032

plural layers surrounding the resistive element ([H01C 1/028](#) takes precedence)

### References

#### Limiting references

*This place does not cover:*

Resistive elements being embedded in insulation with outer enclosing sheath	<a href="#">H01C 1/028</a>
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## H01C 1/034

the housing or enclosure being formed as coating or mould without outer sheath ([H01C 1/032](#) takes precedence)

### References

#### Limiting references

*This place does not cover:*

Plural layers surrounding the resistive element	<a href="#">H01C 1/032</a>
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## H01C 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

### References

#### Informative references

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

Terminals or tapping points in general	<a href="#">H01R</a>
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**H01C 1/148**

the terminals embracing or surrounding the resistive element ([H01C 1/142](#) takes precedence)

**References****Limiting references**

*This place does not cover:*

Terminals or tapping points being coated on the resistive element	<a href="#">H01C 1/142</a>
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**H01C 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)

**References****Limiting references**

*This place does not cover:*

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

**H01C 3/18**

wound on a flat or ribbon base ([H01C 3/16](#) takes precedence)

**References****Limiting references**

*This place does not cover:*

Resistive elements including two or more distinct wound elements or two or more winding patterns	<a href="#">H01C 3/16</a>
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## H01C 3/20

wound on cylindrical or prismatic base ([H01C 3/16](#) takes precedence)

### References

#### Limiting references

*This place does not cover:*

Resistive elements including two or more distinct wound elements or two or more winding patterns	<a href="#">H01C 3/16</a>
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## 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 [H01C 8/00](#); resistors having potential barriers, 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 [H10N 50/10](#); bulk negative resistance effect devices [H10N 80/00](#))**

### References

#### Limiting references

*This place does not cover:*

Resistors consisting of loose powdered or granular material	<a href="#">H01C 8/00</a>
Resistors having potential barriers, e.g. field effect resistors	<a href="#">H01L 29/00</a>
Semiconductor devices sensitive to electro-magnetic or corpuscular radiation, e.g. photoresistors	<a href="#">H01L 31/00</a>
Magnetic field controlled resistors	<a href="#">H10N 50/10</a>
Bulk negative resistance effect devices	<a href="#">H10N 80/00</a>

#### 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	<a href="#">G01B 7/20</a>
Insulating materials	<a href="#">H01B 3/00</a>
Passive thin-film or thick-film semiconductor or solid state devices	<a href="#">H01L 27/00</a>
Resistors without a potential-jump or surface barrier specially adapted for integrated circuits	<a href="#">H01L 28/20</a>
Ohmic resistance heating	<a href="#">H05B 3/00</a>
Printed circuits	<a href="#">H05K</a>
Devices using superconductivity	<a href="#">H10N 60/00</a>
Solid state devices for rectifying, amplifying, oscillating or switching having no potential barriers	<a href="#">H10N 70/00</a>

## H01C 7/04

having negative temperature coefficient {(thermometers using resistive elements [G01K 7/16](#))}

### References

#### Informative references

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

Thermometers using resistive elements	<a href="#">G01K 7/16</a>
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## H01C 7/102

Varistor boundary, e.g. surface layers ([H01C 7/12](#) takes precedence)

### References

#### Limiting references

This place does not cover:

Overvoltage protection resistors	<a href="#">H01C 7/12</a>
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## H01C 7/105

Varistor cores ([H01C 7/12](#) takes precedence)

### References

#### Limiting references

This place does not cover:

Overvoltage protection resistors	<a href="#">H01C 7/12</a>
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## H01C 7/12

Overvoltage protection resistors {(series resistors structurally associated with spark gaps [H01T 1/16](#))}

### References

#### Informative references

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

Series resistors structurally associated with spark gaps	<a href="#">H01T 1/16</a>
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## H01C 7/13

current responsive

### Special rules of classification

Groups [H01C 7/02](#) - [H01C 7/13](#) take precedence over groups [H01C 7/18](#) - [H01C 7/22](#).

## H01C 10/00

### Adjustable resistors

#### Special rules of classification

Groups [H01C 10/02](#) - [H01C 10/26](#) take precedence over groups [H01C 10/28](#) - [H01C 10/50](#).

## H01C 10/22

resistive element dimensions changing gradually in one direction, e.g. tapered resistive element ([H01C 10/04](#) takes precedence)

#### References

##### Limiting references

*This place does not cover:*

With specified mathematical relationship between movement of resistor actuating means and value of resistance, other than direct proportional relationship	<a href="#">H01C 10/04</a>
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## H01C 10/26

resistive element moving ([H01C 10/16](#), [H01C 10/24](#) take precedence)

#### References

##### Limiting references

*This place does not cover:*

Plural resistive elements	<a href="#">H01C 10/16</a>
Contacts moving along turns of a helical resistive element, or vice versa	<a href="#">H01C 10/24</a>

## H01C 10/44

the contact bridging and sliding along resistive element and parallel conducting bar or collector ([H01C 10/42](#) takes precedence)

#### References

##### Limiting references

*This place does not cover:*

Contact bridging and sliding along resistive element and parallel conducting bar or collector	<a href="#">H01C 10/42</a>
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## H01C 10/46

Arrangements of fixed resistors with intervening connectors, e.g. taps  
([H01C 10/28](#), [H01C 10/30](#) take precedence)

### References

#### Limiting references

*This place does not cover:*

Contact rocking or rolling along resistive element or taps	<a href="#">H01C 10/28</a>
Contact sliding along resistive element	<a href="#">H01C 10/30</a>

## H01C 10/50

structurally combined with switching arrangements ([H01C 10/36](#) takes precedence)

### References

#### Limiting references

*This place does not cover:*

Contact moving in an arcuate path structurally combined with switching arrangements	<a href="#">H01C 10/36</a>
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## H01C 13/02

Structural combinations of resistors (impedance networks per se [H03H](#))

### References

#### Informative references

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

Impedance networks per se	<a href="#">H03H</a>
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## H01C 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](#))

### References

#### Limiting references

*This place does not cover:*

Providing fillings for housings or enclosures	<a href="#">H01C 1/02</a>
Reducing insulation surrounding a resistor to powder	<a href="#">H01C 1/03</a>
Manufacture of thermally variable resistors	<a href="#">H01C 7/02</a> , <a href="#">H01C 7/04</a>

**H01C 17/24**

by removing or adding resistive material ([H01C 17/23](#), [H01C 17/232](#), [H01C 17/235](#) take precedence)

**References****Limiting references**

*This place does not cover:*

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

**H01C 17/242**

by laser {(trimming by laser in general [B23K 26/351](#))}

**References****Informative references**

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

Trimming by laser in general	<a href="#">B23K 26/351</a>
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