

H05B

ELECTRIC HEATING; ELECTRIC LIGHT SOURCES NOT OTHERWISE PROVIDED FOR; CIRCUIT ARRANGEMENTS FOR ELECTRIC LIGHT SOURCES, IN GENERAL

Definition statement

This place covers:

Electric heating

- Heat sources utilising ohmic resistance, electric, magnetic or electromagnetic fields, electric discharge, or combinations thereof;
- Light sources specially adapted for heating, e.g. infrared sources as used in light ovens.

This subclass covers not only the electric elements and circuitry designs but also the electric aspects of their arrangement, where these concern cases of general application.

Electric light sources

This subclass is residual as to electric light sources and covers in particular:

- Electric arc lamps, electroluminescent light sources and light sources using a combination of different types of light generation;

Circuit arrangements

- Circuit arrangements for operating electric light sources.
- Primary circuits, circuit arrangements and circuit elements for operating electric light sources.

Relationships with other classification places

Electric Heating

While this subclass covers electric aspects of heating, like electric elements, circuitry designs and their electric arrangement in heating apparatus or devices, the physical disposition of such electric elements as well as any other mechanical aspect of electric heating is covered by the subclasses of [F24](#) and [F27](#). Heating elements used in specific applications are classified in subclasses for those applications.

Electric light sources

This subclass is residual as to electric light sources: see section "References out of residual references" for a list of places covering electric light sources per se. Differently from this subclass, subclasses of class [F21](#) cover the mechanical arrangement of parts including electrical elements, i.e. their geometrical or physical position in relation to one another, such as the structures or constructional features of lighting devices incorporating a light source (be it electric or otherwise).

References

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:

Domestic cooking	A47J
Heating or cooling appliances for medical or therapeutic treatment	A61F 7/00
Radiation therapy using microwaves	A61N 5/02
Forging by heat	B21J , B21K

Joining of preformed parts by heating of plastics or substances in a plastic state	B29C 65/02
Metallurgy	C21 , C22 , C23
Domestic heating and stoves	F24
Furnaces and ovens	F27
Thermally-actuated switches	H01H 37/00

References out of a residual place

Examples of places in relation to which this place is residual:

Electric light sources

Electric discharge tubes	H01J
Electric discharge lamps	H01J 61/00 - H01J 65/00
Circuit elements structurally associated with the lighting element of an electric discharge lamp	H01J 61/56
Electric incandescent lamps	H01K
Laser	H01S
Plasma torches	H05H 1/26
Semiconductor devices having potential barriers, specially adapted for light emission, e.g. LEDs	H10H 20/00 , H10H 29/10 , H10H 20/00
Organic solid-state devices specially adapted for light emission, e.g. OLEDs or PLEDs	H10K 59/00 , H10K 50/00

Informative references

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

Electric light sources

Measuring characteristics of light; Colorimetry	G01J
Control of temperature in general	G05D 23/00
Regulating electric characteristics of arcs in general	G05F 1/02
Regulating electric power in general	G05F 1/66

Special rules of classification

In this subclass the use of indexing codes [H05B 2203/00](#) – [H05B 2214/04](#) is mandatory.

H05B 1/00**Details of electric heating devices****Definition statement**

This place covers:

General automatic switching arrangements specially adapted to heating applications, when no specific class exist for the particular heating application.

Control of heating devices, when no specific class exist for the particular heating application.

Definition statement

Further information:

[H05B 1/0202](#) relates to automatic switching.

[H05B 1/0227](#) relates to automatic control, classified according to the type of application.

References

Informative references

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

Control of induction heating devices	H05B 6/06
Control of microwave heating devices	H05B 6/68
Control of electric discharge heating devices	H05B 7/00
Bakers' ovens; machines or equipment for baking	A21B
Industrial microwave ovens	A23L 5/10
Characteristic features of footwear; parts of footwear	A43B
Heated mirrors	A47G 1/00
Kitchen equipment; coffee mills; spice mills; apparatus for making beverages	A47J
Dentistry	A61C
Methods or apparatus for sterilising materials	A61L
Chemical or physical processes	B01J
Soldering or welding; cutting by applying heat locally	B23K
Shaping or joining of plastics	B29C
Vehicle heating	B60H
Car seats	B60N
Heated mirrors for cars	B60R 1/0602
Heated windshield window (car) / heated rear window (car)	B60S 1/00
Helicopters de-icing	B64C
Airplane wings de-icing	B64D
Containers for storage or transport	B65D
Pop corn heating	B65D 81/3469
Nanotechnology	B82Y
Carbon nanotubes	C01B 32/15
Ceramics	C04B
Adhesives	C09J 4/00
Heat treatment of metals or alloys	C21D
Metal-spraying	C23C 4/00
Heating of sport playgrounds	E01C 13/02
Cleaning open waters, e.g. deicing	E02B 15/00
Roofs de-icing	E04D 13/00
Devices for securing together constructional elements or machine parts	F16B 1/00
Pipes; joints or fittings for pipes; supports for pipes or cables	F16L

Glow plugs	F23Q 7/001
Electrical cooker / glow plug / gas cooker	F24C
Removal of fumes associated to cooking range (or microwave ovens)	F24C 15/2042
Domestic- or space-heating systems e.g. central heating	F24D
Fluid heaters	F24H
Drying solid materials or objects by removing liquid there from	F26B
Electric furnaces	F27B 3/08
Details or accessories of furnaces	F27D
Electrography; electrophotography; magnetography	G03G
Controlling non-electric variables	G05D
Control of temperature in general	G05D 23/00
Controlling electric or magnetic variables	G05F
Resistors; methods of production	H01C 7/00
Electric switches	H01H
Thermally actuated switches	H01H 37/00
Aerials	H01Q
Connectors	H01R
Removing snow from cables	H02G 7/16
Electric power conversion	H02M
Printed circuits	H05K 1/00
Semiconductor devices; methods of production	H10

H05B 3/00

Ohmic-resistance heating

Definition statement

This place covers:

Heating by applying a voltage to a material with a certain conductivity, so that an electric current is generated that, according to the resistivity of the material will dissipate energy in form of heat (Joule heating).

Accordingly, the heat can be generated in the same object that needs to be heated. Otherwise, the heat has to be transferred to the object that needs to be heated by a further process of radiation, conduction, or convection.

Further information:

[H05B 3/0033](#)- [H05B 3/009](#) deal with heating devices using lamps

[H05B 3/06](#) does not cover connectors (suitable) for heating elements, but covers the particular cases when the heater is structurally combined with the technical means allowing the electrical connection, otherwise only the classification in connectors, i.e. in [H01R](#), applies.

[H05B 3/10](#) deal with heater elements characterised by the composition or nature of the materials or by the arrangement of the conductor.

[H05B 3/34](#) covers car seat heaters.

[H05B 3/345](#) covers any heater to be used in a textile material (even if they are not clothes)

[H05B 3/50](#) covers any car air heater (independently of the structure of the heater).

[H05B 3/62](#)- [H05B 3/66](#) deal with heating elements specially adapted for furnaces.

[H05B 3/62](#)-[H05B 3/82](#) only cover electrical details, or details about the generation or transmission of heat. For other mechanical details the corresponding [F24](#) or [F27](#) class applies.

[H05B 3/68](#)- [H05B 3/76](#) deal with heating arrangements specially adapted for cooking plates or analogous hot-plates

[H05B 3/78](#)- [H05B 3/82](#) deal with heating arrangements specially adapted for immersion heating

[H05B 3/84](#) deal with heating arrangements specially adapted for transparent or reflecting areas

Relationships with other classification places

Further information about subgroups:

- [H05B 3/0033](#) - [H05B 3/009](#) cover heating devices using lamps.
- [H05B 3/06](#) does not cover connectors (suitable) for heating elements, but covers the particular cases when the heater is structurally combined with the technical means allowing the electrical connection, otherwise only the classification in connectors, i.e. in [H01R](#), applies.
- [H05B 3/10](#) deal with heater elements characterised by the composition or nature of the materials or by the arrangement of the conductor.
- [H05B 3/34](#) covers car seat heaters.
- [H05B 3/345](#) covers any heater to be used in a textile material (even if they are not clothes).
- [H05B 3/50](#) covers any car air heater (independently of the structure of the heater).
- [H05B 3/62](#) - [H05B 3/66](#) deal with heating elements specially adapted for furnaces.
- [H05B 3/62](#) - [H05B 3/82](#) only cover electrical details, or details about the generation or transmission of heat. For other mechanical details, classification is directed to the corresponding groups of classes [F24](#) or [F27](#).
- [H05B 3/68](#) - [H05B 3/76](#) deal with heating arrangements specially adapted for cooking plates or analogous hot-plates.
- [H05B 3/78](#) - [H05B 3/82](#) deal with heating arrangements specially adapted for immersion heating.
- [H05B 3/84](#) deal with heating arrangements specially adapted for transparent or reflecting areas.

References

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:

Electric cigarettes	A24F 40/00
Devices for radiation therapy	A61N
Electrothermic treatment of ores	C22B 4/00
Ironing	D06F 61/00
Combustion engines heaters	F02M 31/00
Arrangements of heating elements in furnaces	F27D 11/00
Heat exchangers	F28F 21/00
Apparatus for thermal treatment of semiconductor or solid-state devices or of parts thereof	H10P 72/00

Informative references

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

Aquarium heaters	A01K 63/065
Bakers' ovens; machines or equipment for baking	A21B
Characteristic features of footwear; parts of footwear	A43B
Warming plates	A47F 3/00
Heated mirrors	A47G 1/00
Kitchen equipment; coffee mills; spice mills; apparatus for making beverages	A47J
Dentistry	A61C
Chemical or physical processes	B01J
Soldering or welding; cutting by applying heat locally	B23K
Shaping or joining of plastics	B29C
Layered products comprising glass	B32B 17/00
Thermal printers	B41J 11/00
Vehicle heating	B60H
Car seats	B60N
Heated mirrors (for cars)	B60R 1/0602
Heated windshield window (car) / heated rear window (car)	B60S 1/00
Helicopters de-icing	B64C
Aircraft de-icing	B64D 15/00
Containers for storage or transport	B65D
Pop corn heating	B65D 81/3469
Nanotechnology	B82Y
Carbon nanotubes	C01B 32/15
Surface treatment of glass-plate materials	C03C 17/00
Ceramics	C04B
Adhesives	C09J 4/00
Heat treatment of metals or alloys	C21D
Metal-spraying	C23C 4/00
Heating of sport playgrounds	E01C 13/02
Cleaning open waters, e.g. deicing	E02B 15/00
Roofs de-icing	E04D 13/00
Devices for securing together constructional elements or machine parts	F16B 1/00
Pipes; joints or fittings for pipes; supports for pipes or cables	F16L
Glow plugs	F23Q 7/001
Electrical cooker / glow plug / gas cooker	F24C
Removal of fumes associated to cooking ranges	F24C 15/2042
Domestic- or space-heating systems e.g. central heating	F24D
Air-conditioning	F24F

Fluid heaters	F24H
Drying solid materials or objects by removing liquid there from	F26B
Electric furnaces	F27B 3/08
Details or accessories of furnaces	F27D
Electrography; electrophotography; magnetography	G03G
Image fixing devices	G03G 15/2064
Controlling non-electric variables	G05D
Resistors-methods of production	H01C 7/00
Electric switches	H01H
Gas-filled discharge tubes	H01J 37/32
Aerials	H01Q
Removing snow or ice from cables	H02G 7/16
Removing snow from cables	H02G 7/16
Electric power conversion	H02M
Printed circuits	H05K 1/00
Semiconductor devices; methods of production	H10

Special rules of classification

Usage or orthogonal indexing codes.

- Aspects relating to Ohmic resistive heating covered by group [H05B 3/00](#) are classified in [H05B 2203/00](#) and subgroups.
- Aspects relating to both to resistive heating and to induction heating, covered by [H05B 3/00](#) and [H05B 6/00](#) are classified in [H05B 2213/00](#) and subgroups.
- Aspects relative to resistive heating, induction heating and heating using microwaves, covered by groups [H05B 3/00](#), [H05B 6/00](#) are classified in [H05B 2214/00](#) and subgroups.

H05B 3/0033

{Heating devices using lamps}

References

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:

ELECTROTHERAPY; MAGNETOTHERAPY; RADIATION THERAPY; ULTRASOUND THERAPY	A61N
--	----------------------

H05B 3/0076

{for cooking, e.g. in ovens (lamps specially adapted for non-metallic cooking plates [H05B 3/742](#), [H05B 3/744](#))}

References**Limiting references**

This place does not cover:

Lamps specially adapted for non-metallic cooking plates	H05B 3/742 , H05B 3/744
---	---

H05B 3/0085

{for medical applications}

References**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:

Radiation therapy	A61N 5/00
-------------------	---------------------------

H05B 3/03

Electrodes

References**Informative references**

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

Electrothermic treatment of ores	C22B 4/00
----------------------------------	---------------------------

H05B 3/12

characterised by the composition or nature of the conductive material

References**Informative references**

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

Electric conductive compositions characterised by PTC or NTC resistance	H01C 7/02 , H01C 7/04
---	---

H05B 3/14**the material being non-metallic****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Non-metallic, non-adjustable resistors	H01C 7/022 , H01C 7/042
--	---

H05B 3/143**{applied to semiconductors, e.g. wafers heating ([H05B 3/0047](#) takes precedence)}****References****Limiting references***This place does not cover:*

For semi-conductors manufacture	H05B 3/0047
---------------------------------	-----------------------------

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:*

Apparatus for thermal treatment of semiconductor or solid-state devices or of parts thereof	H10P 72/0431
---	------------------------------

H05B 3/342**{heaters used in textiles}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Making textile fabrics	D04H
------------------------	----------------------

H05B 3/688**{Fabrication of the plates (for single-step processes see the appropriate subclass, e.g. in [B23C](#), sub-section metallurgy)}****References****Limiting references***This place does not cover:*

Machine tool; metal-working	B23C
-----------------------------	----------------------

H05B 6/00

Heating by electric, magnetic or electromagnetic fields

Definition statement

This place covers:

- Induction heating
- Dielectric heating
- Microwave heating

Further information:

[H05B 6/02](#) and subgroups relate to induction heating

[H05B 6/46](#) and subgroups relate to dielectric heating

[H05B 6/64](#) and subgroups relate to microwave heating

Control of cooking plates is covered by [H05B 6/062](#). Control of cooking appliances other than cooking plates is covered by [H05B 6/06](#).

Apportioning of the total heating power among the different heating coils is covered by [H05B 6/065](#). Also apportioning in time, e.g. cyclic powering on and off of each heating coil. Also supplying a coil from multiple generators or multiple coils with a controlled amount of power from multiple generators. Also synchronisation, e.g. for avoiding generation of noise, or avoiding electromagnetic interferences. Not simply matrix heating plate per-se.

Induction heating apparatus, other than furnaces, for specific applications are covered by [H05B 6/10](#).

Cooking devices are covered by [H05B 6/12](#) but control of induction cooking devices is covered by [H05B 6/06](#) and continuous movement of food is covered by [H05B 6/10](#).

Induction cooking plates or the like and devices to be used in combination with them are covered by [H05B 6/1209](#), but control for induction cooking plates is covered by [H05B 6/062](#) and ohmic heating plates are covered by [H05B 3/68](#).

[H05B 6/1218](#) deals with induction cooking plates with arrangements using lights for the indication of the state of the heating zones. The typical application deals with the provision of LED's on a cooking area that are switched on when the induction heating power of that cooking area is switched on. Also particular details of the glass ceramic plate in order to achieve such effect, for example cut out, and darken areas to only illuminate the desired portion of the cooking area. Also glass plates having a substance or material sandwiched there inside that will interact with the magnetic field of the induction coils so that light is generated when the corresponding induction coil is switched on.

[H05B 6/1227](#) deals with Induction cooking plates specially designed for wok pans, or similar shaped pans; also wok supports specially adapted for induction cooking (facilitating magnetic field transmission, coils provided inside the support...), cook-tops with wok-shaped upper surface (so substantially concave upper surface), but also cylinder surface with coils from top to bottom; wok is also called Chinese Pan.

[H05B 6/1236](#) deals with Induction cooking plates adapted to induce current in a coil to supply power to a device and electrical heating devices powered in this way, If it is described any of the heating device itself or a particular control of the cook-top to recognise the load and correctly supply it with power. Typically the system acts as a transformer. The heating device is provided with a secondary coil for which the induction coil of the cook-top acts as primary.

[H05B 6/1245](#) deals with induction cooking plates with special coil arrangements. The typical application deals with a particular coil material, coil shape, coil geometry, coil position within the plate or with respect to other coils.

Definition statement

[H05B 6/1272](#) deals with induction cooking plates with more than one coil or coil segment per heating zone. Also when different concentric coils or coil segments or section with different coil distance or winding direction are provided. Also when coils are provided in different planes for the same heating zone.

[H05B 6/1281](#) deals with induction cooking plates with flat coils. This means that the coil as a whole is constructed in a flat distribution, the coil conductor can however present a non-flat section. The typical application deals with coils particularly designed to be have a small total thickness, normally by printing a conductor on a substrate or by having a thin conductor embedded in a substrate. The flatness of the conductor used for the coil is not relevant.

[H05B 6/129](#) deals with induction ovens. These are domestic appliances similar to a kitchen ovens wherein the heating means include at least an induction coil, (possibly in addition to any of the traditional heating means resistance heating, microwave heating, convection heating). Also induction heated trolleys, for catering, for example in airplanes. Also pop-corn machines (provided there is a closable / closed) cavity. Also vending machines in general (provided there is a closable / closed) cavity. Also induction warming drawers or the like (provided there is a closable / closed) cavity. Metal heat-treating apparatus only if there is a closable / closed cavity (therefore if it looks like a domestic oven). This class applies to cooking, de-freezing, warming, heat treating and re-heating appliances (the temperature achieved is unimportant).

[H05B 6/14](#) can be assigned in combination with any of [H05B 6/36](#), [H05B 6/101](#) and [H05B 6/105](#).

[H05B 6/1209](#) takes precedence over [H05B 6/34](#).

[H05B 6/36](#) deals with coil arrangements with flat coil conductors. This means that the conductor used for the coil present a flat section (as a band), but the coil itself can have a (not flat) tri-dimensional distribution.

[H05B 6/6402](#) deals with aspects relating to the microwave cavity but multiple cavity ovens are covered by [H05B 6/80](#), continuous movement of material is covered by [H05B 6/78](#), ovens specially adapted to a particular application are covered by [H05B 6/80](#).

[H05B 6/6408](#) deals with support or covers for the load inside the cavity. Supports or covers including microwave susceptors (e.g. browning plates) are additionally covered by [H05B 6/6494](#).

[H05B 6/6414](#) deals with aspects relating to the door of the microwave heating apparatus but microwave leakage is covered by [H05B 6/76](#), and microwave leakage testing is covered by [H05B 6/6432](#).

[H05B 6/6417](#) deals with door interlocks of the microwave heating apparatus and related circuits. Also door position detecting circuits (e.g. with switches).

[H05B 6/642](#) deals with the cooling of the microwave components and related air circulation systems, however if the refrigerating air is being re-circulated through the cavity for convection heating the class [H05B 6/6476](#) is relevant instead.

[H05B 6/6426](#) deals with any aspect relating to the exterior of the microwave heating apparatus, e.g. metal casing, power cord. Also handles (in portable microwave ovens) to allow carrying the microwave oven. Portable microwave ovens are additionally covered by [H05B 6/80](#).

[H05B 6/6432](#) deals with aspects relating to testing or detecting leakage in a microwave heating apparatus. This means detecting or testing the microwave radiation leaking out of the microwave oven but also microwave switching off upon detection of microwave leakage. Also testing the quality of microwave seals and screens by measuring the microwave leakage. However, detecting leaked or reflected microwaves going back to the magnetron is covered by [H05B 6/76](#).

[H05B 6/6447](#) deals with methods of operation or details of the microwave heating apparatus related to the use of detectors or sensors. However detecting reflected radiation for feedback control purposes is covered by [H05B 6/705](#).

Definition statement

[H05B 6/645](#) deals with the use of temperature sensor or thermistors for detecting the temperature of interior of the cavity or the product placed inside. However detecting the temperature of the magnetron or any related safety aspect is covered by [H05B 6/666](#).

Details of particular circuits or particular components of the microwave generation circuit, e.g. a particular capacitor, a particular inductor... are classified under [H05B 6/66](#) when no other more specific subgroup is provided for.

[H05B 6/662](#) deals with aspects related to the boost transformer of the microwave heating apparatus. However cooling of the boost transformer is covered by [H05B 6/642](#).

[H05B 6/666](#) deals with safety circuits. The general idea in this subgroup is identifying situations where possible damage to the circuits (including inverter and magnetron) can occur. Also simply detecting the temperature of the magnetron/inverter or measuring anode current for limiting control, detecting status or detecting moding and eventually switching off the microwave oven/signalling alarm. Also soft start-up, control of preheating mode, controlled ramp up power supply at start up or at changing power level. However [H05B 6/666](#) does not cover:

- fume or fire detection, covered by [H05B 6/6461](#)
- avoiding leakage, covered by [H05B 6/76](#)
- sensing leakage outside the microwave oven, covered by [H05B 6/6432](#)
- aspects related with door interlocks, even if relating to avoiding over-current at start up, covered by [H05B 6/6417](#)
- circuit where a variable (e.g. anode current) is measured on a power supplied feedback control (feedback power control with anode current), covered by [H05B 6/683](#)
- circuit for feedback power control with input current or inverter current being measured, covered by [H05B 6/685](#)
- avoiding radiation back into the waveguide or in the magnetron, covered by [H05B 6/76](#)
- avoiding generation of harmonics, covered by [H05B 6/68](#)

[H05B 6/68](#) deals with circuits for monitoring or control. Typically the power supplied is controlled in a feedback loop. Includes monitoring input / output voltage / current / power in a feedback loop. Also if it is described compensation of the cooking time taking account of fluctuations in the power supply, temperature in the cavity or variables of the magnetron. If the presence of an inverter or of a solid state oscillator is not specified then this group is given and not the sub-groups. Also avoiding generation of harmonics. Also ZVS and ZCS.

However [H05B 6/68](#) does not cover:

- limiting threshold control, (keeping a variable bellow a safety threshold value) covered by [H05B 6/666](#)
- soft start-up, control of preheating mode, controlled ramp up power supply at start up or at changing power level, covered by [H05B 6/666](#)

[H05B 6/681](#) deals with circuits comprising an inverter, a boost transformer and a magnetron. Determinant is the presence of an inverter (there will always be a boost transformer and a magnetron). Includes methods of switching the inverter to regulate power (Duty-Ratio control and Frequency control). However, [H05B 6/681](#) does not cover control based on sensors readings of non electrical variables (e.g. temperature, humidity... inside the cavity), covered by [H05B 6/687](#) and [H05B 6/6447](#).

[H05B 6/686](#) deals with circuits comprising a signal generator and power amplifier, e.g. using solid state oscillators. Determinant is the presence of any of a power amplifier or a solid state oscillator (one implies the other).

[H05B 6/687](#) deals with circuits for monitoring or control for cooking. The general idea is solving the problem of how to bring the cooked product to a certain status. Cooking is to be understood in the broad sense, therefore meaning also simply (re-)heating food or beverages. However, it is not enough the mere mention of cooking. It must be described a method of cooking with different steps in time or upon reaching certain status based on sensors readings. Also if a method of heating a particular type

Definition statement

of food is described. [H05B 6/688](#), [H05B 6/6435](#), [H05B 6/6447](#) and [H05B 6/647](#) can be assigned in combination with [H05B 6/687](#). However [H05B 6/687](#) does not cover any of the following:

- a particular apparatus for heating a particular food product covered by [H05B 6/80](#) or [H05B 6/782](#)
- switching off upon reaching a certain status for safety reasons covered by [H05B 6/666](#)
- circuits controlling the switching of the inverter covered by [H05B 6/681](#)
- compensation of the cooking time taking account of fluctuations in the power supply, temperature in the cavity, temperature of the magnetron or age of the magnetron covered by [H05B 6/68](#).

[H05B 6/688](#) is equivalent to [H05B 6/687](#) but for the case of thawing.

[H05B 6/70](#) deals with feed lines. This means the special way of providing microwave radiation to the load (not provided for in the sub-classes), like: application of microwaves using antennas inserted in the load; application of microwaves from multiple directions and/or with different parameters (frequency, phase, power); modification of the cavity (both periodically or according to a feedback control).

[H05B 6/701](#) deals with the use of microwave applicators. It is not enough the mere mention of the word applicator (as any cavity can be called applicator, and this interpretation would be too broad). Typically for continuous movement of material (but not only). The waveguide ends with a particular shape that acts as a resonant cavity. To distinguish from the subject-matter covered by [H05B 6/6402](#), it is considered an applicator when the applicator is a resonant cavity of dimensions similar to those of the waveguide and in this sense the applicator/cavity can be considered a continuation of the waveguide or waveguides.

However, magnetrons providing microwaves directly to the cavity or only using a coaxial cable (so no waveguide) are covered by [H05B 6/70](#) or [H05B 6/702](#).

[H05B 6/702](#) takes precedence over [H05B 6/707](#) and s.gr. when coaxial cables are used in combination with waveguides.

[H05B 6/704](#) deals with the use of microwave polarisers. This includes when there is an explicit description of means for polarising the microwave radiation and also when it is described a method or apparatus where the use of polarised microwave radiation solves a technical problem.

[H05B 6/705](#) deals with the use of microwave tuning. This includes changing the phase of the microwave radiation at the point of entering the cavity. Typically a waveguide with movable parts is used to change the phase of the standing wave generated. Microwave tuning comprises also impedance matching. Also changing the frequency with the intention of obtaining minimal impedance at the input of the cavity (in a feedback loop). Also detecting / sensing / measuring the microwave radiation reflected / not adsorbed, typically to make a feedback control on the power, frequency, phase applied (also with multiple microwave sources).

[H05B 6/707](#) deals with the use of waveguides. Also when multiple waveguides are used.

However, waveguides used in combination with coaxial cables are covered by [H05B 6/702](#).

[H05B 6/72](#) deals with radiators or aerals. Also when multiple antennas are used. Antennas can receive microwaves directly from the magnetron, from a waveguide or from a coaxial cable.

[H05B 6/725](#) deals with rotatable antennas. This also includes microwave stirring devices located inside the waveguide or at the opening of a waveguide to the cavity.

[H05B 6/74](#) deals with mode transformers or mode stirrers. Stirrers are not antennas. The stirrers "only" reflect microwaves coming from the walls of the cavity. Also Cavity with moving walls or changing shape.

However, microwave stirring devices placed inside a waveguide or at the opening of a waveguide to the cavity are covered by [H05B 6/72](#).

Definition statement

[H05B 6/76](#) deals with the prevention of microwave leakage, e.g. door sealings. This includes also screens or deflectors for avoiding radiation back into the waveguide or in the magnetron. Also using dummy loads.

However, detection of microwave leakage is covered by [H05B 6/6432](#).

[H05B 6/763](#) deals with microwave radiation seals for doors.

However, mere air seals are covered by [H05B 6/6414](#).

[H05B 6/78](#) deals with arrangements for the continuous movement of material. However [H05B 6/78](#) does not cover:

- arrangements for heating fluids covered by [H05B 6/802](#)
- the invention only refers to the applicator covered by [H05B 6/701](#)

[H05B 6/782](#) deals with arrangements for the continuous movement of material wherein the material moved is food. This also includes particular apparatus for cooking / thawing a particular food product. However, [H05B 6/782](#) does not cover:

- method of cooking / Thawing a particular food product in a normal microwave oven covered by [H05B 6/687](#) and [H05B 6/688](#)
- the invention only refers to the applicator covered by [H05B 6/701](#)

[H05B 6/80](#) deals with microwave apparatus for specific applications. Also particular apparatus for cooking / Thawing a particular food product. Also special type of microwave ovens, (e.g. portable, for vehicles or with DC power supply). Also multiple cavity oven. Also microwave oven with a separate cavity functioning as toaster, eventually in combination with other relevant classes ([H05B 6/6414](#), [H05B 6/6402](#)).

However [H05B 6/80](#) does not cover:

- methods of cooking / thawing a particular food product in a normal microwave oven covered by [H05B 6/687](#) or [H05B 6/688](#)
- single cavity microwave including additionally radiating means (capable of toasting bread), covered by [H05B 6/6482](#)
- continuous movement of material covered by [H05B 6/78](#)

[H05B 6/802](#) deals with microwave apparatus for heating fluids.

[H05B 6/802](#) does not cover:

- methods of heating fluids in conventional microwave ovens covered by [H05B 6/687](#)
- documents where the invention only refers to the applicator covered by [H05B 6/701](#)

[H05B 6/806](#) deals with microwave apparatus for laboratory use. Typically it is mentioned a chemical reactor or similar. [H05B 6/806](#) takes precedence over [H05B 6/802](#).

References

Limiting references

This place does not cover:

Radiation therapy using microwaves	A61N 5/02
Joining of preformed parts by heating of plastics or substances in a plastic state	B29C 65/02

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:

Single-crystal growth by zone-melting or refining by zone-melting using heating of the molten zone by induction, e.g. hot wire technique	C30B 13/20
--	----------------------------

Informative references

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

Trolleys with heating, cooling or ventilating means	A47B 31/02
Kitchen equipment of specific material or of particular construction	A47J 36/02 , A47J 27/002
Warming devices with electrical heating means	A47J 36/2483
Heat insulated warming chambers for heating food	A47J 39/006
Melt casting nozzles with heating means	B22D 41/60
Soldering	B23K 1/002
Shrink fit tools	B23P 11/025
Joining of preformed parts by heating of plastics or substances in a plastic state	B29C 65/02
Laser engraving of inorganic materials	B41M 5/262
Removing dry paint by electrically heating	B44D 3/168
Sealing of packages by induction welding	B65B 51/227
Containers, packaging elements or packages specially adapted to be heated by microwaves	B65D 81/3446
Melting furnaces	C03B 5/021
Glass-plate processing	C03C 17/36
Heat treatment of metals or alloys	C21D 1/10 , C21D 1/42 , C21D 9/60
Refining or remelting of metals	C22B 9/003
Heating of cords using rolls	D02J 13/005
Heating of pipes	F16L 53/34
General details of cooking plates not related to the generation or transmission of heat	F24C 7/00
Transparent panels, e.g. for doors specially adapted for stoves or ranges	F24C 15/04
Tops with provisions of circulation of air	F24C 15/101
Tube through flow heaters	F24H 1/105
Furnaces, kilns, ovens or retorts and details thereof	F27B 9/067 , F27B 14/061 , F27D 11/06
Electro-photography	G03G 15/2053
Vending machines in general	G07F
Inductive couplings	H01F 38/14
Inductive transmission of power in general, not directly related to heating	H01F 38/14
For wireless supply or distribution of electric power	H02J 50/00

Special rules of classification

Usage of orthogonal indexing codes.

- Additional aspects relating to induction heating, as covered by group [H05B 6/02](#), are classified in [H05B 2206/00](#).
- Additional aspects relating to heating, as covered by [H05B 6/64](#), are classified in [H05B 2206/02](#).
- Additional aspects relating to both resistive heating and induction heating, as covered by [H05B 3/00](#) and [H05B 6/00](#), are classified in [H05B 2213/00](#).
- Additional aspects relating to resistive heating, induction heating and microwave heating, as covered by groups [H05B 3/00](#) and [H05B 6/00](#), are classified in [H05B 2214/00](#).

H05B 6/10

Induction heating apparatus, other than furnaces, for specific applications

Definition statement

This place covers:

Induction heating apparatus, other than furnaces, for specific applications.

Relationships with other classification places

Further information:

[H05B 6/101](#) relates to induction heating apparatus, other than furnaces, for local heating of metal pieces.

[H05B 6/105](#) relates to induction heating apparatus, other than furnaces, for specific applications using a susceptor.

[H05B 6/12](#) relates to induction cooking devices.

[H05B 6/14](#) relates to induction tools, e.g. nozzles, rollers, calenders.

[H05B 6/1218](#) deals with induction cooking plates with arrangements using lights for the indication of the state of the heating zones. The typical application deals with the provision of LED's on a cooking area that are switched on when the induction heating power of that cooking area is switched on.

[H05B 6/1227](#) deals with induction cooking plates specially designed for wok pans, or similar shaped pans, also wok supports specially adapted for induction cooking (facilitating magnetic field transmission, coils provided inside the support), cook-tops with wok-shaped upper surface (so substantially concave upper surface), but also cylinder surface with coils from top to bottom; wok is also called Chinese pan.

[H05B 6/1236](#) deals with induction cooking plates adapted to induce current in a coil to supply power to a device and electrical heating devices. Typically the system acts as a transformer. The heating device is provided with a secondary coil for which the induction coil of the cook-top acts as primary.

[H05B 6/1245](#) deals with induction cooking plates with special coil arrangements. The typical application deals with a particular coil material, coil shape, coil geometry, coil position within the plate or with respect to other coils.

[H05B 6/1272](#) deals with induction cooking plates with more than one coil or coil segment per heating zone. Also different concentric coils or coil segments or section with different coil distance or winding direction are provided in different planes for the same heating zone.

[H05B 6/1281](#) deals with induction cooking plates with flat coils. This means that the coil as a whole is constructed in a flat distribution; the coil conductor can, however, present a non-flat section. The typical application deals with coils particularly designed to be a small total thickness, normally by

printing a conductor on a substrate or by having a thin conductor embedded in a substrate. The flatness of the conductor used for the coil is not relevant.

[H05B 6/129](#) deals with induction ovens. These are domestic appliances similar to kitchen ovens wherein the heating means include at least an induction coil (possibly, in addition to any of the traditional heating means resistance heating, microwave heating, convection heating), and also induction heated trolleys, for catering, for example in airplanes. This class applies to cooking, de-freezing, warming, heat treating and re-heating appliances (the temperature achieved is unimportant).

References

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:

Heating arrangements specially adapted for cooking plates	H05B 3/68
Soldering by means of induction heating	B23K 1/002
Joining of preformed parts by induction heating of plastics or substances in a plastic state	B29C 65/32
Heat treatment of metals or alloys by induction heating, surface hardening by electric induction, induction heating, continuous furnaces with induction heating	C21D 1/10 , C21D 1/42 , C21D 9/60

Informative references

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

Induction heating with coil arrangements	H05B 6/36
Melting furnaces for glass; mineral or slag wool by induction heating	C03B 5/021
Refining or remelting of metals by induction	C22B 9/003
Furnaces, kilns, ovens or retorts and details thereof	F27B 9/067 , F27B 14/061 , F27D 11/06
Inductive transmission of power in general, not directly related to heating	H01F 38/14
For wireless supply or distribution of electric power using inductive coupling	H02J 50/10

H05B 7/00

Heating by electric discharge (plasma torches [H05H 1/26](#))

Definition statement

This place covers:

Details about the electrodes of electric discharge heating apparatus, including mounting of the electrodes, electrical and mechanical connections. Also methods of supplying current and controlling power in electric discharge apparatus. Also heating by glow discharge and heating by arc discharge.

Further information:

[H05B 7/02](#) - [H05B 7/09](#) cover details of the electrodes

[H05B 7/10](#) - [H05B 7/14](#) cover details about how electrodes are mounted or connected

[H05B 7/148](#) - [H05B 7/156](#) cover power supplies for heating by electric discharge

[H05B 7/16](#) covers heating by glow discharge

[H05B 7/18](#) - [H05B 7/225](#) cover heating by arc discharge

References

Limiting references

This place does not cover:

Plasma torches	H05H 1/26
----------------	---------------------------

Informative references

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

Soldering or welding; cutting by applying heat locally	B23K
Automatic feeding of electrodes for spot or seam welding or cutting	B23K 9/12
Electric furnaces	F27B 3/08
Details or accessories of furnaces	F27D
Disposition of electrodes in or on furnaces	F27D 11/10
Control of position in general	G05D 3/00
Regulating electric characteristics of arcs in general	G05F 1/02
Regulating electric power in general	G05F 1/66
Non-insulated conductors or conductive bodies in general	H01B 5/00
Insulated conductors or cables in general	H01B 7/00
Electron beam or ion beam tubes for localised treatment of objects	H01J 37/30
Gas-filled discharge tubes	H01J 37/32
Electric power networks; Circuit arrangements or systems for supplying or distributing electric power; Systems for storing electric energy	H02J
Electric power conversion	H02M

H05B 7/225

{by arc image}

Definition statement

This place covers:

Indirect Radiation from the arc is focused (e.g. by an ellipsoidal mirror) into a projection on a work being heated.

References

Informative references

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

Heating by means of lamps	H05B 3/0033
Spot arc welding	B23K 9/007
Investigating particle size or size distribution using imaging, e.g. a projected image of suspension; using holography	G01N 15/0227

Imaging characterized by its optical setup	G01N 2015/144
Reflectors or mirrors with curved faces	G02B 5/10
Gratings for image generation	G02B 5/1842
Optical details of the image generation	G02B 21/0052
Details of the optical system between the polygonal mirror and the image plane	G02B 26/125
Regulating electric characteristics of arcs	G05F 1/02

H05B 11/00

Heating by combined application of processes covered by two or more of groups [H05B 3/00](#) - [H05B 7/00](#) ([H05B 7/20](#) takes precedence)

Definition statement

This place covers:

Heating by combined application of ohmic heating, induction heating, dielectric heating or electric discharge heating.

References

Limiting references

This place does not cover:

Aspects related to microwave heating combined with other heating techniques	H05B 6/647
---	----------------------------

Informative references

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

Bakers' ovens; machines or equipment for baking	A21B
Industrial microwave ovens	A23L 5/10
Characteristic features of footwear; parts of footwear	A43B
Heated mirrors	A47G 1/00
Kitchen equipment; coffee mills; spice mills; apparatus for making beverages	A47J
Dentistry	A61C
Methods or apparatus for sterilising materials	A61L
Chemical or physical processes	B01J
Soldering or welding; cutting by applying heat locally	B23K
Shaping or joining of plastics	B29C
Vehicle heating	B60H
Car seats	B60N
Heated mirrors for cars	B60R 1/0602
Heated windshield window (car) / heated rear window (car)	B60S 1/00
Helicopters de-icing	B64C

Informative references

Airplane wings de-icing	B64D
Containers for storage or transport	B65D
Pop corn heating	B65D 81/3469
Nanotechnology	B82Y
Carbon nanotubes	C01B 32/15
Ceramics	C04B
Adhesives	C09J 4/00
Heat treatment of metals or alloys	C21D
Metal-spraying	C23C 4/00
Heating of sport playgrounds	E01C 13/02
Cleaning open waters, e.g. deicing	E02B 15/00
Roofs de-icing	E04D 13/00
Devices for securing together constructional elements or machine parts	F16B 1/00
Pipes; joints or fittings for pipes; supports for pipes or cables	F16L
Glow plugs	F23Q 7/001
Electrical cooker / glow plug / gas cooker	F24C
Removal of fumes associated to cooking range (or microwave ovens)	F24C 15/2042
Domestic- or space-heating systems e.g. central heating	F24D
Fluid heaters	F24H
Drying solid materials or objects by removing liquid there from	F26B
Electric furnaces	F27B 3/08
Details or accessories of furnaces	F27D
Electrography; electrophotography; magnetography	G03G
Controlling non-electric variables	G05D
Controlling electric or magnetic variables	G05F
Resistors; methods of production	H01C 7/00
Electric switches	H01H
Aerials	H01Q
Connectors	H01R
Removing snow from cables	H02G 7/16
Electric power conversion	H02M
Printed circuits	H05K 1/00
Semiconductor devices; methods of production	H10

H05B 31/00

Electric arc lamps (regulating electric characteristics of arcs [G05F 1/02](#))

Definition statement

This place covers:

Lamps where an arc is established through air or a gas mixture using consumable electrodes (for example carbon rods).

References

Limiting references

This place does not cover:

Regulating electric characteristics of arcs	G05F 1/02
Electric arc lamps with non-consumable electrodes	H01J 61/00

Informative references

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

Circuit for gas discharge lamps	H05B 41/00
Electric lighting	F21
Electric discharge tubes or discharge lamps	H01J
Electric arc lamps with non-consumable electrodes	H01J 61/00

Special rules of classification

[G05F 1/02](#) with non-consumable electrodes [H01J 61/00](#)

Circuit for gas discharge lamps in [H05B 41/00](#)

H05B 33/00

Electroluminescent light sources

Definition statement

This place covers:

- Structural details of electroluminescent light sources
- Chemical elements, chemical compositions or chemical compounds capable of emitting light
- Circuit arrangements for driving said electroluminescent sources.

References

Informative references

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

Luminescent scales or hands	G01D 13/20 , G01D 13/28
Luminescent dials	G09F 13/20
Conductive layers on isolated substrate	H01B 1/00
Discharge lamps	H01J 61/00 - H01J 65/00

Lasers	H01S 3/00 , H01S 5/00
Pulse generation with electroluminescent elements	H03K 3/00
Electronic gates with electroluminescent elements	H03K 17/78
Semi-conductor devices with at least one particular jump barrier or surface barrier adapted for light emission	H10H 20/00 , H10H 29/00
Organic light emitting devices	H10K 59/00 , H10K 50/00

H05B 33/10

Apparatus or processes specially adapted to the manufacture of electroluminescent light sources

References

Limiting references

This place does not cover:

Luminescent materials	C09K 11/00
-----------------------	----------------------------

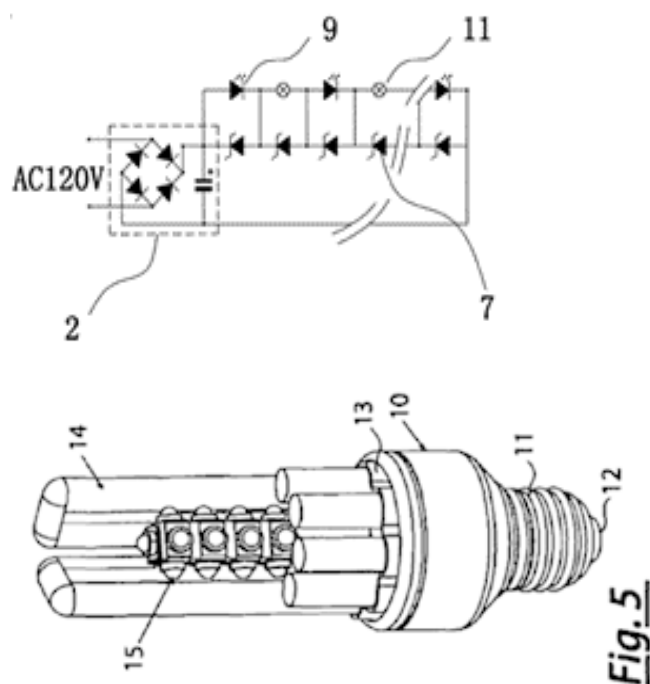
H05B 35/00

Electric light sources using a combination of different types of light generation

Definition statement

This place covers:

Circuits and apparatus for driving two dissimilar light sources, e.g. diverse light sources or light generators, e.g. a compact fluorescent lamp and LEDs (see illustrations below)



The two dissimilar light sources must be in the same casing or form a single unit

Definition statement

This group is meant for two types of light sources used simultaneously. Phosphors or different coloured LEDs are not to be considered as dissimilar light sources for the purpose of this group.

References

Informative references

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

Circuit arrangements or apparatus for operating incandescent light sources	H05B 39/00
Circuit arrangements or apparatus for igniting or operating discharge lamps, e.g. fluorescent lamps	H05B 41/00
Driving electroluminescent panels	H05B 44/00
Circuit arrangements for operating light emitting diodes [LED]	H05B 45/00
Circuit arrangements for electric light sources in general	H05B 47/00
Lighting in general	F21
Luminaries and their mechanical construction, e.g. combination of light sources	F21Y 2113/00
Gas-discharge or vapour-discharge lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope.	H01J 61/96
Electric incandescent lamps	H01K
Circuit arrangements for emergency or stand-by power supply with automatic change-over	H02J 9/06

Special rules of classification

In case of failure of the lamp, circuits providing for substitution: [H05B 41/46](#).

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

LED	Light emitting diode
OLED	Organic Light emitting diode
CCFL	Cold Cathode Fluorescent lamp
CFL	Compact Fluorescent lamp
HID	High Intensity discharge lamp
HPS	High Pressure lamp

H05B 39/00

Circuit arrangements or apparatus for operating incandescent light sources (structurally associated with the incandescent lamps [H01K 1/62](#))

Definition statement

This place covers:

Circuit arrangements for controlling the light intensity of incandescent lamps.

References

Informative references

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

Regulating electric variables, e.g. voltage or current	G05F
Incandescent lamps per se	H01K
Switching power supplies and inverters	H02M
Switching in general	H03K

H05B 39/04

Controlling

References

Informative references

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

Regulating electric variables in general	G05F
--	----------------------

H05B 41/00

Circuit arrangements or apparatus for igniting or operating discharge lamps (structurally associated with the discharge lamps [H01J 61/54](#), [H01J 61/56](#))

Definition statement

This place covers:

Circuit arrangements, e.g. drivers, for discharge lamps.

References

Informative references

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

Arc lamps with consumable electrodes	H05B 31/00
Welding using accumulated energy	B23K 11/24
Electric lighting	F21
Transformers or chokes for supplying discharge lamps	H01F 38/08
Circuit elements structurally associated with discharge lamps	H01J 7/44 , H01J 19/78
Discharge lamps per se	H01J 61/00 – H01J 65/00
Discharge lasers	H01S 3/00
Pulse technique	H03K
PCBs in general	H05K

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

DDBL	Dielectric Barrier Discharge Lamp
CCFL	Cold cathode fluorescent Lamp
CFL	Compact Fluorescent Lamp
HID	High Intensity Discharge
HPL	High Pressure Lamp
HPS	High Pressure Sodium

H05B 41/04

Starting switches

References

Informative references

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

Switches in general	H01H
Igniting arrangements for discharge lamps	H01J 7/30 , H01J 17/30 , H01J 61/54

H05B 41/30

in which the lamp is fed by pulses, e.g. flash lamp

References

Informative references

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

Welding using accumulated energy	B23K 11/24
Circuit arrangements for gas discharge lasers	H01S 3/097
Electrical pulse generators with charge and discharge of an accumulating element	H03K 3/53

H05B 44/00

Circuit arrangements for operating electroluminescent light sources (for operating light emitting diodes [H05B 45/00](#))

Definition statement

This place covers:

Circuits for driving electroluminescent panels.

References

Limiting references

This place does not cover:

Circuit arrangements for operating light emitting diodes	H05B 45/00
--	----------------------------

Informative references

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

Circuit arrangements or apparatus for operating discharge lamps, e.g. fluorescent tubes	H05B 41/00
Control of light sources general	H05B 47/00
Electric lighting	F21
Control arrangements or circuits for displays	G09G 3/00
Control arrangements or circuits for electroluminescent panels	G09G 3/30
Laser	H01S 3/00 , H01S 5/00
Switching power supplies in general and inverters	H02M
Printed circuits [PCBs]; Details of electric apparatus, e.g. heatsinks	H05K
Inorganic light emitting devices [LED]	H10H 20/00
Organic light emitting devices [OLED]	H10K 99/00

Special rules of classification

- Control of white light is classified in the colour section [H05B 45/20](#) and subgroups.

H05B 45/00

Circuit arrangements for operating light-emitting diodes [LED]

Definition statement

This place covers:

Time switching, focus/target/beam control, LED flashes, LEDs as sensors, power saving aspects, shift registers control (simple sequences), emergency lights (when no other aspect is more relevant).

- Circuit arrangements for operating organic or inorganic light emitting diodes.

Relationships with other classification places

Circuit arrangements specially adapted or designed for operating light emitting diodes are classified in [H05B 45/00](#), whereas circuit arrangements for operating light sources in general, i.e. where the type of the light source is not relevant, are classified in [H05B 47/00](#), which is the corresponding function-oriented place.

References

Informative references

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

Controlling of light sources in general	H05B 47/10
Controlling in response to parameters	H05B 47/105

Controlling by the ambient light	H05B 47/11
Control using timing means	H05B 47/16
Control using data bus linked networks	H05B 47/18
Control using power line carrier linked networks	H05B 47/185
Control using wireless networks	H05B 47/19
Arrangements or circuits for vehicle lighting devices	B60Q
Arrangements or circuits for control of indicating devices using static means to present variable information	G09G
Control arrangements or circuits for displays using light-emitting diodes [LED]	G09G 3/32
Control arrangements or circuits for displays using organic light-emitting diodes [OLED]	G09G 3/3208
Arrangements or circuits for control of laser diodes not provided for lighting	H01S 5/00
Solid state devices specially adapted for light emission including an organic material in the active part of the devices, e.g. organic light-emitting diodes [OLED]	H10K 50/00

Special rules of classification

When classifying in [H05B 45/00](#), further classification is made in [H05B 47/00](#), for aspects, which are not lamp specific, whenever appropriate.

H05B 45/14

using electrical feedback from LEDs or from LED modules

Definition statement

This place covers:

Controlling the intensity of the light using electrical feedback from LEDs or from LED-modules, e.g. involving detection of electric parameters.

H05B 45/18

using temperature feedback

Definition statement

This place covers:

Controlling the intensity of the light in response to the signal of a temperature sensor, e.g. for derating.

H05B 45/20

Controlling the colour of the light

Definition statement

This place covers:

Transformations or calculations in a colour space, e.g. in the CIE colour space, to control the colour of the emitted light.

H05B 45/24**using electrical feedback from LEDs or from LED modules****Definition statement***This place covers:*

Controlling the colour of the light using electrical feedback from LEDs or from LED-modules, e.g. involving detection of load characteristics.

H05B 45/30**Driver circuits****Definition statement***This place covers:*

Circuits for supplying driving voltages or currents to LEDs, e.g. impedance circuits or active circuits.

References**Informative references**

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

DC/DC or AC/DC conversion	H02M
Light or sound activated switches	H03K 17/94

H05B 45/305**Frequency-control circuits****Definition statement***This place covers:*

Circuits for supplying driving voltage or driving current of LEDs by controlling the operating frequency of a switching device.

H05B 45/31**Phase-control circuits****Definition statement***This place covers:*

Details of circuits providing leading edge phase control, e.g. triac circuits.

References**Informative references**

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

Bleeder circuits or dummy loads	H05B 45/3575
---------------------------------	------------------------------

H05B 45/315**Reverse phase-control circuits****Definition statement**

This place covers:

Details of circuits providing trailing edge phase control, e.g. AC switch circuits.

Synonyms and Keywords

In patent documents, the following words/expressions are often used with the meaning indicated:

Reverse phase control	Trailing edge phase control
-----------------------	-----------------------------

H05B 45/32**Pulse-control circuits****References****Informative references**

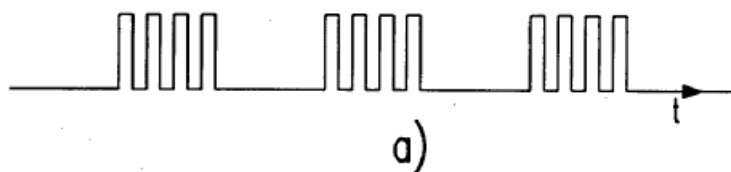
Attention is drawn to the following places, which may be of interest for search:

Power conversion	H02M 3/00
------------------	---------------------------

H05B 45/327**Burst dimming****Definition statement**

This place covers:

Driver circuits generating bursts of pulses, e.g. interrupted pulse trains, for dimming.

**H05B 45/347****Dynamic headroom control [DHC]****Glossary of terms**

In this place, the following terms or expressions are used with the meaning indicated:

Dynamic Headroom Control [DHC]	The term Dynamic Headroom Control refers to the dynamic adjustment of a LED power supply voltage to the lowest level that is sufficient to maintain correct operation of the current sources that supply the LED(s), thereby minimising wasteful power dissipation in the current sources.
--------------------------------	--

H05B 45/35**Balancing circuits****Definition statement***This place covers:*

Circuits for equalising the currents through a plurality of LEDs or strings of LEDs arranged in parallel.

H05B 45/357**specially adapted for retrofit LED light sources****Definition statement***This place covers:*

Driver circuits for LED retrofit light sources, i.e. LED light sources that directly replace incandescent bulbs and discharge lamps.

H05B 45/3575**by means of dummy loads or bleeder circuits, e.g. for dimmers****Definition statement***This place covers:*

Circuits to maintain dimmer operation by the use of bleeder circuits or dummy loads.

References**Informative references**

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

Phase control circuits	H05B 45/31
------------------------	----------------------------

H05B 45/3578**Emulating the electrical or functional characteristics of discharge lamps****Definition statement***This place covers:*

Emulating the electrical or functional characteristics of discharge lamps, e.g. emulating the presence of a discharge lamp by emulating filament resistance, ignition or lamp impedance.

H05B 45/3725**Switched mode power supply [SMPS]****Definition statement***This place covers:*

Cuk or SEPIC – converter structures

H05B 45/382**with galvanic isolation between input and output****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Circuits containing an inverter bridge	H05B 45/39
--	----------------------------

H05B 45/397**Current mirror circuits****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

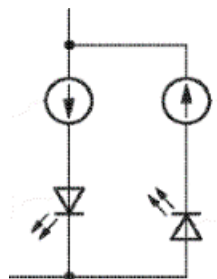
Balancing circuits	H05B 45/35
--------------------	----------------------------

H05B 45/40**Details of LED load circuits****Definition statement***This place covers:*

LED load circuits without active control in the LED matrix, other than in anti-parallel arrangements.

H05B 45/42**Antiparallel configurations****Definition statement***This place covers:*

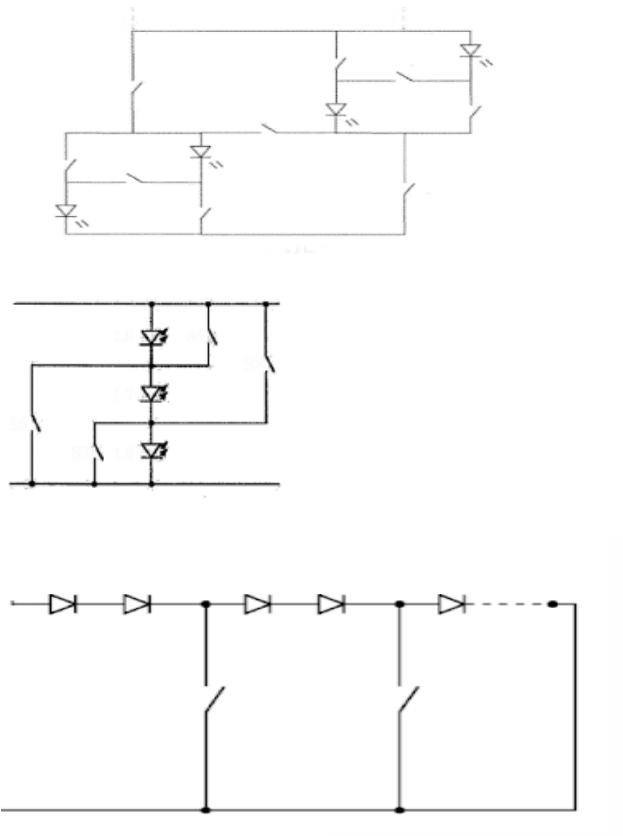
LED load circuits without active control in the LED matrix, in antiparallel arrangements



H05B 45/44
with an active control inside an LED matrix

Definition statement

This place covers:
LED load circuits with active control inside the LED matrix, wherein the control switches are active devices.



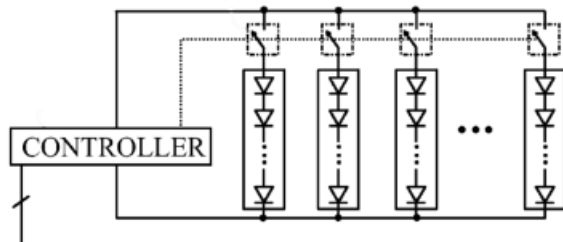
Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

LED matrix with active control	An arrangement of LEDs and switches, whereby some of the LEDs may be switched into a series or a parallel configuration.
--------------------------------	--

H05B 45/46**having LEDs disposed in parallel lines****Definition statement***This place covers:*

LED load circuits having a plurality of LED branches disposed in parallel with respect a power source, each branch comprising at least one LED and one control element arranged in series.



RGBs, current mirroring, active current balancers, minimum voltage selectors, in general when the parallel branches are gated for some purpose.

Special rules of classification

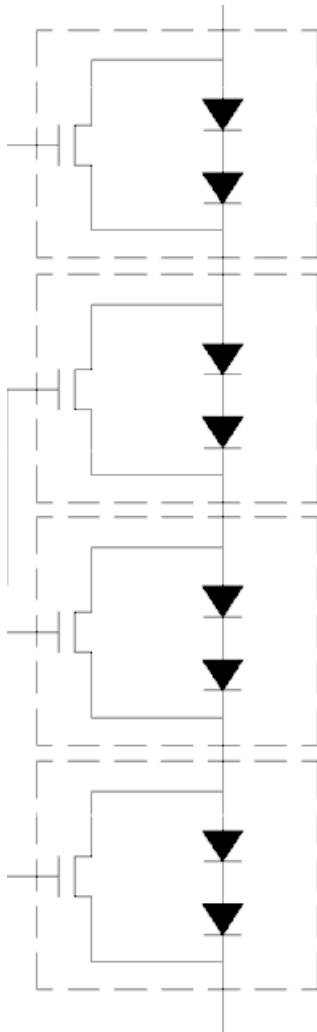
This symbol should be given as INV when the invention relates to the load configuration.

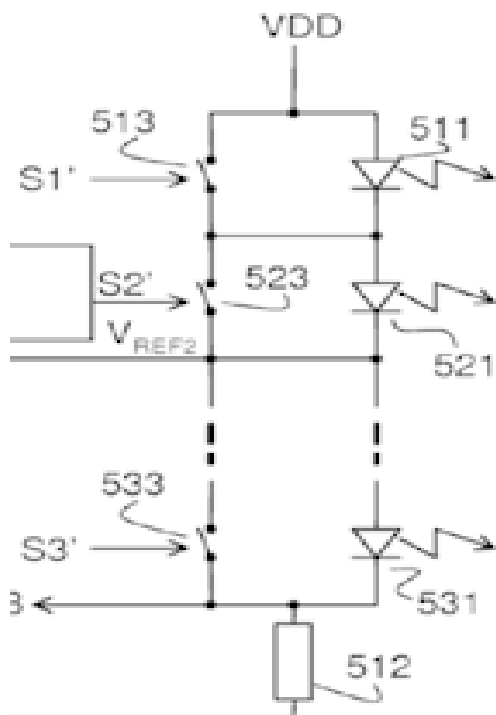
This symbol should be given as ADD when a load matching the definition can be observed in the document, but it is not the subject-matter of the invention or no details of it are provided.

H05B 45/48**having LEDs organised in strings and incorporating parallel shunting devices****Definition statement***This place covers:*

LED load circuits having a plurality of LEDs units arranged in series with respect to a power source, each unit composed by at least one LED and one control element connected in parallel to the LEDs, e.g. a switch, transistor, MOSFET, Zener diode or resistor.

Examples:





Typical problems appearing in the documents with this symbol are: accommodation of potential in a chain of series-connected LEDs, adaptation of the number of LEDs to various supplied voltages.

Special rules of classification

This symbol should be given as INV when the invention relates to the load configuration.

This symbol should be given as ADD when a load matching the definition can be observed in the document, but it is not the subject matter of the invention or no details of it are provided.

H05B 45/50

responsive to malfunctions or undesirable behaviour of LEDs; responsive to LED life; Protective circuits

References

Informative references

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

Circuit arrangements responsive to malfunctions of light sources or light sources life in general; Protective circuits of light sources in general	H05B 47/20
Monitoring vehicle lamps	B60Q 11/00
Changing to a reserve source of current	H02J 9/00

H05B 45/52**in a parallel array of LEDs****Definition statement**

This place covers:

Circuits preventing general failure in case of a short circuit of at least one element of the array

References**Informative references**

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

LED matrixes disposed in parallel lines	H05B 45/46
---	----------------------------

H05B 45/54**in a series array of LEDs****Definition statement**

This place covers:

Circuits preventing general failure in case of an open circuit of at least one element of the array.

References**Informative references**

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

LED matrixes organized in strings and incorporating parallel shunting devices	H05B 45/48
---	----------------------------

H05B 47/00**Circuit arrangements for operating light sources in general, i.e. where the type of light source is not relevant****Definition statement**

This place covers:

- The Internet of Things (IoT) applied to lighting
- The response to the presence or movement of objects or living beings
- The response to the environment luminance
- Program control or Logic control
- Remote control
- The response to malfunctions
- The monitoring of light source life
- The protection circuits or methods

Relationships with other classification places

Relative to the application-oriented places [H05B 39/00](#), [H05B 41/00](#), [H05B 45/00](#) and [H05B 46/00](#), [H05B 47/00](#) is the function-oriented place, where the type of the light source is not relevant or it is in common use.

References

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:

Circuit arrangements or apparatus for operating incandescent light sources and not adapted to a particular application	H05B 39/00
Circuit arrangements or apparatus for igniting or operating discharge lamps	H05B 41/00
Circuit arrangements for operating light emitting diodes [LED]	H05B 45/00
Circuit arrangements for light sources using a charge of combustible material	H05B 46/00

Informative references

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

Wake-up lights	A61M 21/02
Radiation therapy	A61N 5/00
Colour music	A63J 17/00
Vehicle lights	B60L 1/14 , B60Q
Monitoring vehicle lamps	B60Q 11/00
Railways light signals	B61L
Lighting for photographic purposes	G03B 15/02
Time controlled switching	G04 , H01H , H03K
Building automation systems	G05B 15/02
Blinds or shutters	G05D 25/00
Regulating electric variables, e.g. voltage or current	G05F
Illuminated switch circuits	G08B , G08C , H02B 15/00
Traffic lights	G08G 1/00
Advertising	G09F
Light or sound activated switches	H03K 17/00
Transmission of digital information	H04L

Special rules of classification

In this group, multiple classification is applied, so that subject matter characterized by aspects covered by more than one of its subgroups, which is considered to represent information of interest for search, may also be classified in each of those subgroups.

H05B 47/115**by determining the presence or movement of objects or living beings****Definition statement***This place covers:*

Controlling the light source in response to the presence or movement of objects or living beings, e.g. by radar or ultrasound.

H05B 47/12**by detecting audible sound****Definition statement***This place covers:*

Controlling the light source in response to the presence or movement of objects or living beings by detecting audible sound, e.g. speech or voice commands.

H05B 47/125**by using cameras****Definition statement***This place covers:*

Controlling the light source in response to the presence or movement of objects or living beings using a camera, e.g. for gesture or traffic recognition.

H05B 47/135**by determining the type of light source being controlled (electrical parameters of light source being controlled [H05B 47/14](#))****Definition statement***This place covers:*

Recognition of the type of lamp by determining non-electrical parameters, e.g. reading a lamp type identifier or label.

References**Limiting references***This place does not cover:*

Electrical parameters of light source being controlled	H05B 47/14
--	----------------------------

H05B 47/14**by determining electrical parameters of the light source****Definition statement***This place covers:*

Controlling the light source by determining electrical characteristics of the light source, e.g. voltage, current or power; e.g. universal ballast.

H05B 47/155**Coordinated control of two or more light sources****Definition statement***This place covers:*

Dynamic and interrelated control of two or more light sources, e.g. of their on/off pattern; e.g. gaming lighting.

H05B 47/16**by timing means****Definition statement***This place covers:*

Controlling the light source by timing means, e.g. circadian lights, timed lights or burglary deterrent circuits.

References**Informative references**

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

Time-controlled switching in general	G04 , H01H , H03K
Identifying, scaring or incapacitating burglars	G08B 15/00

H05B 47/165**following a pre-assigned programmed sequence; Logic control [LC]****Definition statement***This place covers:*

Controlling the light source on the basis of stored or streamed data, in e.g. theatre lighting or ambilight.

H05B 47/17

Operational modes, e.g. switching from manual to automatic mode or prohibiting specific operations

Definition statement

This place covers:

- Controlling operational modes of a light source, e.g. switching between manual and automatic modes
- Selectively permitting or prohibiting operations according to circumstances, e.g. preventing a street lamp from being lit during daylight, or a flashlamp from operating when there is sufficient light
- Configuration or calibration modes, switching from manual to automatic mode or prohibiting specific operations

H05B 47/18

via data-bus transmission

Definition statement

This place covers:

Controlling the light source via data-bus transmission, e.g. DALI or DMX.

References

Informative references

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

Current supply arrangements for data switching networks, e.g. power over Ethernet	H04L 12/10
---	----------------------------

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

DALI	Digital Addressable Lighting Interface
DMX	Digital Multiplex
PoE	Power over Ethernet

H05B 47/187

{using power over ethernet [PoE] supplies}

Definition statement

This place covers:

Circuit arrangements for controlling light sources by remote control using power over ethernet supplies.

USB operations (power and control) are also classified in this group.

H05B 47/19**via wireless transmission****Definition statement**

This place covers:

Controlling the light source via wireless transmission, e.g. RF or ZigBee.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

RF	Radio Frequency
----	-----------------

H05B 47/195**the transmission using visible or infrared light****Definition statement**

This place covers:

Controlling the light source via wireless transmission using visible or infrared light, e.g. Li-Fi

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

LIFI or Li-Fi	Light Fidelity
---------------	----------------

H05B 47/197**{Sound control or voice control}****Definition statement**

This place covers:

Circuit arrangements for controlling light sources by remote control via wireless transmission using sound or voice control.

Configuration or calibration modes, switching from manual to automatic mode or prohibiting specific operations are classified in this group.

H05B 47/1975**{Gesture control}****Definition statement**

This place covers:

Circuit arrangements for controlling light sources by remote control via wireless transmission using gesture control.

The gestures being captured by cameras or touch pads or using wearable sensing devices are classified in this group.

H05B 47/20**Responsive to malfunctions or to light source life; for protection****Definition statement**

This place covers:

- Monitoring for malfunctions such as earth faults.
- Protection of circuits when malfunctions of light sources occur, e.g. short circuits or open circuits.
- Control circuits and techniques responsive to ageing or degradation of the light source.

References**Informative references**

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

Monitoring vehicle lamps	B60Q 11/00
Circuit arrangements for emergency or stand-by power supply, e.g. changing to a reserve source of current	H02J 9/00