

H05B

ELECTRIC HEATING; ELECTRIC LIGHTING NOT OTHERWISE PROVIDED FOR (apparatus for special application, see the relevant places, e.g. [A47J](#), [C21](#), [C22](#), [C23](#), [F21](#), [F24](#), [F27](#))

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.

Not only the electric elements and circuitry designs are covered by this subclass but also the electric aspects of their arrangement, where these concern cases of general application. Where heating elements are used in specific applications, please see the relevant subclasses.

Electric lighting:

- Electric arc lamps, electroluminescent light sources and light sources using a combination of different types of light generation;
- Circuit arrangements for electric light sources.

The primary circuits of the above light sources and the elements themselves of the circuits are covered by this subclass. The above light sources when combined with light sources of a different kind are also covered by this subclass.

Relationships with other classification places

- Electric heating:

Uses of electric heat sources, or apparatus incorporating such heat sources, are too numerous to mention and cover all possible areas of technology. Examples of places where such uses or apparatus could be found include [A47J](#) (domestic cooking); [B21J](#), [B21K](#) (forging by heat); [C21](#), [C22](#), [C23](#) (metallurgy); [F24](#) (domestic heating and stoves); [F27](#) (furnaces and ovens). See also the references below.

- Electric lighting:

Uses of electric light sources are also too numerous to mention and cover all possible areas of technology.

Class [F21](#) covers the material arrangement of the various electric 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, electric or otherwise.

References

Limiting references

This place does not cover:

Regulating electric characteristics of arcs in general	G05F 1/02
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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 or cooling appliances for medical or therapeutic treatment	A61F 7/00
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Heating by electric, magnetic or electromagnetic fields for therapeutic purposes	A61N 5/00
Joining of preformed parts by heating of plastics or substances in a plastic state	B29C 65/02
Thermally-actuated switches	H01H 37/00
Electron beam or ion beam tubes for localised treatment of objects	H01J 37/30

References out of a residual place

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

Electric lighting	Numerous areas of technology, e.g. F21 .
Electric discharge tubes	H01J
Electric discharge lamps	H01J 61/00 - H01J 65/00
Electric incandescent lamps	H01K
Semiconductor devices with at least one particular jump barrier or surface barrier, specially adapted for light emission	H01L 27/15 , H01L 33/00
Organic light emitting devices (OLED)	H01L 27/32 , H01L 51/50
Stimulated-emission devices	H01S
Plasma torches	H05H 1/26

Informative references

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

Measuring of temperature by colorimeter	G01J
Control of temperature in general	G05D 23/00
Regulating electric power in general	G05F 1/66

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.

Further information:

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

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

References

Limiting references

This place does not cover:

Control of induction heating devices	H05B 6/06
Control of electric discharge heating devices	H05B6/148
Control of microwave heating devices	H05B 6/68
Control of temperature in general	G05D 23/00
Thermally-actuated switches	H01H 37/00

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
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
Semiconductor devices; methods of production	H01L
Aerials	H01Q
Connectors	H01R
Removing snow from cables	H02G 7/16
Electric power conversion	H02M
Printed circuits	H05K 1/00

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 will according to the resistivity of the material will dissipate energy in form of heat.

According with this type of generation of heat, the heat can be generated in the same object that needs to be heated, or otherwise the heat has to be transferred to the object that needs to be heated by 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

References

Limiting references

This place does not cover:

Electric cigarettes	A24F 47/008
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
Electric conductive compositions characterised by PTC or NTC resistance, per se	H01C 7/02 , H01C 7/04
Electric discharge tubes or discharge lamps	H01J
Apparatus for thermal treatment of semiconductor or solid-state devices or of parts thereof	H01L 21/67
Connectors	H01R

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
Semiconductor devices; methods of production	H01L
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

H05B 6/00

Heating by electric, magnetic, or electromagnetic fields (for therapeutic purposes [A61N 5/00](#); joining of preformed parts by heating of plastics or substances in a plastic state [B29C 65/02](#))

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.

[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](#).

[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 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 aerials. 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](#).

[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:

For therapeutic purposes	A61N 5/00
Soldering	B23K 1/002
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	B44D 3/168
Sealing of packages	B65B 51/227
Containers, packaging elements or packages specially adapted to be heated by microwaves	B65D 81/3446
Melting furnaces	C03B 5/021
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 pipes	F16L 53/34
General details of cooking plates not related to the generation or transmission of heat	F24C 7/00
Tube through flow heaters	F24H 1/105
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
Battery chargers using inductive or capacitive power transmission	H02J 7/025

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 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
Shrink fit tools	B23P 11/025
Glass-plate processing	C03C 17/36
Induction heating of molten crystal zone	C30B 13/20
Heating of cords using rolls	D02J 13/005
Doors specially adapted for stoves or ranges	F24C 15/02
Sealings for doors or transparent panels (for doors specially adapted for stoves or ranges)	F24C 15/021
Latches (for doors specially adapted for stoves or ranges)	F24C 15/022

Mounting of doors, e.g. hinges, counterbalancing (for doors specially adapted for stoves or ranges)	F24C 15/023
Handles (for doors specially adapted for stoves or ranges)	F24C 15/024
Transparent panels (for doors specially adapted for stoves or ranges)	F24C 15/04
Tops with provisions of circulation of air	F24C 15/101
Electro-photography	G03G 15/2053
Vending machines in general	G07F
Coils in general	H01F 5/00
Inductive couplings	H01F 38/14
Waveguides; resonators, lines, or other devices of the waveguide type	H01P
Inductive charging batteries from ac mains by converters	H02J 7/025

Glossary of terms

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

Chinese Pan	wok
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H05B 7/00

Heating by electric discharge (electron beam or ion beam tubes for localised treatment of objects [H01J 37/30](#); 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:

Electron beam or ion beam tubes for localised treatment of objects	H01J 37/30
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
Gas-filled discharge tubes	H01J 37/32
Circuit arrangements for supplying electric power in general	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
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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
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
Semiconductor devices; methods of production	H01L
Aerials	H01Q
Connectors	H01R
Removing snow from cables	H02G 7/16
Electric power conversion	H02M
Printed circuits	H05K 1/00

H05B 31/00

Electric arc lamps (regulating electric characteristics of arcs [G05F 1/02](#); with non-consumable electrodes [H01J 61/00](#))

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:

Luminaries and their mechanical construction	F21
Regulating electric characteristics of arcs	G05F 1/02

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 (discharge lamps [H01J 61/00](#) - [H01J 65/00](#); semi-conductor devices with at least one particular jump barrier or surface barrier adapted for light emission [H01L 27/15](#), [H01L 33/00](#); organic light emitting devices [H01L 27/32](#), [H01L 51/50](#); lasers [H01S 3/00](#), [H01S 5/00](#); compositions per se, see the relevant subclasses; {luminescent scales or hands [G01D 13/20](#), [G01D 13/28](#); luminescent dials [G09F 13/20](#); conductive layers on isolated substrate [H01B 1/00](#); solid state image amplifiers [H01L 31/14](#); electronic gates with electroluminescent elements [H03K 17/78](#); pulse generation with electroluminescent elements [H03K 3/00](#)})

Definition statement

This place covers:

Elements, compositions, chemical compounds capable of emitting light and circuit arrangements for driving said sources.

References

Limiting references

This place does not cover:

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
Semi-conductor devices with at least one particular jump barrier or surface barrier adapted for light emission	H01L 27/15 , H01L 33/00
Organic light emitting devices	H01L 27/32 , H01L 51/50
Solid state image amplifiers	H01L 31/14
Lasers	H01S 3/00 , H01S 5/00
Pulse generation with electroluminescent elements	H03K 3/00
Electronic gates with electroluminescent elements	H03K 17/78

Special rules of classification

The sub-range [H05B 33/08](#) dealing with electronics has to be circulated to and classified separately in [H05B 33/08](#).

OLED's have to be circulated to [H01L 51/00](#).

Inorganic LED have to be circulated to [H01L 25/00](#), [H01L 27/00](#), [H01L 33/00](#)

Other aspects of semiconductor have to be circulated to the appropriate classes, mainly in [H01L](#).

H05B 33/08

Circuit arrangements not adapted to a particular application

Definition statement

This place covers:

Circuits for driving Electroluminescent panels, Light Emitting Diodes, Organic Light Emitting Diodes

Relevant documentation for LED/OLED colour control, optics: see SPIE digital library (www.spie.org)

Relevant documentation for Organic LEDs is to be found mainly in then on patent literature

References

Limiting references

This place does not cover:

Chemistry of Luminescent materials	H05B 33/00
Control of light sources general	H05B 37/00
Drivers for Fluorescent Lamps	H05B 41/00
Physical arrangement of lamp components and construction aspects	F21
Displays	G09G 3/00
LED fabrication and semiconductor	H01L 25/00 , H01L 27/00 , H01L 33/00
Lasers	H01S 3/00 , H01S 5/00
Switching power supplies in general and inverters	H02M
Heat sinks and PCBs	H05K

Special rules of classification

- Control of white light is classified in the colour section [H05B 33/0857](#) and subgroups.
- See also attached classification document [H05B_Bible](#)

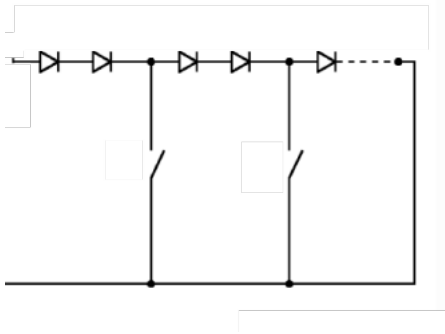
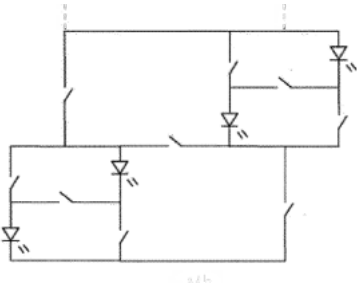
H05B 33/0824

{with an active control inside the LED load configuration}

Definition statement

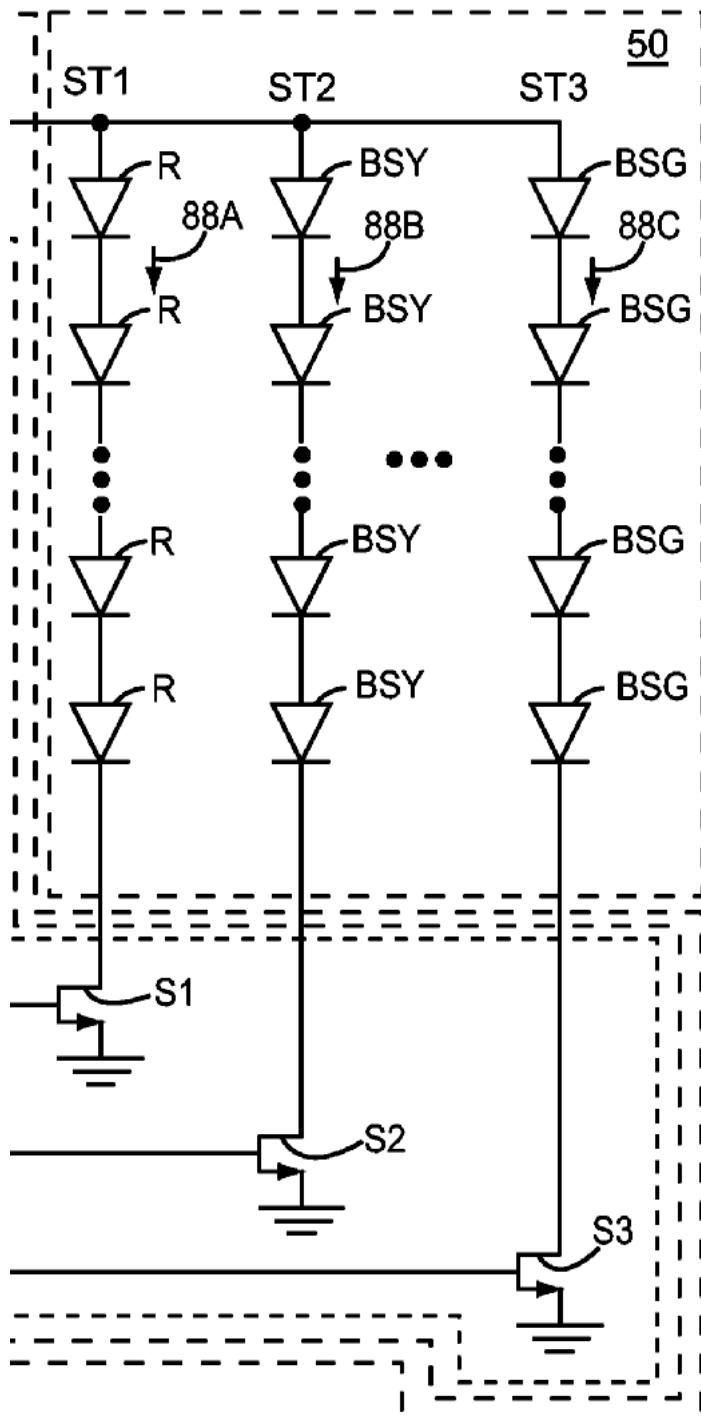
This place covers:

adaptive matrixes, antiparallel arrangements with an internal active control



H05B 33/0827**{organized essentially in parallel configuration}****Definition statement***This place covers:*

Documents describing LED loads formed by parallel strings of LEDs, wherein each of said strings may be individually controlled by provided circuitry.



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 CCI when the invention relates to the load configuration.

This symbol should be given as CCA 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.

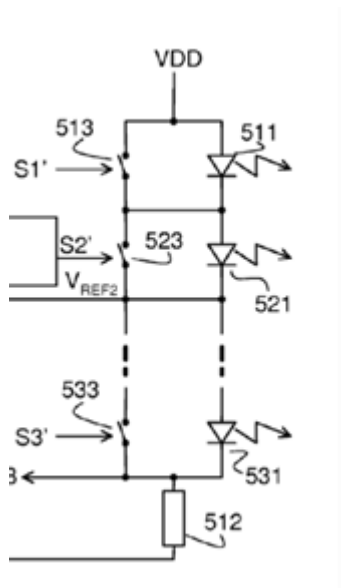
H05B 33/083

{organized essentially in string configuration with shunting switches}

Definition statement

This place covers:

Documents describing LED loads formed by strings of LEDs, wherein each of said LEDs may be individually controlled by provided parallel device (switch, transistor, MOSFET, zener diode, resistor...)



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 CCI when the invention relates to the load configuration.

This symbol should be given as CCA 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 33/0842

{with control ([H05B 33/0884](#) takes precedence)}

Definition statement

This place covers:

Catch-all for LED control aspects not covered by lower subclasses.

Examples of subject matter covered in this subclass: 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).

References

Limiting references

This place does not cover:

Protection aspects of LED circuits	H05B 33/0884
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Informative references

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

Controlling (of light sources in general)	H05B 37/02
Controlling by the ambient light	H05B 37/0218
Controlling by other parameter (presence...)	H05B 37/0227
Data bus linked networks	H05B 37/0254
Power line carrier linked networks	H05B 37/0263
Wireless networks	H05B 37/0272
Controlling by timing means	H05B 37/0281

Special rules of classification

Documents relating to control of LEDs but wherein no details about specific aspects of LED control are given may be given this code; in particular in combination of symbols in [H05B 37/00](#).

This subclass is a catch-all for LED control details, it is strongly recommended using it only as last resource. Use the subclasses underneath for classifying the relevant control aspects.

[H05B 33/0845](#) (control of intensity) and [H05B 33/0857](#) (colour control) trees are mutually exclusive.

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
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H05B 35/00

Electric light sources using a combination of different types of light generation (combinations of dissimilar light sources [F21](#), [H01J 61/96](#))

Definition statement

This place covers:

Circuits and apparatus for driving two dissimilar light sources (i.e. a compact fluorescent lamp and LEDs)

References

Limiting references

This place does not cover:

Luminaries and their mechanical construction	F21
Lamps with light-emitting discharge path and separately-heated incandescent body within a common envelope.	H01J 61/96

Informative references

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

Driving Electroluminescent panels	H05B 33/08
Driving LEDs	H05B 33/0803
Controlling of lighting in general	H05B 37/00
Driving Incandescent lamps	H05B 39/00
Driving Fluorescent lamps	H05B 41/00

Special rules of classification

The two dissimilar light sources must be in the same casing.

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.

Not for substitution of the light source in case of failure, for that application see [H05B 41/46](#)

for emergency lighting check possibly [H02J 9/065](#)

rarely used

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 37/00

Circuit arrangements for electric light sources in general {(vehicle lights [B60L 1/14](#), [B60Q](#); railways light signals [B61L](#); lighting for photographic purposes [G03B 15/02](#), for advertising purposes [G09F](#))}

Definition statement

This place covers:

Application circuits for control of light sources. Where the focus of the control is in the application and not in the light source, controlling the light source when some external condition occurs (light dependent, occupancy, data communication, etc).

References

Limiting references

This place does not cover:

Wakeup 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
Stage Lighting Lamp mechanical construction aspects	F21P5/00
Lighting for photographic purposes	G03B 15/02
Time controlled switching	G04 , H01H , H03K
Building Automation Systems as e.g. domotics.	G05B 15/02
Blinds and Shutters	G05D 25/00
Regulating Voltage and current	G05F
Illuminated switch circuits	G08B , G08C , H02B 15/00
Traffic Lights	G08G 1/00
For advertising purposes	G09F
Light or sound activated switches	H03K 17/00
Data Communication in general	H04L , H04N

Special rules of classification

When the light source is not relevant, release [A61L 9/00](#)

H05B 39/00

Circuit arrangements or apparatus for operating incandescent light sources and not adapted to a particular application {(incandescent lamps per se [H01K](#))}

Definition statement

This place covers:

Circuits controlling the light intensity of incandescent lamps.

References

Limiting references

This place does not cover:

Control of voltage and current	G05F
Incandescent lamps per se	H01K
Switching power supplies and inverters	H02M
Switching in general	H03K

Special rules of classification

See attached classification document [H05B](#) Bible

H05B 41/00

Circuit arrangements or apparatus for igniting or operating discharge lamps {(circuit elements structurally associated with discharge lamps [H01J 7/44](#), [H01J 19/78](#); discharge lamps per se [H01J 61/00](#) - [H01J 65/00](#); arc lamps with consumable electrodes [H05B 31/00](#); transformers or chokes for supplying discharge lamps [H01F 38/08](#))}

Definition statement

This place covers:

Circuits and drivers for discharge lamps.

References

Limiting references

This place does not cover:

Arc lamps with consumable electrodes	H05B 31/00
Welding with accumulated energy	B23K 11/24
Physical arrangement of lamp components and construction aspects	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
Switches and switching	H03K
PCBs in general and heatsinks	H05K

Special rules of classification

discharge lamps per se [H01J](#)

circuit elements structurally associated with discharge lamps [H01J 7/44](#) , [H01J 19/78](#)

arc lamps with consumable electrodes [H05B 31/00](#)

transformers or chokes for supplying discharge lamps [H01F 38/08](#)

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 43/00

Circuit arrangements for light sources, not otherwise provided for ([H05B 37/00](#) takes precedence)

Definition statement

This place covers:

Combustible light sources like magnesium flashes and other light sources not provided by the above groups

References

Limiting references

This place does not cover:

Circuit arrangements for electric light sources in general (control oriented rather than light source)	H05B 37/00
Physical arrangement of lamp components and construction aspects	F21

Informative references

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

Circuits for discharge flash lamps	H05B 41/30
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Special rules of classification

[H05B 37/00](#) takes precedence

very rarely used