

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H02 GENERATION; CONVERSION OR DISTRIBUTION OF ELECTRIC POWER

H02J CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS FOR STORING ELECTRIC ENERGY

NOTES

1. This subclass covers:
 - ac or dc mains or distribution networks;
 - circuit arrangements for battery supplies, including charging or control thereof, or coordinated supply from two or more sources of any kind;
 - circuit arrangements or systems for wireless supply or distribution of electric power.
2. This subclass does not cover:
 - control of a single motor, generator or dynamo-electric converter, of the types covered by subclass [H01F](#) or [H02K](#), which is covered by subclass [H02P](#);
 - control of a single motor or generator, of the types covered by subclass [H02N](#), which is covered by that subclass.

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00	Circuit arrangements for dc mains or dc distribution networks	1/16	• . using dynamo-electric machines coupled to flywheels
1/001	• {Hot plugging or unplugging of load or power modules to or from power distribution networks}	3/00	Circuit arrangements for ac mains or ac distribution networks
1/002	• {Intermediate AC, e.g. DC supply with intermediated AC distribution}	3/001	• {Methods to deal with contingencies, e.g. abnormalities, faults or failures}
1/02	• Arrangements for reducing harmonics or ripples	3/0012	• . {Contingency detection}
1/04	• Constant-current supply systems	3/00125	• . {Transmission line or load transient problems, e.g. overvoltage, resonance or self-excitation of inductive loads (H02J 3/01 takes precedence)}
1/06	• Two-wire systems	3/002	• {Flicker reduction, e.g. compensation of flicker introduced by non-linear load}
1/08	• Three-wire systems; Systems having more than three wires	3/003	• {Load forecast, e.g. methods or systems for forecasting future load demand}
1/082	• . {Plural DC voltage, e.g. DC supply voltage with at least two different DC voltage levels}	3/004	• {Generation forecast, e.g. methods or systems for forecasting future energy generation}
1/084	• . {for selectively connecting the load or loads to one or several among a plurality of power lines or power sources}	3/007	• {Arrangements for selectively connecting the load or loads to one or several among a plurality of power lines or power sources (for providing uninterruptable power supply H02J 9/00)}
1/086	• . . {for providing alternative feeding paths between load or loads and source or sources when the main path fails}	3/0073	• . {for providing alternative feeding paths between load and source when the main path fails, e.g. transformers, busbars}
1/10	• Parallel operation of dc sources	3/0075	• . {for providing alternative feeding paths between load and source according to economic or energy efficiency considerations, e.g. economic dispatch}
1/102	• . {being switching converters (H02J 1/108 , H02J 1/12 take precedence)}	3/008	• {involving trading of energy or energy transmission rights}
1/106	• . {for load balancing, symmetrisation, or sharing}	3/01	• Arrangements for reducing harmonics or ripples
1/108	• . {using diodes blocking reverse current flow (H02J 1/12 takes precedence)}	3/02	• using a single network for simultaneous distribution of power at different frequencies; using a single network for simultaneous distribution of ac power and of dc power
1/109	• . {Scheduling or re-scheduling the operation of the DC sources in a particular order, e.g. connecting or disconnecting the sources in sequential, alternating or in subsets, to meet a given demand}		
1/12	• . Parallel operation of dc generators with converters, e.g. with mercury-arc rectifier		
1/122	• . {Provisions for temporary connection of DC sources of essentially the same voltage, e.g. jumpstart cables}		
1/14	• Balancing the load in a network		

- 3/04 . . for connecting networks of the same frequency but supplied from different sources
- 3/06 . . Controlling transfer of power between connected networks; Controlling sharing of load between connected networks
- 3/08 . . Synchronising of networks
- 3/10 . . Constant-current supply systems
- 3/12 . . for adjusting voltage in ac networks by changing a characteristic of the network load
- 3/14 . . by switching loads on to, or off from, network, e.g. progressively balanced loading
- 3/144 . . . {Demand-response operation of the power transmission or distribution network}
- 3/16 . . by adjustment of reactive power
- 3/18 . . Arrangements for adjusting, eliminating or compensating reactive power in networks (for adjustment of voltage [H02J 3/16](#))
- 3/1807 . . {using series compensators}
- 3/1814 . . . {wherein at least one reactive element is actively controlled by a bridge converter, e.g. unified power flow controllers [UPFC]}
- 3/1821 . . {using shunt compensators ([H02J 3/1807](#), [H02J 3/1878](#) take precedence)}
- 3/1828 . . . {with stepwise control, the possibility of switching in or out the entire compensating arrangement not being considered as stepwise control}
- 3/1835 . . . {with stepless control}
- 3/1842 {wherein at least one reactive element is actively controlled by a bridge converter, e.g. active filters}
- 3/185 {wherein such reactive element is purely inductive, e.g. superconductive magnetic energy storage systems [SMES]}
- 3/1857 {wherein such bridge converter is a multilevel converter}
- 3/1864 {wherein the stepless control of reactive power is obtained by at least one reactive element connected in series with a semiconductor switch}
- 3/1871 . . . {Methods for planning installation of shunt reactive power compensators}
- 3/1878 . . {using tap changing or phase shifting transformers}
- 3/1885 . . {using rotating means, e.g. synchronous generators}
- 3/1892 . . {the arrangements being an integral part of the load, e.g. a motor, or of its control circuit}
- 3/20 . . in long overhead lines
- 3/22 . . in cables
- 3/24 . . Arrangements for preventing or reducing oscillations of power in networks (by control effected upon a single generator [H02P 9/00](#))
- 3/241 . . {The oscillation concerning frequency}
- 3/242 . . {using phasor measuring units [PMU]}
- 3/26 . . Arrangements for eliminating or reducing asymmetry in polyphase networks
- 3/28 . . Arrangements for balancing of the load in a network by storage of energy
- 3/30 . . using dynamo-electric machines coupled to flywheels
- 3/32 . . using batteries with converting means
- 3/322 . . . {the battery being on-board an electric or hybrid vehicle, e.g. vehicle to grid arrangements [V2G], power aggregation, use of the battery for network load balancing, coordinated or cooperative battery charging}
- 3/34 . . Arrangements for transfer of electric power between networks of substantially different frequency
- 3/36 . . Arrangements for transfer of electric power between ac networks via a high-tension dc link
- 2003/365 . . {Reducing harmonics or oscillations in HVDC}
- 3/38 . . Arrangements for parallely feeding a single network by two or more generators, converters or transformers
- 3/381 . . {Dispersed generators}
- 3/388 . . {Islanding, i.e. disconnection of local power supply from the network}
- 3/40 . . Synchronising a generator for connection to a network or to another generator
- 3/42 . . . with automatic parallel connection when synchronisation is achieved
- 3/44 . . . with means for ensuring correct phase sequence
- 3/46 . . Controlling of the sharing of output between the generators, converters, or transformers
- 3/466 . . . {Scheduling the operation of the generators, e.g. connecting or disconnecting generators to meet a given demand}
- 3/472 {For selectively connecting the AC sources in a particular order, e.g. sequential, alternating or subsets of sources}
- 3/48 . . . Controlling the sharing of the in-phase component
- 3/50 . . . Controlling the sharing of the out-of-phase component
- 4/00** **Circuit arrangements for mains or distribution networks not specified as ac or dc**
- 5/00** **Circuit arrangements for transfer of electric power between ac networks and dc networks ([H02J 3/36](#) takes precedence)**
- 7/00** **Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries**
- 7/00032 . . {characterised by data exchange}
- 7/00034 . . {Charger exchanging data with an electronic device, i.e. telephone, whose internal battery is under charge}
- 7/00036 . . {Charger exchanging data with battery}
- 7/00038 . . {using passive battery identification means, e.g. resistors or capacitors (identification by mechanical connections [H02J 7/0045](#))}
- 7/00041 . . . {in response to measured battery parameters, e.g. voltage, current or temperature profile}
- 7/00043 . . . {using switches, contacts or markings, e.g. optical, magnetic or barcode}
- 7/00045 . . {Authentication, i.e. circuits for checking compatibility between one component, e.g. a battery or a battery charger, and another component, e.g. a power source}
- 7/00047 . . {with provisions for charging different types of batteries}
- 7/0013 . . {acting upon several batteries simultaneously or sequentially ([H02J 7/1423](#) takes precedence)}
- 7/0014 . . {Circuits for equalisation of charge between batteries}
- 7/0016 . . . {using shunting, discharge or bypass circuits}

- 7/0018 . . . {using separate charge circuits}
- 7/0019 . . . {using switched or multiplexed charge circuits}
- 7/0024 . . {Parallel/serial switching of connection of batteries to charge or load circuit}
- 7/0025 . . {Sequential battery discharge in systems with a plurality of batteries}
- 7/0029 . {with safety or protection devices or circuits}
- 7/00302 . . {Overcharge protection}
- 7/00304 . . {Overcurrent protection}
- 7/00306 . . {Overdischarge protection}
- 7/00308 . . {Overvoltage protection}
- 7/00309 . . {Overheat or overtemperature protection}
- 7/0031 . . {using battery or load disconnect circuits ([H02J 9/002 takes precedence](#))}
- 7/0032 . . . {disconnection of loads if battery is not under charge, e.g. in vehicle if engine is not running}
- 7/0034 . . {using reverse polarity correcting or protecting circuits ([mechanical means of polarity protection H02J 7/0045](#))}
- 7/0036 . . {using connection detecting circuits ([H02J 7/0034 takes precedence](#))}
- 7/0042 . {characterised by the mechanical construction}
- 7/0044 . . {specially adapted for holding portable devices containing batteries ([H02J 7/0045 takes precedence](#))}
- 7/0045 . . {concerning the insertion or the connection of the batteries}
- 7/0047 . {with monitoring or indicating devices or circuits}
- 7/0048 . . {Detection of remaining charge capacity or state of charge [SOC]}
- 7/0049 . . . {Detection of fully charged condition}
- 7/005 . . {Detection of state of health [SOH]}
- 7/0063 . {with circuits adapted for supplying loads from the battery}
- 7/0068 . {Battery or charger load switching, e.g. concurrent charging and load supply ([H02J 7/0013 takes precedence](#))}
- 7/0069 . {Charging or discharging for charge maintenance, battery initiation or rejuvenation}
- 7/007 . {Regulation of charging or discharging current or voltage}
- 7/0071 . . {with a programmable schedule}
- 7/00711 . . {with introduction of pulses during the charging process}
- 7/00712 . . {the cycle being controlled or terminated in response to electric parameters}
- 7/00714 . . . {in response to battery charging or discharging current}
- 7/00716 {in response to integrated charge or discharge current}
- 7/00718 {in response to charge current gradient}
- 7/007182 . . . {in response to battery voltage}
- 7/007184 {in response to battery voltage gradient}
- 7/007186 {obtained with the battery disconnected from the charge or discharge circuit}
- 7/007188 . . {the charge cycle being controlled or terminated in response to non-electric parameters}
- 7/00719 . . . {in response to degree of gas development in the battery}
- 7/007192 . . . {in response to temperature}
- 7/007194 {of the battery}
- 7/02 . for charging batteries from ac mains by converters
- 7/04 . . Regulation of charging current or voltage
- 7/06 using discharge tubes or semiconductor devices
- 7/08 using discharge tubes only
- 7/12 . . . using magnetic devices having controllable degree of saturation, i.e. transductors
- 7/14 . for charging batteries from dynamo-electric generators driven at varying speed, e.g. on vehicle
- 7/1407 . . {on vehicles not being driven by a motor, e.g. bicycles}
- 7/1415 . . {with a generator driven by a prime mover other than the motor of a vehicle}
- 7/1423 . . {with multiple batteries}
- 7/143 . . {with multiple generators}
- 7/1438 . . {in combination with power supplies for loads other than batteries}
- 7/1446 . . {in response to parameters of a vehicle}
- 7/1469 . . {Regulation of the charging current or voltage otherwise than by variation of field}
- 7/1476 . . . {by mechanical action on the generator}
- 7/1484 . . . {by commutation of the output windings of the generator}
- 7/1492 . . . {by means of controlling devices between the generator output and the battery}
- 7/16 . . Regulation of the charging current or voltage by variation of field
- 7/163 . . . {with special means for initiating or limiting the excitation current}
- 7/18 . . . due to variation of ohmic resistance in field circuit, using resistance switching in or out of circuit step by step
- 7/20 . . . due to variation of continuously variable ohmic resistor
- 7/22 . . . due to variation of make-to-break ratio of intermittently-operating contacts, e.g. using Tirrill regulator
- 7/225 {characterised by the mechanical construction}
- 7/24 . . . using discharge tubes or semiconductor devices
- 7/243 {with on/off action}
- 7/2434 {with pulse modulation}
- 7/2437 {using thyristors or triacs as final control devices}
- 7/26 . . . using magnetic devices with controllable degree of saturation
- 7/28 . . . using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device
- 7/30 . . . using armature-reaction-excited machines
- 7/32 . for charging batteries from a charging set comprising a non-electric prime mover {rotating at constant speed}
- 7/34 . Parallel operation in networks using both storage and other dc sources, e.g. providing buffering ([H02J 7/14 takes precedence](#))
- 7/342 . . {The other DC source being a battery actively interacting with the first one, i.e. battery to battery charging ([with circuits for polarity protection H02J 7/0034](#))}
- 7/345 . . {using capacitors as storage or buffering devices}
- 7/35 . . with light sensitive cells
- 7/36 . Arrangements using end-cell switching
- 9/00 Circuit arrangements for emergency or stand-by power supply, e.g. for emergency lighting**

- 9/002 . {in which a reserve is maintained in an energy source by disconnecting non-critical loads, e.g. maintaining a reserve of charge in a vehicle battery for starting an engine}
- 9/005 . {using a power saving mode ([for copiers G03G 15/5004](#))}
- 9/007 . . {Detection of the absence of a load}
- 9/02 . in which an auxiliary distribution system and its associated lamps are brought into service
- 9/04 . in which the distribution system is disconnected from the normal source and connected to a standby source
- 9/06 . . with automatic change-over {, e.g. UPS systems}
- 9/061 . . . {for DC powered loads}
- 9/062 . . . {for AC powered loads}
- 9/063 {Common neutral, e.g. AC input neutral line connected to AC output neutral line and DC middle point}
- 9/065 {for lighting purposes}
- 9/066 . . . {characterised by the use of dynamo-electric machines ([H02J 9/08 takes precedence](#))}
- 9/067 . . . {using multi-primary transformers, e.g. transformer having one primary for each AC energy source and a secondary for the loads}
- 9/068 . . . {Electronic means for switching from one power supply to another power supply, e.g. to avoid parallel connection}
- 9/08 . . . requiring starting of a prime-mover
- 11/00** **Circuit arrangements for providing service supply to auxiliaries of stations in which electric power is generated, distributed or converted**
- 13/00** **Circuit arrangements for providing remote indication of network conditions, e.g. an instantaneous record of the open or closed condition of each circuitbreaker in the network; Circuit arrangements for providing remote control of switching means in a power distribution network, e.g. switching in and out of current consumers by using a pulse code signal carried by the network**
- 13/00001 . {characterised by the display of information or by user interaction, e.g. supervisory control and data acquisition systems [SCADA] or graphical user interfaces [GUI]}
- 13/00002 . {characterised by monitoring}
- 13/00004 . {characterised by the power network being locally controlled}
- 13/00006 . {characterised by information or instructions transport means between the monitoring, controlling or managing units and monitored, controlled or operated power network element or electrical equipment}
- 13/00007 . . {using the power network as support for the transmission}
- 13/00009 . . . {using pulsed signals}
- 13/0001 . . . {using modification of a parameter of the network power signal}
- 13/00012 . . {using an auxiliary transmission line}
- 13/00014 . . . {carrying signals having the network frequency or DC signals}
- 13/00016 . . {using a wired telecommunication network or a data transmission bus}
- 13/00017 . . . {using optical fiber}
- 13/00018 . . . {using phone lines}
- 13/00019 . . {using optical means}
- 13/0002 . . {using ultrasonic means}
- 13/00022 . . {using wireless data transmission}
- 13/00024 . . . {by means of mobile telephony}
- 13/00026 . . . {involving a local wireless network, e.g. Wi-Fi, ZigBee or Bluetooth}
- 13/00028 . . {involving the use of Internet protocols}
- 13/00032 . {Systems characterised by the controlled or operated power network elements or equipment, the power network elements or equipment not otherwise provided for ([circuits specially adapted for remote switching of lighting via the power line H05B 47/185](#))}
- 13/00034 . . {the elements or equipment being or involving an electric power substation}
- 13/00036 . . {the elements or equipment being or involving switches, relays or circuit breakers ([circuits for indication of single switches H01H 9/167](#))}
- 13/0004 . . . {involved in a protection system}
- 13/0005 . . {the elements or equipment being or involving power plugs or sockets}
- 15/00** **Systems for storing electric energy (mechanical systems therefor [F01-F04](#); in chemical form [H01M](#))**
- 15/003 . {in the form of hydraulic energy}
- 15/006 . {in the form of pneumatic energy, e.g. compressed air energy storage [CAES] ([accumulators for supplying fluid under pressure F15B 1/04](#))}
- 15/007 . {involving storage in the form of mechanical energy, e.g. fly-wheels}
- 15/008 . {using hydrogen as energy vector}
- 50/00** **Circuit arrangements or systems for wireless supply or distribution of electric power**
- NOTE**
- In this main group, the specific types of wireless technology used for the power transmission are covered in groups [H02J 50/05-H02J 50/30](#), while aspects relevant to the circuit arrangements or systems thereof are covered in groups [H02J 50/40-H02J 50/90](#).
- 50/001 . {Energy harvesting or scavenging}
- 50/005 . {Mechanical details of housing or structure aiming to accommodate the power transfer means, e.g. mechanical integration of coils, antennas or transducers into emitting or receiving devices}
- 50/05 . using capacitive coupling
- 50/10 . using inductive coupling
- 50/12 . . of the resonant type
- 50/15 . using ultrasonic waves
- 50/20 . using microwaves or radio frequency waves
- 50/23 . . characterised by the type of transmitting antennas, e.g. directional array antennas or Yagi antennas
- 50/27 . . characterised by the type of receiving antennas, e.g. rectennas
- 50/30 . using light, e.g. lasers
- 50/40 . using two or more transmitting or receiving devices ([H02J 50/50 takes precedence](#))
- 50/402 . . {the two or more transmitting or the two or more receiving devices being integrated in the same unit, e.g. power mats with several coils or antennas with several sub-antennas}

50/50	• using additional energy repeaters between transmitting devices and receiving devices	2300/40	• wherein a plurality of decentralised, dispersed or local energy generation technologies are operated simultaneously
50/502	• . {the energy repeater being integrated together with the emitter or the receiver}	2310/00	The network for supplying or distributing electric power characterised by its spatial reach or by the load
50/60	• responsive to the presence of foreign objects, e.g. detection of living beings	2310/10	• The network having a local or delimited stationary reach
50/70	• involving the reduction of electric, magnetic or electromagnetic leakage fields	2310/12	• . The local stationary network supplying a household or a building
50/80	• involving the exchange of data, concerning supply or distribution of electric power, between transmitting devices and receiving devices	2310/14	• . . The load or loads being home appliances
50/90	• involving detection or optimisation of position, e.g. alignment	2310/16	• . . The load or loads being an Information and Communication Technology [ICT] facility
2203/00	Indexing scheme relating to details of circuit arrangements for AC mains or AC distribution networks	2310/18	• . The network being internal to a power source or plant
2203/10	• Power transmission or distribution systems management focussing at grid-level, e.g. load flow analysis, node profile computation, meshed network optimisation, active network management or spinning reserve management	2310/20	• . The network being internal to a load
2203/20	• Simulating, e.g. planning, reliability check, modelling or computer assisted design [CAD]	2310/22	• . . The load being a portable electronic device
2207/00	Indexing scheme relating to details of circuit arrangements for charging or depolarising batteries or for supplying loads from batteries	2310/23	• . . The load being a medical device, a medical implant, or a life supporting device
2207/10	• Control circuit supply, e.g. means for supplying power to the control circuit	2310/40	• The network being an on-board power network, i.e. within a vehicle
2207/20	• Charging or discharging characterised by the power electronics converter	2310/42	• . for ships or vessels
2207/30	• Charge provided using DC bus or data bus of a computer	2310/44	• . for aircrafts
2207/40	• adapted for charging from various sources, e.g. AC, DC or multivoltage	2310/46	• . for ICE-powered road vehicles
2207/50	• Charging of capacitors, supercapacitors, ultra-capacitors or double layer capacitors (using capacitors as storage or buffering device in cooperation with batteries H02J 7/345)	2310/48	• . for electric vehicles [EV] or hybrid vehicles [HEV]
2213/00	Indexing scheme relating to details of circuit arrangements for providing remote indication of network conditions of for circuit arrangements for providing remote control of switching means in a power distribution network	2310/50	• for selectively controlling the operation of the loads
2213/10	• using simultaneously two or more different transmission means	2310/52	• . The controlling of the operation of the load not being the total disconnection of the load, i.e. entering a degraded mode or in current limitation
2300/00	Systems for supplying or distributing electric power characterised by decentralized, dispersed, or local generation	2310/54	• . according to a pre-established time schedule
2300/10	• The dispersed energy generation being of fossil origin, e.g. diesel generators	2310/56	• . characterised by the condition upon which the selective controlling is based
2300/20	• The dispersed energy generation being of renewable origin	2310/58	• . . The condition being electrical
2300/22	• . The renewable source being solar energy	2310/60	• . . . Limiting power consumption in the network or in one section of the network, e.g. load shedding or peak shaving
2300/24	• . . of photovoltaic origin	2310/62	• . . The condition being non-electrical, e.g. temperature
2300/26	• . . . involving maximum power point tracking control for photovoltaic sources (maximum power point systems in particular G05F 1/67)	2310/64	• . . . The condition being economic, e.g. tariff based load management
2300/28	• . The renewable source being wind energy (wind motors F03D)	2310/66	• . one of the loads acting as master and the other or others acting as slaves
2300/30	• The power source being a fuel cell	2310/70	• Load identification