

**CPC****COOPERATIVE PATENT CLASSIFICATION****H02J**

**CIRCUIT ARRANGEMENTS OR SYSTEMS FOR SUPPLYING OR DISTRIBUTING ELECTRIC POWER; SYSTEMS FOR STORING ELECTRIC ENERGY** (for digital computers [G06F 1/18](#); circuits or apparatus for the conversion of electric power, arrangements for control or regulation of such circuits or apparatus [H02M](#) ; interrelated control of several motors, control of a prime-mover/generator combination [H02P](#) ; control of high-frequency power [H03L](#) ; additional use of power line or power network for transmission of information [H04B](#) )

**NOTE**

This subclass covers:

- ac or dc mains or distribution networks;
- circuit arrangements for battery supplies, including charging or control thereof, or co-ordinated supply from two or more sources of any kind;
- systems for supplying or distributing electric power by electromagnetic waves.

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**

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups :

[H02J 7/10](#) covered by [H02J 7/0072](#)

**H02J 1/00****Circuit arrangements for dc mains or dc distribution networks****H02J 2001/002**

- . Intermediate ac, e.g. dc supply with intermediated ac distribution

**H02J 2001/004**

- . Distribution of power generated by fuel cells

**H02J 2001/006**

- . Provisions for temporary connection of dc sources of essentially the same voltage, e.g. jumpstart cables

**H02J 2001/008**

- . Plural dc voltage, e.g. dc supply voltage with at least two different dc voltage levels

**H02J 1/02**

- . Arrangements for reducing harmonics or ripples (in converters [H02M 1/14](#))

**H02J 1/04**

- . Constant-current supply systems

**H02J 1/06**

- . Two-wire systems

- H02J 1/08 . Three-wire systems; Systems having more than three wires
- H02J 1/10 . Parallel operation of dc sources ([involving batteries H02J 7/34](#))
- H02J 1/102 . . {[being switching converters \(H02J 1/108, H02J 1/12 take precedence\)](#) }
- H02J 2001/104 . . . for synchronisation
- H02J 2001/106 . . . for load balancing or load symmetrisation
- H02J 1/108 . . {[using diodes blocking reverse current flow \(H02J 1/12 takes precedence\)](#) }
- H02J 1/12 . . Parallel operation of dc generators with converters, e.g. with mercury-arc rectifier
  
- H02J 1/14 . Balancing the load in a network ([by batteries H02J 7/34](#))
- H02J 1/16 . . using dynamo-electric machines coupled to fly-wheels
  
- H02J 3/00                      Circuit arrangements for ac mains or ac distribution networks**
  
- H02J 2003/001 . Emergency control, e.g. method to deal with contingencies
- H02J 2003/002 . Flicker reduction, e.g. compensation of flicker introduced by non linear load
- H02J 2003/003 . Load forecast, e.g. method and systems for forecasting future load demand
- H02J 3/005 . {[Arrangements for selectively connecting the load to one among a plurality of power lines or power sources \(for providing uninterruptable power supply H02J 9/00\)](#) }
- H02J 3/006 . . {[for providing alternative feeding paths between load and source when the main path fails, e.g. transformers, busbars](#) }
- H02J 2003/007 . Simulating, e. g. planning, reliability check, modeling
- H02J 3/008 . {[involving trading of energy or energy transmission rights](#) }
- H02J 3/01 . Arrangements for reducing harmonics or ripples ([in converters H02M 1/12](#))
- H02J 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
- H02J 3/04 . for connecting networks of the same frequency but supplied from different sources
- H02J 3/06 . . Controlling transfer of power between connected networks; Controlling sharing of  
load between connected networks
- H02J 3/08 . . Synchronising of networks
- H02J 3/10 . Constant-current supply systems
- H02J 3/12 . for adjusting voltage in ac networks by changing a characteristic of the network load
- H02J 3/14 . . by switching loads on to, or off from, network, e.g. progressively balanced loading
- H02J 2003/143 . . . Household appliances management
- H02J 2003/146 . . . Tariff based load management
- H02J 3/16 . . by adjustment of reactive power
- H02J 3/18 . Arrangements for adjusting, eliminating, or compensating reactive power in networks  
([for adjustment of voltage H02J 3/12; use of Petersen coils H02H 9/08](#))

- H02J 3/1807 .. {using series compensators }
- H02J 3/1814 ... {wherein at least one reactive element is actively controlled by a bridge converter, e.g. unified power flow controllers (UPFC) }
- H02J 3/1821 .. {using shunt compensators ([H02J 3/1807](#), [H02J 3/1878](#) take precedence) }
- H02J 3/1828 ... {with stepwise control, the possibility of switching in or out the entire compensating arrangement not being considered as stepwise control }
- H02J 3/1835 ... {with stepless control }
- H02J 3/1842 .... {wherein at least one reactive element is actively controlled by a bridge converter, e.g. active filters }
- H02J 3/185 ..... { wherein such reactive element is purely inductive, e.g. superconductive magnetic energy storage systems (SMES) }
- H02J 3/1857 ..... {wherein such bridge converter is a multilevel converter }
- H02J 3/1864 .... {wherein the stepless control of reactive power is obtained by at least one reactive element connected in series with a semiconductor switch }
- H02J 3/1871 ... {Methods for planning installation of shunt reactive power compensators }
- H02J 3/1878 .. {using tap changing or phase shifting transformers }
- H02J 3/1885 .. {using rotating means, e.g. synchronous generators }
- H02J 3/1892 .. {the arrangements being an integral part of the load, e.g. a motor, or of its control circuit }
- H02J 3/20 .. in long overhead lines
- H02J 3/22 .. in cables
- H02J 3/24 . Arrangements for preventing or reducing oscillations of power in networks ([by control effected upon a single generator \[H02P 9/00\]\(#\)](#))
- H02J 3/26 . Arrangements for eliminating or reducing asymmetry in polyphase networks
- H02J 3/28 . Arrangements for balancing of the load in a network by storage of energy
- H02J 3/30 .. using dynamo-electric machines coupled to fly-wheels
- H02J 3/32 .. using batteries with converting means
- H02J 3/34 . Arrangements for transfer of electric power between networks of substantially different frequency ([frequency-convertors \[H02M\]\(#\)](#) )
- H02J 3/36 . Arrangements for transfer of electric power between ac networks via a high-tension dc link
- H02J 2003/365 .. Reducing harmonics or oscillations in HVDC
- H02J 3/38 . Arrangements for parallelly feeding a single network by two or more generators, converters or transformers
- H02J 3/381 .. { Dispersed generators }
- H02J 3/382 ... { the generators exploiting renewable energy }
- H02J 3/383 .... { Solar energy, e.g. photovoltaic energy ([generation of electric power by conversion of light \[H02S\]\(#\)](#) ) }
- H02J 3/385 ..... { Maximum power point tracking control for photovoltaic sources ([inverter means associated with the PV module \[H02S 40/32\]\(#\)](#) ) }
- H02J 3/386 .... { Wind energy ([wind motors \[F03D\]\(#\)](#) ) }
- H02J 3/387 ... { using fuel cells ([fuel cells per se \[H01M 8/00\]\(#\)](#) ) }

- H02J 2003/388 . . . Islanding, i.e. disconnection of local power supply from the network
- H02J 3/40 . . . Synchronising a generator for connection to a network or to another generator
- H02J 3/42 . . . with automatic parallel connection when synchronisation is achieved
- H02J 3/44 . . . with means for ensuring correct phase sequence
- H02J 3/46 . . . Controlling of the sharing of output between the generators, converters, or transformers
- H02J 3/48 . . . Controlling the sharing of the in-phase component
- H02J 3/50 . . . Controlling the sharing of the out-of-phase component
  
- H02J 4/00** **Circuit arrangements for mains of distribution networks not specified as ac or dc**
  
- H02J 5/00** **Circuit arrangements for transfer of electric power between ac networks and dc networks ([H02J 3/36](#) takes precedence)**
  
- H02J 5/005 . {with inductive power transfer (for charging [H02J 7/025](#)) }
  
- H02J 7/00** **Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries**
  
- H02J 2007/0001 . 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
  
- H02J 7/0003 . {with provision for charging different types of batteries }
- H02J 7/0004 . . { with data exchange between battery and charger ([H02J 7/0011](#) takes precedence) }
- H02J 7/0006 . . {using passive battery identification means, e.g. resistors, capacitors ([H02J 7/0011](#) takes precedence; identification by mechanical connections [H02J 7/0045](#)) }
- H02J 7/0008 . . . {in response to measured battery parameters, e.g. voltage, current, temperature profile }
- H02J 7/0009 . . . {using switches, contacts or markings, e.g. optical, magnetic, barcode }
- H02J 7/0011 . . {with charge circuits contained within battery unit }
  
- H02J 7/0013 . {for charging several batteries simultaneously or sequentially ([H02J 7/1423](#) takes precedence) }
- H02J 7/0014 . . {Circuits for equalisation of charge between batteries }
- H02J 7/0016 . . . {using shunting, discharge or bypass circuits }
- H02J 7/0018 . . . {using separate charge circuits }
- H02J 7/0019 . . . {using switched or multiplexed charge circuits }
- H02J 7/0021 . . {Monitoring or indicating circuits ([H02J 7/0026](#) takes precedence) }
- H02J 7/0022 . . {Management of charging with batteries permanently connected to charge circuit ([H02J 7/0014](#) takes precedence) }
- H02J 7/0024 . . {Parallel/serial switching of connection of batteries to charge or load circuit }
- H02J 7/0026 . . {using safety or protection circuits, e.g. overcharge/discharge disconnection }
- H02J 7/0027 . . {Stations for charging mobile units, e.g. of electric vehicles, of mobile telephones ([H02J 7/0021](#), [H02J 7/0026](#) take precedence) }
  
- H02J 7/0029 . {with safety devices ([H02J 7/0026](#) takes precedence) }

- H02J 7/0031 .. {using battery or load disconnect circuits ([H02J 9/002](#) takes precedence) }
- H02J 7/0032 ... {disconnection of loads if battery is not under charge, e.g. in vehicle if engine is not running }
- H02J 7/0034 .. {using reverse polarity correcting or protecting circuits ([mechanical means of polarity protection H02J 7/0045](#)) }
- H02J 7/0036 .. {using connection detecting circuits ([H02J 7/0034](#) takes precedence) }
- H02J 2007/0037 .. Overcharge protection
- H02J 2007/0039 .. Overcurrent protection
- H02J 2007/004 .. Overdischarge protection
  
- H02J 7/0042 . {characterised by the mechanical construction ([H02J 7/355](#) takes precedence) }
- H02J 7/0044 .. {specially adapted for holding portable devices containing batteries ([H02J 7/0045](#) takes precedence) }
- H02J 7/0045 .. {concerning the insertion or the connection of the batteries (charging from ac mains using non-contact coupling [H02J 7/025](#)) }
  
- H02J 7/0047 . {with indicating devices ([H02J 7/0021](#) takes precedence) }
- H02J 2007/0049 .. Detection of fully charged condition
- H02J 2007/005 .. Detection of remaining charge capacity
  
- H02J 7/0052 . {Charge circuits only ([H02J 7/0003](#), [H02J 7/0013](#), [H02J 7/007](#) take precedence) }
- H02J 7/0054 .. {Battery to battery charging (with circuits for polarity protection [H02J 7/0034](#)) }
- H02J 7/0055 .. {adapted for charging from various sources, e.g. AC, DC, multivoltage }
- H02J 7/0057 .. {adapted for charge maintenance or battery rejuvenation ([H02J 7/0075](#) takes precedence) }
- H02J 2007/0059 .. characterised by the converter
- H02J 2007/006 .. Charge provided using dc bus or data bus of a computer
- H02J 2007/0062 .. Charge provided using USB port connectors
  
- H02J 7/0063 . {Circuits adapted for supplying loads only }
- H02J 7/0065 .. {using converters specially adapted for use with a battery }
- H02J 2007/0067 .. Discharge management, i.e. discharge current reduction at low state of charge, sequential battery discharge in systems with a plurality of battery
  
- H02J 7/0068 . {Battery or charger load switching, e.g. concurrent charging and load supply ([H02J 7/0013](#) takes precedence) }
  
- H02J 7/007 . {Regulation of charging current or voltage }
- H02J 7/0072 .. {using semiconductor devices only }
- H02J 7/0073 ... {with a programmable charge schedule ([H02J 7/0093](#) takes precedence) }
- H02J 7/0075 .... {for charge maintenance, battery initiation or rejuvenation }
- H02J 7/0077 ... {the charge cycle being terminated in response to electric parameters ([H02J 7/0093](#) takes precedence) }
- H02J 7/0078 .... {in response to discharge current, e.g. using a coulometer, pilot cell }
- H02J 7/008 .... {with the battery connected to the charge circuit }
- H02J 7/0081 ..... {and in response to battery voltage gradient }
- H02J 7/0083 ..... {and in response to charge current gradient }

- H02J 7/0085 . . . . {with the battery disconnected from the charge circuit }
- H02J 7/0086 . . . . . {and in response to battery voltage }
- H02J 7/0088 . . . {the charge cycle being terminated in response to non-electric parameters  
(H02J 7/0093 takes precedence) }
- H02J 7/009 . . . . {in response to degree of gas development in the battery }
- H02J 7/0091 . . . . {in response to temperature of the battery }
- H02J 7/0093 . . . {with introduction of pulses during the charging process }
  
- H02J 2007/0095 . Control circuit supply, e.g. means for supplying power to the control circuit
  
- H02J 2007/0096 . Charger exchanging data with an electronic device, i.e. telephone, whose internal battery is under charge
  
- H02J 2007/0098 . Smart battery, e.g. battery with means for data exchanging with charger
  
- H02J 7/02 . for charging batteries from ac mains by converters
- H02J 7/022 . . {characterised by the type of converter }
- H02J 7/025 . . . {using non-contact coupling, e.g. inductive, capacitive }
- H02J 7/027 . . {with safety or indicating device }
- H02J 7/04 . . Regulation of charging current or voltage
- H02J 7/041 . . . {with a programmable charge schedule }
- H02J 7/042 . . . {the charge cycle being controlled in response to a measured parameter }
- H02J 7/044 . . . . {in response to integrated charge or discharge current }
- H02J 7/045 . . . . {in response to voltage or current }
- H02J 7/047 . . . . {in response to temperature }
- H02J 7/048 . . . . {in response to degree of gas development in the battery }
- H02J 7/06 . . . using discharge tubes or semiconductor devices
- H02J 7/08 . . . . using discharge tubes only
- H02J 7/082 . . . . . {with a programmable charge schedule }
- H02J 7/085 . . . . . {the charge cycle being terminated in response to electric parameters }
- H02J 7/087 . . . . . {the charge cycle being terminated in response to non-electric parameters }
  
- H02J 2007/10 . . . . using semiconductor devices only
- H02J 2007/105 . . . . . with introduction of pulses during the charging process
- H02J 7/12 . . . using magnetic devices having controllable degree of saturation, i.e. transducers
  
- H02J 7/125 . . . . {in combination with discharge tubes or semiconductor devices }
  
- H02J 7/14 . for charging batteries from dynamo-electric generators driven at varying speed, e.g. on vehicle
- H02J 7/1407 . . {on vehicles not being driven by a motor, e.g. bicycles }
- H02J 7/1415 . . {with a generator driven by a prime mover other than the motor of a vehicle }
- H02J 7/1423 . . {with multiple batteries or generators }
- H02J 2007/143 . . . Multiple generators
- H02J 7/1438 . . {in combination with power supplies for loads other than batteries }

- H02J 7/1446 . . {in response to parameters of a vehicle }
- H02J 7/1453 . . {with temperature compensation }
- H02J 7/1461 . . {with safety or indicating devices }
- H02J 7/1469 . . {Regulation of the charging current or voltage otherwise than by variation of field }
- H02J 7/1476 . . . {by mechanical action on the generator }
- H02J 7/1484 . . . {by commutation of the output windings of the generator }
- H02J 7/1492 . . . {by means of controlling devices between the generator output and the battery }
- H02J 7/16 . . Regulation of the charging current or voltage by variation of field
- H02J 7/163 . . . {with special means for initiating or limiting the excitation current }
- H02J 7/166 . . . {with safety or indicating devices }
- H02J 7/18 . . . due to variation of ohmic resistance in field circuit, using resistance switching in or out of circuit step by step
- H02J 7/20 . . . due to variation of continuously variable ohmic resistor
- H02J 7/22 . . . due to variation of make-to-break ratio of intermittently-operating contacts, e.g. using Tirrill regulator
- H02J 7/225 . . . . {characterised by the mechanical construction }
- H02J 7/24 . . . using discharge tubes or semiconductor devices
- H02J 7/241 . . . . {using discharge tubes only }
- H02J 7/242 . . . . {using semiconductor devices as final control devices }
- H02J 7/244 . . . . . {with on/off action }
- H02J 7/245 . . . . . {with pulse modulation }
- H02J 7/247 . . . . . {using thyristors or triacs as final control devices }
- H02J 7/248 . . . . . {characterised by the mechanical construction }
- H02J 7/26 . . . using magnetic devices with controllable degree of saturation
- H02J 7/28 . . . using magnetic devices with controllable degree of saturation in combination with controlled discharge tube or controlled semiconductor device
- H02J 7/30 . . . using armature-reaction-excited machines
- H02J 7/32 . . for charging batteries from a charging set comprising a non-electric prime mover {rotating at constant speed }
- H02J 7/322 . . {by variation of field, using discharge tubes }
- H02J 7/324 . . {by variation of field, using semiconductor devices }
- H02J 7/326 . . {by variation of field, using armature-reaction-excited machines }
- H02J 7/328 . . {by variation of field, using magnetic devices having controllable degree of saturation }
- H02J 7/34 . . Parallel operation in networks using both storage and other dc sources, e.g. providing buffering ([H02J 7/14 takes precedence](#))
- H02J 7/345 . . {using capacitors as storage or buffering devices }
- H02J 7/35 . . with light sensitive cells
- H02J 7/355 . . . {characterised by the mechanical construction }
- H02J 7/36 . . Arrangements using end-cell switching
- H02J 9/00** . . **Circuit arrangement for emergency or standby power supply, e.g. for emergency lighting (with provision for charging standby battery [H02J 7/00](#))**



- H02J 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 }
- H02J 9/005 . {using a power saving mode (for copiers [G03G 15/00C1](#)) }
- H02J 2009/007 . . Detection of the absence of a load
- H02J 9/02 . in which an auxiliary distribution system and its associated lamps are brought into service
- H02J 9/04 . in which the distribution system is disconnected from the normal source and connected to a standby source
- H02J 9/06 . . with automatic change-over
- H02J 9/061 . . . {characterised by the use of electronic means ([H02J 9/062](#) and [H02J 9/065](#) take precedence) }
- H02J 9/062 . . . {involving non rotating DC/AC converters }
- H02J 2009/063 . . . . Common neutral, e.g. ac input neutral line connected to ac output neutral line and dc middle point
- H02J 9/065 . . . . {for lighting purposes }
- H02J 9/066 . . . {characterised by the use of dynamo-electric machines ([H02J 9/08](#) takes precedence) }
- H02J 2009/067 . . . using multi-primary transformers, e.g. transformer having one primary for each ac energy source and a secondary for the loads
- H02J 2009/068 . . . Electronic means for switching from one power supply to another power supply , e.g. to avoid parallel connection
- H02J 9/08 . . . requiring starting of a prime-mover
- H02J 11/00** **Circuit arrangements for providing service supply to auxiliaries of stations in which electric power is generated, distributed, or converted** (emergency or standby arrangements [H02J 9/00](#))
- H02J 13/00** **Circuit arrangements for providing remote indication of network conditions, e.g. an instantaneous record of the open or closed condition of each circuit-breaker 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** { (circuits for indication of single switches [H01H 9/167](#); circuits specially adapted for remote switching of lighting via the power line [H05B 37/0263](#)) }
- H02J 13/0003 . {for DC networks }
- H02J 13/0006 . {for single frequency AC networks }
- H02J 13/001 . . {characterised by the display, e.g. of data or controls }
- H02J 13/0013 . . {characterised by transmission structure between the control or monitoring unit and the controlled or monitored unit }
- H02J 13/0017 . . . {with direct transmission between the control or monitoring unit and the controlled or monitored unit }
- H02J 13/002 . . . . {using the power network as support for the transmission }
- H02J 13/0024 . . . . . {using pulsed signals }



H02J 13/0027	.....	{Details of signals treatment means }
H02J 13/0031	.....	{using static semiconductor means }
H02J 13/0034	.....	{Transmitters }
H02J 13/0037	.....	{Receivers }
H02J 13/0041	.....	{using lamps or electromechanical means }
H02J 13/0044	.....	{using DC signal superposition }
H02J 13/0048	.....	{using modification of a parameter of the network power signal }
H02J 13/0051	.....	{Zero-crossing time }
H02J 13/0055	....	{using an auxiliary transmission line }
H02J 13/0058	.....	{carrying signals having the network frequency or DC signals }
H02J 13/0062	....	{using a data transmission bus }
H02J 13/0065	....	{using optical means }
H02J 13/0068	....	{using ultrasonic means }
H02J 13/0072	....	{using phone lines }
H02J 13/0075	....	{ using radio means }
H02J 13/0079	...	{with transmission using an intermediate treatment level between the control or monitoring unit and the controlled or monitored unit }
H02J 13/0082	....	{using the power network as transmission support }
H02J 13/0086	...	{with transmission using plurality of intermediate treatment level between the control or monitoring unit and the controlled or monitored unit }
H02J 13/0089	....	{using the power network as transmission support }
H02J 13/0093	.	{for AC networks with plurality frequencies }
H02J 13/0096	.	{for networks combining AC and DC power }
<b>H02J 15/00</b>		<b>Systems for storing electric energy</b> (mechanical systems therefor <a href="#">F01</a> to <a href="#">F04</a> ; in chemical form <a href="#">H01M</a> )
H02J 15/003	.	{in the form of hydraulic energy }
H02J 15/006	.	{in the form of pneumatic energy (accumulators for supplying fluid under pressure <a href="#">F15B 1/04</a> ) }
<b>H02J 17/00</b>		<b>Systems for supplying or distributing electric power by electromagnetic waves</b>