

# CPC COOPERATIVE PATENT CLASSIFICATION

**H02M APPARATUS FOR CONVERSION BETWEEN AC AND AC, BETWEEN AC AND DC, OR BETWEEN DC AND DC, AND FOR USE WITH MAINS OR SIMILAR POWER SUPPLY SYSTEMS; CONVERSION OF DC OR AC INPUT POWER INTO SURGE OUTPUT POWER; CONTROL OR REGULATION THEREOF** (systems for regulating electric or magnetic variables in general, e.g. using transformers, reactors or choke coils, combination of such systems with static converters [G05F](#); {digital function or clock generators} for digital computers [G06F 1/00](#), {[G06F 1/025](#), [G06F 1/04](#)}; transformers [H01F](#); connection or control of one converter with regard to conjoint operation with a similar or other source of supply [H02J](#); dynamo-electric converters [H02K 47/00](#); controlling transformers, reactors or choke coils, control or regulation of electric motors, generators or dynamo-electric converters [H02P](#); pulse generators [H03K](#); {static converters specially adapted for igniting or operating discharge lamps [H05B 41/28](#)})

## NOTES

1. This subclass covers only circuits or apparatus for the conversion of electric power, or arrangements for control or regulation of such circuits or apparatus. The electrotechnical elements employed are dealt within the appropriate subclasses, e.g. inductors, transformers [H01F](#), capacitors, electrolytic rectifiers [H01G](#), mercury rectifying or other discharge tubes [H01J](#), semiconductor devices [H01L](#), impedance networks or resonant circuit not primarily concerned with the transfer of electric power [H03H](#).
2. In this subclass, the following term is used with the meaning indicated:
  - "conversion", in respect of an electric variable, e.g. voltage or current, means the change of one or more of the parameters of the variable, e.g. amplitude, frequency, phase, polarity.

## 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 :

<a href="#">H02M 9/00</a>	covered by	<a href="#">H03K 3/53</a>
<a href="#">H02M 9/02</a>	covered by	<a href="#">H03K 3/53</a>
<a href="#">H02M 9/04</a>	covered by	<a href="#">H03K 3/53</a>
<a href="#">H02M 9/06</a>	covered by	<a href="#">H03K 3/53</a>

1/00	Details of apparatus for conversion	
2001/0003	. {Details of control, feedback and regulation circuits}	2001/0035 . . . {by burst mode control}
2001/0006	. . {Arrangements for supplying an adequate voltage to the control circuit of a converter}	2001/0038 . . {Circuits or arrangements for suppressing, e.g. by masking incorrect turn-on or turn-off signals, e.g. due to current spikes in current mode control}
2001/0009	. . {Devices and circuits for detecting current in a converter}	2001/0041 . . {Control circuits in which a clock signal is selectively enabled or disabled}
2001/0012	. . {Control circuits using digital or numerical techniques (in dc/dc converters <a href="#">H02M 3/157</a> , <a href="#">H02M 3/33515</a> ; in dc-ac converters <a href="#">H02M 7/53873</a> )}	2001/0045 . {Converters combining the concepts of switch-mode regulation and linear regulation, e.g. linear preregulator to switching converter, linear and switching converter in parallel, same converter or same transistor operating either in linear or switching mode}
2001/0016	. . {Control circuits providing compensation of output voltage deviations using feedforward of disturbance parameter}	2001/0048 . {Circuits or arrangements for reducing losses (using snubbers <a href="#">H02M 1/34</a> )}
2001/0019	. . . {the disturbance parameter being load current fluctuations}	2001/0051 . . {Diode reverse recovery losses}
2001/0022	. . . {the disturbance parameter being input voltage fluctuations}	2001/0054 . . {Transistor switching losses (periodically suspending operation of switching converter in low power mode <a href="#">H02M 2001/0035</a> )}
2001/0025	. . {Arrangements for modifying reference value, feedback value or error value in the control loop of a converter}	
2001/0029	. . {Circuits or arrangements for limiting the slope ("slew rate") of switching signals}	
2001/0032	. . {Control circuits allowing low power mode operation, e.g. "standby"}	

- 2001/0058 . . . {by employing soft switching techniques, i.e. commutation of transistor when voltage applied to it is zero and/or when current flowing through it is zero (in resonant inverters [H02M 2007/4815](#); in inverters operating from a resonant dc source [H02M 7/4826](#); using an auxiliary actively switched resonant commutation circuit connected to an intermediate dc voltage or between two push-pull branches of an inverter bridge [H02M 2007/4811](#))}
- 1/0061 . {using discharge tubes}
- 2001/0064 . {Magnetic structures combining different functions, e.g. storage, filtering, transformation}
- 2001/0067 . {Converter structures employing plural converter units, other than for parallel operation of the units on a single load}
- 2001/007 . . {Plural converter units in cascade (push-pull dc/dc converters with preregulator [H02M 3/3374](#); dc-ac converters following a dc-dc stage which includes a high frequency transformer [H02M 7/4807](#), dc-ac converters following a dc-dc conversion stage which generates a periodically varying voltage [H02M 7/4826](#))}
- 2001/0074 . . {Plural converter units whose inputs are connected in series}
- 2001/0077 . . {Plural converter units whose outputs are connected in series}
- 2001/008 . . {Plural converter units for generating at least two independent, non-parallel outputs, e.g. systems with plural point of load switching regulators}
- 2001/0083 . {Converters characterized by their input or output configuration}
- 2001/0087 . . {adapted for receiving as input a current source}
- 2001/009 . . {having more than one output with independent control (for dc-dc converter with intermediate ac [H02M 3/33561](#))}
- 2001/0093 . . {wherein the output is created by adding a regulated voltage to or subtracting it from an unregulated input}
- 2001/0096 . {Means for increasing hold-up time, i.e. the duration of time that a converter's output will remain within regulated limits following a loss of input power}
- 1/02 . Circuits specially adapted for the generation of grid-control or igniter-control voltages for discharge tubes incorporated in static converters
- 1/04 . . for tubes with grid control
- 1/042 . . . {wherein the phase of the control voltage is adjustable with reference to the AC voltage}
- 1/045 . . . . {for multiphase systems}
- 1/047 . . . . {for ignition at the zero-crossing of voltage or current}
- 1/06 . Circuits specially adapted for rendering non-conductive gas discharge tubes or equivalent semiconductor devices, e.g. thyatrons, thyristors
- 1/065 . . {for discharge tubes}
- 1/08 . Circuits specially adapted for the generation of control voltages for semiconductor devices incorporated in static converters
- 1/081 . . {wherein the phase of the control voltage is adjustable with reference to the AC source}
- 1/082 . . . {with digital control}
- 1/083 . . {for the ignition at the zero crossing of the voltage or the current}
- 1/084 . . using a control circuit common to several phases of a multi-phase system
- 1/0845 . . . {digitally controlled (or with digital control)}
- 1/088 . . for the simultaneous control of series or parallel connected semiconductor devices
- 1/092 . . . the control signals being transmitted optically
- 1/096 . . . the power supply of the control circuit being connected in parallel to the main switching element ([H02M 1/092](#) takes precedence)
- 1/10 . Arrangements incorporating converting means for enabling loads to be operated at will from different kinds of power supplies, e.g. from ac or dc
- 1/12 . Arrangements for reducing harmonics from ac input or output
- 2001/123 . . {Suppression of common mode voltage or current}
- 1/126 . . {using passive filters}
- 1/14 . Arrangements for reducing ripples from dc input or output
- 1/143 . . {using compensating arrangements (for reducing noise from the supply in transmission systems [H04B 15/005](#))}
- 1/146 . . {using discharge tubes}
- 1/15 . . using active elements
- 1/16 . Means for providing current step on switching, e.g. with saturable reactor
- 1/20 . Contact mechanisms of dynamic converters
- 1/22 . . incorporating collectors and brushes
- 1/24 . . incorporating rolling or tumbling contacts
- 1/26 . . incorporating cam-operated contacts
- 1/28 . . incorporating electromagnetically-operated vibrating contacts
- 1/30 . . incorporating liquid contacts
- 1/32 . Means for protecting converters other than automatic disconnection (emergency protective circuit arrangements specially adapted for converters with automatic disconnection [H02H 7/10](#))
- WARNING**  
Group [H02M 1/32](#) and its subgroup are not complete, see provisionally also [H02M 1/32](#), [H02M 3/00](#) and subgroups, [H02M 7/00](#) and subgroups
- 2001/322 . . {Means for rapidly discharging a capacitor of the converter, in order to protect electrical components or prevent electrical shock}
- 2001/325 . . {with means for allowing continuous operation despite a fault, i.e. fault tolerant converters}
- 2001/327 . . {against abnormal temperatures}
- 1/34 . . Snubber circuits
- 2001/342 . . . {Active non-dissipative snubbers}
- 2001/344 . . . {Active dissipative snubbers}
- 2001/346 . . . {Passive non-dissipative snubbers}
- 2001/348 . . . {Passive dissipative snubbers}
- 1/36 . Means for starting or stoping converters
- WARNING**  
Group [H02M 1/36](#) is not complete, see provisionally also [H02M 3/00](#) and subgroups, [H02M 7/00](#) and subgroups

1/38	<ul style="list-style-type: none"> <li>Means for preventing simultaneous conduction of switches</li> </ul> <p><b>WARNING</b></p> <p>Group <a href="#">H02M 1/38</a> is not complete, see provisionally also <a href="#">H02M 3/337</a> and subgroups, <a href="#">H02M 7/538</a> and subgroups</p>	3/07	<ul style="list-style-type: none"> <li>using capacitors charged and discharged alternately by semiconductor devices with control electrode, {e.g. charge pumps (for substrate bias voltage generators <a href="#">G05F 3/205</a>; for static stores <a href="#">G11C 5/145</a>, <a href="#">G11C 16/06</a>; charge pumping structures for internal polarisation <a href="#">H01L 27/0222</a>)}</li> </ul>
2001/385	<ul style="list-style-type: none"> <li>{with means for correcting output voltage deviations introduced by the dead time}</li> </ul>	2003/071	<ul style="list-style-type: none"> <li>{adapted to generate a negative voltage output from a positive voltage source}</li> </ul>
1/40	<ul style="list-style-type: none"> <li>Means for preventing magnetic saturation</li> </ul> <p><b>WARNING</b></p> <p>Group <a href="#">H02M 1/40</a> is not complete, see provisionally also <a href="#">H02M 3/335</a></p>	2003/072	<ul style="list-style-type: none"> <li>{adapted to generate an output voltage whose value is lower than the input voltage}</li> </ul>
1/42	<ul style="list-style-type: none"> <li>Circuits or arrangements for compensating for or adjusting power factor in converters or inverters</li> </ul> <p><b>WARNING</b></p> <p>Group <a href="#">H02M 1/42</a> is not complete, see provisionally also <a href="#">H02M 1/32</a> and subgroups</p>	3/073	<ul style="list-style-type: none"> <li>{Charge pumps of the SCHENKEL type}</li> </ul>
1/4208	<ul style="list-style-type: none"> <li>{Arrangements for improving power factor of AC input}</li> </ul>	2003/075	<ul style="list-style-type: none"> <li>{including a plurality of stages and two sets of clock signals, one set for the odd and one set for the even numbered stages}</li> </ul>
1/4216	<ul style="list-style-type: none"> <li>{operating from a three-phase input voltage (<a href="#">H02M 1/4233</a> takes precedence)}</li> </ul>	2003/076	<ul style="list-style-type: none"> <li>{the clock signals being boosted to a value which is higher than input voltage value}</li> </ul>
1/4225	<ul style="list-style-type: none"> <li>{using a non-isolated boost converter}</li> </ul>	2003/077	<ul style="list-style-type: none"> <li>{with parallel connected charge pump stages}</li> </ul>
1/4233	<ul style="list-style-type: none"> <li>{using a bridge converter consisting of active switches}</li> </ul>	2003/078	<ul style="list-style-type: none"> <li>{with means for reducing the back bias effect, i.e. the effect which causes the threshold voltage of transistors to increase as more stages are added to the converter}</li> </ul>
1/4241	<ul style="list-style-type: none"> <li>{using a resonant converter}</li> </ul>	3/08	<ul style="list-style-type: none"> <li>using discharge tubes without control electrode or semiconductor devices without control electrode</li> </ul>
1/425	<ul style="list-style-type: none"> <li>{using a single converter stage both for correction of AC input power factor and generation of a high frequency AC output voltage}</li> </ul>	3/10	<ul style="list-style-type: none"> <li>using discharge tubes with control electrode or semiconductor devices with control electrode (<a href="#">H02M 3/07</a> takes precedence)</li> </ul>
1/4258	<ul style="list-style-type: none"> <li>{using a single converter stage both for correction of AC input power factor and generation of a regulated and galvanically isolated DC output voltage (<a href="#">H02M 1/4241</a> takes precedence)}</li> </ul>	3/125	<ul style="list-style-type: none"> <li>using devices of a thyatron or thyristor type requiring extinguishing means</li> </ul>
1/4266	<ul style="list-style-type: none"> <li>{using passive elements}</li> </ul>	3/13	<ul style="list-style-type: none"> <li>using discharge tubes only</li> </ul>
2001/4275	<ul style="list-style-type: none"> <li>{by adding an auxiliary output voltage in series to the input}</li> </ul>	3/135	<ul style="list-style-type: none"> <li>using semiconductor devices only</li> </ul>
2001/4283	<ul style="list-style-type: none"> <li>{by adding a controlled rectifier in parallel to a first rectifier feeding a smoothing capacitor}</li> </ul>	3/137	<ul style="list-style-type: none"> <li>with automatic control of output voltage or current, e.g. switching regulators</li> </ul>
2001/4291	<ul style="list-style-type: none"> <li>{by using a Buck converter to switch the input current}</li> </ul>	3/139	<ul style="list-style-type: none"> <li>with digital control</li> </ul>
1/44	<ul style="list-style-type: none"> <li>Circuits or arrangements for compensating for electromagnetic interference in converters or inverters</li> </ul> <p><b>WARNING</b></p> <p>Group <a href="#">H02M 1/44</a> is not complete, see provisionally also <a href="#">H02M 7/00</a> and subgroups</p>	3/142	<ul style="list-style-type: none"> <li>including plural semiconductor devices as final control devices for a single load</li> </ul>
3/00	<p><b>Conversion of dc power input into dc power output {(converters specially adapted for use in combination with a battery <a href="#">H02J 7/0065</a>)}</b></p>	3/145	<ul style="list-style-type: none"> <li>using devices of a triode or transistor type requiring continuous application of a control signal</li> </ul>
3/005	<ul style="list-style-type: none"> <li>{using Cuk converters}</li> </ul>	3/15	<ul style="list-style-type: none"> <li>using discharge tubes only</li> </ul>
3/02	<ul style="list-style-type: none"> <li>without intermediate conversion into ac</li> </ul>	3/155	<ul style="list-style-type: none"> <li>using semiconductor devices only</li> </ul>
3/04	<ul style="list-style-type: none"> <li>by static converters</li> </ul>	2003/1552	<ul style="list-style-type: none"> <li>{Boost converters exploiting the leakage inductance of a transformer or of an alternator as boost inductor}</li> </ul>
3/06	<ul style="list-style-type: none"> <li>using resistors or capacitors, e.g. potential divider</li> </ul>	2003/1555	<ul style="list-style-type: none"> <li>{for the generation of a regulated current to a load whose impedance is substantially inductive}</li> </ul>
		2003/1557	<ul style="list-style-type: none"> <li>{Single ended primary inductor converters [SEPIC]}</li> </ul>
		3/156	<ul style="list-style-type: none"> <li>with automatic control of output voltage or current, e.g. switching regulators</li> </ul>
		3/1563	<ul style="list-style-type: none"> <li>{without using an external clock (<a href="#">H02M 3/158</a> takes precedence)}</li> </ul>
		2003/1566	<ul style="list-style-type: none"> <li>{with means for compensating against rapid load changes, e.g. with auxiliary current source, with dual mode control, with inductance variation}</li> </ul>
		3/157	<ul style="list-style-type: none"> <li>with digital control</li> </ul>

3/158	. . . . .	including plural semiconductor devices as final control devices for a single load	3/33569	. . . . .	{having several active switching elements ( <a href="#">H02M 3/3353</a> takes precedence)}
3/1582	. . . . .	{Buck-boost converters ( <a href="#">H02M 3/1584</a> takes precedence)}	3/33576	. . . . .	{having at least one active switching element at the secondary side of an isolation transformer}
3/1584	. . . . .	{with a plurality of power processing stages connected in parallel}	3/33584	. . . . .	{Bidirectional converters}
2003/1586	. . . . .	{switched with a phase shift, i.e. interleaved}	3/33592	. . . . .	{having a synchronous rectifier circuit or a synchronous freewheeling circuit at the secondary side of an isolation transformer}
3/1588	. . . . .	{comprising at least one synchronous rectifier element ( <a href="#">H02M 3/1582</a> , <a href="#">H02M 3/1584</a> take precedence)}	3/337	. . . . .	in push-pull configuration {( <a href="#">H02M 3/33576</a> takes precedence; with self-oscillating arrangements <a href="#">H02M 3/3382</a> and <a href="#">H02M 3/3385</a> )}
3/16	. .	by dynamic converters	3/3372	. . . . .	{of the parallel type}
3/18	. . .	using capacitors or batteries which are alternately charged and discharged, e.g. charged in parallel and discharged in series	3/3374	. . . . .	{with preregulator, e.g. current injected push-pull}
3/20	. .	by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters	3/3376	. . . . .	{with automatic control of output voltage or current}
3/22	. .	with intermediate conversion into ac	3/3378	. . . . .	{in a push-pull configuration of the parallel type ( <a href="#">H02M 3/3374</a> takes precedence)}
3/24	. .	by static converters	3/338	. . . . .	in a self-oscillating arrangement ( <a href="#">H02M 3/337</a> takes precedence)
3/26	. . .	using discharge tubes without control electrode or semiconductor devices without control electrode to produce the intermediate ac	3/3381	. . . . .	{using a single commutation path}
3/28	. . .	using discharge tubes with control electrode or semiconductor devices with control electrode to produce the intermediate ac	3/3382	. . . . .	{in a push-pull circuit arrangement}
3/285	. . . .	{Single converters with a plurality of output stages connected in parallel (parallel operation of a plurality of converters in dc distribution networks <a href="#">H02J 1/10</a> )}	3/3384	. . . . .	{of the parallel type}
3/305	. . . .	using devices of a thyatron or thyristor type requiring extinguishing means	3/3385	. . . . .	{with automatic control of output voltage or current ( <a href="#">H02M 3/33561</a> takes precedence)}
3/31	. . . . .	using discharge tubes only	3/3387	. . . . .	{in a push-pull configuration}
3/315	. . . . .	using semiconductor devices only	3/3388	. . . . .	{of the parallel type}
3/3155	. . . . .	{with automatic control of the output voltage or current}	3/34	. .	by dynamic converters
3/325	. . . .	using devices of a triode or a transistor type requiring continuous application of a control signal	3/36	. . .	using mechanical parts to select progressively or to vary continuously the input potential
3/33	. . . . .	using discharge tubes only	3/38	. . .	using mechanical contact-making and -breaking parts to interrupt a single potential
3/335	. . . . .	using semiconductor devices only	3/40	. . . .	wherein the parts are rotating and collectors co-operate with brushes or rollers
3/33507	. . . . .	{with automatic control of the output voltage or current ( <a href="#">H02M 3/33561</a> , <a href="#">H02M 3/33569</a> take precedence)}	3/42	. . . .	with electromagnetically-operated vibrating contacts, e.g. chopper ( <a href="#">self-interrupters in general H01H 51/34</a> )
3/33515	. . . . .	{with digital control}	3/44	. .	by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
3/33523	. . . . .	{with galvanic isolation between input and output}	<b>5/00</b>		<b>Conversion of ac power input into ac power output, e.g. for change of voltage, for change of frequency, for change of number of phases</b>
3/3353	. . . . .	{having at least two simultaneously operating switches on the input side, e.g. "double forward" or "double (switched) flyback" converter}	5/005	. .	{using discharge tubes}
3/33538	. . . . .	{of the forward type ( <a href="#">H02M 3/3353</a> , <a href="#">H02M 3/33569</a> take precedence)}	5/02	. .	without intermediate conversion into dc
3/33546	. . . . .	{with automatic control of the output voltage or current ( <a href="#">H02M 3/33561</a> takes precedence)}	5/04	. .	by static converters ( <a href="#">controlling transformers, reactors or choke coils, e.g. by tap changing H02P 13/00</a> )
3/33553	. . . . .	{with galvanic isolation between input and output}	5/06	. . .	using impedances
3/33561	. . . . .	{having more than one output with independent control}	5/08	. . . .	using capacitors only
			5/10	. . .	using transformers
			5/12	. . . .	for conversion of voltage or current amplitude only
			5/14	. . . .	for conversion between circuits of different phase number
			5/16	. . . .	for conversion of frequency

5/18	. . . . .	for conversion of waveform	5/458	. . . . .	using semiconductor devices only
5/20	. . .	using discharge tubes without control electrode or semiconductor devices without control electrode	5/4585	. . . . .	{having a rectifier with controlled elements}
5/22	. . .	using discharge tubes with control electrode or semiconductor devices with control electrode	5/46	. .	by dynamic converters
5/225	. . . . .	{comprising two stages of AC-AC conversion, e.g. having a high frequency intermediate link}	5/48	. .	by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
5/25	. . . . .	using devices of a thyatron or thyristor type requiring extinguishing means ( <a href="#">H02M 5/225</a> , <a href="#">H02M 5/27</a> take precedence)	<b>7/00</b>		<b>Conversion of ac power input into dc power output; Conversion of dc power input into ac power output</b>
5/253	. . . . .	using discharge tubes only	7/003	. .	{Constructional details, e.g. physical layout, assembly, wiring, busbar connections}
5/257	. . . . .	using semiconductor devices only	7/006	. .	{using discharge tubes}
5/2573	. . . . .	{with control circuit}	7/02	. .	Conversion of ac power input into dc power output without possibility of reversal
5/2576	. . . . .	{with digital control}	7/04	. .	by static converters
5/27	. . . . .	for conversion of frequency	7/043	. . .	{using transformers or inductors only}
5/271	. . . . .	{from a three phase input voltage}	7/046	. . .	{using discharge tubes}
5/272	. . . . .	{for variable speed constant frequency systems}	7/06	. . .	using discharge tubes without control electrode or semiconductor devices without control electrode
5/273	. . . . .	{with digital control}	7/062	. . . . .	{Avoiding or suppressing excessive transient voltages or currents}
5/275	. . . . .	using devices of a triode or transistor type requiring continuous application of a control signal ( <a href="#">H02M 5/225</a> , <a href="#">H02M 5/297</a> take precedence)	7/064	. . . . .	{with several outputs}
5/29	. . . . .	using discharge tubes only	7/066	. . . . .	{particular circuits having a special characteristic}
5/293	. . . . .	using semiconductor devices only	7/068	. . . . .	{mounted on a transformer}
2005/2932	. . . . .	{with automatic control of output voltage, current or power}	7/08	. . . . .	arranged for operation in parallel
2005/2935	. . . . .	{using reverse phase control, i.e. turn-on of switch in series with load at zero crossing of input voltage, turn-off before next zero crossing}	7/10	. . . . .	arranged for operation in series, e.g. for multiplication of voltage
2005/2937	. . . . .	{using whole cycle control, i.e. switching an integer number of whole (half) cycles of the ac input voltage}	7/103	. . . . .	{Containing passive elements (capacitively coupled) which are ordered in cascade on one source}
5/297	. . . . .	for conversion of frequency	7/106	. . . . .	{With physical arrangement details}
5/32	. .	by dynamic converters	7/12	. . .	using discharge tubes with control electrode or semiconductor devices with control electrode
5/34	. . .	using mechanical contact-making and -breaking parts	7/125	. . . . .	{Avoiding or suppressing excessive transient voltages or currents}
5/36	. . . . .	wherein the parts are rotating and collectors co-operate with brushes or rollers	7/145	. . . . .	using devices of a thyatron or thyristor type requiring extinguishing means
5/38	. .	by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters	7/15	. . . . .	using discharge tubes only
5/40	. .	with intermediate conversion into dc	7/151	. . . . .	{with automatic control ( <a href="#">H02M 7/153</a> takes precedence)}
5/42	. .	by static converters	7/153	. . . . .	{arranged for operation in parallel}
5/44	. . .	using discharge tubes or semiconductor devices to convert the intermediate dc into ac	7/155	. . . . .	using semiconductor devices only
5/443	. . . . .	using devices of a thyatron or thyristor type requiring extinguishing means	7/1552	. . . . .	{in a biphasic or polyphase arrangement (voltage multipliers <a href="#">H02M 7/19</a> )}
5/447	. . . . .	using discharge tubes only	7/1555	. . . . .	{with control circuit}
5/45	. . . . .	using semiconductor devices only	7/1557	. . . . .	{with automatic control of the output voltage or current}
5/4505	. . . . .	{having a rectifier with controlled elements}	7/162	. . . . .	in a bridge configuration
5/451	. . . . .	with automatic control of output voltage or frequency	7/1623	. . . . .	{with control circuit}
5/452	. . . . .	with automatic control of output waveform	7/1626	. . . . .	{with automatic control of the output voltage or current}
5/453	. . . . .	using devices of a triode or transistor type requiring continuous application of a control signal	7/17	. . . . .	arranged for operation in parallel
5/456	. . . . .	using discharge tubes only	7/19	. . . . .	arranged for operation in series, e.g. for voltage multiplication
			7/21	. . . . .	using devices of a triode or transistor type requiring continuous application of a control signal
			7/213	. . . . .	using discharge tubes only
			7/217	. . . . .	using semiconductor devices only

7/2173	. . . . .	{in a biphasic or polyphase circuit arrangement ( <a href="#">H02M 7/2176</a> takes precedence; voltage multipliers <a href="#">H02M 7/25</a> )}	2007/4835	. . . . .	{comprising a plurality of cells, each including a switchable capacitor, the capacitors having a nominal charge voltage which corresponds to a given fraction of the input voltage, the capacitors being selectively connected in series to determine the instantaneous output voltage}
7/2176	. . . . .	{comprising a passive stage to generate a rectified sinusoidal voltage and a controlled switching element in series between such stage and the output}	7/487	. . . . .	Neutral point clamped inverters
7/219	. . . . .	in a bridge configuration	7/49	. . . . .	Combination of the output voltage waveforms of a plurality of converters
2007/2195	. . . . .	{the switches being synchronously commutated at the same frequency of the AC input voltage}	7/493	. . . . .	the static converters being arranged for operation in parallel
7/23	. . . . .	arranged for operation in parallel {( <a href="#">H02M 7/2176</a> takes precedence)}	7/497	. . . . .	sinusoidal output voltages being obtained by combination of several voltages being out of phase
7/25	. . . . .	arranged for operation in series, e.g. for multiplication of voltage	7/501	. . . . .	sinusoidal output voltages being obtained by the combination of several pulse-voltages having different amplitude and width
7/26	. . . . .	using open-spark devices, e.g. Marx rectifier	7/505	. . . . .	using devices of a thyatron or thyristor type requiring extinguishing means {( <a href="#">H02M 7/4807</a> , <a href="#">H02M 7/483</a> , <a href="#">H02M 7/493</a> and <a href="#">H02M 7/4826</a> take precedence)}
7/28	. . . . .	using electrolytic rectifiers	7/51	. . . . .	using discharge tubes only
7/30	. . . . .	by dynamic converters	7/515	. . . . .	using semiconductor devices only
7/32	. . . . .	using mechanical contact-making and -breaking parts	7/5152	. . . . .	{with separate extinguishing means}
7/34	. . . . .	wherein the parts are rotating and collectors co-operate with brushes or rollers	7/5155	. . . . .	{wherein each commutation element has its own extinguishing means}
7/36	. . . . .	with electromagnetically-operated vibrating contacts, e.g. chopper ( <a href="#">self-interrupters in general H01H 51/34</a> )	7/5157	. . . . .	{wherein the extinguishing of every commutation element will be obtained by means of a commutation inductance, by starting another main commutation element in series with the first}
7/38	. . . . .	using one or more sparking electrodes rotating over counterelectrodes	7/516	. . . . .	Self-oscillating arrangements
7/40	. . . . .	by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters	7/517	. . . . .	with special starting equipment
7/42	. . . . .	Conversion of dc power input into ac power output without possibility of reversal	7/519	. . . . .	in a push-pull configuration ( <a href="#">H02M 7/517</a> takes precedence)
7/44	. . . . .	by static converters	7/521	. . . . .	in a bridge configuration
7/445	. . . . .	{using discharge tubes}	7/523	. . . . .	with LC-resonance circuit in the main circuit
7/46	. . . . .	using discharge tubes without control electrode or semiconductor devices without control electrode	7/5233	. . . . .	{the commutation elements being in a push-pull arrangement}
7/48	. . . . .	using discharge tubes with control electrode or semiconductor devices with control electrode	7/5236	. . . . .	{in a series push-pull arrangement}
2007/4803	. . . . .	{with means for reducing dc component from AC output voltage}	7/525	. . . . .	with automatic control of output waveform or frequency ( <a href="#">H02M 7/517</a> - <a href="#">H02M 7/523</a> take precedence)
7/4807	. . . . .	{having a high frequency intermediate AC stage}	7/527	. . . . .	by pulse width modulation
2007/4811	. . . . .	{having an auxiliary actively switched resonant commutation circuit connected to an intermediate dc voltage or between two push-pull branches}	7/529	. . . . .	using digital control
2007/4815	. . . . .	{Resonant converters ( <a href="#">H02M 2007/4811</a> and <a href="#">H02M 7/4826</a> take precedence)}	7/53	. . . . .	using devices of a triode or transistor type requiring continuous application of a control signal {( <a href="#">H02M 7/4807</a> , <a href="#">H02M 7/493</a> and <a href="#">H02M 7/4826</a> take precedence)}
2007/4818	. . . . .	{with means for adaptation of resonance frequency, e.g. by modification of capacitance or inductance of resonance circuit}	7/533	. . . . .	using discharge tubes only
2007/4822	. . . . .	{arranged for operation in parallel}	7/537	. . . . .	using semiconductor devices only, e.g. single switched pulse inverters
7/4826	. . . . .	{operating from a resonant DC source, i.e. the DC input voltage varies periodically, e.g. resonant DC-link inverters}	7/5375	. . . . .	with special starting equipment
7/483	. . . . .	Converters with outputs that each can have more than two voltages levels	<b>WARNING</b> Incomplete, see also <a href="#">H02M 1/36</a>		
			7/538	. . . . .	in a push-pull configuration ( <a href="#">H02M 7/5375</a> takes precedence; {with oscillating arrangements <a href="#">H02M 7/53832</a> , <a href="#">H02M 7/53846</a> })

- 7/53803 . . . . . {with automatic control of output voltage or current}
- 7/53806 . . . . . {in a push-pull configuration of the parallel type}
- 7/5381 . . . . . Parallel type
- 7/5383 . . . . . in a self-oscillating arrangement  
([H02M 7/538](#) takes precedence)
- 7/53832 . . . . . {in a push-pull arrangement}
- 7/53835 . . . . . {of the parallel type}
- 7/53838 . . . . . using a single commutation path
- 7/53846 . . . . . Control circuits

**WARNING**

Group [H02M 7/53846](#) and subgroups is not complete, see provisionally also [H02M 7/5383](#) and subgroups

- 7/538463 . . . . . {for thyristor type converters}
- 7/538466 . . . . . {for transistor type converters}
- 7/53854 . . . . . using thyristor type converters
- 7/53862 . . . . . using transistor type converters
- 7/5387 . . . . . in a bridge configuration
- 7/53871 . . . . . {with automatic control of output voltage or current}
- 7/53873 . . . . . {with digital control}
- 7/53875 . . . . . {with analogue control of three-phase output}
- 2007/53876 . . . . . {based on synthesising a desired voltage vector via the selection of appropriate fundamental voltage vectors, and corresponding dwelling times}
- 2007/53878 . . . . . {by time shifting switching signals of one diagonal pair of the bridge with respect to the other diagonal pair}
- 7/5388 . . . . . with asymmetrical configuration of switches

**WARNING**

Group [H02M 7/5388](#) is not complete, see provisionally also [H02M 7/5387](#) and subgroups

- 7/539 . . . . . with automatic control of output wave form or frequency  
([H02M 7/5375](#) - [H02M 7/5387](#) take precedence)
- 7/5395 . . . . . by pulse-width modulation
- 7/54 . . . by dynamic converters
- 7/56 . . . using mechanical parts to select progressively, or to vary continuously, the input potential
- 7/58 . . . using mechanical contact-making and -breaking parts to interrupt a single potential
- 7/60 . . . wherein the parts are rotating and collectors co-operate with brushes or rollers
- 7/62 . . . with electromagnetically-operated vibrating contacts, e.g. chopper ([self-interrupters in general H01H 51/34](#))
- 7/64 . . . by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters
- 7/66 . . with possibility of reversal
- 7/68 . . . by static converters

- 7/70 . . . using discharge tubes without control electrode or semiconductor devices without control electrode
- 7/72 . . . using discharge tubes with control electrode or semiconductor devices with control electrode
- 7/75 . . . . using devices of a thyratron or thyristor type requiring extinguishing means ([H02M 7/77](#) takes precedence)
- 7/753 . . . . . using discharge tubes only
- 7/757 . . . . . using semiconductor devices only
- 7/7575 . . . . . {for high voltage direct transmission link}
- 7/758 . . . . . with automatic control of output waveform or frequency
- 7/77 . . . . . arranged for operation in parallel
- 7/79 . . . . using devices of a triode or transistor type requiring continuous application of a control signal ([H02M 7/81](#) takes precedence)
- 7/793 . . . . . using discharge tubes only
- 7/797 . . . . . using semiconductor devices only
- 7/81 . . . . . arranged for operation in parallel
- 7/82 . . . using open-spark devices, e.g. Marx rectifier
- 7/84 . . . using electrolytic rectifiers
- 7/86 . . . by dynamic converters
- 7/88 . . . using mechanical parts to select progressively or to vary continuously the input potential
- 7/90 . . . using mechanical contact-making and -breaking parts to interrupt a single potential
- 7/92 . . . wherein the parts are rotating and collectors co-operate with brushes or rollers
- 7/94 . . . wherein the parts are operated by rotating cams or cam-like devices
- 7/95 . . . with electromagnetically-operated vibrating contacts, e.g. chopper ([self-interrupters in general H01H 51/34](#))
- 7/96 . . . with moving liquid contacts
- 7/98 . . . by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters

**11/00 Power conversion systems not covered by the preceding groups**