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 (transformers H01F; dynamo-electric converters H02K 47/00; controlling transformers, reactors or choke coils, control or regulation of electric motors, generators or dynamo-electric converters H02P)

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.

WARNINGS
1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
   - H02M 9/00 covered by H03K 3/53
   - H02M 9/02 covered by H03K 3/53
   - H02M 9/04 covered by H03K 3/53
   - H02M 9/06 covered by H03K 3/53

2. 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 Details of apparatus for conversion

WARNING

Group H02M 1/00 is impacted by reclassification into group H02M 1/0043.
Groups H02M 1/00 and H02M 1/0043 should be considered in order to perform a complete search.

1/0003 [Details of control, feedback or regulation circuits]
1/0006 [Arrangements for supplying an adequate voltage to the control circuit of converters]
1/0009 [Devices or circuits for detecting current in a converter]
1/0012 [Control circuits using digital or numerical techniques (in DC/DC converters H02M 3/157, H02M 3/33515; in DC-AC converters H02M 7/53873)]
1/0016 [Control circuits providing compensation of output voltage deviations using feedforward of disturbance parameters]
1/0019 [the disturbance parameters being load current fluctuations]
1/0022 [the disturbance parameters being input voltage fluctuations]
is impacted by

should be considered in order to

and

and

[WARNING]

Groups H02M 1/0083 and H02M 1/0095 should be considered in order to perform a complete search.

[Magnetic structures combining different functions, e.g. storage, filtering or transformation]

Converter units, other than for parallel operation of the units on a single load

[WARNING]

Groups H02M 1/0083 and H02M 1/0095 is incomplete pending reclassification of documents from group H02M 1/0083.

Circuits specially adapted for the generation of grid-control or igniter-control voltages for discharge tubes incorporated in static converters

for tubes with grid control

(wherein the phase of the control voltage is adjustable with reference to the AC voltage)

[for multiphase systems]

[for ignition at the zero-crossing of voltage or current]

Circuits specially adapted for the generation of control voltages for semiconductor devices incorporated in static converters

(wherein the phase of the control voltage is adjustable with reference to the AC source)

(with digital control)

[for the ignition at the zero crossing of the voltage or the current]

using a control circuit common to several phases of a multi-phase system

(digitally controlled (or with digital control))

for the simultaneous control of series or parallel connected semiconductor devices

the control signals being transmitted optically

the power supply of the control circuit being connected in parallel to the main switching element (H02M 1/092 takes precedence)

Arrangements incorporating converting means for enabling loads to be operated at will from different kinds of power supplies, e.g. from ac or dc

Arrangements for reducing harmonics from ac input or output

(Suppression of common mode voltage or current)

(using passive filters)

Arrangements for reducing ripples from dc input or output

(using compensating arrangements (for reducing noise from the supply in transmission systems H04B 15/005))

(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
1/322 . . . [Means for rapidly discharging a capacitor of the converter for protecting electrical components or for preventing electrical shock]
1/325 . . . [with means for allowing continuous operation despite a fault, i.e. fault tolerant converters]
1/327 . . . [against abnormal temperatures]
1/34 . . . Snubber circuits
1/342 . . . [Active non-dissipative snubbers]
1/344 . . . [Active dissipative snubbers]
1/346 . . . [Passive non-dissipative snubbers]
1/348 . . . [Passive dissipative snubbers]
1/36 . . . Means for starting or stopping converters
1/38 . . . Means for preventing simultaneous conduction of switches
1/385 . . . [with means for correcting output voltage deviations introduced by the dead time]
1/40 . . . Means for preventing magnetic saturation
1/42 . . . Circuits or arrangements for compensating for or adjusting power factor in converters or inverters
1/4208 . . . [Arrangements for improving power factor of AC input]
1/4216 . . . [operating from a three-phase input voltage (H02M 1/4233 takes precedence)]
1/4225 . . . [using a non-isolated boost converter]

**WARNING**

Group H02M 1/4225 is impacted by reclassification into group H02M 1/0085.
Groups H02M 1/4225 and H02M 1/0085 should be considered in order to perform a complete search.

1/4233 . . . [using a bridge converter comprising active switches]

**WARNING**

Group H02M 1/4233 is impacted by reclassification into group H02M 1/0085.
Groups H02M 1/4233 and H02M 1/0085 should be considered in order to perform a complete search.

1/4241 . . . [using a resonant converter]
1/425 . . . [using a single converter stage both for correction of AC input power factor and generation of a high frequency AC output voltage]
1/4258 . . . [using a single converter stage both for correction of AC input power factor and generation of a regulated and galvanically isolated DC output voltage (H02M 1/4241 takes precedence)]
1/4266 . . . [using passive elements]
1/4275 . . . [by adding an auxiliary output voltage in series to the input]
1/4283 . . . [by adding a controlled rectifier in parallel to a first rectifier feeding a smoothing capacitor]
1/4291 . . . [by using a Buck converter to switch the input current]
1/44 . . . Circuits or arrangements for compensating for electromagnetic interference in converters or inverters

**3/00 Conversion of dc power input into dc power output**

**WARNING**

Group H02M 3/00 is impacted by reclassification into group H02M 3/003.
Groups H02M 3/00 and H02M 3/003 should be considered in order to perform a complete search.

3/003 . . . [Constructional details, e.g. physical layout, assembly, wiring or busbar connections]

**WARNING**

Group H02M 3/003 is incomplete pending reclassification of documents from group H02M 3/00.
Groups H02M 3/00 and H02M 3/003 should be considered in order to perform a complete search.

3/005 . . . [using Cuk converters]
3/01 . . . [Resonant DC/DC converters]

**WARNING**

Groups H02M 3/01 and H02M 3/015 are incomplete pending reclassification of documents from groups H02M 3/33569 and H02M 3/337.
All groups listed in this Warning should be considered in order to perform a complete search.

3/015 . . . [with means for adaptation of resonance frequency, e.g. by modification of capacitance or inductance of resonance circuit]
3/02 . . . without intermediate conversion into ac
3/04 . . . by static converters
3/06 . . . using resistors or capacitors, e.g. potential divider
3/07 . . . using capacitors charged and discharged alternately by semiconductor devices with control electrode, e.g. charge pumps
3/071 . . . . . . [adapted to generate a negative voltage output from a positive voltage source]
3/072 . . . . . . [adapted to generate an output voltage whose value is lower than the input voltage]
3/073 . . . . . . [Charge pumps of the Schenkel-type]
3/075 . . . . . . [including a plurality of stages and two sets of clock signals, one set for the odd and one set for the even numbered stages]
3/076 . . . . . . [the clock signals being boosted to a value being higher than the input voltage value]
3/077 . . . . . . [with parallel connected charge pump stages]
by dynamic converters

3/18 . . . using capacitors or batteries which are
alternately charged and discharged, e.g.
charged in parallel and discharged in series

3/20 . . . by combination of static with dynamic converters;
by combination of dynamo-electric with other
dynamic or static converters

3/22 . . . with intermediate conversion into ac

3/24 . . . by static converters

3/26 . . . using discharge tubes without control electrode
or semiconductor devices without control electrode
to produce the intermediate ac

3/28 . . . using discharge tubes with control electrode or
semiconductor devices with control electrode to produce the intermediate ac

3/285 . . . [Single converters with a plurality of
output stages connected in parallel (parallel
operation of a plurality of converters in dc
distribution networks H02J 1/101)]

3/305 . . . using devices of a thyatron or thyristor type
requiring extinguishing means

3/31 . . . using discharge tubes only

3/315 . . . using semiconductor devices only

3/3155 . . . [with automatic control of the output
voltage or current]

3/325 . . . using devices of a triode or a transistor type
requiring continuous application of a control signal

3/33 . . . using discharge tubes only

3/335 . . . using semiconductor devices only

3/33507 . . . [with automatic control of the output
voltage or current, e.g.
flyback converters (H02M 3/33561,
H02M 3/33569 take precedence)]

3/33515 . . . . . . . [with digital control]

3/33523 . . . . . . . [with galvanic isolation between
input and output of both the power
stage and the feedback loop]

3/3353 . . . . . . . . [having at least two simultaneously
operating switches on the input side, e.g.
double forward or double (switched)
flyback” converter]

3/33538 . . . . . . . . . [of the forward type (H02M 3/3353,
H02M 3/33569 take precedence)]

3/33546 . . . . . . . . . . (with automatic control of the output
voltage or current (H02M 3/33561
takes precedence))

3/33553 . . . . . . . . . . . [with galvanic isolation between
input and output of both the power
stage and the feedback loop]

3/33561 . . . . . . . . . . . [having more than one output with
independent control]

3/33569 . . . . . . . . . . . [having several active switching
elements (H02M 3/3353 takes
precedence)]

**WARNING**

Group **H02M** 3/33569 is impacted by reclassification into groups
H02M 3/33571, H02M 3/33573,
H02M 3/01 and H02M 3/015.
All groups listed in this Warning
should be considered in order to
perform a complete search.
3/337 

**WARNING**

Group H02M 3/337 is incomplete pending reclassification of documents from groups H02M 3/33569 and H02M 3/337.

Groups H02M 3/33569, H02M 3/337 and H02M 3/3371 should be considered in order to perform a complete search.

3/337

**[Half-bridge at primary side of an isolation transformer]**

3/338

**[Full-bridge at primary side of an isolation transformer]**

3/3376

**[having at least one active switching element at the secondary side of an isolation transformer]**

3/3384

**[Bidirectional converters]**

3/3392

**[having a synchronous rectifier circuit or a synchronous freewheeling circuit at the secondary side of an isolation transformer]**

3/337

**in push-pull configuration**

(H02M 3/3376 takes precedence; with self-oscillating arrangements H02M 3/3382, H02M 3/3385)

**WARNING**

Group H02M 3/337 is impacted by reclassification into groups H02M 3/33571, H02M 3/3373, H02M 3/301 and H02M 3/3015.

All groups listed in this Warning should be considered in order to perform a complete search.

3/3372

**[of the parallel type]**

3/3374

**[with preregulator, e.g. current injected push-pull]**

3/3376

**[with automatic control of output voltage or current]**

3/3378

**[in a push-pull configuration of the parallel type (H02M 3/3374 takes precedence)]**

3/338

**in a self-oscillating arrangement**

(H02M 3/337 takes precedence)

3/3381

**[using a single commutation path]**

3/3382

**[in a push-pull circuit arrangement]**

3/3384

**[of the parallel type]**

3/3385

**[with automatic control of output voltage or current (H02M 3/33561 takes precedence)]**

3/3387

**[in a push-pull configuration]**

3/3388

**[of the parallel type]**

3/34

**by dynamic converters**

3/36

**using mechanical parts to select progressively or to vary continuously the input potential**

3/38

**using mechanical contact-making and - breaking parts to interrupt a single potential**

3/40

**wherein the parts are rotating and collectors co-operate with brushes or rollers**

3/42

**with electromagnetically-operated vibrating contacts, e.g. chopper**

3/44

**by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters**

5/00 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

5/005

**[using discharge tubes]**

5/02

**without intermediate conversion into dc**

5/04

**by static converters (controlling transformers, reactors or choke coils, e.g. by tap changing H02P 13/00)**

5/06

**using impedances**

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**

5/20

**using discharge tubes without control electrode or semiconductor devices without control electrode**

5/22

**using discharge tubes with control electrode or semiconductor devices with control electrode**

5/225

**[comprising two stages of AC-AC conversion, e.g. having a high frequency intermediate link]**

5/25

**using devices of a thyatron or thyristor type requiring extinguishing means**

5/253

**using discharge tubes only**

5/257

**using semiconductor devices only**

5/2573

**[with control circuit]**

5/2576

**[with digital control]**

5/27

**for conversion of frequency**

5/271

**[from a three phase input voltage]**

5/272

**[for variable speed constant frequency systems]**

5/273

**[with digital control]**

5/275

**using devices of a triode or transistor type requiring continuous application of a control signal**

5/29

**using discharge tubes only**

5/293

**using semiconductor devices only**

5/2932

**[with automatic control of output voltage, current or power]**
5/2935 . . . . . . . [using reverse phase control, i.e. turn-
on of switches in series with load at
zero crossing of input voltage, turn-
off before next zero crossing]
5/2937 . . . . . . . [using whole cycle control, i.e.
switching an integer number of
whole or half cycles of the AC input
voltage]
5/297 . . . . . . . for conversion of frequency
5/32 . . . . . . . by dynamic converters
5/34 . . . . . . . using mechanical contact-making and -
breaking parts
5/36 . . . . . . . wherein the parts are rotating and collectors
co-operate with brushes or rollers
5/38 . . . . by combination of static with dynamic converters;
by combination of dynamo-electric with other
dynamic or static converters
5/40 . . . . . . . with intermediate conversion into dc
5/42 . . . . . . . by static converters
5/44 . . . . . . . using discharge tubes or semiconductor devices
to convert the intermediate dc into ac
5/443 . . . . . . . using devices of a thyatron or thyristor type
requiring extinguishing means
5/447 . . . . . . . using discharge tubes only
5/45 . . . . . . . using semiconductor devices only
5/450 . . . . . . . [having a rectifier with controlled
elements]
5/451 . . . . . . . with automatic control of output voltage
or frequency
5/452 . . . . . . . with automatic control of output
waveform
5/453 . . . . . . . using devices of a triode or transistor type
requiring continuous application of a control
signal
5/456 . . . . . . . using discharge tubes only
5/458 . . . . . . . using semiconductor devices only
5/4585 . . . . . . . [having a rectifier with controlled
elements]
5/46 . . . . . . . by dynamic converters
5/48 . . . . . . . by combination of static with dynamic converters;
by combination of dynamo-electric with other
dynamic or static converters

7/00 Conversion of ac power input into dc power
output; Conversion of dc power input into ac
power output
7/003 . . . . (Constructional details, e.g. physical layout,
assembly, wiring or busbar connections)
7/006 . . . . (using discharge tubes)
7/002 . . . . Conversion of ac power input into dc power output
without possibility of reversal
7/004 . . . . by static converters

**WARNING**

Group H02M 7/04 is impacted by reclassification into group H02M 7/05.
Groups H02M 7/04 and H02M 7/05 should be considered in order to perform a complete
search.

7/043 . . . . [using transformers or inductors only]
7/046 . . . . [using discharge tubes]

7/05 . . . . [Capacitor coupled rectifiers]

**WARNING**

Group H02M 7/05 is incomplete pending reclassification of documents from group
H02M 7/04.
Groups H02M 7/04 and H02M 7/05 should be considered in order to perform a complete
search.

7/06 . . . . using discharge tubes without control electrode
or semiconductor devices without control
electrode
7/062 . . . . [Avoiding or suppressing excessive transient
voltages or currents]
7/064 . . . . [with several outputs]
7/066 . . . . [particular circuits having a special
characteristic]
7/068 . . . . [mounted on a transformer]
7/08 . . . . arranged for operation in parallel
7/10 . . . . arranged for operation in series, e.g. for
multiplication of voltage
7/103 . . . . [Containing passive elements
(capacitively coupled) which are ordered
in cascade on one source]
7/106 . . . . [With physical arrangement details]
7/12 . . . . using discharge tubes with control electrode or
semiconductor devices with control electrode
7/125 . . . . [Avoiding or suppressing excessive transient
voltages or currents]
7/145 . . . . using devices of a thyatron or thyristor type
requiring extinguishing means
7/15 . . . . using discharge tubes only
7/151 . . . . [with automatic control (H02M 7/153
takes precedence)]
7/153 . . . . [arranged for operation in parallel]
7/155 . . . . using semiconductor devices only
7/1552 . . . . [in a biphase or polyphase circuit
(voltage multipliers H02M 7/19)]
7/1555 . . . . [with control circuit]
7/1557 . . . . [with automatic control of the output
voltage or current]
7/162 . . . . in a bridge configuration
7/1623 . . . . [with control circuit]
7/1626 . . . . [with automatic control of the
output voltage or current]
7/17 . . . . . . . arranged for operation in parallel
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 biphase or polyphase circuit
arrangement (H02M 7/2176 takes precedence; voltage multipliers
H02M 7/25)]
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]
7/219 . . . . in a bridge configuration
7/2195 . . . . . . [the switches being synchronously commutated at the same frequency of the AC input voltage]

7/23 . . . . . . arranged for operation in parallel

{ (H02M 7/2176 takes precedence) }

7/25 . . . . . . arranged for operation in series, e.g. for multiplication of voltage

7/26 . . . using open-spark devices, e.g. Marx rectifier

7/28 . . . using electrolytic rectifiers

7/30 . . . by dynamic converters

7/32 . . . using mechanical contact-making and - breaking parts

7/34 . . . wherein the parts are rotating and collectors co-operate with brushes or rollers

7/36 . . . with electromagnetically-operated vibrating contacts, e.g. chopper

7/38 . . . using one or more sparking electrodes rotating over counter electrodes

7/40 . . . by combination of static with dynamic converters; by combination of dynamo-electric with other dynamic or static converters

7/42 . Conversion of dc power input into ac power output without possibility of reversal

7/44 . . . by static converters

7/445 . . . [using discharge tubes]

7/46 . . . using discharge tubes without control electrode or semiconductor devices without control electrode

7/48 . . . using discharge tubes with control electrode or semiconductor devices with control electrode

7/4803 . . . [with means for reducing DC component from AC output voltage]

7/4807 . . . [having a high frequency intermediate AC stage]

7/4811 . . . [having auxiliary actively switched resonant commutation circuits connected to intermediate DC voltage or between two push-pull branches]

7/4815 . . . [Resonant converters (H02M 7/4811 and H02M 7/4826 take precedence)]

7/4818 . . . . . [with means for adaptation of resonance frequency, e.g. by modification of capacitance or inductance of resonance circuits]

7/4826 . . . . . [operating from a resonant DC source, i.e. the DC input voltage varies periodically, e.g. resonant DC-link inverters]

7/483 . . . . . . Converters with outputs that each can have more than two voltages levels

7/4833 . . . . . . [Capacitor voltage balancing]

WARNING

Group H02M 7/4833 is incomplete pending reclassification of documents from group H02M 7/483.

Groups H02M 7/483 and H02M 7/4833 should be considered in order to perform a complete search.

7/4835 . . . . . . [comprising two or more cells, each including a switchable capacitor, the capacitors having a nominal charge voltage which corresponds to a given fraction of the input voltage, and the capacitors being selectively connected in series to determine the instantaneous output voltage]

WARNING

Group H02M 7/4835 is impacted by reclassification into group H02M 7/4837.

Groups H02M 7/4835 and H02M 7/4837 should be considered in order to perform a complete search.

7/4837 . . . . . . [Flying capacitor converters]

WARNING

Group H02M 7/4837 is incomplete pending reclassification of documents from group H02M 7/4835.

Groups H02M 7/4835 and H02M 7/4837 should be considered in order to perform a complete search.

7/487 . . . . . . Neutral point clamped inverters

7/49 . . . . . . Combination of the output voltage waveforms of a plurality of converters

7/493 . . . . . . the static converters being arranged for operation in parallel

WARNING

Group H02M 7/493 is impacted by reclassification into group H02M 1/0043.

Groups H02M 7/493 and H02M 1/0043 should be considered in order to perform a complete search.

7/497 . . . . . . sinusoidal output voltages being obtained by combination of several voltages being out of phase

7/501 . . . . . . sinusoidal output voltages being obtained by the combination of several pulse-voltages having different amplitude and width

7/505 . . . . using devices of a thyatron or thyristor type requiring extinguishing means

{ (H02M 7/4807, H02M 7/483, H02M 7/493 and H02M 7/4826 take precedence) }

7/51 . . . . using discharge tubes only

7/515 . . . . using semiconductor devices only

7/5152 . . . . [with separate extinguishing means]

7/5155 . . . . [wherein each commutation element has its own extinguishing means]
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 }
7/516 . . . . . . . . . Self-oscillating arrangements
7/517 . . . . . . . . . with special starting equipment
7/519 . . . . . . . . . in a push-pull configuration 
(H02M 7/517 takes precedence)
7/521 . . . . . . . . . in a bridge configuration
7/523 . . . . . . . . . with LC-resonance circuit in the main 
circuit
7/5233 . . . . . . . . . { the commutation elements being in 
a push-pull arrangement }
7/5236 . . . . . . . . . { in a series push-pull arrangement }
7/525 . . . . . . . . . with automatic control of 
output waveform or frequency 
(H02M 7/521 - H02M 7/523 take precedence)
7/527 . . . . . . . . . by pulse width modulation
7/529 . . . . . . . . . using digital control
7/53 . . . . . . . . . using devices of a triode or transistor type 
requiring continuous application of a control 
signal (H02M 7/4807, H02M 7/493 
and H02M 7/4826 take precedence)
7/533 . . . . . . . . . using discharge tubes only
7/537 . . . . . . . . . using semiconductor devices only, e.g. 
single switched pulse inverters
7/5375 . . . . . . . . . with special starting equipment
7/538 . . . . . . . . . in a push-pull configuration 
(H02M 7/5375 takes precedence 
{: with oscillating arrangements 
H02M 7/5382, H02M 7/53846})
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 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 }
7/53876 . . . . . . . . . { based on synthesising a desired 
voltage vector via the selection of 
appropriate fundamental voltage 
vecors, and corresponding 
dwelling times }
7/53878 . . . . . . . . . { 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 waveform 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
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 thyatron or thyristor type 
requiring extinguishing means
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 
voltage 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
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 . . . . . . . . . wherein the parts are rotating and collectors 
co-operate with brushes or rollers
wherein the parts are operated by rotating
cams or cam-like devices

with electromagnetically-operated vibrating
contacts, e.g. chopper

with moving liquid contacts

by combination of static with dynamic converters;
by combination of dynamo-electric with other
dynamic or static converters

Power conversion systems not covered by the
preceding groups