

# CPC COOPERATIVE PATENT CLASSIFICATION

## F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

### LIGHTING; HEATING

## F25 REFRIGERATION OR COOLING; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS; MANUFACTURE OR STORAGE OF ICE; LIQUEFACTION SOLIDIFICATION OF GASES

## F25B REFRIGERATION MACHINES, PLANTS OR SYSTEMS; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS

### Compression machines, plants or systems

- 1/00** Compression machines, plants or systems with non-reversible cycle ([F25B 3/00](#), [F25B 5/00](#), [F25B 6/00](#), [F25B 7/00](#), [F25B 9/00](#) take precedence)
- 1/005** . {of the single unit type ([F25B 1/10](#) takes precedence)}
- 1/02** . with compressor of reciprocating-piston type ([F25B 1/005](#), [F25B 1/10](#) take precedence)
- 1/04** . with compressor of rotary type ([F25B 1/005](#), [F25B 1/10](#) take precedence)
- 1/047** . . of screw type
- 1/053** . . of turbine type
- 1/06** . with compressor of jet type, e.g. using liquid under pressure ([F25B 1/005](#), [F25B 1/10](#) take precedence)
- 1/08** . . using vapour under pressure
- 1/10** . with multi-stage compression (with cascade operation [F25B 7/00](#))
- 3/00** Self-contained rotary compression machines, i.e. with compressor, condenser and evaporator rotating as a single unit
- 5/00** Compression machines, plants or systems, with several evaporator circuits, e.g. for varying refrigerating capacity (with cascade operation [F25B 7/00](#))
- 5/02** . arranged in parallel
- 5/04** . arranged in series
- 6/00** Compression machines, plants or systems, with several condenser circuits
- 6/02** . arranged in parallel
- 6/04** . arranged in series
- 7/00** Compression machines, plants or systems, with cascade operation, i.e. with two or more circuits, the heat from the condenser of one circuit being absorbed by the evaporator of the next circuit ([F25B 9/00](#) takes precedence)
- 9/00** Compression machines, plants or systems, in which the refrigerant is air or other gas of low boiling point
- 9/002** . {characterised by the refrigerant}
- 9/004** . . {the refrigerant being air}

- 9/006** . . {the refrigerant containing more than one component ([F25B 9/004](#) takes precedence)}
- 9/008** . . {the refrigerant being carbon dioxide}
- 9/02** . using Joule-Thompson effect; using vortex effect
- 9/04** . . using vortex effect
- 9/06** . using expanders ([F25B 9/10](#) takes precedence)
- 9/065** . . {using pressurised gas jets}
- 9/08** . using ejectors ([F25B 9/10](#) takes precedence)
- 9/10** . with several cooling stages
- 9/12** . using  $^3\text{He}$ - $^4\text{He}$  dilution
- 9/14** . characterised by the cycle used, e.g. Stirling cycle
- 9/145** . . {pulse-tube cycle}

### **11/00** Compression machines, plants or systems, using turbines, e.g. gas turbines

- 11/02** . as expanders ([F25B 9/06](#) takes precedence)
- 11/04** . . centrifugal type

### **13/00** Compression machines, plants or systems, with reversible cycle (defrosting cycles [F25B 47/02](#))

### Sorption machines, plants or systems

- 15/00** Sorption machines, plants or systems, operating continuously, e.g. absorption type
- 15/002** . {using the endothermic solution of salt}
- 15/004** . {of rotary type}
- 15/006** . {with cascade operation}
- 15/008** . {with multi-stage operation ([F25B 15/006](#) takes precedence)}
- 15/02** . without inert gas ([F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#), [F25B 15/12](#), [F25B 15/14](#), [F25B 15/16](#) take precedence)
- 15/025** . . {Liquid transfer means}
- 15/04** . . the refrigerant being ammonia evaporated from aqueous solution ([F25B 15/025](#) takes precedence)}
- 15/06** . . the refrigerant being water vapour evaporated from a salt solution, e.g. lithium bromide ([F25B 15/025](#) takes precedence)}
- 15/08** . . the refrigerant being sulfuric acid ([F25B 15/025](#) takes precedence)}
- 15/09** . . the refrigerant being hydrogen desorbed from a hydride ([F25B 15/025](#) takes precedence)}

- 15/10 . with inert gas ({[F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#)}, [F25B 15/12](#), [F25B 15/14](#), [F25B 15/16](#) take precedence)
- 15/12 . with resorber ({[F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#)}, [F25B 15/14](#) take precedence)
- 15/14 . using osmosis ({[F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#) take precedence})
- 15/16 . using desorption cycle ({[F25B 15/004](#), [F25B 15/006](#), [F25B 15/008](#) take precedence})
- 17/00 Sorption machines, plants or systems, operating intermittently, e.g. absorption or adsorption type**
- 17/02 . the absorbent or adsorbent being a liquid, e.g. brine ([F25B 17/10](#) takes precedence)
- 17/04 . . with two or more boilers operating alternately
- 17/06 . . with the boiler and evaporator built-up as a unit in a tiltable or revolving arrangement
- 17/08 . the absorbent or adsorbent being a solid, e.g. salt ([F25B 17/12](#) takes precedence)
- 17/083 . . {with two or more boiler-sorbers operating alternately}
- 17/086 . . {with two or more boiler-sorber/evaporator units}
- 17/10 . using the endothermic solution of salt
- 17/12 . using desorption of hydrogen from a hydride

**Machines, plants or systems, with a single mode of operation, not covered by groups [F25B 1/00](#) - [F25B 17/00](#)**

- 19/00 Machines, plants or systems, using evaporation of a refrigerant but without recovery of the vapour**
- 19/005 . {the refrigerant being a liquefied gas}
- 19/02 . using fluid jet, e.g. of steam ({[F25B 19/005](#) takes precedence})
- 19/04 . . using liquid jet, e.g. of water
- 21/00 Machines, plants or systems, using electric or magnetic effects**
- 21/02 . using Peltier effect; using Nernst-Ettinghausen effect
- 21/04 . . reversible
- 23/00 Machines, plants or systems, with a single mode of operation not covered by groups [F25B 1/00](#) - [F25B 21/00](#), e.g. using selective radiation effect**
- 23/003 . {using selective radiation effect}
- 23/006 . {boiling cooling systems}

- 25/00 Machines, plants or systems, using a combination of modes of operation covered by two or more of the groups [F25B 1/00](#) - [F25B 23/00](#)**
- 25/005 . {using primary and secondary systems}
- 25/02 . Compression-sorption machines, plants, or systems
- 27/00 Machines, plants or systems, using particular sources of energy ([F25B 30/06](#) takes precedence)**
- 27/002 . {using solar energy}
- 27/005 . . {in compression type systems}
- 27/007 . . {in sorption type systems}
- 27/02 . using waste heat, e.g. from internal-combustion engines
- 29/00 Combined heating and refrigeration systems, e.g. operating alternately or simultaneously**
- 29/003 . {of the compression type system}

- 29/006 . {of the sorption type system}
- 30/00 Heat pumps ([F25B 1/00](#)-[F25B 25/00](#), [F25B 29/00](#) take precedence)**
- 30/02 . of the compression type
- 30/04 . of the sorption type
- 30/06 . characterised by the source of low potential heat

**Component parts or details**

- 31/00 Compressor arrangements**
- 31/002 . {Lubrication}
- 31/004 . . {oil recirculating arrangements}
- 31/006 . {Cooling of compressor or motor}
- 31/008 . . {by injecting a liquid}
- 31/02 . of motor-compressor units
- 31/023 . . {with compressor of reciprocating-piston type}
- 31/026 . . {with compressor of rotary type}
- 33/00 Boilers; Analysers; Rectifiers (boiler-absorbers [F25B 35/00](#))**
- 35/00 Boiler-absorbers, i.e. boilers usable for absorption or adsorption**
- 35/02 . using a liquid as sorbent, e.g. brine
- 35/04 . using a solid as sorbent
- 37/00 Absorbers; Adsorbers (boiler-absorbers [F25B 35/00](#))**
- 39/00 Evaporators; Condensers**
- 39/02 . Evaporators
- 39/022 . . {with plate-like or laminated elements}
- 39/024 . . . {with elements constructed in the shape of a hollow panel}
- 39/026 . . {specially adapted for sorption type systems}
- 39/028 . . {having distributing means}
- 39/04 . Condensers
- 40/00 Subcoolers, desuperheaters or superheaters**
- 40/02 . Subcoolers
- 40/04 . Desuperheaters
- 40/06 . Superheaters
- 41/00 Fluid-circulation arrangements**
- 41/006 . {optical fluid control arrangements}
- 41/10 . using electro-osmosis
- 41/20 . Disposition of valves, e.g. of on-off valves or flow control valves ([expansion valves \[F25B 41/31\]\(#\)](#))

**WARNING**

Group [F25B 41/20](#) is impacted by reclassification into groups [F25B 41/24](#) and [F25B 41/28](#).

Groups [F25B 41/20](#), [F25B 41/24](#), and [F25B 41/28](#) should be considered in order to perform a complete search.

- 41/22 . . between evaporator and compressor

**WARNING**

Group [F25B 41/22](#) is impacted by reclassification into group [F25B 41/28](#).

Groups [F25B 41/22](#) and [F25B 41/28](#) should be considered in order to perform a complete search.

- 41/24 . . Arrangement of shut-off valves for disconnecting a part of the refrigerant cycle, e.g. an outdoor part

**WARNING**

Group [F25B 41/24](#) is incomplete pending reclassification of documents from group [F25B 41/20](#).

Groups [F25B 41/20](#) and [F25B 41/24](#) should be considered in order to perform a complete search.

- 41/26 . . of fluid flow reversing valves

**WARNING**

Group [F25B 41/26](#) is impacted by reclassification into group [F25B 41/28](#).

Groups [F25B 41/26](#) and [F25B 41/28](#) should be considered in order to perform a complete search.

- 41/28 . . specially adapted for sorption cycles

**WARNING**

Group [F25B 41/28](#) is incomplete pending reclassification of documents from groups [F25B 41/20](#), [F25B 41/22](#) and [F25B 41/26](#).

Groups [F25B 41/20](#), [F25B 41/22](#), [F25B 41/26](#) and [F25B 41/28](#) should be considered in order to perform a complete search.

- 41/30 . Expansion means; Dispositions thereof

**WARNING**

Group [F25B 41/30](#) is impacted by reclassification into groups [F25B 41/38](#), [F25B 41/385](#), and [F25B 41/39](#).

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

- 41/31 . . Expansion valves

**WARNING**

Group [F25B 41/31](#) is impacted by reclassification into groups [F25B 41/32](#), [F25B 41/325](#), [F25B 41/33](#), [F25B 41/335](#), [F25B 41/34](#), [F25B 41/345](#), [F25B 41/347](#), [F25B 41/35](#), [F25B 41/355](#), and [F25B 41/36](#).

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

- 41/315 . . . actuated by floats

- 41/32 . . . having flow rate limiting means other than the valve member, e.g. having bypass orifices in the valve body

**WARNING**

Group [F25B 41/32](#) is incomplete pending reclassification of documents from group [F25B 41/31](#).

Groups [F25B 41/31](#) and [F25B 41/32](#) should be considered in order to perform a complete search.

- 41/325 . . . having two or more valve members

**WARNING**

Group [F25B 41/325](#) is incomplete pending reclassification of documents from group [F25B 41/31](#).

Groups [F25B 41/31](#) and [F25B 41/325](#) should be considered in order to perform a complete search.

- 41/33 . . . with the valve member being actuated by the fluid pressure, e.g. by the pressure of the refrigerant

**WARNING**

Groups [F25B 41/33](#) and [F25B 41/335](#) are incomplete pending reclassification of documents from group [F25B 41/31](#).

Groups [F25B 41/31](#), [F25B 41/33](#), and [F25B 41/335](#) should be considered in order to perform a complete search.

- 41/335 . . . . via diaphragms

- 41/34 . . . with the valve member being actuated by electric means, e.g. by piezo-electric actuators

**WARNING**

Groups [F25B 41/34](#), [F25B 41/345](#), [F25B 41/347](#), [F25B 41/35](#), and [F25B 41/355](#) are incomplete pending reclassification of documents from group [F25B 41/31](#).

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

- 41/345 . . . . by solenoids

- 41/347 . . . . {with the valve member being opened and closed cyclically, e.g. with pulse width modulation}

- 41/35 . . . . by rotary motors, e.g. by stepping motors

- 41/355 . . . . by electric heating of bimetal elements, shape memory elements or heat expanding elements

- 41/36 . . . with the valve member being actuated by bimetal elements or shape-memory elements influenced by fluids, e.g. by the refrigerant

**WARNING**

Group [F25B 41/36](#) is incomplete pending reclassification of documents from group [F25B 41/31](#).

Groups [F25B 41/31](#) and [F25B 41/36](#) should be considered in order to perform a complete search.

- 41/37 . . Capillary tubes

**WARNING**

Group [F25B 41/37](#) is impacted by reclassification into group [F25B 41/375](#).

Groups [F25B 41/37](#) and [F25B 41/375](#) should be considered in order to perform a complete search.

- 41/375 . . . characterised by a variable restriction, e.g. restrictors made of shape memory alloy

**WARNING**

Group [F25B 41/375](#) is incomplete pending reclassification of documents from group [F25B 41/37](#).

Groups [F25B 41/37](#) and [F25B 41/375](#) should be considered in order to perform a complete search.

- 41/38 . . specially adapted for reversible cycles, e.g. bidirectional expansion restrictors

**WARNING**

Group [F25B 41/38](#) is incomplete pending reclassification of documents from group [F25B 41/30](#).

Groups [F25B 41/30](#) and [F25B 41/38](#) should be considered in order to perform a complete search.

- 41/385 . . Dispositions with two or more expansion means arranged in parallel on a refrigerant line leading to the same evaporator

**WARNING**

Group [F25B 41/385](#) is incomplete pending reclassification of documents from group [F25B 41/30](#).

Groups [F25B 41/30](#) and [F25B 41/385](#) should be considered in order to perform a complete search.

- 41/39 . . Dispositions with two or more expansion means arranged in series, i.e. multi-stage expansion, on a refrigerant line leading to the same evaporator

**WARNING**

Group [F25B 41/39](#) is incomplete pending reclassification of documents from group [F25B 41/30](#).

Groups [F25B 41/30](#) and [F25B 41/39](#) should be considered in order to perform a complete search.

- 41/40 . Fluid line arrangements

**WARNING**

Group [F25B 41/40](#) is impacted by reclassification into groups [F25B 41/42](#), [F25B 41/45](#), and [F25B 41/48](#).

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

- 41/42 . . Arrangements for diverging or converging flows, e.g. branch lines or junctions

**WARNING**

Groups [F25B 41/42](#), [F25B 41/45](#), and [F25B 41/48](#) are incomplete pending reclassification of documents from group [F25B 41/40](#).

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

- 41/45 . . . for flow control on the upstream side of the diverging point, e.g. with spiral structure for generating turbulence

- 41/48 . . . for flow path resistance control on the downstream side of the diverging point, e.g. by an orifice

- 43/00 Arrangements for separating or purifying gases or liquids (in analysers or rectifiers [F25B 33/00](#)); Arrangements for vaporising the residuum of liquid refrigerant, e.g. by heat ([F25B 40/00](#) takes precedence)**

- 43/003 . {Filters}

- 43/006 . {Accumulators}

- 43/02 . for separating lubricants from the refrigerant

- 43/04 . for withdrawing non-condensable gases

- 43/043 . . {for compression type systems}

- 43/046 . . {for sorption type systems}

- 45/00 Arrangements for charging or discharging refrigerant**

- 47/00 Arrangements for preventing or removing deposits or corrosion, not provided for in another subclass**

- 47/003 . {for preventing corrosion}

- 47/006 . {for preventing frost}

- 47/02 . Defrosting cycles

- 47/022 . . {hot gas defrosting}

- 47/025 . . . {by reversing the cycle}

- 47/027 . . {for defrosting sorption type systems}

- 49/00 Arrangement or mounting of control or safety devices**

- 49/005 . {of safety devices ([F25B 49/02](#) and [F25B 49/04](#) take precedence)}

- 49/02 . for compression type machines, plants or systems

- 49/022 . . {Compressor control arrangements}

- 49/025 . . {Motor control arrangements}

- 49/027 . . {Condenser control arrangements}

- 49/04 . for sorption type machines, plants or systems

- 49/043 . . {Operating continuously}

- 49/046 . . {Operating intermittently}

**Indexing scheme associated with groups [F25B 1/00](#) - [F25B 49/00](#), relating to arrangements, features or devices for refrigeration machines, plants or systems, combined heating and refrigeration systems or heat-pump systems as well as solved problems, control issues and sensing of parameters therefore**

- 2300/00** Special arrangements or features for refrigeration machines, plants or systems, combined heating and refrigeration systems or heat-pump systems

- 2309/00** Gas cycle refrigeration machines

- 2309/001 . with a linear configuration or a linear motor

2309/002	. with parallel working cold producing expansion devices in one circuit	2309/14241	. . . Pulse tubes with basic schematic including an orifice reservoir multiple inlet pulse tube
2309/003	. characterised by construction or composition of the regenerator	2309/1425	. . Pulse tubes with basic schematic including several pulse tubes
2309/004	. using a compressor of the rotary type	2309/1426	. . Pulse tubes with basic schematic including at the pulse tube warm end a so called warm end expander
2309/005	. using an expander of the rotary type	2309/1427	. . Control of a pulse tube
2309/006	. using a distributing valve of the rotary type	2309/1428	. . Control of a Stirling refrigeration machine
2309/02	. using the Joule-Thompson effect		
2309/021	. . with a cryosurgical probe tip having a specific construction	<b>2313/00</b>	<b>Compression machines, plants or systems with reversible cycle not otherwise provided for</b>
2309/022	. . characterised by the expansion element	2313/001	. with two or more accumulators
2309/023	. . with two stage expansion	2313/002	. geothermal
2309/06	. Compression machines, plants or systems characterised by the refrigerant being carbon dioxide	2313/003	. Indoor unit with water as a heat sink or heat source
2309/061	. . with cycle highest pressure above the supercritical pressure	2313/004	. Outdoor unit with water as a heat sink or heat source
2309/14	. Compression machines, plants or systems characterised by the cycle used	2313/005	. Outdoor unit expansion valves
2309/1401	. . Ericsson or Ericsson cycles	2313/006	. two pipes connecting the outdoor side to the indoor side with multiple indoor units
2309/1402	. . Pulse-tube cycles with acoustic driver	2313/007	. three pipes connecting the outdoor side to the indoor side with multiple indoor units
2309/1403	. . Pulse-tube cycles with heat input into acoustic driver	2313/008	. Refrigerant heaters
2309/1404	. . Pulse-tube cycles with loudspeaker driven acoustic driver	2313/009	. indoor unit in circulation with outdoor unit in first operation mode, indoor unit in circulation with an other heat exchanger in second operation mode or outdoor unit in circulation with an other heat exchanger in third operation mode
2309/1405	. . Pulse-tube cycles with travelling waves	2313/021	. Indoor unit or outdoor unit with auxiliary heat exchanger not forming part of the indoor or outdoor unit
2309/1406	. . Pulse-tube cycles with pulse tube in co-axial or concentric geometrical arrangements	2313/0211	. . the auxiliary heat exchanger being only used during defrosting
2309/1407	. . Pulse-tube cycles with pulse tube having in-line geometrical arrangements	2313/0212	. . the auxiliary heat exchanger being only used during dehumidifying
2309/1408	. . Pulse-tube cycles with pulse tube having U-turn or L-turn type geometrical arrangements	2313/0213	. . the auxiliary heat exchanger being only used during heating
2309/1409	. . Pulse-tube cycles with pulse tube having special type of geometrical arrangements not being a coaxial, in-line or U-turn type	2313/0214	. . the auxiliary heat exchanger being used parallel to the indoor unit during heating operation
2309/1411	. . Pulse-tube cycles characterised by control details, e.g. tuning, phase shifting or general control	2313/0215	. . the auxiliary heat exchanger being used parallel to the outdoor heat exchanger during heating operation
2309/1412	. . Pulse-tube cycles characterised by heat exchanger details	2313/023	. using multiple indoor units
2309/1413	. . Pulse-tube cycles characterised by performance, geometry or theory	2313/0231	. . with simultaneous cooling and heating
2309/1414	. . Pulse-tube cycles characterised by pulse tube details	2313/0232	. . with bypasses
2309/1415	. . Pulse-tube cycles characterised by regenerator details	2313/02321	. . . during cooling
2309/1416	. . Pulse-tube cycles characterised by regenerator stack details	2313/02322	. . . during defrosting
2309/1417	. . Pulse-tube cycles without any valves in gas supply and return lines	2313/02323	. . . during heating
2309/1418	. . Pulse-tube cycles with valves in gas supply and return lines	2313/0233	. . in parallel arrangements
2309/14181	. . . the valves being of the rotary type	2313/02331	. . . during cooling
2309/1419	. . Pulse-tube cycles with pulse tube having a basic pulse tube refrigerator [PTR], i.e. comprising a tube with basic schematic	2313/02332	. . . during defrosting
2309/1421	. . Pulse-tube cycles characterised by details not otherwise provided for	2313/02333	. . . during dehumidification
2309/1422	. . Pulse tubes with basic schematic including a counter flow heat exchanger instead of a regenerative heat exchanger	2313/02334	. . . during heating
2309/1423	. . Pulse tubes with basic schematic including an inertance tube	2313/0234	. . in series arrangements
2309/1424	. . Pulse tubes with basic schematic including an orifice and a reservoir	2313/02341	. . . during cooling
		2313/02342	. . . during defrosting
		2313/02343	. . . during dehumidification
		2313/02344	. . . during heating
		2313/025	. using multiple outdoor units
		2313/0251	. . being defrosted alternately
		2313/0252	. . with bypasses
		2313/02521	. . . during cooling
		2313/02522	. . . during defrosting

- 2313/02523 . . . during heating
- 2313/0253 . . . in parallel arrangements
- 2313/02531 . . . during cooling
- 2313/02532 . . . during defrosting
- 2313/02533 . . . during heating
- 2313/0254 . . . in series arrangements
- 2313/02541 . . . during cooling
- 2313/02542 . . . during defrosting
- 2313/02543 . . . during heating
- 2313/027 . . characterised by the reversing means
- 2313/0271 . . the compressor allows rotation in reverse direction
- 2313/0272 . . using bridge circuits of one-way valves
- 2313/02731 . . using one three-way valve
- 2313/02732 . . using two three-way valves
- 2313/02741 . . using one four-way valve
- 2313/02742 . . using two four-way valves
- 2313/02743 . . using three four-way valves
- 2313/0276 . . using six-way valves
- 2313/0279 . . using nine-way valves
- 2313/02791 . . using shut-off valves
- 2313/02792 . . using reversing valve changing the refrigerant flow direction due to pressure differences of the refrigerant and not by external actuation
- 2313/029 . . Control issues
- 2313/0291 . . related to the pressure of the indoor unit
- 2313/0292 . . related to reversing valves
- 2313/0293 . . related to the indoor fan, e.g. controlling speed
- 2313/0294 . . related to the outdoor fan, e.g. controlling speed
- 2313/031 . . Sensor arrangements
- 2313/0311 . . Pressure sensors near the expansion valve
- 2313/0312 . . Pressure sensors near the indoor heat exchanger
- 2313/0313 . . Pressure sensors near the outdoor heat exchanger
- 2313/0314 . . Temperature sensors near the indoor heat exchanger
- 2313/0315 . . Temperature sensors near the outdoor heat exchanger
- 2313/0316 . . Temperature sensors near the refrigerant heater
- 2315/00 Sorption refrigeration cycles or details thereof**
- 2315/001 . Crystallization prevention
- 2315/002 . Generator absorber heat exchanger [GAX]
- 2315/003 . Hydrates for sorption cycles
- 2315/004 . Inert heat-exchangers
- 2315/005 . Regeneration
- 2315/006 . Reversible sorption cycles
- 2315/007 . Parallel systems therefor
- 2321/00 Details of machines, plants or systems, using electric or magnetic effects**
- 2321/001 . by using electro-caloric effects
- 2321/002 . by using magneto-caloric effects
- 2321/0021 . . with a static fixed magnet
- 2321/0022 . . with a rotating or otherwise moving magnet
- 2321/0023 . . with modulation, influencing or enhancing an existing magnetic field
- 2321/003 . by using thermionic electron cooling effects
- 2321/02 . using Peltier effects; using Nernst-Ettinghausen effects
- 2321/021 . . Control thereof
- 2321/0211 . . . of fans
- 2321/0212 . . . of electric power, current or voltage
- 2321/023 . . Mounting details thereof
- 2321/025 . . Removal of heat
- 2321/0251 . . . by a gas
- 2321/0252 . . . by liquids or two-phase fluids
- 2327/00 Refrigeration system using an engine for driving a compressor**
- 2327/001 . of the internal combustion type
- 2333/00 Details of boilers; Analysers; Rectifiers**
- 2333/001 . the generator or boiler having an analyser
- 2333/002 . the generator or boiler is heated electrically
- 2333/003 . the generator or boiler is heated by combustion gas
- 2333/004 . the generator or boiler uses an inert gas as pressure equalizing medium
- 2333/005 . the generator or boiler uses electromagnetic energy in the form of microwaves for desorbing the sorbate from the sorbate/sorbent compound
- 2333/0051 . . the energy is used for heating an auxiliary medium which is used as heating source for desorbing the sorbate from the sorbate/sorbent compound
- 2333/006 . the generator or boiler having a rectifier
- 2333/007 . the generator or boiler heated by heat exchangers with steam or hot water as heating fluid or by a secondary boiling-condensing heater
- 2339/00 Details of evaporators; Details of condensers**
- 2339/02 . Details of evaporators
- 2339/021 . . Evaporators in which refrigerant is sprayed on a surface to be cooled
- 2339/022 . . Evaporators constructed from a pair of plates forming a space in which is located a refrigerant carrying coil
- 2339/023 . . Evaporators consisting of one or several sheets on one face of which is fixed a refrigerant carrying coil
- 2339/024 . . Evaporators with refrigerant in a vessel in which is situated a heat exchanger
- 2339/0241 . . . having plate-like elements
- 2339/0242 . . . having tubular elements
- 2339/04 . Details of condensers
- 2339/041 . . of evaporative condensers
- 2339/042 . . of pcm condensers
- 2339/043 . . Condensers made by assembling plate-like or laminated elements
- 2339/044 . . Condensers with an integrated receiver
- 2339/0441 . . . containing a drier or a filter
- 2339/0442 . . . characterised by the mechanical fixation of the receiver to the header
- 2339/0443 . . . the receiver being positioned horizontally
- 2339/0444 . . . where the flow of refrigerant through the condenser receiver is split into two or more flows, each flow following a different path through the condenser receiver
- 2339/0445 . . . with throttle portions
- 2339/0446 . . . characterised by the refrigerant tubes connecting the header of the condenser to the receiver; Inlet or outlet connections to receiver
- 2339/045 . . Condensers made by assembling a tube on a plate-like element or between plate-like elements
- 2339/046 . . Condensers with refrigerant heat exchange tubes positioned inside or around a vessel containing water or pcm to cool the refrigerant gas
- 2339/047 . . Water-cooled condensers



<b>2341/00</b>	<b>Details of ejectors not being used as compression device; Details of flow restrictors or expansion valves</b>	2400/05	. Compression system with heat exchange between particular parts of the system
2341/001	. Ejectors not being used as compression device	2400/051	. . between the accumulator and another part of the cycle
2341/0011	. . Ejectors with the cooled primary flow at reduced or low pressure	2400/052	. . between the capillary tube and another part of the refrigeration cycle
2341/0012	. . Ejectors with the cooled primary flow at high pressure	2400/053	. . between the storage receiver and another part of the system
2341/0013	. . Ejector control arrangements	2400/054	. . between the suction tube of the compressor and another part of the cycle
2341/0014	. . Ejectors with a high pressure hot primary flow from a compressor discharge	2400/06	. Several compression cycles arranged in parallel
2341/0015	. . using two or more ejectors	2400/061	. . the capacity of the first system being different from the second
2341/0016	. . Ejectors for creating an oil recirculation	2400/07	. Details of compressors or related parts
2341/06	. Details of flow restrictors or expansion valves	2400/071	. . Compressor mounted in a housing in which a condenser is integrated
2341/062	. . Capillary expansion valves	2400/072	. . Intercoolers therefor
2341/063	. . Feed forward expansion valves	2400/073	. . Linear compressors
2341/064	. . Superheater expansion valves	2400/074	. . with multiple cylinders
2341/067	. . Expansion valves having a pilot valve	2400/075	. . with parallel compressors
2341/068	. . Expansion valves combined with a sensor	2400/0751	. . . the compressors having different capacities
2341/0681	. . . the sensor is heated	2400/076	. . having multiple cylinders driven by a rotating swash plate
2341/0682	. . . the sensor contains sorbent materials	2400/077	. . Compressor control units, e.g. terminal boxes, mounted on the compressor casing wall containing for example starter, protection switches or connector contacts
2341/0683	. . . the sensor is disposed in the suction line and influenced by the temperature or the pressure of the suction gas	2400/08	. Refrigeration machines, plants and systems having means for detecting the concentration of a refrigerant
<b>2345/00</b>	<b>Details for charging or discharging refrigerants; Service stations therefor</b>	2400/09	. Refrigeration machines, plants and systems having means for detecting the concentration of a sorbent solution
2345/001	. Charging refrigerant to a cycle	2400/11	. Drop catchers
2345/002	. Collecting refrigerant from a cycle	2400/12	. Inflammable refrigerants
2345/003	. Control issues for charging or collecting refrigerant to or from a cycle	2400/121	. . using R1234
2345/004	. with several tanks to collect or charge a cycle	2400/13	. Economisers
2345/005	. Service stations therefor	2400/14	. Power generation using energy from the expansion of the refrigerant
2345/0051	. . having a carrying handle	2400/141	. . the extracted power is not recycled back in the refrigerant circuit
2345/0052	. . having wheels	2400/15	. Microelectro-mechanical devices
2345/006	. characterised by charging or discharging valves	2400/16	. Receivers
2345/007	. characterised by the weighing of refrigerant or oil	2400/161	. . arranged in parallel
<b>2347/00</b>	<b>Details for preventing or removing deposits or corrosion</b>	2400/162	. . characterised by the plug or stop
2347/02	. Details of defrosting cycles	2400/17	. Re-condensers
2347/021	. . Alternate defrosting	2400/18	. Refrigerant conversion
2347/022	. . Cool gas defrosting	2400/19	. Pumping down refrigerant from one part of the cycle to another part of the cycle, e.g. when the cycle is changed from cooling to heating, or before a defrost cycle is started
2347/023	. . Set point defrosting	2400/21	. Modules for refrigeration systems
<b>2400/00</b>	<b>General features or devices for refrigeration machines, plants or systems, combined heating and refrigeration systems or heat-pump systems, i.e. not limited to a particular subgroup of F25B</b>	2400/22	. Refrigeration systems for supermarkets
2400/01	. Heaters	2400/23	. Separators
2400/02	. Centrifugal separation of gas, liquid or oil	2400/24	. Storage receiver heat
2400/03	. Suction accumulators with deflectors	<b>2500/00</b>	<b>Problems to be solved</b>
2400/04	. Refrigeration circuit bypassing means	2500/01	. Geometry problems, e.g. for reducing size
2400/0401	. . for the compressor	2500/02	. Increasing the heating capacity of a reversible cycle during cold outdoor conditions
2400/0403	. . for the condenser	2500/03	. Cavitations
2400/0405	. . for the desuperheater	2500/04	. Clogging
2400/0407	. . for the ejector	2500/05	. Cost reduction
2400/0409	. . for the evaporator	2500/06	. Damage
2400/0411	. . for the expansion valve or capillary tube		
2400/0413	. . for the filter or drier		
2400/0415	. . for the receiver		
2400/0417	. . for the subcooler		
2400/0419	. . for the superheater		

2500/07	. Exceeding a certain pressure value in a refrigeration component or cycle	2600/23	. Time delays
2500/08	. Exceeding a certain temperature value in a refrigeration component or cycle	2600/25	. Control of valves
2500/09	. Improving heat transfers	2600/2501	. . Bypass valves
2500/11	. Reducing heat transfers	2600/2503	. . Condenser exit valves
2500/12	. Sound	2600/2505	. . Fixed-differential control valves
2500/13	. Vibrations	2600/2507	. . Flow-diverting valves
2500/14	. the presence of moisture in a refrigeration component or cycle	2600/2509	. . Economiser valves
2500/15	. Hunting, i.e. oscillation of controlled refrigeration variables reaching undesirable values	2600/2511	. . Evaporator distribution valves
2500/16	. Lubrication	2600/2513	. . Expansion valves
2500/17	. Size reduction	2600/2515	. . Flow valves
2500/18	. Optimization, e.g. high integration of refrigeration components	2600/2517	. . Head-pressure valves
2500/19	. Calculation of parameters	2600/2519	. . On-off valves
2500/21	. Reduction of parts	2600/2521	. . On-off valves controlled by pulse signals
2500/22	. Preventing, detecting or repairing leaks of refrigeration fluids	2600/2523	. . Receiver valves
2500/221	. . Preventing leaks from developing	2600/2525	. . Pressure relief valves
2500/222	. . Detecting refrigerant leaks		
2500/23	. High amount of refrigerant in the system	<b>2700/00</b>	<b>Sensing or detecting of parameters; Sensors therefor</b>
2500/24	. Low amount of refrigerant in the system	2700/01	. Sensors determining characteristics of the burner for a generator
2500/25	. Standardisation of apparatus or parts	2700/02	. Humidity
2500/26	. characterised by the startup of the refrigeration cycle	2700/03	. Oil level
2500/27	. characterised by the stop of the refrigeration cycle	2700/04	. Refrigerant level
2500/28	. Means for preventing liquid refrigerant entering into the compressor	2700/05	. Load shedding of a compressor
2500/29	. High ambient temperatures	2700/06	. Piston positions of a compressor
2500/31	. Low ambient temperatures	2700/11	. Sensor to detect if defrost is necessary
2500/32	. Weight	2700/111	. . using an emitter and receiver, e.g. sensing by emitting light or other radiation and receiving reflection by a sensor
<b>2600/00</b>	<b>Control issues</b>	2700/13	. Mass flow of refrigerants
2600/01	. Timing	2700/131	. . at the outlet of a subcooler
2600/02	. Compressor control	2700/133	. . through the condenser
2600/021	. . Inverters therefor	2700/1331	. . . at the inlet
2600/022	. . for multi-stage operation	2700/1332	. . . at the outlet
2600/023	. . controlling swash plate angles	2700/135	. . through the evaporator
2600/024	. . by controlling the electric parameters, e.g. current or voltage	2700/1351	. . . of the cooled fluid upstream or downstream of the evaporator
2600/025	. . by controlling speed	2700/1352	. . . at the inlet
2600/0251	. . . with on-off operation	2700/1353	. . . at the outlet
2600/0252	. . . with two speeds	2700/15	. Power, e.g. by voltage or current
2600/0253	. . . with variable speed	2700/151	. . of the compressor motor
2600/026	. . by controlling unloaders	2700/17	. Speeds
2600/0261	. . . external to the compressor	2700/171	. . of the compressor
2600/0262	. . . internal to the compressor	2700/172	. . of the condenser fan
2600/027	. . by controlling pressure	2700/173	. . of the evaporator fan
2600/0271	. . . the discharge pressure	2700/19	. Pressures
2600/0272	. . . the suction pressure	2700/191	. . near an expansion valve
2600/05	. Refrigerant levels	2700/193	. . of the compressor
2600/07	. Remote controls	2700/1931	. . . Discharge pressures
2600/11	. Fan speed control	2700/1932	. . . Oil pressures
2600/111	. . of condenser fans	2700/1933	. . . Suction pressures
2600/112	. . of evaporator fans	2700/195	. . of the condenser
2600/13	. Pump speed control	2700/197	. . of the evaporator
2600/15	. during shut down	2700/21	. Temperatures
2600/17	. by controlling the pressure of the condenser	2700/2101	. . in a bypass
2600/19	. Refrigerant outlet condenser temperature	2700/2102	. . at the outlet of the gas cooler
2600/21	. Refrigerant outlet evaporator temperature	2700/2103	. . near a heat exchanger
		2700/2104	. . of an indoor room or compartment
		2700/2105	. . Oil temperatures
		2700/2106	. . of fresh outdoor air
		2700/2107	. . of a Peltier element
		2700/2108	. . of a receiver



2700/2109	. .	of a separator
2700/2111	. .	of a heat storage receiver
2700/2113	. .	of a suction accumulator
2700/2115	. .	of a compressor or the drive means therefor
2700/21151	. . .	at the suction side of the compressor
2700/21152	. . .	at the discharge side of the compressor
2700/21153	. . .	of electronic components
2700/21154	. . .	of an inverter
2700/21155	. . .	of the oil
2700/21156	. . .	of the motor
2700/21157	. . . .	at the coil or rotor
2700/2116	. .	of a condenser
2700/21161	. . .	the fluid cooled by the condenser
2700/21162	. . .	of the refrigerant at the inlet of the condenser
2700/21163	. . .	of the refrigerant at the outlet of the condenser
2700/2117	. .	of an evaporator
2700/21171	. . .	of the fluid cooled by the evaporator
2700/21172	. . . .	at the inlet
2700/21173	. . . .	at the outlet
2700/21174	. . .	of the refrigerant at the inlet of the evaporator
2700/21175	. . .	of the refrigerant at the outlet of the evaporator