

# 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	<ul style="list-style-type: none"> <li>with inert gas (<a href="#">F25B 15/004</a>, <a href="#">F25B 15/006</a>, <a href="#">F25B 15/008</a>, <a href="#">F25B 15/12</a>, <a href="#">F25B 15/14</a>, <a href="#">F25B 15/16</a> take precedence)</li> </ul>
15/12	<ul style="list-style-type: none"> <li>with resorber (<a href="#">F25B 15/004</a>, <a href="#">F25B 15/006</a>, <a href="#">F25B 15/008</a>, <a href="#">F25B 15/14</a> take precedence)</li> </ul>
15/14	<ul style="list-style-type: none"> <li>using osmosis (<a href="#">F25B 15/004</a>, <a href="#">F25B 15/006</a>, <a href="#">F25B 15/008</a> take precedence)</li> </ul>
15/16	<ul style="list-style-type: none"> <li>using desorption cycle (<a href="#">F25B 15/004</a>, <a href="#">F25B 15/006</a>, <a href="#">F25B 15/008</a> take precedence)</li> </ul>
<b>17/00</b>	<b>Sorption machines, plants or systems, operating intermittently, e.g. absorption or adsorption type</b>
17/02	<ul style="list-style-type: none"> <li>the absorbent or adsorbent being a liquid, e.g. brine (<a href="#">F25B 17/10</a> takes precedence)</li> </ul>
17/04	<ul style="list-style-type: none"> <li>with two or more boilers operating alternately</li> </ul>
17/06	<ul style="list-style-type: none"> <li>with the boiler and evaporator built-up as a unit in a tiltable or revolving arrangement</li> </ul>
17/08	<ul style="list-style-type: none"> <li>the absorbent or adsorbent being a solid, e.g. salt (<a href="#">F25B 17/12</a> takes precedence)</li> </ul>
17/083	<ul style="list-style-type: none"> <li>{with two or more boiler-sorbers operating alternately}</li> </ul>
17/086	<ul style="list-style-type: none"> <li>{with two or more boiler-sorber/evaporator units}</li> </ul>
17/10	<ul style="list-style-type: none"> <li>using the endothermic solution of salt</li> </ul>
17/12	<ul style="list-style-type: none"> <li>using desorption of hydrogen from a hydride</li> </ul>

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

<b>19/00</b>	<b>Machines, plants or systems, using evaporation of a refrigerant but without recovery of the vapour</b>
19/005	<ul style="list-style-type: none"> <li>{the refrigerant being a liquefied gas}</li> </ul>
19/02	<ul style="list-style-type: none"> <li>using fluid jet, e.g. of steam (<a href="#">F25B 19/005</a> takes precedence)</li> </ul>
19/04	<ul style="list-style-type: none"> <li>using liquid jet, e.g. of water</li> </ul>
<b>21/00</b>	<b>Machines, plants or systems, using electric or magnetic effects</b>
21/02	<ul style="list-style-type: none"> <li>using Peltier effect; using Nernst-Ettinghausen effect</li> </ul>
21/04	<ul style="list-style-type: none"> <li>reversible</li> </ul>
<b>23/00</b>	<b>Machines, plants or systems, with a single mode of operation not covered by groups <a href="#">F25B 1/00</a> - <a href="#">F25B 21/00</a>, e.g. using selective radiation effect</b>
23/003	<ul style="list-style-type: none"> <li>{using selective radiation effect}</li> </ul>
23/006	<ul style="list-style-type: none"> <li>{boiling cooling systems}</li> </ul>
<b>25/00</b>	<b>Machines, plants or systems, using a combination of modes of operation covered by two or more of the groups <a href="#">F25B 1/00</a> - <a href="#">F25B 23/00</a></b>
25/005	<ul style="list-style-type: none"> <li>{using primary and secondary systems}</li> </ul>
25/02	<ul style="list-style-type: none"> <li>Compression-sorption machines, plants, or systems</li> </ul>
<b>27/00</b>	<b>Machines, plants or systems, using particular sources of energy (<a href="#">F25B 30/06</a> takes precedence)</b>
27/002	<ul style="list-style-type: none"> <li>{using solar energy}</li> </ul>
27/005	<ul style="list-style-type: none"> <li>{in compression type systems}</li> </ul>
27/007	<ul style="list-style-type: none"> <li>{in sorption type systems}</li> </ul>
27/02	<ul style="list-style-type: none"> <li>using waste heat, e.g. from internal-combustion engines</li> </ul>
<b>29/00</b>	<b>Combined heating and refrigeration systems, e.g. operating alternately or simultaneously</b>
29/003	<ul style="list-style-type: none"> <li>{of the compression type system}</li> </ul>

29/006	<ul style="list-style-type: none"> <li>{of the sorption type system}</li> </ul>
<b>30/00</b>	<b>Heat pumps (<a href="#">F25B 1/00</a>-<a href="#">F25B 25/00</a>, <a href="#">F25B 29/00</a> take precedence)</b>
30/02	<ul style="list-style-type: none"> <li>of the compression type</li> </ul>
30/04	<ul style="list-style-type: none"> <li>of the sorption type</li> </ul>
30/06	<ul style="list-style-type: none"> <li>characterised by the source of low potential heat</li> </ul>

**Component parts or details**

<b>31/00</b>	<b>Compressor arrangements</b>
31/002	<ul style="list-style-type: none"> <li>{Lubrication}</li> </ul>
31/004	<ul style="list-style-type: none"> <li>{oil recirculating arrangements}</li> </ul>
31/006	<ul style="list-style-type: none"> <li>{Cooling of compressor or motor}</li> </ul>
31/008	<ul style="list-style-type: none"> <li>{by injecting a liquid}</li> </ul>
31/02	<ul style="list-style-type: none"> <li>of motor-compressor units</li> </ul>
31/023	<ul style="list-style-type: none"> <li>{with compressor of reciprocating-piston type}</li> </ul>
31/026	<ul style="list-style-type: none"> <li>{with compressor of rotary type}</li> </ul>
<b>33/00</b>	<b>Boilers; Analysers; Rectifiers (boiler-absorbers <a href="#">F25B 35/00</a>)</b>
<b>35/00</b>	<b>Boiler-absorbers, i.e. boilers usable for absorption or adsorption</b>
35/02	<ul style="list-style-type: none"> <li>using a liquid as sorbent, e.g. brine</li> </ul>
35/04	<ul style="list-style-type: none"> <li>using a solid as sorbent</li> </ul>
<b>37/00</b>	<b>Absorbers; Adsorbers (boiler-absorbers <a href="#">F25B 35/00</a>)</b>
<b>39/00</b>	<b>Evaporators; Condensers</b>
39/02	<ul style="list-style-type: none"> <li>Evaporators</li> </ul>
39/022	<ul style="list-style-type: none"> <li>{with plate-like or laminated elements}</li> </ul>
39/024	<ul style="list-style-type: none"> <li>{with elements constructed in the shape of a hollow panel}</li> </ul>
39/026	<ul style="list-style-type: none"> <li>{specially adapted for sorption type systems}</li> </ul>
39/028	<ul style="list-style-type: none"> <li>{having distributing means}</li> </ul>
39/04	<ul style="list-style-type: none"> <li>Condensers</li> </ul>
<b>40/00</b>	<b>Subcoolers, desuperheaters or superheaters</b>
40/02	<ul style="list-style-type: none"> <li>Subcoolers</li> </ul>
40/04	<ul style="list-style-type: none"> <li>Desuperheaters</li> </ul>
40/06	<ul style="list-style-type: none"> <li>Superheaters</li> </ul>
<b>41/00</b>	<b>Fluid-circulation arrangements</b>
41/006	<ul style="list-style-type: none"> <li>{optical fluid control arrangements}</li> </ul>
41/10	<ul style="list-style-type: none"> <li>using electro-osmosis</li> </ul>
41/20	<ul style="list-style-type: none"> <li>Disposition of valves, e.g. of on-off valves or flow control valves (<a href="#">expansion valves <a href="#">F25B 41/31</a></a>)</li> </ul>
41/22	<ul style="list-style-type: none"> <li>between evaporator and compressor</li> </ul>
41/24	<ul style="list-style-type: none"> <li>Arrangement of shut-off valves for disconnecting a part of the refrigerant cycle, e.g. an outdoor part</li> </ul>
41/26	<ul style="list-style-type: none"> <li>of fluid flow reversing valves</li> </ul>
41/28	<ul style="list-style-type: none"> <li>specially adapted for sorption cycles</li> </ul>
41/30	<ul style="list-style-type: none"> <li>Expansion means; Dispositions thereof</li> </ul>
41/31	<ul style="list-style-type: none"> <li>Expansion valves</li> </ul>
41/315	<ul style="list-style-type: none"> <li>actuated by floats</li> </ul>
41/32	<ul style="list-style-type: none"> <li>having flow rate limiting means other than the valve member, e.g. having bypass orifices in the valve body</li> </ul>
41/325	<ul style="list-style-type: none"> <li>having two or more valve members</li> </ul>
41/33	<ul style="list-style-type: none"> <li>with the valve member being actuated by the fluid pressure, e.g. by the pressure of the refrigerant</li> </ul>
41/335	<ul style="list-style-type: none"> <li>via diaphragms</li> </ul>

- 41/34 . . . with the valve member being actuated by electric means, e.g. by piezoelectric actuators
- 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
- 41/37 . . Capillary tubes
- 41/375 . . . characterised by a variable restriction, e.g. restrictors made of shape memory alloy
- 41/38 . . specially adapted for reversible cycles, e.g. bidirectional expansion restrictors
- 41/385 . . Dispositions with two or more expansion means arranged in parallel on a refrigerant line leading to the same evaporator
- 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
- 41/40 . Fluid line arrangements
- 41/42 . . Arrangements for diverging or converging flows, e.g. branch lines or junctions
- 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
- 2309/003 . characterised by construction or composition of the regenerator
- 2309/004 . using a compressor of the rotary type
- 2309/005 . using an expander of the rotary type
- 2309/006 . using a distributing valve of the rotary type
- 2309/02 . using the Joule-Thompson effect
- 2309/021 . . with a cryosurgical probe tip having a specific construction
- 2309/022 . . characterised by the expansion element
- 2309/023 . . with two stage expansion
- 2309/06 . Compression machines, plants or systems characterised by the refrigerant being carbon dioxide
- 2309/061 . . with cycle highest pressure above the supercritical pressure
- 2309/14 . Compression machines, plants or systems characterised by the cycle used
- 2309/1401 . . Ericsson or Ericsson cycles
- 2309/1402 . . Pulse-tube cycles with acoustic driver
- 2309/1403 . . Pulse-tube cycles with heat input into acoustic driver
- 2309/1404 . . Pulse-tube cycles with loudspeaker driven acoustic driver
- 2309/1405 . . Pulse-tube cycles with travelling waves
- 2309/1406 . . Pulse-tube cycles with pulse tube in co-axial or concentric geometrical arrangements
- 2309/1407 . . Pulse-tube cycles with pulse tube having in-line geometrical arrangements
- 2309/1408 . . Pulse-tube cycles with pulse tube having U-turn or L-turn type geometrical arrangements
- 2309/1409 . . Pulse-tube cycles with pulse tube having special type of geometrical arrangements not being a coaxial, in-line or U-turn type
- 2309/1411 . . Pulse-tube cycles characterised by control details, e.g. tuning, phase shifting or general control
- 2309/1412 . . Pulse-tube cycles characterised by heat exchanger details
- 2309/1413 . . Pulse-tube cycles characterised by performance, geometry or theory
- 2309/1414 . . Pulse-tube cycles characterised by pulse tube details
- 2309/1415 . . Pulse-tube cycles characterised by regenerator details
- 2309/1416 . . Pulse-tube cycles characterised by regenerator stack details

- 2309/1417 . . Pulse-tube cycles without any valves in gas supply and return lines
- 2309/1418 . . Pulse-tube cycles with valves in gas supply and return lines
- 2309/14181 . . . the valves being of the rotary type
- 2309/1419 . . Pulse-tube cycles with pulse tube having a basic pulse tube refrigerator [PTR], i.e. comprising a tube with basic schematic
- 2309/1421 . . Pulse-tube cycles characterised by details not otherwise provided for
- 2309/1422 . . Pulse tubes with basic schematic including a counter flow heat exchanger instead of a regenerative heat exchanger
- 2309/1423 . . Pulse tubes with basic schematic including an inertance tube
- 2309/1424 . . Pulse tubes with basic schematic including an orifice and a reservoir
- 2309/14241 . . . Pulse tubes with basic schematic including an orifice reservoir multiple inlet pulse tube
- 2309/1425 . . Pulse tubes with basic schematic including several pulse tubes
- 2309/1426 . . Pulse tubes with basic schematic including at the pulse tube warm end a so called warm end expander
- 2309/1427 . . Control of a pulse tube
- 2309/1428 . . Control of a Stirling refrigeration machine
- 2313/00 Compression machines, plants or systems with reversible cycle not otherwise provided for**
- 2313/001 . with two or more accumulators
- 2313/002 . geothermal
- 2313/003 . Indoor unit with water as a heat sink or heat source
- 2313/004 . Outdoor unit with water as a heat sink or heat source
- 2313/005 . Outdoor unit expansion valves
- 2313/006 . two pipes connecting the outdoor side to the indoor side with multiple indoor units
- 2313/007 . three pipes connecting the outdoor side to the indoor side with multiple indoor units
- 2313/008 . Refrigerant heaters
- 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
- 2313/021 . Indoor unit or outdoor unit with auxiliary heat exchanger not forming part of the indoor or outdoor unit
- 2313/0211 . . the auxiliary heat exchanger being only used during defrosting
- 2313/0212 . . the auxiliary heat exchanger being only used during dehumidifying
- 2313/0213 . . the auxiliary heat exchanger being only used during heating
- 2313/0214 . . the auxiliary heat exchanger being used parallel to the indoor unit during heating operation
- 2313/0215 . . the auxiliary heat exchanger being used parallel to the outdoor heat exchanger during heating operation
- 2313/023 . using multiple indoor units
- 2313/0231 . . with simultaneous cooling and heating
- 2313/0232 . . with bypasses
- 2313/02321 . . . during cooling
- 2313/02322 . . . during defrosting
- 2313/02323 . . . during heating
- 2313/0233 . . in parallel arrangements
- 2313/02331 . . . during cooling
- 2313/02332 . . . during defrosting
- 2313/02333 . . . during dehumidification
- 2313/02334 . . . during heating
- 2313/0234 . . in series arrangements
- 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	2339/0442	. . . characterised by the mechanical fixation of the receiver to the header
<b>2321/00</b>	<b>Details of machines, plants or systems, using electric or magnetic effects</b>	2339/0443	. . . the receiver being positioned horizontally
2321/001	. by using electro-caloric effects	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
2321/002	. by using magneto-caloric effects	2339/0445	. . . with throttle portions
2321/0021	. . with a static fixed magnet	2339/0446	. . . characterised by the refrigerant tubes connecting the header of the condenser to the receiver; Inlet or outlet connections to receiver
2321/0022	. . with a rotating or otherwise moving magnet	2339/045	. . Condensers made by assembling a tube on a plate-like element or between plate-like elements
2321/0023	. . with modulation, influencing or enhancing an existing magnetic field	2339/046	. . Condensers with refrigerant heat exchange tubes positioned inside or around a vessel containing water or pcm to cool the refrigerant gas
2321/003	. by using thermionic electron cooling effects	2339/047	. . Water-cooled condensers
2321/02	. using Peltier effects; using Nernst-Ettinghausen effects	<b>2341/00</b>	<b>Details of ejectors not being used as compression device; Details of flow restrictors or expansion valves</b>
2321/021	. . Control thereof	2341/001	. Ejectors not being used as compression device
2321/0211	. . . of fans	2341/0011	. . Ejectors with the cooled primary flow at reduced or low pressure
2321/0212	. . . of electric power, current or voltage	2341/0012	. . Ejectors with the cooled primary flow at high pressure
2321/023	. . Mounting details thereof	2341/0013	. . Ejector control arrangements
2321/025	. . Removal of heat	2341/0014	. . Ejectors with a high pressure hot primary flow from a compressor discharge
2321/0251	. . . by a gas	2341/0015	. . using two or more ejectors
2321/0252	. . . by liquids or two-phase fluids	2341/0016	. . Ejectors for creating an oil recirculation
<b>2327/00</b>	<b>Refrigeration system using an engine for driving a compressor</b>	2341/06	. Details of flow restrictors or expansion valves
2327/001	. of the internal combustion type	2341/062	. . Capillary expansion valves
<b>2333/00</b>	<b>Details of boilers; Analysers; Rectifiers</b>	2341/063	. . Feed forward expansion valves
2333/001	. the generator or boiler having an analyser	2341/064	. . Superheater expansion valves
2333/002	. the generator or boiler is heated electrically	2341/067	. . Expansion valves having a pilot valve
2333/003	. the generator or boiler is heated by combustion gas	2341/068	. . Expansion valves combined with a sensor
2333/004	. the generator or boiler uses an inert gas as pressure equalizing medium	2341/0681	. . . the sensor is heated
2333/005	. the generator or boiler uses electromagnetic energy in the form of microwaves for desorbing the sorbate from the sorbate/sorbent compound	2341/0682	. . . the sensor contains sorbent materials
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	2341/0683	. . . the sensor is disposed in the suction line and influenced by the temperature or the pressure of the suction gas
2333/006	. the generator or boiler having a rectifier	<b>2345/00</b>	<b>Details for charging or discharging refrigerants; Service stations therefor</b>
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	2345/001	. Charging refrigerant to a cycle
<b>2339/00</b>	<b>Details of evaporators; Details of condensers</b>	2345/002	. Collecting refrigerant from a cycle
2339/02	. Details of evaporators	2345/003	. Control issues for charging or collecting refrigerant to or from a cycle
2339/021	. . Evaporators in which refrigerant is sprayed on a surface to be cooled	2345/004	. with several tanks to collect or charge a cycle
2339/022	. . Evaporators constructed from a pair of plates forming a space in which is located a refrigerant carrying coil	2345/005	. Service stations therefor
2339/023	. . Evaporators consisting of one or several sheets on one face of which is fixed a refrigerant carrying coil	2345/0051	. . having a carrying handle
2339/024	. . Evaporators with refrigerant in a vessel in which is situated a heat exchanger	2345/0052	. . having wheels
2339/0241	. . . having plate-like elements	2345/006	. characterised by charging or discharging valves
2339/0242	. . . having tubular elements	2345/007	. characterised by the weighing of refrigerant or oil
2339/04	. Details of condensers	<b>2347/00</b>	<b>Details for preventing or removing deposits or corrosion</b>
2339/041	. . of evaporative condensers	2347/02	. Details of defrosting cycles
2339/042	. . of pcm condensers	2347/021	. . Alternate defrosting
2339/043	. . Condensers made by assembling plate-like or laminated elements	2347/022	. . Cool gas defrosting
2339/044	. . Condensers with an integrated receiver	2347/023	. . Set point defrosting
2339/0441	. . . containing a drier or a filter		



<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 <a href="#">F25B</a></b>	2400/17	• Re-condensers
2400/01	• Heaters	2400/18	• Refrigerant conversion
2400/02	• Centrifugal separation of gas, liquid or oil	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
2400/03	• Suction accumulators with deflectors	2400/21	• Modules for refrigeration systems
2400/04	• Refrigeration circuit bypassing means	2400/22	• Refrigeration systems for supermarkets
2400/0401	• . for the compressor	2400/23	• Separators
2400/0403	• . for the condenser	2400/24	• Storage receiver heat
2400/0405	• . for the desuperheater	<b>2500/00</b>	<b>Problems to be solved</b>
2400/0407	• . for the ejector	2500/01	• Geometry problems, e.g. for reducing size
2400/0409	• . for the evaporator	2500/02	• Increasing the heating capacity of a reversible cycle during cold outdoor conditions
2400/0411	• . for the expansion valve or capillary tube	2500/03	• Cavitations
2400/0413	• . for the filter or drier	2500/04	• Clogging
2400/0415	• . for the receiver	2500/05	• Cost reduction
2400/0417	• . for the subcooler	2500/06	• Damage
2400/0419	• . for the superheater	2500/07	• Exceeding a certain pressure value in a refrigeration component or cycle
2400/05	• Compression system with heat exchange between particular parts of the system	2500/08	• Exceeding a certain temperature value in a refrigeration component or cycle
2400/051	• . between the accumulator and another part of the cycle	2500/09	• Improving heat transfers
2400/052	• . between the capillary tube and another part of the refrigeration cycle	2500/11	• Reducing heat transfers
2400/053	• . between the storage receiver and another part of the system	2500/12	• Sound
2400/054	• . between the suction tube of the compressor and another part of the cycle	2500/13	• Vibrations
2400/06	• Several compression cycles arranged in parallel	2500/14	• the presence of moisture in a refrigeration component or cycle
2400/061	• . the capacity of the first system being different from the second	2500/15	• Hunting, i.e. oscillation of controlled refrigeration variables reaching undesirable values
2400/07	• Details of compressors or related parts	2500/16	• Lubrication
2400/071	• . Compressor mounted in a housing in which a condenser is integrated	2500/17	• Size reduction
2400/072	• . Intercoolers therefor	2500/18	• Optimization, e.g. high integration of refrigeration components
2400/073	• . Linear compressors	2500/19	• Calculation of parameters
2400/074	• . with multiple cylinders	2500/21	• Reduction of parts
2400/075	• . with parallel compressors	2500/22	• Preventing, detecting or repairing leaks of refrigeration fluids
2400/0751	• . . the compressors having different capacities	2500/221	• . Preventing leaks from developing
2400/076	• . having multiple cylinders driven by a rotating swash plate	2500/222	• . Detecting refrigerant leaks
2400/077	• . Compressor control units, e.g. terminal boxes, mounted on the compressor casing wall containing for example starter, protection switches or connector contacts	2500/23	• High amount of refrigerant in the system
2400/08	• Refrigeration machines, plants and systems having means for detecting the concentration of a refrigerant	2500/24	• Low amount of refrigerant in the system
2400/09	• Refrigeration machines, plants and systems having means for detecting the concentration of a sorbent solution	2500/25	• Standardisation of apparatus or parts
2400/11	• Drop catchers	2500/26	• characterised by the startup of the refrigeration cycle
2400/12	• Inflammable refrigerants	2500/27	• characterised by the stop of the refrigeration cycle
2400/121	• . using R1234	2500/28	• Means for preventing liquid refrigerant entering into the compressor
2400/13	• Economisers	2500/29	• High ambient temperatures
2400/14	• Power generation using energy from the expansion of the refrigerant	2500/31	• Low ambient temperatures
2400/141	• . the extracted power is not recycled back in the refrigerant circuit	2500/32	• Weight
2400/15	• Microelectro-mechanical devices	<b>2600/00</b>	<b>Control issues</b>
2400/16	• Receivers	2600/01	• Timing
2400/161	• . arranged in parallel	2600/02	• Compressor control
2400/162	• . characterised by the plug or stop	2600/021	• . Inverters therefor
		2600/022	• . for multi-stage operation
		2600/023	• . controlling swash plate angles
		2600/024	• . by controlling the electric parameters, e.g. current or voltage
		2600/025	• . by controlling speed
		2600/0251	• . . with on-off operation

2600/0252	. . . with two speeds	2700/173	. . of the evaporator fan
2600/0253	. . . with variable speed	2700/19	. Pressures
2600/026	. . by controlling unloaders	2700/191	. . near an expansion valve
2600/0261	. . . external to the compressor	2700/193	. . of the compressor
2600/0262	. . . internal to the compressor	2700/1931	. . . Discharge pressures
2600/027	. . by controlling pressure	2700/1932	. . . Oil pressures
2600/0271	. . . the discharge pressure	2700/1933	. . . Suction pressures
2600/0272	. . . the suction pressure	2700/195	. . of the condenser
2600/05	. Refrigerant levels	2700/197	. . of the evaporator
2600/07	. Remote controls	2700/21	. Temperatures
2600/11	. Fan speed control	2700/2101	. . in a bypass
2600/111	. . of condenser fans	2700/2102	. . at the outlet of the gas cooler
2600/112	. . of evaporator fans	2700/2103	. . near a heat exchanger
2600/13	. Pump speed control	2700/2104	. . of an indoor room or compartment
2600/15	. during shut down	2700/2105	. . Oil temperatures
2600/17	. by controlling the pressure of the condenser	2700/2106	. . of fresh outdoor air
2600/19	. Refrigerant outlet condenser temperature	2700/2107	. . of a Peltier element
2600/21	. Refrigerant outlet evaporator temperature	2700/2108	. . of a receiver
2600/23	. Time delays	2700/2109	. . of a separator
2600/25	. Control of valves	2700/2111	. . of a heat storage receiver
2600/2501	. . Bypass valves	2700/2113	. . of a suction accumulator
2600/2503	. . Condenser exit valves	2700/2115	. . of a compressor or the drive means therefor
2600/2505	. . Fixed-differential control valves	2700/21151	. . . at the suction side of the compressor
2600/2507	. . Flow-diverting valves	2700/21152	. . . at the discharge side of the compressor
2600/2509	. . Economiser valves	2700/21153	. . . of electronic components
2600/2511	. . Evaporator distribution valves	2700/21154	. . . of an inverter
2600/2513	. . Expansion valves	2700/21155	. . . of the oil
2600/2515	. . Flow valves	2700/21156	. . . of the motor
2600/2517	. . Head-pressure valves	2700/21157	. . . . at the coil or rotor
2600/2519	. . On-off valves	2700/2116	. . of a condenser
2600/2521	. . On-off valves controlled by pulse signals	2700/21161	. . . of the fluid heated by the condenser
2600/2523	. . Receiver valves	2700/21162	. . . of the refrigerant at the inlet of the condenser
2600/2525	. . Pressure relief valves	2700/21163	. . . of the refrigerant at the outlet of the condenser
<b>2700/00</b>	<b>Sensing or detecting of parameters; Sensors therefor</b>	2700/2117	. . of an evaporator
2700/01	. Sensors determining characteristics of the burner for a generator	2700/21171	. . . of the fluid cooled by the evaporator
2700/02	. Humidity	2700/21172	. . . . at the inlet
2700/03	. Oil level	2700/21173	. . . . at the outlet
2700/04	. Refrigerant level	2700/21174	. . . of the refrigerant at the inlet of the evaporator
2700/05	. Load shedding of a compressor	2700/21175	. . . of the refrigerant at the outlet of the evaporator
2700/06	. Piston positions of a compressor		
2700/11	. Sensor to detect if defrost is necessary		
2700/111	. . using an emitter and receiver, e.g. sensing by emitting light or other radiation and receiving reflection by a sensor		
2700/13	. Mass flow of refrigerants		
2700/131	. . at the outlet of a subcooler		
2700/133	. . through the condenser		
2700/1331	. . . at the inlet		
2700/1332	. . . at the outlet		
2700/135	. . through the evaporator		
2700/1351	. . . of the cooled fluid upstream or downstream of the evaporator		
2700/1352	. . . at the inlet		
2700/1353	. . . at the outlet		
2700/15	. Power, e.g. by voltage or current		
2700/151	. . of the compressor motor		
2700/17	. Speeds		
2700/171	. . of the compressor		
2700/172	. . of the condenser fan		