

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 ({evaporation or evaporation apparatus for physical or chemical purposes, e.g. evaporation of liquids for gas phase reactions [B01B 1/005](#)}; heat-transfer, heat-exchange or heat-storage materials, e.g. refrigerants, or materials for the production of heat or cold by chemical reactions other than by combustion [C09K 5/00](#); pumps, compressors [F04](#); use of heat-pumps for domestic- or space-heating or for domestic hot-water supply [F24D](#); air-conditioning, air-humidification [F24F](#); fluid heaters using heat pumps [F24H](#))

NOTES

1. Attention is drawn to Note (2) following the title of subclass [F24F](#).
2. When classifying heat pump circuits or systems, groups [F25B 1/00](#) - [F25B 25/00](#) and [F25B 29/00](#) take precedence over group [F25B 30/00](#).

WARNING

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.

Compression machines, plant, or systems

- 1/00 Compression machines, plant, 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, plant, 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, plant, or systems, with several condenser circuits**
- 6/02 . arranged in parallel
- 6/04 . arranged in series
- 7/00 Compression machines, plant, 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, plant, 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 (air conditioning [F24F](#))}
- 9/006 . . {the refrigerant containing more than one component ([F25B 9/004](#) takes precedence; refrigerant materials *per se* [C09K 5/00](#))}
- 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 ^3He - ^4He dilution

9/14	characterised by the cycle used, e.g. Stirling cycle { (engine plants with Vuilleumier-type cycles F02G 1/0445) }	19/005	{the refrigerant being a liquefied gas}
9/145	. . {pulse-tube cycle}	19/02	. using fluid jet, e.g. of steam { (F25B 19/005 takes precedence) }
11/00	Compression machines, plant, or systems, using turbines, e.g. gas turbines	19/04	. . using liquid jet, e.g. of water
11/02	. as expanders (F25B 9/06 takes precedence)	21/00	Machines, plant, or systems, using electric or magnetic effects { (magnetic refrigerating material H01F 1/012 and H01F 1/017) }
11/04	. . centrifugal type	21/02	. using Peltier effect; using Nernst-Ettinghausen effect (thermoelectric elements H01L 35/00, H01L 37/00)
13/00	Compression machines, plant or systems with reversible cycle (defrosting cycles F25B 47/02)	21/04	. . reversible
<u>Sorption machines, plant, or systems</u>			
15/00	Sorption machines, plant, or systems, operating continuously, e.g. absorption type	23/00	Machines, plant, or systems, with a single mode of operation not covered by groups F25B 1/00 - F25B 21/00, e.g. using selective radiation effect
15/002	. {using the endothermic solution of salt}	23/003	. {using selective radiation effect}
15/004	. {of rotary type}	23/006	. {boiling cooling systems}
15/006	. {with cascade operation}	25/00	Machines, plant, or systems, using a combination of modes of operation covered by two or more of the groups F25B 1/00 - F25B 23/00 (combinations of two or more modes of operation covered by a single main group, see the relevant group)
15/008	. {with multi-stage operation (F25B 15/006 takes precedence) }	25/005	. {using primary and secondary systems}
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)	25/02	. Compression-sorption machines, plants, or systems
15/025	. . {Liquid transfer means}	27/00	Machines, plant, or systems, using particular sources of energy (F25B 30/06 takes precedence)
15/04	. . the refrigerant being ammonia evaporated from aqueous solution { (F25B 15/025 takes precedence) }	27/002	. {using solar energy (solar heat collectors F24S) }
15/06	. . the refrigerant being water vapour evaporated from a salt solution, e.g. lithium bromide { (F25B 15/025 takes precedence) }	27/005	. . {in compression type systems}
15/08	. . the refrigerant being sulfuric acid { (F25B 15/025 takes precedence) }	27/007	. . {in sorption type systems}
15/09	. . the refrigerant being hydrogen desorbed from a hydride { (F25B 15/025 takes precedence) }	27/02	. using waste heat, e.g. from internal-combustion engines
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)	29/00	Combined heating and refrigeration systems, e.g. operating alternately or simultaneously
15/12	. with resorber ({ F25B 15/004 , F25B 15/006 , F25B 15/008 }, F25B 15/14 take precedence)	29/003	. {of the compression type system}
15/14	. using osmosis { (F25B 15/004 , F25B 15/006 , F25B 15/008 take precedence)}	29/006	. {of the sorption type system}
15/16	. using desorption cycle { (F25B 15/004 , F25B 15/006 , F25B 15/008 take precedence)}	30/00	Heat pumps
17/00	Sorption machines, plant, or systems, operating intermittently, e.g. absorption or adsorption type	30/02	. of the compression type
17/02	. the absorbent or adsorbent being a liquid, e.g. brine (F25B 17/10 takes precedence)	30/04	. of the sorption type
17/04	. . with two or more boilers operating alternately	30/06	. characterised by the source of low potential heat
17/06	. . with the boiler and evaporator built-up as a unit in a tiltable or revolving arrangement	<u>Component parts or details</u>	
17/08	. the absorbent or adsorbent being a solid, e.g. salt (F25B 17/12 takes precedence)	31/00	Compressor arrangements (compressors per se F04)
17/083	. . {with two or more boiler-sorbers operating alternately}	31/002	. {lubrication (of compressors per se F04B, of machines or engines in general F01M) }
17/086	. . {with two or more boiler-sorber/evaporator units}	31/004	. . {oil recirculating arrangements}
17/10	. using the endothermic solution of salt	31/006	. {cooling of compressor or motor (of compressors per se F04B 39/06) }
17/12	. using desorption of hydrogen from a hydride	31/008	. . {by injecting a liquid (for compressors in general F04B 39/062) }
<u>Machines, plant, or systems, with a single mode of operation, not covered by groups F25B 1/00 - F25B 17/00</u>			
19/00	Machines, plant, or systems, using evaporation of a refrigerant but without recovery of the vapour	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 ; separating processes involving the treatment of liquids with adsorbents B01D 15/00 ; separation of gases or vapours by adsorption B01D 53/02 ; separation of gases or vapours by absorption B01D 53/14 ; investigating using adsorption or absorption G01N 30/00); {(absorption or adsorption in general B01J 20/00)}	41/28	<ul style="list-style-type: none"> • specially adapted for sorption cycles <p>WARNING</p> <p>Group F25B 41/28 is incomplete pending reclassification of documents from groups F25B 41/20, F25B 41/22 and F25B 41/26.</p> <p>Groups F25B 41/20, F25B 41/22, F25B 41/26 and F25B 41/28 should be considered in order to perform a complete search.</p>
39/00	Evaporators; Condensers		
39/02	• Evaporators	41/30	<ul style="list-style-type: none"> • Expansion means; Dispositions thereof <p>WARNING</p> <p>Group F25B 41/30 is impacted by reclassification into groups F25B 41/38, F25B 41/385, and F25B 41/39.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
39/022	• • {with plate-like or laminated elements}		
39/024	• • • {with elements constructed in the shape of a hollow panel (for heat exchange in general F28F 3/12)}		
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	41/31	<ul style="list-style-type: none"> • Expansion valves <p>WARNING</p> <p>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.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>
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 .	41/315	<ul style="list-style-type: none"> • • • actuated by floats
	Groups F25B 41/20 , F25B 41/24 , and F25B 41/28 should be considered in order to perform a complete search.	41/32	<ul style="list-style-type: none"> • • • having flow rate limiting means other than the valve member, e.g. having bypass orifices in the valve body <p>WARNING</p> <p>Group F25B 41/32 is incomplete pending reclassification of documents from group F25B 41/31.</p> <p>Groups F25B 41/31 and F25B 41/32 should be considered in order to perform a complete search.</p>
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.	41/325	<ul style="list-style-type: none"> • • • having two or more valve members <p>WARNING</p> <p>Group F25B 41/325 is incomplete pending reclassification of documents from group F25B 41/31.</p> <p>Groups F25B 41/31 and F25B 41/325 should be considered in order to perform a complete search.</p>
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.	41/33	<ul style="list-style-type: none"> • • • with the valve member being actuated by the fluid pressure, e.g. by the pressure of the refrigerant <p>WARNING</p> <p>Groups F25B 41/33 and F25B 41/335 are incomplete pending reclassification of documents from group F25B 41/31.</p> <p>Groups F25B 41/31, F25B 41/33, and F25B 41/335 should be considered in order to perform a complete search.</p>
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.		

- 41/335 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 (in general [B01D](#))}

- 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 (testing refrigerators G01M; control in general G05)	
49/005	. {of safety devices (F25B 49/02 and F25B 49/04 take precedence)}	
49/02	. for compression type machines, plant or systems	
49/022	. . {Compressor control arrangements (in general F04B)}	
49/025	. . {Motor control arrangements (motors per se H02K)}	
49/027	. . {Condenser control arrangements}	
49/04	. for sorption type machines, plant or systems	
49/043	. . {Operating continuously}	
49/046	. . {Operating intermittently}	
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, plant or systems characterised by the refrigerant being carbon dioxide	
2309/061	. . with cycle highest pressure above the supercritical pressure	
2309/14	. Compression machines, plant 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, plant, 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
- 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
2341/00		Details of ejectors not being used as compression device; Details of flow restrictors or expansion valves
2341/001	. .	Ejectors not being used as compression device
2341/0011	. .	Ejectors with the cooled primary flow at reduced or low pressure
2341/0012	. .	Ejectors with the cooled primary flow at high pressure
2341/0013	. .	Ejector control arrangements
2341/0014	. .	Ejectors with a high pressure hot primary flow from a compressor discharge
2341/0015	. .	using two or more ejectors
2341/0016	. .	Ejectors for creating an oil recirculation
2341/06	. .	Details of flow restrictors or expansion valves
2341/062	. .	Capillary expansion valves
2341/063	. .	Feed forward expansion valves
2341/064	. .	Superheater expansion valves
2341/067	. .	Expansion valves having a pilot valve
2341/068	. .	Expansion valves combined with a sensor
2341/0681	. . .	the sensor is heated
2341/0682	. . .	the sensor contains sorbent materials
2341/0683	. . .	the sensor is disposed in the suction line and influenced by the temperature or the pressure of the suction gas
2345/00		Details for charging or discharging refrigerants; Service stations therefor
2345/001	. .	Charging refrigerant to a cycle
2345/002	. .	Collecting refrigerant from a cycle
2345/003	. .	Control issues for charging or collecting refrigerant to or from a cycle
2345/004	. .	with several tanks to collect or charge a cycle
2345/005	. .	Service stations therefor
2345/0051	. . .	having a carrying handle
2345/0052	. . .	having wheels
2345/006	. .	characterised by charging or discharging valves
2345/007	. .	characterised by the weighing of refrigerant or oil
2347/00		Details for preventing or removing deposits or corrosion
2347/02	. .	Details of defrosting cycles
2347/021	. . .	Alternate defrosting
2347/022	. . .	Cool gas defrosting
2347/023	. . .	Set point defrosting
2400/00		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
2400/01	. .	Heaters
2400/02	. .	Centrifugal separation of gas, liquid or oil
2400/03	. .	Suction accumulators with deflectors
2400/04	. .	Refrigeration circuit bypassing means
2400/0401	. . .	for the compressor
2400/0403	. . .	for the condenser
2400/0405	. . .	for the desuperheater
2400/0407	. . .	for the ejector
2400/0409	. . .	for the evaporator
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
2400/05	. .	Compression system with heat exchange between particular parts of the system
2400/051	. . .	between the accumulator and another part of the cycle
2400/052	. . .	between the capillary tube and another part of the refrigeration cycle
2400/053	. . .	between the storage receiver and another part of the system
2400/054	. . .	between the suction tube of the compressor and another part of the cycle
2400/06	. .	Several compression cycles arranged in parallel
2400/061	. . .	the capacity of the first system being different from the second
2400/07	. .	Details of compressors or related parts
2400/071	. . .	Compressor mounted in a housing in which a condenser is integrated
2400/072	. . .	Intercoolers therefor
2400/073	. . .	Linear compressors
2400/074	. . .	with multiple cylinders
2400/075	. . .	with parallel compressors
2400/0751	the compressors having different capacities
2400/076	. . .	having multiple cylinders driven by a rotating swash plate
2400/077	. . .	Compressor control units, e.g. terminal boxes, mounted on the compressor casing wall containing for example starter, protection switches or connector contacts
2400/08	. .	Refrigeration machines, plants and systems having means for detecting the concentration of a refrigerant

2400/09	• Refrigeration machines, plants and systems having means for detecting the concentration of a sorbent solution	2500/28	• Means for preventing liquid refrigerant entering into the compressor
2400/11	• Drop catchers	2500/29	• High ambient temperatures
2400/12	• Inflammable refrigerants	2500/31	• Low ambient temperatures
2400/121	• . . using R1234	2500/32	• Weight
2400/13	• Economisers	2600/00	Control issues
2400/14	• Power generation using energy from the expansion of the refrigerant	2600/01	• Timing
2400/141	• . . the extracted power is not recycled back in the refrigerant circuit	2600/02	• Compressor control
2400/15	• Microelectro-mechanical devices	2600/021	• . . Inverters therefor
2400/16	• Receivers	2600/022	• . . for multi-stage operation
2400/161	• . . arranged in parallel	2600/023	• . . controlling swash plate angles
2400/162	• . . characterised by the plug or stop	2600/024	• . . by controlling the electric parameters, e.g. current or voltage
2400/17	• Re-condensers	2600/025	• . . by controlling speed
2400/18	• Refrigerant conversion	2600/0251	• . . . with on-off operation
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	2600/0252	• . . . with two speeds
2400/21	• Modules for refrigeration systems	2600/0253	• . . . with variable speed
2400/22	• Refrigeration systems for supermarkets	2600/026	• . . by controlling unloaders
2400/23	• Separators	2600/0261	• . . . external to the compressor
2400/24	• Storage receiver heat	2600/0262	• . . . internal to the compressor
2500/00	Problems to be solved	2600/027	• . . by controlling pressure
2500/01	• Geometry problems, e.g. for reducing size	2600/0271	• . . . the discharge pressure
2500/02	• Increasing the heating capacity of a reversible cycle during cold outdoor conditions	2600/0272	• . . . the suction pressure
2500/03	• Cavitations	2600/05	• Refrigerant levels
2500/04	• Clogging	2600/07	• Remote controls
2500/05	• Cost reduction	2600/11	• Fan speed control
2500/06	• Damage	2600/111	• . . of condenser fans
2500/07	• Exceeding a certain pressure value in a refrigeration component or cycle	2600/112	• . . of evaporator fans
2500/08	• Exceeding a certain temperature value in a refrigeration component or cycle	2600/13	• Pump speed control
2500/09	• Improving heat transfers	2600/15	• during shut down
2500/11	• Reducing heat transfers	2600/17	• by controlling the pressure of the condenser
2500/12	• Sound	2600/19	• Refrigerant outlet condenser temperature
2500/13	• Vibrations	2600/21	• Refrigerant outlet evaporator temperature
2500/14	• the presence of moisture in a refrigeration component or cycle	2600/23	• Time delays
2500/15	• Hunting, i.e. oscillation of controlled refrigeration variables reaching undesirable values	2600/25	• Control of valves
2500/16	• Lubrication	2600/2501	• . . Bypass valves
2500/17	• Size reduction	2600/2503	• . . Condenser exit valves
2500/18	• Optimization, e.g. high integration of refrigeration components	2600/2505	• . . Fixed-differential control valves
2500/19	• Calculation of parameters	2600/2507	• . . Flow-diverting valves
2500/21	• Reduction of parts	2600/2509	• . . Economiser valves
2500/22	• Preventing, detecting or repairing leaks of refrigeration fluids	2600/2511	• . . Evaporator distribution valves
2500/221	• . . Preventing leaks from developing	2600/2513	• . . Expansion valves
2500/222	• . . Detecting refrigerant leaks	2600/2515	• . . Flow valves
2500/23	• High amount of refrigerant in the system	2600/2517	• . . Head-pressure valves
2500/24	• Low amount of refrigerant in the system	2600/2519	• . . On-off valves
2500/25	• Standardisation of apparatus or parts	2600/2521	• . . On-off valves controlled by pulse signals
2500/26	• characterised by the startup of the refrigeration cycle	2600/2523	• . . Receiver valves
2500/27	• characterised by the stop of the refrigeration cycle	2600/2525	• . . Pressure relief valves
		2700/00	Sensing or detecting of parameters; Sensors therefor
		2700/01	• Sensors determining characteristics of the burner for a generator
		2700/02	• Humidity
		2700/03	• Oil level
		2700/04	• Refrigerant level
		2700/05	• Load shedding of a compressor
		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
2700/173	. . of the evaporator fan
2700/19	. Pressures
2700/191	. . near an expansion valve
2700/193	. . of the compressor
2700/1931	. . . Discharge pressures
2700/1932	. . . Oil pressures
2700/1933	. . . Suction pressures
2700/195	. . of the condenser
2700/197	. . of the evaporator
2700/21	. Temperatures
2700/2101	. . in a bypass
2700/2102	. . at the outlet of the gas cooler
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