

CPC COOPERATIVE PATENT CLASSIFICATION

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

LIGHTING; HEATING

F24 HEATING; RANGES; VENTILATING (protecting plants by heating in gardens, orchards, or forests [A01G 13/06](#); baking ovens and apparatus [A21B](#); cooking devices other than ranges [A47J](#); forging [B21J](#), [B21K](#); specially adapted for vehicles, see the relevant subclasses of [B60](#) - [B64](#); combustion apparatus in general [F23](#); drying [F26B](#); ovens in general [F27](#); electric heating elements and arrangements [H05B](#))
(NOTE omitted)

F24F AIR-CONDITIONING, AIR-HUMIDIFICATION, VENTILATION, USE OF AIR CURRENTS FOR SCREENING (devices for ventilating greenhouses [A01G](#) {air-conditioning systems for greenhouses [A01G 9/246](#)}; animal husbandry [A01K](#), e.g. controlling humidity in incubators [A01K 41/04](#); disinfecting or sterilising of air [A61L](#); devices for reconditioning breathing air in sealed rooms or for ventilating gas-proof shelters [A62B](#); filtering, washing or drying of gases [B01D](#); mixing gases with vapours or liquids in general [B01F 3/00](#); spraying [B05B](#), [B05D](#); removing dirt or fumes from areas where they are produced [B08B 15/00](#); ventilation, air-conditioning or cooling, specially adapted for vehicles, see the relevant vehicle places, e.g. [B60H](#), [B61D 27/00](#), {[B64D 13/00](#)}; production of ozone [C01B 13/10](#); chimneys or flues [E04F 17/02](#), [E04H 12/28](#), [F23J 11/00](#), [F23L 17/02](#); air ducts or conduits [E04F 17/04](#), [F16L](#); ventilation in doors or windows [E06B 7/02](#); fans, blowers [F04](#); noise-absorbing in pipes or pipe systems [F16L](#); tops for chimneys and ventilating shafts [F23L](#); cooling [F25](#); details of heat-exchange or heat-transfer apparatus, of general application [F28F](#); apparatus for generating ions to be introduced into non-enclosed gases, e.g. the atmosphere [H01T 23/00](#))

NOTES

- In this subclass:
 - air-humidification as auxiliary treatment in air-conditioning, i.e. in units wherein the air is also either cooled or heated, is covered by groups [F24F 1/00](#) or [F24F 3/14](#);
 - air-humidification *per se*, e.g. "room humidifiers", is covered by group [F24F 6/00](#).
- In this subclass, the following terms or expressions are used with the meanings indicated:
 - "air-conditioning" means the supply of air to rooms or spaces by means which provide for the treatment of the air in at least two of the following ways: heating — cooling — any other kind of treatment, e.g. humidification.
 - "ventilation" means the supply of air to, or its extraction from, rooms or spaces, and systems for circulating air within rooms or spaces, but does not cover the mere treatment of air being supplied to, extracted from, or circulated within, rooms or spaces.
- In this subclass, control or safety arrangements are classified in [F24F 11/00](#). In order to indicate the type of air-treatment system in which these arrangements are used, further classification may be made in main groups [F24F 1/00](#) - [F24F 9/00](#).

1/00	Room units, e.g. separate or self-contained units or units receiving primary air from a central station {or with supply of heating or cooling agents from a central station, such as those applied to air-treatment systems included in F24F 3/00 and F24F 5/00}	1/0025	. . . {Cross flow or tangential fan}
		1/0029	. . . {Axial fan}
		1/0033	. . . {comprising two or more fans}
		2001/0037	. . . {mounted in or under the ceiling}
		2001/004	. . . {mounted or standing on the floor}
		2001/0044	. . . {mounted at least partially under the floor or the outlet air is being distributed under the floor (HVAC with raised floors F24F 2221/40)}
1/0003	. {Split units}	2001/0048	. . . {mounted in or on the wall}
1/0007	. {Fan coil units, e.g. using an evaporating refrigerant}	2001/0051	. . . {Introducing outside air to rooms}
1/0011	. . {characterised by the air outlet}	2001/0055	. . . {Exhausting internal air from rooms}
1/0014	. . . {with two or more blow out openings}	1/0059	. {characterised by the heat exchanger}
1/0018	. . {characterised by the fan}		
1/0022	. . . {Centrifugal or radial fan}		

2001/0062	. {receiving air from a central station}	1/38	. . Fan details of outdoor units, e.g. bell-mouth shaped inlets or fan mountings
2001/0066	. . {with air treatment in the central station and in the room unit}	1/40	. . Vibration or noise prevention at outdoor units (for outdoor units compressors F24F 1/12)
2001/007	. . {with air treatment in the room unit}	1/42	. . characterised by the use of the condensate, e.g. for enhanced cooling
2001/0074	. {receiving heat exchange fluid}	1/44	. . characterised by the use of internal combustion engines
2001/0077	. . {the fluid entering and leaving the room unit as a liquid}	1/46	. . Component arrangements in separate outdoor units
2001/0081	. . {the fluid entering the room unit as a liquid and leaving it as a gas}	1/48	. . . characterised by air airflow, e.g. inlet or outlet airflow
2001/0085	. {using the cooling effect of evaporating fluid either evaporating directly in the room air, in the air supplied to the room or in the outside air}	1/50 with outlet air in upward direction
2001/0088	. . {evaporating directly in the room air or the air supplied to the room}	1/52 with inlet and outlet arranged on the same side, e.g. for mounting in a wall opening
2001/0092	. . {evaporating in the outside air, e.g. evaporation heat being extracted from the room air by indirect heat exchange}	1/54 Inlet and outlet arranged on opposite sides
2001/0096	. {Units supplying highly filtered air to a room or to a limited area within a room}	1/56	. . Casing or covers of separate outdoor units, e.g. fan guards
1/01	. in which secondary air is induced by injector action of the primary air (F24F 1/02 takes precedence; {arrangement or assembly of or components for the regulation of the air supply through a heat exchanger and the associated bypass for the secondary treatment of the air F24F 11/81; nozzle for induction unit F24F 13/26})	1/58	. . . Separate protective covers for outdoor units, e.g. solar guards, snow shields or camouflage
1/02	. self-contained, i.e. with all apparatus for treatment installed in a common casing {(arrangement or assembly of components for the primary treatment of air in independent units F24F 11/30)}	1/60	. . Arrangement or mounting of the outdoor unit
1/022	. . {Comprising a compressor cycle}	1/62	. . . Wall-mounted
1/025	. . . {Portable}	1/64	. . . Ceiling-mounted, e.g. below a balcony
1/027	. . . {mounted in wall openings, e.g. in windows}	1/66	. . . under the floor level
1/04	. . Arrangements for portability	1/68	. . . Arrangement of multiple separate outdoor units
1/06	. Separate outdoor units, e.g. outdoor unit to be linked to a separate room comprising a compressor and a heat exchanger	3/00	Air-conditioning systems in which conditioned primary air is supplied from one or more central stations to distributing units in the rooms or spaces where it may receive secondary treatment; Apparatus specially designed for such systems (room units F24F 1/00)
	NOTE		
	In this group, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.		
1/08	. . Compressors specially adapted for separate outdoor units	3/001	. {in which the air treatment in the central station takes place by means of a heat-pump or by means of a reversible cycle (regulation of heat-pump circuit in air treatment systems F25B 29/00; heat pumps F25B 13/00, F25B 29/00; reversible cycle for humidifying and drying air F24F 3/147)}
1/10	. . . Arrangement or mounting thereof	2003/003	. {with primary air treatment in the central station and subsequent secondary air treatment in air treatment units located in or near the rooms}
1/12	. . . Vibration or noise prevention thereof	2003/005	. . {with a single air duct for transporting treated primary air from the central station to air treatment units located in or near the rooms}
1/14	. . Heat exchangers specially adapted for separate outdoor units	2003/006	. . {with two air ducts for separately transporting treated hot and cold primary air from the central station to air treatment units located in or near the rooms}
1/16	. . . Arrangement or mounting thereof	2003/008	. {Supplying highly filtered air to a room or to a limited area within a room}
1/18	. . . characterised by their shape	3/02	. characterised by the pressure or velocity of the primary air (F24F 3/044 takes precedence)
1/20	. . Electric components for separate outdoor units	3/04	. . operating with high pressure or high velocity
1/22	. . . Arrangement or mounting thereof	3/044	. Systems in which all treatment is given in the central station, i.e. all-air systems
1/24	. . . Cooling of electric components	3/0442	. . {with volume control at a constant temperature}
1/26	. . Refrigerant piping		
1/28	. . . for connecting several separate outdoor units		
1/30	. . . for use inside the separate outdoor units		
1/32	. . . for connecting the separate outdoor units to indoor units		
1/34	. . . Protection means thereof, e.g. covers for refrigerant pipes		
1/36	. . Drip trays for outdoor units		

- 3/0444 . . . {in which two airstreams are conducted from the central station via independent conduits to the space to be treated, of which one has a constant volume and a season-adapted temperature to compensate for the fluctuating heat transfer losses of the building, while the other varies in volume and is always cold in order to compensate for the interior fluctuations and variable solar heating effects, i.e. so-called "Dual Conduit System"; this system is similar to a high-pressure air-water system}
- 2003/0446 . . {with a single air duct for transporting treated air from the central station to the rooms}
- 2003/0448 . . {with two air ducts for separately transporting treated hot and cold air from the central station to the rooms}
- 3/048 . . with temperature control at constant rate of air-flow ([F24F 3/056](#) takes precedence)
- 3/052 . . . Multiple duct systems, e.g. systems in which hot and cold air are supplied by separate circuits from the central station to mixing chambers in the spaces to be conditioned
- 3/0522 {in which warm or cold air from the central station is delivered via individual pipes to mixing chambers in the space to be treated, the cold air/warm air ratio being controlled by a thermostat in the space concerned, i.e. so-called Dual-duct System}
- 3/0525 {in which the air treated in the central station is reheated; this may take place near the central station upon arrival, in the space to be treated, in a branch pipe to zone in a multi-zone system or in the warm pipe in a system having separate supply conduits for warm and cold air}
- 3/0527 {in which treated air having differing temperatures is conducted through independent conduits from the central station to various spaces to be treated, i.e. so-called "multi-Zone" system; ([F24F 3/0525](#) takes precedence)}
- 3/056 . . the air at least partially flowing over lighting fixtures, the heat of which is dissipated or used
- 3/06 . . characterised by the arrangements for the supply of heat-exchange fluid for the subsequent treatment of primary air in the room units ([F24F 3/02](#) takes precedence {Arrangement or assembly of components for the regulation of the supply of heating or cooling media for the secondary treatment of air [F24F 11/83](#)})
- 3/065 . . {with a plurality of evaporators or condensers}
- 3/08 . . with separate supply and return lines for hot and cold heat-exchange fluids {i.e. so-called "4-conduit" system}
- 3/10 . . with separate supply lines and common return line for hot and cold heat-exchange fluids {i.e. so-called "3-conduit" system}
- 3/12 . . characterised by the treatment of the air otherwise than by heating and cooling ([F24F 3/02](#), [F24F 3/06](#) take precedence, apparatus for the individual treatment, [see the appropriate subclasses for the treatments](#))
- 3/14 . . by humidification; by dehumidification
- 3/1405 . . . {in which the humidity of the air is exclusively affected by contact with the evaporator of a closed-circuit cooling system or heat pump circuit}
- 3/1411 . . . {by absorbing or adsorbing water, e.g. using an hygroscopic desiccant}
- 3/1417 {with liquid hygroscopic desiccants}
- 3/1423 {with a moving bed of solid desiccants, e.g. a rotary wheel supporting solid desiccants}
- 3/1429 {alternatively operating a heat exchanger in an absorbing/adsorbing mode and a heat exchanger in a regeneration mode}
- 2003/1435 . . . {comprising semi-permeable membrane}
- 2003/144 . . . {by dehumidification only}
- 2003/1446 {by condensing}
- 2003/1452 {heat extracted from the humid air for condensing is returned to the dried air}
- 2003/1458 . . . {using regenerators}
- 2003/1464 {using rotating regenerators}
- 3/147 . . . with both heat and humidity transfer between supplied and exhausted air
- 3/153 . . . with subsequent heating, i.e. with the air, given the required humidity in the central station, passing a heating element to achieve the required temperature
- 3/16 . . by purification, e.g. by filtering; by sterilisation; by ozonisation ({ion sources [H01J 27/02](#), [H01J 37/08](#); treatment rooms or enclosures for medical purposes [A61G 10/00](#)})
- 3/1603 . . . {by filtering (arrangements or mounting of filters [F24F 13/28](#))}
- 3/1607 {Clean air work stations, i.e. selected areas within a space to which filtered air is passed (means providing sterile air at a surgical operation table or area [A61G 13/108](#))}
- 3/161 {Clean rooms, i.e. enclosed spaces in which a uniform flow of filtered air is distributed (air distribution by perforated walls [F24F 7/10](#); dust-free rooms or enclosures applicable solely to laboratory purposes [B01L 1/04](#))}
- 2003/1614 {using a dry filtering element}
- 2003/1617 {using wet filtering methods}
- 2003/1621 {using chemical filtering methods}
- 2003/1625 {using active carbon}
- 2003/1628 {using catalytic reaction}
- 2003/1632 {using vortex}
- 2003/1635 {using high voltage}
- 2003/1639 {with filter cleaning}
- 2003/1642 {of pollen, to avoid allergies}
- 2003/1646 {of tobacco smoke}
- 2003/165 {of ozone}
- 2003/1653 {using biofilters, plants or microorganisms}
- 2003/1657 {the air pollution of a street or a city}
- 3/166 . . . {using electric means, e.g. applying electrostatic field (using thermo-electric means [F24F 5/0042](#))}
- 2003/1664 . . . {by sterilisation}
- 2003/1667 {using UV light}
- 2003/1671 {using ozone}
- 2003/1675 {using a sterilising medium}
- 2003/1678 {to avoid the Legionella bacteria}
- 2003/1682 . . . {by ionisation}

- 2003/1685 . . . {by ozonisation}
- 2003/1689 . . . {by odourising}
- 2003/1692 . . . {by adding oxygen}
- 2003/1696 . . . {by removing radon}
- 5/00 Air-conditioning systems or apparatus not covered by F24F 1/00 or F24F 3/00 {, e.g. using solar heat or combined with household units such as an oven or water heater}**
- 5/0003 . {Exclusively-fluid systems}
- 5/0007 . {cooling apparatus specially adapted for use in air-conditioning (self-contained room units [F24F 1/02](#); [F24F 5/0046](#) takes precedence; air-humidification [F24F 6/00](#))}
- 5/001 . . {Compression cycle type}
- 5/0014 . . {using absorption or desorption}
- 5/0017 . . {using cold storage bodies, e.g. ice}
- 5/0021 . . . {using phase change material [PCM] for storage}
- 2005/0025 . . . {using heat exchange fluid storage tanks}
- 2005/0028 . . . {using hydridable metals as energy storage media}
- 2005/0032 . . . {Systems storing energy during the night}
- 5/0035 . . {using evaporation}
- 2005/0039 . . {using a cryogen, e.g. CO₂ liquid or N₂ liquid}
- 5/0042 . {characterised by the application of thermo-electric units or the Peltier effect (refrigerators and cooling systems using magnetic or electrical effects in general [F25B 21/02](#); for semi-conductors [H01L 23/38](#); thermobatteries or thermogenerators [H01L 35/00](#))}
- 5/0046 . {using natural energy, e.g. solar energy, energy from the ground}
- 5/005 . . {using energy from the ground by air circulation, e.g. "Canadian well"}
- 2005/0053 . . {receiving heat-exchange fluid from a well}
- 2005/0057 . . {receiving heat-exchange fluid from a closed circuit in the ground}
- 2005/006 . . {receiving heat-exchange fluid from the drinking or sanitary water supply circuit}
- 2005/0064 . . {using solar energy}
- 2005/0067 . . . {with photovoltaic panels}
- 5/0071 . {adapted for use in covered swimming pools}
- 5/0075 . {Systems using thermal walls, e.g. double window (double windows *per se* [E06B](#))}
- 2005/0078 . . {Double windows}
- 2005/0082 . . {Facades}
- 5/0085 . {Systems using a compressed air circuit ([B64D 13/00](#), [B60H](#) take precedence)}
- 5/0089 . {Systems using radiation from walls or panels}
- 5/0092 . . {ceilings, e.g. cool ceilings}
- 5/0096 . {combined with domestic apparatus}
- 6/00 Air-humidification {, e.g. cooling by humidification}**
- 2006/001 . {using a water curtain}
- 2006/003 . {using a decorative fountain}
- 2006/005 . {using plants}
- 2006/006 . {with water treatment}
- 2006/008 . {Air-humidifier with water reservoir}
- 6/02 . by evaporation of water in the air {(humidifiers specially adapted for radiators *see* [F24D 19/008](#))}
- 6/025 . . {using electrical heating means ([F24F 6/105](#) takes precedence)}
- 6/04 . . using stationary unheated wet elements
- 6/043 . . . {with self-sucking action, e.g. wicks (humidifiers for radiators [F24D 19/008](#))}
- 2006/046 . . . {with a water pump}
- 6/06 . . using moving unheated wet elements
- 2006/065 . . . {using slowly rotating discs for evaporation}
- 6/08 . . using heated wet elements
- 6/10 . . . heated electrically
- 6/105 {using the heat of lamps}
- 6/12 . by forming water dispersions in the air
- 6/14 . . using nozzles (nozzles *per se*, spraying in general [B05B](#))
- 2006/143 . . . {using pressurised air for spraying}
- 2006/146 . . . {using pressurised water for spraying}
- 6/16 . . using rotating elements
- 6/18 . by injection of steam into the air
- 7/00 Ventilation {, e.g. by means of wall-ducts or systems using window or roof apertures}**
- 2007/001 . {with exhausting air ducts}
- 2007/002 . . {Junction box, e.g. for ducts from kitchen, toilet or bathroom}
- 2007/003 . {using vent ports in a wall}
- 2007/004 . {Natural ventilation using convection}
- 2007/005 . {Cyclic ventilation, e.g. alternating air supply volume or reversing flow direction ([F24F 2012/008](#) takes precedence when there is heat exchange between exhaust and supply air)}
- 7/007 . with forced flow (using ducting systems [F24F 7/06](#))
- 7/013 . . using wall or window fans, displacing air through the wall or window {possibly through a grill or through a shutter or flap (with heating elements [F24F 3/00](#) - [F24F 3/14](#); ventilators with provision for recirculating air or piping it away [F24F 7/06](#); room ventilators, portable ventilators [F04D 25/08](#))}
- 7/02 . Roof ventilation ([F24F 7/007](#) takes precedence; ventilation of roof coverings [E04D](#))
- 7/025 . . {with forced air circulation by means of a built-in ventilator}
- 7/04 . with ducting systems {also by double walls; with natural circulation ([F24F 7/02](#) takes precedence)}
- 7/06 . . with forced air circulation, e.g. by fan {positioning of a ventilator in or against a conduit (ventilators *per se* [F04D 25/08](#))}
- 7/065 . . . {fan combined with single duct; mounting arrangements of a fan in a duct (construction of fans [F04D](#))}
- 7/08 . . . with separate ducts for supplied and exhausted air {with provisions for reversal of the input and output systems}
- 7/10 . . . with air supply, or exhaust, through perforated wall, floor or ceiling, (outlet members for directing or distributing air {into rooms or spaces, e.g. ceiling air-diffusers} [F24F 13/06](#))
- 9/00 Use of air currents for screening, e.g. air curtains**
- 2009/002 . {Room dividers}
- 2009/005 . {combined with a door}
- 2009/007 . {using more than one jet or band in the air curtain}

<p>11/00 Control or safety arrangements</p> <p>NOTE</p> <p>In this group, it is desirable to add the indexing codes of groups F24F 2110/00 – F24F 2140/00.</p> <p>11/0001 . {for ventilation (F24F 11/30 takes precedence)}</p> <p>2011/0002 . . {for admittance of outside air}</p> <p>2011/0004 . . . {to create overpressure in a room}</p> <p>2011/0005 . . . {to create underpressure in a room, keeping contamination inside}</p> <p>2011/0006 . . {using low temperature external supply air to assist cooling}</p> <p>11/0008 . {for air-humidification (F24F 11/30 takes precedence)}</p> <p>11/30 . for purposes related to the operation of the system, e.g. for safety or monitoring</p> <p>WARNINGS</p> <p>1. Group F24F 11/30 is impacted by reclassification into groups F24F 11/32 – F24F 11/88, F24F 2120/00, and F24F 2140/00.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p> <p>2. Groups F24F 11/32 – F24F 11/49 are incomplete pending reclassification of documents from group F24F 11/30.</p> <p>Groups F24F 11/30 and F24F 11/32 – F24F 11/49 should be considered in order to perform a complete search.</p> <p>11/32 . . Responding to malfunctions or emergencies</p> <p>11/33 . . . to fire, excessive heat or smoke</p> <p>11/34 by opening air passages</p> <p>11/35 by closing air passages</p> <p>11/36 . . . to leakage of heat-exchange fluid</p> <p>11/37 . . . Resuming operation, e.g. after power outages; Emergency starting</p> <p>11/38 . . . Failure diagnosis</p> <p>11/39 . . . Monitoring filter performance</p> <p>11/41 . . Defrosting; Preventing freezing</p> <p>11/42 . . . of outdoor units</p> <p>11/43 . . . of indoor units</p> <p>11/46 . . Improving electric energy efficiency or saving</p> <p>11/47 . . . Responding to energy costs</p> <p>11/48 . . prior to normal operation, e.g. pre-heating or pre-cooling</p> <p>11/49 . . ensuring correct operation, e.g. by trial operation or configuration checks</p> <p>11/50 . characterised by user interfaces or communication</p> <p>WARNING</p> <p>Groups F24F 11/50 – F24F 11/61 are incomplete pending reclassification of documents from group F24F 11/30.</p> <p>Groups F24F 11/50 – F24F 11/61 and F24F 11/30 should be considered in order to perform a complete search.</p> <p>11/52 . . Indication arrangements, e.g. displays</p> <p>11/523 . . . for displaying temperature data</p> <p>11/526 . . . giving audible indications</p> <p>11/54 . . using one central controller connected to several sub-controllers</p>	<p>11/56 . . Remote control</p> <p>11/57 . . . using telephone networks</p> <p>11/58 . . . using Internet communication</p> <p>11/59 . . . for presetting</p> <p>11/61 . . using timers</p> <p>11/62 . characterised by the type of control or by internal processing, e.g. using fuzzy logic, adaptive control or estimation of values</p> <p>WARNING</p> <p>Groups F24F 11/62 – F24F 11/67 are incomplete pending reclassification of documents from group F24F 11/30.</p> <p>Groups F24F 11/62 – F24F 11/67 and F24F 11/30 should be considered in order to perform a complete search.</p> <p>11/63 . . Electronic processing</p> <p>11/64 . . . using pre-stored data</p> <p>11/65 . . . for selecting an operating mode</p> <p>WARNING</p> <p>Group F24F 11/65 is incomplete pending reclassification of documents from group F24F 11/30.</p> <p>Group F24F 11/65 is also impacted by reclassification into group F24F 11/67.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p> <p>11/66 Sleep mode</p> <p>11/67 Switching between heating and cooling modes</p> <p>WARNING</p> <p>Group F24F 11/67 is incomplete pending reclassification of documents from groups F24F 11/30 and F24F 11/65.</p> <p>Groups F24F 11/30, F24F 11/65, and F24F 11/67 should be considered in order to perform a complete search.</p> <p>11/70 . Control systems characterised by their outputs; Constructional details thereof</p> <p>WARNING</p> <p>Groups F24F 11/70 – F24F 11/875 are incomplete pending reclassification of documents from group F24F 11/30.</p> <p>Group F24F 11/70 is also impacted by reclassification into groups F24F 11/80 – F24F 11/875.</p> <p>All groups listed in this warning should be considered in order to perform a complete search.</p> <p>11/72 . . for controlling the supply of treated air, e.g. its pressure</p>
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- 11/74 . . . for controlling air flow rate or air velocity
- WARNING**
- Group [F24F 11/74](#) is incomplete pending reclassification of documents from group [F24F 11/30](#) and [F24F 11/70](#).
- Group [F24F 11/74](#) is also impacted by reclassification into group [F24F 11/755](#).
- All groups listed in this warning should be considered in order to perform a complete search
- 11/745 {the air flow rate increasing with an increase of air-current or wind pressure}
- 11/75 for maintaining constant air flow rate or air velocity
- 11/755 for cyclical variation of air flow rate or air velocity
- WARNING**
- Group [F24F 11/755](#) is incomplete pending reclassification of documents from groups [F24F 11/30](#), [F24F 11/70](#) and [F24F 11/74](#).
- All groups listed in this warning should be considered in order to perform a complete search.
- 11/76 by means responsive to temperature, e.g. bimetal springs
- 11/77 by controlling the speed of ventilators
- 11/79 . . . for controlling the direction of the supplied air
- 11/80 . . for controlling the temperature of the supplied air
- WARNING**
- Groups [F24F 11/80](#) – [F24F 11/875](#) are incomplete pending reclassification of documents from groups [F24F 11/30](#) and [F24F 11/70](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 11/81 . . . by controlling the air supply to heat-exchangers or bypass channels
- 11/83 . . . by controlling the supply of heat-exchange fluids to heat-exchangers
- WARNING**
- Group [F24F 11/83](#) is incomplete pending reclassification of documents from groups [F24F 11/30](#) and [F24F 11/70](#).
- Group [F24F 11/83](#) is also impacted by reclassification into groups [F24F 11/84](#) and [F24F 11/85](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 11/84 using valves
- WARNING**
- Group [F24F 11/84](#) is incomplete pending reclassification of documents from groups [F24F 11/30](#), [F24F 11/70](#) and [F24F 11/83](#).
- All groups listed in this warning should be considered in order to perform a complete search.
- 11/85 using variable-flow pumps
- WARNING**
- Group [F24F 11/85](#) is incomplete pending reclassification of documents from groups [F24F 11/30](#), [F24F 11/70](#) and [F24F 11/83](#).
- All groups listed should be considered in order to perform a complete search.
- 11/86 . . . by controlling compressors within refrigeration or heat pump circuits
- 11/87 . . . by controlling absorption or discharge of heat in outdoor units
- 11/871 by controlling outdoor fans
- 11/873 . . . by controlling refrigerant heaters
- 11/875 . . . by controlling heat-storage apparatus
- 11/88 . Electrical aspects, e.g. circuits
- WARNING**
- Group [F24F 11/88](#) is incomplete pending reclassification of documents from group [F24F 11/30](#).
- Groups [F24F 11/30](#) and [F24F 11/88](#) should be considered in order to perform a complete search.
- 11/89 . Arrangement or mounting of control or safety devices
- 12/00 Use of energy recovery systems in air conditioning, ventilation or screening (with both heat and humidity transfer between supplied and exhausted air [F24F 3/147](#); heat-exchange in general [F28](#))**
- 12/001 . {with heat-exchange between supplied and exhausted air}
- 12/002 . . {using an intermediate heat-transfer fluid}
- 12/003 . . . {using a heat pump}
- 2012/005 . . . {using heat pipes}
- 12/006 . . {using an air-to-air heat exchanger ([F24F 12/002](#) takes precedence)}
- 2012/007 . . {using a by-pass for bypassing the heat-exchanger}
- 2012/008 . . {cyclic routing supply and exhaust air ([F24F 2007/005](#) takes precedence when there is no heat exchange)}
- 13/00 Details common to, or for air-conditioning, air-humidification, ventilation or use of air currents for screening**
- 13/02 . Ducting arrangements
- 13/0209 . . {characterised by their connecting means, e.g. flanges}
- 13/0218 . . {Flexible soft ducts, e.g. ducts made of permeable textiles}

- 13/0227 . . {using parts of the building, e.g. air ducts inside the floor, walls or ceiling of a building (air ducts or channels of buildings [E04F 17/04](#))}
- 13/0236 . . {with ducts including air distributors, e.g. air collecting boxes with at least three openings}
- 13/0245 . . {Manufacturing or assembly of air ducts; Methods therefor}
- 13/0254 . . {characterised by their mounting means, e.g. supports}
- 13/0263 . . {Insulation for air ducts}
- 13/0272 . . {Modules for easy installation or transport}
- 13/0281 . . {Multilayer duct}
- 13/029 . . {Duct comprising an opening for inspection, e.g. manhole}
- 13/04 . . Air mixing units ([F24F 13/06](#) takes precedence; mixing gases in general [B01F 3/02](#) {room units for the mixing of pre-treated primary air with recirculated or room air [F24F 1/00](#))}
- 13/06 . . Outlets for directing or distributing air into rooms or spaces, e.g. ceiling air diffuser
 - 13/0604 . . . {integrated in or forming part of furniture}
 - 2013/0608 . . . {Perforated ducts}
 - 2013/0612 . . . {Induction nozzles without swirl means}
 - 2013/0616 . . . {Outlets that have intake openings}
 - 13/062 . . . having one or more bowls or cones diverging in the flow direction ([F24F 13/072](#) takes precedence)
 - 13/065 . . . formed as cylindrical or spherical bodies which are rotatable ([F24F 13/072](#) takes precedence)
 - 13/068 . . . formed as perforated walls, ceilings or floors ([F24F 13/078](#) takes precedence)
 - 13/072 . . . of elongated shape, e.g. between ceiling panels
 - 13/075 . . . having parallel rods or lamellae directing the outflow, e.g. the rods or lamellae being individually adjustable ([F24F 13/072](#) takes precedence)
 - 13/078 . . . combined with lighting fixtures (air-treatment systems with air-flow over lighting fixtures [F24F 3/056](#))
- 13/08 . . Air-flow control members, e.g. louvres, grilles, flaps, guide plates ([F24F 13/06](#) takes precedence; roof ventilators [F24F 7/02](#))
 - 13/081 . . {for guiding air around a curve}
 - 13/082 . . {Grilles, registers or guards}
 - 13/084 . . . {with mounting arrangements, e.g. snap fasteners for mounting to the wall or duct}
 - 13/085 . . . {including an air filter}
 - 2013/087 . . . {using inflatable bellows}
 - 2013/088 . . . {Air-flow straightener}
 - 13/10 . . movable, e.g. damper ([F24F 13/18](#) takes precedence; valves in general [F16K](#))
 - 13/105 . . . {composed of diaphragms or segments}
 - 13/12 . . . built up of sliding members
 - 13/14 . . . built up of tilting members, e.g. louver
 - 13/1406 {characterised by sealing means}
 - 13/1413 {using more than one tilting member, e.g. with several pivoting blades ([F24F 13/15](#) takes precedence)}
 - 13/142 {using pivoting blades with intersecting axles}
 - 13/1426 {characterised by actuating means}
 - 2013/1433 {with electric motors}
 - 2013/144 {with thermoactuators}
 - 2013/1446 {with gearings}
 - 2013/1453 {with cables, e.g. bowden cables}
 - 2013/146 {with springs}
 - 2013/1466 {with pneumatic means}
 - 2013/1473 {with cams or levers}
 - 2013/148 {with magnets}
 - 13/1486 {characterised by bearings, pivots or hinges}
 - 2013/1493 {using an elastic membrane}
 - 13/15 with parallel simultaneously tiltable lamellae
 - 13/16 built up of parallelly-movable plates
 - 13/18 specially adapted for insertion in flat panels, e.g. in door or window-pane
 - 13/20 . . Casings or covers
 - 2013/202 . . . {Mounting a compressor unit therein}
 - 2013/205 . . . {Mounting a ventilator fan therein}
 - 2013/207 . . . {with control knobs; Mounting controlling members or control units therein}
 - 13/22 . . Means for preventing condensation or evacuating condensate {(for refrigerating devices in general [F25D 21/14](#))}
 - 2013/221 . . . {to avoid the formation of condensate, e.g. dew}
 - 13/222 . . . {for evacuating condensate}
 - 13/224 {in a window-type room air conditioner}
 - 2013/225 {by evaporating the condensate in the cooling medium, e.g. in air flow from the condenser}
 - 2013/227 {Condensate pipe for drainage of condensate from the evaporator}
 - 2013/228 . . . {Treatment of condensate, e.g. sterilising}
 - 13/24 . . Means for preventing or suppressing noise {(in perforated ceilings [F24F 7/10](#))}
 - 2013/242 . . . {Sound-absorbing material}
 - 2013/245 . . . {using resonance}
 - 2013/247 . . . {Active noise-suppression}
 - 13/26 . . Arrangements for air-circulation by means of induction, e.g. by fluid coupling or thermal effect
 - 13/28 . . Arrangement or mounting of filters
 - 13/30 . . Arrangement or mounting of heat-exchangers
 - 13/32 . . Supports for air-conditioning, air-humidification or ventilation units

Indexing scheme associated with group F24F 11/00, relating to control inputs, e.g. measured or estimated values or parameters

2110/00 Control inputs relating to air properties

- 2110/10 . . Temperature
- 2110/12 . . . of the outside air
- 2110/20 . . Humidity
- 2110/22 . . . of the outside air
- 2110/30 . . Velocity
- 2110/32 . . . of the outside air
- 2110/40 . . Pressure, e.g. wind pressure

WARNING

Group [F24F 2110/40](#) is impacted by reclassification into groups [F24F 2140/10](#) and [F24F 2140/12](#).

Groups [F24F 2110/40](#), [F24F 2140/10](#), and [F24F 2140/12](#) should be considered in order to perform a complete search.

2110/50 . Air quality properties

WARNING

Group [F24F 2110/50](#) is impacted by reclassification into group [F24F 2110/65](#).
Groups [F24F 2110/50](#) and [F24F 2110/65](#) should be considered in order to perform a complete search.

2110/52 . . of the outside air

2110/60 . . Odour

2110/62 . . Tobacco smoke

2110/64 . . Airborne particle content

2110/65 . . Concentration of specific substances or contaminants

WARNING

Group [F24F 2110/65](#) is incomplete pending reclassification of documents from group [F24F 2110/50](#).
Groups [F24F 2110/50](#) and [F24F 2110/65](#) should be considered in order to perform a complete search.

2110/66 . . . Volatile organic compounds [VOC]

2110/68 . . . Radon

2110/70 . . . Carbon dioxide

2110/72 . . . Carbon monoxide

2110/74 . . . Ozone

2110/76 . . . Oxygen

2110/80 . . Electric charge

2120/00 Control inputs relating to users or occupants

WARNING

Group [F24F 2120/00](#) is incomplete pending reclassification of documents from group [F24F 11/30](#).
Groups [F24F 11/30](#) and [F24F 2120/00](#) should be considered in order to perform a complete search.

2120/10 . Occupancy

2120/12 . . Position of occupants

2120/14 . . Activity of occupants

2120/20 . Feedback from users

2130/00 Control inputs relating to environmental factors not covered by group [F24F 2110/00](#)

2130/10 . Weather information or forecasts

2130/20 . Sunlight

2130/30 . Artificial light

2130/40 . Noise

2140/00 Control inputs relating to system states

WARNING

Group [F24F 2140/00](#) is incomplete pending reclassification of documents from group [F24F 11/30](#).
Groups [F24F 11/30](#) and [F24F 2140/00](#) should be considered in order to perform a complete search.

2140/10 . Pressure

WARNING

Groups [F24F 2140/10](#) and [F24F 2140/12](#) are incomplete pending reclassification of documents from group [F24F 2110/40](#).
Groups [F24F 2110/40](#), [F24F 2140/10](#) and [F24F 2140/12](#) should be considered in order to perform a complete search.

2140/12 . . Heat-exchange fluid pressure

2140/20 . Heat-exchange fluid temperature

2140/30 . Condensation of water from cooled air

2140/40 . Damper positions, e.g. open or closed

2140/50 . Load

2140/60 . Energy consumption

2203/00 Devices or apparatus used for air treatment

2203/02 . System or Device comprising a heat pump as a subsystem, e.g. combined with humidification/dehumidification, heating, natural energy or with hybrid system

2203/021 . . Compression cycle

2203/023 . . . with turbine used for expansion

2203/025 . . . with turbine for compression

2203/026 . . Absorption - desorption cycle

2203/028 . . . using a solid absorbing medium

2203/10 . Rotary wheel

2203/1004 . . Bearings or driving means

2203/1008 . . comprising a by-pass channel

2203/1012 . . Details of the casing or cover

2203/1016 . . combined with another type of cooling principle, e.g. compression cycle

2203/102 . . combined with a heat pipe

2203/1024 . . combined with a humidifier

2203/1028 . . combined with a spraying device

2203/1032 . . Desiccant wheel

2203/1036 . . . Details

2203/104 . . Heat exchanger wheel

2203/1044 . . performing other movements, e.g. sliding

2203/1048 . . Geometric details

2203/1052 . . comprising a non-axial air flow

2203/1056 . . comprising a reheater

2203/106 . . . Electrical reheater

2203/1064 . . . Gas fired reheater

2203/1068 . . comprising one rotor

2203/1072 . . comprising two rotors

2203/1076 . . comprising three rotors

2203/108 . . comprising rotor parts shaped in sector form

2203/1084 . . comprising two flow rotor segments

2203/1088 . . comprising three flow rotor segments

2203/1092 . . comprising four flow rotor segments

2203/1096 . . comprising sealing means

2203/12 . Dehumidifying or humidifying belt type

Air-conditioning

2221/00 Details or features not otherwise provided for

2221/02 . combined with lighting fixtures

2221/08 . Installation or apparatus for use in sport halls, e.g. swimming pools, ice rings

2221/10 . combined with, or integrated in, furniture

- 2221/12 . transportable
- 2221/125 . . mounted on wheels
- 2221/14 . mounted on the ceiling
- 2221/16 . mounted on the roof
- 2221/17 . mounted in a wall
- 2221/18 . combined with domestic apparatus
- 2221/183 . . combined with a hot-water boiler
- 2221/186 . . combined with a fireplace
- 2221/20 . mounted in or close to a window
- 2221/22 . Cleaning ducts or apparatus
- 2221/225 . . using a liquid
- 2221/26 . improving the aesthetic appearance
- 2221/28 . using the Coanda effect
- 2221/30 . comprising fireproof material
- 2221/32 . preventing human errors during the installation, use or maintenance, e.g. goofy proof
- 2221/34 . Heater, e.g. gas burner, electric air heater
- 2221/36 . Modules, e.g. for an easy mounting or transport
- 2221/38 . Personalised air distribution
- 2221/40 . HVAC with raised floors
- 2221/42 . Mobile autonomous air conditioner, e.g. robots
- 2221/44 . Protection from terrorism or theft
- 2221/46 . Air flow forming a vortex
- 2221/48 . HVAC for a wine cellar
- 2221/50 . HVAC for high buildings, e.g. thermal or pressure differences
- 2221/52 . Weather protecting means, e.g. against wind, rain or snow
- 2221/54 . Heating and cooling, simultaneously or alternatively
- 2221/56 . Cooling being a secondary aspect