

ECLA**EUROPEAN CLASSIFICATION****F24F**

AIR-CONDITIONING, AIR-HUMIDIFICATION, VENTILATION, USE OF AIR CURRENTS FOR SCREENING (devices for ventilating greenhouses A01G [N: [F24F9/24](#); air-conditioning systems for greenhouses [A01G9/24E](#)]; animal husbandry A01K, e.g. controlling humidity in incubators [A01K41/04](#); 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 [B01F3/00](#); spraying B05B, B05D; removing dirt or fumes from areas where they are produced [B08B15/00](#); ventilation, air-conditioning or cooling, specially adapted for vehicles, see the relevant vehicle places, e.g. B60H, [B61D27/00](#), [N: [B64D13/00](#)]; production of ozone [C01B13/10](#); chimneys or flues [E04F17/02](#), [E04H12/28](#), [F23J11/00](#), [F23L17/02](#); air ducts or conduits E0417/04, F16L; ventilation in doors or windows [E06B7/02](#); 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 [H01T23/00](#))

Notes

1. 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 [F24F1/00](#) or [F24F3/14](#);
- air-humidification per se, e.g. "room humidifiers", is covered by group [F24F6/00](#).

2. 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.

Guide heading:**Air-conditioning****F24F1/00**

Rooms units, e.g. receiving primary air from a central station [N: or with supply of heating or cooling agents from a central station, such as those applied to air-treatment systems included in [F24F3/00](#) and [F24F5/00](#) (arrangement or assembly of components for the primary treatment of air [F24F11/08](#); mixing chambers for air [F24F13/04](#))]

[N: **WARNING** [N1202]

[F24F1/08](#) to [F24F1/24](#) and [F24F1/28](#) to [F24F1/68](#) not complete pending the completion of a reclassification; see also other groups of [F24F1/00](#)]

F24F1/00B

. [N: Split units] [N9902]

- F24F1/00C . [N: Fan coil units, e.g. using an evaporating refrigerant] [C0203]
- F24F1/00C1 . . [N: characterised by the air outlet] [N9912]
- F24F1/00C1A . . . [N: with two or more blow out openings] [N1107]
- F24F1/00C3 . . [N: characterised by the fan] [N1107]
- F24F1/00C3A . . . [N: Centrifugal or radial fan] [N1107]
- F24F1/00C3C . . . [N: Cross flow or tangential fan] [N1107]
- F24F1/00C3E . . . [N: Axial fan] [N1107]
- F24F1/00C3G . . . [N: comprising two or more fans] [N1107]

- F24F1/00D . [N: characterised by the heat exchanger] [N0203]

- F24F1/01 . in which secondary air is induced by injector action of the primary air ([F24F1/02](#) takes precedence; [N: 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 [F24F11/02C](#); nozzle for induction unit [F24F13/26](#)])

- F24F1/02 . self-contained, i.e. with all apparatus for treatment installed in a common casing [N: (arrangement or assembly of components for the primary treatment of air in independent units [F24F11/08B](#))] [C9902]
- F24F1/02B . . [N: Comprising a compressor cycle]
- F24F1/02B1 . . . [N: Portable]
- F24F1/02B3 . . . [N: mounted in wall openings, e.g. in windows]
- F24F1/04 . . Arrangements for portability

- F24F1/06 . Separate outdoor units, e.g. outdoor unit to be linked to a separate room comprising a compressor and a heat exchanger [N1202]

- Note** [N1202]
 In this group, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.

- F24F1/08 . . Compressors specially adapted for separate outdoor units [N1202]
- F24F1/10 . . . Arrangement or mounting thereof [N1202]
- F24F1/12 . . . Vibration or noise prevention thereof [N1202]
- F24F1/14 . . Heat exchangers specially adapted for separate outdoor units [N1202]
- F24F1/16 . . . Arrangement or mounting thereof [N1202]
- F24F1/18 . . . characterized by their shape [N1202]
- F24F1/20 . . Electric components for separate outdoor units [N1202]
- F24F1/22 . . . Arrangement or mounting thereof [N1202]
- F24F1/24 . . . Cooling of electric components [N1202]
- F24F1/26 . . Refrigerant piping [N1202]
- F24F1/28 . . . for connecting several separate outdoor units [N1202]
- F24F1/30 . . . for use inside the separate outdoor units [N1202]
- F24F1/32 . . . for connecting the separate outdoor units to indoor units [N1202]
- F24F1/34 . . . Protection means thereof, e.g. covers for refrigerant pipes [N1202]
- F24F1/36 . . Drip trays for outdoor units [N1202]
- F24F1/38 . . Fan details of outdoor units, e.g. bell-mouth shaped inlets of fan mountings

-]
- F24F1/40 . . Vibration or noise prevention at outdoor units (for outdoor units compressors [F24F1/12](#)) [N1202]
 - F24F1/42 . . characterized by the use of the condensate, e.g. for enhanced cooling [N1202]
 - F24F1/44 . . characterized by the use of internal combustion engines [N1202]
 - F24F1/46 . . Component arrangements in separate outdoor units [N1202]
 - F24F1/48 . . . characterized by air airflow, e.g. inlet or outlet airflow [N1202]
 - F24F1/50 with outlet air in upward direction [N1202]
 - F24F1/52 with inlet and outlet arranged on the same side, e.g. for mounting in a wall opening [N1202]
 - F24F1/54 Inlet and outlet arranged on opposite sides [N1202]
 - F24F1/56 . . Casing or covers of separate outdoor units, e.g. fan guards [N1202]
 - F24F1/58 . . . Separate protective covers for outdoor units, e.g. solar guards, snow shields or camouflage [N1202]
 - F24F1/60 . . Arrangement or mounting of the outdoor unit [N1202]
 - F24F1/62 . . . Wall-mounted [N1202]
 - F24F1/64 . . . Ceiling-mounted, e.g. below a balcony [N1202]
 - F24F1/66 . . . under the floor level [N1202]
 - F24F1/68 . . . Arrangement of multiple separate outdoor units [N1202]
- F24F3/00** **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 [F24F1/00](#); construction of heat-exchangers [F28](#)) [N: [F24F3/044](#) takes precedence; arrangement or assembly of components for the primary treatment of air [F24F11/08](#)]**
- F24F3/00B2 . [N: 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 [F25B29/00](#); heat pumps [F25B13/00](#), [F25B29/00](#); reversible cycle for humidifying and drying air [F24F3/147](#))] [C9509]
 - F24F3/02 . characterised by the pressure or velocity of the primary air ([F24F3/044](#) takes precedence)
 - F24F3/04 . . operating with high pressure or high velocity
 - F24F3/044 . Systems in which all treatment is given in the central station, i.e. all-air systems
 - F24F3/044B . . [N: with volume control at a constant temperature]
 - F24F3/044B2 . . . [N: 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]
 - F24F3/048 . . with temperature control at constant rate of air-flow ([F24F3/056](#) takes precedence)
 - F24F3/052 . . . 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

- F24F3/052B [N: 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]
- F24F3/052D [N: 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]
- F24F3/052F [N: 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; ([F24F3/052D](#) takes precedence)]
- F24F3/056 . . the air at least partially flowing over lighting fixtures, the heat of which is dissipated or used
- F24F3/06 . characterised by the arrangements for the supply of heat-exchange fluid for the subsequent treatment of primary air in the room units ([F24F3/02](#) takes precedence) [N: Arrangement or assembly of components for the regulation of the supply of heating or cooling media for the secondary treatment of air [F24F11/06](#)]
- F24F3/06F . . [N: with a plurality of evaporators or condensers] [N9707]
- F24F3/08 . . with separate supply and return lines for hot and cold heat-exchange fluids [N: i.e so-called "4-conduit" system]
- F24F3/10 . . with separate supply lines and common return line for hot and cold heat-exchange fluids [N: i.e so-called "3-conduit" system]
- F24F3/12 . characterised by the treatment of the air otherwise than by heating and cooling ([F24F3/02](#), [F24F3/06](#) take precedence, apparatus for the individual treatment, see the appropriate subclasses for the treatments)
- F24F3/14 . . by humidification; by dehumidification
- F24F3/14A [N: 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]
- F24F3/14C [N: by absorbing or adsorbing water, e.g. using an hygroscopic desiccant] [N9902]
- F24F3/14C1 [N: with liquid hygroscopic desiccants] [N0404]
- F24F3/14C2 [N: with a moving bed of solid desiccants, e.g. a rotary wheel supporting solid desiccants] [N0404]
- F24F3/14C3 [N: alternatively operating a heat exchanger in an absorbing/adsorbing mode and a heat exchanger in a regeneration mode] [N1202]
- F24F3/147 . . . with both heat and humidity transfer between supplied and exhausted air
- F24F3/153 . . . 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
- F24F3/16 . . by purification, e.g. by filtering; by sterilisation; by ozonisation [N: ion sources [H01J27/02](#), [H01J37/08](#); treatment rooms or enclosures for medical purposes [A61G10/00](#)]
- F24F3/16B [N: by filtering (arrangements or mounting of filters [F24F13/28](#))] [C0404]
- F24F3/16B3 [N: 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 [A61G13/00B](#))]
- F24F3/16B5 [N: Clean rooms, i.e. enclosed spaces in which a uniform flow of filtered air is distributed (air distribution by perforated walls [F24F7/10](#); dust-free rooms or enclosures applicable solely to laboratory purposes [B01L1/04](#))]
- F24F3/16C [N: using electric means, e.g. applying electrostatic field (using thermo-electric

means [F24F5/00D](#)]

- F24F5/00** **Air-conditioning systems or apparatus not covered by [F24F1/00](#) or [F24F3/00](#) [N: e.g. using solar heat; combined with household units such as an oven or water heater]**
- [F24F5/00B](#) . [N: Exclusively-fluid systems]
- [F24F5/00C](#) . [N: cooling apparatus specially adapted for use in air-conditioning (self-contained room units [F24F1/02](#); [F24F5/00F](#) takes precedence; air-humidification [F24F6/00](#))]
- [F24F5/00C1](#) . . [N: Compression cycle type]
- [F24F5/00C3](#) . . [N: using absorption or desorption] [N9902]
- [F24F5/00C5](#) . . [N: using cold storage bodies, e.g. ice]
- [F24F5/00C5A](#) . . . [N: using phase change material [PCM] for storage] [N1107]
- [F24F5/00C7](#) . . [N: using evaporation] [N9902]
- [F24F5/00D](#) . [N: characterised by the application of thermo-electric units or the Peltier effect (refrigerators and cooling systems using magnetic or electrical effects in general [F25B21/02](#); for semi-conductors [H01L23/38](#); thermobatteries or thermogenerators [H01L 35/00](#))]
- [F24F5/00F](#) . [N: using natural energy, e.g. solar energy, energy from the ground]
- [F24F5/00F1](#) . . [N: using energy from the ground by air circulation, e.g. "Canadian well"] [N1107]
- [F24F5/00H](#) . [N: adapted for use in covered swimming pools] [C9602]
- [F24F5/00K](#) . [N: Systems using thermal walls, e.g. double window (double windows per se [E06B](#))]
- [F24F5/00L](#) . [N: Systems using a compressed air circuit ([B64D13/00](#), [B60H](#) take precedence)]
- [F24F5/00R](#) . [N: Systems using radiation from walls or panels]
- [F24F5/00R1](#) . . [N: ceilings, e.g. cool ceilings] [N1107]
- [F24F5/00T](#) . [N: combined with domestic apparatus]
- F24F6/00** **Air-humidification, e.g. for increasing comfort in living spaces by "room humidifiers" [N: cooling by humidification]**
- [F24F6/02](#) . by evaporation of water in the air [N: humidifiers specially adapted for radiators see [F24D19/00B](#)]
- [F24F6/02B](#) . . [N: using electrical heating means ([F24F6/10B](#) takes precedence)]
- [F24F6/04](#) . . using stationary unheated wet elements
- [F24F6/04B](#) . . . [N: with self-sucking action, e.g. wicks (humidifiers for radiators [F24D19/00B](#))]
- [F24F6/06](#) . . using moving unheated wet elements
- [F24F6/08](#) . . using heated wet elements
- [F24F6/10](#) . . . heated electrically
- [F24F6/10B](#) [N: using the heat of lamps]
- [F24F6/12](#) . by forming water dispersions in the air

- F24F6/14 . . . using nozzles (nozzles per se, spraying in general [B05B](#))
 - F24F6/16 . . . using rotating elements
 - F24F6/18 . . . by injection of steam into the air
- F24F7/00** **Ventilation**, [N: e.g. by means of wall-ducts; systems using window or roof apertures]
- F24F7/007 . . . with forced flow (using ducting systems [F24F7/06](#))
 - F24F7/013 . . . using wall or window fans, displacing air through the wall or window [N: possibly through a grill or through a shutter or flap (with heating elements [F24F3/00](#) to [F24F3/14](#); ventilators with provision for recirculating air or piping it away [F24F7/06](#); room ventilators, portable ventilators [F04D25/08](#))] [C9601]
 - F24F7/02 . . . Roof ventilation ([F24F7/007](#) takes precedence; ventilation of roof coverings [E04D](#))
 - F24F7/02B . . . [N: with forced air circulation by means of a built-in ventilator]
 - F24F7/04 . . . with ducting systems [N: also by double walls; with natural circulation ([F24F7/02](#) takes precedence)]
 - F24F7/06 . . . with forced air circulation, e.g. by fan [N: positioning of a ventilator in or against a conduit (ventilators per se [F04D25/08](#))] [C9509]
 - F24F7/06D [N: fan combined with single duct; mounting arrangements of a fan in a duct (construction of fans [F04D](#))]
 - F24F7/08 with separate ducts for supplied and exhausted air [N: with provisions for reversal of the input and output systems]
 - F24F7/10 with air supply, or exhaust, through perforated wall, floor or ceiling, (outlet members for directing or distributing air [N: into rooms or spaces, e.g. ceiling air-diffusers] [F24F13/06](#))
- F24F9/00** **Use of air currents for screening, e.g. air curtain** (air curtains for vehicles [B60J9/04](#))
- Guide heading:** **Common features or details**
- F24F11/00** **Control or safety systems or apparatus** ([N: extinguishing or preventing fire [A62C3/14](#)]; control valves per se [F16K](#); humidity control [G05D22/00](#))
- F24F11/00C . . . [N: for ventilation ([F24F11/00R](#) takes precedence)] [C9707]
 - F24F11/00E . . . [N: for air-humidification ([F24F11/00R](#) takes precedence)] [N9809]
 - F24F11/00R . . . [N: Electrical control or safety systems or apparatus]
 - F24F11/00R3 [N: Control systems or circuits characterised by their inputs, e.g. using sensors] [N9707]
 - F24F11/00R3A [N: Air temperature] [N9707]
 - F24F11/00R3B [N: Air humidity] [N9707]
 - F24F11/00R3C [N: Air quality properties] [N9707]
 - F24F11/00R3D [N: Occupancy] [N9707]
 - F24F11/00R5 [N: Control systems or circuits characterised by type of control, internal processing]

- or calculations, e.g. using fuzzy logic adaptative control or estimating values] [N9707]
- F24F11/00R7 . . [N: Control systems or circuits characterised by their outputs, e.g. using a variable flow fan] [N9707]
- F24F11/00R7A . . . [N: controlling the angle of the air stream] [N9707]
- F24F11/00R7B . . . [N: controlling the speed of ventilators] [N9707]
- F24F11/00R7D . . . [N: controlling the supply of heat-exchange fluid] [N9707]
- F24F11/00R9 . . [N: Control systems or circuits characterised by other control features, e.g. display or monitoring devices] [N9707]

- F24F11/02 . Arrangements or mounting of control or safety devices
- F24F11/02B . . [N: for the control of flow conditions, e.g. pressure, velocity]
- F24F11/02B1 . . . [N: characterised by velocity control]
- F24F11/02C . . [N: exclusively for controlling the air supply to a heat-exchanger or the ancillary bypass ([F24F11/08](#) takes precedence)]
- F24F11/04 . . solely for controlling the rate of air-flow ([F24F11/08](#) takes precedence)
- F24F11/04D . . . [N: dependent on air-current or wind pressure ([F24F11/04](#) takes precedence)]
- F24F11/047 . . . to constant value
- F24F11/053 . . . by means responsive to temperature
- F24F11/06 . . solely for controlling the supply of heating or cooling fluids for secondary treatment ([F24F11/08](#) takes precedence)
- F24F11/08 . . for controlling the primary treatment of air
- F24F11/08B . . . [N: in independent units]

- F24F12/00** **Use of energy recovery systems in air conditioning, ventilation or screening** (with both heat and humidity transfer between supplied and exhausted air [F24F3/147](#); heat-exchange in general [F28](#))

- F24F12/00B . [N: with heat-exchange between supplied and exhausted air]
- F24F12/00B1 . . [N: using an intermediate heat-transfer fluid]
- F24F12/00B1B . . . [N: using a heat pump] [N9707]
- F24F12/00B3 . . [N: using an air-to-air heat exchanger ([F24F12/00B1](#) takes precedence)] [N9707]

- F24F13/00** **Details common to, or for air-conditioning, air-humidification, ventilation or use of air currents for screening**

- F24F13/02 . Ducting arrangements
- F24F13/02A . . [N: characterised by their connecting mens, e.g. flanges] [N0702]
- F24F13/02B . . [N: Flexible soft ducts, e.g. ducts made of permeable textiles] [N0702]
- F24F13/02C . . [N: using parts of the building, e.g. air ducts inside the floor, walls or ceiling of a building (air ducts or channels of buildings [E04F17/04](#))] [N1012]
- F24F13/02D . . [N: with ducts including air distributors, e.g. air collecting boxes with at least three openings] [N1012]
- F24F13/02E . . [N: Manufacturing or assembly of air ducts; Methods therefor] [N1012]
- F24F13/02F . . [N: characterised by their mounting means, e.g. supports] [N0702]
- F24F13/02H . . [N: Insulation for air ducts] [N0702]

- F24F13/02J . . [N: Modules for easy installation or transport] [N1107]
- F24F13/02K . . [N: Multilayer duct] [N1107]
- F24F13/02L . . [N: Duct comprising an opening for inspection, e.g. manhole] [N1107]
- F24F13/04 . . Air mixing units ([F24F13/06](#) takes precedence; mixing gases in general [B01F3/02](#))
[N: room units for the mixing of pre-treated primary air with recirculated or room air [F24F1/00](#)]
- F24F13/06 . . Outlets for directing or distributing air into rooms or spaces, e.g. ceiling air diffuser
- F24F13/06A . . . [N: integrated in or forming part of furniture]
- F24F13/062 . . . having one or more bowls or cones diverging in the flow direction ([F24F13/072](#) takes precedence)
- F24F13/065 . . . formed as cylindrical or spherical bodies which are rotatable ([F24F13/072](#) takes precedence)
- F24F13/068 . . . formed as perforated walls, ceilings or floors ([F24F13/078](#) takes precedence)
- F24F13/072 . . . of elongated shape, e.g. between ceiling panels
- F24F13/075 . . . having parallel rods or lamellae directing the outflow, e.g. the rods or lamellae being individually adjustable ([F24F13/072](#) takes precedence)
- F24F13/078 . . . combined with lighting fixtures ([air-treatment systems with air-flow over lighting fixtures \[F24F3/056\]\(#\)](#))
- F24F13/08 . . Air-flow control members, e.g. louvres, grilles, flaps, guide plates ([F24F13/06](#) takes precedence; [roof ventilators \[F24F7/02\]\(#\)](#))
- F24F13/08B . . [N: for guiding air around a curve]
- F24F13/08C . . [N: Grilles, registers or guards] [N0002]
- F24F13/08C1 . . . [N: with mounting arrangements, e.g. snap fasteners for mounting to the wall or duct] [N0005]
- F24F13/08C3 . . . [N: including an air filter] [N0005]
- F24F13/10 . . movable, e.g. damper ([F24F13/18](#) takes precedence; valves in general [F16K](#))
- F24F13/10B . . . [N: composed of diaphragms or segments]
- F24F13/12 . . . built up of sliding members
- F24F13/14 . . . built up of tilting members, e.g. louver
- F24F13/14A [N: characterised by sealing means] [N0105]
- F24F13/14B [N: using more than one tilting member, e.g. with several pivoting blades ([F24F13/15](#) takes precedence)] [N0303]
- F24F13/14C [N: using pivoting blades with intersecting axles] [C0105]
- F24F13/14D [N: characterised by actuating means] [N0105]
- F24F13/14F [N: characterised by bearings, pivots or hinges] [N0105]
- F24F13/15 with parallel simultaneously tiltable lamellae
- F24F13/16 . . . built up of parallelly-movable plates
- F24F13/18 . . specially adapted for insertion in flat panels, e.g. in door or window-pane
- F24F13/20 . . Casings or covers
- F24F13/22 . . Means for preventing condensation or evacuating condensate [N: ([for refrigerating devices in general \[F25D21/14\]\(#\)](#))]
- F24F13/22B . . [N: for evacuating condensate] [N9912]
- F24F13/22B1 . . . [N: in a window-type room air conditioner] [N9912]

- F24F13/24 . Means for preventing or suppressing noise [N: (in perforated ceilings [F24F7/10](#))]
- F24F13/26 . Arrangements for air-circulation by means of induction, e.g. by fluid coupling or thermal effect [N9601]
- F24F13/28 . Arrangement or mounting of filters [N9601]
- F24F13/30 . Arrangement or mounting of heat-exchangers [N9601]
- F24F13/32 . Supports for air-conditioning, air-humidification or ventilation units [N9601]