

3/22	characterised by evaporation and condensation of coolant in closed cycles (other cooling by evaporation F01P 9/02); characterised by the coolant reaching higher temperatures than normal atmospheric boiling-point	7/087	{actuated directly by deformation of a thermostatic device}
3/2207	{characterised by the coolant reaching temperatures higher than the normal atmospheric boiling point}	7/088	{actuated in response to driving speed, e.g. by centrifugal devices}
2003/2214	{Condensers}	7/10	by throttling amount of air flowing through liquid-to-air heat exchangers
2003/2221	{of the horizontal type}	7/12	by thermostatic control
2003/2228	{of the upflow type}	7/14	the coolant being liquid
2003/2235	{of the downflow type}	2007/143	{using restrictions}
2003/2242	{Steam-to-steam condensers}	2007/146	{using valves}
2003/225	{Steam-to-liquid condensers}	7/16	by thermostatic control
2003/2257	{Rotating condensers}	7/161	{by bypassing pumps}
2003/2264	{Separators}	7/162	{by cutting in and out of pumps}
3/2271	{Closed cycles with separator and liquid return}	7/164	{by varying pump speed}
2003/2278	{Heat pipes}	7/165	{characterised by systems with two or more loops}
3/2285	{Closed cycles with condenser and feed pump}	7/167	{by adjusting the pre-set temperature according to engine parameters, e.g. engine load, engine speed}
2003/2292	{with thermostatically controlled by-pass}	2007/168	{By varying the cooling capacity of a liquid-to-air heat-exchanger}
<u>Pumping cooling-air or liquid coolants; Controlling circulation or supply of coolants</u>			
5/00	Pumping cooling-air or liquid coolants (controlling circulation or supply of coolants by influencing drive of pumps F01P 7/00)	9/00	Cooling having pertinent characteristics not provided for in, or of interest apart from, groups F01P 1/00 - F01P 7/00 (profiting from waste heat of combustion-engine cooling F02G 5/00)
5/02	Pumping cooling-air; Arrangements of cooling-air pumps, e.g. fans or blowers	2009/005	{Cooling with melting solids}
2005/025	{using two or more air pumps}	9/02	Cooling by evaporation, e.g. by spraying water on to cylinders (evaporation and condensation of liquid coolant in closed cycles F01P 3/22 ; evaporation or evaporation apparatus for physical or chemical purposes, e.g. evaporation of liquids for gas phase reactions B01B 1/005)
5/04	Pump-driving arrangements		
5/043	{Pump reversing arrangements}	9/04	by simultaneous or alternative use of direct air-cooling and liquid cooling (F01P 9/02 takes precedence)
2005/046	{with electrical pump drive}	9/06	by use of refrigerating apparatus, e.g. of compressor or absorber type
5/06	Guiding or ducting air to, or from, ducted fans		
5/08	Use of engine exhaust gases for pumping cooling-air		
5/10	Pumping liquid coolant; Arrangements of coolant pumps	11/00	Component parts, details, or accessories not provided for in, or of interest apart from, groups F01P 1/00 - F01P 9/00
2005/105	{Using two or more pumps}	11/02	Liquid-coolant {filling}, overflow, venting, or draining devices (automatic draining during freezing conditions F01P 11/20)
5/12	Pump-driving arrangements	11/0204	{Filling}
2005/125	{Driving auxiliary pumps electrically}	11/0209	{Closure caps}
5/14	Safety means against, or active at, failure of coolant-pumps drives, e.g. shutting engine down; Means for indicating functioning of coolant pumps	11/0214	{Mounting}
7/00	Controlling of coolant flow	2011/0219	{using bayonet connections}
7/02	the coolant being cooling-air	2011/0223	{Decoration}
7/023	{Cowlings for airplane engines}	2011/0228	{Sealing}
7/026	{Thermostatic control}	2011/0233	{Venting}
7/04	by varying pump speed, e.g. by changing pump-drive gear ratio	11/0238	{with overpressure valves or vent valves}
7/042	{using fluid couplings (couplings or clutches of this type per se F16D 35/00)}	2011/0242	{setting the pressure valve}
7/044	{using hydraulic drives}	11/0247	{Safety; Locking against opening}
7/046	{using mechanical drives}	2011/0252	{Venting before opening}
7/048	{using electrical drives}	2011/0257	{with theft preventing means}
7/06	by varying blade pitch	2011/0261	{activated by temperature}
7/08	by cutting in or out of pumps	2011/0266	{activated by pressure}
7/081	{using clutches, e.g. electro-magnetic or induction clutches}	2011/0271	{Semi-permeable, e.g. using Gore-Tex c fibres}
7/082	{using friction clutches}	11/0276	{Draining or purging}
7/084	{actuated electromagnetically}	11/028	{Deaeration devices}
7/085	{actuated by fluid pressure}	11/0285	{Venting devices}

11/029	. . {Expansion reservoirs}
11/0295	. . {Condensers for radiators}
11/04	. Arrangements of liquid pipes or hoses
11/06	. Cleaning (in general B08B); Combating corrosion (in general C23F)
2011/061	. . {Cleaning or combating corrosion using filters}
2011/063	. . {Cleaning (F01P 2011/061 takes precedence)}
2011/065	. . {Flushing}
2011/066	. . {Combating corrosion (F01P 2011/061 takes precedence)}
2011/068	. . . {chemically}
11/08	. Arrangements of lubricant coolers (in lubrication apparatus F01M)
11/10	. Guiding or ducting cooling-air, to, or from, liquid-to-air heat exchangers
11/12	. Filtering, cooling, or silencing cooling-air
11/14	. Indicating devices; Other safety devices
11/16	. . concerning coolant temperature (F01P 11/20 takes precedence)
11/18	. . concerning coolant pressure, coolant flow, or liquid-coolant level
11/20	. . concerning atmospheric freezing conditions, e.g. automatically draining or heating during frosty weather
2011/205	. . {using heat-accumulators}

2023/00 Signal processing; Details thereof

2023/08	. Microprocessor; Microcomputer
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Air cooling; Liquid cooling (propelling cooling-air or liquid coolants [F01P 5/00](#); controlling supply or circulation of coolants [F01P 7/00](#); cylinders, pistons, valves, fuel injectors, sparking-plugs, or other engine or machine parts, modified to facilitate cooling, [see the relevant classes for such parts](#))

2025/00 Measuring

2025/04	. Pressure
2025/06	. . for determining flow
2025/08	. Temperature
2025/12	. . Cabin temperature
2025/13	. . Ambient temperature
2025/30	. . Engine incoming fluid temperature
2025/31	. . Cylinder temperature
2025/32	. . Engine outgoing fluid temperature
2025/33	. . Cylinder head temperature
2025/34	. . Heat exchanger incoming fluid temperature
2025/36	. . Heat exchanger mixed fluid temperature
2025/40	. . Oil temperature
2025/42	. . Intake manifold temperature
2025/44	. . Outlet manifold temperature
2025/46	. . Engine parts temperature
2025/48	. . Engine room temperature
2025/50	. . using two or more temperature sensors
2025/52	. . Heat exchanger temperature
2025/60	. Operating parameters
2025/62	. . Load
2025/64	. . Number of revolutions
2025/66	. . Vehicle speed
2025/70	. Level
2025/80	. Concentration anti-freeze

2031/00 Fail safe

2031/16	. using melting materials
2031/18	. Detecting fluid leaks
2031/20	. Warning devices
2031/22	. using warning lamps
2031/24	. for freezing
2031/30	. Cooling after the engine is stopped
2031/32	. Deblocking of damaged thermostat
2031/34	. Limping home
2031/36	. Failure of coolant pump

2037/00 Controlling

2037/02	. starting
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2050/00 Applications

2050/02	. Marine engines
2050/04	. . using direct cooling
2050/06	. . using liquid-to-liquid heat exchangers
2050/08	. . Engine room
2050/10	. . Z-type engine
2050/12	. . Outboard engine
2050/16	. Motor-cycles
2050/20	. Aircraft engines
2050/22	. Motor-cars
2050/24	. Hybrid vehicles
2050/30	. Circuit boards

2060/00 Cooling circuits using auxiliaries

2060/02	. Intercooler
2060/04	. Lubricant cooler
2060/045	. . for transmissions
2060/06	. Retarder
2060/08	. Cabin heater
2060/10	. Fuel manifold
2060/12	. Turbo charger
2060/14	. Condenser
2060/16	. Outlet manifold
2060/18	. Heater
2060/185	. . for alternators or generators

2070/00 Details

2070/02	. using shape memory alloys
2070/04	. using electrical heating elements
2070/06	. Using intake pressure as actuating fluid
2070/08	. Using lubricant pressure as actuating fluid
2070/10	. using electrical or electromechanical means
2070/30	. Rotating radiators
2070/32	. Ring-shaped heat exchangers
2070/50	. mounting fans to heat-exchangers
2070/52	. mounting heat-exchangers