

**CPC****COOPERATIVE PATENT CLASSIFICATION****F02P****IGNITION, OTHER THAN COMPRESSION IGNITION, FOR INTERNAL-COMBUSTION ENGINES; TESTING OF IGNITION TIMING IN COMPRESSION-IGNITION ENGINES** ({anti-pollution

means for internal-combustion engines [F02B 17/00](#)}; specially adapted for rotary-piston or oscillating-piston engines [F02B 53/12](#); {ignition of gas turbine plants [F02C 7/26](#); ignition of jet propulsion plants [F02K 9/95](#); starting of combustion engines [F02N 9/00](#)}; ignition of combustion apparatus in general, glowing plugs [F23Q](#); measuring of physical variables in general [G01](#); controlling in general [G05](#); data processing in general [G06](#); electrical components in general see Section H; {ignition coils [H01F 38/12](#)}; sparking plugs [H01T 13/00](#))

**Electric spark ignition installations characterised by the type of ignition power generation or storage****F02P 1/00**

**Installations having electric ignition energy generated by magneto- or dynamo- electric generators without subsequent storage** {(combination starter-magneto [F02N 11/06](#); magneto- or dynamo-electric generators [H02K 21/00](#))}

## F02P 1/005

- {Construction and fastening of elements of magnetos other than the magnetic circuit and the windings ([F02P 1/02](#) to [F02P 1/08](#) take precedence)}

## F02P 1/02

- the generator rotor being characterised by forming part of the engine flywheel

## F02P 1/04

- the generator being specially adapted for use with specific engine types, e.g. engines with V arrangement of cylinders

## F02P 1/06

- Generator drives, e.g. having snap couplings

## F02P 1/08

- Layout of circuits

## F02P 1/083

- . {for generating sparks by opening or closing a coil circuit}

## F02P 1/086

- . {for generating sparks by discharging a capacitor into a coil circuit}

**F02P 3/00****Other installations**

## F02P 3/005

- {having inductive-capacitance energy storage (capacitive storage installations using an intermediate charging inductance [F02P 3/0876](#))}

## F02P 3/01

- Electric spark ignition installations without subsequent energy storage, i.e. energy supplied by an electrical oscillator (with magneto- or dynamo-electric generators [F02P 1/00](#); piezo-electric ignition [F02P 3/12](#); with continuous electric spark [F02P 15/10](#))

## F02P 3/02

- having inductive energy storage, e.g. arrangements of induction coils {(ignition coils structurally combined with sparking plugs [F02P 13/00](#); constructional details of ignition coils [H01F 38/12](#))}

## F02P 3/04

- . Layout of circuits

## F02P 3/0407

- . . {Opening or closing the primary coil circuit with electronic switching means ([F02P 3/045](#) to [F02P 3/055](#) take precedence)}

## F02P 3/0414

- . . . {using digital techniques ([F02P 3/0428](#), [F02P 3/0442](#) take precedence)}

## F02P 3/0421

- . . . . {with electronic tubes}

F02P 3/0428	. . . . .	{using digital techniques}
F02P 3/0435	. . . . .	{with semiconductor devices ( <a href="#">F02P 3/0453</a> , <a href="#">F02P 3/051</a> , <a href="#">F02P 3/0552</a> take precedence)}
F02P 3/0442	. . . . .	{using digital techniques ( <a href="#">F02P 3/0456</a> , <a href="#">F02P 3/053</a> , <a href="#">F02P 3/0554</a> , <a href="#">F02P 3/0558</a> take precedence)}
F02P 3/045	. . . . .	for control of the dwell or anti dwell time
F02P 3/0453	. . . . .	{Opening or closing the primary coil circuit with semiconductor devices}
F02P 3/0456	. . . . .	{using digital techniques}
F02P 3/05	. . . . .	for control of the magnitude of the current in the ignition coil ( <a href="#">during starting F02P 15/12</a> )
F02P 3/051	. . . . .	{Opening or closing the primary coil circuit with semiconductor devices}
F02P 3/053	. . . . .	{using digital techniques}
F02P 3/055	. . . . .	with protective means to prevent damage to the circuit, {e.g. semiconductor devices} or the ignition coil
F02P 3/0552	. . . . .	{Opening or closing the primary coil circuit with semiconductor devices}
F02P 3/0554	. . . . .	{using digital techniques ( <a href="#">F02P 3/0558</a> takes precedence)}
F02P 3/0556	. . . . .	{Protecting the coil when the engine is stopped}
F02P 3/0558	. . . . .	{using digital techniques}
F02P 3/06	. . . . .	having capacitive energy storage ( <a href="#">piezo-electric or electrostatic ignition F02P 3/12</a> )
F02P 3/08	. . . . .	Layout of circuits ( <a href="#">for low tension F02P 3/10</a> )
F02P 3/0807	. . . . .	{Closing the discharge circuit of the storage capacitor with electronic switching means ( <a href="#">F02P 3/0853</a> , <a href="#">F02P 3/0876</a> , <a href="#">F02P 3/09</a> take precedence)}
F02P 3/0815	. . . . .	{using digital techniques ( <a href="#">F02P 3/083</a> , <a href="#">F02P 3/0846</a> take precedence)}
F02P 3/0823	. . . . .	{with electronic tubes}
F02P 3/083	. . . . .	{using digital techniques}
F02P 3/0838	. . . . .	{with semiconductor devices ( <a href="#">F02P 3/0861</a> , <a href="#">F02P 3/0884</a> , <a href="#">F02P 3/093</a> take precedence)}
F02P 3/0846	. . . . .	{using digital techniques ( <a href="#">F02P 3/0869</a> , <a href="#">F02P 3/0892</a> , <a href="#">F02P 3/096</a> take precedence)}
F02P 3/0853	. . . . .	{for control of the dwell or anti-dwell time}
F02P 3/0861	. . . . .	{Closing the discharge circuit of the storage capacitor with semiconductor devices}
F02P 3/0869	. . . . .	{using digital techniques}
F02P 3/0876	. . . . .	{the storage capacitor being charged by means of an energy converter (DC-DC converter) or of an intermediate storage inductance}
F02P 3/0884	. . . . .	{Closing the discharge circuit of the storage capacitor with semiconductor devices}
F02P 3/0892	. . . . .	{using digital techniques}
F02P 3/09	. . . . .	for control of the charging current in the capacitor ( <a href="#">F02P 15/12</a> takes precedence)

- F02P 3/093 . . . . {Closing the discharge circuit of the storage capacitor with semiconductor devices}
- F02P 3/096 . . . . {using digital techniques}
- F02P 3/10 . . Low-tension installation, e.g. using surface-discharge sparking plugs
- F02P 3/12 . Piezo-electric ignition; Electrostatic ignition

**Advancing or retarding electric ignition spark; Arrangements of distributors or of circuit-makers or -breakers for electric spark ignition; Electric spark ignition control or safety means, not otherwise provided for**

- F02P 5/00 Advancing or retarding ignition; Control therefor**
- F02P 5/005 . {with combination of automatic and non- automatic means}
- F02P 5/02 . non-automatically; dependent on position of personal controls of engine, e.g. throttle position
- F02P 5/04 . automatically, as a function of the working conditions of the engine or vehicle or of the atmospheric conditions (dependent on position of personal controls of engine F02P 5/02)
- F02P 5/045 . . {combined with electronic control of other engine functions, e.g. fuel injection (in general F02D 37/02)}
- F02P 5/05 . . using mechanical means
- F02P 5/06 . . . dependent on engine speed
- F02P 5/07 . . . . Centrifugal timing mechanisms
- F02P 5/075 . . . . {Centrifugal devices combined with other specific conditions}
- F02P 5/10 . . . dependent on fluid pressure in engine, e.g. combustion-air pressure
- F02P 5/103 . . . . {dependent on the combustion-air pressure in engine}
- F02P 5/106 . . . . {Combustion-air pressure devices combined with other specific conditions (with centrifugal devices F02P 5/075)}
- F02P 5/12 . . . . dependent a specific pressure other than that of combustion-air, e.g. of exhaust, cooling fluid, lubricant
- F02P 5/14 . . . dependent on specific conditions other than engine speed or engine fluid pressure, e.g. temperature
- F02P 5/142 . . . . {dependent on a combination of several specific conditions (F02P 5/075, F02P 5/106 takes precedence)}
- F02P 5/145 . . using electrical means
- F02P 5/1455 . . . {by using a second control of the closed loop type (dependent on pinking F02P 5/152)}
- F02P 5/15 . . . digital data processing
- F02P 5/1502 . . . . {using one central computing unit}
- F02P 5/1504 . . . . {with particular means during a transient phase, e.g. acceleration, deceleration, gear change (during starting F02P 5/1506)}
- F02P 5/1506 . . . . {with particular means during starting}
- F02P 5/1508 . . . . {with particular means during idling}
- F02P 5/151 . . . . {with means for compensating the variation of the characteristics of the engine or of a sensor, e.g. by ageing}

- F02P 5/1512 . . . . . {with particular means concerning an individual cylinder}
- F02P 5/1514 . . . . . {with means for optimising the use of registers or of memories, e.g. interpolation}
- F02P 5/1516 . . . . . {with means relating to exhaust gas recirculation, e.g. turbo}
- F02P 5/1518 . . . . . {using two or more central computing units, e.g. interpolation}
- F02P 5/152 . . . . . dependent on pinking (detecting or indicating knocks in internal-combustion engines [G01L 23/22](#))
- F02P 5/1521 . . . . . {with particular means during a transient phase, e.g. starting, acceleration, deceleration, gear change}
- F02P 5/1522 . . . . . {with particular means concerning an individual cylinder}
- F02P 5/1523 . . . . . {with particular laws of return to advance, e.g. step by step, differing from the laws of retard}
- F02P 5/1525 . . . . . {with means for compensating the variation of the characteristics of the pinking sensor or of the electrical means, e.g. by ageing (when variation of characteristics results only from incorrect functioning [F02P 5/1526](#))}
- F02P 5/1526 . . . . . {with means for taking into account incorrect functioning of the pinking sensor or of the electrical means}
- F02P 5/1527 . . . . . {with means allowing burning of two or more fuels, e.g. super or normal, premium or regular}
- F02P 5/1528 . . . . . {for turbocompressed engine}
- F02P 5/153 . . . . . dependent on combustion pressure
- F02P 5/155 . . . . . Analogue data processing
- F02P 5/1551 . . . . . {by determination of elapsed time with reference to a particular point on the motor axle, dependent on specific conditions}
- F02P 5/1553 . . . . . {by determination of elapsed angle with reference to a particular point on the motor axle, dependent on specific conditions}
- F02P 5/1555 . . . . . {using a continuous control, dependent on speed}
- F02P 5/1556 . . . . . {using a stepped control, dependent on speed}
- F02P 5/1558 . . . . . {with special measures for starting}
- F02P 5/16 . . . . . characterised by the mechanical transmission between sensing elements or personal controls and final actuating elements

**F02P 7/00** Arrangements of distributors, circuit-makers or -breakers, {e.g. of distributor and circuit-breaker combinations} or pick-up devices (advancing or retarding ignition or control therefor [F02P 5/00](#); such devices *per se*, see the relevant classes of Section H, e.g. rotary switches [H01H 19/00](#), contact-breakers, distributors [H01R 39/00](#), generators [H02K](#))

- F02P 7/02 . . . . . of distributors
- F02P 7/021 . . . . . {Mechanical distributors}
- F02P 7/022 . . . . . {Details of the distributor rotor or electrode}
- F02P 7/023 . . . . . {with magnetically controlled mechanical contacts}
- F02P 7/025 . . . . . {with noise suppression means specially adapted for the distributor}
- F02P 7/026 . . . . . {Distributors combined with other ignition devices, e.g. coils, fuel-injectors}

- F02P 7/027 . . . . {combined with centrifugal advance devices}
- F02P 7/028 . . . . {combined with circuit-makers or -breakers (and with centrifugal advance devices [F02P 7/027](#))}
- F02P 7/03 . . with electrical means (ignition occurring simultaneously at different places in one engine cylinder or in two or more separate engine cylinders [F02P 15/08](#))
- F02P 7/035 . . . {without mechanical switching means}
- F02P 7/04 . . having distributors with air-tight casing
- F02P 7/06 . . of circuit-makers or -breakers, or pick-up devices adapted to sense particular points of the timing cycle
- F02P 7/061 . . {pick-up devices without mechanical contacts ([F02P 7/067](#) to [F02P 7/077](#) take precedence)}
- F02P 7/063 . . Mechanical pick-up devices, circuit-makers or -breakers, e.g. contact-breakers
- F02P 7/0631 . . . {Constructional details of contacts}
- F02P 7/0632 . . . {with rotary contacts}
- F02P 7/0634 . . . {Details of cams or cam-followers}
- F02P 7/0635 . . . {with means to set the breaker gap}
- F02P 7/0637 . . . {with several circuit-makers or -breakers actuated by the same cam}
- F02P 7/0638 . . . {with noise suppression means specially adapted for the breakers}
- F02P 7/067 . . Electromagnetic pick-up devices, {e.g. providing induced current in a coil}
- F02P 7/0672 . . . {using Wiegand effect}
- F02P 7/0675 . . . {with variable reluctance, e.g. depending on the shape of a tooth}
- F02P 7/0677 . . . {Mechanical arrangements}
- F02P 7/07 . . . Hall-effect pick-up devices
- F02P 7/073 . . Optical pick-up devices
- F02P 7/077 . . Circuits therefor, e.g. pulse generators
- F02P 7/0775 . . . {Electronical verniers}
- F02P 7/08 . . having air-tight casings
- F02P 7/10 . . Drives of distributors or of circuit-makers or -breakers

## **F02P 9/00 Electric spark ignition control, not otherwise provided for**

- F02P 9/002 . {Control of spark intensity, intensifying, lengthening, suppression (by means of current control in the storage devices [F02P 3/05](#), [F02P 3/09](#), during starting [F02P 15/12](#))}
- F02P 9/005 . . {by weakening or suppression of sparks to limit the engine speed}
- F02P 9/007 . . {by supplementary electrical discharge in the pre-ionised electrode interspace of the sparking plug, e.g. plasma jet ignition}

## **F02P 11/00 Safety means for electric spark ignition, not otherwise provided for**

- F02P 11/02 . Preventing damage to engines or engine-driven gearing
- F02P 11/025 . . {Shortening the ignition when the engine is stopped (to prevent damage to the coil [F02P 3/0556](#))}
- F02P 11/04 . Preventing unauthorised use of engines (of vehicles [B60R 25/04](#); ignition locks [H01H 27/00](#))

F02P 11/06 . Indicating unsafe conditions

**F02P 13/00 Sparking plugs structurally combined with other parts of internal-combustion engines** ({connection of ignition coil to spark plug connector [F02P 3/02](#); with fuel injectors [F02M 57/06](#); {spark plug connectors per se [H01T 13/04](#) to [H01T 13/06](#); predominant aspects of sparking plug, see [H01T 13/40](#) to [H01T 13/44](#)}; predominant aspects of the parts, see the relevant subclasses)

**F02P 15/00 Electric spark ignition having characteristics not provided for in, or of interest apart from, groups [F02P 1/00](#) to [F02P 13/00](#) {and combined with layout of ignition circuits** (not combined [F02B](#), [F02C](#), [F02G](#), [F02K](#))}

F02P 15/001 . {Ignition installations adapted to specific engine types (ignition of jet propulsion plants [F02K 9/95](#); for rotary piston engines [F02B 53/12](#))}

F02P 15/003 . . {Layout of ignition circuits for gas turbine plants (ignition of gas turbine plants per se [F02C 7/26](#))}

F02P 15/005 . . {Layout of ignition circuits for rotary- or oscillating piston engines (ignition of those engines per se [F02B 53/12](#))}

F02P 15/006 . {Ignition installations combined with other systems, e.g. fuel injection (to advance or to retard the ignition spark [F02P 5/045](#))}

F02P 15/008 . {Reserve ignition systems; Redundancy of some ignition devices}

F02P 15/02 . Arrangements having two or more sparking plugs

F02P 15/04 . one of the spark electrodes being mounted on the engine working piston

F02P 15/06 . the electric spark triggered by engine working cylinder compression

F02P 15/08 . having multiple-spark ignition, i.e. ignition occurring simultaneously at different places in one engine cylinder or in two or more separate engine cylinders

F02P 15/10 . having continuous electric sparks

F02P 15/12 . having means for strengthening spark during starting

**F02P 17/00 Testing of ignition installations, e.g. in combination with adjusting** (testing fuel injection apparatus [F02M 65/00](#); testing ignition installations in general [F23Q 23/00](#)); **Testing of ignition timing in compression-ignition engines**

F02P 2017/003 . {using an inductive sensor, e.g. trigger tongs}

F02P 2017/006 . {using a capacitive sensor}

F02P 17/02 . Checking or adjusting ignition timing

F02P 17/04 . . dynamically

F02P 17/06 . . . using a stroboscopic lamp

F02P 17/08 . . . using a cathode-ray oscilloscope ([F02P 17/06](#) takes precedence)

F02P 17/10 . Measuring dwell or antidwell time

F02P 17/12 . Testing characteristics of the spark, ignition voltage or current (testing of sparking plugs [H01T 13/60](#))

F02P 2017/121 . . {by measuring spark voltage}

F02P 2017/123 . . {Generating additional sparks for diagnostics}

F02P 2017/125 . . {Measuring ionisation of combustion gas, e.g. by using ignition circuits}

F02P 2017/126 . . . {for burners}

F02P 2017/128 . . . {for knock detection}

**Other ignition****F02P 19/00****Incandescent ignition, e.g. during starting of internal combustion engines;  
Combination of incandescent and spark ignition**

- F02P 19/02 . electric, e.g. layout of circuits of apparatus having glowing plugs
- F02P 19/021 . . {characterised by power delivery controls}
- F02P 19/022 . . . {using intermittent current supply}
- F02P 19/023 . . . {Individual control of the glow plugs}
- F02P 19/025 . . {with means for determining glow plug temperature or glow plug resistance}
- F02P 19/026 . . {Glow plug actuation during engine operation}
- F02P 19/027 . . {Safety devices, e.g. for diagnosing the glow plugs or the related circuits}
- F02P 19/028 . . {the glow plug being combined with or used as a sensor}
- F02P 19/04 . non-electric, e.g. heating incandescent spots by burners (use of burners for direct ignition [F02P 21/00](#))

**F02P 21/00****Direct use of flames or burners for ignition**

- F02P 21/02 . the flames being kept burning essentially external to engine working chambers
- F02P 21/04 . Burning-cartridges or like inserts being arranged in engine working chambers (as starting aid [F02N 19/02](#))

**F02P 23/00****Other ignition**

- F02P 23/02 . Friction, pyrophoric, or catalytic ignition
- F02P 23/04 . Other physical ignition means, e.g. using laser rays
- F02P 23/045 . . {using electromagnetic microwaves}