

## F03C

**POSITIVE-DISPLACEMENT ENGINES DRIVEN BY LIQUIDS (positive-displacement engines for liquids and elastic fluids [F01](#); positive-displacement machines for liquids [F04](#); fluid-pressure actuators [F15B](#); fluid gearing [F16H](#))**

### Definition statement

*This place covers:*

Engines with reciprocating pistons or rotary or oscillating pistons wherein the working fluid is a liquid.

### Relationships with other classification places

Related subclasses [F04B](#), [F01C](#) and [F04C](#) cover the same type of apparatus using reciprocating, rotary or oscillating pistons for positive displacement.

[F04B](#) covers machines or pumps with reciprocating pistons, or other kinds of positive displacement mechanisms with the exception of rotary or oscillating piston type machines or pumps.

Regarding the machines with rotary or oscillating pistons, the distinguishing characteristic used for classifying the machines, i.e. devices which could be equally be an engine or pump, is the working fluid used. Machines with rotary or oscillating pistons for working fluids containing elastic fluids, e.g. a combination of liquids and elastic fluids are classified in [F01C](#). Internal combustion piston engines or combustion engines in general, where the driving forces are generated by expansion of gases due to combustion are classified in [F02B](#). If only liquid is used as working fluid for these machines with rotary or oscillating pistons they are classified in [F04C](#). However, devices with rotary or oscillating pistons that are only pumps, i.e. cannot be used as engines, are classified in [F04C](#), irrespective of the working fluid.

Subject matter like cyclically operating valves, lubricating or cooling are classified in subclasses [F01L](#), [F01M](#), [F01P](#) irrespective of their stated application, unless their novel and non-obvious features are peculiar to their application, in which case they are classified only in the relevant subclass of [F04](#). The subclasses [F01L](#), [F01M](#), [F01P](#) do not cover pump or machine features per se.

### References

#### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Rotary-piston or oscillating piston machines for elastic fluids	<a href="#">F01C</a>
Rotary-piston or oscillating piston machines for liquids and elastic fluids	<a href="#">F01C</a>
Cyclically operating valves for machines or engines	<a href="#">F01L</a>
Lubrication of machines or engines in general	<a href="#">F01M</a>
Cooling of machines or engines in general	<a href="#">F01P</a>
Internal combustion piston engines or combustion engines in general	<a href="#">F02B</a>
Fuel injection apparatus	<a href="#">F02M 39/00</a> - <a href="#">F02M 57/00</a>
Positive displacement machines for liquids, or pumps in which the working-fluid is displaced by one or more reciprocating pistons or by flexible working members	<a href="#">F04B</a>
Rotary-piston or oscillating piston machines for liquids	<a href="#">F04C 2/00</a>
Rotary-piston or oscillating piston pumps for elastic fluids	<a href="#">F04C 18/00</a>
Fluid pressure actuators	<a href="#">F15B</a>

Rotary fluid gearing using pumps and motors of the volumetric type for conveying rotary motion	<a href="#">F16H</a>
Sealing in general	<a href="#">F16J</a>
Means for thermal insulation in general	<a href="#">F16L</a>
Refrigeration machines, plants or systems	<a href="#">F25B</a>
Dynamo electric machines	<a href="#">H02K</a>

### Special rules of classification

Reciprocating piston type:

Documents indicating that the machine may be operated both as a hydraulic engine and/or as a pump are classified in [F03C](#) and in [F04B](#).

In cases where a control or a material is of special interest, the document should be classified by using the corresponding Indexing Code of [F04B](#) and [F05C](#).

Rotary or oscillating piston type:

Details not provided for in [F03C](#) are classified by using the [F04C](#) scheme.

As a general rule a complete classification will contain at least one class specifying the type of engine concerned, combined with at least one class out of the control group [F04C 14/00](#) or of the accessory group [F04C 15/00](#).

In cases where a control or a "Details, component, parts, or accessories" has to be classified which can be used in a number of different types of engines which would be covered by different subgroups, the type of engine considered in the document should be classified by using the corresponding subclass.

### Glossary of terms

*In this place, the following terms or expressions are used with the meaning indicated:*

Pump	Device for continuously raising, forcing, compressing, or exhausting fluid by mechanical means
Machine	Device that could equally be both an engine and a pump and not a device which is restricted to an engine or one which is restricted to a pump
Positive displacement pumps	Pumps using pistons or other mechanical members to displace a working fluid in a working chamber, the dynamic effect on the fluid being of minor importance
Positive displacement engines	The energy of a working fluid is transformed into mechanical energy, in which variations of volume created by the working fluid in a working chamber produce equivalent movement of mechanical members, e.g. pistons transmitting the energy, the dynamic effect of the fluid being of minor importance
Oscillating piston machine	Positive-displacement machine in which a fluid-engaging, work-transmitting member oscillates, e.g. a vane piston swinging back and forth about a fixed axis
Reciprocating piston	Fluid-engaging, work-transmitting member of an reciprocating-piston type machine or pump that slides alternately back and forth usually along a straight line or path

Rotary piston	Fluid engaging, work-transmitting member of a rotary-piston machine or pump that can completely rotate about a fixed axis or about an axis moving along a circular or similar orbit when operating, e.g. rotor having vanes or teeth
Free-piston machine	A linear , "crankless" reciprocating piston machine in which the piston motion is not controlled by a crankshaft but determined by the interaction forces from the fluid pressure in the working chamber, a rebound device (e.g. a piston in a closed cylinder) and a load device (e.g. a gas compressor or a linear alternator)
Rotary piston machine	Positive-displacement machine in which a liquid-engaging, work-transmitting member rotates about a fixed axis or about an axis moving along a circular or similar orbit, e.g. machine with a rotor having vanes or teeth
Cooperating members	The "oscillating piston" or "rotary piston" and another member, e.g., the working-chamber wall, which assists in the pumping action or machine's action
Movement of the cooperating members	To be interpreted as relative, i.e. one of the "cooperating members" may be stationary, even though reference may be made to its rotational axis, or both may move
Teeth or tooth equivalents	Includes lobes, projections or abutments
Internal axis type	The rotational axes of the inner and outer co-operating members remain at all times within the outer member, e.g., in a similar manner to that of a pinion meshing with the internal teeth of a ring gear
Working fluid	The driven fluid in a pump or driving or driven liquid in a machine. The working fluid can be in a compressible, gaseous state, e.g. steam, called elastic fluid, a liquid state, or a state where there is coexistence of elastic fluid and liquid state

## **F03C 1/00**

### **Reciprocating-piston liquid engines**

#### **Definition statement**

*This place covers:*

Hydraulic motors wherein an axial or radial piston reciprocates inside a working chamber.

## **F03C 1/003**

### **{controlling}**

#### **Definition statement**

*This place covers:*

Methods and means for controlling the reciprocating piston movement, such as e.g. piston speed-control or piston stroke-control.

## References

### Limiting references

*This place does not cover:*

Controlling specifically related to multiple-cylinder hydraulic motors having cylinders in tsar or fan arrangement	<a href="#">F03C 1/0447</a>
Controlling specifically related to multiple-cylinder hydraulic motors having cylinders with axes generally coaxial with, or parallel or inclined to, main shaft axis	<a href="#">F03C 1/0678</a>

## F03C 1/26

**adapted for special use or combined with apparatus driven thereby**

### Definition statement

*This place covers:*

Hydraulic motors which are primarily defined by their use, or their specific combination, with an other apparatus, e.g. for driving said apparatus.

## F03C 2/00

**Rotary-piston engines (in which the liquid exclusively displaces one or more piston reciprocating in rotary cylinders [F03C 1/24](#))**

### Definition statement

*This place covers:*

Hydraulic motors wherein the rotary-piston moves in a single direction inside the working chamber including "cat and mouse" type hydraulic motors.

## References

### Limiting references

*This place does not cover:*

Rotary-piston engines in which the liquid exclusively displaces one or more piston reciprocating in rotary cylinders	<a href="#">F03C 1/24</a>
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## F03C 4/00

**Oscillating-piston engines**

### Definition statement

*This place covers:*

Hydraulic motors in which the rotary-piston moves back and forth inside the working chamber.

## F03C 7/00

### Engines of flexible-wall type

#### Definition statement

*This place covers:*

Hydraulic motors having flexible working members, such as membranes, diaphragm, or flexible tubes, e.g. peristaltic motors.

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Machines, pumps, or pumping installations having flexible working members; Pumps or pumping installations specially adapted for elastic fluids	<a href="#">F04B 43/00</a>
Pumps or pumping installations having flexible working members and specially adapted for elastic fluids	<a href="#">F04B 45/00</a>

## F03C 99/00

### Subject matter not provided for in other groups of this subclass

#### Definition statement

*This place covers:*

Hydraulic motors having working principles not provided for in other groups, and components or parts specifically adapted for hydraulic motors.

## F03C 99/005

### {Free-piston type engines}

#### Definition statement

*This place covers:*

Linear fluid engines, in which the piston motion is determined only by the interaction of fluid forces within a cylinder, rebound means and/or a load means, but without mechanical connection between the piston and a crankshaft.

#### References

##### Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Free-piston engines	<a href="#">F02B 71/00</a>
Free-piston pumps and systems incorporating such pumps	<a href="#">F04B 31/00</a>