

F04C

ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS (engines [F03C](#)); ROTARY-PISTON, OR OSCILLATING-PISTON, POSITIVE-DISPLACEMENT PUMPS

Definition statement

This place covers:

Pumps with rotary or oscillating pistons for liquids, for elastic fluids, or for combination of liquid and elastic fluid.

Positive displacement machines, i.e. devices which could be equally an engine or pump, with rotary or oscillating pistons for liquids only.

Relationships with other classification places

Related subclasses [F01C](#) and [F04C](#) cover the same type of apparatus using rotary or oscillating pistons for positive displacement. 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](#). If only liquid is used as working fluid for these machines with rotary or oscillating pistons they are classified in [F04C](#).

Classification is in [F03C](#) when the working fluid is a liquid but the machine is specifically an engine with reciprocating pistons or rotary or oscillating pistons.

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. [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.

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

Limiting references

This place does not cover:

Positive displacement engines for liquids	F03C
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	F04B

Informative references

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

Rotary-piston or oscillating piston engines for liquids and elastic fluids	F01C
Cyclically operating valves for machines or engines	F01L
Lubrication of machines or engines in general	F01M
Gas-flow silencer or exhaust apparatus for machines or engines in general	F01N

Cooling of machines or engines in general	F01P
Combustion engines with pumps for charging	F02B 33/34 , F02B 53/08
Fluid pressure actuators	F15B
Rotary fluid gearing using pumps and motors of the volumetric type for conveying rotary motion	F16H
Sealing in general	F16J
Means for thermal insulation in general	F16L
Refrigeration machines, plants or systems	F25B

Special rules of classification

As a general rule a complete classification will contain at least one class specifying the type of pump concerned, combined with at least one class out of the control group [F04C 14/00](#) or [F04C 28/00](#), or of the sealing group [F04C 27/00](#) or of the accessory group [F04C 15/00](#) or [F04C 29/00](#).

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 pumps which would be covered by different groups, the type of pump considered in the document should be classified by using the corresponding Indexing Code.

The Indexing Code [F05C](#) is used to classify materials and material properties.

Glossary of terms

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

Pump	means a device for continuously raising, forcing, compressing, or exhausting fluid by mechanical means
Machine	means a 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	means a 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	means a 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	means a 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
Rotary piston machine	means a 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	means 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	is to be interpreted as relative, so that 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	include lobes, projections or abutments
Internal axis type	means that 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	means 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

F04C 2/00

Rotary-piston machines or pumps (with non-parallel axes of co-operating members [F04C 3/00](#); with the working-chamber walls at least partly resiliently deformable [F04C 5/00](#); with fluid ring or the like [F04C 7/00](#); rotary-piston pumps specially adapted for elastic fluids [F04C 18/00](#); rotary-piston machines or pumps in which the working-fluid is exclusively displaced by, or exclusively displaces, one or more reciprocating pistons [F04B](#))

References

Limiting references

This place does not cover:

Rotary-piston machines or pumps with non-parallel axes of co-operating members	F04C 3/00
Rotary-piston machines or pumps with the working-chamber walls at least partly resiliently deformable	F04C 5/00
Rotary-piston machines or pumps with fluid ring or the like	F04C 7/00
Rotary-piston machines or pumps specially adapted for elastic fluids	F04C 18/00
Rotary-piston machines or pumps in which the working-fluid is exclusively displaced by, or exclusively displaces, one or more reciprocating pistons	F04B

F04C 2/08

of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing

References

Informative references

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

Gear teeth manufacturing by metal processing	B23F
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Extruders in plastic moulding	B29C 47/00
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F04C 2/086

{Carter}

References

Limiting references

This place does not cover:

Non intermeshing-engagement type machines	F01C 21/10
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Special rules of classification

If the carter is not the core topic, it is highly desirable to add the Indexing Code [F04C 2240/10](#) or [F04C 2240/30](#).

F04C 2/1075

{Construction of the stationary member}

References

Informative references

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

Details of the mould	B29C 33/00
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F04C 3/00

Rotary-piston machines or pumps, with non-parallel axes of movement of co-operating members, e.g. of screw type (with the working-chamber walls at least partly resiliently deformable [F04C 5/00](#); rotary-piston pumps with non-parallel axes of movement of co-operating members specially adapted for elastic fluids [F04C 18/48](#))

Definition statement

This place covers:

Rotary-piston machines or pumps, with non-parallel axes of movement of co-operating members, e.g. of screw type

References

Limiting references

This place does not cover:

Rotary screw type piston pumps with parallel axes	F04C 2/16
Rotary-piston pumps with the working-chamber walls at least partly resiliently deformable	F04C 5/00
Rotary-piston pumps with non-parallel axes of movement of co-operating members specially adapted for elastic fluids	F04C 18/48

F04C 5/00

Rotary-piston machines or pumps with the working-chamber walls at least partly resiliently deformable (such pumps specially adapted for elastic fluids [F04C 18/00](#))

References**Limiting references**

This place does not cover:

Such pumps specially adapted for elastic fluids	F04C 18/00
Peristaltic pumps	F04B 43/12

F04C 7/00

Rotary-piston machines or pumps with fluid ring or the like (such pumps specially adapted for elastic fluids [F04C 19/00](#))

Definition statement

This place covers:

Rotary-piston machines or pumps in which the rotary-piston is sealed by a mass of liquid rotating inside the housing.

References**Limiting references**

This place does not cover:

Such pumps specially adapted for elastic fluids	F04C 19/00
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F04C 9/00

Oscillating-piston machines or pumps (such pumps specially adapted for elastic fluids [F04C 21/00](#))

Definition statement

This place covers:

Rotary-piston machines or pumps in which the rotary-piston moves back and forth inside the working chamber.

References**Limiting references**

This place does not cover:

Rotary-piston pumps with coaxially mounted members having continuously-changing circumferential spacing between them	F04C 2/063
Such pumps specially adapted for elastic fluids	F04C 21/00

F04C 9/005

{the piston oscillating in the space, e.g. around a fixed point (rotary-piston machines or pumps with non-parallel axes of movement between co-operating members [F04C 3/00](#))}

References**Limiting references**

This place does not cover:

Rotary-piston machines or pumps with non-parallel axes of movement between co-operating members	F04C 3/00
Rotary-piston machines or pumps in which the working fluid is compressed in a flexible chamber	F04B 43/1207

F04C 11/00

Combinations of two or more machines or pumps, each being of rotary-piston or oscillating-piston type (combinations of such pumps specially adapted for elastic fluids [F04C 23/00](#)); Pumping installations ([F04C 13/00](#) takes precedence; specially adapted for elastic fluids [F04C 23/00](#); fluid gearing [F16H](#))

Definition statement

This place covers:

Combinations of two or more machines or pumps, each being of rotary-piston or oscillating-piston type, such as multistage and parallel operating machines; Pumping installations

References**Limiting references**

This place does not cover:

Combinations of such pumps specially adapted for elastic fluids	F04C 23/00
Combination of engines with pumps or compressors driven thereby	F01C 13/04

Informative references

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

Fluid gearing	F16H
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Special rules of classification

[F04C 13/00](#) takes precedence.

F04C 13/00

Adaptations of machines or pumps for special use, e.g. for extremely high pressures (of pumps specially adapted for elastic fluids [F04C 25/00](#))

References**Limiting references**

This place does not cover:

Of such pumps specially adapted for elastic fluids	F04C 25/00
Combination of engines with pumps or compressors driven thereby	F01C 13/04

Special rules of classification

Documents classified here should have a main class elsewhere.

F04C 13/005

{Removing contaminants, deposits or scale from the pump; Cleaning}

References**Limiting references**

This place does not cover:

Prevention of deposits in the pump	F04C 2280/02
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F04C 13/008

{Pumps for submersible use, i.e. down-hole pumping}

Definition statement

This place covers:

Drawing well fluid out of a well with the adaptation for being below the earth's surface, and also pumps working in submersed conditions for other use.

References**Informative references**

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

Earth drilling	E21B
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F04C 14/00

Control of, monitoring of, or safety arrangements for, machines, pumps or pumping installations (of pumps or pumping installations specially adapted for elastic fluids [F04C 28/00](#))

Definition statement

This place covers:

Control of, monitoring of, or safety arrangements for, machines, pumps or pumping installations.

References**Limiting references**

This place does not cover:

Of pumps or pumping installations specially adapted for elastic fluids	F04C 28/00
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Special rules of classification

Documents classified here should have a main class elsewhere.

F04C 14/06

specially adapted for stopping, starting, idling or no-load operation

Definition statement

This place covers:

Measures or means for stopping, starting or idling a compressor or a pump; measures taken as a consequence or preceding starting, stopping or idling favouring the action, e.g. having reduced side sealing pressure at start.

F04C 14/18

characterised by varying the volume of the working chamber (by changing the positions of inlet or outlet openings [F04C 14/10](#))

Definition statement

This place covers:

Rotary-piston machines or pumps controlled by varying the volume of the working chamber also including those where the underlined expression is construed as changing the stroke ("stroke" as relative displacement between cooperating members defining the size of the working chamber as in reciprocating engines).

References**Limiting references**

This place does not cover:

By changing the positions of inlet or outlet openings	F04C 14/10
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F04C 14/22

by changing the eccentricity between cooperating members

References**Limiting references**

This place does not cover:

Internal gear pumps with variable eccentricity (i.e. variable in direction and not in quantity)(no change of volume but only relative displacement of the working chamber to the inlet and outlet openings).	F04C 14/10
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F04C 15/00

Component parts, details or accessories of machines, pumps or pumping installations, not provided for in groups [F04C 2/00](#) - [F04C 14/00](#) (of pumps specially adapted for elastic fluids [F04C 18/00](#) - [F04C 29/00](#))

Definition statement

This place covers:

Component parts, details or accessories of machines, pumps or pumping installations, not provided for in groups [F04C 2/00](#) - [F04C 14/00](#).

References**Limiting references**

This place does not cover:

Of pumps specially adapted for elastic fluids	F04C 29/00
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F04C 15/0042

{Systems for the equilibration of forces acting on the machines or pump (interstice adjustment other than by fluid pressure [F01C 21/102](#))}

References**Limiting references**

This place does not cover:

Silencing for compressors	F04C 29/06
Bearings	F01C 21/02 , F04C 2240/50
Interstice adjustment other than by fluid pressure	F01C 21/102

F04C 15/0046**{Internal leakage control}****References****Limiting references***This place does not cover:*

Seals for sealing such spaces	F04C 15/0034
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F04C 15/0049**{Equalization of pressure pulses (silencing for compressors [F04C 29/06](#))}****References****Limiting references***This place does not cover:*

Silencing for compressors	F04C 29/06
Vibration control	F04C 2270/12

F04C 15/0065**{for eccentric movement}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Oldham couplings	F01C 17/066
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F04C 15/0076**{Fixing rotors on shafts, e.g. by clamping together hub and shaft}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Rotor/shaft keyed connections	F04C 15/0073
Shaft sleeves	F04C 2240/605
Couplings for rigidly connecting two coaxial shafts or other movable machine elements, with clamping hub or with hub and longitudinal key	F16D 1/08

F04C 18/00

Rotary-piston pumps specially adapted for elastic fluids (with fluid ring or the like [F04C 19/00](#); rotary-piston pumps in which the working-fluid is exclusively displaced by one or more reciprocating pistons [F04B](#))

References**Limiting references**

This place does not cover:

Rotary-piston pumps for liquids or both liquids and elastic fluids	F04C 2/00
Rotary-piston pumps with fluid ring or the like	F04C 19/00
Rotary-piston pumps in which the working-fluid is exclusively displaced by one or more reciprocating pistons	F04B

F04C 18/08

of intermeshing-engagement type, i.e. with engagement of co-operating members similar to that of toothed gearing

References**Informative references**

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

Gear teeth manufacturing by metal processing	B23F
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F04C 18/086

{Carter}

Definition statement

This place covers:

Outer member cooperating with the toothed wheels; casing

References**Limiting references**

This place does not cover:

Non intermeshing-engagement type pumps	F01C 21/10
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Special rules of classification

If the carter is not the core topic, it is highly desirable to add the Indexing Code [F04C 2240/10](#) or [F04C 2240/30](#).

F04C 19/00

Rotary-piston pumps with fluid ring or the like, specially adapted for elastic fluids

Definition statement

This place covers:

Rotary-piston pumps in which the rotary-piston is sealed by a mass of liquid rotating inside the housing.

F04C 21/00

Oscillating-piston pumps specially adapted for elastic fluids

Definition statement

This place covers:

Rotary-piston pumps in which the rotary-piston moves back and forth inside the working chamber.

F04C 21/005

{the piston oscillating in the space, e.g. around a fixed point (rotary-piston pumps with non-parallel axes of rotation between co-operating members [F04C 18/48](#))}

References**Limiting references**

This place does not cover:

Rotary-piston pumps with non-parallel axes of movement between co-operating members	F04C 18/48
Rotary-piston pumps in which the working fluid is compressed in a flexible chamber	F04B 43/1207

F04C 23/00

Combinations of two or more pumps, each being of rotary-piston or oscillating-piston type, specially adapted for elastic fluids; Pumping installations specially adapted for elastic fluids; Multi-stage pumps specially adapted for elastic fluids ([F04C 25/00](#) takes precedence)

Definition statement

This place covers:

Combinations of two or more pumps, each being of rotary-piston or oscillating-piston type, specially adapted for elastic fluids; Pumping installations specially adapted for elastic fluids; Multi-stage pumps operating in parallel or in series specially adapted for elastic fluids.

References

Limiting references

This place does not cover:

Combination of engines with pumps or compressors driven thereby	F01C 13/04
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Special rules of classification

[F04C 25/00](#) takes precedence.

F04C 25/00

Adaptations of pumps for special use of pumps for elastic fluids

Definition statement

This place covers:

Adaptations of pumps for special use of pumps for elastic fluids.

References

Limiting references

This place does not cover:

Combination of engines with pumps or compressors driven thereby	F01C 13/04
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Special rules of classification

Documents classified here should have a main class elsewhere.

F04C 25/02

for producing high vacuum (sealing arrangements [F04C 27/00](#); silencing [F04C 29/06](#))

Definition statement

This place covers:

Pumps adapted for working at pressures below atmospheric pressure.

References

Limiting references

This place does not cover:

Sealing arrangements	F04C 27/00
Silencing	F04C 29/06

Informative references

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

Discharge tubes with vacuum locks	H01J 37/18
Apparatus specially adapted for handling semiconductor or electric solid state devices during manufacture or treatment thereof	H01L 21/67

F04C 27/00

Sealing arrangements in rotary-piston pumps specially adapted for elastic fluids

Definition statement

This place covers:

Any seal construction or mode not provided by the groups, e.g. labyrinth.

F04C 27/005

{Axial sealings for working fluid}

Definition statement

This place covers:

Especially scroll compressors where the axial sealing force is cancelled for capacity control purposes (e.g. forming an axial gap between scroll bodies).

Special rules of classification

When capacity control is concerned, it is highly desirable to add the Indexing Code [F04C 28/265](#).

F04C 28/00

Control of, monitoring of, or safety arrangements for, pumps or pumping installations specially adapted for elastic fluids

Definition statement

This place covers:

Control of, monitoring of, or safety arrangements for, pumps or pumping installations specially adapted for elastic fluids.

Special rules of classification

Documents classified here should have a main class elsewhere.

F04C 28/06

specially adapted for stopping, starting, idling or no-load operation

Definition statement

This place covers:

Measures or means for stopping, starting or idling a compressor or pump; measures taken as a consequence or preceding starting, stopping or idling favouring the action, e.g. having reduced side sealing pressure at start.

F04C 28/16

using lift valves

References

Limiting references

This place does not cover:

Rotary-Piston pumps where a sliding valve controls an opening or port of non uniform section progressively (or a multiplicity of holes, passages forming as a whole an inlet or outlet port of a machine, pump).	F04C 28/12
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Glossary of terms

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

Lift valve	valve with an ON-OFF action, i.e. opening or closing a passage in one movement
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F04C 28/18

characterised by varying the volume of the working chamber (by changing the positions of inlet or outlet openings [F04C 28/10](#))

Definition statement

This place covers:

Rotary-piston pumps controlled by varying the volume of the working chamber also including those where the underlined expression is construed as changing the stroke ("stroke" as relative displacement between cooperating members defining the size of the working chamber as in reciprocating engines).

References

Limiting references

This place does not cover:

By changing the positions of inlet or outlet openings	F04C 28/10
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F04C 29/00

Component parts, details or accessories of pumps or pumping installations, not provided for in groups [F04C 18/00](#) - [F04C 28/00](#)

Special rules of classification

Documents classified here should have a main class elsewhere.

F04C 29/0035**{Equalization of pressure pulses (silencing [F04C 29/06](#))}****References****Limiting references***This place does not cover:*

Silencing	F04C 29/06
Vibration control	F04C 2270/12

F04C 29/0057**{for eccentric movement}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Oldham couplings	F01C 17/066
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F04C 29/0078**{Fixing rotors on shafts, e.g. by clamping together hub and shaft}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Rotor/shaft keyed connections	F04C 29/0071
Shaft sleeves	F04C 2240/605
Couplings for rigidly connecting two coaxial shafts or other movable machine elements, with clamping hub or with hub and longitudinal key	F16D 1/08

F04C 29/0092**{Removing solid or liquid contaminants from the gas under pumping, e.g. by filtering or deposition; Purging; Scrubbing; Cleaning}****References****Limiting references***This place does not cover:*

Prevention of deposits in the pump	F04C 2280/02
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F04C 29/02

Lubrication (of machines or engines in general [F01M](#)); Lubricant separation (separation in general [B01D](#))

References**Informative references**

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

Separation in general	B01D
Lubrication of machines or engines in general	F01M

F04C 29/04

Heating; Cooling (of machines or engines in general [F01P](#)); Heat insulation (heat insulation in general [F16L 59/00](#))

References**Informative references**

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

Heating, cooling of machines or engines in general	F01P
Heat insulation in general	F16L 59/00

F04C 29/06

Silencing (gas-flow silencers or exhaust apparatus for machines or engines in general [F01N](#))

References**Informative references**

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

Gas-flow silencers or exhaust apparatus for machines or engines in general	F01N
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F04C 2210/00**Fluid****Definition statement**

This place covers:

Additional information regarding the function, the nature and the properties of fluids inside the machine.

F04C 2220/00

Application

Definition statement

This place covers:

Additional information regarding the use of the machine.

F04C 2230/00

Manufacture

Definition statement

This place covers:

Additional information regarding the manufacturing process of the machine, including surface treatments, repair, assembly and disassembly methods.

F04C 2240/00

Components

Definition statement

This place covers:

Additional information regarding machine parts.

F04C 2250/00

Geometry

Definition statement

This place covers:

Additional information regarding forms and dimensions of machine parts.

F04C 2270/00

Control; Monitoring or safety arrangements

Definition statement

This place covers:

Additional information regarding parameters used to control or monitor a rotary-piston machine.