

F15B

SYSTEMS ACTING BY MEANS OF FLUIDS IN GENERAL; FLUID-PRESSURE ACTUATORS, e.g. SERVO-MOTORS; DETAILS OF FLUID-PRESSURE SYSTEMS, NOT OTHERWISE PROVIDED FOR ([N: hydraulically or pneumatically operated lifting devices for soil-working machines A01B63/10; hydraulic drawing presses B21D; hydraulic or pneumatic manipulators B25J; hydraulic or pneumatic tipping devices for vehicles B60P1/00; hydraulic or pneumatic remote control for railway signals B61L7/04; hydraulic or pneumatic mine supports E21D15/44]; motors, turbines, compressors, blowers, pumps F01 to F04; [N: fluid signal amplifiers, relays F15C]; fluid dynamics F15D; fluid clutches or brakes F16D; fluid springs F16F; fluid gearing F16H; pistons, cylinders packing F16J; valves, taps, cocks, actuating-floats F16K; safety valves with auxiliary fluid operation of the main valve F16K17/10; fluid-operating means for valves F16K31/12 ; pipes, pipe joints F16L; lubricating F16N)

Definition statement

This subclass/group covers:

Systems transferring mechanical energy by means of a fluid under pressure using the principles of fluid statics or hydrostatics, i.e. hydraulic or pneumatic systems

References relevant to classification in this subclass

This subclass/group does not cover:

Desalination	B63J 1/00
Water purification	C02F 1/00
Engine water cooling	F01P 3/00
Fuel injection	F02M
Central heating systems	F24D 3/00

Informative references

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

Hydraulically or pneumatically operated lifting devices for soil-working machines	A01B 63/10
Hydraulic drawing presses	B21D
Hydraulic or pneumatic manipulators	B25J
Hydraulic or pneumatic tipping devices for vehicles	B60P 1/00
Hydraulic or pneumatic remote control for railway signals	B61L 7/04
Hydraulic or pneumatic mine supports	E21D 15/44
Motors, turbines, compressors, blowers, pumps	F01 - F04
Steam engines	F01B
Perpetua mobilia using fluid	F03B 17/00
Fluid signal amplifiers, relays	F15C
Fluid dynamics	F15D
Fluid clutches or brakes	F16D
Fluid springs	F16F
Fluid gearing	F16H
Pistons, cylinders packing	F16J
Valves, taps, cocks, actuating-floats	F16K
Safety valves with auxiliary fluid operation of the main valve	F16K 17/10
Fluid-operating means for valves	F16K 31/12
Pipes, pipe joints	F16L
Lubricating	F16N

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Pneumatic	using air or an inert gas (except steam) as a pressure medium.
Hydraulic	using a liquid as the pressure medium.
Telemotor	system or device in which a substantially constant amount of fluid is trapped between an input member and an output member to act as a fluid link
Servomotor	fluid-pressure actuator, e.g. a piston and a cylinder, directly controlled by a valve or other device (e.g. pump) which is responsive to operation of an initial controlling member (e.g. joystick). The initial controlling member may be adjacent to the servomotor or at a distance and may be, e.g. a hand lever.

F15B 1/00

Installations or systems with accumulators; Supply reservoir or sump assemblies

Informative references

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

Hydro-pneumatic suspensions	B60G 17/056 , F16F 9/06
Pumps having reservoirs	F04B 41/04
Central heating systems	F24D 3/1008

Special rules of classification within this group

The main group [F15B 1/00](#) is complemented by the main group [F15B 2201/00](#) and is used for classifying invention information only.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Accumulator	vessel for storing pressurised liquid (e.g. using a liquid and a gas chamber separated by a membrane or piston or using an elastic housing)
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F15B 1/02

Installations or systems with accumulators ([N: energy recuperation means F15B21/14]; devices damping pulsations or vibrations for fluids for use in, or connection with, pipes or pipe systems F16L55/04)

Informative references

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

Energy recuperation means	F15B 21/14
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Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Accumulator	vessel for storing pressurised liquid (e.g. using a liquid and a gas chamber separated by a membrane or piston or using an elastic housing)
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F15B 1/021

[N: used for damping]

Informative references

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

Pumps having accumulators for reducing pressure pulsations	F04B 11/0008
Hydro-pneumatic suspensions	F16F 9/08
Buffers for preventing water hammer	F16L 55/05

F15B 1/022

[N: used as an emergency power source, e.g. in case of pump failure]

Informative references

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

See also	F15B 2211/212
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Special rules of classification within this group

[F15B 2211/212](#) takes precedence

F15B 1/024

[N: used as a supplementary power source, e.g. to store energy in idle periods to balance pump load]

Definition statement

This subclass/group covers:

Also for recuperation of hydraulic energy (as e.g. used in hydraulic excavators)

Informative references

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

Dredgers or soil-shifting machinery with energy recovery arrangements	E02F 9/2217
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F15B 1/025

[N: used for thermal compensation, e.g. to collect expanded fluid and to return it to the system as the system fluid cools down]

Informative references

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

Central heating systems	F24D 3/1008
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F15B 1/027

having accumulator charging devices (control of fluid pressure in general G05D16/00)

Definition statement

This subclass/group covers:

E.g. valves controlling flow of hydraulic fluid to and from the liquid chamber of an accumulator.

Informative references

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

Accumulator gas charging devices	F15B 1/08 , F15B 2201/415
Control of fluid pressure in general	G05D 16/00

F15B 1/04

Accumulators (connection of valves to inflatable elastic bodies B60C29/00)

Definition statement

This subclass/group covers:

Vessel for storing pressurised liquid (e.g. using a liquid and a gas chamber separated by a membrane or piston or using an elastic housing).

References relevant to classification in this group

This subclass/group does not cover:

Pressure vessels per se	F17C 1/00
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Informative references

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

Pumps having accumulators for reducing pressure pulsations	F04B 11/0008
Hydro-pneumatic suspensions	F16F 9/08
Buffers for preventing water hammer	F16L 55/05
Central heating systems	F24D 3/1008
See also	F15B 2201/00

Special rules of classification within this group

The sub-group [F15B 1/04](#) is complemented by the main group [F15B 2201/00](#) and is used for classifying invention information only. [F15B 2201/00](#) takes precedence.

Synonyms and Keywords

In patent documents the following expressions/words "pressure accumulator", "Druckspeicher", "Hydrospeicher" and "Accumulateur" are often used as synonyms.

In patent documents the following expressions/words "bladder-type accumulator" and "Blasenspeicher" are often used as synonyms.

In patent documents the following expressions/words "membrane-type accumulator" and "Membranspeicher" are often used as synonyms.

In patent documents the following expressions/words "accumulator using pistons" and "Kolbenspeicher" are often used as synonyms.

In patent documents the following expressions/words "accumulators having springs" and "Federspeicher" are often used as synonyms.

F15B 1/08

using a gas cushion; Gas charging devices; Indicators or

floats therefor

Informative references

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

See also	F15B 2201/205
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Special rules of classification within this group

[F15B 2201/205](#) takes precedence.

F15B 1/083

[N: the accumulator having a fusible plug]

Definition statement

This subclass/group covers:

Accumulators with a safety plugs that melt at a certain temperature for relieving the pressure.

F15B 1/086

[N: the gas cushion being entirely enclosed by the separating means, e.g. foam or gas-filled balls]

References relevant to classification in this group

This subclass/group does not cover:

Accumulators using bladders	F15B 1/165
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Informative references

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

See also	F15B 2201/3154
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Special rules of classification within this group

[F15B 2201/3154](#) takes precedence.

F15B 1/10

with flexible separating means

Informative references

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

Accumulators with flexible separating means but without gas cushion	F15B 1/04
See also	F15B 2201/315

Special rules of classification within this group

[F15B 2201/315](#) takes precedence.

Accumulators not using a gas cushion are classified in [F15B 1/04](#) even if they have flexible separating means (e.g. a membrane).

F15B 1/103

[N: the separating means being bellows]

Definition statement

This subclass/group covers:

Illustrative example of subject matter classified in this group.

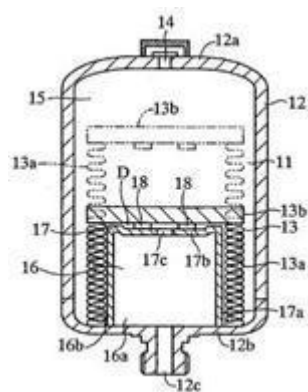


Fig. from US2004244857

Informative references

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

See also	F15B 2201/3153
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Special rules of classification within this group

[F15B 2201/3153](#) takes precedence.

Synonyms and Keywords

In patent documents the following expressions/words "bellows", "Faltenbalg" and "soufflet" are often used as synonyms.

F15B 1/106

[N: characterised by the way housing components are assembled]

Informative references

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

See also	F15B 2201/605
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Special rules of classification within this group

[F15B 2201/605](#) takes precedence.

F15B 1/125

[N: characterised by the attachment means (F15B1/14 takes precedence)]

Special rules of classification within this group

[F15B 1/14](#) takes precedence.

F15B 1/165

[N: in the form of a bladder]

Definition statement

This subclass/group covers:

Accumulators using bladders, i.e. essentially cylindrical flexible separating means having a first open end portion which is normally rounded and a second end portion with a fluid inlet for separating a hydraulic fluid and a gas.

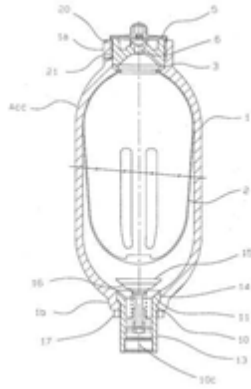


Fig. from US2006042707

Informative references

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

See also	F15B 2201/3152
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Special rules of classification within this group

[F15B 2201/3152](#) takes precedence.

Synonyms and Keywords

In patent documents the following expressions/words "bladder", "Blase" and "vessie" are often used as synonyms.

In patent documents the following expressions/words " bladder-type accumulator", "Blasenspeicher" and "accumulateur à vessie" are often used as synonyms.

F15B 1/18

Anti-extrusion means

Informative references

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

See also	F15B 2201/43
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Special rules of classification within this group

[F15B 2201/43](#) takes precedence.

F15B 1/20

fixed to the separating means

Informative references

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

See also	F15B 2201/435
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Special rules of classification within this group

[F15B 2201/435](#) takes precedence.

F15B 1/22

Liquid port constructions

Informative references

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

See also	F15B 2201/41
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Special rules of classification within this group

[F15B 2201/41](#) takes precedence.

F15B 1/24

with rigid separating means, e.g. pistons

Informative references

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

See also	F15B 2201/31
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Special rules of classification within this group

[F15B 2201/31](#) takes precedence.

Accumulators using springs and no gas cushion are classified in [F15B 1/04](#) even if they have rigid separating means (e.g. a piston).

F15B 1/26

Supply reservoir or sump assemblies

Informative references

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

Reservoirs for vehicle braking systems	B60T 17/06
Fluid supply systems for power Power-steering systems with reservoirs	B62D 5/07
Pumps having reservoirs	F04B 41/04

F15B 3/00

Intensifiers or fluid-pressure converters, e.g. pressure exchangers; Conveying pressure from one fluid system to another, without contact between the fluids [N: (fluid-driven pumps F04B9/08)]

Definition statement

This subclass/group covers:

Devices for converting fluid energy, i.e. from a flow of fluid having high pressure and low flow rate to a flow of fluid having low pressure and high flow rate or vice versa.

E.g. devices using pistons of different size or rotating fluid pumps and motors of different capacity.

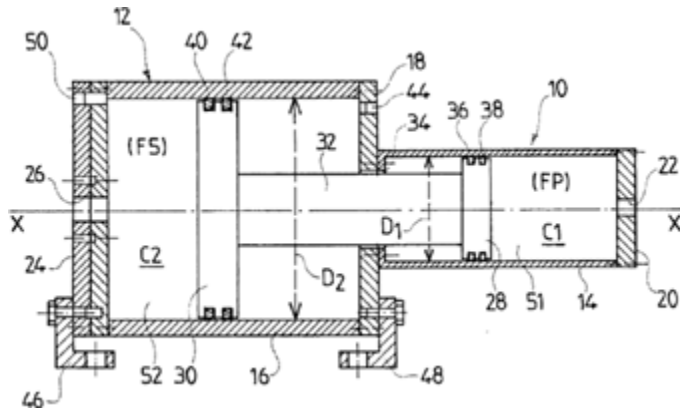


Fig. from FR2822906

References relevant to classification in this group

This subclass/group does not cover:

Fluid-driven pumps	F04B 9/08
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Informative references

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

Pressure intensifiers in processes of separation using semi-permeable membranes, e.g. dialysis, osmosis	B01D 61/00
Fluid-driven pumps	F04B 9/08

F15B 5/00

Transducers converting variations of physical quantities, e.g. expressed by variations in positions of members, into fluid-pressure variations or vice-versa; Varying fluid pressure as a function of variations of a plurality of fluid pressures or variations of other quantities (F15B9/00 takes precedence; for measuring or controlling G01, G05)

References relevant to classification in this group

This subclass/group does not cover:

Fluid pressure actuators	F15B 15/00
Pressure sensors	G01L 9/00

Informative references

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

Transducers for measuring or controlling	G01 , G05
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Special rules of classification within this group

[F15B 9/00](#) takes precedence.

F15B 7/00

Systems in which the movement produced is definitely related to the output of a volumetric pump; Telemotors [N: (for control in motor vehicles B60K; in ships B63H25/00; in aircraft B64C13/00; combinations of telemotor and servomotor systems F15B17/00)]

Definition statement

This subclass/group covers:

E.g. systems wherein a master cylinder is directly connected to a slave cylinder. Illustrative example:

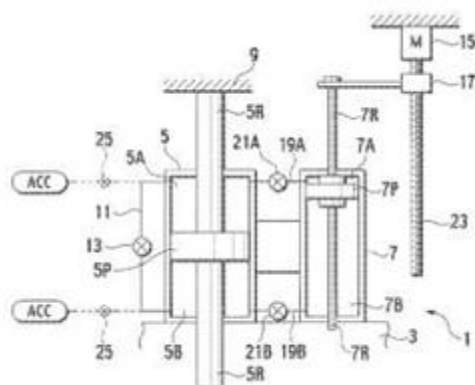


Fig. from WO2006129746

Informative references

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

For control in motor vehicles	B60K
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Vehicle brakes	B60T 1/08 , B60T 1/093
For control in ships	B63H 25/00
For control in aircraft	B64C 13/00
Combinations of telemotor and servomotor systems	F15B 17/00
Hydraulic clutch actuation	F16D 25/00
Hydraulic gear shifting devices	F16H 61/30

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Telemotor	system or device in which a substantially constant amount of fluid is trapped between an input member and an output member to act as a fluid link, e.g. realised as a master cylinder which is directly connected to a slave cylinder.
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F15B 7/001

[N: with multiple inputs (input units F15B7/08, e.g. for dual control)]

Informative references

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

Input units (e.g. master cylinders)	F15B 7/08
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F15B 7/005

[N: with rotary or crank input (input units F15B7/08)]

Informative references

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

Input units	F15B 7/08
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F15B 7/04

in which the ratio between pump stroke and motor stroke varies with the resistance against the motor (in brake-actuating systems for motor vehicles B60T)

Informative references

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

In brake actuating systems for motor vehicles	B60T
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F15B 7/06

Details (F15B15/00 takes precedence)

Special rules of classification within this group

[F15B 15/00](#) takes precedence for slave cylinders.

F15B 7/08

Input units; Master units

Informative references

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

Vehicle brake master cylinders	B60T 11/16
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F15B 7/10

Compensation of the liquid content in a system (F15B7/08 takes precedence; pressure-maintaining arrangements for brake master cylinders B60T11/228)

Informative references

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

Pressure-maintaining arrangements for brake master cylinders	B60T 11/228
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Special rules of classification within this group

[F15B 7/08](#) takes precedence.

F15B 9/00

Servomotors with follow-up action, [e.g. obtained by feed-back control], i.e. in which the position of the actuated member conforms with that of the controlling member [N: (F15B11/10 takes precedence)]

Definition statement

This subclass/group covers:

Fluid power drives using position feed-back

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Servomotor	fluid-pressure acuator, e.g. a piston and a cylinder, directly controlled by a valve or other device (e.g. pump) which is responsive to operation of an initial controlling member (e.g. joystick). The initial controlling member may be adjacent to the servomotor or at a distance and may be, e.g. a hand lever.
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F15B 9/10

in which the controlling element and the servomotor each controls a separate member, these members influencing different fluid passages or the same passage

Definition statement

This subclass/group covers:

Illustrative example of subject matter classified in this group.

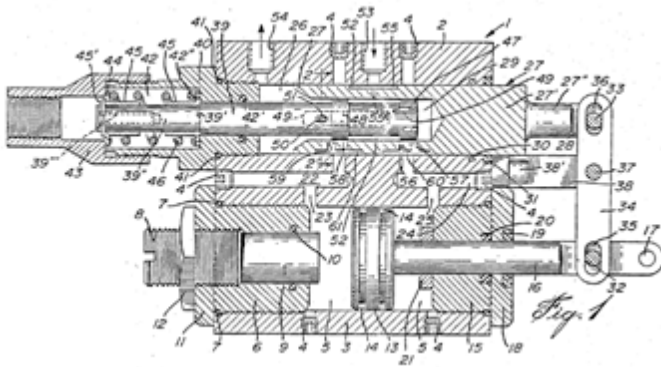


Fig. from US4733601

F15B 9/12

in which both the controlling element and the servomotor control the same member influencing a fluid passage and are connected to that member by means of a differential gearing

Definition statement

This subclass/group covers:

This class is also used for systems with a differential gear ratio of 1:1.

Illustrative example:

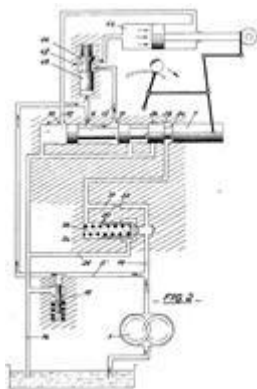


Fig. from FR74115

F15B 9/16

Systems essentially having two or more interacting servomotors, [N: e.g. multi-stage (F15B18/00, F15B20/00 take precedence; servo-operated pilot valves for the following

stage F15B13/042)]

Definition statement

This subclass/group covers:

E.g. multi-stage systems

Informative references

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

Servo-operated pilot valves for the following stage	F15B 13/042
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F15B 11/00

**Servomotor systems without provision for follow-up action;
[N: Circuits therefor] (F15B3/00 takes precedence)**

Definition statement

This subclass/group covers:

Servomotor systems without provision for follow-up action and circuits therefor

Special rules of classification within this group

The main group [F15B 11/00](#) is implemented by the main group [F15B 2211/00](#) and is used for classifying invention information only. [F15B 2211/00](#) takes precedence.

Glossary of terms

In this subclass/group, the following terms (or expressions) are used with the meaning indicated:

Servomotor	fluid-pressure acuator, e.g. a piston and a cylinder, directly controlled by a valve or other device (e.g. pump) which is responsive to operation of an initial controlling member (e.g. joystick). The initial controlling member may be adjacent to the servomotor or at a distance and may be, e.g. a hand lever.
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F15B 11/003

[N: Systems with load-holding valves (locking valve details F15B13/01)]

Definition statement

This subclass/group covers:

This class comprises releasable check valves and proportional braking valves.

Informative references

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

Locking valve details	F15B 13/01
See also	F15B 2211/30515

Special rules of classification within this group

[F15B 2211/30515](#) takes precedence.

Synonyms and Keywords

In patent documents the following expressions/words "load holding valve" and "Lasthalteventil" are often used as synonyms.

In patent documents the following expressions/words "releasable check valve" and "Entsperrbares Rückschlagventil " are often used as synonyms.

F15B 11/022

[N: in which a rapid approach stroke is followed by a slower, high-force working stroke (F15B11/0325 takes precedence)]

Informative references

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

See also	F15B 2211/775
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F15B 11/024

by means of differential connection of the servomotor lines,

e.g. regenerative circuits [N: (interconnecting valve details F15B13/021)]

References relevant to classification in this group

This subclass/group does not cover:

Regeneration valves per se	F15B 13/021
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Informative references

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

Systems with directional control valves having a regenerative position	F15B 2211/3133
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F15B 11/028

for controlling the actuating force (F15B11/024 takes precedence)

Informative references

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

See also	F15B 2211/76
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Special rules of classification within this group

[F15B 11/024](#), [F15B 2211/76](#) take precedence.

F15B 11/032

by means of fluid-pressure converters (fluid-pressure converters per se F15B3/00)

Informative references

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

Fluid pressure converters	F15B 3/00
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F15B 11/036

by means of servomotors having a plurality of working chambers (servomotors per se F15B15/00)

Informative references

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

Servomotors (fluid pressure actuators)	F15B 15/00
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F15B 11/0406

[N: during starting or stopping (F15B11/048 takes precedence)]

Informative references

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

See also	F15B 2211/755 , F15B 2211/851 , F15B 2211/853
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Special rules of classification within this group

[F15B 11/048](#), [F15B 2211/00](#) take precedence.

F15B 11/042

by regulating means in feed line, [N: i.e. "meter in"] (F15B11/046, F15B11/05 take precedence)

Informative references

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

See also	F15B 2211/351
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Special rules of classification within this group

[F15B 11/05](#), [F15B 2211/351](#) take precedence.

F15B 11/0423

[N: by controlling pump output or bypass, other than to maintain constant speed (adjusting pump output or bypass to maintain constant speed F15B11/055)]

Informative references

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

Adjusting pump output or bypass to maintain constant speed	F15B 11/055
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F15B 11/0426

[N: by controlling the number of pumps or parallel valves switched on]

Definition statement

This subclass/group covers:

E.g. systems controlling the speed by means of so-called digital valves or by means of systems using pulse code modulation (PCM)

Informative references

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

Circuits with digital valves	F15B 2211/40592
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F15B 11/044

by regulating means in return line, [N: i.e. "meter out"]
(F15B11/046, F15B11/05 take precedence)

Informative references

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

See also	F15B 2211/353
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Special rules of classification within this group

[F15B 11/05](#), [F15B 2211/353](#) take precedence.

F15B 11/0445

[N: with counterbalance valves, e.g. to prevent overrunning or for braking]

Informative references

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

Counterbalance valves	F15B 13/029
Pressure control using counterbalance valves	F15B 2211/50581

Special rules of classification within this group

[F15B 2211/50581](#) takes precedence

F15B 11/05

specially adapted to maintain constant speed, e.g. pressure-compensated, load-responsive [N: (F15B11/161 takes precedence); counterbalance valves F15B11/0445; valves for load sensing F15B13/0416]

Informative references

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

Valves for load sensing	F15B 13/0416
Directional control valves in combination with pressure compensating valves	F15B 2211/3053
Flow control using pressure compensating valves	F15B 2211/40553

Synonyms and Keywords

In patent documents the following abbreviations are often used:

LS	Load sensing
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In patent documents the following expressions/words "pressure-compensated", "Lastdruckunabhängig" and "LUDV" are often used as synonyms.

In patent documents the following expressions/words "pressure compensator", "pressure compensating valve" and "Druckwaage" are often used as synonyms.

F15B 11/055

[N: by adjusting the pump output or bypass (pump control F04B49/00)]

Informative references

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

Pump control	F04B 49/002
Pressure margin control in load sensing systems	F15B 2211/253

Special rules of classification within this group

[F15B 11/165](#) takes precedence.

F15B 11/06

involving features specific to the use of a compressible medium, e.g. air, steam

Informative references

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

Control specific to compressible fluids	F15B 2211/8855
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F15B 11/12

providing distinct intermediate positions; with step-by-step action [N: with a number of pistons in a single cylinder

step-by-step action obtained by combining two or more servomotors F15B11/18; (for restricting the stroke F15B15/24)]

Informative references

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

Step-by-step action obtained by combining two or more servomotors (actuators)	F15B 11/18
Restricting the stroke of servomotors (actuators)	F15B 15/24

F15B 11/15

with special provision for automatic return [N: (fluid gearing with oscillating input or output F16H43/00)]

Informative references

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

Fluid gearing with oscillating input or output	F16H 43/00
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F15B 11/16

with two or more servomotors [N: (for soil-shifting machines E02F9/22)]

Informative references

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

For soil-shifting machines	E02F 9/22
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Synonyms and Keywords

In patent documents the following abbreviations are often used:

LS	Load sensing
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In patent documents the following expressions/words "pressure-compensated", "Lastdruckunabhängig" and "LUDV" are often used as synonyms.

In patent documents the following expressions/words "pressure compensator", "pressure compensating valve" and "Druckwaage" are often used as synonyms.

F15B 11/162

[N: for giving priority to particular servomotors or users (priority valve details F15B13/022; for power steering B62D5/07)]

Informative references

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

One or more output members having priority	F15B 2211/781
Flow control using flow dividers	F15B 2211/40523
Priority valve details	F15B 13/022
For power steering	B62D 5/07

F15B 11/163

[N: for sharing the pump output equally amongst users or groups of users, e.g. using anti-saturation, pressure compensation]

Informative references

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

Valves for load sensing	F15B 13/0416
Directional control valves in combination with pressure compensating valves	F15B 2211/3053
Flow control using pressure compensating valves	F15B 2211/40553

F15B 11/165

[N: for adjusting the pump output or bypass in response to demand]

Informative references

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

Pump control	F04B 49/002
Maintaining constant speed by controlling pump output or bypass	F15B 11/055
Pressure margin control in load sensing systems	F15B 2211/253

F15B 11/168

[N: with an isolator valve (duplicating valve), i.e. at least one load sense (LS) pressure is derived from a work port load sense pressure but is not a work port pressure itself]

Informative references

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

Load-sensing circuits with isolator valves	F15B 2211/6058
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Special rules of classification within this group

[F15B 2211/6058](#) takes precedence.

F15B 11/17

using two or more pumps

Informative references

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

Servomotor systems with multiple pumps	F15B 2211/20576
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F15B 11/20

controlling several interacting or sequentially-operating members (fluid distribution or supply devices for the control of two or more servomotors F15B13/06)

Informative references

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

Fluid distribution or supply devices for the control of two or more servomotors	F15B 13/06
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F15B 11/205

[N: the position of the actuator controlling the fluid flow to the subsequent actuator (telescopic booms B66C23/70)]

Informative references

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

Telescopic booms	B66C 23/70
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F15B 11/22

Synchronisation of the movement of two or more servomotors

Informative references

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

Synchronisation of cylinders in fluid-driven presses	B30B 15/24
See also	F15B 2211/782

F15B 13/00

Details of servomotor systems ([N: F15B1/04, F15B1/06, F15B3/00, F15B7/08, F15B11/02, F15B11/10, F15B15/00 take precedence; Valves for servomotor systems])

Definition statement

This subclass/group covers:

Components of hydraulic or pneumatic circuits such as valves and flow dividers.

Special rules of classification within this group

[F15B 1/04](#), [F15B 1/06](#), [F15B 3/00](#), [F15B 5/00](#), [F15B 7/08](#), [F15B 11/02](#), [F15B 11/10](#), [F15B 15/00](#), [F15B 2201/00](#) take precedence

F15B 13/01

Locking-valves or other detent, [N: i.e. load-holding], devices (associated with the actuator F15B15/26; [N: systems with load-holding valves F15B11/003])

Informative references

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

Systems with load holding valves	F15B 11/003 , F15B 2211/30515
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Synonyms and Keywords

In patent documents the following expressions/words "over-centre valve", "Lasthalteventil", "Senkbremsventil" and "locking-valve" are often used as synonyms.

F15B 13/02

Fluid distribution or supply devices characterised by their adaptation to the control of servomotors ([N: F15B11/15 takes precedence]; multiple-way valves F16K11/00)

Informative references

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

Multiple-way valves	F16K 11/00
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Special rules of classification within this group

Subgroups [F15B 13/022](#) - [F15B 13/029](#) are not complete

F15B 13/021

[N: Valves for interconnecting the fluid chambers of an actuator (regenerative circuits F15B11/024)]

Informative references

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

Regenerative circuits	F15B 11/024
Systems with directional control valves having a separate valve for interconnecting the fluid chambers of an actuator	F15B 2211/3058
Systems with directional control valves having a regenerative position	F15B 2211/3133

Synonyms and Keywords

In patent documents the following expressions/words "valves for interconnecting the fluid chambers of an actuator" and "Regeneration valves" are often used as synonyms.

F15B 13/022

[N: Flow-dividers; Priority valves (circuits for giving priority to particular servomotors F15B11/162; priority valves for power steering B62D5/07)]

Informative references

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

Priority valves for power steering	B62D 5/07
Circuits for giving priority to a particular servomotor	F15B 11/162
Flow control using flow dividers	F15B 2211/40523

F15B 13/023

[N: Excess flow valves, e.g. for locking cylinders in case of hose burst]

Synonyms and Keywords

In patent documents the following expressions/words "excess flow valves", "Rohrbruchsicherung" and "clapet parachute" are often used as synonyms.

F15B 13/027

[N: Check valves]

Informative references

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

Load holding valves	F15B 13/01
Locking valves	F15B 13/01

F15B 13/029

[N: Counterbalance valves]

Informative references

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

Servomotor systems with counterbalance valves	F15B 11/0445
Pressure control using counterbalance valves	F15B 2211/50581

F15B 13/0402

[N: for linearly sliding valves, e.g. spool valves]

Definition statement

This subclass/group covers:

Illustrative example of subject matter classified in this group.

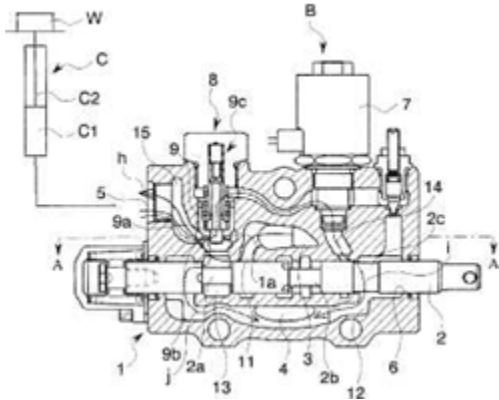


Fig. from WO2008015752

F15B 13/0416

[N: with means or adapted for load sensing (fluid systems with load sensing F15B11/05, F15B11/161)]

Informative references

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

Systems with load sensing	F15B 11/05 , F15B 11/161 , F15B 2211/3053
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F15B 13/0422

[N: with manually-operated pilot valves, e.g. joysticks (arrangements of handles or pedals for cranes B66C13/54; control levers for dredgers and soil shifting machines E02F9/2004; similar mechanical control actuators G05G9/049)]

Informative references

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

Arrangements of handles or pedals for cranes	B66C 13/54
Control levers for dredgers and soil shifting machines	E02F 9/2004
Similar mechanical control actuators	G05G 9/049

F15B 13/043

**with electrically-controlled pilot valves [N:
electrically-operated main valves F15B13/044]**

Informative references

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

Electrically operated main valves	F15B 13/044
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F15B 13/044

**operated by electrically-controlled means, e.g. solenoids,
torque-motors [N: (electrically-controlled pilot valves
F15B13/043)]**

Informative references

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

Electrically controlled pilot valves	F15B 13/043
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F15B 13/0832

[N: Modular valves]

Informative references

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

Modular valves in general	F16K 27/003
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F15B 13/0867

[N: Data bus systems]

Informative references

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

Servomotor systems using data bus,	F15B 21/085
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e.g. CAN bus	
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F15B 13/16

Special measures for feedback, [N: e.g. by a follow-up device (servomotors with follow-up action F15B9/00; devices with means or adapted for load sensing F15B13/0416)]

Informative references

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

Servomotors with follow-up action	F15B 9/00
Devices with means or adapted for load sensing	F15B 13/0416

F15B 15/00

Fluid-actuated devices for displacing a member from one position to another (motors for continuous movement F01 to F03); Gearing associated therewith

Definition statement

This subclass/group covers:

Hydraulic or pneumatic actuators with linear or non-continuous rotary output.

References relevant to classification in this group

This subclass/group does not cover:

Motors with continuous rotary movement	F01 , F03
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F15B 15/06

for mechanically converting rectilinear movement into non-rectilinear movement

Informative references

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

Fluid-driven safety belt tensioners	B60R 22/4628
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F15B 15/063

[N: Actuator having both linear and rotary output, i.e. dual action actuator]

Informative references

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

Corresponding FI class	F15B 15/06&E
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F15B 15/08

characterised by the construction of the motor unit (pistons, cylinders, packing F16J)

Informative references

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

Pistons, cylinders, packings	F16J
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F15B 15/082

[N: the motor being of the slotted cylinder type (locking mechanisms therefor F15B15/265)]

Informative references

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

Locking mechanisms therefor	F15B 15/265
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F15B 15/084

[N: the motor being of the rodless piston type, e.g. with cable, belt or chain (locking mechanisms therefor F15B15/265)]

Informative references

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

Locking mechanisms therefor	F15B 15/265
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F15B 15/10

the motor being of diaphragm type (connection of valves to inflatable elastic bodies B60C29/00; diaphragms, bellows F16J3/00; [N: clutches with a fluid-actuated elastic clutching member F16D25/04])

References relevant to classification in this group

This subclass/group does not cover:

Inflatable flexible elements for lifting goods	B66F 3/35
Bellows pistons	F16J 3/06

Informative references

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

Corresponding FTerms	3H081/AA14-3H081/AA18
Hoisting using inflatable flexible elements	B66F 3/35
Pneumatic actuators for EGR valves	F02M 25/0778
Clutches with fluid-actuated elastic clutching member	F16D 25/04
Bellows	F16 J3/06

F15B 15/103

[N: using inflatable bodies that contract when fluid pressure is applied, e.g. pneumatic artificial muscles or McKibben-type actuators]

Definition statement

This subclass/group covers:

Illustrative example of subject matter classified in this group.

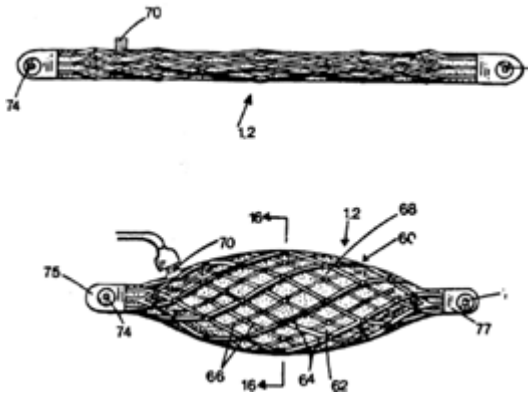


Fig. from US4819547

Informative references

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

Corresponding FI class	F15B 15/10&H
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Synonyms and Keywords

In patent documents the following expressions/words "fluidic muscle-type actuator", "McKibben-type actuator" and "Fluidischer Muskel" are often used as synonyms.

F15B 15/12

of the oscillating-vane or curved-cylinder type

References relevant to classification in this group

This subclass/group does not cover:

Rotary motors with continuous output movement	F01C 9/002 , F03C 4/00 , F04C 9/002
Sealings for vane motors	F15J 15/54B

F15B 15/125

[N: of the curved-cylinder type]

Definition statement

This subclass/group covers:

Illustrative example of subject matter classified in this group.

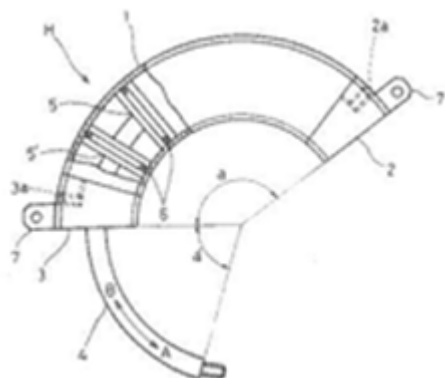


Fig. from JP58163805

F15B 15/1404

[N: in clusters, e.g. multiple cylinders in one block (servomotors having a plurality of working chambers F15B11/036; motors with two or more independently movable working pistons F15B15/1409)]

Informative references

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

Systems with servomotors having a plurality of working chambers	F15B 11/036
Motors with two or more independently movable working pistons	F15B 15/1409

F15B 15/1409

[N: with two or more independently movable working pistons (systems F15B11/12, F15B11/18)]

Informative references

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

Servomotor systems with step-by-step action	F15B 11/12
Servomotor systems with stepwise operation	F15B 11/18

F15B 15/1447

[N: Pistons; Piston to piston rod assemblies]

References relevant to classification in this group

This subclass/group does not cover:

Pistons per se	F16J 1/00
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F15B 15/18

Combined units comprising both motor and pump [N: (telemotors F15B7/00)]

Informative references

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

Telemotors	F15B 7/00
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F15B 15/26

Locking mechanisms [N: (locking valves not combined with the actuator F15B13/01)]

Informative references

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

Locking valves not combined with the actuator	F15B 13/01
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F15B 15/261

[N: using positive interengagement, e.g. balls and grooves, for locking in the end positions]

Definition statement

This subclass/group covers:

Locking mechanisms using positive interengagement for locking in any distinct position (not restricted to locking in the end positions).

F15B 15/264

[N: Screw mechanisms attached to the piston]

Definition statement

This subclass/group covers:

This subgroup contains documents relating to locking mechanisms using screw mechanisms attached to the piston but not using friction.

F15B 15/2869

[N: using electromagnetic radiation, e.g. radar or microwaves]

Special rules of classification within this group

[F15B 15/2846](#) takes precedence.

F15B 17/00

Combinations of telemotor and servomotor systems

Informative references

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

Telemotors	F15B 7/00
Servomotors with follow-up	F15B 9/00
Servomotors without follow-up	F15B 11/00

F15B 18/00

Parallel arrangements of independent servomotor systems

Definition statement

This subclass/group covers:
E.g. redundant systems.

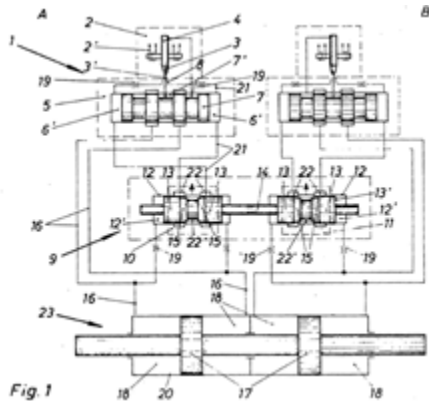


Fig. from DE1940946A1

F15B 19/00

Testing; [N: Calibrating; Fault detection or monitoring; Simulation or modelling of] fluid-pressure systems or apparatus not otherwise provided for

Informative references

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

Testing of fluid pressure systems	F15B 2211/855
Monitoring of fluid pressure systems	F15B 2211/857

F15B 20/00

Safety arrangements; Applications of safety devices (safety devices in general F16P) [N: F16P3/22]; Emergency measures

Informative references

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

Safety devices in general	F16P
Safety devices for pneumatic or hydraulic control systems	F16P 3/22
Control during or prevention of an electric or electronic failure	F15B 2211/862

Control during or prevention of an hydraulic or pneumatic failure	F15B 2211/863
Control during or prevention of a human failure	F15B 2211/8643
Prevention of failures	F15B 2211/865
Detection of failures	F15B 2211/87
Control measures for coping with failures	F15B 2211/875

F15B 20/002

[N: Electrical failure]

Informative references

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

Control during or prevention of electric or electronic failures	F15B 2211/862
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F15B 20/004

[N: Fluid pressure supply failure]

Informative references

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

Fluid supply failure	F15B 2211/8633
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F15B 20/005

[N: Leakage; Spillage; Hose burst]

Informative references

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

Valve or hose failure	F15B 2211/8636
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F15B 20/008

[N: Valve failure (F15B18/00 takes precedence)]

Informative references

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

Valve or hose failure:	F15B 2211/8636
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F15B 21/00

Common features; Fluid-pressure systems, or details thereof, not covered by any preceding group

F15B 21/02

Servomotor systems with programme control derived from a store or timing device; Control devices therefor ([N: programme control in washing-machines D06F33/04]; programme control in general G05B19/00)

Informative references

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

Servomotor systems with electrically operated control means	F15B 21/08
Programme control in general	G05B 19/00

F15B 21/044

[N: Deaeration, venting, bleeding; Removal or measurement of undissolved gas (preventing cavitation F15B21/047)]

Informative references

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

Preventing cavitation	F15B 21/047
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Synonyms and Keywords

In patent documents the following expressions/words "deaeration" and "Entlüftung" are often used as synonyms.

F15B 21/045

[N: Viscosity or temperature compensation (warming up fluid systems F15B21/042)]

Informative references

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

Warming up fluid systems	F15B 21/042
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F15B 21/047

[N: Preventing foaming, churning or cavitation (supply reservoir or sump assemblies F15B1/26)]

Informative references

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

Supply reservoir or sump assemblies	F15B 1/26
Control during or prevention of cavitation	F15B 2211/8609

F15B 21/04H

[N: Compensation or avoidance of ambient pressure variation (systems with a pressurised main reservoir F15B1/265)]

Informative references

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

Systems with a pressurised main reservoir	F15B 1/265
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F15B 21/04J

[N: Noise or vibration reduction]

Informative references

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

For pumps	F04B 39/0027
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F15B 21/048

[N: Compressed air preparation units, e.g. comprising air driers or condensers, filters, oilers or lubricators, pressure regulators (for steam traps F16T; for mist lubrication F16N7/32; for air conditioning F24F)]

Informative references

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

For mist lubrication	F16N 7/32
For steam traps	F16T
For airconditioning	F24F

F15B 21/06

Use of special fluids, e.g. liquid metal; Special adaptations of fluid-pressure systems, or control of elements therefor, to the use of such fluids

References relevant to classification in this group

This subclass/group does not cover:

Actuators having special fluid pressurization means	F15B 2015/208
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F15B 21/065

[N: Use of electro- or magnetosensitive fluids, e.g.

electrorheological fluid]

Informative references

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

Control specific to the type of fluid, e.g. specific to magnetorheological fluid	F15B 2211/885
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F15B 21/085

[N: using a data bus, e.g. "CANBUS"]

Informative references

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

Modular units using data bus	F15B 13/0867
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Special rules of classification within this group

[F15B 13/0867](#) takes precedence.

F15B 21/10

Delay devices or arrangements ([N: hydraulic braking F15B11/076]; associated with fluid motors or actuators F15B15/22)

Informative references

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

Hydraulic braking	F15B 11/076
Delay devices associated with fluid motors or actuators	F15B 15/22

F15B 21/12

Fluid oscillators or pulse generators (fluid oscillators predominantly used for computing or control purposes)

F15C1/22, F15C3/16)

Informative references

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

Fluid oscillators used for computing or control purposes	F15C 1/22 , F15C 3/16
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F15B 21/14

Energy recuperation means (for vehicles B60T1/10); [N: Means for reducing energy consumption (regenerative circuits F15B11/024)]

Informative references

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

For vehicles	B60T 1/10
Regenerative circuits	F15B 11/024
Systems for storing electric energy in the form of pneumatic energy	H02J 15/006
Control measure for saving energy	F15B 2211/88