[CLAIMS]

[Claim 1]

An electro-hydraulic actuator, comprising:

a motor configured to output rotative power;

an external gear pump configured to be activated by the motor;

a hydraulic actuator configured to be operated by a pressurized working fluid supplied by the external gear pump;

a manifold block in which a flow channel forming one portion of a working fluid circuit of the hydraulic actuator is incorporated;

a first portion configured to store the motor;

a second portion configured to store the external gear pump, the hydraulic actuator, and a reservoir; and

a coupling portion separable from the manifold block, configured to couple the first portion and the second portion with each other in a liquid-tight state, wherein

the coupling portion includes a communication hole through which the first portion and the second portion communicate with each other and the flow channel forming another portion of the working fluid circuit is formed,

a rotational shaft of the motor and a driving shaft of the external gear pump are joined to each other in the communication hole,

a solenoid valve configured to open and close the flow channel formed in the coupling portion, wherein the solenoid valve is arranged outside the reservoir, and

the external gear pump is attached to the coupling portion while being stored in the manifold block, the manifold being immersed in the working fluid.

[Claim 2]

The electro-hydraulic actuator according to claim 1,

wherein

in the coupling portion, a bearing of the rotational shaft of the motor is arranged in the communication hole, and

in the flow channel formed in the coupling portion, one end is coupled to an ejection port of the working fluid in the external gear pump, and another end is coupled to an inlet of the working fluid in the manifold block.

[Claim 3]

The electro-hydraulic actuator according to claim 1, wherein

the reservoir is a sealed space occupying an inner region of the second portion, and

a housing of the manifold block, the external gear pump, and the hydraulic actuator is stored in the reservoir.

[Claim 4]

The electro-hydraulic actuator according to any one of claims 1 to 3, wherein

the flow channel includes a pressurization flow channel configured to guide the working fluid into the hydraulic actuator and a depressurization flow channel configured to guide the working fluid in the hydraulic actuator to the reservoir,

the depressurization flow channel is diverged into a plurality of flow channels while a valve mechanism is arranged in each of the diverged flow channels, and

the valve mechanism in an open state returns the working fluid to the reservoir.

[Claim 5]

The electro-hydraulic actuator according to any one of claims 1 to 3, wherein

the flow channel includes a pressurization flow channel configured to guide the working fluid into the hydraulic

actuator and a depressurization flow channel configured to guide the working fluid in the hydraulic actuator to the reservoir,

a valve mechanism and a throttle mechanism are arranged in the middle of the depressurization flow channel,

the valve mechanism in an open state returns the working fluid to the reservoir, and

the throttle mechanism reduces a flow velocity of the working fluid from the hydraulic actuator toward the reservoir.

[Claim 6]

The electro-hydraulic actuator according to claim 5, wherein

the throttle mechanism includes an orifice.

[Claim 7]

The electro-hydraulic actuator according to claim 5 or 6, wherein

the depressurization flow channel is diverged into a plurality of flow channels while the valve mechanism is arranged in each of the diverged flow channels.

[Claim 8]

The electro-hydraulic actuator according to any one of claims 1 to 7, wherein

the hydraulic actuator is an oil hydraulic cylinder, and

a tip of a piston rod of the oil hydraulic cylinder projects from a chassis of the second portion.

[Claim 9]

The electro-hydraulic actuator according to claim 8, further comprising:

a spring mechanism configured to constantly bias the piston rod in a bottom dead center direction, wherein

the spring mechanism assists an operation by the working

fluid circuit to return the working fluid in a housing of the oil hydraulic cylinder to the reservoir.

[Claim 10]

A disc brake device including the electro-hydraulic actuator according to claim 8 or 9, comprising:

a braking mechanism configured to press and separate a brake lining against and from two surfaces of a brake disc in a circular plate form, wherein

the braking mechanism releases a braking state for the brake disc in conjunction with a rising movement of the piston rod of the oil hydraulic cylinder and sets the brake disc to the braking state while the piston rod is in a falling state.