

CLAIMS

1. A system comprising:

a hydraulic control system configured to control actuation of a valve selectively in a stepwise manner and a continuous manner, wherein the hydraulic control system comprises~~ing~~:

a first valve configured to deliver a fluid through a first fluid path to actuate ~~a device~~the valve;

a first piston disposed in a cylinder and configured to deliver a discrete quantity of the fluid to the first valve through a second fluid path;

a second valve configured to provide the fluid to the first piston through a third fluid path; and

a third valve configured to provide a continuous quantity of the fluid through the second fluid path to the first valve.

2. The system of claim 1, wherein the valve is configured to control a hydrocarbon fluid flow. ~~device comprises at least one of a second piston, a diaphragm, a subsea valve system, or a topside valve system.~~

3. The system of claim 1, wherein the first valve comprises a three-position flow control valve.

4. The system of claim 3, wherein the three-position flow control first valve comprises a forward flow position, a stop flow position, and a reverse flow position.

~~4. The system of claim 1, wherein the second valve comprises a two-position flow control valve.~~

5. The system of ~~claim 4~~claim 1, wherein the second valve comprises a two-position flow control valve, and the two-position flow control second valve comprises a forward flow position and a reverse flow position.
6. The system of claim 1, wherein the third valve comprises a two-position flow control valve.
7. The system of claim 6, wherein the two-position flow control third valve comprises a stop flow position and a forward flow position.
8. The system of claim 1, comprising a first and a second proximity switch, wherein the first and the second proximity switches are configured to alternate the direction of the first piston to deliver pulses of the discrete quantity.
9. The system of claim 1, wherein a displacement ratio R of a full displacement of the first piston to a stepwise displacement of the valve device, is used to determine the discrete quantity of the fluid.
10. The system of claim 9, wherein the position of the first piston with respect to the cylinder is adjustable to adjust the displacement ratio R .
11. The system of claim 1, comprising an actuator configured to actuate the valve selectively in response to the hydraulic control system and an electric drive system. ~~wherein the device comprises a valve system having a rotary-to-linear converter and a fourth fluid path, wherein the rotary-to-linear converter, the fluid, or a combination thereof, are configured to open and close the fourth fluid path.~~
12. A system comprising:
a hydraulic control system configured to control actuation of a valve selectively in a stepwise manner and a continuous manner, wherein the hydraulic control system comprises~~ing~~:

a discrete hydraulic supply system configured to supply a plurality of discrete quantities of a hydraulic fluid to drive a hydraulic system in ~~a~~the stepwise manner to actuate the valve in the stepwise manner; and

a continuous hydraulic supply system configured to supply a continuous flow of the hydraulic fluid to drive the hydraulic system in ~~a~~the continuous manner to actuate the valve in the continuous manner, wherein the hydraulic control system is configured to operate the discrete hydraulic supply system and the continuous hydraulic supply system independently from one another.

13. The system of claim 12, wherein the discrete hydraulic supply system is configured to adjust a volume of the discrete quantities of the hydraulic fluid.

14. The system of claim 12, wherein the discrete hydraulic supply system is configured to provide a pulsed discrete quantity of the fluid flow.

15. The system of claim 14, wherein the discrete hydraulic supply system comprises a piston configured to travel between a first position and a second position to provide the pulsed discrete fluid flow.

16. The system of claim 15, wherein the discrete hydraulic supply system comprises a first proximity switch configured to detect when the piston is in the first position and a second proximity switch configured to detect when the piston is in the second position to provide the pulsed discrete fluid flow.

17. The system of claim 16, wherein the discrete hydraulic supply system comprises a ~~third~~ valve communicatively coupled to the first and to the second proximity switch and configured to move the piston from the first position to the second position to provide the pulsed discrete fluid flow.

18. A system comprising:

a valve;

an actuator coupled to the valve;

a hydraulic system coupled to the actuator; and

a controller configured to control a—~~the~~ hydraulic system to control actuation of the valve selectively in a stepwise manner and a continuous manner; wherein the controller is configured to control a plurality of discrete quantities of a hydraulic fluid provided to the hydraulic system to control actuation of the valve in the stepwise manner, and the controller is configured to control a continuous flow of the hydraulic fluid provided to the hydraulic system to control actuation of the valve in the continuous manner.

19. The system of claim 18, wherein the valve comprises a choke valve having a choke cage with a plurality of openings, and a movable member configured to selectively open and close the plurality of openings in the choke cage, wherein the actuator is coupled to the movable member. ~~wherein the controller is configured to control a hydraulic control system configured provide the discrete quantities and the continuous flow of the hydraulic fluid.~~

20. The system of claim 18, wherein the controller is configured to use a fast actuation mode to control the continuous flow of the hydraulic fluid and a discrete actuation mode to control the discrete quantities of the hydraulic fluid.

21. The system of claim 1, comprising the valve coupled to the hydraulic control system.

22. The system of claim 21, wherein the valve comprises a choke valve having a choke cage with a plurality of openings, a movable member configured to selectively open and close the plurality of openings in the choke cage, and an actuator coupled to the movable member, wherein the hydraulic control system is coupled to the actuator.

23. The system of claim 11, wherein the electric drive system comprises an electric motor coupled to a rotary to linear converter.

24. The system of claim 1, wherein the hydraulic control system comprises a first valve actuation mode and a second valve actuation mode, the first valve actuation mode is configured to actuate the valve in the stepwise manner, and the second valve actuation mode is configured to actuate the valve in the continuous manner.

25. The system of claim 12, comprising the valve coupled to the hydraulic control system.

26. The system of claim 25, wherein the valve comprises a choke valve having a choke cage with a plurality of openings, a movable member configured to selectively open and close the plurality of openings in the choke cage, and an actuator coupled to the movable member, wherein the hydraulic control system is coupled to the actuator.