CHARGING UNIT, SYSTEM AND METHOD FOR ACTIVATING A WELLSITE COMPONENT

BACKGROUND

[0001] This present disclosure relates generally to activation devices used in wellsite operations. More specifically, the present disclosure relates to activation devices, such as accumulators and chargers used therewith, for activating wellsite equipment, such as blowout preventers.

[0002] Various oilfield operations may be performed to locate and gather valuable downhole fluids. Oil rigs are positioned at wellsites, and downhole tools, such as drilling tools, are deployed into the ground to reach subsurface reservoirs. Once the downhole tools form a wellbore (or borehole) to reach a desired reservoir, casings may be cemented into place within the wellbore, and the wellbore completed to initiate production of fluids from the reservoir. Tubulars (or tubular strings) may be provided in the wellbore for passing subsurface fluids to the surface. Wellheads may be positioned about the wellbore at a surface end thereof to connect the tubulars to surface equipment.

[0003] Land-based or offshore wellsites may be provided with various equipment to facilitate capture of fluid from the wellbore. For example, blowout preventers may be positioned about a tubular at the wellhead to sever and/or seal the wellbore in the event of a blowout. The blowout preventers may have rams to engage the tubular and prevent the passage of fluid therethrough. Examples of blowout preventers are provided in Patent/App. Nos. WO2012/037173 and US7367396, the entire contents of which are hereby incorporated by reference herein. Accumulators may be provided to activate the rams of the blowout preventers. Examples of accumulators are provided in US Patent/App. Nos. 7520129 and 2008/0267786, the entire contents of which are hereby incorporated by reference herein.

SUMMARY

[0004] In at least one aspect the disclosure relates to a charging unit of a system for activating a wellsite component of a wellsite. The ~~activation~~ system includes an activation unit including a pump unit, a pressure circuit with an unloader valve to selectively permit ~~the~~ fluid to pass from the pump unit to the wellsite component, and an accumulator bank operatively connectable to the

pressure circuit to store at least a portion of the fluid under pressure for passage to the wellsite component whereby the wellsite component is selectively activated. The charging unit includes a charging circuit operatively connectable to the pressure circuit to selectively receive the fluid from the pump unit, a charging accumulator operatively connectable to the charging circuit to store the at least a portion of the fluid received from the pump unit under pressure, and a pressure reducing valve operatively connectable to the charging circuit to selectively pass the fluid from the charging accumulator to the accumulator bank whereby an activation pressure of the fluid provided to the wellsite component is maintained.

[0005] The charging may include a check valve, a dump valve, a charging line operatively connectable to the pump unit and receiving fluid therefrom (the charging line may operatively connect the pump unit to the charging accumulator), an accumulator line that operatively connects the charging accumulator to the pressure reducing valve, a reducing line that operatively connects the pressure reducing valve to the accumulator bank, a dump line that operatively connects the pressure reducing valve to a dump tank, and/or a secondary dump line that operatively connects the pressure reducing valve to a charging line (the charging line may operatively connect to the pump unit to the charging accumulator). The wellsite component may be a blowout preventer comprising rams drivable by the charged fluid.

[0006] In another aspect the disclosure may relate to a system for activating a wellsite component of a wellsite having a wellbore penetrating a subterranean formation. The system includes an activation unit and a charging unit. The activation unit includes a pump unit, a pressure circuit comprising an unloader valve to selectively permit the fluid to pass from the pump unit to the wellsite component, and an accumulator bank operatively connectable to the pressure circuit to store at least a portion of the fluid under pressure for passage to the wellsite component whereby the wellsite component is selectively activated. The charging unit includes a charging circuit operatively connectable to the pressure circuit to selectively receive the fluid from the pump unit, a charging accumulator operatively connectable to the charging circuit to store the at least a portion of the fluid received from the pump unit under pressure, and a pressure reducing valve operatively connectable to the charging circuit to selectively pass the fluid from the charging accumulator to the accumulator bank whereby an activation pressure of the fluid provided to the wellsite component is maintained.

[0007] The pump unit includes at least one pump and a power source and/or a dump tank. The accumulator bank includes a plurality of blowout preventer accumulators. The system also includes at least one pressure gauge. The pressure circuit includes an input line operatively connecting the pump unit to the unloader valve, a pump line operatively connecting the unloader valve to the accumulator bank, a dump line operatively connecting the pump line to a dump tank, a blowout preventer line operatively connecting the accumulator bank to the wellsite component, and/or a three-way valve operatively connecting the charging circuit to the accumulator bank and a dump tank.

[0008] The system may also include an activation valve operatively connected to the blowout preventer line, the activation valve selectively permitting the fluid to pass to the wellsite component for activation thereof, and/or a pilot line operatively connected to a charging line, the charging line operatively connectable to the pump unit and the charging unit, the pilot line selectively passing a pilot signal to the unloader valve upon detection of a predetermined pressure in the charging line. The unloader valve may have a pressure setting, may be operable between an open position and a closed position depending on the pressure setting, may have a pilot to detect pressure in the pressure circuit, the pilot sending a signal to the unloader valve when the detected pressure is outside the pressure range, and/or may have an open position in fluid communication with the charging circuit and a closed position in fluid communication with a dump tank. The unloader valve may be operable to the open position when a pressure in the pressure circuit is above the predetermined pressure range and the unloader valve operable to the closed position when a pressure in the pressure circuit is below the predetermined pressure range.

[0009] Finally, in another aspect, the disclosure relates to a method of activating a wellsite component of a wellsite having a wellbore penetrating a subterranean formation. The method involves selectively pumping fluid to the wellsite component via an activation unit, ~~(~~the activation unit comprising a pressure circuit and an accumulator bank~~)~~,; maintaining the fluid in the accumulator bank at a predetermined pressure by selectively charging the fluid in the activation unit with a charging unit, ~~(~~the charging unit operatively connected to the pressure circuit, ~~and~~ the charging unit comprising a charging circuit with a charging accumulator~~)~~, and selectively activating the

CLAIMS

What is claimed is:

1. A charging unit of a system for activating a wellsite component of a wellsite, the system comprising an activation unit comprising a pump unit, a pressure circuit comprising an unloader valve to selectively permit fluid to pass from the pump unit to the wellsite component, and an accumulator bank operatively connectable to the pressure circuit to store at least a portion of the fluid under pressure for passage to the wellsite component whereby the wellsite component is selectively activated, the charging unit comprising:

a charging circuit operatively connectable to the pressure circuit to selectively receive the fluid from the pump unit;

a charging accumulator operatively connectable to the charging circuit to store the at least a portion of the fluid received from the pump unit under pressure; and

a pressure reducing valve operatively connectable to the charging circuit to selectively pass the fluid from the charging accumulator to the accumulator bank whereby an activation pressure of the fluid provided to the wellsite component is maintained.

2. The charging unit of Claim 1, wherein the charging circuit comprises a check valve.

3. The charging unit of Claim 1, wherein the charging circuit comprises a dump valve.

4. The charging unit of Claim 1, wherein the charging circuit comprises a charging line operatively connectable to the pump unit and receiving the fluid therefrom.

5. The charging unit of Claim 4, wherein the charging line operatively connects the pump unit to the charging accumulator.

6. The charging unit of Claim 1, wherein the charging circuit comprises an accumulator line that operatively connects the charging accumulator to the pressure reducing valve.

7. The charging unit of Claim 1, wherein the charging circuit comprises a reducing line that operatively connects the pressure reducing valve to the accumulator bank.

8. The charging unit of Claim 1, wherein the charging circuit comprises a dump line that operatively connects the pressure reducing valve to a dump tank.

9. The charging unit of Claim 1, wherein the charging circuit comprises a secondary dump line that operatively connects the pressure reducing valve to a charging line, and the charging line operatively connects the pump unit to the charging accumulator.

10. A system for activating a wellsite component of a wellsite having a wellbore penetrating a subterranean formation, the system comprising:

an activation unit comprising;

a pump unit;

a pressure circuit comprising an unloader valve to selectively permit fluid to pass from the pump unit to the wellsite component; and

an accumulator bank operatively connectable to the pressure circuit to store at least a portion of the fluid under pressure for passage to the wellsite component whereby the wellsite component is selectively activated;

a charging unit, comprising:

a charging circuit operatively connectable to the pressure circuit to selectively receive the fluid from the pump unit;

a charging accumulator operatively connectable to the charging circuit to store the at least a portion of the fluid received from the pump unit under pressure; and

a pressure reducing valve operatively connectable to the charging circuit to selectively pass the fluid from the charging accumulator to the accumulator bank whereby an activation pressure of the fluid provided to the wellsite component is maintained.

11. The system of Claim 10, wherein the pump unit comprises at least one pump and a power source.

12. The system of Claim 10, wherein the accumulator bank comprises a plurality of blowout preventer accumulators.

13. The system of Claim 10, wherein the pressure circuit comprises an input line operatively connecting the pump unit to the unloader valve, a pump line operatively connecting the unloader valve to the accumulator bank, a dump line operatively connecting the pump line to a dump tank,

and/or a blowout preventer line operatively connecting the accumulator bank to the wellsite component.

14. The system of Claim 10, further comprising a pilot line operatively connected to a charging line, the charging line operatively connectable to the pump unit and the charging unit, the pilot line selectively passing a pilot signal to the unloader valve upon detection of a predetermined pressure in the charging line.

15. The system of Claim 10, wherein the pressure circuit further comprises a three-way valve operatively connecting the charging circuit to the accumulator bank and a dump tank.

16. The system of Claim 10, wherein the unloader valve has a pressure setting, the unloader valve operable between an open position and a closed position depending on the pressure setting.

17. The system of Claim 10, wherein the unloader valve has a pilot to detect pressure in the pressure circuit, the pilot sending a signal to the unloader valve when the detected pressure is outside a pre-determined pressure range.

18. A method of activating a wellsite component of a wellsite having a wellbore penetrating a subterranean formation, the method comprising:

selectively pumping fluid to the wellsite component via an activation unit, the activation unit comprising a pressure circuit and an accumulator bank;

maintaining the fluid in the accumulator bank at a predetermined pressure by selectively charging the fluid in the activation unit with a charging unit, the charging unit operatively connected to the pressure circuit, the charging unit comprising a charging circuit with a charging accumulator; and

selectively activating the wellsite component by selectively permitting the fluid to pass from the activation unit to the wellsite component.

19. The method of Claim 18, further comprising selectively dumping the fluid from the pressure circuit.

20. The method of Claim 18, wherein the selectively pumping comprises passing the fluid from a pump unit to the accumulator bank when the fluid is below the predetermined pressure.

21. The method of Claim 18, wherein the selectively pumping comprises passing the fluid from a pump unit through the charging circuit and to the accumulator bank when the fluid is below a predetermined pressure range.

22. The method of Claim 18, wherein the selectively pumping comprises dumping the fluid from at least one of the activation unit and the charging unit when the fluid is above a predetermined pressure range.

23. The method of Claim 18, wherein the maintaining further comprises selectively dumping the fluid from the charging unit or passing the fluid from the charging unit to the accumulator bank when the fluid is below the predetermined pressure.

24. The method of Claim 18, wherein the maintaining is performed when a pump used for the selectively pumping is off.

25. The method of Claim 18, further comprising storing the fluid under pressure in at least one of the accumulator bank and the charging accumulator.

CLAIMS

What is claimed is:

1. A charging unit of a system for activating a wellsite component of a wellsite, the activation system comprising an activation unit comprising a pump unit, a pressure circuit comprising an unloader valve to selectively permit fluid to pass from the pump unit to the wellsite component, and an accumulator bank operatively connectable to the pressure circuit to store at least a portion of the fluid under pressure for passage to the wellsite component whereby the wellsite component is selectively activated, the charging unit comprising:

a charging circuit operatively connectable to the pressure circuit to selectively receive the fluid from the pump unit;

a charging accumulator operatively connectable to the charging circuit to store at least a portion of the fluid received from the pump unit under pressure; and

a pressure reducing valve operatively connectable to the charging circuit to selectively pass the fluid from the charging accumulator to the accumulator bank whereby an activation pressure of the fluid provided to the wellsite component is maintained.

2. The charging unit of Claim 1, wherein the charging circuit comprises a check valve.

3. The charging unit of Claim 1, wherein the charging circuit comprises a dump valve.

4. The charging unit of Claim 1, wherein the charging circuit comprises a charging line operatively connectable to the pump unit and receiving the fluid therefrom.

5. The charging unit of Claim 4, wherein a charging line operatively connects the pump unit to the charging accumulator.

6. The charging unit of Claim 1, wherein the charging circuit comprises an accumulator line that operatively connects the charging accumulator to the pressure reducing valve.

7. The charging unit of Claim 1, wherein the charging circuit comprises a reducing line that operatively connects the pressure reducing valve to the accumulator bank.

8. The charging unit of Claim 1, wherein the charging circuit comprises a dump line that operatively connects the pressure reducing valve to a dump tank.

9. The charging unit of Claim 1, wherein the charging circuit comprises a secondary dump line that operatively connects the pressure reducing valve to a charging line, the charging line operatively connects the pump unit to the charging accumulator.

10. The charging unit of Claim 1, wherein the wellsite component is a blowout preventer comprising rams drivable by the charged fluid.

11. A system for activating a wellsite component of a wellsite having a wellbore penetrating a subterranean formation, the system comprising:

an activation unit comprising;

a pump unit;

a pressure circuit comprising an unloader valve to selectively permit fluid to pass from the pump unit to the wellsite component; and

an accumulator bank operatively connectable to the pressure circuit to store at least a portion of the fluid under pressure for passage to the wellsite component whereby the wellsite component is selectively activated;

a charging unit, comprising:

a charging circuit operatively connectable to the pressure circuit to selectively receive the fluid from the pump unit;

a charging accumulator operatively connectable to the charging circuit to store at least a portion of the fluid received from the pump unit under pressure; and

a pressure reducing valve operatively connectable to the charging circuit to selectively pass the fluid from the charging accumulator to the accumulator bank whereby an activation pressure of the fluid provided to the wellsite component is maintained.

12. The system of Claim 11, wherein the pump unit comprises at least one pump and a power source.

13. The system of Claim 11, wherein the pump unit comprises a dump tank.

14. The system of Claim 11, wherein the accumulator bank comprises a plurality of blowout preventer accumulators.

15. The system of Claim 11, further comprising at least one pressure gauge.

16. The system of Claim 11, wherein the pressure circuit comprises an input line operatively connecting the pump unit to the unloader valve.

17. The system of Claim 11, wherein the pressure circuit comprises a pump line operatively connecting the unloader valve to the accumulator bank.

18. The system of Claim 11, wherein the pressure circuit comprises a dump line operatively connecting the pump line to a dump tank.

19. The system of Claim 11, wherein the pressure circuit comprises a blowout preventer line operatively connecting the accumulator bank to the wellsite component.

20. The system of Claim 19, further comprising an activation valve operatively connected to the blowout preventer line, the activation valve selectively permitting the fluid to pass to the wellsite component for activation thereof.

21. The system of Claim 11, further comprising a pilot line operatively connected to a charging line, the charging line operatively connectable to the pump unit and the charging unit, the pilot line selectively passing a pilot signal to the unloader valve upon detection of a predetermined pressure in the charging line.

22. The system of Claim 11, wherein the pressure circuit further comprises a three-way valve operatively connecting the charging circuit to the accumulator bank and a dump tank.

23. The system of Claim 11, wherein the unloader valve has a pressure setting, the unloader valve operable between an open position and a closed position depending on the pressure setting.

24. The system of Claim 11, wherein the unloader valve has a pilot to detect pressure in the pressure circuit, the pilot sending a signal to the unloader valve when the detected pressure is outside a pre-determined pressure range.

25. The system of Claim 24, wherein the unloader valve has an open position in fluid communication with the charging circuit and a closed position in fluid communication with a dump tank, the unloader valve operable to the open position when a pressure in the pressure circuit is above the predetermined pressure range and the unloader valve operable to the closed position when a pressure in the pressure circuit is below the predetermined pressure range.

26. A method of activating a wellsite component of a wellsite having a wellbore penetrating a subterranean formation, the method comprising:

selectively pumping fluid to the wellsite component via an activation unit, the activation unit comprising a pressure circuit and an accumulator bank;

maintaining the fluid in the accumulator bank at a predetermined pressure by selectively charging the fluid in the activation unit with a charging unit, the charging unit operatively connected to the pressure circuit, the charging unit comprising a charging circuit with a charging accumulator; and

selectively activating the wellsite component by selectively permitting the fluid to pass from the activation unit to the wellsite component.

27. The method of Claim 26, further comprising selectively dumping the fluid from the pressure circuit.

28. The method of Claim 26, wherein the selectively pumping comprises passing the fluid from a pump unit to the accumulator bank when the fluid is below a predetermined pressure.

29. The method of Claim 26, wherein the selectively pumping comprises passing the fluid from a pump unit through the charging circuit and to the accumulator bank when the fluid is below a predetermined pressure range.

30. The method of Claim 26, wherein the selectively pumping comprises dumping the fluid from at least one of the activation unit and the charging unit when the fluid is above a predetermined pressure range.

31. The method of Claim 26, wherein the maintaining further comprises selectively dumping the fluid from the charging unit.

32. The method of Claim 26, wherein the maintaining comprises passing the fluid from the charging unit to the accumulator bank when the fluid is below a predetermined pressure.

33. The method of Claim 26, wherein the maintaining is performed when a pump used for the selectively pumping is off.

34. The method of Claim 26, further comprising storing the fluid under pressure in at least one of the accumulator bank and the charging accumulator.