Claims:

1. A mooring system for mooring a vessel floating on a surface of a body of water, comprising:

a base structure;

a mooring leg having a first end configured to be attached to a seabed and a second end configured to be attached to the base structure;

a column having a first end attached to the base structure; and

a turntable comprising a rotating part rotatively coupled to a fixed part, wherein:

a second end of the column is configured to be connected to the fixed part of the turntable via a dual axis joint,

the rotating part of the turntable is configured to be connected to the vessel such that the vessel is rotatable with respect to the column when the second end of the column is connected to the fixed part of the turntable,

the base structure is configured to be elevated above the seabed when the second end of the column is connected to the fixed part of the turntable, and

the base structure is configured to sit on the seabed when the second end of the column is disconnected from the fixed part of the turntable.

2. The mooring system of claim 1, wherein the dual axis joint is configured to permit the column to pivot relative to the fixed part of the turntable about two axes that are substantially orthogonal or substantially perpendicular to one another when the second end of the column is connected to the fixed part of the turntable.

3. The mooring system of claim 1, wherein the base structure and/or the column comprises a weight.

4. The mooring system of claim 3, wherein the weight is a ballast tank configured to contain a ballast material.

5. The mooring system of claim 1, further comprising:

a releasable connector comprising a first component connected to the dual axis joint and a second component connected to the fixed part of the turntable ;

a lifting device configured to be disposed on the vessel; and

a lifting line having a first end configured to be connected to the first component of the releasable connector and a second end configured to be connected to the lifting device, and

wherein the lifting device and the lifting line are configured to lift the column, the base structure, and a portion of the mooring leg toward the fixed part of the turntable to move the first component of the releasable connector into an engagement position with respect to the second component of the releasable connector.

6. The mooring system of claim 5, wherein the lifting device and the lifting line are configured to lower the column, the base structure, and the portion of the mooring leg toward the seabed to move the first component of the releasable connector into an unengaged position with respect to the second component of the releasable connector.

7. The mooring system of claim 6, wherein the base structure is configured to be set on the seabed when the first component of the releasable connector is in the unengaged position with respect to the second component of the releasable connector.

8. The mooring system of claim 6, further comprising a landing structure configured to be disposed on the seabed, wherein the base structure is configured to be at least partially set on the landing structure when the first component of the releasable connector is in the unengaged position with respect to the second component of the releasable connector.

9. The mooring system of claim 1, further comprising a buoyancy module configured to increase a buoyancy of the column and the base structure and to reduce a buoyancy of the column and the base structure, wherein an internal volume of the buoyancy module is configured to be in fluid communication with the body of water such that the internal volume of the buoyancy module comprises a portion of the body of water when the mooring system is located in the body of water.

10. The mooring system of claim 9, further comprising a compressed gas source and a gas conduit, wherein a first end of the gas conduit is configured to be in fluid communication with the compressed gas source and a second end of the gas conduit is configured to be in fluid communication with the internal volume of the buoyancy module, and wherein, when the mooring system is located in the body of water, the compressed gas source and the gas

conduit are configured to convey a gas into the internal volume of the buoyancy module to displace at least a portion of the water in the internal volume of the buoyancy module into the body of water to increase a buoyancy of the column and the base structure.

11. The mooring system of claim 5, wherein the lifting device comprises a chain jack, a strand jack, a linear winch, a rotary winch, or a combination thereof.

12. The mooring system of claim 1, further comprising a swivel comprising a first part rotatively coupled to a second part and configured to maintain communication between the first part of the swivel and the second part of the swivel when the second part of the swivel rotates relative to the first part of the swivel, and wherein the first part of the swivel is connected to the fixed part of the turntable and the second part of the swivel is connected to the rotating part of the turntable or the vessel.

13. The mooring system of claim 1, further comprising

a fluid swivel having a first part rotatively coupled to a second part and configured to maintain fluid communication between the first part of the swivel and the second part of the swivel when the second part of the swivel rotates relative to the first part of the swivel, and wherein the first part of the swivel is connected to the fixed part of the turntable and the second part of the swivel is connected to the rotating part of the turntable or the vessel;

a first fluid conduit having a first end configured to be in fluid communication with a pipeline disposed on the seabed and a second end configured to be in fluid communication with the fixed part of the fluid swivel; and

a second fluid conduit having a first end configured to be in fluid communication with the rotating part of the fluid swivel and a second end configured to be in fluid communication with the vessel.

14. The mooring system of claim 13, further comprising a guide disposed on the column or the base structure, wherein the guide defines an aperture, wherein a portion of the first fluid conduit is disposed within the aperture defined by the guide, and wherein at least the portion of the first fluid conduit disposed within the aperture defined by the guide is a flexible fluid conduit.

15. The mooring system of claim 14, wherein the first fluid conduit is at least partially constrained in a radial direction of the first fluid conduit by the guide, and wherein the first fluid conduit is free to move in a longitudinal direction of the first fluid conduit relative to the guide.

16. The mooring system of claim 13, further comprising a float and/or a weight configured to be connected to an exterior surface of the first fluid conduit and configured to urge the first fluid conduit into a compliant shape.

17. A process for mooring a vessel floating on a surface of a body of water to a mooring system, comprising:

positioning the vessel near the mooring system, wherein the mooring system comprises:

a base structure sitting on a seabed,

a mooring leg having a first end attached to the seabed and a second end attached to the base structure,

a column having a first end attached to the base structure and a second end attached to a dual axis joint,

a turntable comprising a rotating part rotatively coupled to a fixed part, wherein the rotating part of the turntable is connected to the vessel,

a releasable connector comprising a first component connected to the dual axis joint and a second component connected the fixed part of the turntable,

a lifting device disposed on the vessel, and

a lifting line having a first end connected to the second component of the releasable connector and a second end configured to be connected to the lifting device;

connecting the second end of the lifting line to the lifting device;

hauling in the lifting line with the lifting device to lift the column, the base structure, and at least a portion of the mooring leg to move the first component of the releasable connector into an engagement position with respect to the second component of the releasable connector; and

connecting the first component of the releasable connector to the second component of the releasable connector to secure the vessel to the mooring system, wherein the base structure is elevated above the seabed and the vessel is rotatable with respect to the column

when the first and second components of the releasable connector are connected to one another.

18. The process of claim 17, wherein the mooring system further comprises a gas conduit, a compressed gas source, and a buoyancy module, and wherein an internal volume of the buoyancy module is in fluid communication with and contains a portion of the body of water, the process further comprising at least partially filling the internal volume of the buoyancy module with a gas from the compressed gas source via the gas conduit to increase a buoyancy of the column and the base structure prior to and/or during hauling in of the lifting line with the lifting device.

19. The process of claim 18, further comprising at least partially filling an internal volume of the buoyancy module with a water from the body of water after the first component of the releasable connector is connected to the second component .

20. A process for unmooring a vessel floating on a surface of a body of water from a mooring system, comprising:

releasing a releasable connector, wherein the mooring system comprises:

a base structure elevated above of the seabed,

a mooring leg having a first end attached to the seabed and a second end attached to the base structure,

a column having a first end attached to the base structure and a second end attached to a dual axis joint,

a turntable comprising a rotating part rotatively coupled to a fixed part, wherein the rotating part of the turntable is connected to the vessel,

wherein the releasable connector comprises a first component connected to the dual axis joint and a second component connected the fixed part of the turntable such that the vessel is rotatable with respect to the column when the first and second components of the releasable connector are connected to one another,

a lifting device disposed on the vessel, and

a lifting line having a first end connected to the first component of the releasable connector and a second end connected to the lifting device,

lowering the column, the base structure, and a portion of the mooring leg toward the seabed with the lifting line and the lifting device such that the base structure is supported by the seabed;

disconnecting the second end of the lifting line from the lifting device; and

maneuvering the vessel away from the mooring system.