Control and Supply Unit

The present invention relates to a control and supply unit for an actuating device of a choke, a valve, a blow-out preventer or some other device applied in the field of oil and natural gas production. The unit comprises at least an auxiliary power supply, which is especially rechargeable, and a connecting means used for an exchange of data and/or for the purpose of voltage supply. Such application devices are arranged e.g. on the seabed, where they may also constitute part of a so-called tree. In particular in the case of electrically operated actuating devices for such application devices, a connecting means for connecting a voltage supply is required. In addition, the actuating device is normally controlled and monitored with the aid of a respective connecting means for an exchange of data. Data may be exchanged e.g. with a unit, which is arranged above the sea level, through a cable connection. Also the voltage supply may be effected through such a cable connection or, like the exchange of data, from a subsea control module.

Actuating devices and power supply devices of the type in question are described e.g. in PCT/EP2007/003307, PCT/EP2007/003308, PCT/EP2007/004793 or PCT/EP2003/09696.

It is the object of the present invention to improve a control and supply unit of the type specified at the beginning in such a way that the respective connecting means satisfies a relevant standard and has a compact structural design and is also easily accessible from outside.

This object is achieved by the features of claim 1.

In particular, the control and supply unit comprises, as a connecting means, a communication interface for connecting thereto a field bus and a voltage supply connection for connecting thereto a voltage supply line.

According to the present invention, a connection to the actuating device can be established easily by means of the control and supply unit. This control and supply unit also satisfies relevant standards, such as the SIIS (Subsea Instrumentation Interface Standardisation); these standards especially refer to the connection of control systems to a respective sensor of the actuating devices.

The control and supply unit according to the present invention has a compact structural design and satisfies all the demands on an arrangement, especially a submarine arrangement, on the seabed or on a tree.

The respective actuating device is normally accommodated in a housing. The control and supply unit may be arranged in this housing as well. It may, however, be of advantage when the respective unit is implemented separately of the actuating device. This will make the unit more easily accessible, e.g. for the purpose of maintenance.

In this connection, it can also be regarded as advantageous when the unit comprises a unit housing which is releasably secured to the actuating device.

In order to satisfy especially level 2 of the SIIS regulation, the field bus may be a CAN bus. Such a bus is a standardized, real-time field bus for serial data transmission. Such a CAN bus is normally a two-wire bus and can be implemented with copper wires or through glass fibres.

Quite generally, it is also possible to transmit the respective data via the voltage supply line. According to the present invention, it is especially suggested that the connections for the field bus and the voltage supply line can be implemented as separate connections.

For redundancy reasons, it will additionally be of advantage when the actuating device has associated therewith two control and supply units. These two units can be releasably secured to the actuating device, e.g. by means of their unit housing.

The unit housing may contain a plurality of means, and at least the communication interface, the auxiliary power supply and a motor control unit are arranged in the unit housing.

Respective connections of the auxiliary power supply and the motor control unit are extended from the control and supply unit towards the actuating device and are connected to said actuating device.

In order to simplify the structural design of the control and supply unit in its entirety, the communication interface and the voltage supply connection can be defined by a supply and communication assembly. The latter can be arranged as a separate unit within the unit housing and it can be connected to the other assemblies within said unit housing, such as the auxiliary power supply, the motor control unit or the like.

In order to simplify the respective connection between the supply and communication assembly and the other assemblies in the unit housing, the supply and communication assembly can comprise at least outputs for supplying electric power to the motor control unit, the auxiliary power supply, and/or at least one sensor unit of the actuating device.

It is also possible that the supply and communication assembly comprises connections for communication with and/or control of the auxiliary power supply, the motor control unit and/or the sensor unit of the actuating device. The bus connections in question can be adapted to various types of buses, such as a CAN bus, an RS485 bus or the like. This applies analogously also to the outputs for supplying electric power, which can provide different voltages, depending on the voltage required for the respective assembly supplied.

Furthermore, it can be considered to be of advantage when the supply and communication assembly is provided with an ground terminal connected at least to the auxiliary power supply and/or the motor control unit.

In addition, it will be advantageous when an inert gas atmosphere is provided in the unit housing. This inert gas atmosphere may e.g. be a nitrogen atmosphere under a pressure of 1 to 2 or more than 2 bar.

In order to allow a simple connection of the control and supply unit from outside, the unit housing can be provided with a plug connection device, which is accessible from outside, for the communication interface and the voltage supply connection. It is thus possible to establish by means of only one plug connection device a connection with the communication interface as well as with the voltage supply connection.

In this context, the connection in question can be a connection to a subsea control module for communication and/or voltage supply. It is, however, also possible to provide communi-

cation and a supply of voltage via separate connection lines to different control modules or to other control units, in particular to control units on the seabed.

In the following, an advantageous embodiment of the present invention will be explained in more detail on the basis of the figures added in the drawing, in which

Fig. 1 shows a perspective view of an actuating device for a choke with the control and supply unit according to the present invention, and

Fig. 2 shows a block diagram of the control and supply units and of the actuating device.

Fig. 1 shows a perspective side view of an actuating device 2 for a choke 3, which is only shown in the form of a choke insert 22, as an application device 8. The actuating device 2 comprises at least a spindle drive having a drive unit associated therewith, and in particular also a position sensor, all said components being arranged within a cylindrical housing. The choke insert 22 is longitudinally displaceable by means of the spindle drive.

Other devices applied in the field of oil and natural gas production are e.g. a valve, a blow-out preventer or other units of this type. Directly adjacent the actuating device 2, a control and supply unit 1 according to the present invention is arranged on a base plate 23. This control and supply unit 1 is of redundant design so that a second control and supply unit 12 is arranged directly adjacent said first unit and in parallel relationship therewith. The control and supply units 1 and 12, respectively, have a unit housing 9. Also this unit housing 9 is cylindrical and is provided with a plug connection device 20 on its upper end in Fig. 1. This plug connection device serves to connect a respective connection cable for transmitting data and for supplying electric power.

The broken line in Fig. 1 represents such a control module 21, which is also arranged below the seal level and, in particular, on the seabed.

The whole unit shown in Fig. 1 can be transported e.g. by an ROV (remote operated vehicle) and it can be conveyed to and removed from its usage site.

A terminal 24 is arranged laterally on the housing of the actuating device 2, said terminal being used for connecting thereto an electric connection line. This electric connection line is not shown in Fig. 1 and serves to supply power to one or a plurality of electric motors within the actuating device 2. These motors are associated with the spindle drive as a drive unit used for displacing said spindle drive. The electric connection line serves to establish a connection with the control and supply units 1 and 12, respectively.

Fig. 2 shows a block diagram of the unit according to Fig. 1. Various assemblies are arranged within the respective unit housing 9 of the control and supply units 1 and 12. A first assembly is a supply and communication assembly 14. This supply and communication assembly 14 comprises the respective terminals and the connecting means 5 contacted via the plug connection device 20 according to Fig. 1.

The connecting means 5 comprises a communication interface 6 and a voltage supply connection 7. A voltage supply line 11, which is connected to the voltage supply connection 7, is shown at said voltage supply connection. This voltage supply line 11 extends, cf. again Fig. 1, e.g. up to the control module 21.

The communication interface 6 is implemented as a field bus interface and is especially used for connecting a CAN bus thereto.

The voltage supply connection 7 is e.g. a d.c. voltage connection for a specific wattage, as for example 48W, and for a specific electric voltage or electric voltage range, as for example 20-27 VDC.

The supply and communication assembly 14 is provided with additional connections within the unit housing. These connection are e.g. two terminals 15, 16 for supplying electric power to an auxiliary power supply 4 and a sensor unit 25 of the actuating device 2. The sensor unit 25 may also comprise different sensors e.g. for position determination, temperature detection or the like.

In addition, the supply and communication assembly 14 is provided with bus connections 17 and 18 through which data are exchanged with the auxiliary power supply 4 or the sensor

unit 25. Bus connection 17 is e.g. an RS485 bus connection and bus connection 18 is a CAN bus connection.

Via the bus connection 18 and through the auxiliary power supply 4, it is also possible to control the respective motor control unit 13. This motor control unit 13 is connected to respective motors, which are only shown schematically in Fig. 2 and which are identified by reference numeral 26.

The respective terminals 15 and 16 used for the purpose of electric supply can provide different wattages and voltages. In addition, the auxiliary power supply 4 can be connected to the supply terminal 16 of the supply and communication assembly 14 for the purpose of recharging and it can also be connected to the terminal 15, which is also associated with the sensor unit 25.

Finally, the supply and communication assembly 14 is also provided with a ground terminal 19, which is connected to both the auxiliary power supply 4 and the motor control unit 13.

Within the unit housing 9, an inert gas atmosphere may prevail, e.g. a dry nitrogen atmosphere with a pressure of 1 to 2 or more than 2 bar.

The control and supply unit according to the present invention serves to supply the actuating device with data as well as with electric power. The respective terminals are standardized so as to satisfy in particular the demands specified in SIIS. Making use of the control and supply unit, the actuating device can be operated and controlled easily. The control and supply unit comprises all the assemblies which are required for controlling the actuating device as well as for supplying electric power thereto. The auxiliary power supply is rechargeable and is especially used for compensating power shortages or shortfalls. Sufficient power is provided for the idling state of the respective motors of the actuating device as well as for operating said motors when they are in operation.

The control and supply unit 1 is mounted together with the actuating device 2 and can easily be transported together therewith, i.e. the whole unit shown in Fig. 1 can be transported e.g. by an ROV and retrieved for the purpose of maintenance or repair.

Claims

1. A control and supply unit (1) for an actuating device (2) of a choke (3), a valve, a blow-out preventer or some other device applied in the field of oil and natural gas production, said unit (1) comprising at least an auxiliary power supply (4), which is especially rechargeable, and a connecting means (5) used for an exchange of data and/or for the purpose of voltage supply, **characterized in that** the control and supply unit (1) comprises, as a connecting means (5), a communication interface (6) for connecting thereto a field bus (10) and a voltage supply connection (7) for connecting thereto a voltage supply line (11).

2. A control and supply unit according to claim 1, **characterized in that** the unit (1) is implemented separately of the actuating device (2).

3. A control and supply unit according to claim 1 or 2, **characterized in that** the unit (1) comprises a unit housing (9), which is releasably secured to the actuating device (2).

4. A control and supply unit according to one of the preceding claims, **characterized in that** the field bus (10) is a CAN bus.

5. A control and supply unit according to one of the preceding claims, **characterized in that** the connections for the field bus (10) and the voltage supply line (11) are implemented as separate connections.

6. A control and supply unit according to one of the preceding claims, **characterized in that** the actuating device (2) has associated therewith two units (1, 12) for reasons of redundancy.

7. A control and supply unit according to one of the preceding claims, **characterized in that** at least the communication interface (6), the auxiliary power supply (4) and a motor control unit (13) are arranged in the unit housing (9).

8. A control and supply unit according to one of the preceding claims, **characterized in that** the communication interface (6) and the voltage supply connection (7) are formed on a supply and communication assembly (14).

9. A control and supply unit according to one of the preceding claims, **characterized in that** the supply and communication assembly (14) comprises at least connections for supplying electric power to the motor control unit (13), the auxiliary power supply (4) and/or at least one sensor unit of the actuating device (2).

10. A control and supply unit according to one of the preceding claims, **characterized in that** the supply and communication assembly (14) comprises bus connections (17, 18) for communication with and/or control of the auxiliary power supply (4), the motor control unit (13) and/or the sensor unit of the actuating device (2).

11. A control and supply unit according to one of the preceding claims, **characterized in that** the supply and communication assembly (14) is provided with an earthing terminal (19) connected at least to the auxiliary power supply (4) and/or the motor control unit (13).

12. A control and supply unit according to one of the preceding claims, **characterized in that** an inert gas atmosphere is provided in the unit housing (9).

13. A control and supply unit according to one of the preceding claims, **characterized in that** the unit housing (9) is provided with a plug connection device (20), which is accessible from outside, for the communication interface (6) and the voltage supply connection (7).

14. A control and supply unit according to one of the preceding claims, **characterized in that** the unit (1) is connected to a submarine control module (21) for communication and/or voltage supply.