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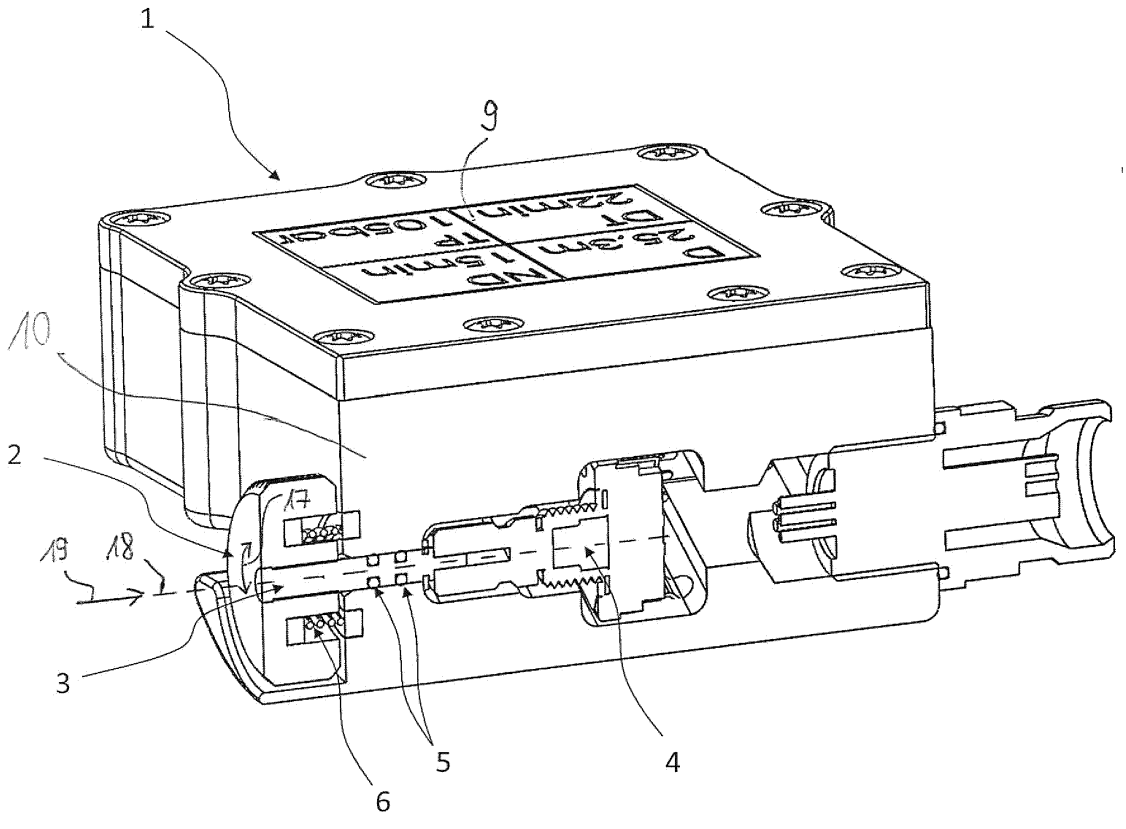
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(54) **INTUITIVE OPERABLE DIVE COMPUTER**

(57) A dive computer (1) for displaying output data to a user during a dive, wherein the dive computer (1) comprises a user input unit configured for inputting input data to the dive computer (1) by rotating a rotational input device (2).

Figure 2



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Description

[0001] The invention relates to a dive computer and to a method of operating a dive computer.

[0002] Underwater a diver is exposed to an increased ambient pressure. Each ten meters of depth, the ambient pressure rises by approximately 1 bar. A self-contained underwater breathing apparatus (SCUBA) allows divers to breathe underwater. Breathing gases under higher ambient pressure, causes a gas uptake of the body. The physics of the gas uptake is described in Henry's law. Of major concern during diving is the uptake of inert gases in the body, as these gases will be released during ascent and after the dive, which may cause the formation of inert gas bubbles within the body. This may cause decompression sickness (DCS) or "the bends".

[0003] Decompression models are used to simulate and calculate inert gas uptake in the body and to calculate ascend profiles so that a diver can safely ascend to the surface with minimized risk of suffering DCS. Common practice is to perform one or more decompression stops during the ascent. While in the early years of diving a depth gauge, a watch and decompression tables were used for diving and to manage decompression obligations, today is common practice to use a diver worn dive computer.

[0004] A user interface may be provided for a dive computer on the one hand to perform user settings like setting date and time, setting the dive computer to imperial or metric units, selecting a personalized dive computer conservatism, select the altitude or for instance set the oxygen content of the breathing gas mixture.

[0005] On the other hand, a user interface can be used to switch between different menus and screens, in particular to switch the dive computer to logbook mode, where previous dive data are displayed or to a dive planner mode.

[0006] Some recreational diving computers also allow the diver to switch between different breathing gases under water during the dive, which is of particular interest, when carrying multiple gas supplies and using oxygen rich decompression gases.

[0007] More advanced dive computers, typically linked to technical diving activities, allow on the one hand more personalized settings, like for instance which decompression model is used, or allow modification of parameters of the decompression model. In technical diving, breathing gas mixtures containing helium are used as bottom gas for deep diving. Such breathing gas is usually referred to TRIMIX (i.e. mixture between O_2, He and N_2). Technical divers use several different breathing gases to handle decompression obligations. Therefore technical diving computers usually can be programmed with different breathing gas mixtures - typically 3-16 breathing gases, where for each gas the O_2 and the He fraction is set. Underwater, during the dive, the diver can set the dive computer to the breathing gas he is actually breathing so that the dive computer can perform the decompression calculations accordingly.

[0008] Conventional dive computers are disclosed in US6904382B2, DE102007047133A1, DE102007047144A1, US7600430B2, DE102004007986A1, US2009085865A1, WO2009/046906A3, DE19649418A1, DE102006028085A1, GB2455389A, US5503145A, US5806514A, US2005/205092A1, US2007/283953A1, USD541179S1.

[0009] Some recreational dive computers have additional features. They can display pictures, can store information about the user, may display maps or display the heart rate of the diver (see EP1878654A1).

[0010] Multiple features and settings require a user interface with an input capability, which allows the user to perform inputs to the diver.

[0011] Dive computers found on the market today are operated with buttons. Different types of buttons are used, but the majority of manufacturers are using mechanical O-ring sealed push buttons. Some manufacturers use piezo buttons, which do not require an O-ring seal of a moving part, thus are believed to be more robust. Some manufactures use an accelerometers (GB2455389A, US5899204A) instead of buttons, where the divers tap on the dive computer instead of pressing a button.

[0012] Especially when a dive computer features many functions, allows many user settings, and/or features different screens and user menus, several buttons are required to implement an efficient user interface. Dive computers usually feature between 1 to 5 push buttons. In some models short and long button pushes are used to call different functions. This increases the input capability of the dive computer, but also increases the complexity of the operation of a dive computer.

[0013] Especially when some buttons are used to implement different functions - like when one button is used to increment or decrement a value with a short button press, but confirms a value with a long button press, operation becomes less intuitive, the user interface is not self-explaining and the user usually needs to read the user manual before being able to perform user settings.

[0014] This is a problem especially in diving, where divers possibly also need to perform settings on the dive computer in a stress or emergency situation, like changing the gas settings in the case of equipment failure. Especially in such situations an intuitive user interface is an important safety feature.

[0015] In case of a dive accident, the rescue team usually also examines the dive computer to understand the dive profile and to decide which treatment is used. Also here, an intuitive user interface of the dive computer is a safety benefit.

[0016] An alternative to operating a dive computer with push buttons is disclosed in WO 2012/035021A1, where a touchscreen is described, which can be used underwater, and which can be used as an intuitive user input device. One challenge of this device is however the man-

ufacturing process, where a resistive touchscreen needs to be filled with silicon oil.

[0017] It is an object of the invention to provide a user input device for a dive computer, which allows intuitive operation of a dive computer, can be manufactured in a simple way and at low cost, and has a reliable mechanical design

[0018] In order to achieve the object defined above, a dive computer and a method of operating a dive computer according to the independent claims are provided.

[0019] According to an exemplary embodiment of the invention, a dive computer for displaying output data to a user during a dive is provided, wherein the dive computer comprises a user input unit configured for inputting input data to the dive computer by rotating a rotatable input device.

[0020] According to another exemplary embodiment of the invention, a method of operating a dive computer for displaying output data to a user is provided, wherein the method comprises inputting input data to the dive computer by actuating a rotatable input device of the dive computer.

[0021] According to an exemplary embodiment, a system for intuitive operation of a dive computer is provided, where a wheel is used as input device. A wheel, mounted on the outside of the dive computer may be connected with an O-ring sealed axis to a rotational encoder inside the dive computer. The wheel may be used to increment and decrement parameters and to switch between different screens, menus and menu items. Optionally, the wheel may have a push button function.

[0022] An embodiment relates to a method of intuitive operation of a dive computer, wherein a wheel is used in a dive computer as input device. Using a wheel is an intuitive method to increment or decrement values or to switch between different menus, screens or menu items. Such one or more wheels can be used to switch between different menus and for selecting.

[0023] In the following, further exemplary embodiments of the dive computer and the method will be explained.

[0024] In an embodiment, the dive computer comprises at least one of a depth sensor, a clock, a microcontroller (or processor), and a display. It may measure the depth and may use a decompression model to calculate inert gas uptake in the body in real time, and may perform decompression calculations. Such a dive computer may show on the screen or display depth, dive time, remaining no decompression time, time to surface and/or required decompression stops/ceiling.

[0025] In an embodiment, the rotatable input device is a wheel. Such a wheel may be mounted at a housing of the dive computer so as to be rotatable around a predefined rotation axis, in particular a symmetry axis of the wheel. The wheel may be substantially cylindrically shaped and may be rotatable around its central axis. Additionally or alternatively, the rotational input device may be rotatable or pivotable, in a lever type, around a rotation or pivoting axis which does not correspond to a central or symmetry axis of the rotational input device body. The wheel may be mounted on the outside of the dive computer and may be connected with an O-ring sealed axis to a rotational encoder or potentiometer inside the dive computer. A wheel based input device allows a simple and intuitive way of operating a dive computer. The rotational function of the wheel can be used to switch between different screen layouts (like surface screen, settings screen, logbook screen, dive screen, etc.) Using the push function of the menu or using a separate button can then be used to confirm a screen setting.

[0026] In an embodiment, the dive computer further comprises a rotational detector configured for detecting a detection signal from the rotatable input device indicative of the data inputted by the user. The rotational detector may be mounted statically in a housing of the dive computer and may be configured for detecting a rotation state or position of the rotatable input device. A processor of the dive computer may be programmed so as to assign a corresponding control command to certain positional or rotational states or rotation patterns of the rotational input device. Rotational encoders or potentiometers can be read out in a very simple way with microcontrollers. Such a rotational encoder may for instance be based on two outputs, which can provide a square signal when the encoder is turned. The signals of the two outputs may have a phase shift dependent on the direction of rotation of the encoder. Potentiometers can be read with an analog to digital converter input of a microcontroller. Other rotary or rotational encoders may be based on absolute positions, quadrature output, digital binary output or digital output on a bus interface like I2C. Alternatively, optical encoders may be used, wherein a pattern is printed, engraved, molded and/or milled into the wheel and then read with an optical photo sensor like found in a computer mouse.

[0027] In an embodiment, the rotational detector is configured as one of the group consisting of an optical detector configured for detecting an optical detection signal as light propagating from the rotating input device, a magnetic detector configured for detecting a magnetic detection signal from at least one magnetic element forming part of the rotational input device, a potentiometer configured for detecting a resistance signal depending on a rotational state of the rotational input device. When configured as an optical detector, a photocell or the like may be statically mounted at a housing of the dive computer and may capture optical data from the rotating input device body. For this purpose, the input device body may be provided with an optically detectable marker or pattern so that the optical detector can determine a positional or rotational state of the rotational input device body by processing the captured optical data. Alternatively, one or more magnetic elements may be arranged at, for instance attached to, the input device body so that, when the body rotates as a result of a user actuation, a magnetic detector may detect the presence of magnetic ele-

ments passing the detector during the rotation. A potentiometer as a rotation detector can determine a value of a resistance which changes in accordance with a rotation of the input device body. The detector may also comprise or consist of an encoder (in particular a rotational encoder) with an output signal indicative of turning angle (i.e. rotation angle) and direction (i.e. rotation direction) of the wheel.

[0028] In an embodiment, the user input unit is further configured for inputting further input data to the dive computer by pushing or pulling the rotational input device, in particular by pushing or pulling along a rotational axis around which the rotational input device is rotatable. Highly advantageously, the functionality may hence be further extended by allowing a user to input a control command not only by rotating the rotational input device, but to input additional control commands by using the input device body as a push button or as a pull button. Highly advantageously, a push or pull axis may correspond to a rotation axis. Hence, the mechanical wheel may also be designed with a push button function. Therefore the axis can not only be rotated but also moved in axial direction. Implementing a push button function is simple, wherein such a push button may be electrically closed when the axis of the encoder is pressed.

[0029] In an embodiment, the user input unit is further configured for inputting further input data to the dive computer by touching the rotational input device

[0030] In an embodiment, the pushable rotational input device comprises a biasing mechanism configured for applying a predefined biasing force to the rotational input device for biasing the rotational input device into a non-pushed position. When a push button shall be operated under water, i.e. in a sub-merged state of the dive computer during a dive, it has to be considered that the water pressure at a certain diving depth may generate a pushing force onto the push button rotational input device. In order to prevent undesired triggering of commands by this artificial pushing pressure, a biasing element such as a loaded spring may bias the rotational input device body towards a position at which it is located in the absence of a pushing operation of a user. This biasing force can be predefined so as to prevent undesired triggering of a pushing operation by water pressure at the maximum diving depth. Since the hydrostatic pressure in diving will perform a force on the axis, the axis can be spring loaded, wherein the force of the spring shall be greater than the cross section area of the axis multiplied by the hydrostatic pressure found at maximum depth.

[0031] In an embodiment, the dive computer comprises a housing at which the rotational input device is mounted, and a sealing, in particular one or more O-rings, mounted for sealing a gap between the housing and the input device. Thus, one or more O-rings may be arranged along an axis of the input device body so as to ensure a waterproof bearing of the input device body at and/or in the housing. Sealing an axis with an O-ring is a robust and reliable method, it is however also possible to select an implementation of a wheel input device without a mechanical O-ring sealed connection. This may be specially of interest, when the electronics of the dive computer is potted or encapsulated, like for instance in silicone gel, polyurethane or resin.

[0032] In an embodiment, the dive computer comprises a housing at which the rotational input device is rotatably mounted, and a magnetic coupling configured for coupling the housing to the rotational input device in a waterproof way. A magnetic coupling may render the provision of sealing rings or the like dispensable, since corresponding magnetic elements may cooperate functionally even through a (in particular non-magnetic) housing hermetically sealing an interior of the dive computer (for instance electronics, etc.) with regard to the aqueous environment. An alternative way of implementing a wheel without an O-ring sealed axis can hence be the use of magnetic sensors. The wheel may include several magnets, and a magnetic sensor inside the dive computer housing may detect the position of the magnets and based on that the position of the wheel.

[0033] In an embodiment, the dive computer comprises a processor (such as a microcontroller) configured for processing the data input by the user input unit for determining the data to be displayed to the user based on the processed input data. Such a processor, for instance a microprocessor, may interpret the data input via the rotational input device in terms of a pre-stored set of control commands, each assigned to a respective actuation state of the input device. For instance, data displayed to a user (such as a diver) may be selected and configured in accordance with the assigned rotational input device states/control commands. Displaying the data to the user may be performed via an LCD display, or any other electronic display.

[0034] In an embodiment, the dive computer comprises a housing, wherein the processor is potted within the housing. When the electronics (such as the processor, parts of the display, etc.) is encapsulated into a solid-state body (such as a mold), the dive computer can be rendered waterproof even when no sealing is provided. In other words, a sealing function may be provided by the encapsulation.

[0035] In an embodiment, the processor is configured for incrementing a displayed value, in particular breathing gas fractions, upon rotating the rotational input device in one direction and for decrementing the displayed value upon rotating the rotational input device in the opposite direction. Hence, turning the rotational input device in one direction may increase a number or other value displayed on the display of the dive computer, whereas rotating the rotational input device in a counter-direction will decrease the displayed value. By taking this measure, an intuitive way of adjusting parameters by wheel actuation is provided. The wheel can hence be used to change numerical values of the dive computer by rotation. A rotation in one direction increments a parameter. A rotation in the opposite direction decrements a param-

eter. This can be applied for instance to setting hours, minutes, year, month, day of month, O_2 fraction of a breathing gas, He fraction of a breathing gas, pO_2 setpoint in closed circuit rebreather diving, maximum pO_2, maximum depth, maximum dive time or GPS coordinates. A push or pull button function of the wheel (in addition to the actuation by rotation mechanism) or a separate button can be used to confirm a selection.

[0036] In an embodiment, the processor is configured for switching between a plurality of displayed menu items in accordance with a rotation of the rotational input device. For instance, a scrollbar may be displayed on a display of the dive computer, wherein the scrollbar allows to select between different menu items. Rotating the rotational input device in a direction will move a highlighted one of the menu items upwardly, whereas rotating the wheel in a counter-direction will move the highlighted menu item in a downward direction on the display. In a wheel based menu user interface the wheel can be used to switch between different menu items. The menu item, which is currently selected is highlighted, like for instance displayed with a different color, displayed inverted, displayed blinking or underlined.

[0037] In an embodiment, the processor is configured for selecting (for activating a corresponding function) a menu item, to which the processor has switched as a result of a rotation of the rotational input device, in response to a push operation of the rotational input device. Thus, after having selected a screen or menu item by rotating the wheel to a desired position corresponding to a menu item to be activated, a selection of the highlighted menu item or screen can be triggered by a push or pull operation of the wheel.

[0038] In an embodiment, the processor is configured for switching between a plurality of displayed menu items or between a plurality of screens in response to a push operation of the rotational input device. As an alternative to a switch between different screens or menu items by a rotation actuation, it is also possible to interpret a push of the actuator wheel as the control command for switching between different menu items or different screens. In such an embodiment, selection of a switched menu item or screen can then be initiated by a rotation of the rotational input device.

[0039] In an embodiment, the processor is configured for switching between a plurality of screens in accordance with a rotation of the rotational input device. Such different screens may be a setting screen for time and date, another screen for adjusting breathing gas properties, a further screen for displaying logbook data, etc.

[0040] In an embodiment, the processor is configured for activating different switching functions in accordance with a duration of a push operation of the rotational input device. In such an embodiment, a short-term push (for instance less than a predefined threshold value of for instance 1 s) may initiate a first function, whereas a long-term duration (for instance longer than the predefined threshold value of for instance 1 s) may trigger another function. It is also possible to assign more than two functions to more than two pushing time intervals (for instance by predefining a plurality of threshold values). Optionally the software of the dive computer may also be designed in a way that allows measurement of the length of the push of push button function the wheel, to implement more functions with one switching function, like for instance a short push enables or disables a particular breathing gas, and a long push selects that particular breathing gas as breathing gas actually used. Alternatively the long push can also be used to restore default settings.

[0041] In an embodiment, the method comprises displaying output data during a dive. Additionally or alternatively, the method comprises displaying output data when the dive computer is located in an air atmosphere. Thus, the display of output data as well as the actuation of the rotatable/rotational input device for inputting input data may be performed outside of the water or inside the water.

[0042] It is possible that the dive computer is configured as a mask-mountable dive computer, i.e. a dive computer having mounting provisions for mounting it on a dive mask. In an embodiment, the dive computer is configured as a mask-mounted dive computer, i.e. a dive computer mounted on a dive mask. By mounting the wheel operated dive computer on a mask, a user simply has to operate the rotational input device by one hand which she or he can even do without visually seeing the rotational input device, i.e. by a tactile recognition of the rotational input device. This helps a diver to concentrate on the diving tasks when operating the dive computer.

[0043] The wheel can also be used as character and text input device. By rotating the wheel, the different characters may be displayed. Pushing a separate button or pushing the optional wheel push button function selects the displayed character. For instance, the characters are displayed on the display in a consecutive way, like for instance following the ASCII table.

[0044] Rotating the wheel during the dive may be used to display different preprogrammed gas settings. By pushing a separate button or pushing the optional wheel push button function, displayed gas can be selected as breathing gas which is currently breathed by the diver and which should be used for calculation inert gas uptake and release in the body.

[0045] In an embodiment, a dive computer with a wheel is provided. The wheel may be connected to a rotational encoder inside the dive computer. The wheel may be connected to a potentiometer inside the dive computer. The mechanical connection may be established with an O-ring sealed axis. The wheel may be also used as push button input device. Instead, a mechanical connection with a magnetic coupling may be used. Magnetic sensors may be used. The position of the wheel may be read out with a photo sensor. Furthermore, a method of intuitive operation of a dive computer is provided, where a wheel is used as input device. The wheel may be used to in-

crement and decrement breathing gas fractions. The wheel may be used to switch between menu items. The wheel may be used to switch between screens. A push function of the wheel may be used to implement a switching function. The switching function may be used to confirm a highlighted menu item. The duration of the push may be measured to implement different switching functions.

[0046] The aspects defined above and further aspects of the invention are apparent from the examples of embodiment to be described hereinafter and are explained with reference to these examples of embodiment.

[0047] The invention will be described in more detail hereinafter with reference to examples of embodiment but to which the invention is not limited.

Figure 1 illustrates a three-dimensional view of a dive computer with a rotational input device wheel according to an exemplary embodiment of the invention.

Figure 2 illustrates a cross-sectional view of the dive computer according to Figure 1 illustrating details of the wheel-shaped rotational input device.

Figure 3 illustrates a three-dimensional view of a mask mounted dive computer according to an exemplary embodiment of the invention.

Figure 4 is a block diagram illustrating functional blocks of a dive computer according to an exemplary embodiment of the invention.

[0048] The illustrations in the drawings are schematical. In different drawings, similar or identical elements are provided with the same reference signs.

[0049] **Figure 1** shows a dive computer 1 with a wheel 2 according to an exemplary embodiment of the invention. The wheel 2 is mounted on the dive computer 1. The dive computer 1 is configured for displaying dive-related output data to a user, i.e. a diver, during a dive. The dive computer 1 displays this output data via a display 9, such as an LCD display. The dive computer 1 comprises a housing 10 in which the display 9 is integrated. Furthermore, a rotatable input device embodied as the wheel 2 is mounted at the housing 10 of the dive computer 1. The rotatable wheel 2 serves as a user input unit configured for inputting control commands to the dive computer 1. In the embodiment of Figure 1, the rotatable wheel 2 can be turned (in clockwise direction and in counterclockwise direction, see double arrow 17) around a rotation axis 18 corresponding to its symmetry axis.

[0050] Furthermore, the wheel 2 is configured as a push button which can be activated for inputting additional user commands into the dive computer 1 by pushing the rotational input device 2 by applying pressure along its rotational axis 18 (see pushing direction 19). Thus, multiple commands can be input by a user by the very intuitive single wheel 2 allowing to be rotated clockwise, counterclockwise and being pushed.

[0051] **Figure 2** shows a cross section of the dive computer 1 of Figure 1. The cross-sectional view of the dive computer 1 in Figure 2 shows details of the rotatable and pushable rotational input device embodied as wheel 2.

[0052] The wheel 2 is connected with an axis or shaft 3 to an encoder 4 inside the dive computer 1. O-rings 5 seal the axis or shaft 3. Hence, O-rings 5 are mounted for sealing a gap between the housing 10 and the wheel 2.

[0053] The encoder 4 can feature a mechanical push button function. The dive computer 1 comprises a rotational detector in form of the encoder 4 configured for detecting a detection signal from the rotatable and pushable rotational input device wheel 2 which is indicative of a control command of a user input by rotating and/or pushing the wheel 2 around or along the symmetry axis 18 thereof. In the shown embodiment, the encoder 4 is configured as an optical detector for detecting an optical detection signal, i.e. light originating from the rotating wheel 2 and propagating to the encoder 4. For this purpose, a photocell is arranged close to the surrounding lateral surface of the wheel 2.

[0054] To be able to use the mechanical push button function also during the dive and to be able to compensate for the hydrostatic pressure pushing the axis or shaft 3 inwards the dive computer 1, a spring 6 is used to apply a counterforce (i.e. antiparallel to the pushing direction 19).The biasing spring 6 applies a predefined spring force for biasing the wheel 2 into a non-pushed position, thereby preventing undesired triggering of a pushing operation by water pressure when the dive computer 1 is submerged during a dive.

[0055] **Figure 3** shows a mask mounted dive computer 7 with a wheel 2 according to an exemplary embodiment of the invention. The mask mounted dive computer 7 comprises a diver mask 20 (only shown schematically/partially in Figure 3) and a dive computer 1 mounted thereon. The dive computer 1 is mechanically connected with the mask 20 (detachably or non-detachably).

[0056] **Figure 4** shows a block diagram 30 of various functional components of a dive computer 1 according to an exemplary embodiment of the invention.

[0057] The rotatable and pushable wheel 2 is functionally connected to a detector embodied as optical encoder 4 for detecting rotation and/or pushing operations by a user. A processor 11 (such as a microcontroller) is supplied with corresponding detector data and assigns, by using data and algorithms from a database 12 (such as a storage memory) control commands assigned to each of the detected rotation and/or pushing operations. Correspondingly, the processor 11 calculates, based on input data input by the user via the wheel 2, output data to be displayed on the display 9 which is subsequently displayed to the user.

[0058] A first control command may be assigned to a rotation of the wheel 2 in a clockwise direction, a second control command may be assigned to a rotation of the

wheel 2 in a counterclockwise direction, and a third control command may be assigned to a pushing actuation of the wheel 2. Optionally, different control commands may be assigned to different pushing durations.

[0059] It should be noted that the term "comprising" does not exclude other elements or steps and the "a" or "an" does not exclude a plurality. Also elements described in association with different embodiments may be combined.

[0060] It should also be noted that reference signs in the claims shall not be construed as limiting the scope of the claims.

[0061] Implementation of the invention is not limited to the preferred embodiments shown in the figures and described above. Instead, a multiplicity of variants are possible which use the solutions shown and the principle according to the invention even in the case of fundamentally different embodiments.

Claims

1. A dive computer (1) for displaying output data to a user during a dive, wherein the dive computer (1) comprises a user input unit configured for inputting input data to the dive computer (1) by rotating a rotational input device (2).

2. The dive computer (1) according to claim 1, wherein the rotational input device (2) is a wheel.

3. The dive computer (1) according to claim 1 or 2, further comprising a detector (4) configured for detecting a detection signal from the rotational input device (2) indicative of the input data inputted by the user.

4. The dive computer (1) according to claim 3, wherein the detector (4) is configured as one of the group consisting of:

   a rotational encoder;
   an encoder with an output signal indicative of turning angle and direction;
   an optical detector configured for detecting an optical detection signal as light originating from the rotational input device (2);
   a magnetic detector configured for detecting a magnetic detection signal from at least one magnetic element forming part of the rotational input device (2);
   a potentiometer configured for detecting a signal indicative of an electrical resistance which depends on a rotational state of the rotational input device (2).

5. The dive computer (1) according to any of claims 1 to 4, wherein the user input unit is further configured for inputting further input data to the dive computer by pushing or pulling the rotational input device (2), in particular by pushing or pulling the rotational input device (2) along a rotational axis around which the rotational input device (2) is rotatable, and wherein in particular the pushable rotational input device (2) comprises a biasing mechanism (6) configured for applying a predefined biasing force to the rotational input device (2) for biasing the rotational input device (2) into a non-pushed position.

6. The dive computer (1) according to any of claims 1 to 5, comprising:

   a housing (10) at which the rotational input device (2) is rotatably mounted;
   a sealing (5), in particular an O-ring, mounted for sealing a gap between the housing (10) and the rotational input device (2).

7. The dive computer (1) according to any of claims 1 to 5, comprising
   a housing (10) at which the rotational input device (2) is rotatably mounted;
   a magnetic coupling configured for coupling the housing (10) to the rotational input device (2) in a waterproof way.

8. The dive computer (1) according to any of claims 1 to 7, comprising a processor (11) configured for processing the input data input via the user input unit for determining the output data to be displayed based on the processed input data, wherein in particular the dive computer (1) comprises a housing (10), wherein the processor (11) is encapsulated within the housing (10).

9. The dive computer (1) according to any of claims 1 to 8, wherein the processor (11) is configured for incrementing a displayed value, in particular of one or more breathing gas fractions, upon rotating the rotational input device (2) in one direction and for decrementing the displayed value upon rotating the rotational input device (2) in the opposite direction.

10. The dive computer (1) according to any of claims 1 to 9, wherein the processor (11) is configured for switching between a plurality of displayed menu items in accordance with a rotation of the rotational input device (2),
    wherein in particular the processor (11) is configured for selecting a menu item, to which the processor (11) has switched as a result of a rotation of the rotational input device (2), in response to a push operation or a pull operation of the rotational input device (2).

11. The dive computer (1) according to any of claims 1 to 10,

wherein the processor (11) is configured for switching between a plurality of displayed menu items or between a plurality of screens in response to a push operation or a pull operation of the rotational input device (2), and/or
wherein the processor (11) is configured for switching between a plurality of screens in accordance with a rotation of the rotational input device (2), and/or
wherein the processor (11) is configured for activating a selectable one of different switching functions in accordance with a duration of a push operation or a pull operation of the rotational input device (2).

12. The dive computer (1) according to any of claims 1 to 11, configured as a mask-mountable or mask-mounted dive computer (7).

13. A method of operating a dive computer (1) for displaying output data to a user, wherein the method comprises inputting input data to the dive computer (1) by actuating a rotational input device (2) of the dive computer (1).

14. The method according to claim 13, wherein the method comprises displaying output data during a dive.

15. The method according to claim 14, wherein the method comprises displaying output data when the dive computer (1) is located in an air atmosphere.

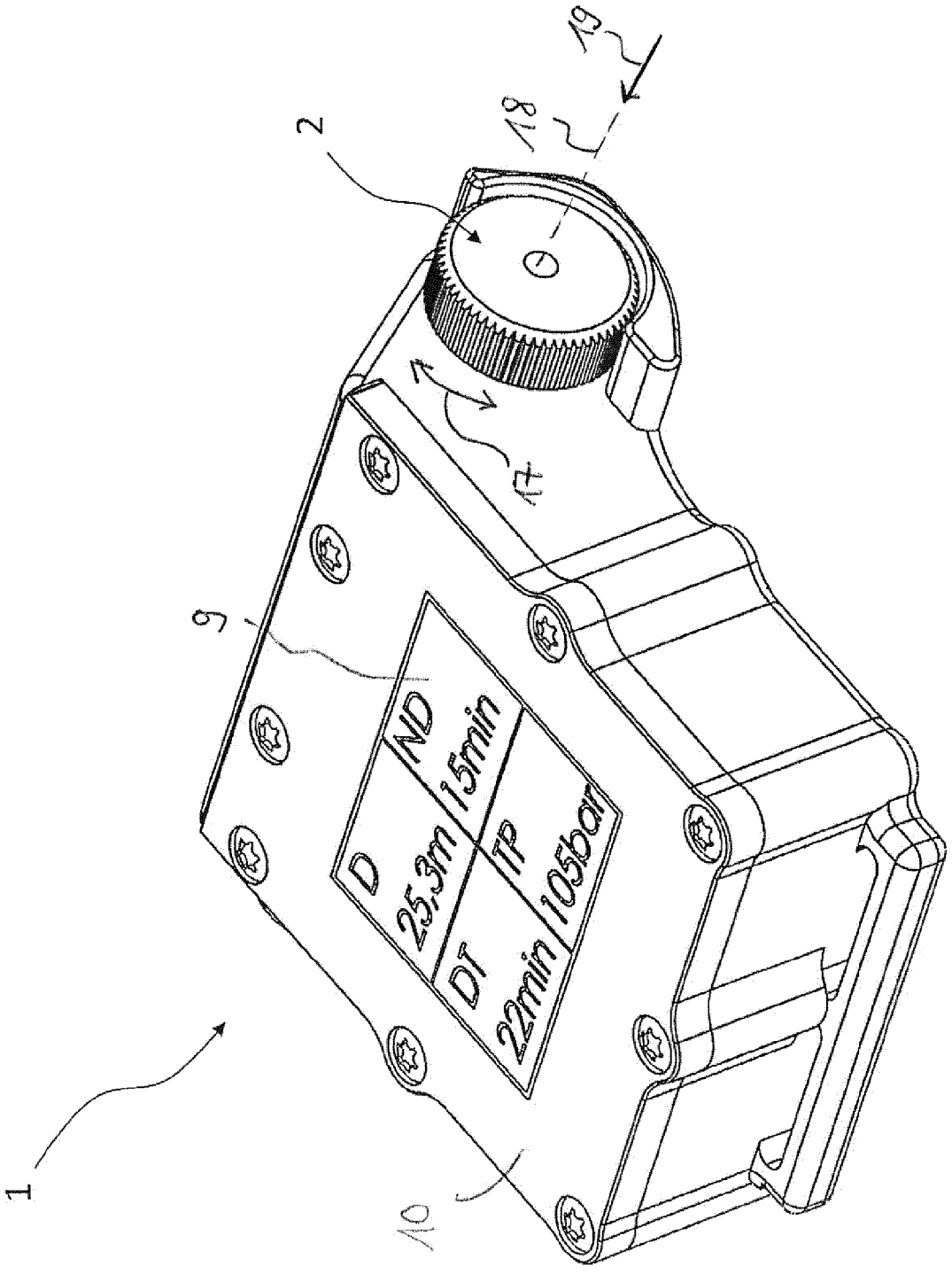


Figure 1

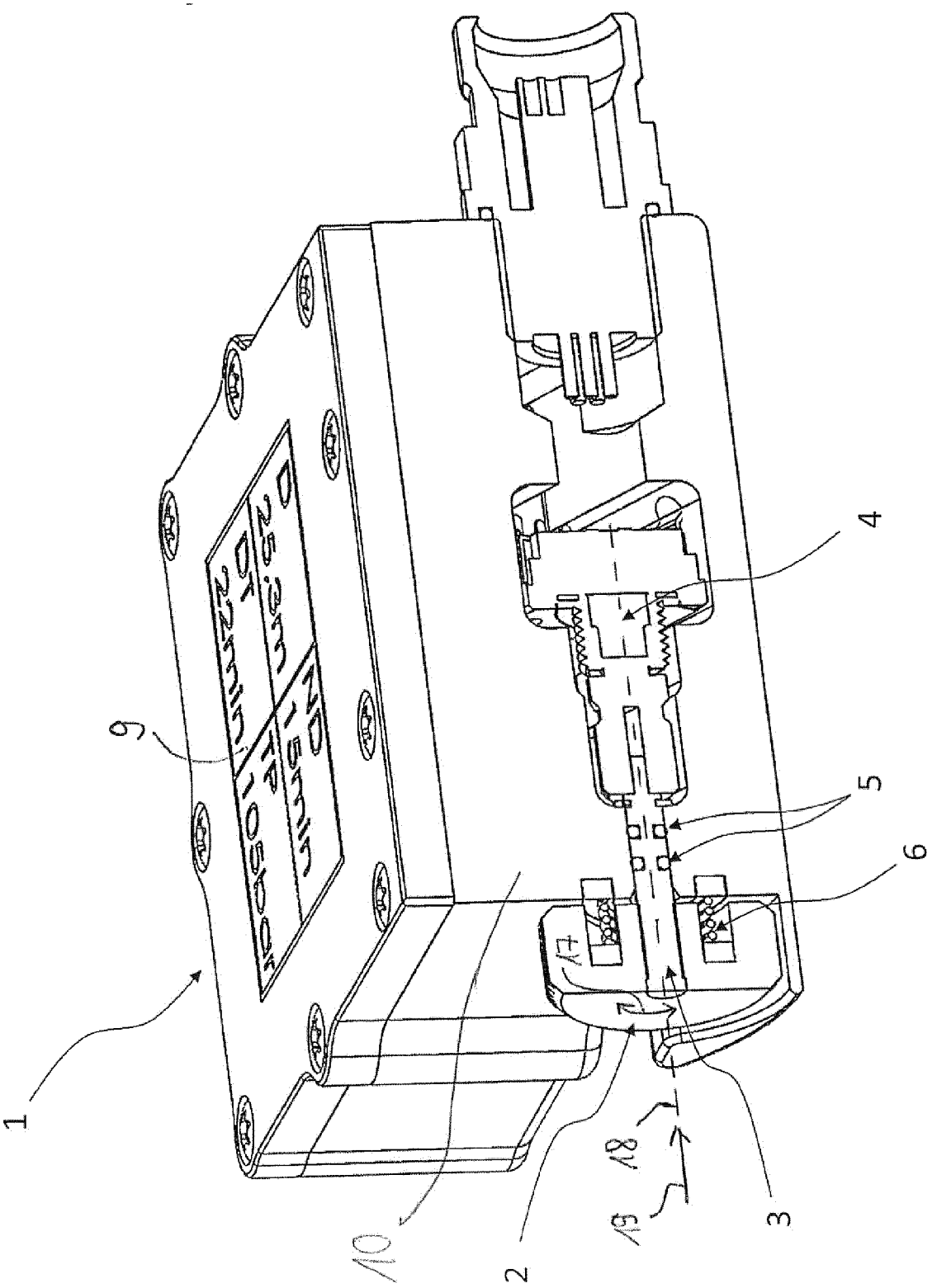


Figure 2

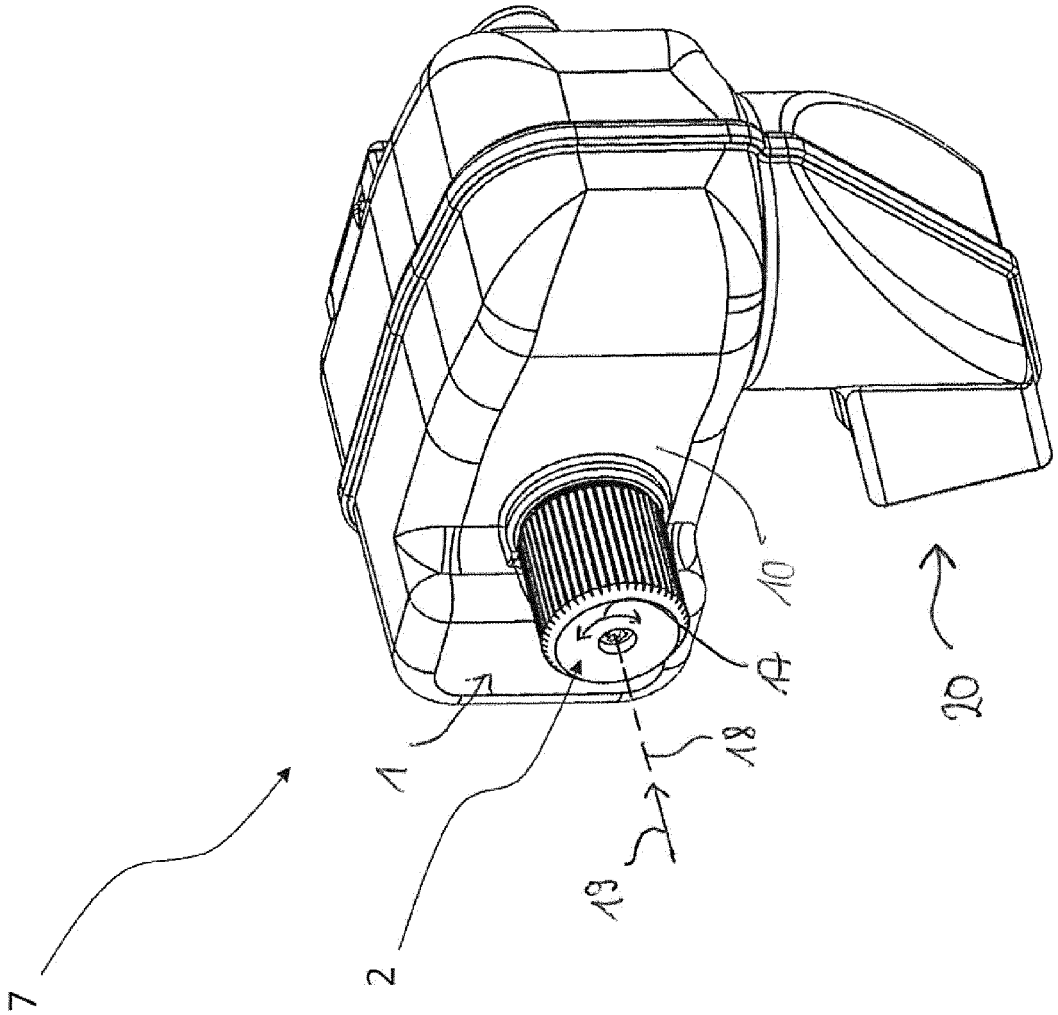
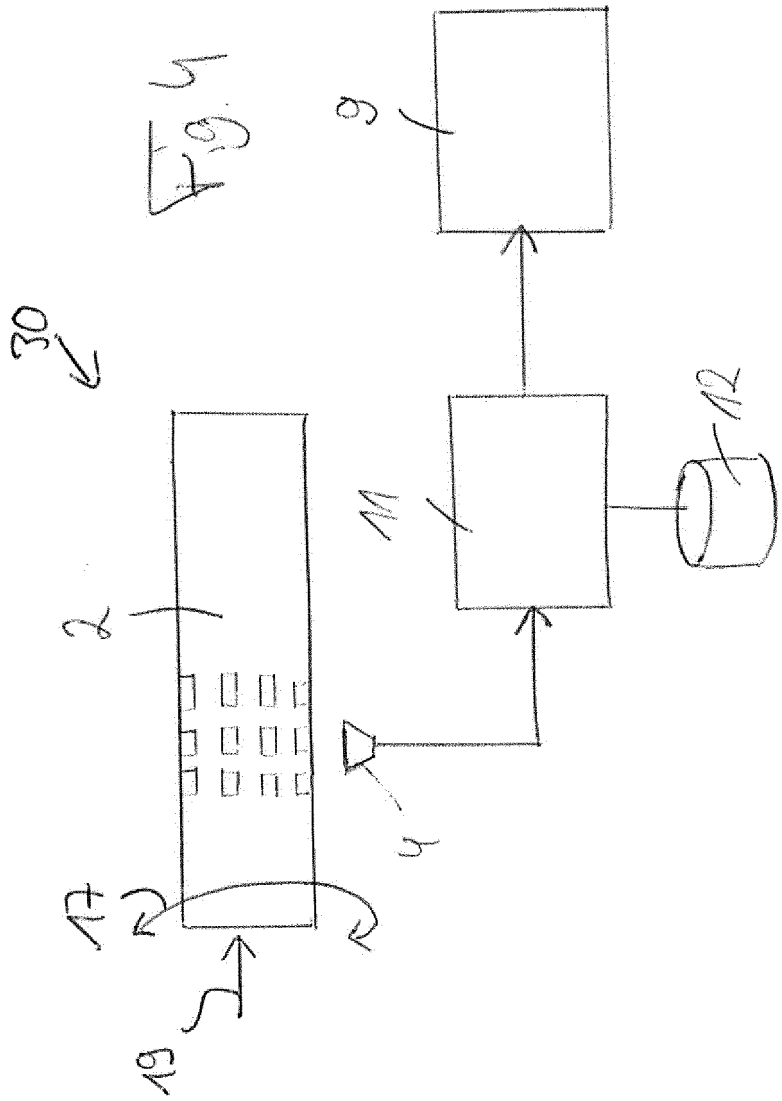


Figure 3

Fig 5



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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 2567

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Place of search	Date of completion of the search	Examiner
The Hague	23 September 2015	Blazquez Lainez, R

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