

PACKAGING STRUCTURE OF SENSOR PROBE, SENSOR PROBE, SENSOR AND WATER PURIFIER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priorities to Chinese Patent Applications No.
5 202320915761.4, filed on April 21, 2023 and entitled “PACKAGING STRUCTURE FOR
SENSOR PROBE, SENSOR PROBE, SENSOR, AND WATER PURIFIER”, the entire
contents of which are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to the technical field of water quality detection, and
10 in particular, to a packaging structure for a sensor probe, a sensor probe, a sensor, and a water
purifier.

BACKGROUND

[0003] When total dissolved solids (TDS) in water are detected, a monitoring current of a
TDS sensor is related to a water temperature, and a current signal is interfered by changes in
15 the water temperature.

SUMMARY

[0004] The present disclosure aims to at least solve one of the technical problems existing
in the related art. To this end, the present disclosure provides a packaging structure for a sensor
probe, which can reduce the number of injection-molded process times for the sensor probe,
20 and improve connection and assembly efficiency between a temperature probe of a temperature
sensor and a TDS sensor probe. In this way, production efficiency of the sensor probe is

improved, and production costs of the sensor probe are reduced.

[0005] The present disclosure further provides a sensor probe.

[0006] The present disclosure further provides a sensor.

[0007] The present disclosure further provides a water purifier.

5 **[0008]** The packaging structure for the sensor probe according to an embodiment of a first aspect of the present disclosure includes: a probe; and an insulation housing formed at an outer periphery of the probe through a one-step injection molding. Two ends of the probe are located outside the insulation housing; and the insulation housing has a through hole extending through two ends of the insulation housing. The through hole is adapted to allow a temperature sensor
10 probe to pass through the through hole.

[0009] For the packaging structure for the sensor probe according to the embodiment of the present disclosure, the insulation housing is integrally formed around the probe through the one-step injection molding, and the through hole extending through the two ends of the insulation housing is formed at the insulation housing. In this way, on the one hand, packaging
15 of the packaging structure for the sensor probe can be completed with only the one-step injection molding, which saves the injection-molded process for sensor probe packaging and improves processing efficiency of the packaging structure for the sensor probe. On the other hand, the through hole is adapted to allow the temperature sensor probe to be mounted in the through hole, or adapted to allow the temperature sensor probe to pass through the through hole.
20 In this way, the temperature sensor probe does not need to be injection-molded together with the sensor probe during the injection molding, which can improve assembly efficiency of the temperature sensor probe, improve assembly efficiency of the entire sensor probe, and save the production cost. In addition, in some scenarios, there is no need to use the temperature sensor probe, which can save materials and costs.

25 **[0010]** According to an embodiment of the present disclosure, the insulation housing has a receiving groove formed at a rear end of the insulation housing. The receiving groove is in communication with the through hole and adapted to receive a rear end of the temperature sensor probe.

[0011] According to an embodiment of the present disclosure, the receiving groove is
30 located at one of two sides of the through hole in a radial direction.

[0012] According to an embodiment of the present disclosure, a depth of the receiving groove is equal to a radial dimension of the rear end of the temperature sensor probe; and/or a length of the receiving groove is equal to a length dimension of the rear end of the temperature sensor probe.

5 **[0013]** According to an embodiment of the present disclosure, the insulation housing has an extending portion at a rear end of the insulation housing. The extending portion has an insertion opening. A rear end of the probe extends into the insertion opening. The through hole is in communication with the insertion opening; and the insertion opening is adapted for a connection of a connection terminal in an inserting manner.

10 **[0014]** According to an embodiment of the present disclosure, the insertion opening has a guide groove formed at an inner wall of the insertion opening. The guide groove extends in a depth direction of the insertion opening.

[0015] According to an embodiment of the present disclosure, the insertion opening has an avoiding opening formed at a side wall of the insertion opening; and the extending portion has
15 a clamping wall located in the avoiding opening and adapted to clamp the connection terminal.

[0016] A sensor probe according to an embodiment of a second aspect of the present disclosure includes the packaging structure for the sensor probe as described according to any one of the embodiments of the first aspect of the present disclosure and a wire connected to the probe in the packaging structure for the sensor probe by a connection terminal.

20 **[0017]** A sensor according to an embodiment of a third aspect of the present disclosure includes the sensor probe as described according to the embodiment of the second aspect of the present disclosure.

[0018] A water purifier according to an embodiment of a fourth aspect of the present disclosure includes the sensor as described according to the embodiment of the third aspect of
25 the present disclosure and a waterway board. The packaging structure for the sensor probe of the sensor is connected to the waterway board and is at least partially located in a waterway.

[0019] Additional aspects and advantages of the present disclosure will be provided in part in the following description, or will become apparent in part from the following description, or can be learned from practicing of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] In order to clearly explain technical solutions according to the embodiments of the present disclosure or in the related art, drawings used in the description of the embodiments or the related art are briefly described below. Obviously, the drawings described below are merely
5 some embodiments of the present disclosure. Based on these drawings, other drawings can be obtained by those skilled in the art without creative effort.

[0021] FIG. 1 is a schematic structural view of an engagement between a packaging structure for a sensor probe and a temperature sensor probe according to an embodiment of the present disclosure.

10 **[0022]** FIG. 2 is a schematic structural view of a packaging structure for a sensor probe according to an embodiment of the present disclosure.

[0023] FIG. 3 is a top view of a packaging structure for a sensor probe according to an embodiment of the present disclosure.

[0024] FIG. 4 is a cross-sectional view taken along line A-A in FIG. 3.

15 **[0025]** FIG. 5 is a top view of an engagement between a packaging structure for a sensor probe and a temperature sensor probe according to an embodiment of the present disclosure.

[0026] FIG. 6 is a schematic structural view of a connection between a temperature sensor probe and a connection terminal according to an embodiment of the present disclosure.

[0027] FIG. 7 is a cross-sectional view taken along line B-B in FIG. 5.

20 **[0028]** FIG. 8 is another schematic structural view of an engagement between a packaging structure for a sensor probe and a temperature sensor probe according to an embodiment of the present disclosure.

[0029] Reference numerals:

[0030] 10-packaging structure; 20-temperature sensor probe; 30-connection terminal;

25 **[0031]** 110-probe; 120-insulation housing;

[0032] 121-through hole; 122-receiving groove; 123-extending portion; 124-insertion opening; 125-guide groove; 126-avoiding opening; 127-clamping wall; 128-snap.

DETAILED DESCRIPTION

[0033] Implementations of the present disclosure are described in further detail below in connection with accompanying drawings and embodiments. The following embodiments are used to explain the present disclosure, but cannot be used to limit the scope of the present disclosure.

[0034] In the description of the present disclosure, it should be noted that, the orientation or the position indicated by terms such as “center”, “longitudinal”, “lateral”, “over”, “below”, “front”, “rear”, “left”, “right”, “vertical”, “horizontal”, “top”, “bottom”, “inner”, and “outer” should be construed to refer to the orientation and the position as shown in the drawings, and is only for the convenience of describing the present disclosure and simplifying the description, rather than indicating or implying that the pointed device or element must have a specific orientation, or be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation of the present disclosure. In addition, the terms “first”, “second”, “third”, etc., are merely for description, and cannot be understood as indicating or implying relative importance.

[0035] In the description of the embodiments of the present disclosure, it should be noted that, unless otherwise clearly specified and limited, terms such as “connect”, “couple”, and the like should be understood in a broad sense. For example, it may be a fixed connection or a detachable connection or a connection as one piece; a mechanical connection or an electrical connection; or a direct connection or an indirect connection through an intermediate. For those of ordinary skill in the art, the specific meaning of the above terms in the present disclosure should be understood according to specific circumstances.

[0036] In the present disclosure, unless expressly stipulated and defined otherwise, the first feature “on” or “under” the second feature may mean that the first feature is in direct contact with the second feature, or the first and second features are in indirect contact through an intermediate. Moreover, the first feature “above” the second feature may mean that the first feature is directly above or obliquely above the second feature, or simply mean that the level of the first feature is higher than that of the second feature. The first feature “below” the second feature may mean that the first feature is directly below or obliquely below the second feature,

or simply mean that the level of the first feature is smaller than that of the second feature.

[0037] In the description of this specification, descriptions with reference to the terms “an embodiment”, “some embodiments”, “examples”, “specific examples”, or “some examples” etc., mean that specific features, structure, materials or characteristics described in conjunction with the embodiment or example are included in at least one embodiment or example of the present disclosure. In this specification, the schematic representations of the above terms do not necessarily refer to the same embodiment or example. Moreover, the described specific features, structures, materials or characteristics may be combined in any one or more embodiments or examples in a suitable manner. In addition, those skilled in the art can combine the different embodiments or examples and the features of the different embodiments or examples described in this specification without contradicting each other.

[0038] A sensor is a detection device capable of detecting relevant information of a detected object/to-be-detected object. For example, a pH meter is capable of detecting a pH value of a solution, a conductivity meter is capable of measuring conductivity of the solution, and some sensors may be used for detecting a content of pollutants in gas. Due to these characteristics of the sensors, the sensors are applied in various industries.

[0039] Nowadays, with the rapid development of technology, people have higher and higher requirements for the quality of life in daily life, and especially pay attention to health issues of diet and drinking water in daily life. Therefore, requirements for a water quality are also getting higher and higher. As a device capable of purifying impurities in water, a water purifier has gradually come into people's sight.

[0040] When the water purifier purifies tap water, in order to evaluate the quality of the purified tap water and also to facilitate timely replacement of a filter element of the water purifier, a sensor is usually provided in a waterway of the water purifier and used to detect total dissolved solids, i.e., a commonly called TDS value, in the water purified by the water purifier. The water quality after purification by the water purifier is evaluated through the TDS value detected by a TDS sensor. In the embodiments of the present disclosure, a TDS sensor probe is taken as an example for illustration.

[0041] When the total dissolved solids in water are detected, a monitoring current of the TDS sensor is related to a water temperature, and a current signal is interfered by a change in

the water temperature.

[0042] In the related art, when the TDS sensor probe is provided, a temperature probe of a temperature sensor and a probe of the TDS sensor probe are injection-molded together through a secondary injection molding. In this way, the water temperature is detected by the temperature sensor, and the TDS value is verified or calibrated, improving accuracy of the TDS sensor in water quality detection.

[0043] However, in the related art, the temperature sensor is injection-molded with the TDS sensor probe by the secondary injection molding, which has high processing difficulty, and is not conducive to processing of the TDS probe, with low processing and production efficiency.

[0044] FIG. 1 is a schematic structural view of an engagement between a packaging structure for a sensor probe and a temperature sensor probe according to an embodiment of the present disclosure, and FIG. 2 is a schematic structural view of a packaging structure for a sensor probe according to an embodiment of the present disclosure.

[0045] Referring to FIG. 1 and FIG. 2, in view of a technical problem existing in the related art, an embodiment of the present disclosure provides a packaging structure 10 for a sensor probe. The packaging structure 10 includes a probe 110 and an insulation housing 120.

[0046] In an exemplary embodiment of the present disclosure, in the embodiment of the present disclosure, the probe 110 may be a metal probe 110 made of metal materials or metal alloy materials such as stainless steel, titanium alloy, or aluminum foil alloy.

[0047] It should be noted that in the embodiment of the present disclosure, the number of probes 110 may be one, two, or more. The accompanying drawings in the specification of the embodiment of the present disclosure show a case where there are two probes 110 as a specific example.

[0048] In the embodiment of the present disclosure, an overall shape of the insulation housing 120 may be, for example, a cylindrical shape as shown in FIG. 1 and FIG. 2. In other examples, the overall shape of the insulation housing 120 may also be a triangular prism structure, a quadrangular prism structure, or other polygonal prism structures. Alternatively, in some examples, the shape of the insulation housing 120 may also be a cylinder-like shape, such as an elliptical cylindrical structure or a double elliptical cylindrical structure. In the embodiment of the present disclosure, the specific shape of the insulation housing 120 is not

limited.

[0049] In a specific arrangement, in the embodiment of the present disclosure, two probes 110 may be placed in an injection mold. It can be understood that when the two probes 110 are placed in the injection mold, the two probes 110 are placed side by side, and front ends of the two probes 110 may pass through to the outside of the injection mold.

[0050] It can be understood here that the front end of the probe 110 may refer to an end inserted into a to-be-monitored liquid during use. After the front ends of the two probes 110 pass through to the outside of the injection mold, the front ends of the two probes 110 may be set to be aligned/flush. Then, an injection molding is performed into the injection mold, and the insulation housing 120 is obtained through the one-step injection molding. In this way, it is ensured that the insulation housing 120 is formed at an outer periphery of each of the two probes 110 through the one-step injection molding. In addition, the two ends of the probe 110 are located outside the insulation housing 120.

[0051] In other examples of the present disclosure, it is also possible to directly perform the injection molding into the injection mold after the front ends of the two probes 110 pass through to the outside of the injection mold. After the injection molding is completed, the front ends of the two probes 110 are set to be aligned/flush through cutting, trimming, or grinding.

[0052] It can be understood that in other optional examples of the present disclosure, the front ends of the two probes 110 may not be aligned/flush. In other words, in the embodiment of the present disclosure, it is only necessary for the front ends of the two probes 110 to pass through to the outside of the insulation housing 120, be insertable into a to-be-monitored object (such as tap water), and form a current loop in the to-be-detected object.

[0053] In other embodiments of the present disclosure, it can be understood that a rear end of the probe 110 needs to be connected to a wire of the sensor probe. Therefore, in the embodiment of the present disclosure, the rear end of the probe 110 is also formed outside the insulation housing 120.

[0054] In this way, there is no need to perform pressure welding on the rear end of the probe 110 with the wire of the sensor probe, which saves a pressure welding process and improves production efficiency and a yield rate of the packaging structure 10 for the sensor probe.

[0055] FIG. 3 is a top view of a packaging structure 10 for a sensor probe according to an

embodiment of the present disclosure, and FIG. 4 is a cross-sectional view taken along line A-A in FIG. 3.

[0056] Referring to FIG. 3 and FIG. 4, in the embodiment of the present disclosure, when the insulation housing 120 is formed through the one-step injection molding, a through hole 121 is also formed on the insulation housing 120 by injection molding. The through hole 121 extends through two ends of the insulation housing 120. It should be noted that in the embodiment of the present disclosure, the two ends of the insulation housing 120 specifically refer to two protruding ends of the probe 110. In a specific example, an extending direction of the through hole 121 may be the same as an extending direction of the probe 110. For example, the extending direction of the through hole 121 is the same as, parallel to, or approximately parallel to the extending direction of the probe 110.

[0057] In specific use, referring to FIG. 1, the temperature sensor probe 20 may be inserted into the through hole 121, to verify or calibrate TDS measurement values at different temperatures, which can facilitate mounting of the temperature sensor probe 20 and improve accuracy of the TDS measurement values. It can be understood that in the embodiment of the present disclosure, after the temperature sensor probe 20 passes through the through hole 121, a front end of the temperature sensor probe 20 may extend to the outside of the insulation housing 120 (which may specifically refer to FIG. 7).

[0058] With the packaging structure 10 for the sensor probe according to the embodiment of the present disclosure, the insulation housing 120 is integrally formed around the probe 110 by the injection molding, and the through hole 121 extending through the two ends of the insulation housing 120 is formed at the insulation housing 120. In this way, on the one hand, packaging of the packaging structure 10 for the sensor probe can be completed with only a one-step injection molding, which saves the injection-molded process for sensor probe packaging and improves processing efficiency of the packaging structure 10 for the sensor probe. On the other hand, the through hole 121 is adapted to allow the temperature sensor probe 20 to be mounted in the through hole 121, or adapted to allow the temperature sensor probe 20 to pass through the through hole 121. In this way, the temperature sensor probe 20 does not need to be injection-molded together with the sensor probe during the injection molding, which can improve assembly efficiency of the temperature sensor probe 20, improve assembly efficiency

of the entire sensor probe, and save production costs. In addition, in some scenarios, there is no need to use the temperature sensor probe 20, which can save materials and costs.

[0059] Referring to FIG. 1, FIG. 3, and FIG. 4, in an optional example of the present disclosure, the insulation housing 120 has a receiving groove 122 formed at a rear end of the insulation housing 120 and in communication with the through hole 121. The receiving groove 122 is adapted to receive a rear end of the temperature sensor probe 20.

[0060] In the embodiment of the present disclosure, it should be noted that the rear end of the insulation housing 120 may refer to an end of the sensor probe that is not submerged in water when the sensor probe is inserted into the water for water quality detection. In some examples, the rear end of the insulation housing 120 may also be understood as an end of the sensor probe connected to a wire, a data line, or a signal line.

[0061] It can be understood that in the embodiment of the present disclosure, the receiving groove 122 may also be integrally formed when the insulation housing 120 is integrally formed by injection molding. A width of the receiving groove 122 may be equal to a diameter of the through hole 121. Alternatively, in some examples, the width of the receiving groove 122 is equal to an opening diameter of the through hole 121.

[0062] As an optional example, the receiving groove 122 may be arranged in a radial direction of the through hole 121. For example, the receiving groove 122 is located at two sides of the through hole 121 in the radial direction of the through hole 121.

[0063] In the embodiment of the present disclosure, the receiving groove 122 is formed at the rear end of the insulation housing 120 and is in communication with the through hole 121. In this way, after the temperature sensor probe 20 passes through the through hole 121, a wire, a transmission line, a signal line, or a data line that is located at the rear end of the temperature sensor probe 20 may be received in the receiving groove 122. As a specific example, referring to FIG. 1, in the embodiment of the present disclosure, the rear end of the temperature sensor probe 20 may be in an “L” shape, “Z” shape. Alternatively, in some examples, the rear end of the temperature sensor probe 20 may also be configured in a bent structure. By forming the receiving groove 122, a routing arrangement of the rear end of the temperature sensor probe 20 may be facilitated, and a space utilization rate is improved. In addition, the receiving groove 122 may also play a predetermined role in limiting and fixing the routing at the rear end of the

temperature sensor probe 20. In this way, mounting and fixing of the temperature sensor probe 20 can be facilitated, and mounting efficiency of the temperature sensor probe 20 is improved.

[0064] As a specific example of the present disclosure, referring to FIG. 1, FIG. 3, and FIG. 4, the receiving groove 122 is located at one of two sides of the through hole 121 in a radial direction. That is, in the embodiment of the present disclosure, the receiving groove 122 is only formed at one side of the through hole 121. For example, referring to FIG. 1 and 3, the receiving groove 122 may be formed at a right side of the through hole 121. It can be understood that in some examples, the receiving groove 122 may also be formed at a left side, an upper side, or a lower side of the through hole 121. In other words, in the embodiment of the present disclosure, the receiving groove 122 may be formed only at one side of the through hole 121. In this way, when the temperature sensor probe 20 passes through the through hole 121, an insertion direction of the temperature sensor probe 20 or a connection terminal 30 connected to the temperature sensor probe 20 may be conveniently determined. That is, by forming the receiving groove 122 at a side of the through hole 121 in the radial direction, the receiving groove 122 may also play a foolproof role, which can effectively improve mounting and connection efficiency of the temperature sensor probe 20 and the connection terminal 30.

[0065] FIG. 5 is a top view of an engagement between a packaging structure 10 for a sensor probe and a temperature sensor probe 20 according to an embodiment of the present disclosure.

[0066] Referring to FIG. 5, in an optional example of the present disclosure, a depth of the receiving groove 122 is equal to a radial dimension of the rear end of the temperature sensor probe 20, and/or a length of the receiving groove 122 is equal to a length dimension of the rear end of the temperature sensor probe.

[0067] In an exemplary embodiment of the present disclosure, in the embodiment of the present disclosure, the width of the receiving groove 122 may be the same as, similar to, or approximately the same as the radial dimension of the rear end of the temperature sensor probe 20. In a specific arrangement, the width of the receiving groove 122 may be set to be slightly smaller than the radial dimension of the rear end of the temperature sensor probe 20. That is, in the embodiment of the present disclosure, after the temperature sensor probe 20 passes through the through hole 121, the rear end of the temperature sensor probe 20 may be at least in contact with a side wall of the receiving groove 122, forming mutual friction of the rear end of the

temperature sensor probe 20 and the side wall of the receiving groove 122, which can effectively limit, position, or initially fix the temperature sensor probe 20 and improve mounting and assembly efficiency of the temperature sensor probe 20.

[0068] In addition, the depth of the receiving groove 122 may also be set to be the same as or approximately the same as the radial dimension of the rear end of the temperature sensor probe 20, which can ensure that a depth or position of the temperature sensor is consistent during each assembly and improve accuracy of TDS detection and calibration.

[0069] FIG. 6 is a schematic structural view of a connection between a temperature sensor probe 20 and a connection terminal 30 according to an embodiment of the present disclosure.

[0070] In an optional example of the present disclosure, the insulation housing 120 has an extending portion 123 at a rear end of the insulation housing 120. The extending portion 123 has an insertion opening 124. A rear end of the probe 110 extends into the insertion opening 124. The through hole 121 is in communication with the insertion opening 124. The insertion opening 124 is adapted for a connection of a connection terminal 30 in an inserting manner.

[0071] It can be understood that in the embodiment of the present disclosure, the extending portion 123 may also be integrally formed when the insulation housing 120 is integrally formed by injection molding. The insertion opening 124 (which may also be called an insertion groove or slot in some examples) extending in an axial direction of the insulation housing 120 may be formed at the extending portion 123. In some examples, it can also be understood that the extending portion 123 is formed by side walls surrounding the outer periphery of the probe 110, and the side walls enclose to form the insertion opening 124, which allows the rear end of the probe 110 to extend into the insertion opening 124.

[0072] Referring to FIG. 6, in the embodiment of the present disclosure, the connection terminal 30 may be a universal connection terminal. The temperature sensor probe 20 is connected to the connection terminal 30, and the connection terminal 30 may be specifically connected to connection wires such as a wire, a data line, a signal line, a communication line, or a transmission line. In some possible examples, the connection terminal 30 may also be connected with various types of connection wires among the wire, the data line, the signal line, the communication line, or the transmission line simultaneously. The connection wire is connected to a main control circuit board, to transmit data detected by the temperature sensor

probe 20 to the main control circuit board.

[0073] FIG. 7 is a cross-sectional view taken along line B-B in FIG. 5. FIG. 8 is another schematic structural view of an engagement between a packaging structure 10 for a sensor probe and a temperature sensor probe 20 according to an embodiment of the present disclosure.

5 **[0074]** In the embodiment of the present disclosure, the extending portion 123 is disposed at the rear end of the insulation housing 120, the insertion opening 124 is formed at the extending portion 123, and the rear end of the probe 110 extends into the insertion opening 124. In this way, referring to FIG. 7 and 8, when the temperature sensor probe 20 is mounted, the temperature sensor probe 20 can conveniently pass through the through hole 121, and then the connection terminal 30 is inserted into the insertion opening 124 to fix the temperature sensor probe 20. In addition, the connection terminal 30 may also be connected to the rear end of the probe 110, which can quickly realize a connection between the probe 110 and an external connection wire. In some cases where the temperature sensor probe 20 is not required, the connection terminal 30 may also be used to quickly realize the connection between the probe 10 110 and the external connection wire. In this way, there is no need to use an additional fixing structure to fix the temperature sensor probe 20, which can save the use of materials and avoid a waste of the materials. In addition, the connection between the probe 110 and the external connection wire can also be quickly and conveniently realized, improving universality of the packaging structure 10 for the sensor probe.

20 **[0075]** It can also be understood that when the packaging structure 10 for the sensor probe is manufactured, since the insertion opening 124 is formed at the extending portion 123, one set of molds and production lines can be used for a packaging structure 10 that needs to use the temperature sensor probe 20 and a packaging structure 10 that does not need to use the temperature sensor probe 20, which improves standardization of the production line and can 25 reduce the production cost.

[0076] In some optional examples of the embodiment of the present disclosure, referring to FIG. 2 to FIG. 4 and 8, the insertion opening 124 has a guide groove 125 formed at an inner wall of the insertion opening 124. The guide groove 125 extends in a depth direction of the insertion opening 124.

30 **[0077]** As an optional example of the present disclosure, the guide groove 125 may be

formed by being recessed into the inner wall of the insertion opening 124. That is, the guide groove 125 may not extend through an inner side wall and an outer side wall of the insertion opening 124. In other optional examples of the embodiment of the present disclosure, the guide groove 125 may also extend through the inner side wall and the outer side wall of the insertion opening 124. By forming the guide groove 125, guiding for the connection terminal 30 is facilitated, and insertion accuracy of the temperature sensor probe 20 is ensured.

[0078] It can be understood that, referring to FIG. 2 to FIG. 4 and FIG. 8, in the embodiment of the present disclosure, a plurality of guide grooves 125 may be formed and are arranged at intervals along the inner wall of the insertion opening 124.

[0079] Alternatively, in some examples, the plurality of guide grooves 125 may also be formed at two opposite side walls of the insertion opening 124.

[0080] In the embodiment of the present disclosure, by forming the guide groove 125, it is also possible to play a limiting role on the connection terminal 30, and improve connection stability between the connection terminal 30 and the insertion opening 124, ensuring stability and accuracy of the mounting of the temperature sensor probe 20. In addition, it is also possible to improve connection stability between the probe 110 and the external wire.

[0081] Continuing to refer to FIG. 2 and FIG. 8, in another optional example of the present disclosure, the insertion opening 124 has an avoiding opening 126 formed at a side wall of the insertion opening 124, and the extending portion 123 has a clamping wall 127 located in the avoiding opening 126 and adapted to clamp the connection terminal 30.

[0082] In the embodiment of the present disclosure, a side wall of the insertion opening 124 may be partially or completely removed to form the avoiding opening 126. In other embodiments of the present disclosure, in some examples, the avoiding opening 126 may also be formed during integral casting. In the embodiment of the present disclosure, the clamping wall 127 may be formed in the avoiding opening 126. In an exemplary embodiment of the present disclosure, a thickness of the clamping wall 127 may be smaller than a thickness of the side wall of the insertion opening 124. In this way, when the connection terminal 30 is inserted into the insertion opening 124, the clamping wall 127 can be deformed to some extent, to clamp the connection terminal 30 and facilitate the fixing of the connection terminal 30.

[0083] As a specific example, referring to FIG. 2 and FIG. 8, a snap 128 may be provided

on the clamping wall 127 and may clamp a clamping groove on the connection terminal 30.

[0084] The embodiments of the present disclosure further provide a sensor probe. The sensor probe includes the packaging structure 10 for the sensor probe according to any one of the foregoing embodiments of the present disclosure and a wire. The wire is connected to the probe 110 in the packaging structure 10 for the sensor probe by the connection terminal 30.

[0085] The embodiments of the present disclosure further provide a sensor. The sensor includes the sensor probe according to the foregoing embodiments of the present disclosure.

[0086] The embodiments of the present disclosure further provide a water purifier. The water purifier includes the sensor according to the foregoing embodiments of the present disclosure and a waterway board. The packaging structure 10 for the sensor probe of the sensor is connected to the waterway board and is at least partially located in a waterway.

[0087] Finally, it should be noted that each of the above embodiments is used only to illustrate, rather than to limit, the present disclosure. Although the present disclosure has been described in detail with reference to the foregoing embodiments, it is conceivable for those skilled in the art that various combinations, modifications, or equivalent substitutions made to the technical solutions of the present disclosure do not depart the spirit and scope of the technical solutions of the present disclosure, and shall fall within the scope of the present disclosure.

CLAIMS

What is claimed is:

1. A packaging structure for a sensor probe, comprising:

a probe; and

5 an insulation housing formed at an outer periphery of the probe through a one-step injection molding, wherein:

two ends of the probe are located outside the insulation housing; and

the insulation housing has a through hole extending through two ends of the insulation housing, the through hole being adapted to allow a temperature sensor probe to pass through
10 the through hole.

2. The packaging structure according to claim 1, wherein the insulation housing has a receiving groove formed at a rear end of the insulation housing, the receiving groove being in communication with the through hole and adapted to receive a rear end of the temperature sensor probe.

15 3. The packaging structure according to claim 2, wherein the receiving groove is located at one of two sides of the through hole in a radial direction.

4. The packaging structure according to claim 2 or 3, wherein:

a depth of the receiving groove is equal to a radial dimension of the rear end of the temperature sensor probe; and/or

20 a length of the receiving groove is equal to a length dimension of the rear end of the temperature sensor probe.

5. The packaging structure according to any one of claims 1 to 4, wherein the insulation housing has an extending portion at a rear end of the insulation housing, the extending portion having an insertion opening, wherein:

25 a rear end of the probe extends into the insertion opening, the through hole being in communication with the insertion opening; and

the insertion opening is adapted for a connection of a connection terminal in an inserting manner.

6. The packaging structure according to claim 5, wherein the insertion opening has a guide groove formed at an inner wall of the insertion opening, the guide groove extending in a depth direction of the insertion opening.

7. The packaging structure according to claim 5 or 6, wherein:

5 the insertion opening has an avoiding opening formed at a side wall of the insertion opening; and

the extending portion has a clamping wall located in the avoiding opening and adapted to clamp the connection terminal.

8. A sensor probe, comprising:

10 the packaging structure for the sensor probe according to any one of claims 1 to 7; and

a wire connected to the probe in the packaging structure for the sensor probe by a connection terminal.

9. A sensor, comprising the sensor probe according to claim 8.

10. A water purifier, comprising:

15 the sensor according to claim 9; and

a waterway board, wherein the packaging structure for the sensor probe of the sensor is connected to the waterway board and is at least partially located in a waterway.